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THORAX

February 2021

Thorax

AN INTERNATIONAL JOURNAL OF RESPIRATORY MEDICINE

British Thoracic Society Winter Meeting

Wednesday 17 to Friday 19 February 2021

Programme and Abstracts

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PROGRAMME

AND

ABSTRACTS

Thorax

British Thoracic Society
Winter Meeting

Wednesday 17 to Friday 19
February 2021
Programme and Abstracts

Approved by the Federation of the
Royal Colleges of Physicians of the UK
for 18 category 1 (external) credits
(6 credits per day).
Code: 133787

DAILY PROGRAMME

WEDNESDAY 17 FEBRUARY 2021

All Symposia, Guest Lectures, Journal Clubs and Spoken Sessions will be shown online live at the times below, and will be available to view via the relevant 'session type' tab online.

Poster presentations will be pre-recorded and available on demand each day and should be viewed prior to the Poster Discussion Q&A, which will be online live at the times below, all via the 'Poster Sessions' tab.

Time	Session Type		Session Title
7.00am – 6.00pm	Poster viewing on demand throughout the day with live discussions at the programmed times	P1-P11 P12-P24 P38-P51 P63-P75 P76-P88	Lessons from COVID-19 Lung cancer: treatment options and care pathways COPD: clinical science Primary care and paediatric asthma Virtually systematic: current interventions and digital delivery in pulmonary rehabilitation
7.45am – 8.00am	Symposium		Daily preview
8.00am – 8.30am	BTS Journal Club		New insights to chronic cough
8.30am – 10.00am	Symposium		Neutrophilic asthma
8.30am – 10.30am	Joint BTS/BALR symposium		Drug re-purposing and target refinement: part 1
8.45am – 10.15am	Symposium		Genomics and respiratory medicine – the 2020 update
8.45am – 10.15am	Symposium		The who, why and how of pulmonary vascular disease
9.00am – 10.30am	Symposium		BTS audit and quality improvement: making an impact
10.30am – 12.20pm	Symposium		Respiratory medicine's experience during and after COVID-19
10.45am – 12.15pm	Symposium		Transforming the management of tuberculosis
11.00am – 12.30pm	Symposium		Hot topics in occupational lung disease – from bench to bedside and beyond
11.00am – 12.35pm	Spoken Session	S25-S30	New insights in asthma care
11.00am – 1.00pm	Joint BTS/BALR symposium		Drug re-purposing and target refinement: part 2
1.00pm – 1.45pm	The BTS Clinical Guest Lecture		Health data science: what can it do for patient care?
2.00pm – 3.20pm	Spoken Session	S31-S35	Understanding lung infection: back to basics
2.00pm – 3.30pm	Joint BTS/BPRS symposium		Persistent wet cough: what's new with diagnostics?
2.00pm – 3.30pm	Symposium	T1-T6	BTS/BALR/BLF Early Career Investigator Awards
2.00pm – 3.35pm	Spoken Session	S13-S18	The secret life of CPETs
2.15pm – 3.45pm	Symposium		Pandemics: from first case to finding a cure
3.45pm – 5.20pm	Spoken Session	S1-S6	Predicting and stratifying COVID-19 using real world data
3.45pm – 5.20pm	Spoken Session	S7-S12	Predicting longer term outcomes in children
3.45pm – 5.20pm	Spoken Session	S19-S24	What's new in COPD?
3.45pm – 5.20pm	Spoken Session	S36-S41	A cut above … update in thoracic surgery
4.00pm – 5.35pm	Spoken Session	L1-L6	Late breaking abstracts: improving diagnostics and patient responses
5.30pm – 6.00pm	Symposium		Twilight highlights
6.00pm – 7.00pm	Poster Session Q&A	P1-P11	Lessons from COVID-19
6.00pm – 7.00pm	Poster Session Q&A	P12-P24	Lung cancer: treatment options and care pathways
6.00pm – 7.00pm	Poster Session Q&A	P38-P51	COPD: clinical science
6.00pm – 7.00pm	Poster Session Q&A	P63-P75	Primary care and paediatric asthma
6.00pm – 7.00pm	Poster Session Q&A	P76-P88	Virtually systematic: current interventions and digital delivery in pulmonary rehabilitation

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7.00am – 6.00pm	Poster viewing on demand throughout the day with live discussions at the programmed times	P25-P37 P52-P62 P89-P97 P98-P107 P108-P121 P122-P130 P131-P140 P141-P153 P154-P166	Service innovation for lung health during COVID-19 Ventilatory strategies in COVID-19 Monitoring and care delivery for children with respiratory disease Emerging evidence on the use of biological agents in severe asthma Diagnostic and management challenges within asthma services Chronic suppurative lung disease in adults and children The nuts and bolts of ILD clinical management Tools to improve delivery of respiratory care TB or not TB, is that the question?
7.45am – 8.00am	Symposium		Daily preview
8.00am – 8.30am	BTS Journal Club		The evidence for and against low emission zones
8.00am – 9.00am	Poster Session Q&A	P25-P37	Service innovation for lung health during COVID-19
8.00am – 9.00am	Poster Session Q&A	P98-P107	Emerging evidence on the use of biological agents in severe asthma
8.00am – 9.00am	Poster Session Q&A	P122-P130	Chronic suppurative lung disease in adults and children
8.00am – 9.00am	Poster Session Q&A	P141-P153	Tools to improve delivery of respiratory care
8.45am – 10.05am	Spoken Session	S75-S79	Basic science in ILD: what drives progression?
9.00am – 11.00am	Symposium		The design and delivery of clinical trials for COVID-19 during COVID-19
9.15am – 10.50am	Spoken Session	S42-S47	Trials and new concepts in pleural disease
9.15am – 10.35am	Spoken Session	S48-S52	Respiratory science: state of the art
9.15am – 10.50am	Spoken Session	S69-S74	An update in lung cancer patient stratification: from screening to pre-treatment assessments
11.00am – 12.45pm	Symposium		Plenary Scientific
11.15am – 12.20pm	Spoken Session	S59-S62	Challenges in pulmonary embolism
11.15am – 12.50pm	Spoken Session	S63-S68	Therapeutic advances in CF: today and tomorrow
11.00am – 1.00pm	Symposium		Rapid re-organisation: learnings from the service response of COVID-19
1.15pm – 2.00pm	The BTS President's Address (Guest Lecture tab)		The future
2.00pm – 3.30pm	Symposium		Alpha one antitrypsin deficiency: a footprint for COPD research
2.00pm – 3.30pm	Symposium		Highlights from *JAMA* and *Thorax*
2.00pm – 3.30pm	Symposium		ILD in 2020 – updates for the new decade
2.00pm – 3.30pm	Joint BTS/BPRS symposium		Breakthrough drugs: blinded by the light or seeing the bigger picture?
2.15pm – 3.45pm	Symposium		The care needs of COVID-19 survivors
3.45pm – 5.05pm	Spoken Session	S80-S84	Genetics insights to respiratory health

DAILY PROGRAMME

THURSDAY 18 FEBRUARY 2021

Time	Session Type		Session Title
3.45pm – 5.15pm	Symposium		Dilemmas in respiratory sleep medicine
3.45pm – 5.20pm	Spoken Session	L7-L12	Late breaking abstracts: COVID-19: impact on respiratory health
3.45pm – 5.45pm	Symposium		Pleural disease: cutting edge developments in science and clinical studies
4.20pm – 5.55pm	Spoken Session	S53-S58	The care needs of those recovering from COVID-19
5.30pm – 6.00pm	Symposium		Twilight highlights
6.00pm – 7.00pm	Poster Session Q&A	P52-P62	Ventilatory strategies in COVID-19
6.00pm – 7.00pm	Poster Session Q&A	P89-P97	Monitoring and care delivery for children with respiratory disease
6.00pm – 7.00pm	Poster Session Q&A	P108-P121	Diagnostic and management challenges within asthma services
6.00pm – 7.00pm	Poster Session Q&A	P131-P140	The nuts and bolts of ILD clinical management
6.00pm – 7.00pm	Poster Session Q&A	P154-P166	TB or not TB, is that the question?

DAILY PROGRAMME

FRIDAY 19 FEBRUARY 2021

All Symposia, Guest Lectures, Journal Clubs and Spoken Sessions will be shown online live at the times below, and will be available to view via the relevant 'session type' tab online.

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Time	Session Type		Session Title
7.00am – 5.30pm	Poster viewing on demand throughout the day with live discussions at the programmed times	P167-P178	The clinical experiences of post-COVID-19 recovery
		P179-P187	Cough and carbon
		P188-P197	Infection, co-infection and chronic infection
		P198-P211	Pleural disease: what are we doing and could we do better?
		P212-P225	The lung cancer diagnostic journey
		P226-P237	Time for sleep
		P238-P250	Respiratory physiology: planes, training and mobility
		P251-P258	COVID-19: contact, admission, recruitment and outcome
7.45am – 8.00am	Symposium		Daily preview
8.00am – 8.30am	BTS Journal Club		Respiratory disease in athletes
8.00am – 9.00am	Poster Session Q&A	P167-P178	The clinical experiences of post-COVID-19 recovery
8.00am – 9.00am	Poster Session Q&A	P179-P187	Cough and carbon
8.00am – 9.00am	Poster Session Q&A	P198-P211	Pleural disease: what are we doing and could we do better?
8.00am – 9.00am	Poster Session Q&A	P226-P237	Time for sleep
8.30am – 10.30am	Symposium		Africa's respiratory 'big five'
9.15am – 10.35am	Spoken Session	S85-S89	TB: still playing the long game
9.15am – 10.35am	Spoken Session	S90-S94	Pulmonary arterial hypertension: drugs, sox and cytokines
9.15am – 10.45am	Symposium		Critical illness: what, who, why and how to treat
9.15am – 11.15am	Symposium		Tick tock goes the respiratory clock
10.45am – 11.45am	Symposium		Analysis of respiratory patients' experience of living through COVID-19 from Asthma UK and the British Lung Foundation
10.45am – 12.20pm	Spoken Session	S105-S110	Lungs at work: occupation and lung health
11.00am – 12.30pm	Symposium		The future of pulmonary rehabilitation: enhancing the intervention and the delivery
11.00am – 12.30pm	Symposium		Detection, biology and management of early lung cancer
11.40am – 1.00pm	Spoken Session	S100-S104	Baby and bathwater: not all lung infections are COVID-19
12.00pm – 1.00pm	Poster Session Q&A	P251-P258	COVID-19: contact, admission, recruitment and outcome
1.00pm – 1.45pm	The BTS Grand Challenge Guest Lecture		Climate change and moves towards a sustainable community
1.45pm – 3.20pm	Spoken Session	S111-S116	Living with and caring for respiratory disease during COVID-19
1.45pm – 3.20pm	Spoken Session	S117-S122	An update in lung cancer: interventions and outcomes
1.45pm – 3.20pm	Spoken Session	S129-S134	Sleep and ventilation: masks … need help!
2.00pm – 3.30pm	Symposium		New insights to how physiology can help
2.00pm – 3.35pm	Spoken Session	S123-S128	Clinical considerations in ILD
3.30pm – 4.30pm	Poster Session Q&A	P188-P197	Infection, co-infection and chronic infection
3.30pm – 4.30pm	Poster Session Q&A	P212-P225	The lung cancer diagnostic journey
3.30pm – 4.30pm	Poster Session Q&A	P238-P250	Respiratory physiology: planes, training and mobility
3.45pm – 5.05pm	Spoken Session	S95-S99	Prognostic tools to treatments in COVID-19
3.45pm – 5.20pm	Spoken Session	S135-S140	Disease modulation within severe asthma
4.45pm – 5.15pm	Symposium		Twilight highlights

THE EXHIBITION

The British Thoracic Society gratefully acknowledges the financial support of the under listed companies at the Winter Meeting Online. None of them have had any input into the programme content or the planning of the conference.

Participants are encouraged to visit the online exhibition stands and to make contact with the company representatives. Their support has helped ensure that the Society has been able to organise a first-class online platform.

Albyn Medical
AstraZeneca
BD Medical
Chiesi Ltd
Fisher & Paykel Healthcare
GSK
Insmed
Janssen
Lincoln Medical
Medtronic
Novartis Pharma UK Ltd
Olympus
Orion Pharma
Sanofi Genzyme
Vathin Medical
Vertex Pharmaceuticals

Fictional patient, for illustrative purposes only

For patients with COPD on treatment with ICS/LABA who are symptomatic and at risk of an exacerbation.*[1]

*Has worsening of symptoms or has experienced an exacerbation treated with antibiotics or oral corticosteroid, in the past 12 months.

It's the things you do today that make a big difference to their tomorrows[1–3]

TRELEGY Ellipta provides your patients with superior improvements in lung function and health-related quality of life, and reduction in annual rate of exacerbations vs. Symbicort Turbohaler at 24 weeks.[1–3]

TRELEGY ▼ ELLIPTA
fluticasone furoate/umeclidinium/vilanterol

TRELEGY Ellipta (FF/UMEC/VI) 92/55/22 mcg OD is indicated for maintenance treatment in adult patients with moderate to severe COPD who are not adequately treated by a combination of an ICS and a LABA or a combination of a LAMA and a LABA[1]

Today. Tomorrow. TRELEGY.

Find out more here:

www.trelegy.co.uk
or request a visit from a GSK representative

TRELEGY Ellipta is generally well tolerated. Common adverse reactions include: pneumonia, upper respiratory tract infection, bronchitis, pharyngitis, rhinitis, sinusitis, influenza, nasopharyngitis, candidiasis of mouth and throat, urinary tract infection, headache, cough, oropharyngeal pain, constipation, arthralgia, back pain[1]

This is not an exhaustive list. Please consult the Summary of Product Characteristics for a full list of adverse reactions before prescribing.

FF, fluticasone furoate; ICS, inhaled corticosteroid; LABA, long-acting β_2-agonist; LAMA, long-acting muscarinic antagonist; OD, once-daily; UMEC, umeclidinium, VI, vilanterol

References: 1. TRELEGY Ellipta SmPC. **2.** Lipson DA *et al. Am J Respir Crit Care Med* 2017; 196:438–446. **3.** Lipson DA *et al. N Engl J Med* 2018; 378:1671–1680.

Trelegy ▼ Ellipta (fluticasone furoate/umeclidinium/vilanterol) Prescribing Information

Please consult the full Summary of Product Characteristics (SmPC) before prescribing. **Trelegy Ellipta (fluticasone furoate/umeclidinium/vilanterol [as trifenatate]) inhalation powder.** Each single inhalation of fluticasone furoate (FF) 100 micrograms (mcg), umeclidinium (UMEC) 62.5 mcg and vilanterol (VI) 25 mcg provides a delivered dose of 92 mcg FF, 55 mcg UMEC and 22 mcg VI. **Indications:** Maintenance treatment in adult patients with moderate to severe COPD who are not adequately treated by a combination of an inhaled corticosteroid (ICS) and a long-acting β_2-agonist (LABA) or a combination of a long-acting β_2-agonist and a long-acting muscarinic antagonist. **Dosage and administration:** One inhalation once daily. **Contraindications:** Hypersensitivity to the active substances or to any of the excipients (lactose monohydrate & magnesium stearate). **Precautions:** Paradoxical bronchospasm, unstable or life-threatening cardiovascular disease or heart rhythm abnormalities, convulsive disorders or thyrotoxicosis, pulmonary tuberculosis or patients with chronic or untreated infections, narrow-angle glaucoma, urinary retention, hypokalaemia, patients predisposed to low levels of serum potassium, diabetes mellitus. In patients with moderate to severe hepatic impairment patients should be monitored for systemic corticosteroid-related adverse reactions. Eye symptoms such as blurred vision may be due to underlying serious conditions such as cataract, glaucoma or central serous chorioretinopathy (CSCR); consider referral to ophthalmologist. Increased incidence of pneumonia has been observed in patients with COPD receiving inhaled corticosteroids. *Risk factors for pneumonia include:* current smokers, older age, patients with a low body mass index and severe COPD. Patients with rare hereditary problems of galactose intolerance, the Lapp lactase deficiency or glucose-galactose malabsorption should not take Trelegy. *Acute symptoms:* Not for acute symptoms, use short-acting inhaled bronchodilator. Warn patients to seek medical advice if short-acting inhaled bronchodilator use increases. Therapy should not be abruptly stopped without physician supervision due to risk of symptom recurrence. *Systemic effects:* Systemic effects of ICSs may occur, particularly at high doses for long periods, but much less likely than with oral corticosteroids. **Interactions with other medicinal products:** Caution should be exercised during concurrent use of non-selective and selective beta-blockers and when co-administering with strong CYP3A4 inhibitors (e.g. ketoconazole, ritonavir, cobicistat-containing products), hypokalaemic treatments or non-potassium-sparing diuretics. Co-administration with other long-acting muscarinic antagonists or long acting β_2-adrenergic agonists has not been studied and is not recommended. **Pregnancy and breast-feeding:** Experience limited. Balance risks against benefits. **Side effects:** *Common (≥1/100 to <1/10):* pneumonia, upper respiratory tract infection, bronchitis, pharyngitis, rhinitis, sinusitis, influenza, nasopharyngitis, candidiasis of mouth and throat, urinary tract infection, headache, cough, oropharyngeal pain, constipation, arthralgia, back pain. Other important side effects include: *Uncommon (≥1/1,000 to <1/100):* supraventricular tachyarrhythmia, tachycardia, atrial fibrillation; *Rare (≥1/10,000 to <1/1,000):* hypersensitivity reactions, including anaphylaxis, angioedema, urticaria, and rash; *Frequency not known (cannot be estimated from the available data):* vision blurred; See SmPC for other adverse reactions. **Legal category:** POM. **Presentation and Basic NHS cost:** *Trelegy Ellipta 92/55/22 mcg* - £44.50. 1 inhaler x 30 doses. **Marketing authorisation (MA) number:** 92/55/22 mcg 1x30 doses [EU/1/17/1236/002]; **MA holder:** GlaxoSmithKline Trading Services Limited, 12 Riverwalk, Citywest Business Campus, Dublin 24, Ireland. **Last date of revision:** October 2020. **CL reference:** PI-6650. Trademarks are owned by or licensed to the GSK group of companies. 2020 GSK group of companies. All rights reserved. Trelegy Ellipta was developed in collaboration with Innoviva Inc.

Adverse events should be reported. Reporting forms and information can be found at https://yellowcard.mhra.gov.uk/ or search for MHRA Yellowcard in the Google Play or Apple App Store. Adverse events should also be reported to GlaxoSmithKline on 0800 221 441.

TRELEGY Ellipta was developed in collaboration with INNOVIVA

PM-GB-FVU-JRNA-200003 (v2.0) | October 2020

7.00am – 6.00pm
POSTER SESSIONS

Posters and pre-recorded poster presentations are available on demand throughout the day and should be viewed prior to joining the live Q&A sessions at the programmed times

P1-P11
Lessons from COVID-19
Live Q&A will take place from 6.00pm to 7.00pm

P12-P24
Lung cancer: treatment options and care pathways
Live Q&A will take place from 6.00pm to 7.00pm

P38-P51
COPD: clinical science
Live Q&A will take place from 6.00pm – 7.00pm

P63-P75
Primary care and paediatric asthma
Live Q&A will take place from 6.00pm to 7.00pm

P76-P88
Virtually systematic: current interventions and digital delivery in pulmonary rehabilitation
Live Q&A will take place from 6.00pm to 7.00pm

7.45am – 8.00am
SYMPOSIUM
DAILY PREVIEW

Professor Adam Hill (Edinburgh) takes a look forward to the day ahead and highlights sessions and speakers of particular interest.

8.00am – 8.30am
BTS JOURNAL CLUB
New insights to chronic cough

Professor Jaclyn Smith (Manchester)

Learning objectives:

By the end of the session participants will:

- be able to critically appraise the published studies discussed in this session and will be able to discuss the rationale of the methodological approaches and analysis used;

- develop an appreciation of how the findings from the studies discussed can be applied to clinical practice.

The relevant references will be available on the BTS website so that participants may review the papers in advance.

8.30am – 10.00am
SYMPOSIUM
NEUTROPHILIC ASTHMA

Chaired by: Professor Adel Mansur (Birmingham) and Dr Aashish Vyas (Preston)

8.30am	Airways microbial dysbiosis in asthma Professor Jodie Simpson (Newcastle, Australia)
8.55am	Beyond T2 asthma: what's left? Professor Salman Siddiqui (Leicester)
9.20am	How can we answer multiple research questions most efficiently in asthma: the challenges and difficulties of platform trials Professor Louise Brown (London)
9.45am	Discussion and questions

Learning objectives:

This symposium will focus on unmet needs in severe asthma research in the advent of monoclonal therapies. Areas covered will include the optimisation of biologic use in clinical care, digital innovation, the role of microbiome modification, targeting airway mucus, targeting the airway smooth muscle and the longer-term ambition of disease modification. The symposium will also explore the premise that the current drug development pathway is costly and unsustainable whilst there are many new therapies emerging that require testing in clinical trials. To improve efficiency and speed up evaluation of drugs, novel trial designs are now being increasingly used to answer multiple research questions within one overarching trial infrastructure and various design features will be presented, including experience of running novel adaptive platform trials in cancer.

8.30am – 10.30am
JOINT BTS/BALR SYMPOSIUM
DRUG RE-PURPOSING AND TARGET REFINEMENT: PART 1

Chaired by: Dr Alison John (Nottingham) and Dr Chris Scotton (Exeter)

8.30am	The pharma perspective – what can academia do (and do we need any new drugs)? Professor Maria Belvisi (London/ AstraZeneca)

9.00am Therapeutic potential of statins in pneumonia
Professor Elizabeth Sapey (Birmingham)

9.30am Mono, dual, and now triple therapy for cystic fibrosis: a multi-pronged approach to targeting CFTR
Dr Mark Higgins (Vertex Pharmaceuticals)

10.00am Discussion and questions

Learning objectives:

1) To gain an appreciation of how academic researchers can work with the pharmaceutical industry to progress drug development.

2) To receive an update on the evaluation of statin administration for lung disease and infection, with a focus on neutrophil biology.

3) To understand how a combined drug approach to a single target can improve efficacy, using cystic fibrosis as an exemplar.

8.45am – 10.15am
SYMPOSIUM

GENOMICS AND RESPIRATORY MEDICINE: THE 2020 UPDATE

Chaired by: Professor Dame Sue Hill (NHS England) and Professor Claire Shovlin (London)

8.45am Precision-medicine: genomics and respiratory drugs
Professor Sir Munir Pirmohamed (Liverpool)

9.10am Sorting chaff from grain: genomics and the respiratory molecular lab
Dr Deborah Morris-Rosendahl (London)

9.35am Functional genomics and genetics in studying airway disease: an industry perspective
Dr Karen Affleck (GSK)

10.00am Discussion and questions

Learning objectives

1) To review how genomic variants dictate the efficacy and adverse event profiles of commonly used drugs in respiratory medicine.

2) To discuss how complex sequence analyses are harvested and interpreted.

3) To obtain an industry perspective on functional genomics in airway disease.

8.45am – 10.15am
SYMPOSIUM

THE WHO, WHY AND HOW OF PULMONARY VASCULAR DISEASE

Chaired by: Dr Robin Condliffe (Sheffield) and Dr Rachel Davies (London)

8.45am Translating insights from signalling and human genetics into therapy for pulmonary arterial hypertension
Professor Paul Yu (Boston)

9.10am Genetic associations in acute and chronic pulmonary embolism
Dr Mark Toshner (Cambridge)

9.35am Follow-up of patients after acute PE: who and how?
Dr Karen Sheares (Cambridge)

10.00am Discussion and questions

Learning objectives:

1) To review how translational and genetic insights are informing new therapeutic strategies for pulmonary hypertension.

2) To learn of genetic susceptibility to thromboembolic disease.

3) To discuss aftercare following thromboembolic disease.

9.00am – 10.30am
SYMPOSIUM

BTS AUDIT AND QUALITY IMPROVEMENT: MAKING AN IMPACT

Chaired by: Professor Michael Steiner (Leicester)

9.00am Introduction
Professor Michael Steiner (Leicester)

9.05am Community acquired pneumonia: variation in clinical outcomes across UK hospitals, a first look
Dr Hannah Lawrence (Nottingham) and Professor Wei Shen Lim (Nottingham)

9.25am	BTS ILD Registry – data shared to improve care
	Professor Andrew Wilson (Norwich)
9.40am	BTS MDR-TB Clinical Advice Service – supporting clinicians and patients across the UK
	Professor Onn Min Kon (London)
9.55am	BTS QI: past, present and future
	Professor Michael Steiner (Leicester)
10.10am	Discussion and questions

Learning objectives:

Those attending this session will receive an update on work across the Society's key quality improvement activities, with an emphasis on how we can strengthen our impact. The session will outline how our data and outputs can be used to support the delivery of the most appropriate standards of care for respiratory patients.

10.30am – 12.20pm
SYMPOSIUM

RESPIRATORY MEDICINE'S EXPERIENCE DURING AND AFTER COVID-19

Chaired by: Professor Jon Bennett (Leicester)

10.30am	COVID-19: the respiratory lessons learned (the GIRFT survey)
	Dr Martin Allen (Stoke on Trent)
10.50am	Re-mobilising and what happened next: the BTS post-COVID-19 survey
	Dr David Connell (Dundee)
11.10am	The evolving response to COVID-19
	Dr Susan Hopkins (London)
11.50am	Discussion and questions

Learning objectives:

Respiratory healthcare professionals were often at the forefront of COVID-19 care, alongside our colleagues in critical care medicine. In this session we will compare and learn from the experiences of our specialty across the UK and the planning that was required to respond to the first wave of the pandemic.

10.45am – 12.15pm
SYMPOSIUM

TRANSFORMING THE MANAGEMENT OF TUBERCULOSIS

Chaired by: Dr Rizwan Ahmed (Bolton) and Dr Hazel Morrison (Bristol)

10.45am	Diagnostic performance of whole genome sequencing for predicting drug resistance in *Mycobacterium tuberculosis*
	Dr Francesc Coll (London)
11.10am	New drugs for a pan-TB treatment
	Dr David Barros-Aguirre (GSK)
11.35am	Vaccination against tuberculosis
	Professor Robert Wilkinson (London/ Cape Town)
12.00pm	Discussion and questions

Learning objectives:

1) Understand how cutting edge-technology is being applied to clinical practice and the management of TB.

2) Gain insight about the new drugs and new approaches to treatment of TB.

3) Be updated on new, relevant information regarding immunisation to prevent TB.

11.00am – 12.30pm
SYMPOSIUM

HOT TOPICS IN OCCUPATIONAL LUNG DISEASE: FROM BENCH TO BEDSIDE AND BEYOND

Chaired by: Dr Chris Barber (Sheffield) and Dr Hayley Mainman (Newcastle upon Tyne)

11.00am	The future of diagnostic tests in occupational lung disease – in vitro or in vivo?
	Dr Johanna Feary (London)
11.25am	Preventing future outbreaks of artificial stone silicosis – the importance of ultrafines and cytokines
	Professor Elizabeth Fireman (Tel Aviv)

11.50am Understanding the toxicity of nano-particles – past, present and future risks

Dr Rodger Duffin (Edinburgh)

12.15pm Discussion and questions

Learning objectives:

1) To review the evidence-base relating to new and emerging diagnostic techniques in allergic occupational lung disease, both in vitro and in vivo, focussing on how basic science might improve diagnostic accuracy and assist in confirming causation.

2) To increase awareness of the latest translational research in this new and emerging global health problem – artificial stone silicosis. This research has led to better understanding of the relationship between particle size, cytokine responses and clinical outcomes in artificial stone workers, aiming to prevent this disease in the future.

3) To better understand how "bench side" research can be used to predict the potential toxicity of occupational and environmental nanoparticle exposures.

11.00am – 12.35pm
SPOKEN SESSION: S25 – S30

New insights in asthma care

Chaired by: Dr Hannah Durrington (Manchester) and Dr Aashish Vyas (Preston)

11.05am **S25**

The impact of COVID-19 on the UK severe asthma population

SJ Smith, J Busby, LG Heaney, PE Pfeffer, DJ Jackson, JF Yang, SJ Fowler, A Menzies-Gow, E Idris, T Brown, R Gore, S Faruqi, P Dennison, JW Dodd, S Doe, AH Mansur, R Priyadarshi, J Holmes, A Hearn, H Al-Aqqad, L Loewenthal, A Cooper, L Fox, M Selvan, MG Crooks, A Thompson, D Higbee, M Fawdon, V Nathwani, L Holmes, R Chaudhuri

11.15am **S26**

An assessment of short-acting β2-agonist (SABA) use and subsequent greenhouse gas (GHG) emissions in five European countries and the consequence of their potential overuse for asthma in the UK

AJK Wilkinson, A Menzies-Gow, M Sawyer, JP Bell, Y Xu, N Budgen, T Harrison

11.25am **S27**

Effect of high ICS dose fixed combination extrafine Beclomethasone Dipropionate, Formoterol Fumarate, and Glycopyrronium (BDP/FF/G) pMDI on asthma control in patients with persistent airflow limitation (PAL): a post-hoc analysis of the TRIGGER study

D Singh, JC Virchow, WG Canonica, G Georges, A Vele, E Nudo, P Guller, A Papi

11.35am **S28**

Can we diagnose asthma using standard non-aerosol generating procedures?

S Drake, S Roberts, L Willmore, L Lowe, G Kerry, SJ Fowler

11.45am **S29**

Longitudinal systemic corticosteroid utilisation for asthma and other diseases in the United Kingdom from 1990 to 2018: a population-based cohort analysis

J Voorham, AN Menzies-Gow, TN Tran, V Carter, JS Smolen, A Bourdin, J Chapaneri, B Emmanuel, DJ Jackson, DB Price

11.55am **S30**

Adrenal insufficiency in adult severe asthma patients on long-term inhaled, oral or intramuscular corticosteroids: a systematic review

P Aspin, Y Khan, D Allen, R Niven, S Fowler, G Tavernier

12.05pm Discussion and questions

11.00am – 1.00pm
JOINT BTS/BALR SYMPOSIUM

DRUG RE-PURPOSING AND TARGET REFINEMENT: PART 2

Chaired by: Dr Bettina Schock (Belfast) and Dr Karl Staples (Southampton)

11.00am CAR T cell immunotherapy for malignant pleural mesothelioma

Dr John Maher (London)

11.30am From psoriasis to asthma: patient endotyping highlights the potential of targeting IL-17

Professor Ratko Djukanovic (Southampton)

12.00pm Targeting metabolism in IPF using metformin

Professor Victor Thannickal (Alabama)

12.30pm Discussion and questions

Learning objectives:

1) To discover the latest advances in CAR-T cell development as a precisely-targeted immunotherapy for solid organ tumours, including mesothelioma.

2) To discuss the benefits of patient endotyping for a personalised medicine approach in asthma.

3) To understand how fundamental research on metabolic processes in IPF led to re-purposing of the commonly used diabetes drug, metformin.

1.00pm – 1.45pm

THE BTS CLINICAL GUEST LECTURE

HEALTH DATA SCIENCE: WHAT CAN IT DO FOR PATIENT CARE?

Professor Andrew Morris CBE (Director, Health Data Research UK)

Introduced by: Professor Jonathan Bennett (Leicester)

Learning objectives:

There is an increasing appreciation that real world data may enable us to better understand real patient disease and design, test and implement better services for patients. HDR-UK has been established to help unlock the potential of NHS data and in this talk, delegates will gain insights into the potential benefits, challenges and current progress in this journey to learn more using NHS data.

2.00pm – 3.20pm

SPOKEN SESSION: S31 – S35

Understanding lung infection: back to basics

Chaired by: Dr Karl Staples (Cambridge) and Dr Bettina Schock (Belfast)

2.05pm **S31**

The novel coronavirus SARS-CoV-2 binds RGD integrins and upregulates avb3 integrins in COVID-19 infected lungs

J Calver, C Joseph, AE John, L Organ, H Fainberg, J Porte, S Mukhopadhyay, L Barton, E Stroberg, E Duval, M Copin, J Poissy, K Steinestrel, AL Tatler, G Jenkins

2.15pm **S32 – Withdrawn**

2.25pm **S33**

TMPRSS2 variation and genomic susceptibility to SARS-CoV-2 infection

S Wang, CL Shovlin

2.35pm **S34**

Influenza virus infection induces prolonged transcriptional and functional alterations in lung stromal cells

JC Worrell, G Finney, C Hansell, J Singh Nijjar, F Morton, J Cole, MKL MacLeod

2.45pm **S35**

Human mesenchymal stromal cells modulate cytokine expression and enhance intracellular clearance of Mycobacterium avium in primary macrophages

TD Shaw, AD Krasnodembskaya, GN Schroeder, CM O'Kane

2.55pm Discussion and questions

2.00pm – 3.30pm

JOINT BTS/BPRS SYMPOSIUM

PERSISTENT WET COUGH: WHAT'S NEW WITH DIAGNOSTICS?

Chaired by: Professor Jane Lucas (Southampton) and Dr Anirban Maitra (Manchester)

2.00pm ERS Chronic Cough Guidelines

Dr Angela Zacharasiewicz (Vienna)

2.25pm Artificial intelligence in PCD diagnosis – all it's cracked up to be?

Dr Claire Hogg (London)

2.50pm Sputum induction for lower airway infection: what can we learn from cystic fibrosis?

Dr Julian Forton (Cardiff)

3.15pm Discussion and questions

Learning objectives:

1) To revise when and how to investigate children with chronic wet cough.

2) To gain an appreciation of advances in complex diagnostics, using PCD and imaging techniques as an exemplar.

3) To learn from the field of CF, how the microbiology of children with chronic wet cough might best be investigated non-invasively.

2.00pm – 3.30pm
PRIZE SYMPOSIUM: T1 – T6
BTS/BALR/BLF EARLY CAREER INVESTIGATOR AWARDS

Chaired by: Dr Graham Burns (Newcastle upon Tyne)

Judged by: Professor James Chalmers (Dundee), Professor Elizabeth Sapey (Birmingham) and Dr Chris Scotton (Exeter)

2.00pm **T1**

Defective metabolism drives macrophage dysfunction in COPD

EM Ryan, P Coelho, J Cole, MA Bewley, R Budd, J Callahan, JB McCafferty, D Singh, DH Dockrell, SR Walmsley, MK Whyte

2.10pm **T2**

Effect of testosterone and sex hormone-binding globulin on lung function: a Mendelian randomisation study

DA van der Plaat, A Lenoir, S Dharmage, F Gómez Real, D Jarvis, C Minelli, B Leynaert

2.20pm **T3**

Occupational exposures and respiratory health: the Burden of Obstructive Lung Disease (BOLD) study results

J Ratanachina, AFS Amaral, S De Matteis, P Cullinan, P Burney

2.30pm **T4**

The respiratory microbiome and metabolome in idiopathic pulmonary fibrosis

R Invernizzi, N Giallourou, JR Swann, RJ Hewitt, P Ghai, BG Wu, Y Li, LN Segal, AJ Byrne, TM Maher, CM Lloyd, PL Molyneaux

2.40pm **T5**

Toll-like receptor 2 has a tumour suppressor function in non-small cell lung cancer via regulation of the senescence associated secretory phenotype

FR Millar, A Pennycuick, M Muir, P Hari, A Quintanilla, M Frame, SM Janes, S Wilkinson, JC Acosta

2.50pm **T6**

Sputum proteomics identifies mechanisms of disease severity and treatment response in bronchiectasis

HR Keir, A Shoemark, ML Crichton, A Dicker, J Pollock, A Giam, A Cassidy, C Fong, S Finch, E Furrie, G Suarez-Cuartin, TC Fardon, G Einarsson, JS Elborn, S Aliberti, O Sibila, J Huang, JD Chalmers

3.00pm Discussion and questions

2.00pm – 3.35pm
SPOKEN SESSION: S13 – S18
The secret life of CPETs

Chaired by: Dr Owen Tomlinson (Exeter) and Dr James Hull (London)

2.05pm **S13**

Effect of portable non-invasive ventilation on thoracoabdominal volume regulation in recovery from intermittent exercise in patients with COPD

NC Chynkiamis, DM Megaritis, JM Manifield, IL Loizou, CA Alexiou, AL LoMauro, NDL Lane, SCB Bourke, IV Vogiatzis

2.15pm **S14**

The utility of the oxygen uptake efficiency plateau as a submaximal exercise biomarker in interstitial lung disease

OW Tomlinson, L Markham, RL Wollerton, BA Knight, A Duckworth, CA Williams, M Gibbons, CJ Scotton

2.25pm **S15**

Practicality and clinical utility of cardiopulmonary exercise testing to investigate complex breathlessness in severe asthma

A Vigus

2.35pm **S16**

An RER of 1.05 should not be used to determine maximal effort during CPET

M Thomas, J Hull, K Sylvester

2.45pm **S17**

Cardio-respiratory exercise, incremental shuttle walk test and thoracoscore in predicting outcomes following thoracotomy

S Apetroaei, N Clayton, D Dowding

2.55pm **S18**

Neuromuscular electrical stimulation in advanced idiopathic pulmonary fibrosis (IPF): a randomised placebo-controlled feasibility trial

CM Nolan, S Patel, RE Barker, JA Walsh, O Polgar, M Maddocks, WD-C Man

3.05pm Discussion and questions

2.15pm – 3.45pm
SYMPOSIUM

PANDEMICS: FROM FIRST CASE TO FINDING A CURE

Chaired by: Dr David Connell (Dundee) and Dr Anika Singanayagam (London)

2.15pm Modelling a pandemic – lessons from COVID-19

Professor Peter Openshaw (London)

2.40pm Host-genetic variation and disease severity

Professor Lisa Gralinski (North Carolina)

3.05pm The realities of setting up and running clinical trials in midst of outbreaks

Professor Calum Semple (Liverpool)

3.30pm Discussion and questions

Learning objectives:

1) To understand how we can predict the impact and spread of a pandemic to aid with plans for containment and testing.

2) To understand why the impact of the illness can vary between individuals and how we might predict host response.

3) To gain insight into how clinical trials can be designed, set up and recruited at pace during outbreaks such as COVID-19.

3.45pm – 5.20pm
SPOKEN SESSION: S1 – S6

Predicting and stratifying COVID-19 using real world data

Chaired by: Professor Jennifer Quint (London) and Dr Luke Hodgson (Southampton)

3.50pm **S1**

Estimates of mortality rate and survival time to predict trends in future deaths for patients in England with laboratory-confirmed COVID-19: a modelling study

C Hillyar, A Nibber, CE Jones, MG Jones

4.00pm **S2**

Vigorous exercise is protective against COVID-19: cross-sectional analysis of baseline data from 9,817 UK adults participating in the COVIDENCE UK study

H Holt, A Martineau, M Greenig, M Talaei, S Rajpoo, A Kayyale, S El Rifai, P Lloyd, S Shaheen

4.10pm **S3**

Comparisons in early and late presentation to hospital in COVID-19 patients

N Sheard, S Williams, B Stuart, H Phan, F Borca, H Burke, A Freeman

4.20pm **S4**

Clinical characteristics, mortality and short term follow up of patients admitted with COVID-19 in a North East London NHS Trust: a retrospective analysis

E Gosal, E Dadey, G Patel, T O'Neill, EW Skyllberg, CJ Calderwood, DO Cheng, A Ainley

4.30pm **S5**

COVID-19 mortality review: current smokers are under-represented and cannot be explained by ethnicity alone

A Hewitt, L Michael, Z Queen, L Baines, B Griffin, N Karunararatne, G Littler, R Mohindra, S Mulholland, B Griffiths, J Brackston, A Sciacca, S Ozokwelu, T Gorsuch, M Kingston, SO Brij

4.40pm **S6**

Frailty and mortality in COVID-19 patients: a retrospective analysis of a large series in a single-centre

H Grover, K Brewin, S Gillespie, J Steer, SC Bourke

4.50pm Discussion and questions

3.45pm – 5.20pm
SPOKEN SESSION: S7 – S12

Predicting longer term outcomes in children

Chaired by: Dr Paul McNally (Dublin) and Dr Julian Forton (Cardiff)

3.50pm **S7**

Associations between a smoke-free homes intervention and childhood admissions to hospital – an interrupted time series analysis of whole population data

S Turner, D Mackay, S Dick, S Semple, JP Pell

4.00pm **S8**

Is MBL deficiency associated with adverse respiratory consequences at five year follow-up?

M Ramphul, A Poghosyan, J Afzaal, E McDermott, L Cliffe, JM Bhatt

4.10pm **S9**

Presentations associated with adverse outcomes in a cohort of children referred for chronic cough

I Ghosh, H Beckett, C Beardsmore, V Rai, M Narayanan

4.20pm **S10**

Predictors of unfavourable treatment outcome for adolescents and young adults with tuberculosis in Brazil: a national retrospective cohort study

L Chenciner, K Sidney Annerstedt, J Pescarini, T Wingfield

4.30pm **S11**

Long-term follow-up of the phase 1 START trial of onasemnogene abeparvovec gene therapy in spinal muscular atrophy type 1

JR Mendell, R Shell, KJ Lehman, M McColly, LP Lowes, LN Alfano, NF Miller, MA Iammarino, K Church, I Kausar, SP Reyna, M Meriggioli, A Kleyn, S Al-Zaidy

4.40pm **S12**

Onasemnogene abeparvovec gene therapy for spinal muscular atrophy type 1: phase 3 study (STR1VE-US)

RS Finkel, AM Connolly, BT Darras, ST Iannaccone, NL Kuntz, LDM Peña, EC Smith, CA Chiriboga, TO Crawford, PB Shieh, JM Kwon, CM Zaidman, M Schultz, I Kausar, D Chand, S Tauscher-Wisniewski, H Ouyang, TA Macek, JR Mendell

4.50pm Discussion and questions

3.45pm – 5.20pm
SPOKEN SESSION: S19 – S24

What's new in COPD?

Chaired by: Professor Charlotte Bolton (Nottingham) and Professor Alice Turner (Birmingham)

3.50pm **S19**

Screening for undiagnosed COPD: a comparison of screening questionnaire test performance in two countries; Breathe Well Brazil and China

AP Dickens, W Salibe-Filho, Z Pan, S Martins, C Chi, P Adab, AA Albuquerque Neto, KK Cheng, A Enocson, S Jowett, X Kong, A Sitch, LVA Sousa, R Stelmach, RE Jordan

4.00pm **S20***

Dual Energy Computerised Tomography (DECT) quantifies lobar iodine distribution in patients with severe emphysema

N Jeyin, N Hopkinson, S Kemp, P Shah, S Desai, S Jordan, S Begum, A Mani, C Ridge

4.10pm **S21**

RECEIVER trial interim analysis: reduction in COPD admissions with digitally supported self-management

A Taylor, D Lowe, J Anderson, G McDowell, S Burns, P McGinness, C Carlin

Wednesday 17 February 2021

4.20pm **S22**

Rate of severe COPD exacerbations with Budesonide/Glycopyrronium/Formoterol Fumarate Dihydrate Metered Dose Inhaler (BGF MDI) versus dual therapies: a post-hoc subgroup analysis of the ETHOS trial

GT Ferguson, KF Rabe, FJ Martinez, D Singh, R Trivedi, P Darken, M Jenkins, M Aurivillius, P Dorinsky

4.30pm **S23**

Impact of coexisting dementia on inpatient outcomes for patients admitted with a COPD exacerbation: analysis of a US national inpatient sample database

A Gupta, TM McKeever, JP Hutchinson, CE Bolton

4.40pm **S24**

Predicting poor outcome at six months following exacerbations of COPD requiring assisted ventilation

ND Lane, TM Hartley, J Steer, MW Elliott, M Sovani, HJ Curtis, ER Fuller, PB Murphy, D Shrikrishna, KE Lewis, NR Ward, CD Turnbull, N Hart, SC Bourke

4.50pm Discussion and questions

***S20 – BTS Medical Student Award Highly Commended**

3.45pm – 5.20pm
SPOKEN SESSION: S36 – S41

A cut above … update in thoracic surgery

Chaired by: Miss Sofina Begum (London) and Mr Hazem Fallouh (Birmingham)

3.50pm **S36**

Multimodality treatment of resectable stage III (N2) lung cancer: is pneumonectomy out of the game?

M Shoeib, SS Avtaar Singh, R James, J Butler, N Kostoulas, M Asif, A Kirk, R Bilancia

4.00pm **S37**

The use of diagnostic robotic assisted segmentectomy accelerates the lung cancer pathway

M Lee, R Baranowski, G Sotiropoulos, R McDermott, N Jayasekera, S Lloyd-Owen, S Ainkaran, T O'Shaughnessy, D Waller

4.10pm **S38**

Can we predict who will suffer a spontaneous pneumothorax after endobronchial lung volume reduction?

M Lee, R Baranowski, D Waller

4.20pm **S39**

Rigid bronchoscopy safety and outcome – a single centre retrospective analysis

A Sharma, N Barnes, BP Madden

4.30pm **S40**

Journey of patients with lung cancer: does South East Scotland's cardiothoracic service meet the NHS Scotland standard for waiting times?

LE Clark, JL Whiteley, V Zamvar

4.40pm **S41**

Litigation in respiratory medicine

NM Read, M Allen

4.50pm Discussion and questions

4.00pm – 5.35pm
SPOKEN SESSION: L1 – L6

Late breaking abstracts: improving diagnostics and patient responses

Chaired by: Dr Amanda Goodwin (Nottingham) and Dr Nazia Chaudhuri (Manchester)

See abstract pages and the online programme for details

5.30pm – 6.00pm
SYMPOSIUM

TWILIGHT HIGHLIGHTS

A live discussion and review of the day's sessions and highlights not to miss online after the conference, with Professor Elizabeth Sapey (Birmingham), Professor John Hurst (London), Dr Philip Molyneaux (London) and Dr Chris Scotton (Exeter)

6.00pm – 7.00pm
POSTER SESSION LIVE Q&A: P1 – P11

Lessons from COVID-19

Chaired by: Dr Nicola Roberts (Glasgow) and Dr Frances Grudzinska (Birmingham)

Please review the pre-recorded presentations and posters before joining this Q&A session

P1 The adoption of digital technology in respiratory education in response to the COVID-19 global pandemic

A Burzić, L George, H Mahmood, P Smith, HX Tan, DP Smith

P2 COVID-19 SPACES initiative reduces staff exposure while maintaining the quality of care

A Poudel, Y Essalmi, K Desai, A Rehal, R Russell, S Shaw, J Bennett

P3 The Yellow Lanyard Team – Gloucestershire Foundation NHS Trust COVID-19 initiative

E Kerslake, H Iftikhar, R Kaminski, S Alaee

P4 Use of the 1-minute sit to stand test in patients presenting with suspected COVID-19 to assess need for hospital admission

AL Key, R Abraham, L Jones, J Rathore, N Maryanji, E Wilson, W Sawicki, PP Walker, G Jones, DG Wooton

P5 A multi-professional education and improvement process to guide clinical practice in the developing management of COVID-19: the trainee experience

EM Ward, B Doherty, J McEwen, S Finch, K Cobb, S Sproule, C Morrice, K Hill, W Anderson, M Doyle, DW Connell, B Mooka

P6 Postgraduate medical education and staff wellbeing during the COVID-19 pandemic: what have we learned?

B Vijayakumar, C McBrien, A Hare

P7 How has COVID-19 impacted on the wellbeing and training of junior doctors?

AK Sundaram, J Salem, L Hawkins, J Gates, YE Ong

P8 Ventilation in COVID-19: lessons to be learnt?

S Assadullah, H Mitchell, A Draper, Y Myint, H Ghani, A Navarra, R Mogal, A Barlow, R Vancheeswaran

P9 Do persistent chest radiograph changes correlate with ongoing respiratory symptoms in patients recovering from COVID-19 pneumonia?

NG Jain, A Saigal, SB Naidu, AJ Shah, SE Brill, H Jarvis, J Barnett, S Hare, JR Hurst, M Lipman, S Mandal

P10 Chest radiograph features of the COVID-19 infection: comparison of the initial and follow-up changes

E Cox, Y Abed El Khaleq, W Storrar, L Bond

P11 COVID 19: utility of plain chest radiograph scoring system to predict disease severity and outcomes

S Iftikhar, F Chaudhry, S Youssef, Z Noori, L Diwakar, S Raza, M Allen, M Haris

6.00pm – 7.00pm

POSTER SESSION LIVE Q&A: P12 – P24

Lung cancer: treatment options and care pathways

Chaired by: Dr Patricia Glynn (Birmingham) and Dr Diane Parry (Cardiff)

Please review the pre-recorded presentations and posters before joining this Q&A session

P12 The impact of the COVID-19 pandemic on Brighton and Sussex University Hospital's (BSUH) lung cancer service; more of the same or a need to change?

H Basheer, C Rowe, T Bicknell, N Colburn, S Doffman

P13 Mapping the lung cancer pathway

MH Lawson, S Underhill, M Chauhan, S Robinson, V Melesi, S Miller, P Beckett

P14 Lung cancer referrals: the impact of the coronavirus pandemic

CL Anderson, W Black, R Randhawa, V Daripally, A Saleem, M Bhattacharya, V Patil

P15 Lung cancer multidisciplinary meeting – does the presence of emphysema on CT imaging correlate with obstructive spirometry or transfer factor?

C Rutherford, C Bradley, N Magee

P16 Patient-assessed versus physician-assessed performance status in lung cancer care – do differing opinions affect patient outcomes?

M Dickson, K Foster, C Murphy, N Elkaram, E Fuller

P17 The SUMMIT study: results processing time

P Verghese, C Horst, J Dickson, S Tisi, H Hall, A Mullin, R Sarpong, J Teague, L Farrelly, K Gyertson, V Bowyer, C Levermore, A Nair, A Devaraj, A Hackshaw, S Janes

ARIKAYCE LIPOSOMAL 590 MG NEBULISER DISPERSION (AMIKACIN SULFATE) - ABBREVIATED PRESCRIBING INFORMATION (API)

Prescribers are recommended to consult the summary of product characteristics before prescribing. **Presentations** Each vial contains amikacin sulfate equivalent to 590 mg amikacin in a liposomal formulation. The mean delivered dose per vial is approximately 312 mg of amikacin. **Indication** Arikayce is indicated for the treatment of non-tuberculous mycobacterial (NTM) lung infections caused by Mycobacterium avium Complex (MAC) in adults with limited treatment options who do not have cystic fibrosis. Consideration should be given to official guidance on the appropriate use of antibacterial agents. **Posology and method of administration** *Arikayce recommended dosage:* one vial (590 mg) administered once daily, by oral inhalation. *Duration of treatment:* Treatment with Arikayce, as part of a combination antibacterial regimen, should be continued for 12 months after sputum culture conversion. Treatment should not continue beyond a maximum of 6 months if sputum culture conversion (SCC) has not been confirmed by then. The maximum duration of treatment should not exceed 18 months. *Hepatic/renal impairment:* Arikayce has not been studied in patients with hepatic or renal impairment. No dose adjustments based on hepatic impairment are required since amikacin is not hepatically metabolised. Use is contraindicated in severe renal impairment. *Paediatrics:* The safety and efficacy of Arikayce in paediatric patients below 18 years of age have not been established. No data are available. *Missed doses:* If a daily dose of Arikayce is missed, the next dose should be administered the next day. A double dose should not be given to make up for the missed dose. *Method of administration:* Arikayce is for inhalation use only. Arikayce must only be used with the Lamira Nebuliser System (nebuliser handset, aerosol head and controller). It must not be administered by any other route or using any other type of inhalation delivery system. Refer to full SmPC for full information on posology and administration. **Contraindications** Hypersensitivity to active substance, to any aminoglycoside antibacterial agent, or any excipient. Hypersensitivity to soya. Co-administration with any aminoglycoside administered via any route of administration. Severe renal impairment. **Special warnings and precautions for use** *Anaphylaxis and hypersensitivity reactions:* Serious and potentially life-threatening hypersensitivity reactions, including anaphylaxis, have been reported in patients taking inhaled liposomal amikacin. *Allergic alveolitis:* Allergic alveolitis and pneumonitis have been reported with the use of inhaled liposomal amikacin. *Bronchospasm:* Bronchospasm has been reported with the use of inhaled liposomal amikacin. *Exacerbation of underlying pulmonary disease:* In clinical trials, exacerbation of underlying pulmonary disease (chronic obstructive pulmonary disease, infective exacerbation of chronic obstructive pulmonary disease, infective exacerbation of bronchiectasis) was reported with a higher frequency in patients treated with inhaled liposomal amikacin. *Ototoxicity:* In clinical trials, ototoxicity, (including deafness, dizziness, presyncope, tinnitus, and vertigo) was reported with a higher frequency in patients treated with inhaled liposomal amikacin. *Nephrotoxicity:* Nephrotoxicity was reported in clinical trials in patients treated with inhaled liposomal amikacin. Renal function should be monitored periodically during treatment in all patients and frequent monitoring is advised in patients with pre-existing renal dysfunction. *Neuromuscular blockade:* In clinical trials, neuromuscular disorders (reported as muscle weakness, neuropathy peripheral and balance disorder) have been reported with inhaled liposomal amikacin. Use of inhaled liposomal amikacin in patients with myasthenia gravis is not recommended. Refer to full SmPC for further information on warnings and precuations. **Interaction with other medicinal products and other forms of interaction** No clinical drug interaction studies have been conducted with inhaled liposomal amikacin. Co-administration of inhaled liposomal amikacin with any aminoglycoside administered by any route is contraindicated. Co-administration with any other medicinal product affecting auditory function, vestibular function or renal function (including diuretics) is not recommended. Concurrent and/or sequential use of inhaled liposomal amikacin is not recommended with other medicinal products with neurotoxic, nephrotoxic or ototoxic potential that can enhance aminoglycoside toxicity (e.g. diuretic compounds such as ethacrynic acid, furosemide or intravenous mannitol). Refer to full SmPC for further information on interactions. **Fertility, pregnancy and lactation** Human data on use during pregnancy or lactation are not available. No fertility studies were conducted with inhaled liposomal amikacin. **Effects on ability to drive and use machines** Amikacin has minor influence on the ability to drive and use machines. The administration of inhaled liposomal amikacin can cause dizziness and other vestibular disturbances. **Undesirable effects** The most commonly reported respiratory adverse reactions were dysphonia, cough, dyspnoea, haemoptysis, oropharyngeal pain, and bronchospasm. Other commonly reported non-respiratory adverse reactions included fatigue, diarrhoea, infective exacerbation of bronchiectasis, and nausea. Most common serious adverse reactions included Chronic Obstructive Pulmonary Disease (COPD), haemoptysis, and infective exacerbation of bronchiectasis. Refer to full SmPC for further information on undesirable effects. **Overdose** Adverse reactions specifically associated with overdose of inhaled liposomal amikacin have not been identified in clinical trials. Overdose in subjects with pre-existing impaired renal function, deafness or vestibular disturbance, or impaired neuromuscular transmission may develop worsening of the pre-existing disorder. Refer to full SmPC for further information on overdose.

Legal Category: Prescription only medicine.

Pack quantities and costs: Pack-size of 28 vials. The carton also contains the Lamira Nebuliser Handset and 4 aerosol heads. £9,513 / €10,570 per pack

Marketing Authorisation Holder: Insmed Netherlands B.V., Stadsplateau 7, 3521 AZ Utrecht, Netherlands

Marketing Authorisation Number: EU/1/20/1469/001

Ireland: Adverse events should be reported. Healthcare professionals are asked to report any adverse events involving ARIKAYCE LIPOSOMAL 590 MG via HPRA Pharmacovigilance, website: www.hpra.ie. Adverse events should also be reported via safety@insmed.com

United Kingdom: Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard or search for MHRA Yellow Card in Google play or Apple App store. Adverse events should also be reported via safety@insmed.com

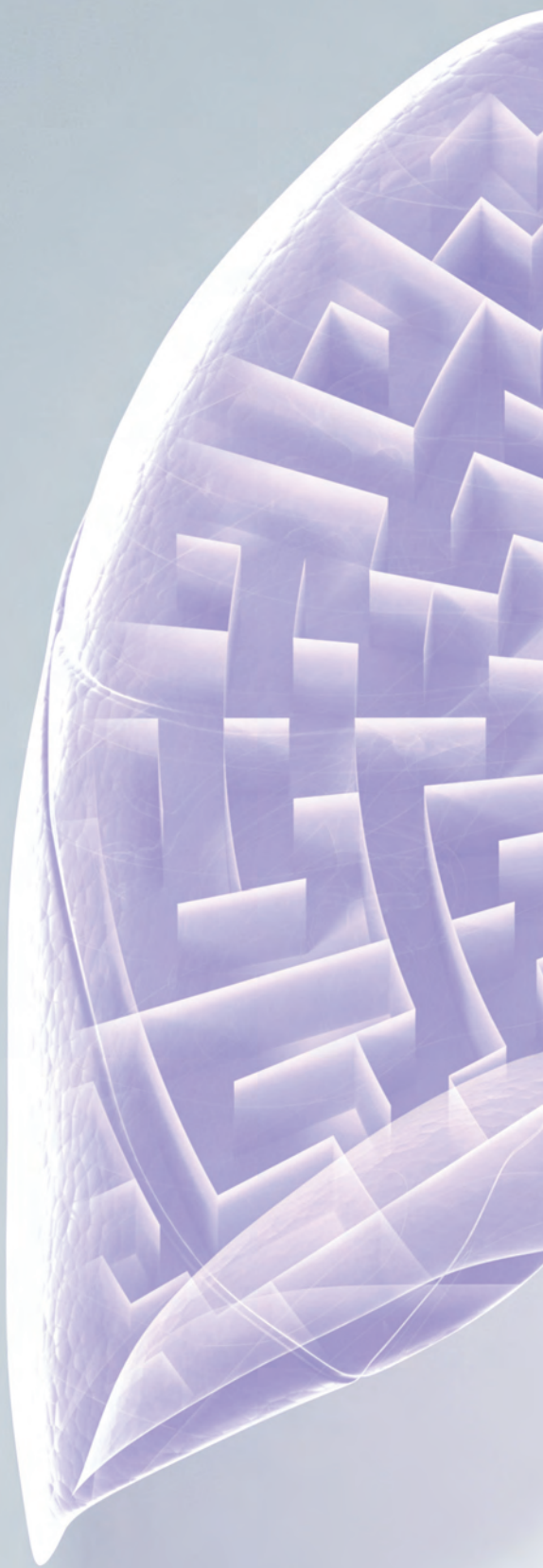
Date of last revision of the API text Oct 2020 Ref 3903

† ARIKAYCE liposomal is an add-on therapy to oral guideline-based therapy (GBT); failure on oral GBT is defined as failure to culture convert despite ≥6 months GBT with three oral antibiotics.

* In the CONVERT study in patients who failed to convert after ≥6 months oral GBT, 29.0% (65/224) patients on ARIKAYCE liposomal + oral GBT vs 8.9% (10/112) patients treated with oral GBT alone achieved culture conversion (P<0.0001).[5] Sustained culture conversion for those on ARIKAYCE liposomal + oral GBT was seen 18.3% (41/224) patients vs 2.7% (3/112) on oral GBT alone.[7] Durable conversion when all therapy was discontinued was observed after 3 months in 16.1% (36/224) ARIKAYCE liposomal + oral GBT patients vs 0% oral GBT alone.[5]

References: 1. Malinin V et al. Antimicrob Agents Chemother 2016;60:6540-49; **2.** Zhang J et al. Front Microbiol 2018;9:915; **3.** Daley CL et al. Eur Respir J 2020;56:2000535; **4.** Griffith DE et al. Am J Respir Crit Care Med 2018;198:1559-69; **5.** ARIKAYCE liposomal. Summary of Product Characteristics October 2020; last accessed October 2020 **6.** Olivier KN et al. Am J Respir Crit Care Med 2017; 195:814-23; **7.** Insmed Incorporated, Bridgewater, NJ, USA. Data on file, CONVERT study final CSR 2019

 Date of Preparation: October 2020. PP-ARIK-UK-00025



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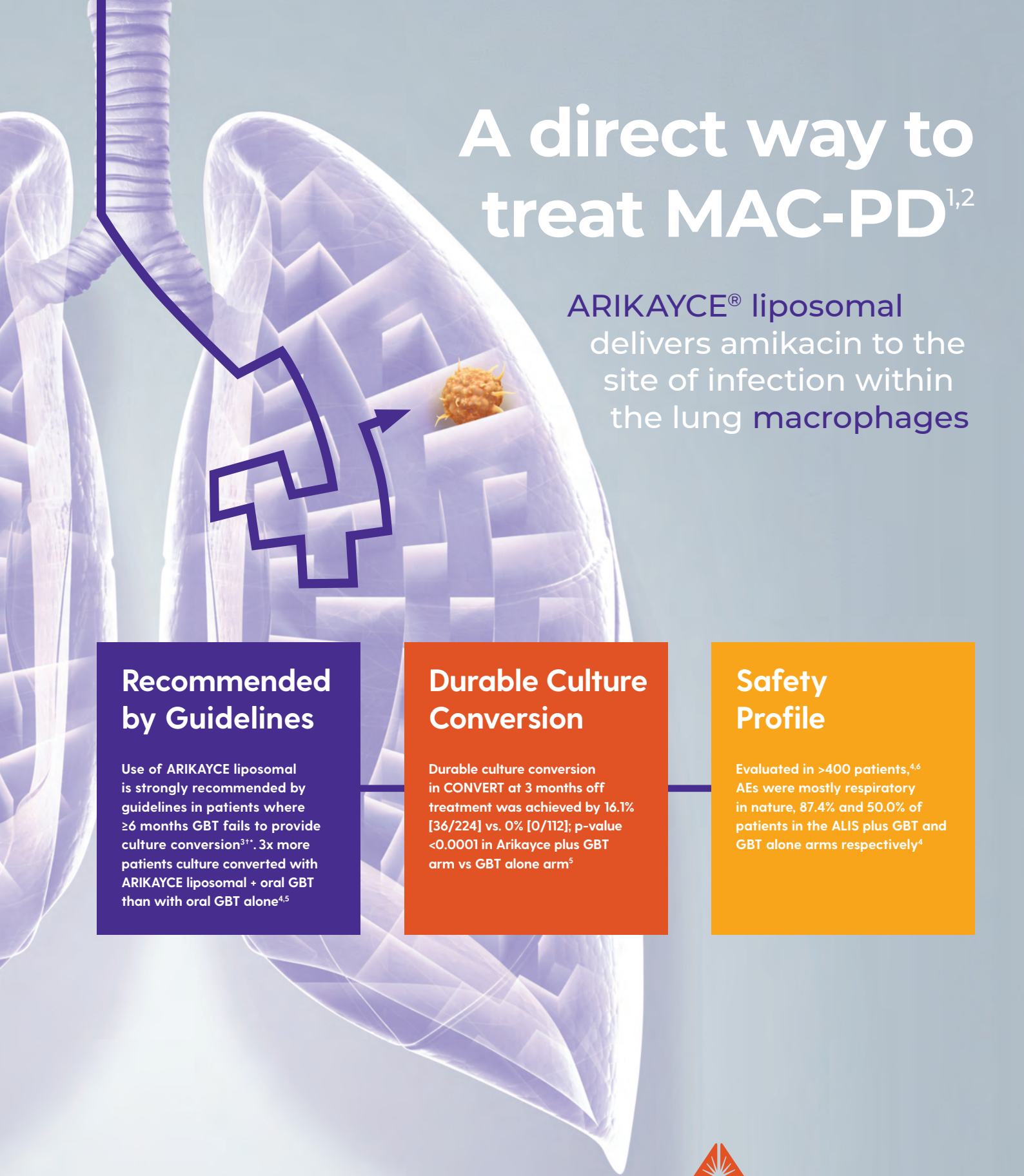

A direct way to treat MAC-PD[1,2]

ARIKAYCE® liposomal delivers amikacin to the site of infection within the lung macrophages

Recommended by Guidelines

Use of ARIKAYCE liposomal is strongly recommended by guidelines in patients where ≥6 months GBT fails to provide culture conversion[3†*]. 3x more patients culture converted with ARIKAYCE liposomal + oral GBT than with oral GBT alone[4,5]

Durable Culture Conversion

Durable culture conversion in CONVERT at 3 months off treatment was achieved by 16.1% [36/224] vs. 0% [0/112]; p-value <0.0001 in Arikayce plus GBT arm vs GBT alone arm[5]

Safety Profile

Evaluated in >400 patients,[4,6] AEs were mostly respiratory in nature, 87.4% and 50.0% of patients in the ALIS plus GBT and GBT alone arms respectively[4]

ARIKAYCE liposomal is indicated for the treatment of non-tuberculous mycobacterial (NTM) lung infections caused by *Mycobacterium avium* Complex (MAC) in adults with limited treatment options who do not have cystic fibrosis. ARIKAYCE liposomal treatment should be initiated and managed by physicians experienced in the treatment of non-tuberculous lung disease due to *Mycobacterium avium* Complex.

ARIKAYCE® LIPOSOMAL
amikacin sulphate
590 mg nebuliser dispersion

P18 The SUMMIT study: uptake from re-invitation

JL Dickson, SL Quaife, C Horst, S Tisi, H Hall, P Verghese, A Mullin, R Sarpong, J Teague, L Farrelly, V Bowyer, K Gyertson, H Pervez, F Bojang, C Levermore, T Anastasiadis, K Sennett, N Navani, A Hackshaw, SM Janes

P19 Does concomitant interstitial lung disease (ILD) influence survival following chemotherapy for advanced lung cancer?

A Alkarn, F Conway, L Thomson, J MacLay, G Chalmers

P20 The impact of PD1 and PDL1 immunotherapy on NSCLC outcomes beyond overall survival: a systematic review

SS Kanabar, A Tiwari, V Soran, P Balendran, AM Turner

P21 Impact of an interventional service on the management of central airways obstruction

D Crowle, M Herriott, A Marchbank, C Daneshvar

P22 Clinical characteristics contributing to lung cancer recurrence following surgical resection

K Sivabalah, E Nasr, B Vernon, W Choon Kon Yune, R Wang, S Mehdi

P23 Do patients commencing multi-modality treatment for stage III-N2 lung cancer complete their treatment?

C Campbell, R Salman, J Morris, H Awni, E Paramasivam, MPT Kennedy

P24 Efficacy of age adjusted d dimers in excluding pulmonary embolism in patients with cancer

A Zahid, R Khan, A Baloch, S Shahzad, MB Ganaie

6.00pm – 7.00pm

POSTER SESSION LIVE Q&A: P38 – P51

COPD: clinical science

Chaired by: Professor Alice Turner (Birmingham) and Dr Binita Kane (Manchester)

Please review the pre-recorded presentations and posters before joining this Q&A session

P38 Is a database search and clinical triage using the GP record feasible as a targeted case-finding approach for identification of undiagnosed COPD in primary care?

K Kearley, T Nichols, A Maycock, L Minden, M Ramos, J Riley, M Hardinge

P39 Self-management interventions for people with chronic obstructive pulmonary disease (COPD). Do they work? A systematic review and meta-analysis

K Marshall, J Newham, J Presseau, S Russell, O Ogunbayo, P Netts, B Hanratty, E Kaner

P40 Shared decision making in pulmonary rehabilitation: a qualitative needs assessment

AC Barradell, M Larkin, SJ Singh

P41 Pulmonary rehabilitation can improve cognitive impairment in COPD patients

G France, MW Orme, NJ Greening, MC Steiner, SJ Singh

P42 Effect of structured review of COPD patients referred for pulmonary rehabilitation; does this improve access to lung volume reduction?

J Clarke, J Congleton

P43 Diaphragmatic ultrasound as a marker of clinical status and early readmissions after acute exacerbations of COPD: preliminary results from a prospective cohort study

AK Kharat, MG Girard, BPD Dubé

P44 Ease of completion of prognostic tools for one-year mortality in patients hospitalised with an exacerbation of COPD

SM Gillespie, H Elder, A Prasad, ND Lane, C Echevarria, KE Frew, SC Bourke

P45 Mortality risk by exacerbation state in the ETHOS study

E de Nigris, K Rhodes, M Ouwens, M Jenkins

P46 Effect of extra-fine triple therapy (BDP/FF/GB) pressurized metered-dose inhaler (pMDI) on patient reported outcomes in East Asian patients with COPD: TRIVERSYTI study interim analysis results

S Baldi, J Zheng, L Zhao, H Lin, L Kwan-Ho, A Papi, F Grapin, A Guasconi, G Georges

P47 Dry powder inhaler resistance does not limit their use among patients with COPD

R Jõgi, V Vartiainen, M Vahteristo, L Mattila, A Takala, S Lähelmä, A Lindqvist

P48 Bioplausible insights captured from COPD patients: aligning biometric data with exacerbation events and therapy changes using a commercial wearable device

A Taylor, D Lowe, I Bryson, L Murray, P McGinness, C Carlin

P49 Using a home oxygen review proforma in COPD care to increase safety and address gaps in high value interventions

MJ Humphries, A Vaghela, N Nakrani, LJ Restrick

P50 Piloting a standardised approach to management of patients with previously undiagnosed COPD presenting with exacerbations

A Kilkelly, A Dewar, L McDonnell, L Crawfurd

P51 The consideration of frailty significantly impacts clinical decision making in acutely-ill chronic respiratory inpatients

V Kumar, S Shotton, A Ali, D Jayaram, S Bax

6.00pm – 7.00pm

POSTER SESSION LIVE Q&A: P63-P75

Primary care and paediatric asthma

Chaired by: Professor Stephen Fowler (Manchester) and Professor Adel Mansur (Birmingham)

Please review the pre-recorded presentations and posters before joining this Q&A session

P63 Clinical spectrum of patients assessed in a primary care respiratory diagnostic hub; informing referral criteria

AH Mansur, B Cooper, M Cotter, C Watson, S Hussain, Y Khan, N Sarwar, R Ramachandram

P64 Application of NICE guidance to diagnose asthma in a primary care diagnostic hub; a case for guideline revision

AH Mansur, B Cooper, R Ramachandram, M Cotter, C Watson, N Sarwar, Y Khan

P65 Relationship between asthma medication adherence, asthma control and lung function parameters in children managed in UK primary care

R Paracha, D Lo, E Gaillard

P66 The effectiveness of a primary care respiratory diagnostic hub in inner city cosmopolitan population

AH Mansur, B Cooper, M Cotter, C Watson, N Sarwar, Y Khan, S Hussain, R Ramachandram

P67 How community pharmacists can engage, empower and educate adult asthma patients by using data driven care

C Heading, U Shah, S Bancroft, D Attar-Zadeh

P68 Scope to improve asthma outcomes in primary care: outcomes of a community outreach programme

S Faruqi, JL Thompson, H Cummings, N Jackson, K Watkins, MG Crooks

P69 Peak flow variability in asthma diagnosis – which is the best threshold to use in practice?

RJ Tudge, L Willmore, S Drake, A Simpson

P70 The utility of assessing between-visit variability of spirometry in asthma diagnosis

R Wang, J Mitchell, L Willmore, R Tudge, S Drake, L Healy, A Simpson, C Murray, SJ Fowler

P71 Peak inspiratory flow measured at different inhaler resistances in patients with asthma

J Haughney, I Pertsovskaya, AJ Lee, E McKnight, M O'Driscoll, O Usmani

P72 Diagnosis of asthma in children – are they able to complete the required tests?

S Drake, J Mitchell, L Healy, G Kerry, R Wang, M Porter, A Simpson, C Murray

P73 A clinical prediction model to support the diagnosis of asthma in children and young people in primary care

L Daines, LJ Bonnett, H Tibble, A Boyd, SW Turner, S Lewis, A Sheikh, H Pinnock

P74 Raised neutrophil elastase activity in asthma supports a neutrophilic-asthma endotype

H Crisford, K Fakes, PR Newby, E Sapey, RA Stockley, JL Simpson

P75 The role of generalised anxiety in asthma outcomes: experiential avoidance and self-efficacy as mediators

L Michalova, DJ Dhasmana, R Chaudhuri, JF Yang, SJ Smith, PG Morris

Wednesday 17 February 2021

6.00pm – 7.00pm
POSTER SESSION LIVE Q&A: P76 – P88

Virtually systematic: current interventions and digital delivery in pulmonary rehabilitation

Chaired by: Dr Claire Nolan (London) and Dr Linzy Houchen-Wolloff (Leicester)

Please review the pre-recorded presentations and posters before joining this Q&A session

P76 Which functional outcome measures can we use as a surrogate for exercise capacity during remote cardiopulmonary rehabilitation assessments? A rapid narrative review

L Houchen-Wolloff, E Daynes, A Watt, E Chaplin, N Gardiner, S Singh

P77 Psychological factors influencing patient activation in health-coaching programmes in chronic obstructive pulmonary disease. A systematic review and narrative synthesis

C Edwards

P78 Small airways response to bronchodilator in asthma and COPD: a systematic review

M Almeshari, NY Alobaidi, E Sapey, OS Usmani

P79 Inspiratory muscle training for improving inspiratory muscle strength and functional capacity in older adults: a systematic review and meta-analysis

J Manifield, A Winnard, E Hume, M Armstrong, K Baker, N Adams, I Vogiatzis, G Barry

P80 Internet usage and intervention delivery preferences in the pulmonary rehabilitation population

D Coope, E Daynes, J Zatloukal, E Chaplin, S Singh

P81 The feasibility and acceptability of delivering virtual pulmonary rehabilitation during the COVID-19 pandemic

A Lound, BC De Luca, ZA Kennedy, MC Maguire, E Goodman, K Shavji, RL Spurway, L Hinkins, V Padmanaban, V Mak, SL Elkin

P82 Comparison of virtual pulmonary rehabilitation platforms use in a regional network

L Morton-Holtham, E Wells, B Sharma, J Congleton, J Bott

P83 Pulmonary rehabilitation in the COVID-19 era: service model redesign, patient's digital access and choice

S Lorenzo, K Brannelly, J Woolford, K Sawado, C Murray, L Holt, M Buxton

P84 Experiences and usability of a digital pulmonary rehabilitation programme: SPACE for COPD®

E Chaplin, S Chantrell, N Gardiner, SJ Singh

P85 Virtual pulmonary rehabilitation: a worthwhile intervention?

ER Jackson, V Bulbeck, T Evans

P86 Physiotherapist-led online exercise session for people with cystic fibrosis (CF) during the COVID-19 pandemic: a service evaluation

CM Milligan, K Pollard, R Watson, C Webster, D Beecham, G Spolentini, D Peckham

P87 Factors influencing patient attendance of a pulmonary rehabilitation program in resource-scarce settings

R Altaf, A Majidulla, S Saeed

P88 Enhancing the performance of elite athletes, are we missing something in the air?

E Hoodless, S Hawkes, T FitzMaurice, R Cooper, J Somauroo, D Wat

7.00am – 6.00pm
POSTER SESSIONS

Posters and pre-recorded poster presentations are available on demand throughout the day and should be viewed prior to joining the live Q&A sessions at the programmed times

P25-P37
Service innovation for lung health during COVID-19
Live Q&A will take place from 8.00am – 9.00am

P52-P62
Ventilatory strategies in COVID-19
Live Q&A will take place from 6.00pm to 7.00pm

P89-P97
Monitoring and care delivery for children with respiratory disease
Live Q&A will take place from 6.00pm – 7.00pm

P98-P107
Emerging evidence on the use of biological agents in severe asthma
Live Q&A will take place from 8.00am – 9.00am

P108-P121
Diagnostic and management challenges within asthma services
Live Q&A will take place from 6.00pm – 7.00pm

P122-P130
Chronic suppurative lung disease in adults and children
Live Q&A will take place from 8.00am – 9.00am

P131-P140
The nuts and bolts of ILD clinical management
Live Q&A will take place from 6.00pm – 7.00pm

P141-P153
Tools to improve delivery of respiratory care
Live Q&A will take place from 8.00am – 9.00am

P154-P166
TB or not TB, is that the question?
Live Q&A will take place from 6.00pm – 7.00pm

7.45am – 8.00am
SYMPOSIUM
DAILY PREVIEW

Dr Binita Kane (Manchester) takes a look forward to the day ahead and highlights sessions and speakers of particular interest.

8.00am – 8.30am
BTS JOURNAL CLUB
THE EVIDENCE FOR AND AGAINST LOW EMISSION ZONES

Dr Ian Mudway (London)

Learning objectives:

By the end of the session participants will be able to critically appraise the published studies discussed in this session and will be able to discuss the rationale of the methodological approaches and analysis used.

The relevant references will be available on the BTS website so that participants may review the papers in advance.

8.00am – 9.00am
POSTER SESSION LIVE Q&A: P25 – P37
Service innovation for lung health during COVID-19

Chaired by: Dr Rachael Evans (Leicester) and Dr Caroline Jolley (London)

Please review the pre-recorded presentations and posters before joining this Q&A session

P25 Postal set up of CPAP: a positive innovation during the COVID-19 pandemic
R Young, K Mcwean, L Emmett, H Pearce, R Nunns, V Lord, J Goodall, B Baxter-Hayes, M Latham, J Ting, D Ghosh

P26 'Pleural triage' facilitates effective management of a pleural service in the COVID-19 era
A Stockbridge, C Vella, S Ajmal, T Deakin, S Johnstone, M Tufail, RK Panchal

P27 The impact of COVID-19 on patients presenting with lung cancer – the missing fifth
L Fox, D Lodge, C Bradley, C Roberts, W Ibrahim, K Bentley, A Hicks

P28 The impact of the COVID-19 pandemic on pleural and lung cancer activity at Plymouth NHS Trust
H McDill, M Hassan, L Taylor, JP Corcoran, C Daneshvar

P29 Maintenance of bronchoscopy services during the COVID-19 pandemic: experience from a tertiary care centre

C Vella, C Weston, A Stockbridge, S Ajmal, M Tufail, R Panchal, J Bennett

P30 An analysis of wait times for bronchoscopy referrals during the COVID-19 pandemic in a tertiary care centre

C Vella, A Stockbridge, S Ajmal, I Novarska, R Panchal, M Tufail, J Bennett

P31 Thoracic surgery in the COVID-19 era: a tertiary single centre report

N Mayer, P Perikleous, G Doukas, K De Rome, H Bruijnen, J Finch, E Beddow, V Anikin, N Asadi

P32 Reduction in the rate of acute exacerbations of COPD and asthma during the COVID-19 pandemic

AJ Taylor, TR Simpson, T Joseph

P33 Effect of COVID-19 on AECOPD admissions

S Naik, R Ragatha, H Campbell, M Anwar

P34 Mitigating the COVID-19 impact on COPD care: rapid development of remote recruitment processes to a digital self-management service

A Taylor, J Anderson, D Lowe, P McGinness, C Carlin

P35 Delivering a community-based COVID-19 rehabilitation service using existing pulmonary rehabilitation teams is safe and feasible

K Donaldson, A Brenton, P Haslam, N Turner, J Talbot, J Newsham, F Clarke, A Kinley, K Prior

P36 Cough provoked by lung function testing – should lung function testing be treated as an aerosol generating procedure post COVID-19?

L Kimberley, J Swan, M Perera, B Swaffield, K Cranstone, N Wilson, M Unstead, AD McGown

P37 Shielding, use of face mask and hand hygiene: could this be the answer to winter pressures?

M Avoseh, B Messer, A Armstrong, J Colt, P Smith, M Sovani

8.00am – 9.00am

POSTER SESSION LIVE Q&A: P98 – P107

Emerging evidence on the use of biological agents in severe asthma

Chaired by: Professor Adel Mansur (Birmingham) and Dr Pujan Patel (London)

Please review the pre-recorded presentations and posters before joining this Q&A session

P98 Steroid-sparing effects of benralizumab in patients with eosinophilic granulomatosis with polyangiitis

AM Nanzer, J Dhariwal, J Kavanagh, A Hearn, S Agarwal, L Thomson, M Fernandes, C Roxas, L Green, G d'Ancona, BD Kent, DJ Jackson

P99 The value of oral prednisolone in patients with severe eosinophilic asthma on mepolizumab treatment

JF Yang, J Busby, LG Heaney, CE Brightling, ID Pavord, K Borg, PJ McDowell, S Diver, R Shrimanker, SJ Smith, M Shepherd, WN Lee, R Chaudhuri

P100 Real word effectiveness of anti IL-5/IL-5R therapies in severe asthma with fungal sensitisation

J Dhariwal, A Hearn, J Kavanagh, G D'Ancona, C Roxas, L Green, L Thomson, M Fernandes, BD Kent

P101 Outcomes with mepolizumab and benralizumab in severe eosinophilic asthma

L Elsey, K Hince, P Aspin, CT Pantin, D Allen, R Niven, SJ Fowler, G Tavernier

P102 Spirometry versus airwave oscillometry for assessment of mepolizumab efficacy in severe eosinophilic asthma

JF Yang, ID Pavord, LG Heaney, CE Brightling, K Borg, J Busby, T Grandison, SJ Smith, WN Lee, M Shepherd, R Chaudhuri

P103 The relationship between FeNO and response to anti-IL5/5R biologic therapies in severe eosinophilic asthma

AP Hearn, J Kavanagh, G d'Ancona, M Fernandes, L Green, C Roxas, L Thomson, J Dhariwal, AM Nanzer, DJ Jackson

P104 Does asthma control change following transition to home benralizumab administration?

G d'Ancona, S Bains, N Stewart-Kelcher, A Hearn, J Kavanagh, C Roxas, L Green, L Thompson, M Fernandes, BD Kent, AM Nanzer, DJ Jackson, J Dhariwal

P105 Does asthma control change when patients transition to home administration of mepolizumab?

G d'Ancona, N Stewart-Kelcher, S Bains, A Hearn, J Kavanagh, C Roxas, L Green, L Thompson, M Fernandes, BD Kent, AM Nanzer, DJ Jackson, J Dhariwal

P106 Global guidance on the use of monoclonal antibodies (MABs) in severe asthma: time for clarity

F Fyles, L Jones, J Aslan, C Lowe, J Burne, H Burhan, L Chishimba

P107 The impact of anti-IL5/5R biologic therapies on specific domains of the Asthma Control Questionnaire

E Rykova, AP Hearn, J Kavanagh, G d'Ancona, M Fernandes, L Green, C Roxas, L Thomson, J Dhariwal, AM Nanzer, DJ Jackson

8.00am – 9.00am

POSTER SESSION LIVE Q&A: P122 – P130

Chronic suppurative lung disease in adults and children

Chaired by: Dr Claire Hogg (London) and Dr Prasad Nagakumar (Birmingham)

Please review the pre-recorded presentations and posters before joining this Q&A session

P122 The impact of COVID-19 shielding on the wellbeing, mental health and treatment adherence of adults with cystic fibrosis (CF)

K Westcott, F Wilkins, M Chancellor, A Anderson, S Doe, C Echevarria, SJ Bourke

P123 Remote delivery of care to people with cystic fibrosis during COVID-19 shielding is not detrimental to patient outcomes

MD Waller, A Tomuta, P Macedo, R Heise, H Parkinson, A Thurlow, T Mathieson, C Long, C Elston, F Perrin

P124 Delivering bronchiectasis physiotherapy clinics remotely: patient perceptions and future preferences

P McCallion, J Davison, A DeSoyza, K Hester

P125 Chronic suppurative lung disease in children – characterisation of a tertiary paediatric hospital cohort

V Alessandrini, SA Unger

P126 Insights into parental experience of a specialist bronchiectasis and primary ciliary dyskinesia service provision – experience from a large tertiary paediatric centre in United Kingdom

N Sharif, A Shawcross, E Tahsin, S Davey, A Maitra

P127 The longitudinal effect of dysglycaemia on the ventilatory and aerobic function in children and adults with cystic fibrosis

ALE Stoate, OW Tomlinson, L Dobson, CA Williams

P128 The use of thoracic CT to determine bone mineral density in adults and children with cystic fibrosis

LE Gardner, LA Pinto, JC Davies, T Semple

P129 Radiation exposure among adults with cystic fibrosis: trends and themes

TS FitzMaurice, T Salmon, M Shaw, D Nazareth, MJ Walshaw

P130 Pseudomonas aeruginosa impairs growth of Aspergillus from CF airway samples

DA Hughes, L Cuthbertson, H Price, I Felton, M Coates, NJ Simmonds, MR Loebinger, D Armstrong-James, JS Elborn, WO Cookson, MF Moffatt, JC Davies

8.00am – 9.00am

POSTER SESSION LIVE Q&A: P141 – P153

Tools to improve delivery of respiratory care

Chaired by: Professor Hilary Pinnock (Edinburgh) and Dr Irem Patel (London)

Please review the pre-recorded presentations and posters before joining this Q&A session

P141 Development of a heat map tool to analyse variation in outcomes and prescribing for patients with asthma in England

I Mullan, V Mak

P142 A decrease in referrals to secondary care following the implementation of a novel integrated care system in the North West of England

K Prior, P Haslam, W Gillen, T Gatheral, S Grimsey

P143 Using hospital admission to offer influenza vaccination to clinically at-risk eligible inpatients; what is the need and what is the uptake? Two years' experience in one acute trust

A Gradeci, A Vaghela, M Formica, A-N Lim, LJ Restrick

P144 Standardising follow up of symptoms, tests, and outcome assessment after hospitalisation for exacerbation of COPD – a Delphi survey

S Ramakrishnan, W Janssens, PR Burgel, M Contoli, FME Franssen, N Greening, T Greulich, A Huerta, J Quint, L Van Flateren, H Watz, M Bafadhel

P145 Improving the follow-up of patients with exacerbations of asthma after discharge from the emergency department

PJ Ireland, M Carling, N Green

P146 Respiratory Improvement programme: COPD reviews in primary care by physician associates

EL Rickards, S Sibley, D Wat, C Allen, X Chen, L Pilling, H Alderson, H Sefton, S Jalota, S Ali

P147 Impact of a dedicated palliative care focus within an integrated respiratory team on advance care planning

C Swindale, P Johnson, H Devin, A Ovington, A Robinson, N Edmans, L Minden, J Stickland, B MacGregor, M Hardinge

P148 Reducing 30-day readmissions through the establishment of a post discharge virtual ward for patients admitted with an exacerbation of COPD

J Riley, C Swindale, N Edmans, A Robinson, A Ovington, K Kearley, M Hardinge

P149 Telehealth and access to medications in an era of COVID-19. Experience from virtual clinics for patients with severe asthma on biologics

MA Khan, R Rajendram, HH Al-Jahdali, MA Alhamadi, BA Al-Ghamdi, SK Alabdulaali

P150 Evaluation of myCOPD, a digital self-management technology for people with COPD, in a remote and rural population

RJ Cooper, J Colligan, S Hamilton, E Finlayson, M Duffy, J Gilliatt, M Swanson, A Giangreco, EK Sage

P151 Co-designing a digital self-management plan for bronchiectasis

KR Smalley, A Lound, C Gardner, V Padmanaban, G Russell, F Husson, S Elkin, L Aufegger, K Flott, EK Mayer, A Darzi

P152 Identification of comorbidities such as anxiety and depression using screening questionnaires in patients with idiopathic pulmonary fibrosis

M Naqvi, A West

P153 Respiratory improvement programme: admission avoidance in the emergency department by physician associates

L Pilling, C Alhan, EL Rickards, S Sibley, D Wat

8.45am – 10.05am

SPOKEN SESSION: S75 – S79

Basic science in ILD: what drives progression?

Chaired by: Dr Hannah Woodcock (London) and Dr Chris Scotton (Exeter)

8.50am **S75**

Hyperpolarised 129-xenon MRI in differentiating between fibrotic and inflammatory interstitial lung disease and assessing longitudinal change

JA Eaden, GJ Collier, G Norquay, H-F Chan, PJC Hughes, ND Weatherley, S Rajaram, A Swift, CT Leonard, S Skeoch, N Chaudhuri, GJM Parker, SM Bianchi, JM Wild

9.00am **S76**

Mendelian randomization study of cigarette smoking in idiopathic pulmonary fibrosis

CJ Reynolds, TA Yates, D Gill, P Cullinan

9.10am **S77**

The G Proteins Gαq/11 and Gα12/13 drive unique myofibroblast functions to promote pulmonary fibrosis

AT Goodwin, B Hinz, G Jenkins

9.20am **S78**

A distinct immune regulatory receptor profile linked to altered monocyte subsets in sarcoidosis

SD Fraser, MG Crooks, PM Kaye, SP Hart

9.30am **S79**

Prevalence of the indeterminate for UIP CT feature and potential link between monocyte and neutrophil levels and progression to IPF – a single centre analysis

A Achaiah, A Rathnapala, A Pereira, H Bothwell, K Dwivedi, R Barker, V Iotchkova, R Hoyles, LP Ho

9.40am Discussion and questions

9.00am – 11.00am
SYMPOSIUM

THE DESIGN AND DELIVERY OF CLINICAL TRIALS FOR COVID-19 DURING COVID-19

Chaired by: Dr Nazia Chaudhuri (Manchester) and Dr Huzaifa Adamali (Bristol)

9.00am RECOVERY

Professor Martin Landray (Oxford)

9.25am STOP-COVID

Professor James Chalmers (Dundee)

9.50am Trials of inhaled interferon-beta

Professor Tom Wilkinson (Southampton)

10.15am The co-ordinated delivery of early phase platform trials

Dr Frances Hall (Cambridge)

10.40am Discussion and questions

Learning objectives:

With no proven treatments for COVID-19 and a devastating mortality rate in hospitalised patients, the clinical and research community of the UK came together with the rapid design of innovative studies, delivered at pace and scale during the first wave. In this session, participants will learn about the process of designing and delivering studies at this time, how targets were chosen, and the initial results for early read outs.

9.15am – 10.50am
SPOKEN SESSION: S42 – S47

Trials and new concepts in pleural disease

Chaired by: Dr Rachel Mercer (Oxford) and Professor Kevin Blyth (Glasgow)

9.20am **S42**

Indwelling pleural catheters in refractory transudative pleural effusions: a randomised controlled trial

S Walker, O Bintcliffe, E Keenan, N Maskell

9.30am **S43**

Preliminary results of the Meso-ORIGINS feasibility study: retrospective element regarding BAPE-mesothelioma evolution rate

K Ferguson, R Mercer, J King, K Marshall, S Tsim, N Maskell, M Evison, N Rahman, K Blyth

9.40am **S44**

Risk factors for recurrence of primary spontaneous pneumothorax: analysis from the RAMPP trial

RJ Hallifax, R Banka, V George, A Sundaralingam, MA Ellayeh, E Bedawi, S Gerry, NM Rahman

9.50am **S45**

Meta-analysis of the association between emphysematous change on thoracic CT scan and recurrent pneumothorax

M Girish, P Pharoah, SJ Marciniak

10.00am **S46**

Identification of pleural infection bacterial patterns. The Oxford Pleural Infection Metagenomics study

NI Kanellakis, JM Wrightson, S Gerry, EO Bedawi, JP Corcoran, R Hallifax, V George, R Banka, R Asciak, A Nezhentsev, GM Economides, LR Bland, E Daly, RF Miller, T Dong, N Maskell, I Psallidas, D Crook, T Hinks, NM Rahman

10.10am **S47**

The NSCLC pleural metastatic environment influences the role neutrophils play in the immune checkpoint

R Grecian, E Gwyer Findlay, K Dhaliwal, A Byron, M Frame, M Whyte, S Walmsley

10.20am Discussion and questions

9.15am – 10.35am
SPOKEN SESSION: S48 – S52

Respiratory science: state of the art

Chaired by: Professor Andres Floto (Cambridge) and Ms Patricia Ogger (London)

9.20am **S48***

Investigating the role of dishevelled associated activator of morphogenesis 2 (Daam2) in lung development

A Muhammed, C Dean

9.30am **S49**

Comparison of the basal stem cell population of the nasal and bronchial epithelium

SE Clarke, M Rouhani, L Kalinke, K Gowers, S Janes

9.40am **S50**

Oxidative stress driven inflammatory responses in lung epithelial cells

F Tarhini, A Crilly, J Brzeszczynska, L McGarvey, K Thornbury, CS Goodyear, JC Lockhart, GJ Litherland

9.50am **S51**

Hungry hungry macrophages: how multiple prey affects macrophage phagocytosis

K Belchamber, E Sapey

10.00am **S52**

Development of protocols for mouse GLP-toxicology studies

A Sinadinos, A Sergijenko, C Meng, T Gamlen, S Hyde, DR Gill, U Griesenbach, EWFW Alton

10.10am Discussion and questions

***S48 – BTS Medical Student Award Winner**

9.15am – 10.50am
SPOKEN SESSION: S69 – S74

An update in lung cancer patient stratification: from screening to pre-treatment assessments

Chaired by: Dr Richard Lee (London) and Dr Elizabeth Sage (Inverness)

9.20am **S69**

Lung cancer screening – cumulative results from five UK-based programmes

H Balata, M Ruparel, E O'Dowd, M Ledson, S Janes, R Booton, D Baldwin, P Crosbie

9.30am **S70**

The Wakefield Lung Health Check Pilot: baseline lung cancer related outcomes

A Ameri, H Bailey, H Taylor, C Hunton, G Esterbrook

9.40am **S71**

The prevalence of additional findings in a community based lung health check pilot

H Bailey, G Esterbrook, A Al-Ameri

9.50am **S72**

Is there merit in CT surveillance of non-discrete inflammatory change seen on CT thorax?

J Ting, B Bhartia, MPT Kennedy

10.00am **S73**

Brain imaging in the management of people with lung cancer prior to therapy with curative intent: multi-centre review of the assumptions made in the NICE Guideline NG122 Evidence Review

C Brockelsby, V Randles, J King, B Dildar, X Lee, T Nagarajan, M Rice, H Al-Najjar, A Atkins, R Sundar, L Brown, S Sharma, N Navani, R Prendecki, E O'Dowd, E Crisp, M Tufail, C Vella, S Grundy, M Evison

10.10am **S74**

'Setting the stage' – can we improve patient selection for pre-operative mediastinal staging with EBUS TBNA in suspected NSCLC within the era of COVID-19?

F Liew, S Mahboobani, G Bailey, C Ross, R Sinharay

10.20am Discussion and questions

11.00am – 12.45pm
SYMPOSIUM

PLENARY SCIENTIFIC

Chaired by: Professor Elizabeth Sapey (Birmingham) and Dr Chris Scotton (Exeter)

11.00am Respiratory infections and the microbiotia

Professor Debby Bogaert (Edinburgh)

11.20am Mechanisms controlling stem cell behaviour in the lungs

Dr Emma Rawlins (Cambridge)

11.40am Pathology and treatment of cardiovascular and pulmonary vascular diseases

Dr Alexander Rothman (Sheffield)

12.00pm Interactions between neutrophils, ILC2 function and asthma

Dr Dhiren Patel (Berlin)

12.20pm Discussion and questions

Learning objectives:

This cutting-edge science symposium will highlight some of the most exciting respiratory science within the UK. This symposium takes us from stem cells in the lung and how their behaviour influences lung health and disease; intercellular interactions in obstructive airways disease, how the lung microbiotia impacts on our susceptibility and presentation of respiratory disease and the latest understanding of the respiratory implications of cardiovascular and pulmonary vascular disease.

11.00am – 1.00pm
SYMPOSIUM

RAPID RE-ORGANISATION: LEARNINGS FROM THE SERVICE RESPONSE OF COVID-19

Chaired by: Rachael Moses (London) and Professor Alex Richter (Birmingham)

11.00am The intensive care response and learnings during the first wave

Dr Brijesh Patel (London)

11.25am Building capacity: The Nightingale in London

Dr Alastair Proudfoot (London)

11.50am Caring for COVID-19 patients and setting up the Nightingale: the AHP view

Rachael Moses (London)

12.15pm Staff testing: from design to delivery

Professor Alex Richter (Birmingham)

12.40pm Discussion and questions

Learning objectives:

The first wave of the COVID-19 pandemic required a rapid reorganisation of health services in an attempt to avoid the healthcare crises seen in other European countries. New hospitals were built and staffed, intensive care units were expanded and NHS Staff Testing was developed and implemented from scratch. In this session, participants will have the opportunity to learn about these processes from speakers at the frontline of these new services.

11.15am – 12.20pm
SPOKEN SESSION: S59 – S62

Challenges in pulmonary embolism

Chaired by: Dr Laura Price (London) and Mr Maciej Juszczak (Birmingham)

11.20am **S59**

8 year retrospective analysis of the ambulatory pulmonary embolism (PE) pathway – a safe and effective service

I Moonga, S Sagar, C Baxter, G Woltmann, R Sudhir, E Bailie, N Parmar

11.30am **S60**

Utility of a novel radiological score in predicting clinical outcomes in large pulmonary embolism. A comparison with simplified PESI score

JP Verghese, S Raj, S Haque, J Ikhlaq, A Zahid, CMR Satur

11.40am **S61**

Pulmonary Embolism Lysis Team (PELT) to guide the management of acute pulmonary embolism in the puerperium

C Carter, T Mason, B Lams, B Mukherjee, N Karunanithy, B Hunt, K Breen, C Nelson-Piercy, A West

11.50am **S62**

The prediction of pulmonary embolism and CTPA findings in the COVID-19 crisis

CJ Valerio, SK Duraisingham, B Osman, M Williams, N Morrison-Bowen, Z Mangera, IK Moonsie

12.00pm Discussion and questions

11.15am – 12.50pm
SPOKEN SESSION: S63 – S68

Therapeutic advances in cystic fibrosis: today and tomorrow

Chaired by: Dr Anirban Maitra (Manchester) and Professor Jane Davies (London)

11.20am **S63**

Ivacaftor in 4- to <6-month-old infants with cystic fibrosis and a gating mutation: results of a 2-part, single-arm, Phase 3 study

M Rosenfeld, C Wainwright, GS Sawicki, M Higgins, D Campbell, C Harris, P Panorchan, S Tian, JC Davies

11.30am **S64**

Real-world outcomes in children aged 2-5 years with cystic fibrosis treated with ivacaftor

N Volkova, M Higgins, D Campbell, A Elbert, R Wu, A Lee, SC Charman, S Cunningham

11.40am **S65**

Impact of elexacaftor/tezacaftor/ivacaftor triple combination therapy on health-related quality of life in people with cystic fibrosis heterozygous for F508del and a minimal function mutation (F/MF): results from a Phase 3 clinical study

I Fajac, K Van Brunt, C Daines, I Durieu, J Goralski, H Heijerman, C Knoop, C Majoor, J Booth, SM Moskowitz, J Savage, C Wang, A Quittner

11.50am **S66**

Impact of elexacaftor/tezacaftor/ivacaftor triple combination therapy on health-related quality of life in people with cystic fibrosis homozygous for F508del (F/F): results from a Phase 3 clinical study

C Majoor, K Van Brunt, C Daines, I Durieu, I Fajac, J Goralski, H Heijerman, C Knoop, J Booth, SM Moskowitz, J Savage, C Wang, A Quittner

12.00pm **S67**

Low levels of lentivirus-mediated CFTR gene transfer are sufficient to generate ion transport correction in air-liquid interface cultures from cystic fibrosis patients

A Sergijenko, A Moiseenko, K Pineault, NAM Nafchi, M Chan, T Gamlen, DR Gill, SC Hyde, S Kreuz, U Griesenbach, EWFW Alton

12.10pm **S68**

Towards a first-in-human trial with a pseudotyped lentivirus

EWFW Alton, AC Boyd, JC Davies, DR Gill, U Griesenbach, TE Harman, SC Hyde, G McLachlan

12.20pm Discussion and questions

1.15pm – 2.00pm
THE BTS PRESIDENT'S ADDRESS

The future

Dr Graham Burns (Newcastle upon Tyne)

Introduced by: Dr Mohammed Munavvar (Preston)

2.00pm – 3.30pm
SYMPOSIUM

ALPHA ONE ANTITRYPSIN DEFICIENCY: A FOOTPRINT FOR COPD RESEARCH

Chaired by: Professor Bibek Gooptu (Leicester) and Professor Alice Turner (Birmingham)

2.00pm	A pan European perspective: the EARCO Registry
	Professor Marc Miravitlles (Barcelona)
2.25pm	Untangling the molecular mechanisms and why they matter
	Professor Bibek Gooptu (Leicester)
2.50pm	The AATD pipeline and opportunities
	Professor Alice Turner (Birmingham)
3.15pm	Discussion and questions

Learning objectives

1) To provide an update on the current scenario from basic science to potential therapies in the pipeline for AATD.

2) To draw analogies where applicable of where AATD research can inform wider COPD perspective.

3) In doing so, reiterate the importance of testing for AATD in patients with COPD.

2.00pm – 3.30pm
SYMPOSIUM

HIGHLIGHTS FROM JAMA AND THORAX

Chaired by: Dr George O'Connor (Associate Editor, JAMA), Professors Nicholas Hart, Gisli Jenkins and Alan Smyth (Joint Editors-in-Chief, Thorax)

Three cutting edge papers from the 2020 issues of the Journal of the American Medical Association and Thorax will be presented. In order to include the most recently published papers, details will be confirmed nearer to the time and will be available via the online programme.

2.00pm – 3.30pm
SYMPOSIUM

ILD IN 2020 – UPDATES FOR THE NEW DECADE

Chaired by: Dr Muhunthan Thillai (Cambridge) and Dr Hannah Woodcock (London)

2.00pm	ILD imaging and AI
	Dr Joseph Jacob (London)
2.25pm	The impact of genetics and the role of genetic testing in clinical practice in ILD
	Dr Maria Molina Molina (Barcelona)
2.50pm	Chronic hypersensitivity pneumonitis
	Dr Julie Morisset (Montreal)
3.15pm	Discussion and questions

Learning objectives:

Following this session delegates will have an understanding of the future directions of both the diagnosis and management of interstitial lung disease. They will understand some of the new radiological advances, genetics and evidenced based strategies that will help clinicians diagnose, manage and treat ILD over the next few years.

2.00pm – 3.30pm
JOINT BTS/BPRS SYMPOSIUM

BREAKTHROUGH DRUGS: BLINDED BY THE LIGHT OR SEEING THE BIGGER PICTURE?

Chaired by: Dr Iram Haq (Newcastle upon Tyne) and Professor Sejal Saglani (London)

2.00pm	Measuring the multidomain impacts of triple CFTR modulator therapy in children with cystic fibrosis; the RECOVER study
	Dr Paul McNally (Dublin)
2.25pm	Biologics for severe paediatric asthma: not simply an extrapolation from adults
	Dr Theresa Guilbert (Cincinnati)
2.50pm	Considering broader healthcare impacts of nusinersen in children with SMA
	Professor Tracey Willis (Oswestry)
3.15pm	Discussion and questions

Learning objectives:

1) To consider how interventional or observational trials can be designed to capture broader impacts than those required for regulatory approval.

2) To be reminded of important differences between paediatric and adult lung diseases, particularly with some of the new advances in asthma therapies.

3) To gain an appreciation of the broader impacts of new, often high-cost drugs, on healthcare delivery.

2.15pm – 3.45pm
SYMPOSIUM

THE CARE NEEDS OF COVID-19 SURVIVORS

Chaired by: Dr Rachael Evans (Leicester) and Professor Chris Brightling (Leicester)

2.15pm Recovery from COVID-19: PHOSP-COVID – initial results and progress
Professor Chris Brightling (Leicester) and Dr Rachael Evans (Leicester)

2.40pm Caring for COVID-19 patients with complex ventilatory needs
Miss Debbie Field (London)

3.05pm COVID-19 step-down ward
Dr Thomas Jackson (Birmingham)

3.30pm Discussion and questions

Learning objectives:

COVID-19 is a new illness with a variable course. In this symposium, participants will learn about the recovery pathways with those with the most complex manifestations of disease, including respiratory and cardiovascular disease, difficulties faced after prolonged ventilation and the nerve palsies and sarcopenia experienced by patients.

3.45pm – 5.05pm
SPOKEN SESSION: S80 – S84

Genetic insights to respiratory health

Chaired by: Dr Philip Molyneaux (London) and Dr Megan Paynton (Leicester)

3.50pm **S80**
Cyclical mechanical stretch regulates alveologenesis via mesenchymal Gαq/11-mediated TGFβ2 signalling
AT Goodwin, AE John, C Joseph, A Habgood, AL Tatler, S Offermanns, NC Henderson, G Jenkins

4.00pm **S81**
Cyclical mechanical stretching of precision cut lung slices to mimic breathing results in activation of TGFb
JT Cairns, R Middlewick, AL Tatler

4.10pm **S82**
Quantification of mRNA and protein from single cells for cystic fibrosis gene therapy
AJ Sinadinos, A Sergijenko, AD Saleh, NAM Nafchi, JW Hickmott, T Gamlen, DR Gill, SC Hyde, EWFW Alton, U Griesenbach

4.20pm **S83**
Genetically raised serum urate and lung cancer: a cohort study and Mendelian randomisation using UK Biobank
I Hall, S Burgess, I Nazareth, LJ Horsfall

4.30pm **S84**
Modification of the association of dietary PUFA with lung function by FADS gene variants in adolescents: results from the GINIplus and LISA birth cohorts
CP Harris, E Fuertes, S Koletzko, A von Berg, D Berdel, T Schikowski, G Herberth, C-P Bauer, H Schulz, D Jarvis, M Standl

4.40pm Discussion and questions

3.45pm – 5.15pm
SYMPOSIUM

DILEMMAS IN RESPIRATORY SLEEP MEDICINE

Chaired by: Dr Sonya Craig (Liverpool) and Professor Anita Simonds (London)

3.45pm Should patients with OSA be treated with wakefulness promoting medications? Evidence from the Pitolisant and Solriamfetol trials
Professor Jean Louis Pepin (Grenoble)

4.10pm Are chronotypes important in OSA and respiratory sleep clinics? Does the short sleep gene matter?
Dr Louis Ptáček (San Francisco)

4.35pm Key questions in OSA and overlap syndrome
Professor Anita Simonds (London)

5.00pm Discussion and questions

Learning objectives:

This symposium, for the multidisciplinary sleep team, will consider new approaches to the diagnosis, treatment and

monitoring of patients with sleep disorders. This includes whether genetic traits can protect or increase susceptibility to sleep disorders, the place of therapeutics to increase wakefulness in OSA and the major clinical questions that need to be addressed to improve care in obstructive sleep apnoea hypopnoea syndrome (OSAHS) and overlap syndrome (co-existence of COPD and OSAHS) will also be covered.

3.45pm – 5.20pm
SPOKEN SESSION: L7 – L12

Late Breaking Abstracts: COVID-19: impact on respiratory health

Chaired by: Dr Alanna Hare (London) and Dr Helen Ward (Wolverhampton)

See abstract pages and the online programme for details

3.45pm – 5.45pm
SYMPOSIUM

PLEURAL DISEASE: CUTTING EDGE DEVELOPMENTS IN SCIENCE AND CLINCAL STUDIES

Chaired by: Professor Kevin Blyth (Glasgow) and Dr Amelia Clive (Bristol)

3.45pm	Understanding the origins of mesothelioma: from injury to prediction to target
	Professor Kevin Blyth (Glasgow)
4.10pm	Altering the diagnostic paradigm in pleural disease: the role of confocal laser endomicroscopy
	Dr Laurence Crombag (Amsterdam)
4.35pm	Drug eluting catheters in malignant pleural effusion: lessons from the SWIFT randomised trial
	Professor Nick Maskell (Bristol)
5.00pm	Preventing drains falling out: the BASIC randomised trial
	Dr Rachel Mercer (Oxford)
5.25pm	Discussion and questions

Learning objectives

1) Review potential key steps in the evolution of mesothelioma, techniques for early detection and novel treatment targets that this offers.

2) Understand the current and future potential of novel diagnostic techniques allowing real-time assessment of tissues with confocal laser techniques in pleural disease.

3) Review the role of drug eluting catheters in malignant effusion, and their place in the treatment armamentarium on the basis of new randomised data.

4) Understand the frequency and implications of drain fall out rate on pleural intervention, and measures to prevent this including results of an RCT assessing a novel balloon catheter.

4.20pm – 5.55pm
SPOKEN SESSION: S53 – S58

The care needs of those recovering from COVID-19

Chaired by: Dr Thomas Jackson (Birmingham) and Dr Paul Pfeffer (London)

4.25pm **S53**

What factors influence mental health burden in patients recovering from COVID-19?

SB Naidu, A Saigal, AJ Shah, SE Brill, H Jarvis, M Lipman, JR Hurst, S Mandal

4.35pm **S54**

'Long-COVID': the need for multi-disciplinary working

A Saigal, SB Naidu, AJ Shah, SE Brill, H Jarvis, JG Goldring, JR Hurst, M Lipman, S Mandal

4.45pm **S55**

Clinical, radiological, functional and psychological characteristics of severe COVID-19 pneumonia survivors: a prospective observational cohort study

RF D'Cruz, F Perrin, M Waller, J Periselneris, S Norton, A Byrne, S Mathew, M Choudhury, L-J Smith, R Madula, T Patrick, D Walder, K Lee, W McNulty, P Macedo, A Heitmann, R Lyall, G Warwick, J Galloway, S Birring, A Patel, I Patel, CJ Jolley

4.55pm **S56**

Feasibility and usage of one minute sit-to-stand test, as a measure of recovery in post-acute COVID-19 patients, following hospital discharge

HLB Owles, V Padmanaban, M Thacker, I Hussein, P Mallia, G Russell, OM Kon, SL Elkin

5.05pm **S57**

The development and implementation of a virtual discharge ward for patients with COVID-19 pneumonia: data on the first 300 patients

F Maghrabi, R Bazaz, E Wilson, S O'Reilly, G Calisti, R Richardson, C Baxter, T Gorsuch, W Khan, B Kane

5.15pm **S58**

The impact of smoking on symptom and radiological severity at COVID-19 follow up

AJ Shah, A Saigal, SB Naidu, S Brill, H Jarvis, J Barnett, S Hare, M Lipman, JR Hurst, ARC Patel, S Mandal

5.25pm Discussion and questions

5.30pm – 6.00pm
SYMPOSIUM

TWILIGHT HIGHLIGHTS

A live discussion and review of the day's sessions and highlights not to miss online after the conference, with Professor Elizabeth Sapey (Birmingham), Professor John Hurst (London), Dr Philip Molyneaux (London) and Dr Chris Scotton (Exeter)

6.00pm – 7.00pm
POSTER SESSION LIVE Q&A: P52 – P62

Ventilatory strategies in COVID-19

Chaired by: Dr Charlotte Summers (Cambridge) and Dr Luke Hodgson (Southampton)

Please review the pre-recorded presentations and posters before joining this Q&A session

P52 Impact of prone positioning on oxygenation of conscious self-ventilating patients during the COVID-19 pandemic

S Gallop, GSF Lawson, CD Tweed, C Valerio, Z Mangera, I Moonsie, KEM Elliott

P53 The role of a "Multidisciplinary Proning Team" in managing SARS-Cov-2 patients with hypoxemic respiratory failure on an acute respiratory care unit

A Dwarakanath, S Booth, I Melton, E Barrow, AOC Johnson

P54 Positive role of continuous positive airway pressure for intensive care unit patients with severe hypoxaemic respiratory failure due to COVID-19 pneumonia: a single centre experience

DR Wozniak, A Rubino, ALW Tan, NL Jones, ST Webb, A Vuylsteke, E Palas, TG Quinnell, IE Smith, MG Davies

P55 Gloucestershire NHS Foundation Trust experience – COVID-19 associated mortality in mechanical ventilation vs non mechanical ventilation

H Iftikhar, S Alaee, J Bennett, A Creamer, R Kaminski, D Windsor, C Sharp

P56 Higher body mass index (BMI) is associated with improved continuous positive airway pressure (CPAP) outcomes in patients with hypoxic respiratory failure secondary to COVID-19

AJ Shah, SB Naidu, A Saigal, JR Hurst, M Lipman, S Mandal

P57 Early use of continuous positive airway pressure (CPAP) in patients with respiratory failure due to COVID-19 pneumonia

L Carroll, D Moore, T Craig

P58 Reviewing the role of continuous positive airway pressure (CPAP) in patients with severe COVID-19: a multi-site observational study

C John, R Crickett, W Owen, L Linkson, T Buttle, D Rao, AS Patel, KK Lee

P59 Self-proning in COVID-19 patients on low-flow oxygen therapy. A cluster randomised controlled trial

A Kharat, E Dupuis-Lozeron, C Cantero, C Marti, O Grosgurin, S Lolachi, F Lador, J Plojoux, J-P Janssens, P Soccal, D Adler

P60 Evaluation of ventilation parameters on aerosol delivery during mechanical ventilation of COVID-19 patients

E Fernandez Fernandez, M Mac Giolla Eain, A O'Sullivan, R MacLoughlin

P61 Mechanical ventilation utilization in COVID-19: a systematic review and meta-analysis

NUCALA
mepolizumab

NUCALA DEMONSTRATED A REDUCTION IN ASTHMA EXACERBATIONS AND MAINTENANCE OCS IN THE REAL-WORLD SETTING[1]

REALITI-A results are an interim analysis of the early initiators with 12 months of data and are consistent with results from RCTs.[3,4]

69%

REDUCTION IN EXACERBATIONS*

(n=367)
Rate ratio: 0.31 CI: 0.27–0.35 p<0.001
4.63 at baseline (over the previous 12 months) vs. 1.43 at 12 months

Exacerbation rate at 12 months[1]

52%

REDUCTION IN MEDIAN MAINTENANCE OCS DOSE**

(n=143)
(95% CI: 50–75)
10mg at baseline vs. 5mg at 53-56 weeks.

Results are descriptive.
Statistical significance was not obtained.

Study limitations: These data are a prespecified interim analysis of 368 patients who completed 12 months of follow-ups as of February 2019. This analysis may not reflect the results from the final dataset.

*Defined as deterioration in asthma requiring use of systemic corticosteroids and/or an ED visit and/or hospital admission

**52 is the median percent reduction from baseline in average daily dose of maintenance OCS. Primary endpoint: to compare the rates of clinically significant asthma exacerbations in the pre-exposure and the 12-month exposure period with NUCALA treatment.

Real-world studies are designed to evaluate associations among variables and not to definitively establish causality. These limitations are important when interpreting results: lack of comparator arm, differences in patient populations and data collection vs. randomised controlled trials.

NUCALA
mepolizumab

CHOOSE NUCALA FOR REAL-WORLD OUTCOMES FOR YOUR SEVERE EOSINOPHILIC ASTHMA PATIENTS[1]

See new real-world efficacy at **Nucala.co.uk**

Real patient compensated by GSK for his time.

Nucala is indicated as an add-on treatment for severe refractory eosinophilic asthma in adults, adolescents and children aged 6 years and older.[2]

The recommended dose of Nucala is 100mg SC once every 4 weeks in adults and adolescents 12 years and older, available in pre-filled pen, pre-filled syringe or as a lyophilised powder. The licensed dose of Nucala in children aged 6–11 years is 40mg SC regardless of weight, and is available as a lyophilised powder. The pre-filled formulations are not indicated in 6-11 year olds.[2]

SC, subcutaneous; OCS, oral corticosteroids; CI, confidence intervals; ED, emergency department

Nucala is generally well tolerated. In clinical trials, Nucala had a similar incidence of adverse events vs. placebo with the exception of injection site reactions (8% vs. 3%), which occurred mainly within the first three injections[2]. The long-term safety and immunogenicity profile of Nucala was similar to that observed in placebo-controlled asthma trials.[3]

Contraindications: Hypersensitivity to the active substance or to any of the excipients. **Warnings and precautions:** Name and batch number of the administered product should be recorded in patient file. Not to be used to treat acute asthma exacerbations. Asthma-related adverse symptoms or exacerbations may occur during treatment. Abrupt discontinuation of corticosteroids after initiation of therapy is not recommended. Hypersensitivity and administration-related reactions have occurred following administration, generally within hours of administration, but in some instances they may have a delayed onset (i.e. typically within several days). These reactions may occur for the first time after a long duration of treatment. Pre-existing helminth infections should be treated before commencing Nucala. If patients become infected and do not respond to anti-helminth treatment, temporary discontinuation of Nucala should be considered. **Side effects:** Very Common (≥1/10): Headache. Common (≥1/100 to <1/10): Lower respiratory tract infection, urinary tract infection, pharyngitis, hypersensitivity reactions (systemic allergic), nasal congestion, abdominal pain upper, eczema, back pain, administration related reactions (systemic nonallergic; most commonly including rash, flushing, myalgia), local injection site reactions, pyrexia. Rare (≥1/10,000 to <1/1,000) : anaphylaxis. Please consult SmPC for further information on adverse reactions.

Nucala (mepolizumab) Prescribing information

(Please consult the full Summary of Product Characteristics (SmPC) before prescribing)

Presentation: *Nucala (mepolizumab) solution for injection in pre-filled pen, Nucala solution for injection in pre-filled syringe.* Each 1 ml pre-filled pen or 1 ml pre-filled syringe contains 100 mg mepolizumab. *Nucala powder for solution for injection.* Each vial contains 100 mg mepolizumab. After reconstitution, each 1 ml of solution contains 100 mg mepolizumab. **Indication:** Indicated as an add-on treatment for severe refractory eosinophilic asthma in adults, adolescents and children aged 6 years and older. **Posology and method of administration:** Nucala should be prescribed by physicians experienced in the diagnosis and treatment of severe refractory eosinophilic asthma. *Adults and adolescents aged 12 years and over:* Recommended dose is 100 mg administered subcutaneously once every 4 weeks. *Children aged 6 to 11 years old:* Recommended dose is 40 mg administered subcutaneously once every 4 weeks. The solution for injection in the pre-filled pen and pre-filled syringe is not indicated in children aged 6 to 11 years. The powder for solution for injection presentation is appropriate for this population. Treatment is intended long-term and need for continued therapy should be considered at least annually. Administration is by subcutaneous injection only. *Powder for solution for injection:* Should be administered by a healthcare professional. Requires reconstitution. Each vial should be used for a single patient, and any remainder of the vial should be discarded. *Solution for injection in a pre-filled pen and pre-filled syringe:* May be self-administered by the patient or administered by a caregiver if their healthcare professional determines it is appropriate, and patient/caregiver are trained in injection techniques. Please see package leaflet for instructions on administration. **Contraindications:** Hypersensitivity to the active substance or to any of the excipients. **Warnings and precautions:** Name and batch number of the administered product should be recorded in patient file. Not to be used to treat acute asthma exacerbations. Asthma-related adverse symptoms or exacerbations may occur during treatment. Abrupt discontinuation of corticosteroids after initiation of therapy is not recommended. Hypersensitivity and administration-related reactions have occurred following administration, generally within hours of administration, but in some instances, they may have a delayed onset (i.e. typically within several days). These reactions may occur for the first time after a long duration of treatment. Pre-existing helminth infections should be treated before commencing Nucala. If patients become infected and do not respond to anti-helminth treatment, temporary discontinuation of Nucala should be considered. **Special populations:** No dose adjustment is required in elderly patients, patients with hepatic impaired or patients with renal impairment with a CrCl 50-80ml/min. **Interactions with other medicinal products:** No interaction studies have been performed. Potential for interactions is considered low. **Fertility, pregnancy and breast-feeding:** Potential for harm to a human foetus is unknown. Preferable to avoid use during pregnancy. Administration should only be considered if the expected benefit to mother is greater than risk to foetus. No data on excretion of Nucala in human milk or on human fertility. **Side effects:** *Very Common (≥1/10):* Headache. *Common (≥1/100 to <1/10):* Lower respiratory tract infection, urinary tract infection, pharyngitis, hypersensitivity reactions (systemic allergic), nasal congestion, abdominal pain upper, eczema, back pain, administration related reactions (systemic non-allergic; most commonly including rash, flushing, myalgia), local injection site reactions, pyrexia. *Rare (≥1/10,000 to <1/1,000):* anaphylaxis. Please consult SmPC for further information on adverse reactions. **Legal category:** POM. **Presentation and Basic NHS cost:** Nucala 1 vial, 1 pre-filled pen, or 1 pre-filled syringe - £840.00. **Marketing authorisation (MA) numbers [vial: EU/1/15/1043/001; pre-filled pen: EU/1/15/1043/003; prefilled-syringe: EU/1/15/1043/005]; MA holder:** GlaxoSmithKline Trading Services Limited, Currabinny, Carrigaline, County Cork, Ireland. **Last date of revision:** August 2020, PI-6452. Trademarks are owned by or licensed to the GSK group of companies. © 2018 GSK group of companies or its licensor Nucala.

References. 1. GlaxoSmithKline data on file. REALITI-A CSR. REF-56226 **2.** Nucala SmPC 2020. **3.** Khurana S *et al. Clin Ther* 2019; 41:2041-2056. **4.** Ortega HG *et al.* N Engl J Med 2014; 371:1198-1207

gsk

Adverse events should be reported. Reporting forums and information can be found at https://yellowcard.mhra.gov.uk/ or search for MHRA Yellowcard in the Google Play or Apple App store. Adverse events should also be reported to GalxoSmithKline on 0800 221 441.

MA Almeshari, NY Alobaidi, M Al Asmri, E Alhuthail, Z Alshehri, F Alenezi, E Sapey, D Parekh

P62 A multi-centre observational study of tracheostomy outcomes during the first surge of the COVID-19 pandemic

T Exall, L Greenham, R Page, S Mansell, A Thomas

6.00pm – 7.00pm

POSTER SESSION LIVE Q&A: P89 – P97

Monitoring and care delivery for children with respiratory disease

Chaired by: Dr Iram Haq (Newcastle upon Tyne) and Professor Jane Davies (London)

Please review the pre-recorded presentations and posters before joining this Q&A session

P89 Impulse oscillometry in children with bronchiectasis-correlation of R5 (reversibility) and R5-R20 (reversibility) with AX

A Zafar, W Alotaibi, M Alzaid, A Alanazi

P90 Impulse oscillometry in preschool children-types of airway defects

A Zafar, M Alzaid, W Alotaibi, A Alanazi

P91 Cardiopulmonary exercise testing in CF adolescents after starting Tezacaftor/Ivacaftor

MI Ahmed, N Dayman, J Madge, E Gaillard

P92 Implementation of physiotherapy led paediatric respiratory clinics

NJ Parsons, P Kenia, J Simpson

P93 Assessing the utility of a standardised breath sampler in asthmatic paediatric patients

K Bhavra, M Wilde, R Cordell, L Bryant, P Monks, E Gaillard

P94 Too many routine pH studies done at the time of bronchoscopy in children

N Orr, I Balfour-Lynn

P95 From hospital to home: virtually observed administration of biologics in children with severe asthma during COVID-19

A Jamalzadeh, S Makhecha, S Irving, A Bush, S Saglani, S Sonnappa, P Hall, R Moore-Crouch, A Kargbo, L Baynton, L Fleming

P96 Survey of paediatric respiratory physicians' experiences of respiratory care and transition of patients with neuro-disability

SMN Brown

P97 Adherence to Government COVID-19 shielding guidance by children with cystic fibrosis and their families

IJ Fullwood, S Davies, E Hodgetts, WD Carroll, FJ Gilchrist

6.00pm – 7.00pm

POSTER SESSION LIVE Q&A: P108 – P121

Diagnostic and management challenges within asthma services

Chaired by: Dr Aashish Vyas (Preston) and Professor Stephen Fowler (Manchester)

Please review the pre-recorded presentations and posters before joining this Q&A session

P108 A systematic review to explore the relationship between inducible laryngeal obstruction and healthcare utilisation in adults with asthma

JM Murphy, S Stephen, F Pearson, A DeSoyza

P109 A review of referrals for severe asthma patients to the specialist inducible laryngeal obstruction speech and language therapy service

A Prasad, J Davison, AE Stanton, J Murphy

P110 Diagnosis and management of ILO and BPD from specialist complex breathlessness clinic service improve patient clinical outcomes

R Yadavilli, S Khurana, A Vyas, C Slinger, H Wilson, L Hitchen, M Bowden, K Dewhurst, T Allerton, V Robinson

P111 The uptake and effect of mindfulness based cognitive therapy on patients with poorly controlled asthma attending a UK asthma centre

SJ Smith, M McGuigan, B O'Dowd, WN Lee, FJ Yang, T Grandison, V Noguera, K Bissett, M Shepherd, R Chaudhuri

P112 The contribution of inhaled corticosteroid exposure to adrenal insufficiency in a severe asthma cohort

J Martin-Grace, V Brennan, G Greene, G Collier, C Mulvey, T McCartan, L Lombard, J Walsh, E Mac Hale, M Sherlock, RW Costello

P113 Risk of osteoporosis and fragility fractures in asthma due to oral and inhaled corticosteroids: two population-based nested case-control studies

C Chalitsios, D Shaw, T McKeever

P114 Systemic adverse effects from inhaled corticosteroid use in asthma: a systematic review

SA Naqvi, R Patel, CJ Griffiths, CI Bloom

P115 Adherence to inhaled corticosteroids (ICS) according to demographic characteristics in asthma

H Dhruve, G d'Ancona, A Nanzer-Kelly, D Jackson

P116 Factors associated with hospital admission for patients presenting with an acute asthma exacerbation

K Kuncewicz, M Fernandes, L Thomson, C Roxas, A Hearn, G d'Ancona, J Dhariwal, DJ Jackson, AM Nanzer

P117 Clinical outcomes in people with difficult-to-control asthma using electronic monitoring to support medication adherence

CE Boddy, S Naveed, A Murphy, LG Heaney, S Siddiqui, P Bradding

P118 Measuring FeNO in the diagnosis of asthma. Does repeating the test improve diagnostic certainty in the RADicA study?

J Mitchell, G Kerry, S Drake, L Healy, C Murray

P119 The effects of the COVID-19 lockdown on severe asthma in patients taking biologic therapy and air pollution

MA Khan, R Rajendram, HH Al-Jahdali, MA Alhamadi, SK Alabdulaali, BA Al-Ghamdi

P120 An evaluation of the impact of shielding to avoid COVID 19 infection on respiratory symptoms in children with severe asthma

HS Gajaweera, DM Oladele, GJ Connett

P121 Raised blood eosinophil count as a predictor of severe asthma exacerbation

M Nayyar, S Scott, M Ahmad

6.00pm – 7.00pm

POSTER SESSION LIVE Q&A: P131 – P140

The nuts and bolts of ILD clinical management

Chaired by: Dr Anjali Crawshaw (Birmingham) and Dr Laura Horgan (Leeds)

Please review the pre-recorded presentations and posters before joining this Q&A session

P131 Home spirometry as a clinical endpoint in fibrotic ILD: lessons from the INJUSTIS interim analysis

FA Khan, ID Stewart, L Howard, G Hearson, G Saini, C Edwards, A Wilson, TM Maher, RG Jenkins

P132 The role of Vitamin D in pulmonary sarcoidosis and inflammation

T Scullion, L Davidson, E Murtagh, P Minnis

P133 Integrating ambulatory oxygen assessments into a specialist interstitial lung disease (ILD) clinic

J Turnbull, L McDonnell, W Lam-Richardson, A West, A Dewar

P134 Outcomes from pulmonary rehabilitation in patients with interstitial lung disease

EL Rickards, S Sibley, D Wat, D Barber, E Barker

P135 Maintenance of antifibrotic treatment for IPF in the South West Peninsula and Exeter ILD service – a real world study

SJ Lines, T Nancarrow, B Carbillido Romero, J Mandizha, MA Gibbons

P136 Pulmonary hypertension and outcomes in a single-centre IPF cohort

DR Woods, RK Coker, P Ind, B Low, G Hulston, J Springett, C Dos Santos, C Hunt, KH Ward

P137 Joint pulmonary-rheumatology clinic in low-resource settings: a one year experience

S Saeed, L Abassi, R Khan, R Altaf

P138 Review of patient longevity when managed with antifibrotics for idiopathic pulmonary fibrosis

M Naqvi, A West

P139 Blood tests in the diagnosis of interstitial lung disease – what's the bleedin' point?

B Phillips, P Evans, J Boylan, S Eccles

P140 Comparison of different measures of diffusion capacity in suspected systemic sclerosis associated pulmonary arterial hypertension

N Maranthe, M Austin, C Billings, C Elliot, A Charalampopoulos, A Hameed, N Hamilton, DG Kiely, R Lewis, I Sabroe, I Smith, A Telfer, AAR Thompson, R Condliffe

6.00pm – 7.00pm

POSTER SESSION LIVE Q&A: P154 – P166

TB or not TB, is that the question?

Chaired by: Dr Rizwan Ahmed (Bolton) and Dr Hazel Morrison (Bristol)

Please review the pre-recorded presentations and posters before joining this Q&A session

P154 An 11-year retrospective review of non-tuberculous mycobacterium isolates in a South London teaching hospital, 2008-2019

C van Zeller, H Davidson, A Houston, A Dunleavy

P155 Targeted tuberculosis screening programme for non-medical university students: characteristics and outcomes

B Willis, N Clerk, E Lunn, K Young, G Antunes

P156 A London centre based review of tuberculosis post kidney transplantation

K Manalan, M Park, C Ratnayake, R Charif, OM Kon

P157 Multidrug resistant tuberculosis – patients' perspective and experiences in a London TB centre

M Park, Y Padayachee, L Ryan, A Hoxha, H Durkan, L Martin, G Russell, OM Kon

P158 Extra-pulmonary tuberculosis (EPTB): a comparison between UK-born and foreign-born populations in East London

C Khaw, A Rahman, S Foley, S Tiberi, H Kunst

P159 Monitoring prolongation of QT interval in patients with multidrug-resistant tuberculosis and non-tuberculous mycobacterium using mobile health device AliveCor

S Puranik, C Harlow, M Park, L Martin, M Coleman, G Russell, OM Kon

P160 Outcomes of new entrant latent tuberculosis screening programme in secondary care setup

M Ijaz, R Ahmed, C Stott, K Jacobs, S Ghag

P161 Blood neutrophil count at 1 month of treatment predicts the radiological severity of post-tuberculous lung disease

TPW Jones, S Dabbak, I Mandal, J Cleverley, C Cash, MCI Lipman, DM Lowe

P162 Developing a tuberculosis patient cost survey adapted to the UK setting: recommendations from a national multi-sectoral workshop

RJ Green, S Anderson, SB Squire, E Tomeny, N Siqueira, S Sweeney, D Zenner, M Mandelbaum, T Wingfield

P163 Survey on use and perception of amikacin for treatment of Mycobacterium avium complex lung disease in the UK

M Obradovic, R van der Laan, J Hale, E Gerden, L Musson

P164 Improved treatment completion for tuberculosis patients: a case for a dedicated social care team

A Izzard, J White, S Wilders, C Smith, M Wickers, J Dos Santos, T Hart, H Booth, D Creer, S Lozewicz, M Lipman

P165 Implementation of the LTBI screening programme: a survey in primary care

I Pervin, A Rahman, H Smethurst, H Kunst

P166 Eosinophils, inhaled corticosteroids and non-tuberculous mycobacterial disease: assessing the associations in a tertiary respiratory centre cohort

AM Pereira, B Kulendrarajah, W Flight

7.00am – 5.30pm
POSTER SESSIONS

Posters and pre-recorded poster presentations are available on demand throughout the day and should be viewed prior to joining the live Q&A sessions at the programmed times

P167-P178
The clinical experiences of post-COVID-19 recovery
Live Q&A will take place from 8.00am – 9.00am

P179-P187
Cough and carbon
Live Q&A will take place from 8.00am – 9.00am

P188-P197
Infection, co-infection and chronic infection
Live Q&A will take place from 3.30pm – 4.30pm

P198-P211
Pleural disease: what are we doing and could we do better?
Live Q&A will take place from 8.00am – 9.00am

P212-P225
The lung cancer diagnostic journey
Live Q&A will take place from 3.30pm – 4.30pm

P226-P237
Time for sleep
Live Q&A will take place from 8.00am – 9.00am

P238-P250
Respiratory physiology: planes, training and mobility
Live Q&A will take place from 3.30pm – 4.30pm

P251-P258
COVID-19: contact, admission, recruitment and outcome
Live Q&A will take place from 12.00pm – 1.00pm

7.45am – 8.00am
SYMPOSIUM
DAILY PREVIEW

Dr Dhruv Parekh (Birmingham) takes a look forward to the day ahead and highlights sessions and speakers of particular interest.

8.00am – 8.30am
BTS JOURNAL CLUB
RESPIRATORY DISEASE IN ATHLETES

Dr James Hull (London)

Learning objectives:

1) Participants will be able to critically appraise the published studies discussed in this session, and will be able to discuss the rationale of the methodological approaches and analysis used.

2) Participants will develop an appreciation of how the findings from the studies discussed can be applied to clinical practice.

The relevant references will be available on the BTS website so that participants may review the papers in advance.

8.00am – 9.00am
POSTER SESSION LIVE Q&A: P167 – P178
The clinical experiences of post-COVID-19 recovery

Chaired by: Rachael Moses (London) and Professor Joanna Porter (London)

Please review the pre-recorded presentations and posters before joining this Q&A session

P167 Early symptom outcomes in hospitalised COVID-19 patients

C Craig, D Siaw Hui Min, S Mason, A Keegan, N Dahanayake, B Nazir, M Longshaw, J Hoyle

P168 Patient symptoms following discharge from hospital after COVID-19 pneumonia

L Pearmain, C Avram, V Yioe, P Webb, GA Margaritopoulos, P Rivera-Ortega, N Chaudhuri, JF Blaikley

P169 An integrated approach to COVID-19 follow up in Stockport; our experience so far

D Tanase, K McEwan, R Wiggans, N Alkemade, M Gregory, C Betts, A Newey, H Sunderland, S Gaduzo, M Childs, F Gardiner, B Currer, L Gifford, T Curtis, P Hood, V Gupta

P170 Using the COPD assessment test as a tool to assess symptoms in COVID recovery

E Daynes, C Gerlis, S Briggs-Price, PW Jones, SJ Singh

P171 Ward vs. emergency department discharge in patients with COVID-19: does it make a difference to symptom burden and radiological severity at follow up?

A Saigal, AJ Shah, SB Naidu, J Brown, JG Goldring, T Sood, M Lipman, JR Hurst, S Mandal

P172 Early clinical experience of a large hospital trust virtual COVID-19 follow up clinic

RR Taylor, R Singh, S Quantrill, A Beverly, H Shaw, H Hylton, C Francis, R McGuckin, B Trivedi, PE Pfeffer

P173 Outcomes of a COVID-19 respiratory follow up clinic in a large tertiary referral centre

J Gates, A Draper, A Dunleavy, R Aul, C Van Zeller, V Taylor, R Dunwoody, M Bridgett, N Walters, H Meredith, S Ruickbie, YE Ong

P174 'Uncovered COVID': the addition of a clinico-radiological pre-follow up multidisciplinary team review improves the provision of follow-up pathways in COVID-19

J Rossdale, A Dereham, E Peter, R Tan, G Robinson, T Hartley, J Suntharalingam, J Rodrigues

P175 Clinico-radiological recovery following severe COVID-19 pneumonia

AW Creamer, S Alaee, H Iftikhar, F Ahmed, H Steer, C Sharp

P176 Early results of radiological follow-up of non-ITU inpatients with COVID-19 pneumonia in a large UK district general hospital

CM Cheung, B Manoharan, M Shafiq, KY Li, S Anderson, E Capuano, A Farrugia, J Peacock, K Wadsworth, B Yung

P177 Experiences from post COVID-19 clinic in a tertiary centre

H Elder, A Prasad, GP Burns

P178 COVID-19 post-discharge mortality rate in a London District General Hospital

J Navvas, R Varghese, B Selvakannan, Y Narayan, O Newman, M Butt, R Ragatha, C Freer, S Kuckreja, S Naik, U Ekeowa, K Nawaz, K Khurum, P Russell, MS Anwar, N Surendraraj

8.00am – 9.00am

POSTER SESSION LIVE Q&A: P179 – P187

Cough and carbon

Chaired by: Professor Jaclyn Smith (Manchester) and Dr Peter Saunders (Oxford)

Please review the pre-recorded presentations and posters before joining this Q&A session

P179 Patient perspective of diagnosis and treatment of chronic cough: a descriptive analysis of UK adults

L McGarvey, AH Morice, E Fonseca, N Way, VW Li, J Schelfhout

P180 Descriptive analyses of cough severity and quality of life among UK adults with chronic cough: a general population survey

AH Morice, L McGarvey, E Fonseca, N Way, VW Li, J Schelfhout

P181 Healthcare utilisation in chronic cough

PSP Cho, J Shearer, A Simpson, S Campbell, MW Pennington, SS Birring

P182 Urinary incontinence in chronic cough and responses to treatments

S Hennessey, J Haines, S Ludlow, A Woodcock, P Marsden, JA Smith

P183 Chronic cough – efficacy of acid suppression therapy in asymptomatic gastroesophageal reflux

H Iftikhar, B Stoneham, J Archer, A Usher

P184 Effect of inhalation patterns on the delivered dose of Symbicort™ from a dry powder inhaler (DPI) compared to a metered dose inhaler (MDI) plus valved holding chamber (VHC)

A Bracey, J Suggett, M Nagel, A Ellery

P185 Life cycle assessment and cradle-to-grave carbon footprint of a multidose reservoir dry powder inhaler

K Borenius, V Vartiainen, A Takala, J Haikarainen, G Parker, N Paronen, T Haahtela

P186 Carbon footprint analysis of the Salford Lung Study (asthma): A SusQI analysis

FJN Hunt, A Wilkinson

P187 Ease of use, effectiveness and environmental impacts: evaluating inhaler prescriptions, patient preferences and opportunities for improvement

SC Walpole, A Fitzpatric, K Moffatt, K Smith, A Potts, S Doe, G Burns, H Tedd

8.00am – 9.00am

POSTER SESSION LIVE Q&A: P198 – P211

Pleural disease: what are we doing and could we do it better?

Chaired by: Professor Kevin Blyth (Glasgow) and Professor Nick Maskell (Bristol)

Please review the pre-recorded presentations and posters before joining this Q&A session

P198 Thoracic skeletal muscle loss is prognostic in malignant pleural mesothelioma

AC Kidd, A Winter, L Miller, W Baird, C Dick, D Pearce, W Sloan, GW Cowell, C Noble, A Smith, P Westwood, T Hopkins, N Williams, HS Walter, A King, D Fennell, KG Blyth

P199 Assessment of pneumothorax treatment response on chest radiograph: a comparison of methods of size measurement

RJ Hallifax, B Kulendrarajah, A Sundarlingam, R Banka, V George, MA Ellayeh, E Bedawi, NM Rahman

P200 Objective thoracoscopic criteria in differentiation between benign and malignant pleural effusions

MA Ellayeh, EO Bedawi, R Banka, A Sundaralingam, V George, NI Kanellakis, RJ Hallifax, HW Abdelwahab, AA Hewidy, RE Ali, NM Rahman

P201 Thoracic ultrasound (TUS) competence for ultrasound guided pleural procedures: the creation and validation of an assessment tool for use in the certification of basic thoracic ultrasound competence

DJ McCracken, EO Bedawi, M Stevenson, KM Cullen, AE Stanton, NM Rahman

P202 South West cohort study In Pleural Empyema (SWIPE)

DT Arnold, PJ Mitchelmore

P203 Pleural biopsies, changing practice over time and a comparison of techniques

AS Sundaralingam, V George, R Banka, RJ Hallax, MA Ellayeh, EO Bedawi, NM Rahman

P204 Incidence and outcomes of pneumothorax secondary to cardiac device insertion

F Frost, A Bull, DJ Wright

P205 Thoracoscopic evaluation of the effect of tumour burden on the outcome of pleurodesis in malignant pleural effusion

MA Ellayeh, EO Bedawi, A Sundaralingam, R Banka, V George, NI Kanellakis, RJ Hallifax, NM Rahman

P206 Outcomes of radiologically diagnosed solitary fibrous tumours of the pleura

RM Mercer, S Alqarooni, Y Gurung-Koney, Z Sharaf, G Dack, D Shatti, A Edey, D Arnold, L Chen, S Matthews, H Beresford, G Cowell, J Rodrigues, S Watson, S Rose, A Stockbridge, P Rao, G Bain, A Aujayeb, P Narkhede, L Wing, R Benamore, NM Rahman

P207 Daycase medical thoracoscopy and pleurodesis: outcomes and cost effectiveness

S Kiran, A Tomuta, M Naeem, G Tsaknis, S Rawson, L Holland, R Reddy

P208 Using a regional network to identify trends in practice of and training in pleural procedures

RJ Miller, L Anning

P209 Establishing a pleural clinic and local anaesthetic thoracoscopy service in a small secondary referral hospital: a review of over 1000 pleural clinic attendances in Singleton Hospital

S Williams, G Tan, R Anowar, N Chinnappa

P210 Patient perspectives on pathways in malignant pleural disease: a qualitative study

B Kulendrarajah, V George, N Rahman

P211 Time to diagnosis and treatment for patients with an undiagnosed pleural effusion – RAPID pleural clinic – Wythenshawe Hospital

J King, K Marshall, A Punjabi, J Holme, M Evison, J Lyons

8.00am – 9.00am
POSTER SESSION LIVE Q&A: P226 – P237

Time for sleep

Chaired by: Dr Joana Alçada Costa (London) and Dr Ian Stone (London)

Please review the pre-recorded presentations and posters before joining this Q&A session

P226 Reduction of appointments after introduction of sleep symptom questionnaire into a sleep apnoea pathway

M Perera, L Kimberley, B Swaffield, J Swan, K Cranstone, N Wilson, AD McGown, J Atkinson, M Unstead

P227 Non-invasive ventilation: improvements in patient selection, time to treatment, and escalation planning

R Ramasamy, P Jackson, N Banbury, R Njafuh, F Wilson, N Gaballa, M Ahmed, A Gerard, E Hughes, S Hippolyte

P228 Hospital at home for hypoxaemic patients: extending the remit of community respiratory care

EL Rickards, C Allen, M Ambrose, N Glover, D Wat, S Sibley, R Peat

P229 Does establishing an early diagnosis of EDAC and initiating CPAP, after performing sleep studies have a role in improving QoL and lower the overall cost burden of the disease?

A Ahmed, A Thomas, S Bikmalla, M Allen

P230 Adherence following non-invasive ventilation initiation in an outpatient setting in motor neurone disease

S Sheridan, N Shah, A Reddy, P Marino, ES Suh, S Srivastava, P Murphy, J Steier, N Hart, M Ramsay, G Kaltsakas

P231 Patient experience of postal CPAP in COVID era: a unique mode of CPAP trials

K Mcewan, L Emmett, H Pearce, B Baxter-Hayes, J Goodall, R Nunns, V Lord, M Latham, MW Elliott, J Ting, D Ghosh

P232 Efficacy of post-acute domiciliary non-invasive ventilation (NIV) set-ups

A Oakes, P Antoine-Pitterson, A Livesey, A Al Helou, B Jones, R Mukherjee

P233 Outcomes of diagnostic and therapeutic CPAP trials in the management of patients with suspected obstructive sleep apnoea

K Millington, G Dixon, J Grenville, P Butler, E Walker, L Buckley

P234 Implementation of an ambulatory pathway for the initiation of home non-invasive ventilation: a pilot project

K Ward, V Ford, H Ashcroft-Kelso, S Wordingham-Baker, J Walsh, S Headon, R Angus, A Manuel, R Parker, P Plant, N Duffy, B Chakrabarti

P235 High flow nasal therapy for acute type 2 respiratory failure: a systematic review and meta-analysis

AA Alnajada, B Blackwood, AM Mobrad, A Akhtar, MS Shyamsundar

P236 WITHDRAWN

P237 Dynamic chest radiography: a novel tool for the assessment of diaphragm palsy

TS FitzMaurice, C McCann, D Nazareth, MJ Walshaw

8.30am – 10.30am
SYMPOSIUM

AFRICA'S RESPIRATORY 'BIG FIVE'

Chaired by: Professor Refiloe Masekela (Durban) and Professor Kevin Mortimer (Liverpool)

8.30am	Pneumonia in the under 5's Dr Rebecca Nantanda (Makerere, Uganda)
8.55am	Post tuberculous lung disease Dr Jamilah Meghji (Liverpool)
9.20am	Ambient air pollution and respiratory disease Dr Aneesa Vanker (Cape Town)
9.45am	Non-communicable respiratory disease (asthma and COPD) across the life-course Professor Andrew Bush (London)
10.10am	Discussion and questions

Learning objectives:

1) To give an Africa-flavoured perspective on five of the major respiratory health challenges affecting low- and middle-income country populations.

2) To inspire BTS members to get involved with work to address global respiratory health through Global Health Group initiatives.

3) To set out priorities for action, research and opportunities to participate in the field of global respiratory health.

9.15am – 10.35am
SPOKEN SESSION: S85 – S89

TB: still playing the long game

Chaired by: Dr Francesc Coll (London) and Professor Robert Wilkinson (London/Cape Town)

9.20am **S85**

Bedaquiline resistance in Mycobacterium tuberculosis predates its clinical use

C Nimmo, L van Dorp, A Torres Ortiz, J Pang, M Acman, J Millard, N Padayatchi, A Grant, M O'Donnell, O Brynildsrud, V Eldholm, L Grandjean, X Didelot, F Balloux

9.30am **S86**

Predictors of adverse treatment outcomes among people with drug-resistant tuberculosis in Sierra Leone: a national, retrospective cohort study

RF Kamara, JE Carlos, F Sahr, L Foray, MJ Saunders, TE Wingfield

9.40am **S87**

Discovery and validation of a personalised risk predictor for incident tuberculosis in settings aiming towards pre-elimination (PERISKOPE-TB)

RK Gupta, CJ Calderwood, A Yavlinksy, M Krutikov, M Quartagno, MC Aichelburg, N Altet, R Diel, CC Dobler, J Dominguez, JS Doyle, C Erkens, S Geis, P Haldar, AM Hauri, T Hermansen, JC Johnston, C Lange, B Lange, F van Leth, L Munoz, C Roder, K Romanowski, D Roth, M Sester, R Sloot, G Sotgiu, G Woltmann, T Yoshiyama, J-P Zellweger, D Zenner, RW Aldridge, A Copas, MX Rangaka, M Lipman, M Noursadeghi, I Abubakar

9.50am **S88**

Negative interferon-gamma release assays reliably rule out progression to active TB in patients who have inflammatory conditions and are starting biologic therapy

Y Padayachee, J Cafferkey, M Park, K Kumar, L Martin, OM Kon, G Russel, M Coleman

10.00am **S89**

Detection of M. tuberculosis DNA in CD34-positive peripheral blood mononuclear cells of asymptomatic TB contacts

AR Martineau, G Ameni, S Younis, D Jolliffe, J Mayito, M Abebe, J Huggett, ST Reece

10.10am Discussion and questions

9.15am – 10.35am
SPOKEN SESSION: S90 – S94

Pulmonary arterial hypertension: drugs, sox and cytokines

Chaired by: Dr Chris Valerio (London) and Professor Mandy MacLean (Glasgow)

9.20am **S90**

SOX17-silenced human pulmonary artery endothelial cells markedly induce CXCL10 and CXCL11 expression

AS Mahomed, A Burke-Gaffney, MM Ghazaly, S Moledina, SJ Wort

9.30am **S91**

Patterns of cytokines and growth factors in pulmonary arterial hypertension patients with BMPR2 mutations and PAH patients without driving mutations and their influence on survival

M Schwiening, D Pandya, EM Swietlik, KA Burling, P Barker, CM Treacy, SJ Wort, J Pepke-Zaba, S Graf, SJ Marciniak, NW Morrell, E Soon

9.40am **S92**

Hepcidin and Interleukin-6 downregulate BMPR2 and dysregulate BMPR2 downstream pathways; implications for pulmonary artery hypertension

I Panselinas, QK Toe, K Clementson, SJ Wort, GJ Quinlan

9.50am **S93**

REPAIR: long-term effects of macitentan on the right ventricle (RV) in pulmonary arterial hypertension (PAH)

DG Kiely, E Cottreel, N Galiè, JT Marcus, A Peacock, S Rosenkranz, AJ Swift, A Tawakol, A Torbicki, A Vonk Noordegraaf, G Wetherill, R Channick

10.00am **S94**

Long-term outcomes with initial triple oral therapy in pulmonary arterial hypertension (PAH): insights from TRITON

L Howard, O Sitbon, N Galiè, M Doelberg, JSR Gibbs, MM Hoeper, M Stefani, SC Mathai, VV McLaughlin, L Perchenet, G Simonneau, KM Chin

10.10am Discussion and questions

9.15am – 10.45am
SYMPOSIUM

CRITICAL ILLNESS: WHAT, WHO, WHY AND HOW TO TREAT

Chaired by: Dr Michelle Ramsay (London) and Dr Murali Shyamsundar (Belfast)

9.15am Immunomodulation for sepsis patients – not again!

Dr Manu Shankar-Hari (London)

9.40am Pharmacotherapy for ARDS: the wrong treatment or the wrong disease?

Dr Charlotte Summers (Cambridge)

10.05am Ventilator-associated pneumonia: defining the undefinable?

Professor John Simpson (Newcastle upon Tyne)

10.30am Discussion and questions

Learning objectives

1) An understanding of the pathophysiology of sepsis, the host response, individualised treatment plans and why some treatments will be effective in some patients but not in others.

2) An understanding of what therapies have been used to treat ARDS and why the scientific promise of some inflammatory modulating therapies has not been replicated with success in clinical trials.

3) The diagnostic challenge of ventilator-associated pneumonia, the results of the recent VAP-rapid trial and the future of diagnostic, monitoring and treatment strategies in VAP.

9.15am – 11.15am
SYMPOSIUM

TICK TOCK GOES THE RESPIRATORY CLOCK

Chaired by: Dr John Blaikley (Manchester) and Dr Julie Gibbs (Manchester)

9.15am What is the respiratory clock?

Professor David Ray (Oxford)

9.40am Rocking the clock in pneumonia

Dr Gareth Kitchen (Manchester)

10.05am Rocking the clock in asthma

Dr Hannah Durrington (Manchester)

10.30am Rhythm and flu: the circardian clock, proteostasis and viral infections

Dr Rachel Edgar (London)

10.55am Discussion and questions

Learning objectives:

1) Understand that the lung has a clock which influences its response to inflammation.

2) Describe how this clock can influence disease pathophysiology.

3) Understand how this clock may alter treatments and vaccination.

10.45am – 11.45am
SYMPOSIUM

Analysis of respiratory patients' experience of living through COVID-19 from Asthma UK and the British Lung Foundation

See online programme for details

10.45am – 12.20pm
SPOKEN SESSION: S105 – S110

Lungs at work: occupation and lung health

Chaired by: Dr Johanna Feary (London) and Dr Chris Barber (Sheffield)

10.50am **S105**

STOP (The STaff smOking Project): designing a sustainable smoking cessation programme for NHS staff

J Gates, D Kaklamanou, H Rupani, TP Brown, K Pilkington, J Longstaff, AJ Chauhan

11.00am **S106**

Understanding the barriers and enablers to implementing a smoke free site across acute care trusts in Greater Manchester; results of a hospital staff survey

H Clegg, F Howle, K Groom, R Moore, S Grundy, A Tempowski, B Turnpenny, H Law, R Sundar, A Butt, M Abdelaziz, M Evison

11.10am **S107**

Occupational lung disease specialist assessment for patients with usual interstitial pneumonia, as part of an interstitial lung disease multi-disciplinary team – a single centre experience

K Lekhak, U Falak, MW Athar, C Donaldson, L Langlands, IA Forrest, S Wiscombe, AJ Simpson, W Funston, JG Macfarlane, HM Tedd

11.20am **S108**

Outcomes of firefighter applicants with a history of asthma

T Kabir, S Schofield, B Fitzgerald, J Cannon, J Szram, P Cullinan, J Feary

11.30am **S109**

Is COVID-19 an occupational disease?

C Moret, C Staley, JL Hoyle

11.40am **S110**

What good came out of the COVID-19 epidemic? A cluster of cases with occupational lung disease

VC Moore, GA Walters, AS Robertson, C Huntley, PS Burge

11.50am Discussion and questions

11.00am – 12.30pm
SYMPOSIUM

THE FUTURE OF PULMONARY REHABILITATION: ENHANCING THE INTERVENTION AND THE DELIVERY

Chaired by: Dr Claire Nolan (London) and Dr Thomas Ward (Loughborough)

11.00am Muscle response to exercise training in COPD: how can we maximise the benefits?

Professor Michael Steiner (Leicester)

11.25am Early findings of a virtual pulmonary rehabilitation programme

Dr Satpal Singh Shekhawat (North Lincolnshire) and Dr Farhan Amin (Barrow in Furness)

11.50am Delivering alternative PR models: next steps for clinical commissioning groups and services

Professor Mike Morgan (Leicester)

12.15pm Discussion and questions

Learning objectives:

1) Outline how an understanding of the muscle response to exercise training in COPD could be used to improve outcomes of PR.

2) How accessibility to PR with technology has helped COPD patients in the community.

3) Determine what Clinical Commissioning Groups and PR services need to do to develop and adapt for the future.

11.00am – 12.30pm
SYMPOSIUM

DETECTION, BIOLOGY AND MANAGEMENT OF EARLY LUNG CANCER

Chaired by: Professor Sam Janes (London) and Dr Laura Succony (Cambridge)

11.00am Lung health checks – NELSON at last!

Professor Harry de Koning (Rotterdam)

11.25am Molecular detection of early lung cancer

Dr Philip Crosbie (Manchester)

11.50am Management of early stage lung cancer – is the surgical moon waxing or waning?

Mr Kandadai Rammohan (Manchester)

12.15pm Discussion and questions

Learning objectives:

1) To discuss the role of lung cancer screening in at risk members of the population in light of recent evidence.

2) To review new approaches to detecting lung cancer using non-invasive tests.

3) To learn about the latest treatments for lung cancer including more targeted approaches to reduce healthy tissue damage.

11.40am – 1.00pm
SPOKEN SESSION: S100 – S104

Baby and bathwater: not all lung infections are COVID-19

Chaired by: Dr Rebecca Nantanda (Makerere, Uganda) and Dr Gareth Kitchen (Manchester)

11.45am **S100**

Vitamin D supplementation to prevent acute respiratory infections: systematic review and meta-analysis of aggregate data from randomised controlled trials

DA Jolliffe, CA Camargo Jr, JD Sluyter, AR Martineau

11.55am **S101**

Predictors of and time frame for readmission following hospitalisation with community acquired pneumonia

B Chakrabarti, S Lane, T Jenks, J Higgins, E Kanwar, M Allen, DG Wootton

12.05pm **S102**

Why do patients with pneumonia readmit?

K Nettleton, M Haris, M Colmer, B Chakrabarti, M Allen

12.15pm **S103**

Baseline CT thorax in patients undergoing allogeneic haematopoetic stem-cell transplantation and risk of invasive fungal disease- a prospective 5-year study

J Periselneris, A Espehana, A Choy, V Potter, V Mehra, P Krishnamurthy, T Pagliuca, D Avenoso, H de Lavallade, MM Ceesay, P Siriwardena, V Mallikarjuna, CG Stovin, V Potter, H de Lavallade, P Krishnamurthy, V Mehra

12.25pm **S104**

Prevalence and clinical significance of lung pathology detected in a virtual pneumonia clinic

FJ Wright, M Dawson, A Green, K Stanton, S Rolin

12.35pm Discussion and questions

12.00pm – 1.00pm
POSTER SESSION LIVE Q&A: P251 – P258

COVID-19: contact, admission, recruitment and outcome

Chaired by: Dr Aashish Vyas (Preston) and Dr Melissa Heightman (London)

Please review the pre-recorded presentations and posters before joining this Q&A session

P251 The induction of early, dynamic airway mucosal and systemic immune responses following recent SARS-CoV-2 household exposure

TD Pillay, A Kondratiuk, M Davies, JS Narean, C Tejpal, L Wang, L Kavege, C Memmi, S George, J Zhou, C Rosadas, R Varro, A Rowan, C Herrera, G Taylor, M McClure, W Barclay, J Fenn, R Kundu, S de Lusignan, A Lalvani, On behalf of the Integrated Network for Surveillance, Trials and Investigation of COVID-19 Transmission (INSTINCT) study team

P252 Role of chest x-ray in diagnosis and predicting outcome of COVID-19 infection in a district general hospital setting

A Sivaramakrishnan, M Syed, E Phyu, J Kuzhively, D Betarse, V Patil

P253 Acute pulmonary emboli and COVID-19

N Johl, D Ap-Emyr, M Jones, K Hardingham, E King, C Carder, A Marin, C Corscadden, K Pink, J Underwood

P254 Azithromycin may play a role in the management of hospitalised patients with suspected or PCR-proven COVID-19

S Waring, H Jeffrey, A Gani, Y Narayan, J Navas, S Kumar, A Sathiyakeerthy, A Mohammed, C Freer, K Bamunuarachchi, R Ragatha, S Kuckreja, P Russell, U Ekeowa, S Naik, K Khan, M Anwar

P255 Frailty and survival in COVID-19 in level 1 patients: the Northumbria experience

E Tullo, C Dotchin, K Jackson, S Welsh, J Dundas, A Aujayeb, G Gilbert

P256 Prognostication in COVID-19: a prospectively derived and externally validated risk prediction score for in-hospital death

F Chua, A Draper, M Knight, R Mogal, J Singh, LG Spencer, E Thwaite, T Vaghela, H Mitchell, S Calmonson, N Mahdi, S Assadullah, M Leung, A O'Neill, C Popat, R Kumar, S Raghunath, TJ Humphries, R Talbutt, M Schechter, J Lowe, A Barlow, R Vancheeswaran

P257 Use of visual basic in Microsoft Word to facilitate data collection for COVID-19 studies

NR Marshall, F Wood, D Derry

P258 ASTERIX: Adaptive stratification of COVID-19 to facilitate endotype-directed intervention studies

J Ferguson, K Blyth, I McInnes, A Biankin, R Jones, D Lowe, M Murphy, E Thomson, J Scott, D Porter, C Goodyear, D Maguire, P Mark, S Hinsley, C Evans, C Orange

1.00pm – 1.45pm

THE BTS GRAND CHALLENGE GUEST LECTURE

CLIMATE CHANGE AND MOVES TOWARDS A SUSTAINABLE COMMUNITY

Professor Paul Ekins OBE (London)

Introduced by: Dr Graham Burns (Newcastle upon Tyne)

Learning objectives:

Climate change has never been more in our thoughts, but what are the challenges we face in order to achieve "net zero"? Professor Ekins is a leading international expert on the conditions and policies required to achieve an environmentally sustainable economy. In this talk, delegates will gain insights into the potential benefits, challenges and current progress on our journey to carbon neutrality.

1.45pm – 3.20pm

SPOKEN SESSION: S111 – S116

Living with and caring for respiratory disease during COVID-19

Chaired by: Miss Debbie Field (London) and Dr Swapna Mandal (London)

1.50pm **S111**

Respiratory patient experience of measures to reduce risk of COVID-19: findings from a descriptive cross-sectional UK wide survey

KEJ Philip, A Cummela, J Farrington-Douglas, M Laffan, NS Hopkinson

2.00pm **S112**

COVID-19 related concerns of people with long-term respiratory conditions: a qualitative study

KEJ Philip, B Lonergan, A Cumella, J Farrington-Douglas, M Laffan, NSHopkinson

2.10pm **S113**

Telephone consultation – the patient perspective

A Armstrong, B Messer

2.20pm **S114**

Clinician and patient perspectives of telephone consultations during COVID-19 pandemic

K Ibrahim, R Yadavilli, R Worswick, F Illston, A Amin, M Ibrahim, C Hood, D Tuck, A Brook, M Murray

2.30pm **S115**

"We, who haven't been diagnosed, are sort of out of the picture…" Breathless without a diagnosis: the UK COVID-19 lockdown experience

GE Doe, S Chantrell, MT Williams, N Armstrong, A Hutchinson, RA Evans

2.40pm **S116**

Resilience, anxiety and depression in nurses working in respiratory areas during the COVID-19 pandemic

NJ Roberts, K McAlooney-Kocaman, L Welch, E Ray, K Lippiet, C Kelly

2.50pm Discussion and questions

1.45pm – 3.20pm

SPOKEN SESSION: S117 – S122

An update in lung cancer: interventions and outcomes

Chaired by: Dr Alice Davies (London) and Mr Babu Naidu (Birmingham)

1.50pm **S117**

Early outcomes from the Macmillan Scottish Mesothelioma Network – a national multidisciplinary team for Scotland

K Ferguson, E Smith, J Ferguson, C MacRae, P Short, S Tsim, S Smyth, M Chetty, T Petrie, C MacGregor, B Sage, J Latham, L Heycock, C Dick, F Roberts, G Cowell, S Sheridan, M Gronski, C Nobile, L Thomson, L Kelly, A Kirk, R Bilancia, L Darlison, K Brasher, C Ali, N O'Rourke, M Ashton, K Blyth

2.00pm **S118**

Interventions for the management of malignant pleural effusions: a network meta-analysis

A Dipper, HE Jones, R Bhatnagar, NJ Preston, N Maskell, AO Clive

2.10pm **S119**

Pre-operative nodal staging of non-small cell lung cancer and risk of lung cancer recurrence in the West of Scotland

A Alkarn, L Stapleton, J Van Der Horst, J Maclay

2.20pm **S120**

Outcomes for lung cancer surgery in octogenarians. Do they do worse than their younger cohort?

J King, D Shah, J Lyons, H Balata, M Evison, C Brockelsby, P Crosbie, R Booton, N Sinnott

2.30pm **S121**

Resection margins and patterns of recurrence following surgical resection of non-small cell lung cancer

HE Scholes, HV Gleeson, HA George, JN Rao, L Socci, S Tenconi, DN Hopkinson, JG Edwards

2.40pm **S122**

Relationship of PDL1 histological findings to prognosis and immunotherapy response in NSCLC: a systematic review

SS Kanabar, A Tiwari, V Soran, P Balendran, AM Turner

2.50pm Discussion and questions

1.45pm – 3.20pm
SPOKEN SESSION: S129 – S134

Sleep and ventilation: masks …. need help!

Chaired by: Dr Syed Huq (Birmingham) and Dr Shruthi Konda (London)

1.50pm **S129**

Social deprivation appears to be a barrier to referral for investigation of obstructive sleep apnoea

K Lee, N Adrienko, G Andrienko, I Kureshi, T Staykova, I Smith

2.00pm **S130**

Continuous positive airway pressure (CPAP) compliance in obstructive sleep apnoea/obesity hypoventilation syndrome patients: can we use digital data to identify predictors of compliance?

J Cowen, S Harrison, J Sedano, P Stephens, GYH Lip, S Craig

2.10pm **S131**

The effect of telemonitoring on improving concordance with continuous positive airway pressure (CPAP) in obstructive sleep apnoea (OSA)

AK Gassama, S Coelho, M Thomas, U Ahmed, MA Saleem, R Mukherjee

2.20pm **S132**

Late failure and relapse in patients receiving non-invasive ventilation for exacerbations of COPD: a UK prospective study

ND Lane, TM Hartley, J Steer, MW Elliott, M Sovani, HJ Curtis, ER Fuller, PB Murphy, D Shrikrishna, KE Lewis, NR Ward, CD Turnbull, N Hart, SC Bourke

2.30pm **S133**

Bi-level positive airway pressure (BiPAP) can be used to manage treatment resistant obstructive sleep apnoea (OSA) and early obesity hypoventilation syndrome (OHS)

SK Mansell, L Williams, S Mandal

2.40pm **S134**

What are the long term outcomes for patients using non-invasive ventilation (NIV) for continuous positive airway pressure (CPAP) failure?

A Saigal, HF Kwong, AJ Shah, N Derashri, K Spurling, S Mandal, SK Mansell

2.50pm Discussion and questions

2.00pm – 3.30pm
SYMPOSIUM

NEW INSIGHTS TO HOW PHYSIOLOGY CAN HELP

Chaired by: Mrs Julie Lloyd (Birmingham) and Dr Karl Sylvester (Cambridge)

2.00pm What can exhaled volatile organic compounds tell us about respiratory disease?

Professor Stephen Fowler (Manchester)

2.25pm How can capnometry waveform shape analysis help us diagnose and monitor respiratory disease?

Dr John Altrip (Cambridge)

2.50pm Can neural respiratory drive help respiratory clinicians treat patients?

Dr Caroline Jolley (London)

3.15pm Discussion and questions

Learning objectives:

1) To understand the methods for collection and analysis, and the potential sources of exhaled volatile organic compounds in relation to lung health and disease.

2) To understand the measurement and analysis of high resolution tidal breathing carbon dioxide (CO_2) waveform shapes, and how metrics extracted from them are facilitating novel diagnostic and monitoring applications.

3) To describe methods used to quantify neural respiratory drive, including invasive and non-invasive respiratory muscle electromyography.

4) To understand how measurement of neural respiratory drive can be used to assess disease severity and breathlessness in stable and acutely unwell patients.

2.00pm – 3.35pm
SPOKEN SESSION: S123 – S128

Clinical considerations in ILD

Chaired by: Dr Shaney Barratt (Bristol) and Dr Nazia Chaudhuri (Manchester)

2.05pm **S123**

Pleuroparenchymal fibroelastosis: clinical, functional and morphologic determinants of mortality

F Chua, EC Bartlett, J Barnett, A Devaraj, E Renzoni, AG Nicholson, A Rice, P Molyneaux, P George, M Kokosi, V Kouranos, TM Maher, AU Wells, SR Desai

2.15pm **S124**

Azithromycin for sarcoidosis cough: an open label exploratory trial

S Thackray-Nocera, M Shepherd, R Flockton, CE Wright, W Sheedy, K Brindle, AH Morice, PM Kaye, MG Crooks, SP Hart

2.25pm **S125**

Establishing prescribing habits and complication awareness of nitrofurantoin, and the impact of adverse effects following prophylactic prescription

N Tuffin, F Mundy-Baird, T Speirs, S Mulholland, M Morales, H Sakota, C Sharp, M Albur, F Keeley, A Medford, H Burden, E Jonas, S Barratt, H Adamali

2.35pm **S126**

The pharmacist-led accelerated transfer of patients to shared care for the monitoring and prescribing of immunomodulatory therapy during COVID-19

S Bains, M Naqvi, A West

2.45pm **S127**

Oropharyngeal swallowing pathophysiology in patients with idiopathic pulmonary fibrosis: a consecutive descriptive case series

A Alamer, R Jones, C Ward, M Drinnan, AJ Simpson, M Griffin, J Patterson, I Forrest

2.55pm **S128**

What is best in the follow up of unclassifiable pulmonary fibrosis?

L Horgan, L Smith, T Sutherland, A Boland, M Darby, R Bishop, P Beirne

3.05pm Discussion and questions

3.30pm – 4.30pm

POSTER SESSION LIVE Q&A: P188 – P197

Infection, co-infection and chronic infection

Chaired by: Dr Jamilah Meghji (Liverpool) and Professor James Chalmers (Dundee)

Please review the pre-recorded presentations and posters before joining this Q&A session

P188 Modelling to mitigate: risk factors for hospital acquired pneumonia

PM Kempster, MP Peirson, S Williams, DJ McKeon

P189 Hospital acquired pneumonia and frailty: the new old age problem to solve

PM Kempster, MP Peirson, S Williams, DJ McKeon

P190 Systematic survey of reported outcomes in ventilator associated pneumonia randomised controlled trials

F Haseeb, A Mathioudakis, M Fally, J Vestbo, P Dark, A Bentley, T Felton

P191 The impact of changes in sepsis coding on mortality reports

C Atkin, T Pankhurst, D McNulty, A Keogh, S Gallier, D Pagano, E Sapey, S Ball

P192 Risk factors for pulmonary Stenotrophomonas maltophilia infection

L Watson, L Priestley, SJ Chapman, MI Andersson, K Jeffery, WG Flight

P193 Impact of delayed radiographic detection of ipsilateral effusion on pleural infection outcomes

C Bell, K Ferguson, J Ferguson, A Kidd, L McNaughton, R Hollis, B Choo-Kang, D Grieve, KG Blyth

P194 Comparing vitamin D levels in patients with COVID-19 and tuberculosis infection

N Essaji, JB Fanshawe, T Mohajer, LV Baker

P195 Secondary infection rates and antibiotic prescribing in a COVID-19 HDU population

SH Zhang, G Bickler, B Porter, R Hallifax, N Rahman, W Flight

P196 Influenza vaccination, airways disease and the risk of COVID-19 related mortality

L Morrison, L Wiffen, P Meredith, T Brown, L D'Cruz, A Chauhan

P197 Bacterial and fungal respiratory co-infection among patients admitted to ICU with COVID-19: a retrospective cohort study in a UK hospital

A May, N Swetenham, M Pandey, V Taylor, H Hughes, J Underwood

3.30pm – 4.30pm

POSTER SESSION LIVE Q&A: P212 – P225

The lung cancer diagnostic journey

Chaired by: Dr Laura Succony (Cambridge) and Dr Georgia Hardavella (Athens)

Please review the pre-recorded presentations and posters before joining this Q&A session

P212 Prehab4Cancer: an innovative regional lung cancer prehabilitation service

P Bradley, Z Merchant, K Rowlinson-Groves, S Grundy, H Al-Najjar, L Brown, A Dand, C Farran, N Bayman, K Banfill, D Wray, J Moore, M Evison

P213 The efficacy of the Southwest Chest X-Ray Reporting Tool (SW CXR RT) in identifying patients with a new diagnosis of lung cancer, subsequently managed via the National Optimal Lung Cancer Pathway (NOLCP)

CS Pearce, HG Bakere, TC Whitehead, TG Burden

P214 A normal CT chest negates the need for bronchoscopy for the detection of covert malignancy in patients presenting with haemoptysis through the two-week-wait pathway; a retrospective study from a district general hospital

N Earl, A Begbey, JH Guppy, S Webster

P215 Time for change? Ultrasound guided biopsy by the respiratory physician – outcome from a specialist pleural clinic

S Iftikhar, AKA Abi Musa Asa'ari, Z Noori, S Leyakathali Khan

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PM-GB-UCV-JRNA-200009 Date of preparation: November 2020.

References:
1. Maleki-Yazdi M et al. Adv Ther 2016; 33:2188-2199. **2.** Feldman G.J et al. Adv Ther 2017; 34:2518–2533. **3.** Decramer M., et al. Lancet Respir Med 2014; 2:472-86. **4.** Maleki-Yazdi MR., et al. Respir Med 2014; 108:1752-60.

P216 Does size matter? The effect of pleural fluid volume on the sensitivity and efficacy of pleural fluid cytological analysis for accurately diagnosing cancer and influencing management

V Nathwani, V Ahluwalia, J Glover

P217 Pneumothorax incidence in CT guided biopsy for the investigation of lung cancer

M Moad, K Jackson, P Narkhede, A Aujayeb

P218 Effectiveness of a physician-led biopsy service for the rapid diagnosis of lung and pleural cancer

M Naeem, G Tsaknis, R Reddy

P219 Potential utility of ultrasound guided supraclavicular lymph node biopsy in the diagnosis of lung cancer – remodelling the pathway

CL Tey, A Pereira, C Xie, AJ Moore, A Sykes, JM Wrightson, NM Rahman

P220 Is there a need for staging EBUS?

M Hashim, A Aujayeb, M Weatherhead

P221 Causes and outcomes of exudative pleural effusions in congestive cardiac failure (CCF)

S Iftikhar, E Hussain, R Haider, M Haris, MB Ganaie

P222 Electronavigational bronchoscopy in a district general hospital under conscious sedation

R Poyner, D Menzies, S Ambalavanan, A Haggar

P223 EBUS sampling of centrally located primary lung tumours provides suitable material for diagnostic and molecular testing

H Rai, E Graham, A Ghoshal, LM Taylor, TJ Howell, JP Corcoran, C Daneshvar

P224 Needle pass time as a metric to monitor progression of EBUS trainees

M Hassan, H McDill, W Falconer, L Taylor, T Howell, JP Corcoran, C Daneshvar

P225 The futility of bronchoscopy in patients with non-massive haemoptysis with normal or benign CT scans

K Jackson, A Aujayeb

3.30pm – 4.30pm
POSTER SESSION LIVE Q&A: P238 – P250

Respiratory physiology: planes, training and mobility

Chaired by: Dr James Hull (London) and Dr James Stockley (Birmingham)

Please review the pre-recorded presentations and posters before joining this Q&A session

P238 Minimal clinically important difference for pedometer step count in COPD: a prospective analysis

O Polgar, S Patel, JA Walsh, RE Barker, SF Clarke, WD-C Man, CM Nolan

P239 The impact of COVID-19 shielding on levels of physical activity and health-related quality of life in COPD patients following pulmonary rehabilitation

E Hume, M Armstrong, J Manifield, I Vogiatzis

P240 Parasternal electromyography as a measure of respiratory muscle function in patients recovering from severe COVID-19 pneumonia

RF D'Cruz, S Mathew, A Byrne, M Choudhury, J Periselneris, A Patel, I Patel, N Hart, PB Murphy, S Birring, CJ Jolley

P241 A pilot RCT assessing the inclusion of physical activity counselling to standard care pulmonary rehabilitation in patients with COPD

M Armstrong, E Hume, L McNeillie, F Chambers, L Wakenshaw, G Burns, K Heslop-Marshall, I Vogiatzis

P242 Can existing routine clinical data be used to predict hypoxaemia for MND patients undertaking commercial flight?

IJ Cliff, N Mustfa, H Stone, C Hurst, E Crawford

P243 Can historical assumptions be used to assess fitness to fly for MND and ILD patients? An evaluation of physiological parameters to risk stratify patients planning air travel

IJ Cliff, N Mustfa, H Stone, C Hurst, E Crawford, MB Allen

P244 An algorithm for automatically identifying trends in maximum and minimum FEV1

NJ Bell, A Kendrick

P245 Acute thoracoabdominal and central haemodynamic responses to inspiratory muscle loading in healthy young adults

J Manifield, N Chynkiamis, C Alexiou, D Megaritis, E Hume, G Barry, I Vogiatzis

P246 Is routine clinical data useful in predicting hypoxaemia in ILD patients undertaking commercial flight?

IJ Cliff, H Stone, N Mustfa, C Hurst

P247 The role of impulse oscillometry in the management of asthma when forced expiratory manoeuvres are contraindicated

L Jordon, S Marciniak

P248 Assessment of repeatability of structured light plethysmography (SLP) technique compared to spirometry

E Alhuthail, B Cooper, A Coney

P249 Changes in ΔPCO2(v-a) or PCO2 gap in response to acute changes in ventilation

L Shastri, B Kjærgaard, SE Rees, LP Thomsen

P250 A six year follow up study of patients undergoing cardiopulmonary exercise testing (CPET) for investigation of unexplained breathlessness

G Warwick, M Pynn, J Thomas

3.45pm – 5.05pm
SPOKEN SESSION: S95 – S99

Prognostic tools to treatments in COVID-19

Chaired by: Dr Felix Chua (London) and Dr Anita Saigal (London)

3.50pm **S95**

The utility of established prognostic scores in COVID-19 hospital admissions: a collaborative trainee-led, multi-centre prospective evaluation of CURB-65, NEWS2, and qSOFA

F Frost, P Bradley, K Tharmaratnam, NWCORR Collaborators, D Wootton

4.00pm **S96**

South West experience of continuous positive airway pressure non-invasive ventilation for COVID-19

JH Noble, A Dipper, C Coombs, H Ifthikar, S Alaee, A Kent, R Wollerton, J Rossdale, R Miller

4.10pm **S97**

The performance of the National Early Warning Score and National Early Warning Score 2 in hospitalised patients infected by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)

L Fox, I Kostakis, C Price, G Smith, D Prytherch, P Meredith, A Chauhan

4.20pm **S98**

Improved COVID-19 survival in acute hospital settings following implementation of a real-time clinical decision support tool

MP Vizcaychipi, CL Shovlin, A McCarthy, A Howard, S Patel, A Godfrey, J Armstrong, I Beveridge, A Brown, L Christie, G Davies, R Davies, A Gupta, M Hayes, RT Keays, C Lockie, T Peters, M Popescu, H Said, P Shah, S Singh, A Sisson, ChelWest COVID-19 Consortium

4.30pm **S99**

The role of anticoagulation therapy in management of COVID-19 patients

S Shahid, A Elsharkawy, A Dethabrew, A Gani, M Elgizouli, R Islam, MA Zahid, O Taylor, S Gupta, M Kashem, O Newman, M Kashem, S Kuckreja, S Naik, U Ekeowa, K Khan, MS Anwar

4.40pm Discussion and questions

Friday 19 February 2021

3.45pm – 5.20pm
SPOKEN SESSION: S135 – S140

Disease modulation within severe asthma

Chaired by: Professor Salman Siddiqui (Leicester) and Dr Pujan Patel (London)

3.50pm **S135**

Dupilumab efficacy vs standard of care in patients with uncontrolled, persistent asthma – a meta-analysis

ID Pavord, AH Khan, B Neupane, P Guyot, S Kamat, J Chao, P Rowe, J Msihid, Y Xu

4.00pm **S136**

Long-term safety and efficacy of Dupilumab in patients with asthma: LIBERTY ASTHMA TRAVERSE open-label extension study

ID Pavord, ME Wechsler, C Domingo, A Papi, A Bourdin, H Watz, X Mao, U Kapoor, FA Khokhar, LP Mannent, M Ruddy, E Laws, N Amin, M Hardin

4.10pm **S137**

Benralizumab is effective at reducing airway inflammation in severe asthma patients following non-response to mepolizumab associated with persistent sputum eosinophilia

G Tavernier, P Aspin, LJ Holmes, L Elsey, R Niven, CT Pantin, D Allen, SJ Fowler

4.20pm **S138**

Effect of tezepelumab on exacerbations in patients with severe, uncontrolled asthma, according to baseline body mass index: results from the Phase 2b PATHWAY study

CS Ambrose, G Colice, K Salapa, JR Parnes, J Corren

4.30pm **S139**

Efficacy of tezepelumab in patients with low and high bronchodilator reversibility in PATHWAY

J Corren, MC Liu, K Bowen, K Salapa, G Colice, JP Llanos-Ackert

4.40pm **S140**

Beta-2-adrenergic receptor gene polymorphisms in severe asthma: a systematic review.

Y Khan, SJ Fowler, G Tavernier

4.50pm Discussion and questions

4.45pm – 5.15pm
SYMPOSIUM

TWILIGHT HIGHLIGHTS

A live discussion and review of the day's sessions and highlights not to miss online after the conference, with Professor Elizabeth Sapey (Birmingham), Professor John Hurst (London), Dr Philip Molyneaux (London) and Dr Chris Scotton (Exeter)

SPEAKERS' BIOGRAPHICAL DETAILS

Dr Rizwan Ahmed MBBS FRCP (Edinburgh) PgCert MedEd Cardiff University, UK, is a Consultant Respiratory Physician and Clinical Lead for Respiratory Medicine at the Royal Bolton Hospitals NHS Foundation Trust. He qualified in 2002 and completed his initial medical training in the Northwest and Yorkshire regions before joining Bolton in 2012. His subspecialty interests include tuberculosis, respiratory infections and medical education. He is the Trust lead for tuberculosis and bronchiectasis. He chairs the Bolton TB Network Group and sits on the British Thoracic Society TB Specialist Advisory Group and Greater Manchester TB Clinical Reference Group.

Dr Martin Allen is a Respiratory Physician at University Hospital of North Staffordshire. He has interests in a variety of respiratory diseases including COPD, ventilatory support/weaning and sleep medicine, originating from his research into sleep and physiological changes. He has fulfilled a variety of management and transformational roles within the hospital, including CD and Medicine Divisional Head. Dr Allen holds a variety of national roles and sits on the British Thoracic Society Board, is Chair of the Respiratory EWG on Coding, sits on the Respiratory CRG, contributes to the Respiratory Long Term Plan and is the GIRFT National Clinical Lead for Respiratory Medicine.

Dr John Altrip is a Chartered Physicist whose original academic research career focussed on the development of electronic materials, devices and displays for mobile technology applications. He has worked in UK and European research laboratories, technology start-ups and multinational corporations. Since retraining as a medic (Nottingham 2009), John has combined emergency medicine (Pilgrim Hospital, Boston) with a special interest in respiratory medicine as a Clinical Fellow in the RSSC at Royal Papworth Hospital, Cambridge. John is the co-founder and Medical Director of Cambridge Respiratory Innovations Ltd and has been awarded an NHS England Clinical Entrepreneur Fellowship to support his activities developing CRiL's novel N-Tidal technology.

Dr Chris Barber is a Respiratory Consultant with a clinical and research interest in occupational lung disease. His time is split between NHS clinical work in Sheffield and HSE sessions at the Centre for Workplace Health in Buxton. He is a member of the Group of Occupational Respiratory Disease Specialists (GORDS), and the current Chair of the BTS Occupational and Environmental Lung Disease Specialist Advisory Group.

Professor Maria Belvisi is SVP and Head of Research and Early Development, Respiratory and Immunology at AstraZeneca and responsible for the basic science from initiation of projects to Phase 3 clinical trials. Maria joined AZ from Imperial College London (ICL) in late 2017 and retains her professorial status and her research group. Maria's research has focused on the cellular and molecular mechanisms of asthma, COPD and chronic cough. Maria has >220 publications, has been on the editorial board of many leading peer review journals and on expert review panels for the WT, BBSRC and MRC. She is an elected Fellow of both the British Pharmacological Society and ERS and was made an Honorary Fellow of BPS and Fellow of the Academy of Medical Science.

Professor Jon Bennett. From a non-medical background, Jon still has to pinch himself about how lucky he was to have found medicine, even in our strange COVID-19 and post COVID-19 world. He is grateful to have found respiratory medicine and to have had great support from the BTS and his respiratory colleagues throughout his career. Jon has been a consultant since 2000, firstly in Derby, and then from 2004 in the nationally renowned Glenfield Hospital where he continues to age disgracefully.
Jon is a COVID-19 survivor – swab negative – terrible self-technique, antibody positive. He can be seen doing his bit for the environment; cycle commuting most days to and from Glenfield Hospital. As a native Wulfrunian, he has the curse of supporting the mighty Wolverhampton Wanderers.
Clinical interests include: lung cancer, interventional respiratory procedures, medical education, general respiratory medicine.

Dr John Blaikley is an MRC Transition Fellow at the University of Manchester. His clinical interests are focused on interstitial lung disease and pulmonary transplantation. His lab investigates how biological timing, circadian biology, alters respiratory pathological processes. Recent papers have suggested that this could be important for infection, fibrosis and primary graft dysfunction.

Professor Kevin Blyth is Professor of Respiratory Medicine in Glasgow. He splits his time between the CRUK Beatson Institute/University of Glasgow and the Queen Elizabeth University Hospital, where he leads

the Glasgow Pleural Disease Unit. He founded and is Director of the Macmillan Scottish Mesothelioma Network, which coordinates clinical care and access to trials for mesothelioma patients in Scotland. He is an NHS Scotland Research (NRS) Senior Research Fellow and leads a translational research programme focused on pleural disease. He has a particular interest in mesothelioma and is Principal Investigator of the CRUK PREDICT-Meso International Accelerator Network.

Professor Debby Bogaert's research group has a major focus on investigating the physiology and pathophysiology of respiratory infections and inflammation from an ecological perspective, with the ultimate goal to design new or improved treatment and preventive measures for respiratory infections in susceptible populations. A second focus in early life microbiome development, drivers and health consequences. To this purpose, the team uses a fully translational approach, combining epidemiological, molecular microbiological, immunological and systems biology approaches to answer their research questions. Moreover, they execute mechanistic studies in vitro and in vivo.

Professor Bogaert joined the Centre for Inflammation Research in September 2016. She also still works as a Principal Investigator at the Department of Paediatric Immunology of the UMC Utrecht, The Netherlands. She is a previous recipient of the prestigious Veni and Vidi Career Grant (NWO) in the Netherlands, and a Scottish Senior Clinical Fellowship (CSO) in Scotland. She worked from 2006 to 2008 as a Postdoctoral Fellow at Harvard School of Public Health/Boston Children's Hospital where she studied immune mechanisms involved in susceptibility of infants to respiratory colonization and infection.

She obtained her PhD degree cum laude from the Erasmus University in Rotterdam, Netherlands focusing her thesis on (molecular) epidemiology of bacterial colonization and host-microbe interactions leading to susceptibility to and prevention of respiratory infections.

In parallel, she was also trained as a pediatrician at the Sophia Children's Hospital in Rotterdam, obtaining her license in 2006. She obtained her license as Paediatric Infectious Diseases and Immunology Specialist at the Wilhelmina Children's Hospital, Utrecht in 2014. Professor Bogaert has published more than 120 peer-reviewed papers. She is internationally active as Programme Committee Member in the European Society for Clinical Microbiology and Infectious Diseases (ESCMID), as Executive Committee Member of the ESCMID Study Group for Host and Microbiome Interactions (ESGHAMI) and Executive Committee Member of the International Symposium on Pneumococci and Pneumococcal Diseases (ISPPD).

Professor Chris Brightling is a Fellow of the Academy of Medical Sciences, National Institute for Health Research Senior Investigator, Respiratory Theme Lead for Leicester NIHR Biomedical Research Centre, Director Institute for Lung Health and Honorary Consultant Respiratory Physician, Leicester, UK. He is Coordinator for the European Union Consortium AirPROM, MRC/ABPI COPD (COPDMAP) Consortium, the MRC Molecular Pathology Node EMBER and respiratory lead for the IMI 3TR. He was founding Director of the European Respiratory Society Clinical Research Collaborations and is the current ERS Science Council Chair. He is the national lead for the post-COVID consortium PHOSP-COVID and local research lead for the COVID-19 pandemic. His main research focus is on improving the clinical management and understanding the immunopathogenesis of the airway diseases asthma, chronic cough and COPD. He is a member of the American College of Chest Physicians' Cough Guidelines, the British Thoracic Society, American Thoracic Society/European Respiratory Society Severe Asthma Guidelines and is on the scientific committee for the Global INitiative for Asthma (GINA).

Professor Louise Brown is Professor of Medical Statistics and Clinical Trials. She has been working in clinical trials for over 25 years and joined the MRC Clinical Trials Unit as a senior statistician in March 2012. She works mainly on cancer trials, particularly those in stratified medicine and biomarker clinical validation. She focusses much of her time as the Project Lead for FOCUS4, a molecularly stratified adaptive trial programme in advanced colorectal cancer and Project Lead for STAMPEDE, a large adaptive clinical trial testing multiple treatments in advanced prostate cancer. She leads the statistical analysis for a number of stratified medicine projects in cancer including the SCORT and RE-IMAGINE MRC Stratified Medicine Consortia Programmes. She has an interest in diagnostic studies and led completion of the PROMIS study, which investigated the role of MRI in the diagnosis of prostate cancer. Her experience on large platform trials and biomarker driven studies lead to her involvement with the BEAT-Severe Asthma trial.

SPEAKERS' BIOGRAPHICAL DETAILS

Dr Graham Burns is a Consultant Physician and Honorary Senior Lecturer at the Royal Victoria Infirmary and University of Newcastle upon Tyne. He began academic life as a mathematician studying to postgraduate level in Nottingham and Cambridge. After deciding the raw pursuit of wealth in the City would not plug the existentialist gap, he explored a number of other diversions including acting, voluntary work in India and a year in the Lord Chancellors Department in Westminster before taking up Medicine.
Dr Burns studied medicine in Newcastle. The conceptual challenges of respiratory physiology drew him to the specialty. As a registrar he won an MRC fellowship, gained a PhD and was a visiting scientist and Honorary Lecturer in the Alfred Hospital, Melbourne. In 2002 he was appointed as Consultant Physician and Honorary Senior Lecturer in the Royal Victoria Infirmary and Newcastle University.
His clinical work is principally in COPD and asthma, including the specialist severe asthma service.
Dr Burns is currently President Elect of the British Thoracic Society. He is working with NHS England on developing early diagnostic pathways. He supervises a number of PhD students with research in: the psychological impact of chronic lung disease, the mechanisms of overlap between OSA and asthma, MRI imaging of the lung and physiological assessment of the small airways.

Professor Andrew Bush is Professor of Paediatrics and Paediatric Respirology, Imperial College and Royal Brompton Hospital, and Director, Imperial Centre for Paediatrics and Child Health. He is an emeritus NIHR Senior Investigator, and was the 2020 ERS Congress Chair awardee. His research interests include severe preschool wheezing and asthma, in particular the early origins of airway disease, and especially global differences in exposures and outcomes; clinical physiology; and rare lung diseases. Other important areas of interest are his six grandchildren (in his unbiased and evidence-based view, the most brilliant kids anywhere on the planet), South African wines, and embarrassing his own children by increasingly disgraceful behaviour.

Professor James Chalmers is the British Lung Foundation Chair of Respiratory Research at the University of Dundee and a Consultant Respiratory Physician at Ninewells Hospital. His research and clinical interests are in difficult lung infections. He chairs the European Bronchiectasis Registry (EMBARC) and chaired the 2017 ERS Bronchiectasis Guidelines, the 2020 ERS COPD inhaled corticosteroid guidelines and currently chairs the ERS COVID19 task force. He is current Deputy Chief Editor of the ERJ.

Dr Nazia Chaudhuri is a Respiratory Physician and the Clinical Lead for the Interstitial Lung Disease (ILD) Service at the Manchester University NHS Foundation Trust (MFT), UK. She is an Honorary Senior Lecturer at the University of Manchester. She is also Deputy Clinical Director of the Respiratory Directorate at MFT.
The MFT ILD tertiary service has established itself as one of the largest ILD units in the UK delivering exemplary care to over 900 new patients per year. Dr Chaudhuri is the clinical lead of a growing team consisting of five consultant colleagues, a clinical fellow, three ILD Specialist nurses, an ILD pharmacist and a multi-disciplinary team (MDT) co-ordinator.
She graduated from the University of Leeds with an honours degree in medicine and a BSc honours in genetics. She performed a PhD and published her work looking at the cellular interactions and signalling in response to infection and air pollution.
As an ILD specialist, Dr Chaudhuri has developed the local ILD service by enhancing the delivery of care by establishing a day case model to reduce waiting times, creating a clinical database and ensuring a presence on the internet by developing a website, Twitter and Facebook page. She has been instrumental in setting up and delivering a regional North West and Northern ILD network.
She is the principal investigator on a number of clinical research trials in idiopathic pulmonary fibrosis (IPF) and is the UK Chief Investigator of a major clinical trial on progressive ILDs. She is also co-applicant for a British Lung Foundation grant for a study in sarcoidosis.
Dr Chaudhuri has published her experience in prescribing antifibrotics and delivering MDT care and has presented over 30 abstracts pertaining to IPF, antifibrotics and the importance of a multi-disciplinary team approach at all major respiratory conferences.
She is a member of the British Thoracic Society (BTS) Lung Registry Steering Group for the BTS Sarcoid and IPF registry. She has been instrumental in ensuring that MFT is the biggest contributor to the BTS IPF Registry. She is also a medical adviser for the British Lung Foundation.

Dr Amelia Clive is a Respiratory Consultant at North Bristol NHS Trust, with a specialist interest in pleural disease. She qualified from University College

Medical School in 2004 and completed registrar training in the Severn Deanery. She has a PhD from the University of Bristol in malignant pleural disease and maintains a clinical and research interest in pleural disease management.

Dr Francesc Coll is a computational biologist with expertise in bacterial genomics and clinical microbiology. He joined the London School in July 2016 as a Postdoctoral Fellow in Professor Sharon Peacock's lab, funded by a Sir Henry Wellcome Postdoctoral Fellowship to work on the application of genome-wide association studies (GWAS) in bacteria. He has worked in the genomic epidemiology of Methicillin-Resistant *Staphylococcus aureus* and Vancomycin-resistance *Enterococcus faecium*. In October 2014, he completed his PhD at the School under the supervision of Professor Taane Clark, which focused on strain genotyping and drug resistance in *Mycobacterium tuberculosis* using whole genome sequencing.

Dr Robin Condliffe is a Consultant Respiratory Physician in the Sheffield Pulmonary Vascular Disease Unit. He is the Chair of the BTS Pulmonary Vascular Disease Specialist Advisory Group. He has published widely on clinical and radiological aspects of pulmonary vascular disease. He has been a member of guideline and clinical statement groups for out-patient PE management, pulmonary vascular exercise haemodynamics and pulmonary arteriovenous malformations and was a member of the 5th World PH Symposium Task Force.

Dr David Connell is Chair of the British Thoracic Society Pulmonary Infection Specialist Advisory Group and Consultant Respiratory Physician at Ninewells Hospital in NHS Tayside. His main clinical interests incorporate complex lung infections, particularly tuberculosis, chronic pulmonary aspergillosis, and non-tuberculous mycobacteria. He currently has a Chief Scientist's Office NRS Career Fellowship to study fungal lung infections, and during the ongoing pandemic was awarded a CSO grant as Chief Investigator for the Scottish FOcused LongitudinaL Observational Study to Improve KnoWledge of COVID-19 (FOLLOW-COVID).

Dr Sonya Craig is a sleep and respiratory physician working at University Hospital Aintree, Liverpool where she is Lead Clinician for Sleep Medicine. She trained at Cambridge University and the Royal Brompton Hospital, London before completing an MD investigating cardiovascular risk and obstructive sleep apnoea (MOSAIC trial) with Professor John Stradling in Oxford. Her main research interests are vascular risk in OSA and the delivery of sleep medicine and care effectively and efficiently within the NHS. She is part of the UK Sleep Research Network and her most recent publication is the results of the MERGE study published in the Lancet Respiratory, December 2019.

Dr Laurence MMJ Crombag is a Consultant Respiratory Physician at the Amsterdam University Medical Center (Amsterdam, the Netherlands) and Deputy Chair of the Department of Pulmonary Medicine, location AMC and VUmc. She has a PhD in endosonography. Her interventional pulmonology research group focus on thoracic oncology and innovational imaging including confocal laser endoscopy in lung and pleural diseases. Her clinical subspecialty interest is in thoracic oncology. Furthermore, she is actively involved in training and education, eg the certified ERS EBUS and Transthoracic Ultrasound educational programmes and the Dutch Basic Bronchoscopy course (endorsed by the NVALT).

Dr Phil Crosbie is a Senior Lecturer and Honorary Consultant in Respiratory Medicine at the University of Manchester. His main research interest is lung cancer with a specific focus on early detection and screening. He is a member of the national Targeted Lung Health Checks Expert Advisory Group. He is also Early Detection Lead for Cancer Research UK's Lung Cancer Centre of Excellence, a member of the National Cancer Research Institute's Lung Clinical Subgroup, co-chief investigator of the Yorkshire Cancer Research funded Yorkshire Lung Screening Trial and research lead for the Manchester Lung Health Check Programme.

Dr Rachel Davies has been a Consultant Respiratory Physician in the National Pulmonary Hypertension Service, Hammersmith Hospital, London and Honorary Senior Lecturer of Imperial College, since 2011. She has particular responsibility for running the genetics and transplant arms of this service as well as managing pregnant patients with pulmonary hypertension. She also has a keen interest in medical education and in 2012, she was appointed Training Programme Director of the North West Thames Respiratory Medicine Specialty Training Programme. She is Vice Chair of the National Respiratory Specialty Advisory Committee and is the lead for Quality in Training. She is actively involved in teaching both undergraduates and post-graduates as well as being an author of the

best-selling revision guide for MRCP, Cases for PACES. She is also a member of the BTS Council, Nominations Committee and also the Quality Improvement Committee.

Dr Henricus J de Koning MD PhD is Deputy Head and Professor of Public Health and Screening Evaluation, Department of Public Health, Erasmus MC University Medical Centre, Rotterdam, The Netherlands. His major scientific contributions are in the areas of (1) designing, running and evaluating (often large-scale) multidisciplinary population-based randomized controlled screening trials to establish the efficacy of screening, (2) evaluating active (inter-) national screening programmes and clinical tests to establish effectiveness and (3) guiding public health policies on screening and primary prevention using predictions of favourable and unfavourable effects and the cost of interventions, based on micro-simulation modelling of the natural history of disease, risk-prediction modelling and cost-effectiveness and cost-utility analyses. Their multidisciplinary and international research results in recommendations on whether or not to introduce screening, surveillance or other preventive interventions for specific diseases and on policy decisions to introduce it in specific ways, either at population level or in (high risk) patients.
His PhD on the cost-effectiveness of breast cancer screening was one of the first Health Technology Assessments in the Netherlands, and one of the first on breast cancer screening in the world. It was the first to include the unfavorable effects of screening into such an analysis and led to the design and implementation of the Dutch programme. He had a shared responsibility for designing the ERSPC trial on prostate cancer screening, which included establishing the screening interval, core age groups, power and monitoring plan (Secretary Data Monitoring Committee), and set up and chaired the international committee charged with reviewing the primary outcome of the trial.
He is PI of the NELSON Lung Cancer Screening Trial and designed the entire trial in all its facets (sole trial with different screening intervals). This trial was the first to show that lung nodules detected by CT scanning can be managed safely with conservative follow-up schedules when including volume-doubling times in the algorithm, and is the largest trial without screening in the control arm.
He was PI of the sole RCT on screening for language disorders in 11,000 toddlers, and is PI of the ROBINSCA trial through an Advanced Researcher Grant (2011), to assess the (cost-) effectiveness of screening for cardiovascular disease.
They are further responsible for the monitoring and evaluation of the Dutch Breast, Cervical and Colorectal Cancer Screening Programme, and presently have HORIZON2020-projects to evaluate breast, cervical and colorectal cancer screening in Europe (coordinator), and evaluate (and implement) vision and hearing screening in Europe (substitute coordinator). They are co-PI in seven CISNET (NIH/NCI-funded) projects, aimed at modelling and predicting the impact of interventions in breast, prostate, lung, colorectal, esophageal, colorectal and cervical cancer. These have led to substantial influences in policy making, perhaps most prominently their recent analyses on lung cancer screening for the USPSTF, which have led to insurance coverage of low-dose CT screening according to their recommended eligibility in the US. Much of their work also has direct implications to patient care, eg in the guidelines of the British Thoracic Society on pulmonary nodules, legislation in screening for child abuse at emergency departments, guidelines evaluating screening for late-effects in children treated for cancer, MRI-guidelines for high risk breast patients, surveillance guidelines after adenoma detection, eligibility criteria for active surveillance in prostate cancer patients, trial criteria for breast cancer patients with ductal carcinoma in situ (DCIS) and prenatal screening.

Professor Ratko Djukanovic MD, DM, FRCP, FERS is Professor of Medicine, University of Southampton, and Southampton BRC Lead of the Respiratory Theme. His research focuses on airway immune and inflammatory mechanisms induced by allergen and infectious agents, determinants of asthma severity and identification of biomarkers that enable its stratification into phenotypes and endotypes. He has led several studies of efficacy and mechanisms of action of new asthma drugs. He is the cofounder of U-BIOPRED, a European Consortium stratifying severe asthma into new endotypes and phenotypes. More recently he has founded (with Professor Elisabeth Bel as co-chair) the ERS Severe Asthma Clinical Research Collaboration, SHARP.

Dr Rodger Duffin is a Reader in Respiratory Medicine within the Centre for Inflammation Research at the University of Edinburgh and a well-established expert in thoracic toxicology, particularly in relation to particle and fibre-mediated disease. He has published over 100 peer-reviewed papers, reviews and book chapters on the toxicology of pathogenic particles and

the processes of inflammation. He is head of the ELEGI Colt research Laboratory where his current research interests are focussed on the mechanisms controlling inflammatory processes from initiation to resolution and also understanding the potential toxicology surrounding environmental and occupational nanoparticle exposures.

Dr Hannah Durrington is a Senior Clinical Lecturer at the University of Manchester and an Honorary Respiratory Consultant at Wythenshawe Hospital, MFT. Her research investigates the rhythmicity of asthma in terms of symptoms experienced and diagnostic features, as well as underlying lung function and inflammatory processes. The daily fluctuation in lung function in asthma is mediated by the circadian timing system, and disruption of the circadian system (eg in shift work) impacts disease incidence and severity. Animal studies from her lab implicate the altered activity of inhibitory clock gene Reverbα in rhythmic exacerbation of lung disease.

Dr Rachel Edgar's research focuses on biological timing and viral diseases. She completed her PhD in 2011 at the University of Cambridge, working on the kinetics of viral transmission between cells, then pursued her interest in circadian biology as a post-doctoral researcher at the Institute of Metabolic Science and MRC Laboratory of Molecular Biology. In 2017, Dr Edgar was awarded a Wellcome Sir Henry Dale Fellowship and moved to Imperial College London, where her lab investigates the impact of the circadian clock on viral replication and pathogenesis.

Professor Paul Ekins has a PhD in economics from the University of London, an Hon DSc from the University of Keele, and is Professor of Resources and Environmental Policy, and Director of the UCL Institute for Sustainable Resources, at University College London. His academic work focuses on the conditions and policies for achieving an environmentally sustainable economy. He is an authority on a number of areas of energy-environment-economy interaction and environmental policy, including: sustainable development assessment methodologies; scenarios, modelling and forecasting; resource productivity; sustainable energy use; the adjustment of national accounts to take account of environmental impacts; environmental economic instruments and ecological tax reform; and environment and trade. www.bartlett.ucl.ac.uk/sustainable

Dr Rachael Evans is an Associate Professor (Clinical) at the University of Leicester and Honorary Consultant Respiratory Physician at Glenfield Hospital, Leicester, UK. She currently holds an NIHR Clinician Scientist Fellowship to improve diagnostic pathways and understand the prognosis of people presenting with chronic breathlessness to primary care. She is the lead (clinical) co-investigator of the 'PHOSP-COVID' consortium, a UK study of adults post-hospitalisation with COVID-19 and also the clinical lead for her local COVID-19 follow-up service.

Dr Johanna Feary MRCP (UK), PhD, MSc is a Senior Clinical Fellow in Occupational and Environmental Medicine at the NHLI, Imperial College and an Honorary Respiratory Consultant at Royal Brompton Hospital, a combination of roles that allows her to carry out clinical work and research as well as teaching. She has a particular interest in occupational asthma and other airways diseases and in the aetiology of hypersensitivity pneumonitis. She was previously a member of the BTS SAG on Occupational and Environmental Medicine and is an active member of GORDS (Group of Occupational Respiratory Disease Specialists) UK.

Debbie Field RN, Dip Nursing, BSc Nursing (Hons), PhD Philosophy, MA Medical Humanities (Distinction), trained at Kings College Hospital London as a state registered nurse. She has been a nurse since 1979 and during this time has seen many changes within nursing and healthcare. However, the essence and fundamental principle of nursing in any specialty has not changed; this is the compassion we give to the patients we care for. At times it may go beneath the surface and get lost within the bureaucratic milieu, which is driven by protocols, evidence-based medicine, lack of imagination, nursing's obsession for professionalism and our healthcare's 'risk adverse' culture. Yet if compassion is valued it puts the patient back into the centre of care allowing all healthcare practitioners to help and support the patient through their journey towards being healed.
This is what drives her passion for caring for patients who have complex ventilation needs in both the hospital and community setting.
Debbie currently runs the community/hospital outreach team for the Sleep and Ventilation Unit at the Royal Brompton and Harefield Hospitals, to meet the needs of a unique group of patients who either require weaning from prolonged ventilation in other critical care units or have long term complex ventilation needs

and require support and care in the community. Setting up such a service depends upon collaboration between hospitals and community, building partnerships and proactive pathways between the two ensuring effective communication.
Currently the outreach team consists of Debbie and her colleague Steve! But the aim is to build it up into a team of five to six practitioners including nurses, physiotherapists, doctors and clinical physiologists with some roles being rotational. So watch this space!

Professor Elizabeth Fireman was born in Argentina and moved to Israel in1965 where she graduated from Tel Aviv University. Her present position is Associate Professor at the Department of Occupational and Environmental Health, School of Public Health of Tel Aviv University. Her research focuses on the bio-monitoring of workers exposed to UFP and NP in order to assess the impact of industrial exposure to nanoparticles on pulmonary function impairment with the aim of testing the superiority of a bio-monitoring approach over environmental monitoring. This hypothesis was supported by more than 25 grants, and most of her 120 peer-reviewed papers.

Dr Julian Forton is a Consultant in Paediatric Respiratory Medicine at the Children's Hospital for Wales in Cardiff. He leads the CF-SpIT research group, a small group of clinicians and scientists studying how best to sample and monitor airway pathogens and microbiome evolution in young children with cystic fibrosis. He is Clinical Senior Lecturer and Education Lead for Child Health at Cardiff University School of Medicine. He is a co-author of the Oxford Handbook of Paediatric Respiratory Medicine.

Professor Stephen Fowler is a Professor of Respiratory Medicine at the University of Manchester and Honorary Consultant Respiratory Physician at Manchester University NHS Foundation Trust. His clinical and research interests lie in the diagnosis, classification and management of airways disease, principally asthma and associated conditions such as inducible laryngeal obstruction and breathing pattern disorders. He is investigating novel non-invasive biomarkers for phenotyping inflammatory and infectious lung disease, through the detection and analysis of volatile molecules in exhaled breath.

Dr Julie Gibbs is a Senior Lecturer at the University of Manchester within the Centre for Biological Timing. Previously she was a Versus Arthritis Career Development Fellow at the University of Manchester, following a PhD in Neuroscience from King's College London. Her research interests include addressing how the circadian timing system regulates immunity and the role of the clock in regulating chronic inflammatory disease.

Professor Bibek Gooptu is a Consultant Respiratory Physician at Glenfield Hospital Leicester and Professor of Respiratory Biology at the NIHR Leicester BRC/Institute for Lung Health and Leicester Institute of Structural and Chemical Biology. His subspecialty interests are α1-antitrypsin deficiency and ILD. His research combines structural, cell and tissue biology to define molecular mechanisms that mediate these conditions, and develop therapeutic strategies to target them. Since the onset of the COVID-19 crisis, his group have studied how the pro-inflammatory, pro-fibrotic pathways they study in pulmonary fibrosis and acute exacerbations are triggered by initial viral spike protein:host cell interactions.

Dr Lisa Gralinski PhD is an Assistant Professor in the Department of Epidemiology at the University of North Carolina. She completed her PhD at the University of Michigan studying mouse adenovirus and a postdoctoral fellowship researching human coronaviruses with Dr Ralph Baric at UNC. Dr Gralinski's research focuses on virus-host interactions that contribute to the development of severe respiratory disease after human coronavirus infection. In particular, she is interested in the impact of natural host genetic variation and how dysregulation of the host immune response contributes to viral pathogenesis. You can follow her on Twitter @ LisaGralinski

Dr Theresa Guilbert MD, MS is a Professor at the University of Cincinnati and the Director of the Asthma Center at Cincinnati Children's Hospital and Medical Center (CCHMC). She has 20 years of experience in providing clinical care to children and adolescents with preschool, childhood and severe asthma particularly in youth from economically disadvantaged neighborhoods. Dr Guilbert also has interest in using technology for novel care delivery systems and has developed a telehealth clinic which serves several urban core school-based health centers. She also has 20 years of experience in and conducting clinical, translational and epidemiologic research. Dr Guilbert's clinical research focuses on identifying the roles of risk factors, exposures, and environment

interactions that lead to early childhood wheezing and severe asthma. She has participated in the steering committees and collaborated with the other center PIs in the NIH funded Childhood Asthma Research and Education, AsthmaNet and Severe Asthma Research Program networks which were created to develop and execute innovative clinical asthma studies in children. Dr Guilbert is currently the site PI for several multi-center asthma trials in both preschool- and school-aged children.

Dr Frances Hall studied Medicine and, later, gained a DPhil at Oxford University. She was a postdoctoral fellow at Stanford University in California from 1997 to 2000. She is currently a Consultant Rheumatologist at Addenbrooke's Hospital in Cambridge with a subspecialist interest in connective tissue disease. Together with Professor David Jayne, she is co-Chief Investigator on the TACTIC-R clinical trial of Baricitinib and Ravulizumab in COVID-19. Dr Hall is the Chair of the Eastern Network for Rare Autoimmune Diseases and Chair of the East Anglian Rheumatology Society. She is also a Fellow of Sidney Sussex College in Cambridge.

Dr Iram Haq MBBS, MRes, MRCPCH, PhD is an NIHR Clinical Lecturer and Paediatric Respiratory Grid Trainee based within the Translational Clinical Research Institute at Newcastle University and the Great North Children's Hospital in Newcastle upon Tyne. She completed her PhD last year, where she investigated the role of paediatric airway epithelial culture models to specifically determine the relevance of alternative ion channels as a therapeutic strategy in cystic fibrosis. In her current role, she is continuing her research in this area in addition to her other clinical interests in paediatric long-term ventilation and sleep medicine.

Dr Mark Higgins trained as a physician in the UK. He is a Senior Clinical Development Fellow at Vertex focused on the respiratory portfolio across the International (ex-US) region. Mark has worked in pharma clinical development for 16 years and specifically in Cystic Fibrosis Clinical Development for about a decade. He has led three different CF products to Regulatory approval. More recently, Mark is working with the Alpha-1 Antitrypsin Deficiency (AATD) team.
Mark's experience at Vertex has also included working with the International Medical Affairs team with the responsibilities of providing clinical data expertise, supporting Vertex Investigator Initiated Studies and Vertex Innovation Award programmes.

Professor Dame Sue Hill is the Chief Scientific Officer for England and the head of profession for the healthcare science workforce in the NHS and associated bodies, providing professional leadership and expert clinical advice across the health and care system.
Sue is also the Senior Responsible Officer for Genomics in NHS England, driving the programme to introduce an NHS-wide Genomic Medicine Service transforming care pathways across a wide range of clinical conditions. This builds on her work in leading the NHS contribution to the 100,000 Genomes Project.

Dr Claire Hogg is a Consultant in Paediatric Respiratory Medicine at Royal Brompton Hospital and Professor of Practice at Imperial College London. She has a special interest in Primary Ciliary Dyskinesia and leads the clinical service for PCD diagnostics in London. She leads a research group with a focus on translational research to develop novel and advanced diagnostic techniques, including a special interest in machine learning tools for clinical diagnostics and research applications. Claire is also a partner on multiple international consortia for PCD and ciliopathies, Head of the BEAT-PCD Training School and was UK PI on the first multinational clinical trial for PCD.

Dr James Hull is a Consultant Respiratory Physician at the Royal Brompton Hospital (RBH) and an Associate Professor at the Institute of Sport, Exercise and Health (ISEH), UCL. He is clinical lead for the unexplained breathlessness and chronic cough services at RBH and has a specialist clinical and research sports pulmonology clinic at ISEH. He is a specialist advisor to the International Olympic Committee, English Institute of Sport and UK Anti-doping and UEFA on sport-related respiratory issues.

Dr Thomas Jackson is a geriatrician and clinical academic working as a Clinician Scientist and Visiting Consultant in Geriatric Medicine in the Institute of Inflammation and Ageing at the University of Birmingham and Queen Elizabeth Hospital. His research focuses on the immune inflammatory basis of delirium and frailty. During the COVID-19 pandemic, Dr Jackson co-developed and led a multispecialty rehabilitation ward specifically for patients with complex needs post ITU.

Dr Joseph Jacob qualified in medicine from Imperial College, worked for Médecins sans Frontières for two

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years and completed radiology training at Kings College Hospital, London. He completed an MD(Research) with Imperial College under Professor David Hansell at the Royal Brompton Hospital in 2016 and was awarded a 5-year Wellcome Trust Clinical Research Career Development Fellowship in 2018. His research at University College London centers on computer-analysis of CT imaging in lung disease. He has co-authored over 75 papers, won national and international awards for his work and was awarded the 2017 best thesis prize by the National Heart and Lung Institute.

Professor Sam Janes won an MRC Training Fellowship to perform a PhD and then a post-doctoral period working in the CRUK Lincoln's Inn Fields Institute with Fiona Watt working on stem cell biology. He then moved as an MRC Clinician Scientist to UCL leading a group interested in the role of stem cells in lung cancer pathogenesis and treatment of lung disease using cell therapies. He was awarded a Wellcome Trust Senior Clinical Fellowship in October 2010 to work on novel cell therapies for lung cancers resulting in a DPFS first-in-man award and in 2015 won his Wellcome Senior Fellowship renewal to study the genetic and cellular changes in lung cancer pathogenesis. He is the lead of four academic randomised clinical trials and most notably recently launched the SUMMIT study, a 25,000 participant London based study examining CT and blood screening for lung and other cancers. Sam works as a Respiratory Consultant at UCLH with a particular interest in lung cancer, mesothelioma, interventional and diagnostic bronchoscopy and early lung cancer detection. He is Head of the Respiratory Research Department at UCL and Vice-Chair of the National 'Clinical Expert Group' on Lung Cancer.

Dr Alison John is a Senior Research Fellow working within the Division of Respiratory Medicine at the University of Nottingham. She earned her undergraduate degree in physiology and pharmacology at the University of Sheffield and her PhD in the Department of Paediatrics at Sheffield Children's Hospital. She completed Research Fellowships at the University of Michigan and at the Sir William Dunn School of Pathology, University of Oxford where she was awarded the Chemocentryx Fellowship in Chemokine Biology and appointed Lecturer of Pathology at Worcester College. Her most recent research focused on preclinical evaluation of novel inhaled $\alpha v\beta 6$ inhibitors for use in the treatment of lung fibrosis and included developing SPECT-CT imaging modalities as non-invasive methods for assessing alveolar $\alpha v\beta 6$ integrin expression.

Dr Caroline Jolley is a Senior Lecturer in Human Physiology in the Centre for Human and Applied Physiological Sciences, King's College London, and an Honorary Consultant Physician in the Department of Respiratory Medicine, King's College Hospital, London. Caroline's principal clinical and academic interest is the use of physiological measures of respiratory muscle function and neural respiratory drive to better understand the pathophysiology of breathlessness, exercise limitation and respiratory failure in chronic respiratory disease.

Professor Onn Min Kon is a Respiratory Physician and Head of Service of the TB Service at Imperial College Healthcare NHS Trust. He is the Chair of the British Thoracic Society Joint Tuberculosis Committee and the National MDRTB Clinical Advice Service. Professor Kon is Professor of Respiratory Medicine at Imperial College and has interests in respiratory infections and the clinical and immuno-diagnosis of TB, the delivery of care and management of TB. He organises the annual London Advanced TB Course and has over 100 peer reviewed publications in tuberculosis and airway disease.

Professor Martin Landray MB ChB PhD FRCP is Professor of Medicine and Epidemiology at the Nuffield Department of Population Health and Acting Director at the Big Data Institute, University of Oxford, UK. He leads the clinical trials programme for Health Data Research UK and NHS DigiTrials, the national health data hub for clinical trials. His research focuses on the use of digital technology and quality-by-design principles for large randomized trials of treatments for cardiovascular and kidney disease. He is co-chief investigator of the RECOVERY trial, the national priority platform trial of potential treatments for patients hospitalised with COVID-19 in the UK.

Professor Jane Lucas is a Professor of Paediatric Respiratory Medicine at the University of Southampton. Clinically Jane leads the National Primary Ciliary Dyskinesia (PCD) Centre in Southampton. Her respiratory research is focused on understanding the pathophysiology of PCD and improving management of patients with this disease. She also investigates the role of ciliated respiratory epithelium in disease and health, including the interaction between cilia and bacteria or viruses. She is investigating associations between patients' genotypes and their clinical phenotype, and

novel approaches to diagnose PCD. Jane's programme closely integrates clinical service, research and education, and the team compromises clinicians, laboratory scientists and social scientists.

Dr John Maher is a Clinical Immunologist who leads the "CAR Mechanics" research group within King's College London. He played a key role in the early development of second generation (CD28) CAR technology while a visiting fellow at Memorial Sloan Kettering Cancer Center, an approach that has achieved clinical impact in haematological malignancies. His research group is focused on the development of adoptive immunotherapy using CAR engineered and gamma delta T-cells, with a primary emphasis on solid tumour types. He is also the scientific founder and Chief Scientific Officer of a spin-out company named Leucid Bio. In addition, he is a Consultant Immunologist within King's Health Partners and Eastbourne Hospital.

Dr Hayley Mainman is a ST7 Respiratory Trainee in the Northern Deanery and during her specialist training has developed an interest in occupational lung disease. She is a member of the GORDs group and trainee representative on the BTS Occupational and Environmental Lung Disease Specialist Advisory Group. Recently she has been part of the group writing the occupational asthma quality statement. Hayley would love to continue her interest in this area of respiratory medicine into her consultant career.

Professor Adel Mansur PhD, FRCP is Consultant Physician and Honorary Professor at the University Hospitals Birmingham and University of Birmingham, UK. He graduated from Tripoli/Libya Medical College and undertook postgraduate medical training in Glasgow and Dudley and higher medical and respiratory training in Leeds and the West Midlands. He was awarded a doctorate in asthma genetics by the University of Leeds in 1998 and has been a Consultant Physician at Birmingham Heartlands Hospital since 2002 and was recently awarded Honorary Chair in Respiratory Medicine by the University of Birmingham. He holds special interest in severe and difficult to treat asthma and has been the lead for the Birmingham Regional Severe Asthma Service which covers the West Midlands and beyond since 2002. Professor Mansur has developed a multidisciplinary approach to the management of difficult to treat asthma and an active research programme composed of strands ranging from asthma genetics, biomarkers in asthma, diagnostics, adherence, phenotyping, asthma therapeutics including biologics, psychosomatic disorders, upper airway dysfunction and allied co-morbidities. He has authored approximately 100 peer reviewed articles.

Professor Refiloe Masekela MD, PhD is a Paediatric Pulmonologist and Head of the Department of Paediatrics and Child Health at the University of KwaZulu Natal, Durban, South Africa. She is the Vice-Chair of the Pan African Thoracic Society and co-Director of the PATS-MECOR programme. Her research interests are in asthma and chronic lung disease in African children.

Professor Nick Maskell is a Professor of Respiratory Medicine at the University of Bristol (UoB) and Honorary Consultant Chest Physician at North Bristol NHS Trust. He was appointed as a consultant there in 2004. He leads the pleural service at Southmead Hospital and is the Head of the Academic Respiratory Unit at UoB. Nick has a major interest in mesothelioma, running a tertiary mesothelioma clinic and chairing the weekly regional mesothelioma MDT. He chaired the current BTS mesothelioma guideline group and was on the committee for the ERS mesothelioma guidelines. He also is the CI of a number of NIHR funded multi-centre pleural disease RCTs and is a co-chair of the forthcoming BTS pleural disease guidelines (2021). He advises the NPSA on safety matters related to pleural interventions.

Dr Paul McNally is a Consultant in Paediatric Respiratory Medicine and Director of Research and Innovation at Children's Health Ireland. He is an Associate Professor of Paediatrics at RCSI in Dublin. Paul's main research interest is early CF lung disease and response to CF modulator therapies.

Dr Jamilah Meghji is a Senior Respiratory Registrar at Imperial College NHS Healthcare Trust, with a strong clinical interest in respiratory infection. She holds a Masters in Public Health and a PhD in Tropical Medicine, and is currently an MRC Skills Development Fellow with the Liverpool School of Tropical Medicine. Her post-doctoral research is focused on developing strategies to improve the management of post-TB lung disease in resource-poor settings.

Dr Rachel Mercer is a Respiratory Registrar who has completed a pleural research and clinical fellowship in Oxford University Hospitals. She is completing her PhD in the management of malignant pleural disease. Her interests include pleural disease and lung cancer

and she is currently working on the British Thoracic Society Pleural Guidelines Committee.

Dr Marc Miravitlles MD, FERS is Senior Researcher and Consultant at Vall d'Hebron University Hospital in Barcelona. His research interests include COPD and alpha-1 antitrypsin deficiency (AATD). He was Chair of the Respiratory Infections Group of the European Respiratory Society (ERS) and Guidelines Director of the ERS. He has acted as a consultant for the development of international guidelines of COPD, including the American Thoracic Society (ATS)/ERS guidelines on exacerbations of COPD and the ERS statement on management of AATD. He is also a consultant of the Spanish Ministry of Health for the development of the National Strategy Against COPD. He is the coordinator of the Spanish National Guidelines for COPD.

Dr Maria Molina Molina is Coordinator of the ILD Unit at the the Bellvitge University Hospital, Chief of the Pulmonary Research Group, the Bellvitge Biomedical Research Institute (*IDIBELL*) and Associate Professor at the University of Barcelona.
Significant professional activities include: ILD Member of European Initiatives; ChILD-COST, RD-Connect, ERN Lung-ILD partner. Director of PII EPID SEPAR, Secretary of the Group Rare-ILD (Assembly 12), ERS, CIBERES researcher. Advisory International Panels; IPF-AIR Europa, Roche, Boehringer Int, Galapagos. Scientific Advisory Boards for: Esteve-Teijin, Roche, Boehringer Int, Pfizer, Galapagos.
In 2003, Dr Molina Molina won the Final Specializing Training Award, Hospital Clínic Barcelona and in 2008, the Lección Joven SEPAR (a national award for young pulmonologists). She is a reviewer and sits on the editorial boards of various respiratory journals, including ERJ, Am J Respir Crit Care Med, Respirology, Resp Research, Arch Bronconeumol.
She is, or has been, Principal Investigator in 16 clinical trials in ILD (IPF, FPF, alveolar proteinosis, LAM, progressive PF, unclassifiable progressive pulmonary fibrosis) and Investigator in international multicentre networks for ILDs: EuIPF Registry, DNA consortium, ILD REG Group, ARIANE IPF-Registry.

Professor Mike Morgan is a Consultant Respiratory Physician at the Department of Respiratory Medicine, Allergy and Thoracic Surgery at the University Hospitals of Leicester NHS Trust at Glenfield Hospital and Honorary Professor at the University of Leicester. He was formally the National Clinical Director for Respiratory Services in England and Chair of the Clinical Reference Group for Respiratory Specialised Commissioning. He is also a past President and Chairman of the British Thoracic Society.

Dr Julie Morisset is an Assistant Clinical Professor at the Université de Montréal. She works at the interstitial lung disease clinic and lung transplant programme of the Centre Hospitalier Universitaire de l'Université de Montréal. She completed an interstitial lung disease fellowship and master's in clinical research at the University of California, San Francisco. Her research focuses on hypersensitivity pneumonitis and the multidisciplinary approach to interstitial lung disease diagnosis.

Professor Andrew Morris CBE MD FRCP FRSE FMedSci has been the inaugural Director of Health Data Research UK since August 2017. HDR UK is the national institute for health data science, with a mission to unite the UK's health data to enable discoveries that improve people's lives.
Andrew was Chief Scientist at the Scottish Government Health Directorate (2012-2017) and currently chairs the Scottish COVID-19 Advisory Group, which supports and provides analysis to the Scottish Government and senior clinical advisors.

Dr Deborah Morris-Rosendahl is a Consultant Clinical Scientist, who heads the Clinical Genetics and Genomics Laboratory (CGGL) in the Royal Brompton and Harefield NHS Foundation Trust, London, UK. She is the Scientific Director of the London South Genomic Laboratory Hub (GLH), which is one of seven GLHs delivering genetic testing in the new NHS Genomic Medicine Service. As an Honorary Senior Research Fellow in Imperial College London, her current research focuses on inherited cardiac and respiratory conditions.

Dr Hazel Morrison is a Clinical Research Fellow working at the Jenner Institute for Vaccine Research, Oxford. Her research interests include tuberculosis vaccine development and human challenge models, including the use of BCG as a mycobacterial challenge agent. She is undertaking a DPhil looking at the adaptive immune responses to aerosol BCG challenge. She has also been working on COVID-19 vaccine development as part of the Oxford COVID-19 vaccine trial.

Professor Kevin Mortimer is a Professor of Respiratory Medicine at the Liverpool School of Tropical Medicine (LSTM), an Honorary Consultant at

Liverpool University Hospitals NHS Foundation Trust and Director of Lung Health for the International Union Against Tuberculosis and Lung Disease. He is also Director of the NIHR Global Health Research Unit on Lung Health and Tuberculosis in Africa at LSTM and Chair of the BTS Global Health Group. He is interested in developing solutions to the lung health needs of the world's poor, including tackling global inequalities in access to basic effective care for lung diseases.

Rachael Moses spent the first 13 years of her career in the Newcastle Upon Tyne Hospitals before her first clinical specialist role in 2013 at St Georges Hospital, London. A Consultant Respiratory Physiotherapist by background, she is currently working at the Royal Brompton and Harefield Foundation Trust as the Associate Director of Rehabilitation and Therapies. Rachael is proud to be BTS President-Elect and is also a Chartered Society of Physiotherapy Council member and Honorary Student President, Co-Chairs the HMV-UK Committee, is Placement Co-ordinator for Medical Aid for Palestinians, Multimedia Editor for Thorax BMJ and Vice Chair of her trust's LGBTQIA+ Network.

Dr Ian Mudway is a Senior Lecturer at the MRC Centre for Environment and Health, Environmental Research Group, Imperial College London, UK. He is also a member of the Asthma UK Centre in Allergic Mechanisms of Asthma and NIHR Health Protection Research Unit in Environmental Exposures and Health. He has over 25 years of experience researching the impacts of air pollution on human health, with his current work focused on understanding early life impacts of pollutants on the development of the lung and cognitive function in children living within urban areas, as well impact of air pollution mitigation schemes on public health.

Dr Rebecca Nantanda is a Paediatrician and Post-Doctoral Research Associate at Liverpool School of Medicine (LSTM), UK. She is also a Senior Research Fellow at Makerere University Lung Institute, Uganda. She has been involved in clinical care and research on respiratory diseases in children for the past 12 years with specific focus on pneumonia and asthma. She is also involved in pre-service and in-service training of health care professionals. Dr Nantanda is a co-Chair of the Asthma Management Working Group of The UNION, founding member of the Africa Paediatric Lung Function Working Group and Immediate Past President of the Uganda Paediatric Association.

Dr Claire Nolan is a Senior Research Physiotherapist at Harefield Respiratory Research Unit. She is also the co-Chair of the BTS Pulmonary Rehabilitation Specialist Advisory Group. Her research interests are pulmonary rehabilitation, functional performance and physical activity and she is currently working on projects investigating different rehabilitation strategies for patients with chronic respiratory disease.

Dr Brij Patel is a Clinical Senior Lecturer in the Division of Anaesthetics, Pain Medicine and Intensive Care at Imperial College London and a Consultant in Intensive Care Medicine at the Royal Brompton and Harefield NHS Foundation Trust. He is lead for critical care research and recently appointed as chair to co-ordinate the Trust's research response to the COVID-19 pandemic. He runs a clinical translational research programme including urgent public health badged clinical studies investigating the pathophysiological response in acute respiratory distress syndrome, in particular how cellular death may be theranostic in patients with severe acute respiratory failure.

Dr Dhiren Patel did his BSc in Biomedical Sciences at King's College London between 2009 and 2013, which included an internship at Novartis in California. In 2013, Dhiren began his PhD in the National Heart and Lung Institute in Imperial College London under the supervision of Dr Robert Snelgrove. In 2017, Dhiren remained in the Snelgrove lab for his postdoctoral training where he continued his work on exploring the role of neutrophils in asthma. In November 2020, Dhiren relocated to Berlin to commence his postdoctoral training under Professor Arturo Zychlinsky in the Max Planck Institute for Infection Biology.

Professor Jean-Louis Pépin is Professor of Clinical Physiology at the University Grenoble-Alpes (UGA) and Head of the Clinic of Physiology, Sleep and Exercise at Grenoble University Hospital (CHUGA). He is Director of the HP2 Laboratory (Inserm U1042, UGA: Hypoxia Pathophysiology), vice-Dean of the Faculty of Medicine in charge of research, and Scientific Director of clinical research at CHUGA. He is the Director of the UGA Chair of Excellence in e-health and integrated care and the Artificial Intelligence Chair of "Trajectories Medicine" (2018-2021).
Professor Pépin graduated as MD in 1987 (University of Montpellier), MSc in 1990 (biophysiology, University Claude Bernard, Lyon) and PhD in 1998 (cardiovascular adaptations induced by chronic hypoxia, University

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Joseph Fourier, Grenoble). In 1999, he was visiting Professor at the Laboratory of Pulmonary Physiology of Harvard University, Boston, MA. He achieved European certification in sleep medicine in 2013. His interests include clinical and translational research on cardiovascular consequences of chronic and intermittent hypoxia, sleep apnoea, chronic obstructive pulmonary disease, and chronic respiratory failure. He runs the French National Registry of Sleep Apnoea (> 120,000 subjects) and is involved in the European Sleep Apnoea Database (ESADA). He participates in several European and US thoracic society task forces. He is ranked by Expertscape as the 3rd highest expert worldwide in the field of sleep apnoea. Professor Pépin is author or co-author of > 450 scientific publications (H=58). He is the former President of the French Sleep Research and Medicine Society and Associate Editor of THORAX (Impact Factor >10.0, a reference journal in the field of sleep medicine). He has experience in innovation (>10 patents), in clinical trials and in industrial partnerships. He was the PI of OPTISAS, a national telemedicine trial on sleep apnoea (1.9 M€), LIFE, a transdisciplinary research programme involving 70 researchers on evidence-based societal and environmental control of chronic diseases, funded by UGA-IDEX (1.7 M€). He is funded by EIT-Health for several EU projects.

Professor Sir Munir Pirmohamed MB ChB, PhD, FRCPE, FRCP, FBPhS, FMedSci is David Weatherall Chair in Medicine at the University of Liverpool, and a Consultant Physician at the Royal Liverpool University Hospital. He is Director of the MRC Centre for Drug Safety Sciences, and Director of the Wolfson Centre for Personalised Medicine. He is also Director of HDR North, an inaugural NIHR Senior Investigator, Fellow of the Academy of Medical Sciences in the UK, Commissioner on Human Medicines and is a non-executive director of NHS England. Sir Munir has been appointed as President of the British Pharmacological Society. He was awarded a Knights Bachelor in the Queen's Birthday Honours in 2015. His research focuses on personalised medicine, clinical pharmacology and drug safety.

Dr Alastair Proudfoot is an Intensive Care Consultant at St Bartholomew's Hospital, London, but also spends part of his time at Berlin Heart / Charite as a clinician scientist. Whilst he is proud to have trained in respiratory medicine in NW London and did his PhD at Imperial/Cambridge investigating human models of ARDS, having spent a year's fellowship in the USA, he developed a clinical and research interest in cardiogenic shock. Between March and May 2020, he was seconded from Barts to lead the Nightingale Hospital, a temporary ICU built within the Excel centre in East London.

Dr Louis Ptáček is Distinguished Professor of Neurology at the University of California, San Francisco. He has used the tools of human genetics in the study of patients with an impressive range of human phenotypes. He pioneered the field of "Channelopathies" which encompasses a large group of episodic/electrical disorders of muscle, heart, and brain. He systematically cloned and characterized all the genes causing a variety of familial periodic paralyses. All encode ion channels and work from his and other labs has shown that homologs of these are the cause of some forms of cardiac arrhythmias, epilepsy, and migraine headache. Subsequently, his group has done extensive work in characterizing the functional consequences of disease-causing mutations. In another line of work motivated by a family with an interesting phenotype, Dr Ptáček has now embarked into the challenging field of behavioural genetics. He and his colleague, Ying-Hui Fu, study the genetics of human sleep phenotypes.
Dr Ptáček serves on a number of editorial boards including eLife, Journal of Neuroscience, and the Journal of Clinical Investigation. He is Editor-in-Chief of the journal Neurogenetics. He is a member of the National Academy of Medicine, the American Association of Arts and Sciences, and the National Academy of Sciences.

Dr Michelle Ramsay is Consultant Respiratory Physician in the Lane Fox Unit, Guy's and St Thomas' NHS Foundation Trust, London. She graduated from King's College London in 2004 and continued her medical training in South West London, Surrey and Sussex. She spent four years completing a PhD at the Lane Fox Unit, St Thomas' Hospital working with the London Respiratory Muscle Group working on respiratory muscle physiology and non-invasive ventilation. The focus of her research is in patient ventilator interaction and non-invasive ventilation. Dr Ramsay has worked as a consultant at the Lane Fox Unit since 2016. Her clinical interest is in ventilatory failure, non-invasive ventilation, ventilation during sleep and neuromuscular disease where she is a clinical lead for the Motor Neurone Disease Service.

Dr Emma Rawlins is a Senior Group Leader and MRC Senior Non-Clinical Fellow based at the Gurdon

Institute, University of Cambridge and her laboratory works on lung developmental and stem cell biology and regeneration. Specific questions addressed include: How are our lungs built and maintained? How does this go wrong in disease? Can we use our insights from developmental biology to induce effective lung regeneration? Or to promote improved maturation of premature lungs?
The laboratory uses a combination of human embryonic lung organoids and mouse genetics as model systems. They perform multiple techniques including in vitro and mouse genetics, lineage-tracing, microscopy, live-imaging, cellular and molecular techniques.

Professor David Ray trained in general internal medicine in North West England, and obtained a PhD from the University of Manchester. He was a Research Fellow at UCLA for two years, working on neuroendocrine-immune interaction, before returning to the UK, and obtaining a GSK fellowship to work on glucocorticoid action, and sensitivity in inflammatory disease. He was promoted to Professor of Medicine at the University of Manchester in 2005, and went on to study nuclear receptor and circadian biology with a focus on lung disease, and inflammation. This work attracted Wellcome Investigator and MRC programme grant support. David moved to take up a Chair in Endocrinology at the University of Oxford in 2018 where he has expanded his research to include patient cohort studies, and the health impacts of shift work.

Professor Alex Richter earned her medical degree from the University of Birmingham (UoB). Her doctorate explored the immunology of pulmonary vasculitis and interstitial lung disease; presenting work from this thesis she was awarded BTS Young Investigator of the Year. Alex undertook specialist training in Clinical Immunology and was appointed Clinical Lecturer at UoB to complete her training. She established clinical immunology services at University Hospitals Birmingham, where she now works as a Consultant. She is Professor of Clinical Immunology and Director of the Clinical Immunology Service at UoB. Her research interests are focussed around secondary immunodeficiency, vaccination response and immunodiagnostics.

Dr Alexander Rothman is Wellcome Trust Clinical Research Career Development Fellow and Consultant Interventional Cardiologist at the University of Sheffield and Sheffield Teaching Hospitals NHS Trust. Alex's research interests are in therapeutic and remote monitoring development, and clinical translation. This work has contributed to clinical trials of pulmonary artery pressure monitoring in patients with heart failure, pulmonary artery denervation and BMP augmentation in patients with pulmonary arterial hypertension, and anti-inflammatory therapy in patients with coronary artery disease.

Professor Sejal Saglani is Professor of Paediatric Respiratory Medicine, Imperial College London and Honorary Consultant, Royal Brompton Hospital, London. Her research focusses on the investigation of mechanisms underlying the inception of severe asthma and preschool wheeze in children, finding novel therapies to improve control, reduce exacerbations and to achieve disease modification. She has a translational research programme involving an integrated approach to answering questions using bronchoscopic airway samples from carefully clinically phenotyped children coupled with an age appropriate neonatal mouse model.

Professor Liz Sapey is Chair of the British Thoracic Society Science and Research Committee. She is an Academic Respiratory Physician at the University of Birmingham, Director of the HDR-UK Health Data Research Hub in Acute Care, PIONEER and the Managing Director of Birmingham's NIHR Clinical Research Facility. Liz's research interests focus on inflammatory respiratory diseases associated with ageing, and the impact of inflammation in an ageing host. Her interests span translational science, moving new or repurposed therapies into early phase clinical trials and using routinely collected health data to inform translational science. Liz's translational science focuses on neutrophil biology, strongly implicated in ageing and COPD related tissue damage and poor bacterial clearance.

Dr Bettina C Schock PhD studies the regulation of the innate immune responses in chronic airway diseases such as cystic fibrosis and paediatric asthma in the Welcome-Wolfson Institute for Experimental Medicine at Queen's University Belfast. While a relative lack of the NF-kB regulator TNFAIP3 (tumour necrosis factor alpha induced protein 3, A20) has been found in several chronic inflammatory diseases, her work has first described the pharmacological and molecular regulations of A20 in these chronic airway diseases. Current work investigates several regulators of A20 in disease conditions.

Dr Chris Scotton is a Senior Lecturer in Lung Pathobiology and Head of the Respiratory Medicine

Group at the University of Exeter, and also holds an honorary appointment at UCL. His current research focuses on interstitial lung disease, COPD and bronchiectasis. Through close links with the clinic and external collaborators, Dr Scotton is investigating novel therapeutic opportunities and biomarkers. He is Chair of the British Association for Lung Research, an Associate Editor of Thorax, and sits on the Scientific Committees of the British Lung Foundation and the BTS.

Professor Calum Semple has studied severe virus disease outbreaks since 1989 in the fields of diagnostics, clinical characterization and clinical trials. He was a founder member of ISARIC. He has led studies of COVID-19, MERS, Monkeypox, Ebola (EVD and survivors), influenza and bronchiolitis, at times field-deployed in austere circumstances. He is a Senior Government Clinical Advisor sitting on the Scientific Advisory Group for Emergencies (COVID-19 response) and the New Emerging Respiratory Viral Threats Advisory Group (NERVTAG), and a former member of the WHO Scientific Technical Advisory Committee for Ebola Emergencies (STAC-EE) and UK Pandemic Flu group.
Professor Semple was appointed Honorary Respiratory Physician at Alder Hey Children's Hospital Liverpool in 2006. In 2016 he and his team were awarded the Queen's Ebola Medal for Service in West Africa 2014-16 and in 2019 he received a Commonwealth Association Award for subsequent work with Ebola survivors in Sierra Leone. He was appointed Officer of the Most Excellent Order of the British Empire in the Queen's Birthday Honours 2020 for his role in the COVID-19 response.

Dr Manu Shankar-Hari is a clinician-scientist in Intensive Care Medicine and leads a translational research group at King's College London. Manu obtained his PhD from King's College London, for his work on B cell abnormalities in sepsis and completed his formal training in epidemiology from the London School of Hygiene and Tropical Medicine. He holds the prestigious National Institute for Health Research (NIHR) Clinician Scientist Award in Intensive Care Medicine.
Shankar-Hari group's research explores ways to improve outcomes in adult critically ill patients with sepsis and with ARDS, by linking the illness immunobiology with novel interventional trial designs. His lab has the following focussed research themes:
1) Immunobiology: explore adaptive immune system changes during sepsis, during ARDS and longer-term in patients who survive sepsis. They integrate orthogonal multilevel data with repeated measurements of cellular phenotype, functional assessments, alongside corresponding transcriptomes and epigenetic landscapes.
2) Epidemiology and stratified medicine: they use early-phase randomised controlled trials, cohort studies, systematic reviews and large clinical trial datasets to: (a) explore treatment effect heterogeneity; (b) identify treatable traits based on dominant biological mechanisms; and (c) modifiable proximate determinants of sepsis and ARDS.
For further details, please see webpage: https://www.kcl.ac.uk/research/shankar-hari-group

Dr Karen Sheares is a Respiratory Consultant in the National Pulmonary Hypertension Service, Pulmonary Vascular Diseases Unit, Royal Papworth Hospital and conducts post pulmonary embolism clinics with the Haematology Service in Addenbrooke's Hospital, Cambridge. Her areas of research interest include pulmonary hypertension, acute and chronic thromboembolism and she is the Respiratory Expert on the National Institute for Health and Care Excellence's Venous Thromboembolic Diseases Guidelines Group. She sat on the British Thoracic Society's Pulmonary Vascular Disease Specialist Advisory Group and the Outpatient Management of Pulmonary Embolism Guideline Group. She contributed to the National Confidential Enquiry in Patient Outcome and Death in Pulmonary Embolism.

Professor Claire Shovlin is Professor of Practice (Clinical and Molecular Medicine) at Imperial College London, based at Hammersmith Hospital. Since 1999, she has run in parallel, national clinical services, and research programmes focussing on patients with inherited vasculopathies, particularly pulmonary arteriovenous malformations (PAVMs) and hereditary haemorrhagic telangiectasia (HHT) where she is the National and European lead (https://vascern.eu/vascern-spotlights-professor-claire-shovlin/). With a first degree in Genetics (Cambridge 1984), she chairs the Genomics England Respiratory GeCIP and HHT/PAVM subdomains, with recent Genomics publications spanning HHT and variant interpretation (https://pubmed.ncbi.nlm.nih.gov/32573726/); mosaicism (https://pubmed.ncbi.nlm.nih.gov/32303606/), and regulatory elements predicting a "ROS storm" in COVID-19 (https://pubmed.ncbi.nlm.nih.gov/32777054/).

Dr Murali Shyamsundar is a Senior Lecturer in Queen's University Belfast and a Consultant in Intensive

Care Medicine in the Royal Victoria Hospital, Belfast. His research programme is focussed on utilising human models of acute pulmonary inflammation and ARDS to develop interventions to prevent and treat acute respiratory failure. He is also involved in leveraging routinely collected data to develop clinical decision support systems to improve critical care practice.

Professor Salman Siddiqui is a Clinical Professor of Airways Disease at the University of Leicester and University Hospitals of Leicester (UHL). Salman coordinates adult severe asthma services at UHL and services for hyper eosinophilia. Salman is the Chief Investigator for the NIHR-EME precision medicine 'BEAT-Severe Asthma' clinical trials programme and MRC/EPSRC East Midlands Molecular Pathology Node.

Professor Jodie Simpson is the Deputy Director of the University of Newcastle's Priority Research Centre for Healthy Lungs, School of Medicine and Public Health, Faculty of Health and Medicine, at the University of Newcastle, Australia. Jodie's work has significantly advanced the understanding of asthma, pathogenesis, and therapeutic approaches. Her current research focuses on understanding the mechanisms of inflammation in asthma and COPD, and specifically on the role of airway phagocytes and bacterial colonisation. This work is complemented by her research investigating macrolide antibiotics as an anti-inflammatory therapy in asthma and COPD. She has forged new collaborations in investigating the airway microbiome in asthma.

Dr Anika Singanayagam has been working on the COVID-19 response at Public Health England within the Virology Section, since the start of the pandemic in January 2020. Her doctoral studies were on pandemic influenza emergence and transmission. She is an Infectious Diseases/General Medical Registrar at Imperial College NHS Trust.

Professor Jacky Smith runs a specialist cough clinic and multi-disciplinary research team studying the symptom of cough. Her group has developed a patented objective cough monitoring system, that has been commercialised by Vitalograph Ltd, the VitaloJAK. This system has changed the standards by which cough therapies are evaluated in clinical trials. She has also led work on the development of novel treatments for chronic cough, including P2X3 antagonists. She is funded by a Wellcome Investigator award, is Director of the NIHR Manchester Clinical Research Facility and is an NIHR Senior Investigator.

Dr Karl Staples is an Associate Professor in Translational Medicine at the University of Southampton Faculty of Medicine and NIHR Southampton BRC Respiratory and Critical Care Training Lead. His research focuses on host-pathogen interactions in chronic inflammatory airways diseases, such as asthma and chronic obstructive pulmonary disease (COPD), and the contribution of these interactions to exacerbations of these respiratory conditions. To study these interactions, he has developed novel ex vivo models of bacterial and viral infection using human lung cells and tissue. He is the Meetings Secretary of the British Association for Lung Research.

Professor Michael Steiner is Professor of Respiratory Medicine at the University of Leicester, Honorary Consultant Respiratory Physician at the University Hospitals of Leicester, and Honorary Clinical Professor at Loughborough University. His sub-speciality clinical interests include management of advanced COPD, lung volume reduction therapies, sleep and home non-invasive ventilation. His research interests focus on chronic disease management and quality improvement in COPD with particular expertise in exercise performance, physical training, pulmonary rehabilitation, nutrition and skeletal muscle dysfunction. He was clinical lead for the Pulmonary Rehabilitation component of the National COPD Audit Programme, 2013-18.

Dr Laura Succony is a Consultant Respiratory Physician in the Thoracic Oncology Service at the Royal Papworth Hospital, Cambridge. She completed her medical training at the University of Southampton and obtained her PhD from University College London. Her research interests are in the early diagnosis of lung cancer.

Dr Karl Sylvester is Head of Joint Respiratory Physiology at both Cambridge University Hospitals and Royal Papworth Hospital NHS Foundation Trusts and is Lead Healthcare Scientist at Royal Papworth. He is Past-Chair of the Association for Respiratory Technology and Physiology. He is Chair of Group 9.1 at the European Respiratory Society, a group which represents respiratory and sleep scientists from across Europe. His specialist interest is the performance and interpretation of cardio-pulmonary exercise testing. Dr Sylvester initially joined Cambridge University Hospitals after completing a PhD investigating respiratory complications in patients with sickle cell disease.

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Dr Victor J Thannickal MD is Professor of Medicine and the Ben Vaughan Branscomb Chair of Medicine in Respiratory Disease at the University of Alabama at Birmingham. Dr Thannickal's research is focused on cellular and molecular mechanisms of lung repair and regeneration. This work has advanced fundamental understanding of myofibroblast origins, differentiation, and survival in pulmonary fibrosis. The clinical impact of his work is evidenced by current and emerging anti-fibrotic therapies in pre-clinical/clinical development; this includes inhibitors of FAK/Akt, MRTF-A/ROCK and NADPH oxidase-4 (NOX4). His laboratory was the first to identify an essential role for NOX4 in organ fibrosis, and has elucidated mechanisms by which redox imbalance and metabolic alterations contribute to age-dependent susceptibility to fibrosis. Active studies are focused on elucidating mechanisms of cellular senescence, oxidative stress and aging in the context of chronic lung diseases, in concert with the development of therapeutics and biomarkers for complex lung diseases. His research programme is funded by the National Institutes of Health and the US Department of Veterans Affairs.
Dr Thannickal is an elected member of the American Association of Physicians, and received the American Thoracic Society (ATS) Recognition Award for Scientific Accomplishments in 2016. He currently serves on the Editorial Boards of the Journal of Clinical Investigation (Consulting Editor), as well those of the American Journal of Respiratory and Critical Care Medicine and the American Journal of Pathology; he is an Associate Editor of the American Journal of Respiratory Cell and Molecular Biology.

Dr Muhunthan Thillai is a Respiratory Physician in the Cambridge Interstitial Lung Disease Unit at the Royal Papworth Hospital. He has a PhD in immunology from Imperial College London and is also a Visiting Senior Fellow to the University of Cambridge. He has a particular interest in idiopathic pulmonary fibrosis and sarcoidosis. He has published a number of research papers and given talks at international conferences. He is the Editor of the 2019 Handbook of Interstitial Lung Diseases and the co-Chair of the 2020 British Thoracic Society Statement on Sarcoidosis.

Dr Mark Toshner is a University Lecturer in Translational Respiratory Medicine and Honorary Consultant in Royal Papworth and Addenbrooke's Hospitals. He is Director of Research for the Cambridge Pulmonary Vascular Diseases Centre with a longstanding interest in applied and experimental medicine in pulmonary vascular diseases.

Professor Alice Turner graduated from the University of Leicester and has done postgraduate training via the Universities of Dundee and Birmingham, completing a PhD focussed on COPD and alpha 1 antitrypsin deficiency (AATD). She has been a Consultant in Respiratory Medicine at Heartlands Hospital since 2011, and is a Professor of Respiratory Medicine at the University of Birmingham. In addition, Professor Turner has been a member of the European Respiratory Society Task Force on AATD, and is on the steering group for the European AATD Registry. She has published widely in COPD and AATD, and has ongoing research projects funded by the Alpha 1 Foundation, NIHR, ATS Foundation and others.

Associate Professor Aneesa Vanker MBCHB (UKZN), FCPaed (CMSA), MMed (SU), CertPulm Paed (CMSA), PhD (UCT) is a Paediatric Pulmonologist at Red Cross War Memorial Children's Hospital, University of Cape Town, South Africa, where she is involved in the care of children with a wide range of both congenital and acquired respiratory conditions. She completed her paediatric pulmonology training at Tygerberg Children's Hospital and Stellenbosch University in 2010. She is also a clinical researcher with a particular interest in the environmental determinants of childhood lung diseases, which was the subject of her PhD entitled "Indoor air pollution and environmental tobacco smoke exposure in a South African birth cohort study." Associate Professor Vanker is the current paediatric pulmonology representative on the South African Thoracic Society and a member of the Forum of International Respiratory Societies (FIRS) Environmental Committee and Chairs the Transformation Action Group, Department of Paediatrics, UCT.

Dr Aashish Vyas FRCP, MD, BSc is the lead for the Regional Severe Asthma Service for Lancashire and South Cumbria and is the NW representative at the UK Severe Asthma Registry. He is a member of the BTS Council and sits on the BTS Science and Research Committee, having previously been a member of the BTS Asthma Specialist Advisory Group. He works at Lancashire Teaching Hospitals working within the regional MDT Complex Breathlessness Unit with a research focus on inducible laryngeal obstruction and breathing pattern disorders. He also leads the Regional Long-term ventilation and complex wean services across the region.

Dr Tom Ward is a Specialist Registrar in Respiratory Medicine in the East Midlands and an Honorary

Clinical Lecturer at Loughborough University. He has an interest in COPD and pulmonary rehabilitation and has recently completed a PhD investigating the impact of novel exercise interventions for individuals with COPD. He is member of the BTS Council and the BTS Pulmonary Rehabilitation Guideline Group.

Professor Robert J Wilkinson is a Professor in Infectious Diseases at Imperial College London, UK, and a Senior Group Leader at the Francis Crick Institute, London, UK. He also directs the Wellcome Centre for Infectious Diseases Research in Africa (CIDRI-Africa) in Cape Town. His research interest is understanding and intervening in tuberculosis and HIV-associated tuberculosis.

Professor Tom Wilkinson is Professor of Respiratory Medicine at the University of Southampton, Faculty of Medicine and Honorary Consultant at University Hospitals Southampton. He trained at the University of Cambridge and Barts and the London School of Medicine and completed his PhD at UCL studying disease mechanisms driving infective exacerbations of COPD. He is Lead of the Southampton COPD Research Group, and Airways Disease Research Theme Lead for the NIHR Biomedical Research Centre in Nutrition and Respiratory Medicine. His research seeks to improve understanding of the mechanisms which drive susceptibility to respiratory infections and exacerbations in patients with chronic lung disease, and to develop new vaccines and therapies to impact on these. Tom has taken these mechanistic discoveries through translation into new treatments. He was co-Chair of the British Thoracic Society Home Oxygen Guidelines Standards of Care Committee, contributed to the National Nutritional Guidance for COPD, is Associate Editor for the journal Thorax and is co-founder of the health technology company myMHealth. He has published over 100 peer reviewed papers and reviews on the topics of airways disease, exacerbations and airway immunology. His work has been recognised by National and International awards including the Maurizio Vignola Award for Innovation in Respiratory Medicine in Europe by the ERS.

Professor Tracey A Willis is a dedicated Paediatric Neurologist with a special interest in neuromuscular diseases, both paediatrics and adults. She did her tertiary neurology training in the West Midlands and following her CCT was based in Starship Children's Hospital, Auckland, New Zealand for two years, returning to Birmingham Children's Hospital until October 2008 when she became the MDC (Muscular Dystrophy Campaign) Research Fellow based at Newcastle University doing a three-year research project in muscle MRI. Professor Willis is currently the Clinical Lead in Neuromuscular Disorders at Robert Jones and Agnes Hunt Orthopaedic Hospital and Birmingham Children's Hospital and Visiting Professor (awarded 2018) for Chester and Shrewsbury University, contributing to the master's courses particularly in medical genetics. She is the National Muscle Interest Group Chair, BMS board member and West Mids Neuromuscular Network Chair. Professor Willis is PI for a number of neuromuscular trials and studies.

Professor Andrew Wilson is a Clinical Academic at Norwich Medical School and Norfolk and Norwich University Hospital. He has a specialist interest in interstitial lung disease and asthma and undertakes clinical trials in these sub-speciality areas. He is the current Chair of the British Thoracic Society Interstitial Lung Disease Registry.

Dr Paul Yu is Associate Professor of Medicine at Harvard Medical School and Physician in Cardiovascular Medicine at Brigham and Women's Hospital. Dr Yu completed his AB in Philosophy and a BS in Biological Sciences at Stanford University, MD and PhD (Immunology) degrees at Duke University, completed Internal Medicine residency at UCSF, clinical and research fellowships in Cardiovascular Disease at MGH, and is board certified in Cardiovascular Medicine. Dr Yu's laboratory studies the function of bone morphogenetic protein (BMP) signaling in development, and in vascular and musculoskeletal disease. The main focus of his laboratory's work is to discern how BMP/TGF-β signaling achieves spatio-temporal and functional specificity, and modulates the tissue-specific consequences of inflammation and injury.

Professor Dr Angela Zacharasiewicz MBA is a Professor of Paediatrics, specialising in respiratory paediatrics, and works as a consultant in a large teaching hospital in Vienna, Austria. Her research focus has been on non-invasive monitoring of airway inflammation, asthma, tobacco related health issues and chronic cough in children and adolescents. Recently, she has been part of the ERS Task Force on the ERS Guidelines on the diagnosis and treatment of chronic cough in adults and children.

EXHIBITORS' INFORMATION

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BTS/BALR/BLF Early Career Investigator Awards

T1 DEFECTIVE METABOLISM DRIVES MACROPHAGE DYSFUNCTION IN COPD

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10.1136/thorax-2020-BTSabstracts.1

COPD is set to become the third leading cause of death globally by 2023. To date, we have no significant disease modifying therapies. COPD patients experience chronic inflammation and defective innate immunity, largely driven by macrophage dysfunction. In established disease, COPD macrophages have impaired phagocytosis of bacteria and apoptotic cells (efferocytosis). There is evidence of altered antioxidant responses, namely via reduced expression of the transcription factor Nrf2. Through the study of airway (AM) and peripheral monocyte-derived (MDM) macrophages recruited from patients with mild moderate and severe COPD, we questioned whether disordered metabolic processes underlie the defect in macrophage function and how this may relate to impaired antioxidant responses.

We demonstrated that both AM and MDM from COPD patients have impaired bacterial phagocytosis and efferocytosis compared to Healthy Donors. Metabolic profiling, using Seahorse technology, confirmed that COPD AM and MDM have exhausted energy reserves in glycolysis and oxidative phosphorylation. Moreover, Seahorse and LC-MS (liquid chromatography mass spectrometry) revealed a persistent over reliance on glycolysis in COPD. Crucially, this apparent defect in oxidative metabolism depleted energy status and may be due to the impaired redox balance we observed in COPD.

We have previously established that COPD AM display a defective transcriptional response to infection with *Streptococcus pneumoniae*, with failure to mount an adequate anti-oxidant response. Thus, we employed highly specific Nrf2 agonists to activate the anti-oxidant-pathway in COPD AM. This induced a reset of the COPD AM transcriptome to more closely resemble Healthy AM. Furthermore, Nrf2 activation increased TCA cycle intermediaries, improved energy status, restored redox balance and most importantly partially restored bacterial phagocytosis and efferocytosis in COPD macrophages.

We have determined that both AM and MDM from COPD patients display altered bio-energetics, with metabolic exhaustion and a refractory metabolic profile. We suggest this is driving the macrophage dysfunction observed in COPD. Selective activation of the Nrf2 pathway, improves metabolism and rescues function in COPD macrophages. This highlights both the therapeutic potential for metabolic reprogramming in COPD and the role of Nrf2 activation in modulating disease behaviour in COPD macrophages.

T2 EFFECT OF TESTOSTERONE AND SEX HORMONE-BINDING GLOBULIN ON LUNG FUNCTION: A MENDELIAN RANDOMISATION STUDY

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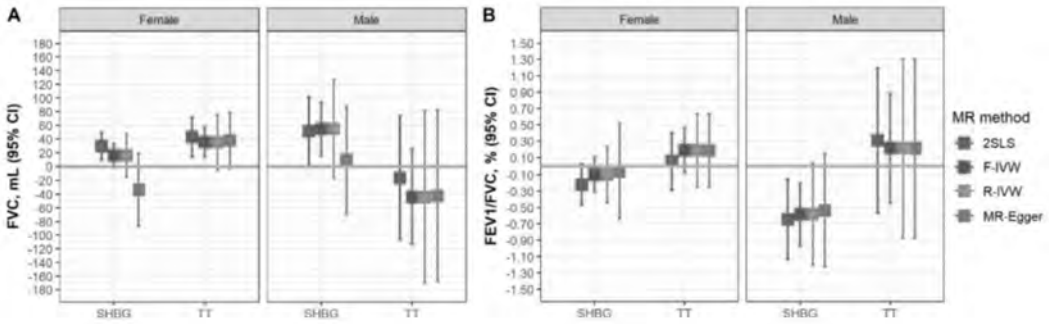
10.1136/thorax-2020-BTSabstracts.2

Cross-sectional and longitudinal observational studies have shown that higher levels of testosterone are associated with better lung function in men and a small attenuation of lung function decline in women. We used multivariable Mendelian randomization (MVMR), which is not affected by classical confounding, to assess the independent causal effect of total testosterone (TT) and sex hormone-binding globulin (SHBG) on lung function (FVC and FEV_1/FVC) in men and women.

To select SNPs associated with TT and SHBG for MR, we performed genome-wide association studies and replicated results in independent UK Biobank samples (N=323,144/161,572). SNPs were considered replicated with same direction of effect and p-value < Bonferroni corrected p-value. For each replicated SNP, we estimated the effect on pre-bronchodilator lung function in UK Biobank (N=341,826) separately by sex adjusting for age, age^2, height, genotyping batch, and centre and accounting for population stratification/relatedness (BOLT-LMM). We used several MVMR methods to investigate and adjust for pleiotropy. We performed subgroup analyses by level of moderate physical activity and by menopausal status in women. To assess a possible source of pleiotropy, we removed 25 SNPs associated with weight/obesity related outcomes.

For TT, we replicated 63 SNP in females and 92 SNPs in males, and 308 SNPs were associated with SHBG in both sexes. In women, the MVMR analyses suggest that a natural log increase in TT is associated with a 33.9 mL increase in FVC independently of SHBG (figure 1A). Stratified analyses showed a beneficial effect of SHBG on FVC in physically active and post-menopausal women. In males, the MVMR analyses suggest that a log increase in SHBG is associated with 0.62% lower FEV_1/FVC and 54.6 mL higher FVC independently of TT (figure 1A/B). However, no associations were found with TT in males in the main analysis nor subgroup analyses. For all analyses there was an indication of high heterogeneity (Q statistic p-value <0.0001), however results remained similar after removing SNPs associated with weight/obesity.

Our MR analyses show that higher hormone levels are associated with better lung function, with higher TT levels being beneficial for FVC in women and higher SHBG levels being beneficial for FVC in males.



Abstract T2 Figure 1 The association of total testosterone (TT) and sex hormone-binding (SHBG) with FVC (A) and FEV:/FVC (B) in MVMR analyses separately per sex. Effect estimates show the difference in lung function (mL or%) per log increase in hormone level for 4 MR methods: Two-Stage Least Squares regression (2SLS), fixed-effect (F-IVW) and random-effect (R-IVW) inverse variance-weighted (IVW) meta-analysis; and MR-Egger.

T3 OCCUPATIONAL EXPOSURES AND RESPIRATORY HEALTH: THE BURDEN OF OBSTRUCTIVE LUNG DISEASE (BOLD) STUDY RESULTS

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10.1136/thorax-2020-BTSabstracts.3

Introduction and Objectives It has been estimated that 15% of the population burden of chronic obstructive pulmonary disease population is attributable to occupational factors. Most of the evidence comes from studies conducted in high-income countries (HICs). Our aim was to examine the relationship between occupational exposures and respiratory health in both HICs and Low- and middle-income countries (LMICs) participating in the multinational, population-based, cross-sectional BOLD study.

Methods We analysed data from 28,823 adults aged ≥40 years who completed respiratory and occupational questionnaires and had acceptable and repeatable post-bronchodilator spirometry measurements. Occupational exposures comprised three categories (organic dust; inorganic dust; fume) and 11 high-risk occupations (farming; flour, feed or grain milling; cotton or jute processing; hard-rock mining; coal mining; sandblasting; working with asbestos; chemical or plastics manufacturing; foundry or steel milling; welding; and firefighting). The associations of respiratory symptoms and lung function with occupational exposures were estimated using multivariable regression models adjusted for potential confounders for each BOLD site and then pooled using meta-analysis. Sensitivity analyses by sex, national gross national income and smoking status were also performed.

Results We found that people working in any of three categories of occupational exposures and the 11 high-risk occupations under consideration were more likely to report respiratory symptoms than those who do not work in any of those occupations. Overall, we found no consistent associations between the occupational exposure categories and high-risk occupations and measures of lung function. Nevertheless, in sensitivity analyses, men in HICs exposed to organic dusts in the workplace for at least 20 years (median) had significantly decreased FEV_1/FVC (β=-0.34%; 95% CI -0.42% to -0.27%) and decreased FVC (β=-0.18L; 95% CI -0.32L to -0.04L). Men in LMICs exposed to fumes for at least 11 years had significantly decreased FEV_1/FVC (β=-0.29%; 95% CI -0.41% to -0.16%).

Conclusions In a large global study, we found respiratory symptoms to be associated with 11 high-risk occupations. The associations between occupational exposures and lung function varied by gross national income groups; more research is needed to understand these differences. Meanwhile, preventive measures and respiratory health surveillance should be enhanced among exposed workers.

T4 THE RESPIRATORY MICROBIOME AND METABOLOME IN IDIOPATHIC PULMONARY FIBROSIS

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10.1136/thorax-2020-BTSabstracts.4

Idiopathic pulmonary fibrosis (IPF) is a progressive and fatal fibrotic lung disease of unknown aetiology. There is growing evidence that the lung microbiota may play a role in IPF. However, no study has investigated the functional impact of the short-chain fatty acids (SCFAs) on primary bronchial epithelial cells (PBECs) and disease pathogenesis. Therefore, we investigated the influence of acetate, propionate, and butyrate on PBECs from healthy controls and subjects with IPF.

Subjects diagnosed with IPF (n=201) and healthy controls (n=40) were prospectively recruited and underwent bronchoalveolar lavage. Bacterial DNA was isolated and 16S rRNA gene sequencing undertaken to characterise bacterial communities. Untargeted ^{1}H nuclear magnetic resonance spectroscopy-based metabolomics and targeted gas chromatography-mass spectrometry captured the metabolic profile of these samples. PBECs from healthy controls and subjects with IPF were differentiated at air-liquid interface (ALI) and either left untreated or exposed to the SCFAs.

The IPF microbiota was less diverse (P<0.01) and had increased proportions of *Firmicutes* (P<0.01) compared to healthy controls. *Streptococcus* and *Staphylococcus* were more abundant in IPF cases than controls (P<0.05). Metabolomics analysis revealed distinct differences between the cohorts. Relative concentrations of the SCFAs were increased in IPF compared to healthy controls, and in IPF, propionate positively correlated with bacterial burden (rho=0.47, $P=8 \times 10^{-5}$). Exposure of healthy and IPF PBECs cultured at ALI to 1 mM of the SCFAs did not impact cell viability. Treatment of

PBECs from IPF subjects but not healthy controls with the SCFAs led to morphological changes, a dose-dependent release of pro-inflammatory mediators in the cell supernatant, and a decrease in transepithelial electrical resistance (TEER) over time. Specifically, compared to baseline, exposure of IPF PBECs to 1 mM of propionate led to a 40% reduction in TEER and a 2-fold increase in the secretion of IL-6.

Subjects with IPF display an altered microbiome which is associated with a distinct metabolic signature in the lower airways. Differences in specific bacterial genera and an increased bacterial burden in IPF results in changes in the SCFAs in the airways. *In vitro* work demonstrates the potential of these SCFAs to shape immunological responses in the lung, mediating the pathogenesis of fibrosis.

T5 TOLL-LIKE RECEPTOR 2 HAS A TUMOUR SUPPRESSOR FUNCTION IN NON-SMALL CELL LUNG CANCER VIA REGULATION OF THE SENESCENCE ASSOCIATED SECRETORY PHENOTYPE

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10.1136/thorax-2020-BTSabstracts.5

Background Lung cancer is the leading cause of cancer related deaths worldwide. The value of targeting early stage disease has been widely recognised to improve survival. Oncogene-induced senescence (OIS) is a stress response instigated following the activation of oncogenes and is a well-known tumour suppressor mechanism. OIS is abundant in pre-invasive lesions in murine lung cancer models, however is lost during the progression to malignancy. We previously identified a regulatory role for Toll-like receptor 2 (TLR2) in OIS and expression of the senescence-associated secretory phenotype (SASP), however the functional relevance of this has yet to be established.

Methods We used genetically engineered mouse (GEM) models of lung cancer (*Kras*$^{LSL\text{-}G12D/+}$ and *Kras*$^{LSL\text{-}G12D/+}$;*TP53* $^{fl/fl}$) on both wild-type and *Tlr2* null backgrounds. Lung specific activation of mutant *Kras*^{G12D} and *TP53* loss was achieved upon intranasal infection with Cre-recombinase expressing adenovirus. Tumour burden, senescence markers and SASP expression were assessed by immunohistochemistry. Immune cell recruitment was measured using flow cytometry on whole lung single cell suspensions from tumour bearing mice. The expression of Tlr2 and associated SASP components were measured in human pre-invasive lung cancer samples that either progressed to invasive malignancy or regressed to normal epithelium.

Results *Tlr2* loss was associated with an increased tumour burden and reduced survival in our GEM model. Furthermore, *Tlr2* loss caused significantly reduced epithelial expression of key senescence markers and SASP factors. However, immune cell recruitment was not affected suggesting this effect was cell intrinsic. Inhalational administration of a synthetic TLR2 agonist (Pam2CSK4) significantly reduced tumour burden in our GEM model. Molecular profiling of bronchoscopic biopsies of human pre-invasive lung lesions revealed increased TLR2 and SASP expression in samples that did not progress to invasive malignancy, suggesting a tumour suppressor role for TLR2-SASP signalling in human lung cancer.

Conclusions We have identified TLR2 as a potential tumour suppressor in lung cancer via regulation of the SASP. Furthermore, we have highlighted a novel therapeutic strategy for the treatment of early stage lung cancer. SASP factors are released into the bloodstream and are ideal candidate biomarkers of pre-invasive disease and thus could potentially aid in stratifying lung cancer screening populations.

T6 SPUTUM PROTEOMICS IDENTIFIES MECHANISMS OF DISEASE SEVERITY AND TREATMENT RESPONSE IN BRONCHIECTASIS

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10.1136/thorax-2020-BTSabstracts.6

Introduction Neutrophil extracellular traps (NETs) are a form of antimicrobial defence which have been implicated in multiple inflammatory diseases. This study investigated the role of NETs in bronchiectasis, a neutrophilic disease which lacks therapies that directly target neutrophilic inflammation, through a series of UK and international studies.

Methods LC/MS proteomics was used to compare protein profiles in sputum between severe and mild bronchiectasis (20 vs 20 patients). Microbiome changes, using 16S rRNA sequencing, clinical characteristics and NET levels using a validated histone-elastase immunoassay were analysed. Results were validated in an independent European cohort. Proteomics was used to identify proteins associated with treatment response of acute exacerbations of bronchiectasis in 20 patients treated with intravenous antibiotics for 14 days. Two studies of long-term macrolide treatment, one in bronchiectasis and a post-hoc analysis of the AMAZES trial in asthma, investigated the effect of macrolide treatment on NETs.

Results 96 proteins were differentially expressed in sputum between severe and mild bronchiectasis, with known NET proteins being the most abundant and discriminating. The relationship between NETs and associated proteins were validated in two independent cohorts, a UK cohort (n=175) and a European cohort (n=275). Sputum NETs were associated with BSI ($p<0.0001$), a history of severe exacerbations ($p=0.0089$), quality of life ($p<0.0001$), time to first exacerbation ($p<0.0001$) and mortality ($p=0.009$). High NET levels were associated with reduced microbial alpha-diversity, measured by Shannon-Weiner, and microbial dysbiosis ($p<0.0001$, PERMANOVA) and elevated IL-8, IL-1beta, TNF-alpha, interferon-gamma and GM-CSF in sputum. Antibiotic treatment (n=20) significantly altered the expression of 39 sputum proteins, with the 'neutrophil degranulation' pathway being most strongly implicated in response. Patients with *P. aeruginosa* infection had a blunted proteomic and clinical response to treatment. Treatment with azithromycin was associated with a significant reduction in sputum NETs over 12 months in both bronchiectasis (n=52, $p=0.016$) and asthma (n=47, $p<0.0001$).

Conclusion NET-associated proteins are elevated in bronchiectasis sputum and are associated with disease severity, bacterial infection and mortality. Treatment response is linked to successfully reducing NET levels with intravenous antibiotic or macrolide therapies suggesting that NETs may be an important therapeutic target in bronchiectasis.

Predicting and stratifying COVID-19 using real world data

S1 ESTIMATES OF MORTALITY RATE AND SURVIVAL TIME TO PREDICT TRENDS IN FUTURE DEATHS FOR PATIENTS IN ENGLAND WITH LABORATORY-CONFIRMED COVID-19: A MODELLING STUDY

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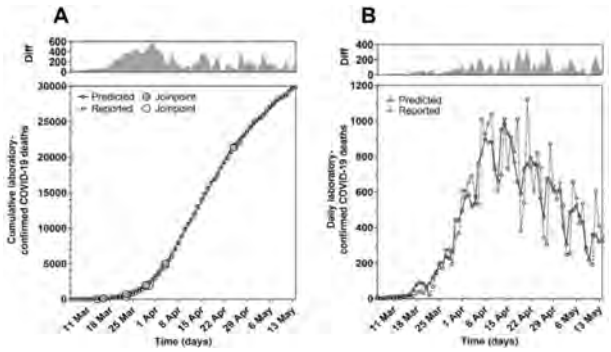
10.1136/thorax-2020-BTSabstracts.7

Background Estimates of fatality rate for patients dying with COVID-19 vary widely. Incorporation of the survival time into predictive models increases the accuracy of fatality rate estimates by reducing sampling bias. We applied predictive modelling approaches to estimate the current mortality rate and survival time for patients in England with laboratory-confirmed COVID-19. We used these data to develop a model to predict trends in future deaths over time.

Methods 143,463 and 30,028 cumulative laboratory-confirmed COVID-19 cases and deaths published by Public Health England between 30 January and 14 May 2020 for England were analysed. Linear regression analysis was utilised to estimate the mortality rate and survival time for patients in England with laboratory-confirmed COVID-19. A predictive model was established which estimated cumulative deaths until 21 May 2020. Joinpoint trend analysis was performed to identify time periods with significantly different rates in daily deaths.

Results Fatality rate for patients in England with laboratory-confirmed COVID-19 was 21.9% (95% confidence interval 21.8% to 22.0%). Survival time for patients who died from SARS-CoV-2 infection was seven days. In comparison with reported data, the accuracy of predicted trends for cumulative and daily laboratory-confirmed COVID-19 deaths was >99% and >96%, respectively. An estimated 31,420 cumulative laboratory-confirmed COVID-19 deaths were predicted to occur in England by 21 May. Predicted daily laboratory-confirmed COVID-19 deaths were significantly different during the following time intervals: 10.5 (6 to 17 March), 111.0 (17 to 27 March), 446.8 (27 March to 4 April), 817.0 (4 to 23 April), 536.3 (23 April to 7 May), and 266.7 (7 to 21 May) daily deaths (P<0.001) (figure 1).

Conclusions Between 30 January and 14 May 2020, the fatality rate for patients in England with clinical need for SARS-CoV-2 testing was 21.9%. The predictive model presented in this study provides a simple method for estimating laboratory-confirmed COVID-19 deaths with utility for clinicians, scientists, and policy makers.



Abstract S1 Figure 1 Comparison of predicted and reported trends in cumulative and daily laboratory-confirmed COVID-19 deaths in England. (A) Joinpoint trend analysis of trends for predicted and reported cumulative laboratory-confirmed COVID-19 deaths plotted from 6 March and 14 May 2020. (B) Trends for predicted and reported daily laboratory-confirmed COVID-19 deaths plotted from 6 March and 14 May 2020. Top panels, difference between predicted and reported trends. Diff, difference.

S2 VIGOROUS EXERCISE IS PROTECTIVE AGAINST COVID-19: CROSS-SECTIONAL ANALYSIS OF BASELINE DATA FROM 9,817 UK ADULTS PARTICIPATING IN THE COVIDENCE UK STUDY

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10.1136/thorax-2020-BTSabstracts.8

Introduction and Objectives Identification of modifiable risk factors for COVID-19 can inform development of public health policies to improve disease control. The COVIDENCE UK study is a population-based 5-year longitudinal study investigating risk factors for, and impacts of, COVID-19 in the UK population.

Methods UK residents aged ≥16 years were invited via a national media campaign to participate in the COVIDENCE UK study by completion of an on-line questionnaire capturing information about potential risk factors for COVID-19. Details of potential symptoms of COVID-19 occurring since 1st February 2020 were also captured, and used to identify those who had experienced probable COVID-19 using an algorithm validated against PCR-positivity for SARS-CoV-2 infection. Multivariable logistic regression was then applied to identify factors independently associated with risk of probable COVID-19, with adjustment for fifteen potential confounders including age, sex and ethnic origin.

Results A total of 9,817 participants completed the COVIDENCE UK baseline questionnaire between 1st May and 12th August 2020, of whom 982 (10.0%) were classified as having had probable COVID-19. Increased risk of probable COVID-19 was independently associated with lower household income (adjusted odds ratio [aOR] 1.52, 95% confidence interval [CI] 1.23 to 1.87), being overweight (BMI 25–30 kg/m^2, aOR 1.19, 95% CI 1.01 to 1.39), poorer self-reported general health (aOR 1.33, 95% CI 1.09 to 1.61) and employment as a 'frontline worker' (aOR 1.57, 95% CI 1.34 to 1.84). Taking at least one hour of vigorous physical exercise per week was associated with a lower risk (aOR 0.77, 95% CI 0.67 to 0.89).

Conclusions Lack of vigorous exercise may be a potentially modifiable risk factor for COVID-19. Lower household income, higher BMI, poorer self-reported general health and employment as a frontline worker were also independently associated with increased risk of disease.

S3 COMPARISONS IN EARLY AND LATE PRESENTATION TO HOSPITAL IN COVID-19 PATIENTS

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10.1136/thorax-2020-BTSabstracts.9

Background The clinical presentation and disease severity in SARS-Cov-2 infection ranges from asymptomatic carriage to death. There is little data regarding the timeframe of symptom onset to presentation to hospital, and disease outcomes. Therefore, we aim to investigate differences between 'early presenters' (< 7 days of symptom onset) and 'late presenters' (>7 days) and their clinical and radiological outcomes.
Methods In this retrospective cohort study, symptom onset, epidemiological, and clinical characteristics were collected from patient electronic medical records at University Hospital Southampton Foundation Trust with laboratory confirmed SARS-Cov-2 infection. Logistical regression models were used to explore the relationships between these data and time of presentation to hospital.
Results Between March and July 2020, symptom onset data was collected for 626 SARS-Cov-2 positive patients, 574 of whom had chest radiographs (CXR). Early presenters comprised 388 (62%) and 238 (38%) were late presenters. Early presenters were significantly older ($p<0.001$), more likely to have significant comorbidities – hypertension, thromboembolic and renal disease ($p<0.001$) – and also significantly less likely to report cardinal symptoms of Covid-19; fever, cough, SOB, myalgia, fatigue/malaise, headache ($p<0.001$). In the cohort overall, the presence of infiltrates was not predictive of adverse outcome (ICU admission, ventilation or death) ($p=0.214$). Although early presenters were less likely to have infiltrates on their CXR (58% vs 76.8%), ($p<0.001$), the presence of CXR infiltrates in early presenters demonstrated an increased risk of adverse outcome (OR 1.90, 95% CI 1.11, 3.25).
Conclusion We have demonstrated that SARS-Cov-2 infection presents in an heterogenous manner that varies with symptom duration. Atypical presentation of SARS-Cov-2 infection is more common earlier on in disease course, where viral shedding is likely to be higher, and this finding is of note in the context of national criteria for self-isolation and testing. Late presentation is more likely to be associated with radiological change, but this does not reflect an increased likelihood of adverse outcome. Patients who present early in their illness with radiological changes are at increased risk of adverse clinical outcome, suggesting that symptom onset and detection of CXR infiltrates are important for clinical assessment of severity at presentation to hospital in Covid-19.

S4 CLINICAL CHARACTERISTICS, MORTALITY AND SHORT TERM FOLLOW UP OF PATIENTS ADMITTED WITH COVID-19 IN A NORTH EAST LONDON NHS TRUST: A RETROSPECTIVE ANALYSIS

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10.1136/thorax-2020-BTSabstracts.10

Introduction and Objectives Descriptions of clinical characteristics of patients hospitalized with coronavirus disease 2019 (COVID-19), their clinical course and short-term in- and outpatient outcomes in deprived urban populations in the United Kingdom is still relatively sparse. We describe the epidemiology, clinical course, experience of non-invasive ventilation and intensive care, mortality and short-term sequalae of patients admitted to two large District General Hospitals across a large East London NHS Trust during the first wave of the pandemic.
Methods A retrospective analysis was carried out on a cohort of 1,946 patients admitted to two hospital sites during the first UK wave of the pandemic, including descriptive statistics and survival analysis. A more detailed analysis was undertaken of a subset of patients admitted across three Respiratory Units in the trust.
Results Overall survival and rates of transfer to critical care are comparable to data from other urban centers. Increasing age, male sex and Asian ethnicity were associated with worse outcomes. Increasing severity of chest X-ray abnormalities trended with mortality. Radiological changes persisted in over 50% of cases at early follow up (6 weeks). Ongoing symptoms including hair loss, memory impairment, breathlessness, cough and fatigue were reported in 67% of survivors, with 42% of patients unable to return to work due to ongoing symptoms. At 12-week follow up, 5 patients out of 109 followed up required treatment for pneumonitis with 2 requiring re-admission. Associated complications such as MI, PE and CVA were seen in less than 2% overall post-discharge.
Conclusions Whilst clinical features, course of illness and in-hospital outcomes are broadly in line with published literature, our initial follow up data suggest there are ongoing sequalae of COVID-19 including, persistent symptoms and radiological abnormalities. These data highlight the ongoing need for localized pathways to provide physical, emotional and psychological support these patients. There are also potential economic ramifications from these patients' delayed return to work. Further data, including longer term follow up data, are necessary to improve our understanding of this novel pathogen and associated disease.

S5 COVID-19 MORTALITY REVIEW: CURRENT SMOKERS ARE UNDER-REPRESENTED AND CANNOT BE EXPLAINED BY ETHNICITY ALONE

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10.1136/thorax-2020-BTSabstracts.11

Aim To compare demographic information between COVID-19 related deaths and those who died of another cause to identify any significant patient factors that may be contributing to COVID-19 deaths.
Methods A retrospective systematic review of all medical (acute, general internal, specialty and critical care) mortality was undertaken from 01/03/2020 until 01/07/2020 in a large inner-city hospital. The electronic medical record from both the hospital and GP (where available) were reviewed to identify demographic information with particular reference to characteristics thought to be associated with COVID-19 illness including age, gender, ethnicity and co-morbidities. Death

Abstract S5 Table 1 Commonest co-morbidities for certified deaths related and not related to COVID-19 illness March to July 2020

	COVID-19 deaths (121)	Non-COVID-19 deaths (158)	
Co-morbidities	number (%)	number (%)	**Relative Risk**
Current smoking	**7 (5.8)**	**37 (23.7)**	**0.33; p 0.0015**
Median BMI (IQR) [range]	25 (21-30) [14-56]	25 (21-30) [11-62]	
-BMI>30	26 (21.5))	48 (30.4)	0.74; p 0.088
-BMI>35	13 (10.7)	22 (13.9)	0.83; p 0.406
Type 2 diabetes	**52 (43.0)**	**50 (31.6)**	**1.31; p 0.045**
COPD	33 (27.3)	41 (25.9)	1.04; p 0.795
Hypertension	80 (66.1)	91 (57.6)	1.24; p 0.150
CKD	53 (43.8)	61 (38.6)	1.13; p 0.370
Renal replacement therapy	8 (6.6)	6 (3.8)	1.34; p 0.220

certificate information was used to establish direct cause of death (part 1 a, b or c). Only deaths where death certification was available were included.

Results Death certification was available for 279 deaths (median age 77 years; IQR 67-83; 133 (48%) female; 76 (27%) BAME; 67 (24%) admitted to critical care). 121 (43%) died as a direct consequence of COVID-19 illness (median age 77 years; IQR 67-83; 61 (50%) female; 47 (39%) BAME; 31 (26%) admitted to critical care).

Non-Caucasian (BAME) ethnicity was associated with increased COVID-19 mortality (RR 1.67; 95% CI 1.30–2.15; p 0.0015). BMI, COPD, hypertension, chronic kidney disease and renal replacement therapy were not independent risk factors for COVID-19 deaths compared to deaths by another cause (see table 1). In comparison, type 2 diabetes was stastically associated with COVID-19 deaths (RR 1.3; CI 1.01–1.71; p 0.045).

Current smoking status was negatively associated with COVID-19 mortality (RR 0.33; 95% CI 0.16–0.65; p 0.0015) with 5.8% current smokers in COVID-19 deaths compared to 23.7% in those who died of another cause. Smoking status was not available for 4 persons (1.4%).

Conclusion In our cohort, there appears to be increased mortality from COVID-19 associated with BAME ethnicity and type 2 diabetes. The signal from current smoking status is interesting and cannot fully be explained by ethnicity alone and should prompt further research.

S6 FRAILTY AND MORTALITY IN COVID-19 PATIENTS: A RETROSPECTIVE ANALYSIS OF A LARGE SERIES IN A SINGLE-CENTRE

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10.1136/thorax-2020-BTSabstracts.12

Introduction The Rockwood clinical frailty score (CFS) has been recommended for use in assessing patients during the COVID-19 pandemic. However, a recent cohort study has suggested it has little impact on the hazard of dying due to COVID-19,[1] while use to inform escalation decisions has proven contentious.

Abstract S6 Table 1 Independent predictors of mortality in COVID-19 patients

Variable	B	S.E.	Wald	OR (95% CI)	P value
Age	0.82	0.015	30.487	1.086 (1.055 – 1.118)	<0.0001
Respiratory Support	1.957	0.462	17.924	7.077 (2.860 – 17.510)	<0.0001
CRP	0.005	0.001	14.558	1.005 (1.002 – 1.007)	<0.0001
CFS	0.270	0.086	9.757	1.310 (1.106 – 1.551)	0.002
CXR infiltrates	0.806	0.307	6.900	2.239 (1.227 – 4.085)	0.009
Previous VTE	1.433	0.476	9.075	4.192 (1.650 – 10.625)	0.003
Metastatic Malignancy	1.053	0.438	9.075	2.866 (1.215 – 6.763)	0.016
Strong trend of association with mortality in COVID-19 patients					
Stroke	0.671	0.363	3.427	1.957 (0.961 – 3.984)	0.064
Cardiovascular disease	0.471	0.273	2.969	1.602 (0.937 – 2.737)	0.085

B, beta coefficient; CRP, C reactive protein; CXR, chest X-ray; VTE, venous thromboembolism; Respiratory Support, Invasive Mechanical Ventilation (IMV), Continuous Positive Airway Pressure (CPAP) or Non-Invasive Ventilation (NIV)

Method We identified patients hospitalised with COVID-19 from 11 March 2020 to 28 April 2020. Age, gender, key co-morbidities, inpatient mortality, length of stay, CFS, respiratory support, chest X-ray (CXR) appearance and C-reactive protein (CRP) were collected retrospectively from electronic records and medical notes. Multiple imputation used for missing values (CFS n= 1; CRP n= 5; CXR n= 9). Univariate relationships with in-hospital mortality were examined (Fisher's exact, T test and Mann-Whitney U as appropriate) and independent predictors of mortality were identified via backward stepwise logistic regression. CFS was verified in patients referred for CPAP/NIV on the Respiratory Support Unit (RSU; maximum level of care); mortality outcomes are separately shown.

Results Among 414 patients; mean age was 73 (SD 14.297) years, 241 males (58%), 135 died (33%) and median CFS 4 (IQR 2.75 – 5.00). Older age (mean 69.90 [SD 15.122] vs. 79.40 [SD 9.616]; p< 0.0001) and CFS (median 3 [IQR 2-4] vs. 5 [IQR 3-6]; p< 0.0001) were significantly associated with mortality. Mortality was higher in those invasively (10/13, 76.9%, p= 0.001) and non-invasively (16/32, 50.0%, p= 0.027) ventilated. Independent predictors associated with mortality are shown in table 1. Among patients receiving CPAP/NIV on the RSU, mortality increased with each CFS category (1–3 n=6/17, 35.3%;4–5 n=9/14, 64.3%;6–7 n=5/6, 83.3%).

Conclusion We report a large, single centre series of COVID-19 patients. Consecutive patients were identified, and missing data were few. CFS is a strong independent predictor of mortality in patients with COVID-19. This data would suggest that, in our population, the continuing use of CFS is important in our management and decision making in patients with COVID-19.

REFERENCE

1. RK Owen, SP Conroy, N Taub, *et al*. Comparing associations between frailty and mortality in hospitalised older adults with or without COVID-19 infection: a retrospective observational study using electronic health records. *Age and Ageing*. 2020. doi.org/10.1093/ageing/afaa167

Predicting longer term outcomes in children

S7 ASSOCIATIONS BETWEEN A SMOKE-FREE HOMES INTERVENTION AND CHILDHOOD ADMISSIONS TO HOSPITAL – AN INTERRUPTED TIME SERIES ANALYSIS OF WHOLE POPULATION DATA

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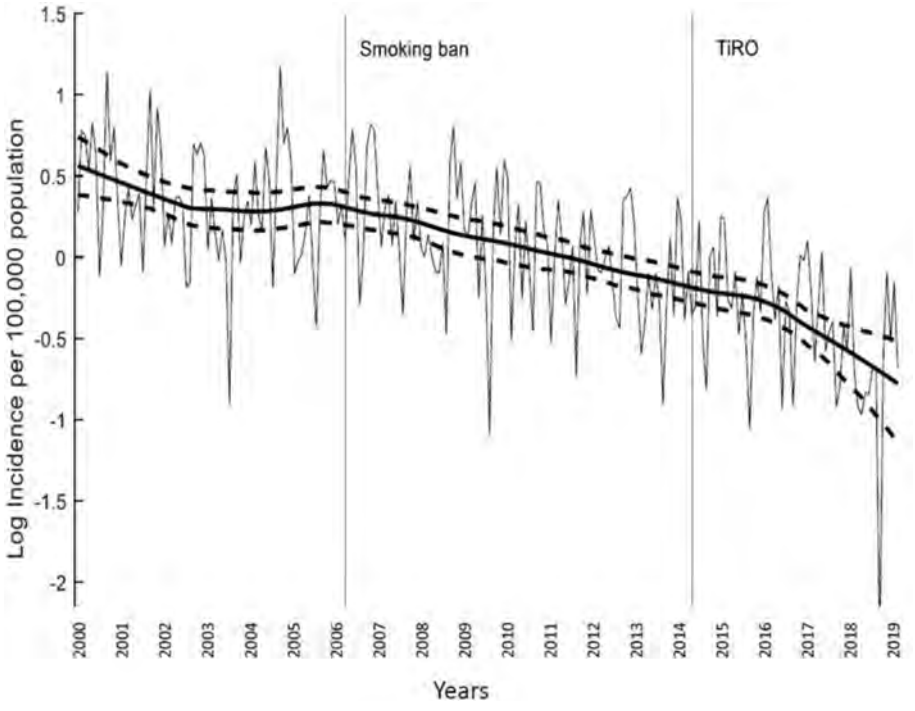
10.1136/thorax-2020-BTSabstracts.13

Background Many children remain exposed to secondhand smoke (SHS) in the home and are at increased risk asthma and other respiratory conditions. Our objective was to determine whether a national mass media smoke-free homes initiative (Take it Right Outside, TiRO) was followed by a fall in admissions for childhood asthma and other SHS-related respiratory conditions across Scotland.

Methods Data were obtained on all emergency hospital admissions in Scotland between 2000 and 2018 for <16 year olds. Interrupted time series analysis studied changes in the monthly incidence of admissions for SHS-related conditions/1,000 children following TiRO (introduced in 2014) whilst considering legislation banning smoking in public places (introduced in 2006). The primary SHS-related condition was asthma. The



Abstract S7 Figure 1

analysis considered subgroups stratified by age and quintile of Scottish Index of Multiple Deprivations.

Results There were 740,055 eligible admissions, including 518,341 for under five-year-olds. After TiRO there was a fall relative to the underlying trend in the slope of admissions for asthma (0.5%/month [95% CI 0.1, 0.9]) for under five-year-olds (figure1), but not in older children. Following the 2006 legislation, the slopes for asthma admissions reduced among children aged under five years (0.4%/month [0.05, 0.7]) and older (0.7%/month [0.4, 1.1]) and for the most, but not the least, deprived areas (0.5%/month [0.1, 0.9]). When TiRO and smoke free legislation were considered there was no change in the underlying trend for asthma admissions in the under five year old categories, and admissions for older children rose between 2000–2018.

Conclusion Smoke-free homes interventions may lead to reduced asthma admissions in young children. Smoke-free public spaces legislation may improve child health for many years, especially in the most deprived communities. Patient-centred interventions are required to reduce the number of children being admitted to hospital.

Abstract S8 Table 1

	MBL deficient (<0.6 mg/L)	MBL sufficient
Number	43 (21%)	163 (79%)
Male (%)	22 (51%)	72 (44%)
Median age in years (Range)	8 (3.2 to 11)	8 (4 to 11.8)
Abnormal imaging at any point during 5 year follow-up (%)	10 (23%)	39 (24%)
Bronchiectasis on CT chest	3 out of 5	7 out of 10
Positive respiratory microbiology (Respiratory viruses, Bacterial pathogens, or both) (%)	14 (32%)	49 (30%)
Suboptimal vaccine responses to primary immunisations, either to prevenar, haemophilus *influenzae* B, tetanus, or a combination: N1 (%)	12 (28%)	53(33%)
Suboptimal vaccine responses to booster immunisations: N2/N1 (%)	8/12 (67%)	21/53 (40%)
Number of children needing emergency PICU admissions during follow-up (%)	1 (2.3%)	6 (3.7%)

S8 IS MBL DEFICIENCY ASSOCIATED WITH ADVERSE RESPIRATORY CONSEQUENCES AT FIVE YEAR FOLLOW-UP?

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10.1136/thorax-2020-BTSabstracts.14

Introduction Mannose-binding lectin (MBL) serum protein is an important molecule of the innate immune system that is involved in antimicrobial recognition and clearing responses. MBL deficiency may thus predispose children to having infection susceptibility. However there is no conclusive evidence that MBL deficiency is associated with adverse respiratory consequences at follow-up.

Aim We explored whether there is a difference in clinical, radiological and microbiological characteristics in those with MBL deficiency (defined as a level of less than 0.6 mg/L) in children presenting with troublesome respiratory symptoms (frequent, recurrent, persistent or very severe), as compared to those who are MBL sufficient.

Method We performed a retrospective study looking at MBL measurements in children over a period of 10 years from 2004 to 2014 in a large teaching hospital. This enabled us to define a follow-up period of 5 years or more from the time of the MBL measurement to the year 2019.

The main indication for testing was frequent or persistent respiratory symptoms such as a chronic wet cough lasting more than 4 weeks, recurrent lower respiratory tract infections (≥4 infections in a year) or severe respiratory tract infections requiring admission to intensive care or to the high dependency unit. The MBL level was checked as part of baseline immunology testing to exclude a primary immune deficiency.

Results The clinical, radiological and microbiological characteristics of the MBL deficient and MBL sufficient children are summarised in table 1.

Conclusion We conclude that there is no difference at five year follow-up in clinical, radiological and microbiological characteristics between children who are MBL deficient as compared to those who have sufficient levels. Children with MBL deficiency are more likely to respond poorly to appropriate booster immunisation, but the clinical significance of this is unclear.

These results add to the existing body of literature that shows no statistically significant association between MBL deficiency and recurrent respiratory tract infection in children.

S9 PRESENTATIONS ASSOCIATED WITH ADVERSE OUTCOMES IN A COHORT OF CHILDREN REFERRED FOR CHRONIC COUGH

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10.1136/thorax-2020-BTSabstracts.15

Introduction Chronic cough (lasting >8 weeks) is a common reason for referral to paediatric respiratory services. There is a paucity of prospective studies regarding outcomes of children presenting with chronic cough. This results in inappropriate referrals, incorrect management and delays in referrals.

Aim To determine which presentation in children referred with chronic cough are associated with adverse outcomes: Bronchiectasis, Cystic Fibrosis, Primary Ciliary Dyskinesia and Primary Immunodeficiency.

Methods We retrospectively assembled a cohort of children referred for chronic cough between August 2017 and December 2018. Standardised forms were used to collect data from clinical records; outcome measures were recorded as the final diagnosis following a standard pathway of investigations. We evaluated the incidence of various presentations and their association with adverse outcomes. Standard statistical tests were used to determine strength of association.

Results Data collected from 124 subjects (54 (44%) female) showed 59 (48%) presented with a wet cough at the initial appointment. Fifty-nine subjects had a formal diagnosis, of whom 11 (19%) had an adverse outcome. Children presenting with a wet nature of cough were more likely to have an adverse outcome (Likelihood Ratio 2.5, p=0.002). However, children with chronic cough and associated parent-reported wheeze were more likely to be diagnosed with asthma (Likelihood Ratio 1.8, p=0.014). Furthermore, symptoms in this group improved significantly (p=0.002) on bronchodilator therapy. There were no significant associations between duration of coughing episodes (p=0.131), history of previous episodes (p=0.138) and adverse outcomes. There were also no significant differences between the mean (p=0.5625) duration of cough in those with or without adverse outcomes.

Conclusion Our analysis suggests that children with chronic cough should be referred for urgent evaluation as they have a significant risk of having adverse outcomes. The two main discriminators of outcome and success of therapy in children referred with chronic cough are the nature of cough and presence of parent-reported wheeze.

S10 PREDICTORS OF UNFAVOURABLE TREATMENT OUTCOME FOR ADOLESCENTS AND YOUNG ADULTS WITH TUBERCULOSIS IN BRAZIL: A NATIONAL RETROSPECTIVE COHORT STUDY

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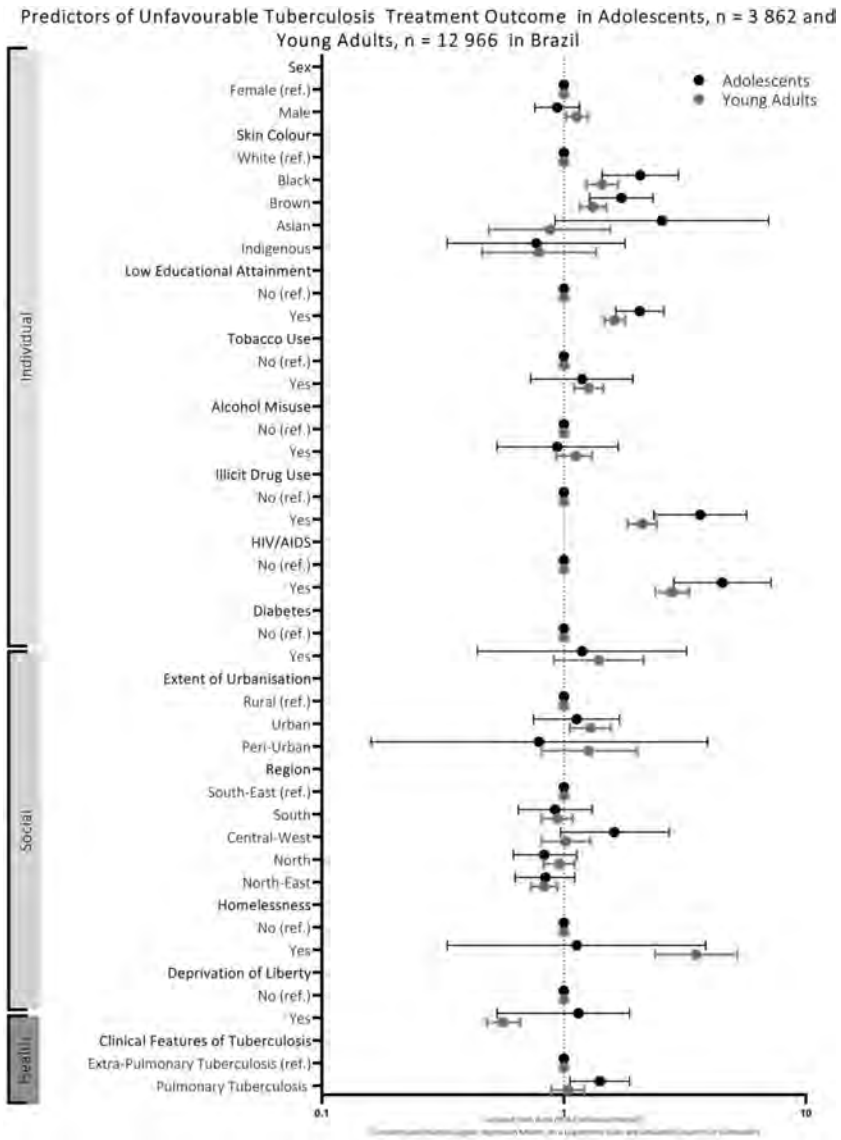
10.1136/thorax-2020-BTSabstracts.16

Introduction and Objectives Young people are often neglected in tuberculosis elimination efforts. Unlike children, young people are likely to contribute to onward transmission of tuberculosis, further perpetuating the epidemic. Brazil has a high burden of tuberculosis, however there is limited knowledge of tuberculosis treatment outcomes among young people in



Abstract S10 Figure 1

Brazil. This study sought to investigate how predictors of unfavourable tuberculosis treatment outcome vary between adolescents (10–17 years) and young adults (18–24 years), and the extent to which they are included in treatment support strategies.

Methods A national retrospective cohort study was conducted using Brazilian tuberculosis registry data to investigate the predictors of unfavourable treatment outcome for young people with tuberculosis. Persons between 10–24 years, with newly diagnosed tuberculosis between January 2015 and December 2018, were included. Unfavourable outcomes were defined as loss to follow-up, treatment failure, change in treatment, death. Favourable outcomes were defined as treatment completion or cure. Factors associated with unfavourable treatment outcome were compared between adolescents and young adults, using complete case and missing indicator multiple logistic regression models.

Results 41,870 young people were included, 7,024 (17%) experienced unfavourable treatment outcomes.

5,869 (14%) were lost to follow-up; of which 86% were young adults, 72% male, 73% identifying with black or brown skin colour, 67% had low educational attainment and 9% diagnosed with HIV/AIDS. HIV/AIDS (OR_{adj}4.52;95% CI:2.85–7.17), drug use (OR_{adj}3.66;95% CI:2.36–5.70), identifying with black skin colour (OR_{adj}2.07;95% CI:1.44–2.98) or low educational attainment (OR_{adj}2.06;95% CI:1.64–2.59) were most strongly associated with unfavourable outcome in adolescents, as compared to young adults. Conversely, deprivation of liberty was only protective for young adults (OR_{adj}0.56;95% CI:0.48–0.66). Adolescents and young adults with tuberculosis had similarly low uptake of treatment supervision (52% vs. 52%; p=0.92), however adolescents were more likely to receive governmental cash transfers compared to young adults (17% vs. 8%; p<0.05).

Conclusions HIV/AIDS, drug use, race and educational attainment are the strongest independent predictors of unfavourable outcome for both adolescents and young adults with tuberculosis in Brazil. Greater efforts are needed to engage vulnerable young people with tuberculosis in treatment support strategies, including treatment supervision and governmental cash transfers.

S11 LONG-TERM FOLLOW-UP OF THE PHASE 1 START TRIAL OF ONASEMNOGENE ABEPARVOVEC GENE THERAPY IN SPINAL MUSCULAR ATROPHY TYPE 1

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10.1136/thorax-2020-BTSabstracts.17

Introduction and Objective Onasemnogene abeparvovec (formerly AVXS-101) is designed to address the genetic root cause of spinal muscular atrophy type 1 (SMA1). In the phase 1 trial (START; NCT02122952), patients who received a one-time (proposed therapeutic dose) infusion (n=12) demonstrated significantly improved outcomes versus untreated natural history. Here, we evaluate long-term safety in patients previously treated in START and long-term efficacy in patients from both Cohorts. START patients could electively enroll into a LTFU study (NCT03421977).

Methods Primary objective: long-term safety. Patients have annual visits (5 years) followed by annual phone contact (additional 10 years). Assessments include medical history/record review, physical examination, clinical laboratory evaluation, pulmonary assessments, and milestone maintenance.

Results As of 31 Dec 2019, 13 patients (low dose, n=3; therapeutic dose, n=10) were enrolled. The oldest patients were aged 6.2 (low dose) and 5.6 (therapeutic dose) years. All patients who received the therapeutic dose have survived and are free of permanent ventilation (mean [range] age at last data cut: 4.8 [4.3–5.6] years; mean [range] time since dosing: 4.5 [4.1–5.2] years). These patients have either maintained all previously attained milestones or gained new milestones; 2 patients have newly achieved standing with assistance while not receiving concomitant survival motor neuron 2 protein (*SMN2*) upregulating therapy at any point. Of the 10 enrolled patients who received therapeutic dose, 6 did not require regular, daily respiratory support more than 4 years after dosing. Additionally, 6 have never received concomitant *SMN2* upregulating therapy. No new treatment-related adverse events (AEs) were reported. Onasemnogene abeparvovec has been associated with transient, manageable, and subacute AEs. During LTFU, no AEs of special interest have been reported to date, specifically none associated with liver enzyme elevations, haematology values, new malignancies or autoimmune disorders. Serious AEs were reported in 8/13 (61.5%) patients; however, no serious AEs were considered related to treatment or lead to study discontinuation supporting a favorable risk–benefit profile.

Conclusions Onasemnogene abeparvovec shows a favorable risk–benefit profile, and continues to demonstrate efficacy with new milestone developments.

S12 ONASEMNOGENE ABEPARVOVEC GENE THERAPY FOR SPINAL MUSCULAR ATROPHY TYPE 1: PHASE 3 STUDY (STR1VE-US)

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10.1136/thorax-2020-BTSabstracts.18

Introduction and Objective Onasemnogene abeparvovec (formerly AVXS-101), is designed to address the genetic root cause of spinal muscular atrophy (SMA), survival motor neuron 1 gene (*SMN1*) deletion/mutation. Here, we evaluate final data from STR1VE-US (NCT03306277), a multicenter, open-

label, single-arm, single-dose, Phase 3 study conducted in the United States, investigating efficacy and safety of one-time intravenous infusion of onasemnogene abeparvovec in patients with SMA1 (aged, <6 months).

Methods Co-primary endpoints: independent sitting for ≥30 seconds at the 18 months visit, survival (no death/permanent ventilation) at 14 months of age. Co-secondary endpoints: ability to thrive at 18 months (composite of: tolerates thin liquids, no mechanical nutrition support, maintains weight consistent with age), independence from ventilatory support at 18 months (based on Trilogy BiPAP usage). Safety endpoints: unanticipated treatment-related toxicity of Grade ≥3 based on CTCAE.

Results All co-primary and co-secondary endpoints demonstrated statistically significant benefits of onasemnogene abeparvovec compared with untreated controls in the Pediatric Neuromuscular Clinical Research (PNCR) study. Thirteen of 22 (59.1%) patients treated with onasemnogene abeparvovec achieved the milestone of functional independent sitting for ≥30 seconds at the 18-month visit (P<0.0001 vs PNCR). Twenty-one of 22 patients (95.5%) survived ≥10.5 months without permanent ventilatory support and 20/22 (90.9%) patients were surviving free of permanent ventilation at 14 months and 18 months of age. For comparison, the relevant PNCR dataset showed event-free survival of 50% at 10.5 months and 25% at 13.6 months. Nine of 22 (40.9%) patients maintained the ability to thrive at 18 months of age, 15/22 (68.2%) patients received no non-oral feeding support at any time during the study, and 18/22 (81.8%) patients were independent of ventilator support at 18 months of age based on Trilogy BiPAP data. Patients exhibited rapid (1-month post doing) and sustained improvements in motor function (CHOP INTEND scores) and achieved motor milestones, previously unseen in PNCR dataset. Adverse events were manageable and consistent with the known safety profile of onasemnogene abeparvovec.

Conclusions In the STR1VE-US study, patients with SMA1 treated with onasemnogene abeparvovec demonstrated a significant therapeutic benefit and a favourable the benefit-risk profile.

The secret life of CPETs

S13 EFFECT OF PORTABLE NON-INVASIVE VENTILATION ON THORACOABDOMINAL VOLUME REGULATION IN RECOVERY FROM INTERMITTENT EXERCISE IN PATIENTS WITH COPD

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10.1136/thorax-2020-BTSabstracts.19

Background We previously identified that 8/24 COPD patients did not improve dynamic hyperinflation (DH) (DH non-responders) with the application of portable non-invasive ventilation (pNIV; Inspiratory/Expiratory Positive Airway Pressure: 18/8 cmH_2O) compared to the pursed lip breathing (PLB) technique during recovery from intermittent exercise (Chynkiamis *et al* 2020). In the present study we employed Optoelectronic Plethysmography during acute application of pNIV and PLB in recovery from exercise to examine potential differences in the pattern of thoracoabdominal volume regulation between DH responders and DH non-responders.

Methods 14 COPD patients (FEV_1: 55±21%predicted) performed 2 intermittent cycling trials (consisting of 5 bouts for 2 minutes at 80% of peak work rate interspersed with 2 minutes of recovery) using PLB or pNIV during recovery on a balanced order sequence.

Results Patients exhibited two different patterns of response to exercise-induced DH during pNIV compared to PLB application: those who recruited expiratory abdominal muscles, thereby compensating end-expiratory rib cage hyperinflation (DH responders: n=7) and those who did not recruit expiratory abdominal muscles to compensate rib cage hyperinflation (DH non-responders: n=7). In DH responders, pNIV application compared to PLB in the 1st minute of recovery decreased total end-expiratory thoracoabdominal volume by 364±114 ml (p=0.019), secondary to greater reduction in end-expiratory abdominal volume by 338±171 ml (p=0.047). In contrast, in DH non-responders, pNIV application compared to PLB increased end-expiratory thoracoabdominal volume by 379±76 ml (p=0.004), secondary to increased end-expiratory rib cage volume by 348±44 ml (p=0.001) with no change in end-expiratory abdominal volume (31±81 ml; p=0.720). Lung function measures were not different between responders and non-responders. However, DH responders had greater BMI (32.8±6.8) compared to DH non-responders (23.6±4.9) (p=0.019).

Conclusions Reports that the respiratory muscles of patients with high BMI might have a mechanical advantage compared to patients with normal BMI (O'Donnell & Ciavaglia, 2014) may partly explain the difference between responders and non-responders. Moreover, pNIV used in the present study provided high extrinsic positive end-expiratory pressure (PEEPe), matching more effectively the higher intrinsic positive end-expiratory pressure, reported in patients with high BMI (O'Donnell & Ciavaglia, 2014). However, PEEPe was likely excessive for the DH non-responders, thereby worsening DH.

S14 THE UTILITY OF THE OXYGEN UPTAKE EFFICIENCY PLATEAU AS A SUBMAXIMAL EXERCISE BIOMARKER IN INTERSTITIAL LUNG DISEASE

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10.1136/thorax-2020-BTSabstracts.20

Introduction Aerobic fitness (represented by VO_{2peak}), derived from cardiopulmonary exercise testing (CPET), is a biomarker predictive of mortality in interstitial lung disease (ILD). However, CPET requires elicitation of maximal responses, which may not be feasible for some patients due to clinical contraindications. Therefore, suitable submaximal exercise-based biomarkers are required. The oxygen uptake efficiency plateau (OUEP), defined as a 90 second average of oxygen uptake relative to minute ventilation (VO_2/V_E), is one submaximal parameter that has been previously investigated in patients with cystic fibrosis and heart failure. Currently, there are no data for ILD.

Objectives To determine if OUEP is a viable biomarker in ILD by 1) characterising OUEP in a cohort of patients with ILD, and 2) establishing relationships between traditional pulmonary function biomarkers (FVC and DL_{CO}), OUEP and VO_{2peak}

Methods 24 participants with ILD (69.7 ± 7.6 years) underwent CPET, via cycle ergometry, to identify VO_{2peak} and OUEP. Pulmonary function data were retrospectively obtained from patient records. OUEP as a percentage of time to exhaustion (TTE), and VO_{2peak} were identified. Pearson's correlation coefficients were established between VO_{2peak}, OUEP, FVC and DL_{CO}.

Results 21 participants (15 male/6 female) produced a valid CPET as per existing guidelines. Mean (± standard deviation) VO_{2peak} and OUEP were 1.40 ± 0.36 $L.min^{-1}$ and 27.4 ± 4.6 $mL.L^{-1}$ respectively. OUEP occurred at 37 ± 22% of TTE, representing 60.1 ± 14.0% VO_{2peak}. FVC held non-significant correlations with VO_{2peak} (r = 0.16, p = 0.48) and OUEP (r = 0.31, p = 0.17). In contrast, DL_{CO} held significant and stronger correlations with both VO_{2peak} (r = 0.59, p =0.006) and OUEP (r = 0.71, p < 0.001). VO_{2peak} and OUEP significantly correlated with one another (r = 0.73, p < 0.001).

Conclusions OUEP was successfully determined and identified in all participants. It correlated highly with VO_{2peak}, the current gold-standard measure from CPET. It also correlated highly with DL_{CO}, to a greater magnitude than VO_{2peak}. As OUEP occurred at ~60%VO_{2peak}, it is submaximal in nature, and may therefore be a viable biomarker in ILD, particularly for those patients who cannot exercise to volitional maximal exhaustion.

S15 PRACTICALITY AND CLINICAL UTILITY OF CARDIOPULMONARY EXERCISE TESTING TO INVESTIGATE COMPLEX BREATHLESSNESS IN SEVERE ASTHMA

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10.1136/thorax-2020-BTSabstracts.21

Background Breathlessness does not always correlate with asthma severity and is often driven by co-existing conditions such as breathing pattern disorder (BPD) or de-conditioning. Cardiopulmonary exercise testing (CPET) may help in elucidating the causes of breathlessness.

Aim To assess the utility of CPET in the management of complex breathlessness in severe asthma.

Methods Retrospective analysis of CPETs performed by well-characterised severe asthmatics with promine nt breathlessness and exercise limitation in a tertiary centre.

Results CPET was performed in 16 patients [mean age 43 yrs (range 26–60), 9 females, mean BMI 33.4±6.5 kg/m^2, FEV1 (L) 2.7±1.1, FEV1%-pred 83.9±25.9%, FEV1/FVC ratio 73.8 ±9.6 (range 55–86), inhaled corticosteroid dose 1.5±0.7 mg/day, oral corticosteroid courses per annum 3.6±3, FeNO 48.1 ±44 ppb, blood eosinophils 0.5±0.6 × 109/L].

Twelve (75%) patients completed CPET (loaded exercise time 9.7±2.8, peak heart rate 89±12% predicted). The V'O2 at peak was 85±24%predicted; at anaerobic threshold 53±11 (range 42–70), and the breathing reserve was 15± 31%. Of the 4 cases that did not complete CPET, 2 had BPD. The CPET diagnoses included BPD in 81% and hyperventilation 56%, deconditioning 12.5%, reduced functional capacity due to obesity 6.5%, and ventilation limitation due to underlying lung disease 6.5%. There were no adverse effects post testing. Results altered diagnosis in 62.5% of cases; reinforced diagnosis in 25%; and did not alter diagnosis in 12.5% (normal CPET).

Conclusion CPET was practical to conduct and aided in elucidating the causes of breathlessness in severe asthma, which facilitated appropriate management.

S16 AN RER OF 1.05 SHOULD NOT BE USED TO DETERMINE MAXIMAL EFFORT DURING CPET

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10.1136/thorax-2020-BTSabstracts.22

Intro A recent ERS statement on standardisation of cardiopulmonary exercise testing (CPET) in chronic lung diseases (Radtke *et al* 2019) discussed the criteria for determining maximal effort. A CPET with a respiratory exchange ratio (RER) >1.05 is considered maximal using these criteria; V'O2 <85% predicted, V'E >85% predicted, and HR <90% predicted were considered abnormal responses if the test is maximal.

We hypothesise that using an RER >1.05 as maximal will result in misinterpretation.

Methods Retrospective analysis of CPETs performed at Birmingham Heartlands Hospital in 2019. Inclusion criteria: patient limited, RER >1.15 at peak, >6 mins. Exclusion criteria: highly variable RER indicating dysfunctional breathing.

V'O2, V'E, and HR were measured at RERs of 1.05, 1.15 and peak, and were compared with Friedman tests.

Results CPET was performed in 422 patients. 199 had an RER > 1.15 at peak. 23 patients were excluded due to dysfunctional breathing. The indication for testing was pre-operative assessment in 117 patients and CPET was for diagnostic purposes in 59 patients. Mean (SD) age = 61.4 (16.9) years, BMI = 27.7 (5.4), CPET duration 9.4 (1.8) mins; gender (F:M) 50:126.

Of the 59 patients that were investigated for cause of breathlessness, 37% were normal at peak exertion based on the ERS criteria for abnormality. At an RER of 1.05 this was 3.4% and at an RER of 1.15 this was 25.4%.

Of the 117 preoperative assessments, 88 had a V'O2peak >15 ml/min/kg and could be considered low risk for surgical intervention. At an RER of 1.05, 70% of these patients would have been considered high risk; 30% would have been considered high risk at RER 1.15.

Discussion Using an RER of 1.05 an indicator of maximal effort underestimates some patients' true exercise capacity. This will have an impact on diagnosis and risk stratification.

Abstract S16 Table 1 CPET Data (median±IQR)

	RER 1.05	RER 1.15	Peak	p
V'O2%pred	54.25 ± 22.2	65.2 ± 25.8	76.1 ± 30.7	<0.0001
V'E%pred	38.4 ± 17.8	53.7 ± 22.25	65 ± 24.44	<0.0001
HR%pred	77.55 ± 17.55	86.9 ± 16.17	91.46 ± 16.95	<0.0001

S17 CARDIO-RESPIRATORY EXERCISE, INCREMENTAL SHUTTLE WALK TEST AND THORACOSCORE IN PREDICTING OUTCOMES FOLLOWING THORACOTOMY

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10.1136/thorax-2020-BTSabstracts.23

Background Current treatment guidelines for lung cancer patients undergoing thoracotomy suggest using a Cardio-Pulmonary Exercise Test (CPET) Incremental Shuttle Walk Test (ISWT) and Thoracoscore as part of the pre-operative assessment to determine operability and post-operative morbidity for curative lung cancer treatment (NICE, 2019)(ERS, 2011). Consequently, the risk stratification pathway for lung cancer patients undergoing thoracotomy is extensive and has become a burden for both patients and respiratory departments throughout the UK. This study was designed to explore the potential utility of each of the measurements for risk stratification of thoracotomy.

Aims To explore which exercise tests best quantifies the risk of surgery in patients undergoing thoracotomy at Manchester University Hospital and to identify any correlation with Length of Hospital Stay (LOHS), unplanned intensive care admissions and the re-admission rate at 90 days.

Methods The study adopted a consecutive recruitment technique. Fifteen lung cancer patients performed CPET and ISWT prior to thoracotomy surgery; thoracoscore was calculated.

Results No statistical difference was identified between patients who experienced complications and those who didn’t ($p>0.05$). Mean VO2 peak: 17.02 ml.min.kg (SD 2.8 ml.min.kg) in those with complications; 14.03 ml.min.kg (SD 3.2 ml.min.kg) in those without. As with ISWT distance ($p>0.05$): mean Distance walked 263.2 m (SD 70 m) in those with complications; 308.9 m (SD 126 m) in those without. However, LOHS was correlated with SpO2 desaturation ($r = 0.857$, $n=15$ p-value$=0.00$). The readmission rate at 90 days was 11%.

Conclusion No statistically significant relationships between pre-operative variables such as VO2Peak (ml/min), VO2 Peak (ml/min/kg), VE/VCO2, Workload, Distance walked, Thoracoscore, SpO2 desaturation and the post-operative outcomes were identified. A positive correlation between SpO2 desaturation and LOHS was found; the smaller the desaturation, the shorter the hospital stay.The results of the study disagree with the recommendations made by national guidelines for radical treatment of thoracotomy (NICE, 2019) (BTS, 2001) (ERS, 2011). Therefore, it is uncertain if pre-operative exercise assessments are useful for predicting post-operative outcomes. Nevertheless, the study provided a foundation to warrant further research in this patient cohort.

S18 NEUROMUSCULAR ELECTRICAL STIMULATION IN ADVANCED IDIOPATHIC PULMONARY FIBROSIS (IPF): A RANDOMISED PLACEBO-CONTROLLED FEASIBILITY TRIAL

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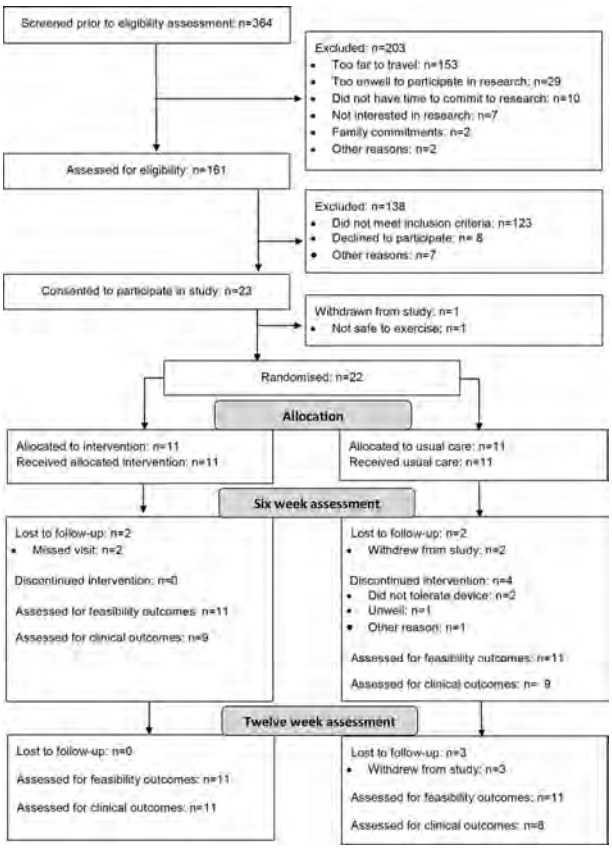
10.1136/thorax-2020-BTSabstracts.24

Background Pulmonary rehabilitation is associated with benefit in IPF. However, those with advanced disease may have difficulties participating as ventilatory limitation may restrict whole-body exercise. Neuromuscular electrical stimulation (NMES) offers a home-based rehabilitation strategy to enhance muscle strength that is unaffected by ventilatory limitation. We aimed to investigate whether home-based NMES is acceptable to people with IPF, and whether it brings improved physical performance, muscle strength and quality of life to those with severe breathlessness.

Methods We undertook a parallel-group, randomised placebo-controlled, assessor-blinded feasibility trial with participants randomised (1:1) to usual care (unsupervised home-based exercise training with exercise manual and weekly telephone support) with either placebo or active NMES (30 minutes daily stimulation of quadriceps) for six weeks, with 12 week follow-up and embedded, topic-guided, qualitative interviews. The primary outcomes were feasibility measures: patient flow and recruitment, intervention uptake, assessor and participant blinding, completion rates. Secondary outcomes included clinical measures (six minute walk test (6MWT), accelerometer-measured physical activity levels quadriceps maximum voluntary contraction, rectus femoris cross-sectional area, Kings Brief Interstitial Lung Disease questionnaire) measured at baseline, six and 12 weeks.

Results Feasibility outcomes are shown in figure 1. The groups were well-matched at baseline, but the intervention group had a higher median (25th, 75th centile) 6MWT distance than the control group (326 (150, 361) versus 240 (130, 325) metres). The assessor remained blinded to group allocation but three (27%) patients in the control group were unblinded. There was no significant between-group differences in device use or home-exercise performance. Due to the small numbers of participants in each



Abstract S18 Figure 1 CONSORT diagram

group, it was not possible to test for within- or between-group differences. However, there was a trend towards a greater reduction in time spent sedentary in the intervention group. Four patients in the control group experienced a serious adverse event compared to one patient in the intervention group. Analysis of qualitative interviews (n=6) indicated that that the intervention was acceptable and feasible to patients but many found the telephone support and home-exercise diary burdensome.

Conclusion This study, although acceptable to patients, should not be developed into a definitive trial because of recruitment challenges.

What's new in COPD?

S19 SCREENING FOR UNDIAGNOSED COPD: A COMPARISON OF SCREENING QUESTIONNAIRE TEST PERFORMANCE IN TWO COUNTRIES; BREATHE WELL BRAZIL AND CHINA

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10.1136/thorax-2020-BTSabstracts.25

Introduction and Objectives The accuracy of available screening questionnaires for undiagnosed COPD in low/middle income country settings is unknown. We compared test performance of a variety of instruments in Brazil and China.

Methods Patients aged ≥40 years from community health centres in China, and hypertension clinics in Basic Health Units in Brazil completed all screening questionnaires (CDQ, CAPTURE, Symptom-based questionnaire[SBP], COPD-SQ) and the reference test (ndd Easy On-PC spirometer). We compared test performance of all questionnaires against the reference test. COPD was defined by the lower limit of normal (LLN-GLI) on the reference test.

Abstract S19 Table 1 Sensitivity and specificity of the screening questionnaires in the Brazil and China studies

	Sensitivity (95%CI)	Specificity (95% CI)
CAPTURE (5 items)		
Brazil	63.7% (53.0%, 73.6%)	45.8% (42.8%, 48.9%)
China	51.7% (46.1%, 57.1%)	70.3% (68.3%, 72.2%)
CDQ (8 items)		
Brazil	52.7% (42.0%, 63.3%)	22.7% (20.2%, 25.3%)
China	45.0% (39.6%, 50.6%)	21.4% (19.6%, 23.2%)
SBQ (11 items)		
Brazil	71.4% (61.0%, 80.4%)	59.2% (56.2%, 62.2%)
China	63.1% (57.6%, 68.3%)	74.2% (72.3%, 76.1%)
COPD-SQ (7 items)		
Brazil	23.1% (14.9%, 33.1%)	48.6% (45.6%, 51.7%)
China	44.7% (39.3%, 50.3%)	22.7% (20.9%, 24.5%)

Results 1162 participants in Brazil and 2445 participants in China completed all tests. Compared to China, the Brazil sample was older (62.3 yrs vs 59.8 yrs), had fewer men (32.5% vs 39.1%) and more ever smokers (51.0% vs 31.1%). The prevalence of study-defined COPD was lower in Brazil (n=91, 7.8%) compared to China (n=333, 13.6%). The SBQ had the best accuracy in both studies, followed by CAPTURE (Table 1).

Conclusion The prevalence of study-defined COPD in the Brazil sample was approximately half that detected in the China study. In Brazil and China, the SBQ was the most accurate screening questionnaire overall. Compared to CAPTURE, the SBQ included additional items about age, smoking, weight, wheeze, allergies and childhood chronic respiratory conditions. Performance for all screening questionnaires was lower than reported in previous literature. While questionnaire performance is dependent on context and may not be replicable across settings, explanations for the observed test performances and potential alternative cut-points need to be explored further.

S20 DUAL ENERGY COMPUTERISED TOMOGRAPHY (DECT) QUANTIFIES LOBAR IODINE DISTRIBUTION IN PATIENTS WITH SEVERE EMPHYSEMA

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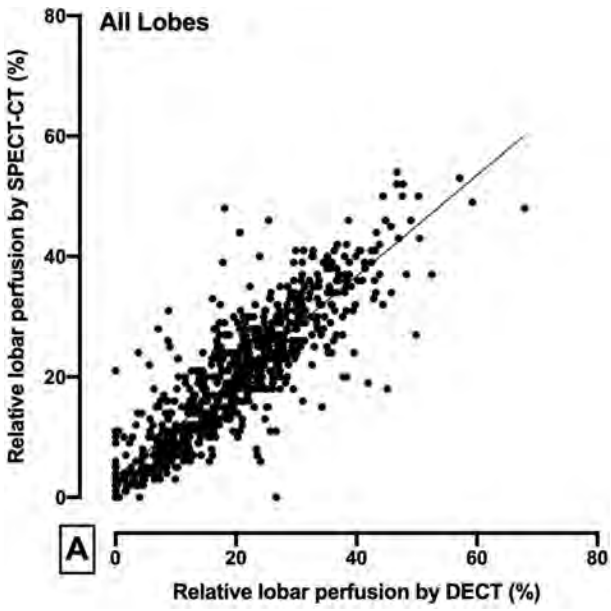
10.1136/thorax-2020-BTSabstracts.26

Background Lung volume reduction (LVR) can transform the lives of patients with severe emphysema. Patient selection is predicated by the quantification of emphysema distribution using computed tomography (CT) and lobar perfusion using single photon emission CT perfusion scintigraphy (SPECTPS). We hypothesize contrast-enhanced dual energy CT (DECT) angiography will accurately estimate lobar iodine distribution and may provide a surrogate marker for lobar perfusion.



Abstract S20 Figure 1

Purpose To quantify the correlation between lobar contrast agent distribution on DECT and SPECTPS.

Materials and Methods Institutional review board approval was obtained for this retrospective study. Between May 2018 and February 2020, 152 patients (89 male, 63 female, 64.5 ± 8.6 years, forced expiratory volume in 1 s (FEV_1) 31.5 ± 12.3% (predicted)) were eligible for inclusion. DECT data was reconstructed using prototype artificial intelligence software (eXamine, Siemens Healthineers, Forchheim, Germany) and recorded in a blinded fashion. Contrast agent lobar distribution on DECT and SPECTPS images were calculated by dividing contrast agent distribution in individual lobes by the total amount in both lungs. Effective radiation dose, adverse reactions, need for manual corrections and processing time were calculated. Bland-Altman analysis (limits of agreement, LoA) and Pearson correlation were used for intermodality comparison using Prism8.

Results There is strong agreement between lobar perfusion values acquired using DECT compared to SPECTPS (r= 0.86, p<0.01). Bland Altman Analysis gave a bias of 0.044; LoA = -11.667, 11.75% (*p*=x). 123 DECT studies (81%) did not require manual correction, taking 1 m53 ± 3s to process. 19% of DECT studied required manual correction (8m48 ± 56s).

Conclusion DECT pulmonary angiography accurately quantifies lobar perfusion, and streamlines the LVR patient selection paradigm. Software efficiency improvements are necessary for the implementation of DECT angiography into mainstream clinical practice.

S21 RECEIVER TRIAL INTERIM ANALYSIS: REDUCTION IN COPD ADMISSIONS WITH DIGITALLY SUPPORTED SELF-MANAGEMENT

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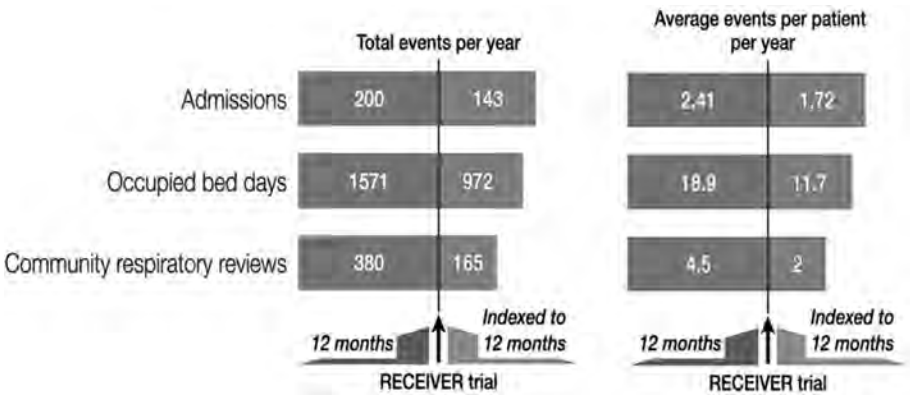
Background The Remote-management of COPD: Evaluating Implementation of Digital Innovations to Enable Routine Care (RECEIVER, NCT04240353) observational cohort trial commenced September 2019. Clinician-patient co-designed progressive web application captures patient-reported outcomes (PROs), Fitbit and home NIV data, and provides self-management resources including asynchronous messaging. Cloud-based clinician dashboard integrates these with clinical summary and event data. Inclusion criteria are diagnosis of COPD with recent severe exacerbation and/or chronic hypercapnia, and daily access to smartphone, tablet or computer. Primary endpoint is patient use of the application. Secondary endpoints include impact on clinical outcomes and deriving AI-based risk predictive models.

Methods We performed a planned interim effectiveness analysis of recruitment, patient-app utilisation and clinical outcomes at week 40, reflecting a minimum of 3 months follow up per patient.

Results 283 patients were screened with 83 patients (average age 65 years) enrolled in RECEIVER by March 2020. Recruitment was paused then due to COVID-19 pandemic. 25/83 patients had home NIV or CPAP. Of the 143 excluded patients, 41 had no access to technology (average age 71 yrs), 42 had not had a recent exacerbation (average age 67 yrs) and 23 declined to participate (average age 67 yrs).

An average of 4.6/patient/week daily PROs were completed, with usage sustained through to week 40. Improvement in patient outcomes versus their preceding year, with reduction in annualised admissions, occupied bed days and community reviews is noted (figure 1). Improved event ratios are maintained in subgroup analyses of home NIV patients, and if follow up is censored at UK COVID-19 lockdown.

Conclusion Interim analyses of the RECEIVER trial are encouraging, with sustained patient use of the application, and associated positive impact on patient outcomes. Older age of patients lacking access to digital technology is notable. To support post COVID-19 NHS recovery we have scaled-up the digital self-management service, offering this to all COPD patients in NHS GG&C. RECEIVER trial dataset will be combined with large NHS GG&C SafeHaven historical cohort and the scale-up patient data for machine-learning analyses. We aim to train, validate and operationalise prediction models for 12-month mortality, 3-month re-admission and 72-hour exacerbation risk.



Abstract S21 Figure 1 Interim analysis of RECEIVER trial outcome data
Reduction in total and average per patient indexed annualised admissions, occupied bed days and community respiratory reviews following RECEIVER trial enrolment

S22 RATE OF SEVERE COPD EXACERBATIONS WITH BUDESONIDE/GLYCOPYRRONIUM/FORMOTEROL FUMARATE DIHYDRATE METERED DOSE INHALER (BGF MDI) VERSUS DUAL THERAPIES: A POST-HOC SUBGROUP ANALYSIS OF THE ETHOS TRIAL

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Introduction and Objectives The management of chronic obstructive pulmonary disease (COPD) exacerbations varies by region; in most countries, patients are hospitalized for serious or potentially life-threatening exacerbations only, while mild/moderate exacerbations are managed in general practice or outpatient settings. To determine whether regional differences had an impact on outcomes in the ETHOS study, we performed a post-hoc analysis of severe exacerbation rates in selected regions with similar management of COPD exacerbations.

Methods ETHOS (NCT02465567) was a 52-week, randomized, double-blind study in patients with moderate-to-very severe COPD who had ≥1 moderate/severe exacerbation in the previous year. Patients received budesonide/glycopyrronium/formoterol fumarate dihydrate metered dose inhaler (BGF MDI) 320/14.4/10µg or 160/14.4/10µg; glycopyrronium/formoterol fumarate dihydrate (GFF) MDI 14.4/10µg; or budesonide/formoterol fumarate dihydrate (BFF) MDI 320/10µg. All treatments were administered twice-daily via an Aerosphere inhaler. This post-hoc analysis assessed the annualized rate of severe exacerbations (a secondary endpoint) in a subgroup of 23 countries with similar patient care practices, including all patients from Europe, North America, South America, Australia, New Zealand, and South Africa.

Results The country subgroup population (n=7922) was a subset of the modified intent-to-treat (mITT) population (n=8509). In the global mITT population, BGF MDI 320/14.4/10µg significantly reduced the severe exacerbation rate by 20% versus BFF MDI (rate ratio [RR] 0.80 [95% CI 0.66–0.97], p=0.0221) with a numerical improvement of 16% versus GFF MDI (RR 0.84 [0.69–1.03], p=0.0944). In the country subgroup, BGF MDI 320/14.4/10µg significantly reduced severe exacerbations by 23% versus BFF MDI (RR 0.77 [95% CI 0.62–0.96], unadjusted p=0.0194); and by 20% versus GFF MDI (RR 0.80 [0.64–0.99], unadjusted p=0.0438). BGF MDI 160/14.4/10µg numerically improved severe exacerbation rates versus BFF MDI and GFF MDI (table 1).

Conclusions In the 52-week ETHOS study, BGF MDI 320/14.4/10µg reduced the rate of severe exacerbations versus both BFF MDI and GFF MDI in a subset of 23 countries with similar patient care practices. The consistent risk reductions in this subset compared with the overall population support the benefits of BGF MDI 320/14.4/10µg compared with dual therapies in reducing the rate of exacerbations that require management in a hospital setting.

Please refer to page A239 for declarations of interest related to this abstract.

S23 IMPACT OF COEXISTING DEMENTIA ON INPATIENT OUTCOMES FOR PATIENTS ADMITTED WITH A COPD EXACERBATION: ANALYSIS OF A US NATIONAL INPATIENT SAMPLE DATABASE

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Introduction Dementia increases the risk of morbidity and mortality in hospitalised patients.[1]Patients with COPD are at a higher risk of cognitive dysfunction than the general population.[2] However, the effect of dementia on inpatient stay among patients with COPD is not well understood. The impact of coexisting dementia on inpatient mortality and length of stay (LOS) in patients with COPD compared to

Abstract S22 Table 1 Rate of severe COPD exacerbations (subgroup of the mITT population*)

	BGF MDI 320/14.4/10 µg (n=1991)	BGF MDI 160/14.4/10 µg (n=1974)	GFF MDI 14.4/10 µg (n=1974)	BFF MDI 320/10 µg (n=1983)
Patients with ≥1 exacerbation, n (%)	182 (9.1)	209 (10.6)	204 (10.3)	221 (11.1)
Number of events	220	242	237	270
Time at risk, years	1755.3	1747.1	1624.5	1696.2
Rate, per year	0.13	0.14	0.15	0.16
Model-adjusted rate per year	0.12	0.13	0.15	0.15
Treatment rate ratio				
	BGF MDI 320/14.4/10 µg versus		**BGF MDI 160/14.4/10 µg versus**	
	GFF MDI 14.4/10 µg	**BFF MDI 320/10 µg**	**GFF MDI 14.4/10 µg**	**BFF MDI 320/10 µg**
Rate ratio	0.80	0.77	0.87	0.85
(95% CI)	(0.64, 0.99)	(0.62, 0.96)	(0.70, 1.08)	(0.69, 1.05)
p-value	0.0438	0.0194	0.2171	0.1240

*The subgroup analysis included all patients from Europe, North America, South America, Australia, New Zealand, and South Africa.
BFF, budesonide/formoterol fumarate dihydrate; BGF, budesonide/glycopyrronium/formoterol fumarate dihydrate; CI, confidence interval; COPD, chronic obstructive pulmonary disease; GFF, glycopyrronium/formoterol fumarate dihydrate; MDI, metered dose inhaler; mITT, modified intent-to-treat

those without dementia was assessed, using a national secondary care dataset from the United States.

Methods Patients aged over 40 years and discharged with a primary diagnosis of COPD exacerbation from the 2011–2015 National Inpatient Sample database were included. Cases were labelled as those with COPD and dementia and comparators, without dementia. Multivariable logistic regression analysis, stratified by age, was used to assess risk of inpatient deaths, adjusted for gender and comorbidities. Mann-Whitney U test was used to assess for differences in LOS in patients discharged alive for cases vs comparators and competing risk analysis gave estimates of the probability of being discharged with time to death a competing variable, using Fine and Gray regression model.

Results A total of 611,402 patients with a primary diagnosis of COPD exacerbation were identified, of which 37,344 (6%) had co-existent dementia. The median (IQR) age for cases was 82 (76–87) years vs 68 (59–77) years for comparators. The odds of inpatient death were significantly greater in younger cases (40–64 years) compared to controls but this risk diminished with age (Table 1). COPD patients with co-existing dementia had a longer LOS [median (IQR) cases vs comparators: 4 (3–6) vs 3 (2–5), p<0.001] and were also less likely to be discharged alive at a given time point [adjusted sub-hazard ratio (95% confidence interval): 0.93 (0.92–0.94), p<0.001].

Abstract S23 Table 1 Odds ratio for inpatient deaths stratified by age for cases vs controls

Age (years)	Adjusted OR (95% CI)*	P value	
40–64	1.78 (1.08–2.92)	0.02	<0.001 (p for
65–74	1.16 (0.94–1.44)	0.17	trend)
≥75	1.01 (0.92–1.11)	0.85	

* adjusted for gender and modified Charlson comorbidity index; OR: odds ratio; CI: confidence interval

Discussion Coexisting dementia is associated with an increased risk of overall inpatient deaths in younger patients with COPD. Patients with COPD and dementia are also more likely to have a longer LOS when admitted due to a COPD exacerbation.

REFERENCES

1. Bouza C, *et al*. *PLoS One* 2019;**14**(2).
2. Dodd J, *et al*. *European Respiratory Journal* 2010;**35**(4):913–22.

S24 PREDICTING POOR OUTCOME AT SIX MONTHS FOLLOWING EXACERBATIONS OF COPD REQUIRING ASSISTED VENTILATION

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Introduction Non-invasive ventilation (NIV) is life-saving in exacerbations of COPD complicated by acute hypercapnic respiratory failure (AHRF). These episodes indicate advanced disease and patients who survive the acute episode show significant morbidity and high one-year mortality.[1] In this group, clinicians can be prognostically pessimistic about outcome and quality of life (QoL); understanding predictors of poor outcome six months following an episode of AHRF treated with NIV could help clinical decision making.

Methods Unique, consecutive patients were prospectively recruited to the NIV Outcomes study (ISRCTN22921168) in 10 NHS trusts. Consenting patients surviving to discharge were followed up monthly with QoL assessed using validated QoL questionnaires including the COPD Assessment Test (CAT). Poor outcome was defined as a pre-discharge CAT score in the worst 50% of responses (CAT=24–40) with subsequent clinically significant decline (≥2 points), or death, within six months. Multivariate logistic regression identified independent predictors. Continuous variables were subsequently dichotomised, and regression rerun.

Results 553 patients survived to discharge; 253 consented and 239 provided >1 QoL assessment. Median(IQR) follow up time was 359(171–367) days, with 8(3–11) months of questionnaires completed, and NIVO score of 3(1–3.75). Mean (SD) age 68.9(9.1) years and $FEV_1$36.8(14.7)% predicted. 34.2% had previously received NIV, 24.6% were prescribed LTOT, and 47.1% were unable to leave the house unassisted. 56.6% had persistent hypercapnia post-ventilation. 67/239 suffered poor outcome.

Independent predictors of poor outcome were LTOT, Left Ventricular Systolic Dysfunction, Diaphragm height ≤2.3 cm, confusion pre-ventilation, admission haemoglobin ≤14 g/dL, Pre-discharge HADS-depression Score ≥8, Pre-discharge Nottingham Extended Activities of Daily Living score ≤30 (Table

Abstract S24 Table 1 Result of backwards stepwise regression model showing independent predictors of poor outcome

VARIABLE	B	S.E	Wald	P value	Odds Ratio (95% CI)
Long term oxygen therapy	1.069	.369	8.412	.004	2.913 (1.414–5.999)
Left ventricular systolic dysfunction	1.017	.425	5.721	.017	2.764 (1.201–6.358)
Diaphragm height ≤2.3 cm	.730	.341	4.571	.033	2.074 (1.063–4.048)
Confusion pre ventilation	1.045	.424	6.072	.014	2.843 (1.238–6.525)
Haemoglobin ≤14 g/dL	.684	.350	3.813	.051	1.981 (0.997–3.934)
Baseline HADS Depression ≥8	.856	.352	5.902	.015	2.354 (1.180–4.695)
Baseline NEADL ≤30	1.162	.353	10.814	.001	3.197 (1.599–6.393)

HADS= Hospital anxiety and depression scale; NEADL= Nottingham extended activities of daily living score; B= beta score; S.E.=Standard error; CI= confidence interval

1). A simple tool (1 point assigned to each variable) demonstrated an area under the receiver operating characteristic curve of 0.809 (95% CI's: 0.747–0.871).

Discussion These routinely available clinical indices, which include a measure of hyperinflation, and two simple patient completed questionnaires demonstrate independent prediction of poor outcome in this population. A clinical tool from these indices shows promise but would require external validation before clinical use. If this occurred, it may help challenge prognostic pessimism and with predicting patients who require specialist palliative input.

REFERENCE

1. BTS/ICS AHRF Guideline. Thorax(2016);71:ii1–ii35.

New insights in asthma care

S25 THE IMPACT OF COVID-19 ON THE UK SEVERE ASTHMA POPULATION

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Introduction Severe asthma patients were assumed to be at greater risk of morbidity from infection with the novel severe acute respiratory syndrome coronavirus (COVID-19), hence, in the UK, were advised to shield. Community data on COVID-19 infection in severe asthmatics is lacking. We assessed the burden of shielding, the impact of COVID-19 and the effect of asthma medication on the UK severe asthma population.

Methods Adults previously consented to inclusion in the UK Severe Asthma Registry (UKSAR) across 14 centres were contacted in June 2020 to collect data on potential COVID-19 infection, asthma control and shielding. Electronic records, where available, were reviewed for confirmation. Data was combined with clinical data from the UKSAR. Univariate and multivariate logistic regression analyses were performed to identify risk factors for COVID-19 infection.

Results 1365 patients were included. 1268 (93%) were advised to shield, 1131 (89%) patients who received shielding advice followed it. Men (OR 0.4, p=0.045) and those in non-shielding households (OR 0.27, p=0.001) were less likely to follow shielding advice. 544 (47%) of patients advised to shield reported worsening of mental health; females (OR 1.59, p=0.001) and those with history of anxiety or depression (OR 2.12 p=0.001) were at greater risk.

97 (7.1%) patients had suspected/confirmed COVID-19 infection, 19 (1.39%) PCR/serology confirmed infection, 13(0.95%) were hospitalised and 2 patients (0.15%) died (table 1).

918 (67%) were on biologic therapy, 515 (37%) maintenance oral corticosteroid (mOCS). Multivariate analysis showed neither biologic therapy (OR 0.73, p=0.165) nor mOCS (OR 1.18, p=0.427) increased the risk of COVID-19 infection. Patients on biologics were less likely to require an acute course of corticosteroids for asthma symptoms (OR 0.6, p=0.002) while patients on mOCS were more likely (OR 1.96 p≤0.001).

Inhaled corticosteroids (ICS) were not associated with COVID-19 infection, including high dose (2000 mcg BDP equivalent) (OR 0.64, p=0.234). Hospitalised patients were on lower median doses of ICS vs non-hospitalised patients (1000 vs 2000 mcg BDP equivalent, p=0.002).

Conclusion Hospitalisation and death occurred in small numbers in our severe asthma population. From this observational data, biologic agents for asthma were not associated with increased risk of COVID-19 infection or hospitalisation.

Abstract S25 Table 1 Characteristics of severe asthma patients with suspected or confirmed mild (ambulatory) or severe (hospitalised) COVID-19 infection

	Mild COVID-19 (n=84)	Hospitalised with COVID-19 (n=13)	p-value
Age (Years) (mean [SD])	50.5 (13.8)	55.6 (13.7)	0.215
Male Gender (n [%])	39 (46.4%)	4 (30.8%)	0.290
BMI (kg-m^2) (mean [SD])	31.3 (6.3)	31.3 (4.9)	0.967
Non-Caucasian Ethnicity (n [%])	15 (17.9%)	3 (25.0%)	0.553
Atopic Disease (n [%])	48 (62.3%)	10 (76.9%)	0.310
FEV$_1$% Predicted (mean [SD])	67.9 (59.9,82.8)	73.7 (60.1,84.8)	0.555
ICS Dose (BDP equivalent-ug) (median [IQR])	2000 (1600,2000)	1000 (800,1600)	**0.002**
On Maintenance OCS (n [%])	35 (47.9%)	3 (23.1%)	0.872
Evidence of Poor Adherence (n [%])	18 (24.7%)	7 (53.8%)	**0.033**
Maintenance Macrolides (n [%])	7 (9.9%)	2 (16.7%)	0.428
On Asthma Biologic (n [%])	57 (67.9%)	8 (61.5%)	0.652
Shielding against COVID-19			
Followed Shielding Advice (n [%])	64 (84.2%)	9 (90.0%)	0.631
Shielding affected mental health (n [%])	33 (46.5%)	5 (50.0%)	0.835
Contracted COVID-19 Before Shielding (n [%])	40 (60.6%)	4 (40.0%)	0.219

S26 AN ASSESSMENT OF SHORT-ACTING β2-AGONIST (SABA) USE AND SUBSEQUENT GREENHOUSE GAS (GHG) EMISSIONS IN FIVE EUROPEAN COUNTRIES AND THE CONSEQUENCE OF THEIR POTENTIAL OVERUSE FOR ASTHMA IN THE UK

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10.1136/thorax-2020-BTSabstracts.32

Introduction The SABA Use IN Asthma (SABINA) programme associates SABA overuse (prescription of ≥3 canisters per year versus 0–2) with increased risk of exacerbations and asthma-related healthcare utilisation[1]; with this overuse common across Europe.[2] In parallel, the environmental impact of inhaler choice receives attention but is often focussed on preventers. We analysed the volume of SABA use and its GHG emissions versus total inhaler devices and compared the U.K. with other European countries. Next, we calculated the annual volume and GHG emissions from SABA overuse in asthma in the U.K. using the SABINA U.K. study data.

Methods Inhaler use was calculated using sales data obtained from life science analytics company IQVIA™ over 12 months to September 2019. Data were compared by dose, preventing confounding from device actuation count differences. SABA overuse volume in asthma *i.e.* sum of prescribing ≥3 prescriptions in 12 months, was extracted from Clinical Practice Research Datalink GOLD as part of SABINA U.K. (≥12 years, current asthma diagnosis, any severity, 12 month period between 2007–2019). GHG emissions of inhaler devices were estimated using published and internal AstraZeneca data on their full life cycle.

Results SABA represents the majority of inhaler use and of GHG emissions in the U.K. and its neighbours (table 1). However, U.K. SABA use and GHG emissions per capita are approximately treble those of other countries. In SABINA U.K., 284,683 out of 574,913 asthma patients were potentially overusing SABA. The average for this group was 6.51 prescriptions per year. 83% of SABA prescriptions for asthma went to patients overusing SABA. For the U.K. asthma population this represents 9.24 million SABA prescriptions and 250,000 tonnes of CO_2[equivalent] annually.

Conclusion These data demonstrate the GHG emissions associated with high SABA use across Europe and particularly in the U.K. Implementing guidelines to drive improvements in asthma care would improve asthma control, thereby reducing reliever medication use and exacerbation frequency, benefiting patients and realising carbon savings that go beyond the reduction in SABA use alone.

REFERENCE

1. Bloom CI, *et al*. *Adv Ther* 2020: https://doi.org/10.1007/s12325-020-01444-5
2. Janson C, *et al*. *Adv Ther* 2020: **37**; 1124–1135

S27 EFFECT OF HIGH ICS DOSE FIXED COMBINATION EXTRAFINE BECLOMETHASONE DIPROPIONATE, FORMOTEROL FUMARATE, AND GLYCOPYRRONIUM (BDP/FF/G) PMDI ON ASTHMA CONTROL IN PATIENTS WITH PERSISTENT AIRFLOW LIMITATION (PAL): A POST-HOC ANALYSIS OF THE TRIGGER STUDY

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Introduction and Objectives Persistent airflow limitation (PAL) predicts a positive clinical response to add-on long acting muscarinic antagonist in patients with asthma taking inhaled corticosteroids and long-acting β2-receptor agonists. We conducted a *post-hoc* analysis of the TRIGGER study to evaluate the effect of extrafine BDP/FF/G vs BDP/FF on asthma control and the use of systemic corticosteroids for asthma exacerbations in a subset of patients with PAL.

Methods TRIGGER was a phase III, randomized, parallel group trial comparing 52-week treatment with BDP/FF/G 200/6/10μg two inhalations twice daily (BID) to BDP/FF 200/6μg BID and an open-label treatment arm consisting of BDP/FF 200/6μg BID plus tiotropium (BDP/FF+Tio). PAL criteria were a post-bronchodilator FEV_1≤80% of predicted normal and FEV_1/FVC≤0.7; ACQ-7 response was defined as a change from baseline in ACQ-7 score ≤-0.5 unit, and asthma control days as asthma symptom-free day without using rescue medication.

Results 1437 subjects were randomized and 61.2% met the PAL criteria. In this subgroup, there was a significantly higher percentage of ACQ-7 responders on BDP/FF/G compared to BDP/FF at week 26 (60.2% vs 49.4%) and week 52 (60.8% vs 51.7%). In the overall population, the difference in the percentage of ACQ-7 responders was 61.3% vs 55.9% at week 26 and 62.3% vs 58.1% at week 52, for BDP/FF/G and BDP/FF respectively. In patients with PAL, the change from

Abstract S26 Table 1 Comparison of U.K. with other European countries on the annual use and impact on greenhouse gas (GHG) emissions of short-acting β_2-agonist (SABA) relievers vs total inhaler usage (reliever & preventer)

Country	SABA vs total inhaler use (%)	SABA vs total inhaler GHG emissions (%)	SABA GHG emissions (tonnes CO_2e*)	SABA use per capita (,000 doses/ 10,000 people)	SABA GHG emissions per capita (tonnes CO_2e/10,000 people)
Italy	46.5	54.8	104,503	126	17
Spain	58.9	69.3	195,771	319	40
France	62.5	72.6	334,715	383	50
Germany	54.1	67.1	293,638	276	36
U.K.	70.2	67.5	862,685	1034	134

*CO_2 equivalent

Abstract S27 Table 1 ACQ responders at week 26 and 52, and asthma control days over 52 weeks in the overall population and PAL subset

	BDP/FF/G vs BDP/FF	
	Overall	**PAL**
ACQ responders at week 26, OR 95% CI; p	1.233 (0.969–1.568); p=0.088	1.584 (1.162–2.160); p=0.004
ACQ responders at week 52, OR 95% CI; p	1.161 (0.912–1.478); p=0.226	1.457 (1.071–1.983); p=0.017
Asthma control days over 52 weeks, Adjusted mean difference 95% CI; p	3.5% (0.3–6.7); p=0.030	5.8% (2.1–9.5); p=0.002

baseline in the asthma control days over 52 weeks was higher in BDP/FF/G compared to BDP/FF (14.5% vs 8.8%), with a smaller difference observed in the overall population (Table 1). Patients treated with BDP/FF/G had less days of systemic corticosteroid use for asthma exacerbations compared to BDP/FF in the PAL subpopulation (34.1% reduction; RR=0.659, 95%CI (0.389–1.118) p=0.122), and in the overall population (24.4% reduction; RR=0.756, 95%CI (0.499–1.145) p=0.186), although not statistically significant.

Conclusions In adult asthmatics with PAL, treatment with high ICS dose extrafine BDP/FF/G compared to BDP/FF was associated with greater odds of experiencing asthma control and a higher trend towards a decreased use of systemic corticosteroids for asthma exacerbations, compared to the overall population.

S28 'CAN WE DIAGNOSE ASTHMA USING STANDARD NON-AEROSOL GENERATING PROCEDURES?'

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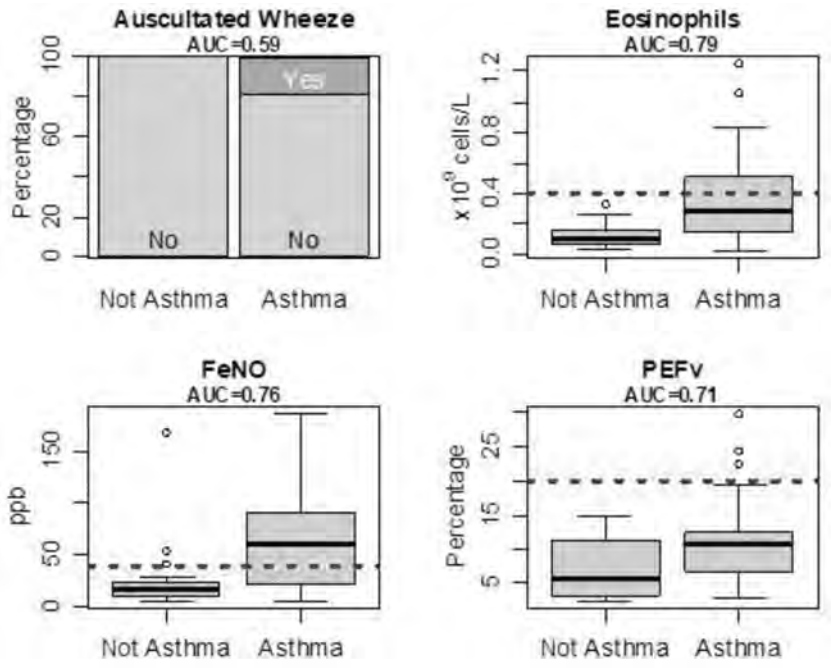
10.1136/thorax-2020-BTSabstracts.34

Objective Asthma diagnostic guidelines from NICE mandate up to five tests in a sequential algorithm, three of which are aerosol generating procedures (AGPs) [spirometry, reversibility (BDR), bronchial challenge testing (BCT)]. The SARS-CoV-2 pandemic has resulted in significant restrictions to AGPs, highlighting the urgent need for an alternative diagnostic model. We aimed to develop a 'rule-in' diagnostic model using non AGPs [chest auscultation, exhaled nitric oxide (FeNO), two week-peak flow variability (PEFv) and serum eosinophils (eos)] which would enable GPs to confidently diagnose asthma in a subgroup of patients and reduce the need for AGPs and onward referral.

Methods Symptomatic but untreated patients with physician-suspected asthma were referred into the RADicA (Rapid Access Diagnostics in Asthma) study. Patients underwent clinical consultation followed by tests including FeNO, spirometry, BDR, PEFv, BCT, and eos. Asthma diagnosis was made on the basis of all available information (including response to eight weeks inhaled corticosteroid treatment) by a panel of respiratory physicians. Data from patients coded as 'definite asthma' or 'not asthma' were evaluated, individually and in combination in order to investigate which non-AGP tests could predict asthma. PEFv was classified as a non-AGP because it is not performed in the clinical setting.

Results Of 61 symptomatic adults [median (IQR) age 32(26–44)yrs, 62% female] 61% had 'definite asthma' by expert panel decision. Each of the four non-AGP tests were able to predict asthma with low sensitivity and high specificity (figure 1). Using established cut-offs (PEFv>20%, FeNO≥40ppb, eos>0.4 × 10^9/L), an algorithm which simply required the presence of two or more positive tests was able to 'rule-in' asthma with a specificity (95% CI) of 100(78–100)%, sensitivity 20(8–39)%. In comparison using all available tests required for the NICE algorithm resulted in a sensitivity of 53(34–72)%, specificity 100(79–100)%.

Conclusion Four simple non-AGPs could be used in primary care to accurately diagnose asthma. The majority of patients



Abstract S28 Figure 1 Performance of individual non-AGPs in the diagnosis of asthma. Established cut-offs are represented by the dashed line

with negative tests would still require further investigation, and so it is clear that AGPs, or novel alternatives, are still required for the diagnosis of asthma in most patients.

S29 LONGITUDINAL SYSTEMIC CORTICOSTEROID UTILISATION FOR ASTHMA AND OTHER DISEASES IN THE UNITED KINGDOM FROM 1990 TO 2018: A POPULATION-BASED COHORT ANALYSIS

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10.1136/thorax-2020-BTSabstracts.35

Introduction and Objectives Evidence of increased adverse event risk with systemic corticosteroid (SCS) use led patient management guidelines to embrace SCS-sparing treatment strategies. This study was conducted to describe time trends in SCS prescriptions and their relation to National Health Service (NHS) availability of SCS-sparing therapies.

Methods A cohort study was performed using the Optimum Patient Care Research Database (OPCRD), which includes data from >10 million patients in >750 general practices in the United Kingdom (UK). The study population comprised all patients aged ≥5 years who were registered for ≥1 year with a participating general practice during the study period (1990–2018) and who had only 1 condition for which SCS may have been prescribed. A set of 28 conditions for which SCS can be prescribed was selected for analysis, and total annual SCS use was calculated for each. Further examination of time trends in SCS prescription frequency and dosage was performed for a subset of conditions, including asthma, chronic obstructive pulmonary disease (COPD), Crohn's disease, and rheumatoid arthritis.

Results The total number of active patients per annum ranged from 642,835 to 1,479,385. Throughout the study period, asthma and COPD accounted for >45% of the total SCS dose prescribed among the 28 studied conditions. The proportion of patients with asthma using SCS was stable at approximately 10% until 2013, after which it increased to 15%. Use of high-dose SCS in asthma appeared to decrease with availability of the first combination inhaled corticosteroid/long-acting β2-agonist, whereas low-dose SCS utilisation increased over time (figure 1). Availability of the first biologic therapy for asthma in 2007 had little effect on SCS prescription trends. In patients with COPD, for which there are currently no approved biologic therapies, use of SCS at all dose levels increased over time (1990: 4%; 2018: 17%), whereas decreased SCS use was observed after biologic therapies became available for Crohn's disease (2000: 51%; 2018: 24%) and rheumatoid arthritis (2000: 14%; 2018: 10%).

Conclusions Despite biologic therapy options, high SCS use persists for patients with asthma in the UK. Increased awareness of SCS overuse and SCS-sparing options is needed to reduce unnecessary prescription.

S30 ADRENAL INSUFFICIENCY IN ADULT SEVERE ASTHMA PATIENTS ON LONG-TERM INHALED, ORAL OR INTRAMUSCULAR CORTICOSTEROIDS: A SYSTEMATIC REVIEW

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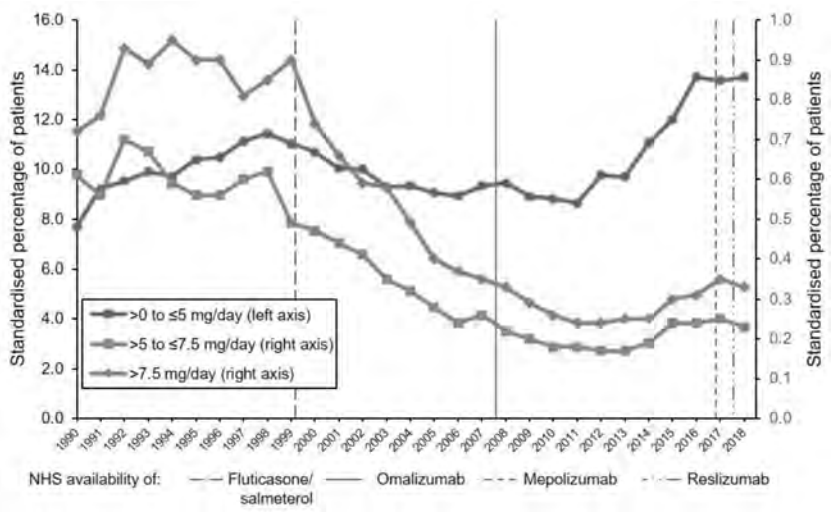
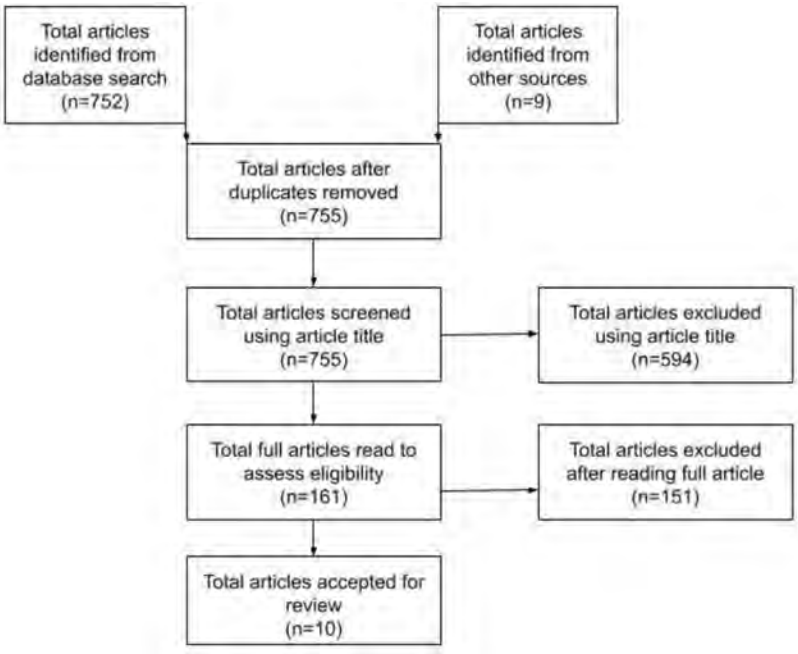
10.1136/thorax-2020-BTSabstracts.36

Introduction and Objectives Severe asthma patients are often treated with long-term high-dose inhaled and systemic corticosteroids which puts them at significant risk of developing adrenal insufficiency. We aimed to collate and review all relevant studies of adult severe asthma patients prescribed inhaled, oral and/or intramuscular corticosteroids and report: 1. the prevalence of adrenal insufficiency; and 2. the methods used to diagnose it.

Methods A systematic review was undertaken using PubMed and Cochrane Library Database on 27th April 2020, using



Abstract S29 Figure 1 Percentage of patients who used SCS over time by average daily dose category



Abstract S30 Figure 1 PRISMA flow chart of the systematic review of the prevalence of adrenal insufficiency in severe asthma patients on long-term inhaled, oral and intramuscular corticosteroids. A total of 755 articles were identified through PubMed, Cochrane Library Database and reference lists of relevant articles. A total of 10 articles fit the inclusion criteria after being assessed by two independent researchers

appropriate search terms (1970 to present). Articles were included or excluded by two independent reviewers. Adrenal suppression prevalence, measurement methods, previous corticosteroid dosage, length of corticosteroid therapy and other relevant data were extracted. The critical appraisal skills programme (CASP) checklist was used to assess the quality of each article.

Results The search generated 755 articles, 10 were accepted, figure 1. This included randomised control trials, case-control and cohort studies. No articles were rejected based on CASP score. Prevalence of adrenal suppression and baseline adrenal suppression of patient cohorts as indicated by blood cortisol <500 nmol/l was reported in all 10 studies. Adrenal suppression prevalence in patients taking high-dose long-term inhaled corticosteroids only was 0–25%. Prevalence in patients prescribed high-dose, long-term inhaled and oral corticosteroid therapy was 68–100%. No studies reported findings in patients prescribed intramuscular corticosteroids. All articles discussed morning serum/plasma cortisol as a measurement of adrenal suppression. Of those 10 studies, only six stated the reference range used for blood cortisol. One article used 10-hour overnight urinary cortisol with overnight urinary cortisol: creatinine ratio and three used 24-hour urinary cortisol. Additionally, eight reported using the standard 250µg Synacthen test, one of which used both the standard and low-dose (1µg) Synacthen test.

Conclusion Adrenal suppression is common in severe asthma patients taking long-term high-dose inhaled and oral corticosteroids, and present even in some patients taking only long-term high-dose inhaled corticosteroids. Standardisation is needed for methods and reference ranges for diagnostic tests of adrenal suppression in clinical and research practice.

Understanding lung infection: back to basics

S31 THE NOVEL CORONAVIRUS SARS-COV-2 BINDS RGD INTEGRINS AND UPREGULATES AVB3 INTEGRINS IN COVID-19 INFECTED LUNGS

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10.1136/thorax-2020-BTSabstracts.37

The novel coronavirus SARS-CoV-2 utilizes Angiotensin Converting Enzyme-2 (ACE2) receptors to internalize cells, which are expressed in the nasal and ocular mucosa, and at low levels in the pulmonary epithelium. Despite significant sequence similarities there are substantial differences in transmission dynamics and clinical phenotype between SARS-CoV-2 and SARS-CoV-1. The SARS-CoV-2 spike protein (S1), which is used to internalize cells, contains RGD integrin binding domains which are not present within SARS-CoV-1 S1. We investigated whether SARS-CoV-2 S1 binds integrins while exploring mechanisms that might upregulate ACE2 expression to help explain SARS-CoV-2 viral entry and associated respiratory disease.

Lung cell line ACE2 expression was determined using QPCR and western blotting, and in primary lung cells using single cell RNAseq data from publicly available datasets. The effect of IL6 and TGFβ on ACE2 expression levels in lung epithelial cells and precision cut lung slices (PCLS) was explored. Solid phase binding assays were used to investigate

S1 binding to ACE2 or αv containing integrins. Immunohistochemistry was used to stain sections of COVID-19 infected lung tissue for ACE2 and αv containing integrins.

Single Cell RNA-seq showed that normal lung expresses low levels of ACE2 and only a small proportion of Alveolar type 2 epithelial cells are ACE2 positive (1.5%). Supporting this we found low level ACE2 mRNA and protein expression in small airway epithelial cells, immortalized human bronchial epithelial cells (iHBECs) and A549 cells. IL6 had no effect on ACE2 mRNA or protein expression in the above cells, nor did it affect ACE2 protein in PCLS. TGFβ increased ACE2 mRNA in iHBECs and increased ACE2 protein in PCLS. Binding assays demonstrated that SARS-CoV-2 S1 binds αvβ3 and αvβ6 integrins in an RGD dependent manner, albeit with a lower affinity than to ACE2. Crucially αvβ3 integrins are upregulated in COVID-19 infected lung tissue, whereas ACE2 levels remain low even in patients with high viral RNA and protein expression in alveolar tissue.

Our data suggests SARS-CoV-2 is able to bind integrins, and may utlise this mechanism to facilitate internalization into lung epithelial cells, which may help explain severe pathology despite low ACE2 expression levels in the lung

S32 ABSTRACT WITHDRAWN

S33 TMPRSS2 VARIATION AND GENOMIC SUSCEPTIBILITY TO SARS-COV-2 INFECTION

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10.1136/thorax-2020-BTSabstracts.38

Background SARS-CoV-2 entry into human cells is mediated by angiotensin-converting enzyme 2 (ACE2) which exhibits only rare coding variants.[1] Viral entry is facilitated by transmembrane protease serine 2 (TMPRSS2) which has multiple roles including cleavage of SARS-CoV-2 spike protein to allow the virus to fuse with the host cell membrane, and antibody neutralisation. We hypothesised that common variability in the *TMPRSS2* gene may contribute to differing susceptibility to COVID-19 in different populations.

Methods Functional domain profiles and primary sequence were established for the TMPRSS2 protein isoforms using UniProt. The coding sequence and population prevalences of genomic variants in the *TMPRSS2* gene mapped to the GRCh38/hg38 reference sequence were identified in 71,702 unrelated individuals in Genome Aggregation Consortium (gnomAD) database v3. Variants were catagorised by molecular subtype and Combined Annotation Dependent Depletion (CADD) scores. Using R (v3.6.1), hierarchical clustering dendrogram methods were evaluated, allele frequencies visualised using mosaic plots, and population associations tested by Chi-squared analysis.

Results Two TMPRSS2 protein isoforms are encoded by 14 exons of *TMPRSS2* gene and have identical extracellular domains including the protease domain (peptidase S1 domain) which activates through autocleavage. Overall, 859 variants were identified in *TMPRSS2* including 372 exonic (coding-region) of which 261 were non-synonymous, and 130 had a scaled CADD score exceeding 20 (i.e. in top 1% of deleterious variants). Hierarchical clustering trees separated into two main clusters, with the Euclidean distance smallest between African and European (non Finnish) populations and a larger distance to Latino, South Asian, East Asian and other populations. Variants in exons 1 and 2 encoding the cytoplasmic domain did not differ between population, but by Chi-squared, 34 *TMPRSS2* variants with scaled CADD scores >20 differed in allele frequency between the populations. These included rare molecular nulls, and missense substitutions in the protease domain that affected over 25% of the genotyped population. Analysis of allele distributions in UK COVID-19 patients is underway within the Genomics England Research Environment (Project RR355 Pulmonary responses to COVID-19).

Conclusions Relatively common variants in the *TMPRSS2* gene could provide a mechanism for individual resistance to SARS-CoV-2 infection.

REFERENCE

1. Shovlin & Vizcaychipi 2020 June 4: https://www.medrxiv.org/content/10.1101/2020.05.12.20098160v3

S34 INFLUENZA VIRUS INFECTION INDUCES PROLONGED TRANSCRIPTIONAL AND FUNCTIONAL ALTERATIONS IN LUNG STROMAL CELLS

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10.1136/thorax-2020-BTSabstracts.39

Introduction and Objectives Influenza A virus (IAV) causes respiratory infections that are a significant cause of morbidity and mortality worldwide. Stromal cells serve an important function in innate immune responses by co ordinating with immune cells to clear pathogens. The immediate responses to infection by fibroblasts and epithelial cells have been well characterised, however few studies have investigated longer term consequences. We hypothesise that molecules upregulated by lung stromal cells early in response to IAV infection persist in order to generate/maintain immune memory.

Methods C57BL/6 mice were infected intranasally with IAV (WSN, 300PFU). Mice were sacrificed at day 0, 10 and 40 post infection. RNA-sequencing was employed to examine the transcriptional profiles of sorted lung fibroblasts and epithelial cells. Findings were independently validated using Nanostring and flow cytometry. Upstream regulators were identified using Ingenuity Pathway Analysis (IPA). Biological functions were extrapolated using PANTHER and confirmed by flow cytometry and immunofluorescence. The location of altered stromal and immune cells within the IAV infected lung was determined using RNA scope and immunohistochemistry.

Results Differential expression of immune-related genes is prolonged in lung fibroblasts and epithelial cells following IAV infection. Many genes (H2-Ab1, Cxcl9, Nlrc5, Ifi47) are triggered by exposure to interferon-gamma (IFNγ) and remain significantly elevated at day 40 post infection. Stromal cells exhibited enrichment in biological processes (antigen processing/presentation and chemokine signalling) and molecular function (antigen binding). IPA identified conserved upstream regulators (IFNγ and CD40 ligand). RNA-scope detected elevated SpiB levels in airway epithelial cells of

inflamed lungs at day 40. SpiB+ airway epithelial cells were adjacent to B220+ immune cell clusters in the IAV infected lung. Increased levels of stromal podoplanin were detected in the IAV infected lung, expression was localised in areas adjacent to immune cell clusters.

Conclusions Taken together these data indicate that IAV infection induces transcriptional changes in stromal cells during peak T-cell response, these cells fail to return to their resting state for at least 40 days. The persistence of immune cell clusters within the lung suggests a dynamic relationship between immune cells and infection altered stromal cells providing mutual support for their persistence.

S35 HUMAN MESENCHYMAL STROMAL CELLS MODULATE CYTOKINE EXPRESSION AND ENHANCE INTRACELLULAR CLEARANCE OF MYCOBACTERIUM AVIUM IN PRIMARY MACROPHAGES

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10.1136/thorax-2020-BTSabstracts.40

Introduction and Objectives There is clear unmet need to develop more efficacious therapies for *Mycobacterium (M. avium)* pulmonary disease, particularly to disrupt their intracellular niche in lung macrophages. Mesenchymal Stromal Cells (MSCs) are multipotent adult cells with antimicrobial and immunomodulatory properties, currently being trialled for treating infection and chronic lung diseases, but their effect on *M. avium* is not known. This study aims to determine whether human MSCs can directly kill *M. avium* and modulate primary macrophages to enhance intracellular clearance.

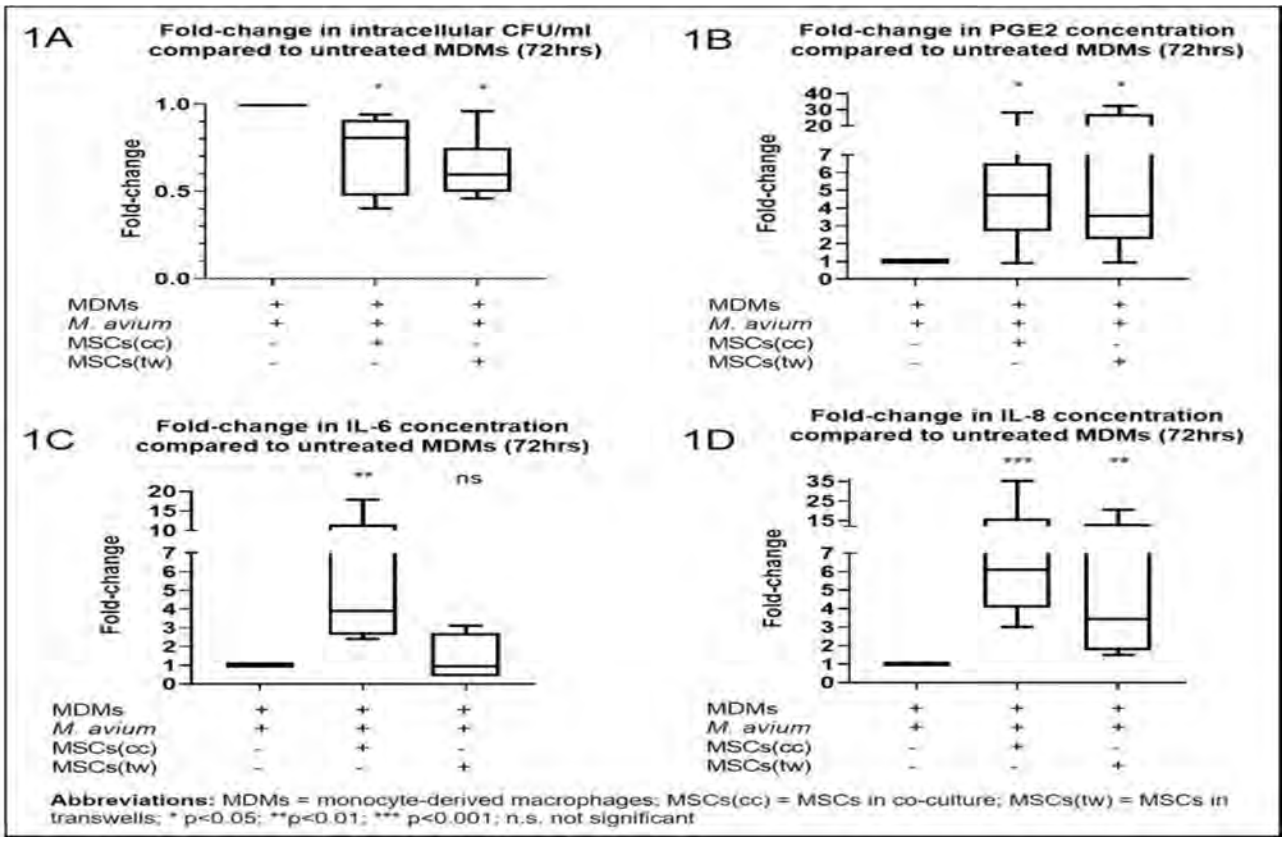
Methods Primary human monocyte-derived macrophages (MDM) from healthy volunteers were infected with *M. avium* (Chester reference laboratory strain) at multiplicity of infection (MOI) 1 for 4 hours, before washing. Infected MDMs were cultured with human bone marrow-derived MSCs, either in direct co-culture or with MSCs in transwells (0.4μm pore diameter). After 72 hours supernatant was collected, and cells lysed in 0.2% saponin, to determine extracellular and cell-associated colony counts. Supernatant cytokines and lipid mediators were quantified by ELISA. Statistical analysis was performed using the Kruskal-Wallis test.

Results MSCs restricted intracellular growth of *M. avium* in MDMs in direct co-culture (median 19%, IQR 9–52%, $p<0.05$) and transwell (median 40%, IQR 25–50%, $p<0.05$) conditions compared to infected MDMs alone (figure 1A). Supernatant bacterial count was unaffected by presence of MSCs. Combining cell-associated and supernatant counts MSC treatment resulted in total growth reduction of 25% (direct co-culture) and 30% (transwell) over 72 hours (data not shown, $p<0.05$). Similar results were found for clinical isolates from patients with NTM-PD.

MSCs infected alone with *M. avium* did not restrict bacterial growth, suggesting their anti-mycobacterial effect is mediated through activation of macrophages.

Co-culture of MSCs and infected MDMs led to significantly increased concentrations of IL-6, IL-8 and PGE2 (figure 1B-1D).

Conclusions MSCs have no direct bactericidal activity against *M. avium* but enhance MDMs' ability to restrict intracellular growth. MSCs co-cultured with infected MDM leads to



Abstract S35 Figure 1

increased secretion of IL-6, IL-8 and PGE2 which could contribute to more efficient growth restriction by macrophages. Further investigation will determine the role of these mediators and uncover the mechanisms underlying MSC ability to enhance the antimycobacterial capacity of MDMs.

A cut above … update in thoracic surgery

S36 MULTIMODALITY TREATMENT OF RESECTABLE STAGE III (N2) LUNG CANCER: IS PNEUMONECTOMY OUT OF THE GAME?

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10.1136/thorax-2020-BTSabstracts.41

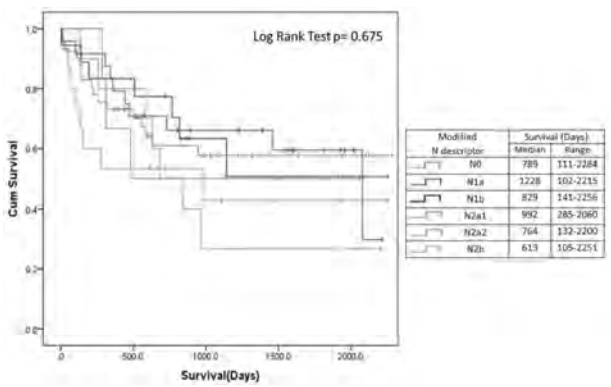
Lung cancer resection by pneumonectomy in the presence of N2 disease has long been debated and non-surgical multimodality therapy often preferred. A more precise prognostic stratification of nodal disease was recently suggested by the International Association for the Study of Lung Cancer (IASLC) (*J Thorac Oncol*. 2015;10: 1675–1684). We therefore aimed to assess the impact of nodal spread patterns on long-term pneumonectomy outcomes.

Methods We retrospectively reviewed all consecutive pneumonectomies performed at our institution for lung cancer over a 5-year period. Staging was adjusted to TNM 8thedition for all tumours. Pathological nodal status was subclassified as: N0, N1a (single-station), N1b (multi-station), N2a1 (single-station N2, with negative N1), N2a2 (single-station N2, with positive N1) and N2b (multi-station). Survival was assessed using Kaplan-Meier method log-rank test.

Results 2226 major anatomical lung resections were performed between April 2014 and July 2019. Of these, we analysed 114(5.1%) pneumonectomy. Pathologic nodal stage was N0 in 41 patients (35.9%), N1a 24(21%), N1b 18(15.8%), N2a1 6 (5.3%), N2a2 10(8.8%), N2b 15(13.2%). Patient characteristics (age, gender, side, Charlson comorbidity index, pT stage, histology) did not differ significantly amongst the groups. 5 (4.4%) patients received neoadjuvant treatments. 30-day and 90-day mortality was 5(4.4%) and 8(7.0%). Median length of stay was 7 days(4–85). Incidence of bronchopleural fistula was 8(7%). R0 resection was achieved in 106(93%) cases, with 7 (6.1%) receiving adjuvant radiotherapy. 38(33%) patients received adjuvant chemotherapy.

After exclusion of postoperative mortality, the highest median survival was observed in the N1a (1228 days) and N2a1 group (992), the lowest in N2b (692), albeit not statistically significant. Kaplan-Meier curves are shown in figure 1. No significant survival difference was observed between N0-N1 and N2. Station 7 involvement was present in 21(19%) patients and was not a predictive factor.

Conclusions No statistically significant survival difference was observed irrespective of nodal status. A trend was detected in favour of single-station N2a1 disease and against multi-station N2b involvement. When pneumonectomy is required, nodal disease does not seem therefore to prejudice survival in a carefully selected patient population. This is particularly important in the current clinical scenario where the range of multimodality options is on the increase.



Abstract S36 Figure 1

S37 THE USE OF DIAGNOSTIC ROBOTIC ASSISTED SEGMENTECTOMY ACCELERATES THE LUNG CANCER PATHWAY

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10.1136/thorax-2020-BTSabstracts.42

Objectives Robotic assisted thoracoscopic surgery (RATS) facilitates complex pulmonary segmentectomy which offers one-stage diagnostic and therapeutic management of small pulmonary nodules. We aimed to explore the advantages of a faster pathway and preservation of function against the disadvantage of unnecessary morbidity in benign cases.

Methods In a prospective observational study all patients with small, central solitary pulmonary nodules deemed suspicious of malignancy by a lung multidisciplinary team were offered RATS segmentectomy without a pre or intra operative biopsy. 41/50 of all patient had pre-operative PET-CT and 38/50 had a two CT scans. As the lesions could not be easily located intraoperatively, a segmental resection margin sufficient only to obtain a R0 resection was obtained using intraoperative fluorescence imaging and near-infrared thoracoscopy.

Results Expressed as median (range)

Fifty RATS segmentectomies were performed in 50 patients (28:22F) over a 26 month period. A median of 2 (1–4) segments were removed; 32 left (19 upper;13 lower) and 18 right (8 upper;1 middle;10 lower). The diagnostic/therapeutic intervention occurred at 24.5 days (6–69) into the patient pathway after initial consultation. 31/37 malignant and 7/13 benign nodules were PET avid. Conversion to open segmentectomy was required in 5 (10%) cases (2/13 for benign disease) due to adhesions or bleeding.

Overall hospital stay was 6 (2–52) days. There was no requirement for postoperative ventilation nor in hospital mortality.

Pathological nodule size was 16 (6–57) mm. Malignancy was found in 37 (74%) patients: primary adenocarcinoma in 26 (55%) including 2 Tmi; 4 T1a; 6 T1b;4 T1c;4 T2a. Of 13 benign cases, 5 proceeded to treatment for tuberculosis.

Conclusions RATS segmentectomy offers a rapid, safe and effective one-stop therapeutic biopsy in early lung cancer and in some benign cases and should be considered as a

modification of the patient pathway. Its effectiveness will be compared to protocols involving preresectional diagnostic biopsy or observation.

S38 CAN WE PREDICT WHO WILL SUFFER A SPONTANEOUS PNEUMOTHORAX AFTER ENDOBRONCHIAL LUNG VOLUME REDUCTION?

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10.1136/thorax-2020-BTSabstracts.43

Background Spontaneous pneumothorax (SP) is a recognized and potentially fatal complication of endobronchial lung volume reduction (EBLVR) in patients with severe emphysema. It has been suggested that prophylactic chest drainage in these patients may minimize this risk but this procedure may in itself increase morbidity.

A selective approach to chest drainage would be beneficial thus an understanding of the risk factors may direct practice.

Method In a consecutive series of 35 patients we have compared preoperative variables in those 13 patients who suffered post EBLVR SP with a contemporary control group of 22 who did not. We specifically analyzed the assessment of preoperative CT scans using the StratX software system. This system analyzes the severity of emphysema using voxel density.

Results SP after EBLVR is associated with a higher emphysema score in the non-target lobe, which is assumed to be the source of the air leak. SP is also associated with anatomical homogeneity with a lower ratio of emphysema severity between target and non-target lobes. However, both groups had similar physiological heterogeneity.

Conclusion SP appears to be more frequent in those with a discrepancy between heterogeneous perfusion and homogeneous emphysema scores. In these patients prophylactic chest drainage after EBLVR may be justified.

Abstract S38 Table 1

Mean (Range)	No SP	SP	p-value
Number	22	13	
LUL:LLL	11:5	8:1	
RUL:RLL	4:2	1:3	
Volumetric Ratio (Target:Non-Target)	1.16 (0.48–2.22)	1.03 (0.49–1.62)	0.3434
Voxel Density			
% < 910 HU Target	56.6 (15–81)	63.2 (34–77)	0.2074
% <910 HU Non-Target	38.6 (12–72)	57.1 (34–77)	0.0004
% < 910 HU Ratio	1.80 (0.83–6.0)	1.03 (0.9–1.5)	0.041
% <950 HU Target	33.0 (2–68)	39.5 (13–58)	0.218
% <950 HU Non-Target	18.2 (1–47)	33.6 (12–55)	0.0004
% <950 HU Ratio	2.14 (0.95–4.8)	1.15 (0.87–1.9)	0.0009
Perfusion Ratio (Target:Non-Target)	0.37 (0.06–0.75)	0.39 (0.15 – 1.1)	0.9477

S39 RIGID BRONCHOSCOPY SAFETY AND OUTCOME – A SINGLE CENTRE RETROSPECTIVE ANALYSIS

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10.1136/thorax-2020-BTSabstracts.44

Background Although rigid bronchoscopy is widely used there is limited data available on complication rates. A series of 1115 procedures quoted overall complication rates in 44 (3.9%)[1]

Another study reporting 3449 procedures quoted complication rates in 173 (5%).[2]

We describe our experience of rigid bronchoscopy and endobronchial intervention at a single tertiary centre.

Methods Between October 2007 and July 2020, 2135 rigid bronchoscopies were performed on 1301 patients aged between 18 to 93 years. Each procedure was performed in cardiothoracic theatres by a designated team under general anaesthesia.

Indications for the procedure were as follows; ND YAG Laser (690), insertion of tracheal or bronchial stent (505), biopsy of proximal tumour (437), diagnostic inspection of airways (247), dilatation of proximal stricture (121), removal of foreign body (29), removal of stent (34), percutaneous tracheostomy insertion (22), application of bio glue (20), and application of Mitomycin C (30).

Results Complications occurred in 24 (1.12%) procedures. There was one fatality (0.05%). Haemorrhage >100 mls occurred in seven (0.33%), all were successfully managed endobronchially. Ten procedures (0.5%) were complicated by pneumothorax and an intercostal drain was required for eight. Five patients received intensive care admission post operatively, all of whom were discharged home. One patient had stent migration.

Conclusion Our experience is encouraging and together with the benefit which the treatment offers to patients we believe that further exposure to this technique is warranted in formal respiratory medicine training in the UK. To the best of our knowledge this is the largest single centre collection of data available for rigid bronchoscopy. Moreover, the complication rate is significantly lower compared to previously published studies. We believe that rigid bronchoscopy is a safe and effective procedure when performed in a high volume specialist centre with designated lists involving a specialist multidisciplinary team.

REFERENCES

1. Ost D.E. *et al*. *Chest* 2015;**148**:pp. 450–471
2. G I Lukomsky *et al*.Chest,1981;79:3:316–321

S40 JOURNEY OF PATIENTS WITH LUNG CANCER: DOES SOUTH EAST SCOTLAND'S CARDIOTHORACIC SERVICE MEET THE NHS SCOTLAND STANDARD FOR WAITING TIMES?

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Background Lung cancer pathways are complex and often subject to delay. Little is known about the pathways of patients treated at the Edinburgh Royal Infirmary cardiothoracic unit

and whether they meet the 95% standards for 62 and 31-day treatment targets set by NHS Scotland.[1]

Aims The primary aims of this project were to track patient journeys from initial referral to surgical resection and to identify where delays occurred. The secondary aims were to audit whether the 95% standards set for 62 and 31-day treatment targets were met.

Methodology The pathways of patients who received surgical resection for primary lung cancer between January 2019 and January 2020 were retrospectively analysed. Intervals between initial referral, 1st CT scan, pathological diagnosis, surgical referral, surgical review, last imaging, and surgical resection were investigated. 62 and 31-day target dates were obtained from patient records and audited.

Results A total of 94 patients met the full inclusion criteria. 51 patients (54.3%) were referred from outside of NHS Lothian. The median (IQR) time from initial referral to surgical resection was 104 (84 – 134) days. Greatest intervals occurred between initial referral and surgical review at 77 (59 – 106) days and between 1st CT scan and last imaging at 63.5 (30 – 93) days. Only 23.3% of patients met their 62-day targets, while 70.5% of patients met their 31-day targets.

Conclusions Pathways are prolonged with the greatest delays occurring during intervals related to diagnosis and staging. Patient waiting times fail to meet the 95% standards set by NHS Scotland, with unknown implications for patients. Further analysis is required to assess the effects these delays have on patient outcomes and to suggest implementable measures to optimise patient care.

REFERENCE

1. Information services division Scotland. Cancer waiting times in NHS Scotland: 1 October to 31 December 2019 [Internet]. 2020 [cited 2020 May 26]. p. 1–34. Available from: https://beta.isdscotland.org/media/4109/2020-03-31-cwt-report.pdf

S41 LITIGATION IN RESPIRATORY MEDICINE

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10.1136/thorax-2020-BTSabstracts.46

Introduction and Objectives Medical care is associated with patient harm and iatrogenic injury. Consequently the NHS faces thousands of litigation cases annually. These cases involve patient, relative and clinician distress; challenge for trusts; and financial cost: 2017–18 alone saw over £1.6 billion claims. Respiratory medicine contributes to this significant spending. This project aims to understand the themes, issues and trends within respiratory litigation cases and facilitate shared learning within specialty.

Methodology NHS Resolution (previously NHS Litigation Authority) data coded to respiratory medicine from 2013/14 – 2017/18 was examined. Qualitative data was reviewed and categorised independently, including coding to NHSE 'never event' and National Patient Safety harm (NPSHD) definitions.

Results During the five years, 549 cases referred to NHS Resolution were coded to respiratory medicine. Total value was £67.8 m; the most expensive case £3.4 m. Five cases each had claims in excess of £1 m, all involving neurological complications. Cases including thoracic surgery had proportionately greater claims.

The data contained 10 never events: 4 wrong site surgery and 6 retained foreign objects. A further 20 clinically determined critical events took place including significant events such as 'unnecessary' pneumonectomy. Death occurred in 22% of cases, but limited case information made further evaluation difficult.

To understand where case events occurred, the events were innovatively mapped to the patient journey (figure 1). Misdiagnosis (n=90) was commonly associated with malignancy and tuberculosis differentials; however there were also unusual cases such as misdiagnosis of cystic fibrosis. Nursing and care issues were common (16% of cases), particularly in-patient falls (7% of cases). Many cases involved consent (n=23) or information provision (n=25) issues. 19 cases involved loss to follow-up. Some disease areas were over represented, with the commonest identified theme being delays in diagnosis or management of lung cancer (n=71).

Conclusions GIRFT hospital visits demonstrated that few respiratory departments were aware of litigation claims, or had established processes to cascade information to departments. This represents missed learning and harm reduction opportunities. We recommend all claims should be discussed in Morbidity & Mortality or similar meetings with wide clinical representation. Identification of themes is useful for shared learning.

Trials and new concepts in pleural disease

S42 INDWELLING PLEURAL CATHETERS IN REFRACTORY TRANSUDATIVE PLEURAL EFFUSIONS: A RANDOMISED CONTROLLED TRIAL

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Introduction and Objective Refractory symptomatic transudative pleural effusions are an indication for pleural drainage. There

Abstract S41 Figure 1

has been supportive observational evidence for the use of indwelling pleural catheters (IPCs) in the management of recurrent transudative effusions, but no randomised studies.

Methods A multi-centre randomised controlled trial, in which patients with pleural effusions secondary to either heart, liver or renal failure were randomly assigned to either an IPC (intervention) or therapeutic thoracentesis (TT) (standard care). The primary outcome was the mean daily breathlessness score over 12 weeks from randomisation, measured using VAS scores, labelled from 0 mm for 'Not breathless at all' to 100 mm for 'Worst possible breathlessness'

Results 68 patients were randomised over 4 years at 13 centres, comprising of 46 patients with heart failure; 16 with liver failure; and 6 with renal failure. In total 64 patients received their allocated treatment, 31 with IPCs and 33 with TT. In the primary-outcome analysis the mean breathless score over the 12-week study period was 39.7 mm (SD 29.5) in the intervention arm and 44.8 mm (SD 26.3) in standard care arm (p=0.71). The mean drainage was 2,878 ml (SD 2,505) and 16,215 ml (SD 17,980) in the TT and IPC group, respectively. The standard care group required 1.3 (1.4) additional aspirations during study period. Additionally, in the TT cohort, 3/33 (9%) subsequently required chest drain insertion, 2/33 (6%) IPC insertion, 1/33(3%) a medical thoracoscopy, and 1/33(3%) talc slurry pleurodesis. 1 IPC required re-siting in the intervention group. 37/64 (57%) patients were taking anticoagulation. The number of patients with one or more adverse events in the IPC group was 14/31 (45%), compared with 5/35 (14%) in the TT group. There was one case of IPC related infection, which did not necessitate drain removal. The number of bed days and hospital visits was not significantly different (p 0.30 and 0.31 respectively).

Conclusion Although IPCs did not offer greater control of breathlessness than repeated TT, they reduced the number of invasive pleural procedures. In this patient cohort with a poor prognosis, poor quality of life and who are typically anticoagulated, IPCs could be used to reduce further invasive procedure.

S43 PRELIMINARY RESULTS OF THE MESO-ORIGINS FEASIBILITY STUDY: RETROSPECTIVE ELEMENT REGARDING BAPE-MESOTHELIOMA EVOLUTION RATE

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10.1136/thorax-2020-BTSabstracts.48

Introduction Malignant Pleural Mesothelioma (MPM) is presaged by Benign Asbestos Pleural Effusion (BAPE) in some patients. In a future study (called Meso-ORIGINS) we will collect longitudinal BAPE-MPM tissue pairs in patients who develop MPM following BAPE and use this material in the PREDICT-Meso CRUK Accelerator programme. PREDICT-Meso will define the key biological events that drive or permit evolution of MPM, generate new pre-clinical models and define new therapeutic targets. At initial planning, the only data reporting BAPE-MPM evolution rate were derived from a single-centre study (n=44 BAPE patients) with wide confidence intervals around the estimate reported (12% (95%CI 5%–24%, Davies *et al*, 2010). Here we report the preliminary findings of a retrospective analysis performed as part of the multi-centre Meso-ORIGINS feasibility study. The primary objective was to define the BAPE-MPM evolution rate more precisely, to generate a reliable sample size estimate for Meso-ORIGINS.

Methods Patients were identified from databases in Glasgow, Oxford, Manchester & Bristol. Eligibility required 2-years complete follow-up data following a diagnosis of BAPE, which was defined as asbestos exposure (history or imaging) plus compatible histology (benign fibrinous pleurisy, non-specific pleuritis, atypical mesothelial proliferation). Comprehensive clinical data were recorded including demographics, radiological findings, blood and pleural fluid results. These will be used to build a logistic regression model for higher MPM evolution risk, to refine the eligibility criteria of the Meso-ORIGINS study. BAPE-MPM evolution was defined as any diagnosis of MPM within 2-years of the diagnosis of BAPE.

Results Data collection is complete in 3 of 4 centres. At the time of writing, data collection is complete in 207 eligible patients with BAPE. Mean (SD) age is 71.8 (9.7) years. 97% of cases are male. On baseline imaging, 64% had pleural plaques and 28% cases had features suggestive of pleural malignancy. The BAPE-MPM evolution rate was 30/207 or 14.5% (95%CI 9.9–19.9%).

Conclusions The final results of this study will allow optimal design of the Meso-ORIGINS study, which is a major component of the PREDICT-Meso CRUK Accelerator programme. If the BAPE-MPM progression rate is similar to the provisional rate reported here, this would translate into a feasible sample size.

S44 RISK FACTORS FOR RECURRENCE OF PRIMARY SPONTANEOUS PNEUMOTHORAX: ANALYSIS FROM THE RAMPP TRIAL

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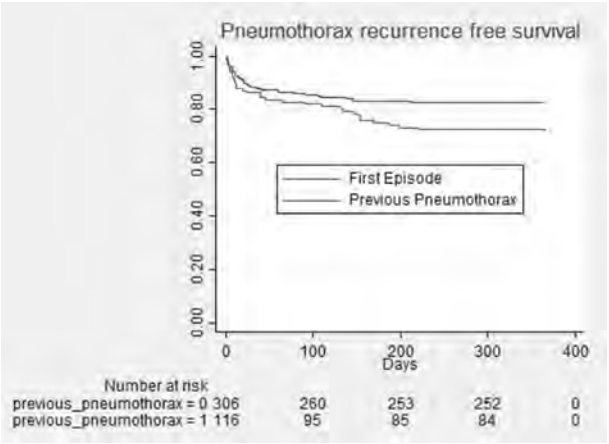
10.1136/thorax-2020-BTSabstracts.49

Introduction and Objectives Primary Spontaneous Pneumothorax (PSP) is a common condition with a high recurrence rate (28–33%).[1, 2, 3] Current guidelines suggest referral for recurrence prevention surgery after the second episode. Identifying patients at greater risk of recurrence would allow a more stratified approach. A number of factors have been proposed previously, but none have been robustly proven. This study used a large prospectively collected dataset from the RAMPP (Randomised Ambulatory Management of Primary Pneumothorax) Trial[1] in the UK to assess risk factors for pneumothorax recurrence up to 12 months.

Methods The RAMPP dataset included 423 patients: 236 were managed actively (either ambulatory or standard care arms) and an observational cohort of 187 patients with small, minimally symptomatic pneumothoraces managed conservatively. A Cox proportional hazards model was used to assess risk of recurrence by the following variables: patient age, sex, size of initial pneumothorax, smoking history (tobacco and marijuana), personal history of prior pneumothorax history, family history and treatments given.



Abstract S44 Figure 1

Results The overall recurrence rate at 12 months was 20.6% (87/423) with a significantly lower rate in the conservatively-managed observational cohort (22/187, 11.8%), than the ambulatory and standard care arms (28/117, 23.9%, and 37/119, 31.1%, respectively) ($p < 0.001$). Personal history of previous episode of pneumothorax significantly increased the risk of pneumothorax (See figure 1) ($p = 0.014$). No other risk factors were significant in predicting recurrence.

Conclusion Patients with small, minimally symptomatic pneumothorax have a low recurrence rate (11.8%). Previous history of pneumothorax is associated with increased risk of recurrence. Further work is required to identify other risk factors to determine who may benefit from early recurrence prevention procedures.

REFERENCES

1. Hallifax RJ. *Lancet* 2020;**396**:39–49.
2. Hallifax RJ. *JAMA* 2018;**320**(14):1471–1480.
3. Bobbio A. *Thorax* 2015;**70**:653–58.

S45 META-ANALYSIS OF THE ASSOCIATION BETWEEN EMPHYSEMATOUS CHANGE ON THORACIC CT SCAN AND RECURRENT PNEUMOTHORAX

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At least a third of patients go on to suffer a recurrence following a first spontaneous pneumothorax. Surgical intervention reduces the risk of recurrence and has been advocated as a primary treatment for pneumothorax. But surgery exposes patients to the risks of anaesthesia and in some cases can cause chronic pain. Risk stratification of patients to identify those most of risk of recurrence would help direct the most appropriate patients to early intervention. Many studies have addressed the role of thoracic CT in identifying those individuals at increased risk of recurrence, but a consensus as to whether CT provides valuable prognostic information is lacking. Here we show by meta-analysis of data from 2475 individuals that emphysematous change on CT scan is associated with a significant increased odds ratio for recurrent pneumothorax ipsilateral to the radiological abnormality (OR 2.49, 95% CI 1.51 to 4.13). The association holds true for primary spontaneous pneumothorax when considering emphysematous changes including blebs and bullae. Features such as bullae at the azygoesophageal recess or increased Goddard score similarly predicted recurrent secondary pneumothorax. Our meta-analysis suggests that CT scanning has value in risk stratifying patients considering surgery for pneumothorax.

S46 IDENTIFICATION OF PLEURAL INFECTION BACTERIAL PATTERNS. THE OXFORD PLEURAL INFECTION METAGENOMICS STUDY

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10.1136/thorax-2020-BTSabstracts.51

Background Pleural infection (PI) is a common and complicated disease. Empirical antibiotic usage has been correlated to poor clinical outcomes. Although the identification of the pathogen is essential for successful treatment, conventional culture-based pathogen detection techniques fail in approximately 40% of cases. Therefore, the bacteriology of PI remains incomplete. Next generation sequencing (NGS) is a molecular-based methodology which could be applied to metagenomics studies and improve pathogen recognition.

Aim To investigate and characterise the bacterial patterns of PI.

Methods Pleural fluid specimens from the 'Pleural Infection Longitudinal Outcome Study'[1] (PILOT, n=243) were subjected to bacterial DNA extraction followed by 16S rRNA NGS. The DADA2 and Phyloseq R packages were used for the analysis of the data.

Results We identified 363 distinct species of bacteria, with various abundances among the samples. Diverse patterns between monomicrobial and polymicrobial PI were detected. 131 (54%) samples had one pathogen with abundance over 50% and 89 (36%) samples had at least three pathogens with relative abundance over 10%, suggesting a polymicrobial infection.

Discussion We developed a methodology to extract bacterial DNA from pleural fluid specimens derived from patients with PI and the quality was satisfactory to be used for NGS. 16S rRNA gene NGS has the potential to detect the total microbiome of pleural fluid samples[1] from complex PI.

Funding National Institute for Health Research (NIHR) Oxford Biomedical Research Centre (BRC).

REFERENCE

1. Corcoran, J.P., *et al*. Prospective validation of the RAPID clinical risk prediction score in adult patients with pleural infection: the PILOT study. *Eur Respir J* (2020).

S47 THE NSCLC PLEURAL METASTATIC ENVIRONMENT INFLUENCES THE ROLE NEUTROPHILS PLAY IN THE IMMUNE CHECKPOINT

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Introduction Raised blood neutrophil-to-lymphocyte ratio (NLR) correlates with worse outcomes in NSCLC. Increasing evidence shows neutrophils are not the short-lived bystander they were once considered to be, but instead a persistent active player in cancer pathophysiology. By studying neutrophils from pleural fluid in NSCLC, we sought to establish the role they play in dictating immune responses to cancer at the metastatic site, and investigate whether features of the pleural environment itself impact upon their behaviour.

Methods Pleural fluid and blood was obtained from patients with NSCLC (n=33). Cells were extracted using magnetic negative selection kits (blood) and flow sorting (pleural fluid). Neutrophils ($CD66b^+CD11b^+CD15^+CD14^-CD49d^-$) were examined for PD-L1 expression. NSCLC neutrophil apoptosis (% $Annexin^+$) was measured, and compared to that of healthy donors. To model the metastatic environment, healthy donor neutrophils and T cells were co-cultured ± NSCLC pleural fluid supernatant (cell-free pleural fluid) ± PD-L1 inhibitor, and $CD8^+$ proliferation observed (CFSE).

Results NSCLC blood neutrophils were functionally different, living longer than those from healthy donors (Apoptosis 34.5% vs. 51.6%, $p<0.05$). NSCLC pleural neutrophils had even lower rates of apoptosis (19.1%), and were phenotypically different, expressing higher levels of PD-L1 ($PD\text{-}L1^+$91.7% vs. 0.9%, $p<0.05$). Healthy donor blood neutrophils exposed to NSCLC pleural fluid supernatant also expressed higher levels of PD-L1 and suppressed CD8+ T cell proliferation ($CD8^+$ T cells divided 8.6% vs. 52.4%, $p<0.05$), an effect partially reversed by PD-L1 inhibition ($CD8^+$ T cells divided 16.6%).

Conclusions Neutrophils in NSCLC are intrinsically different, living longer and expressing higher levels of PD-L1: features augmented by the pleural environment. We have shown evidence to support the hypothesis that neutrophils are detrimental at the pleural metastatic site, with an immunosuppressive role that is partially mediated via PD-L1. This inappropriate innate immune response may indirectly aid tumour progression.

Respiratory science: state of the art

S48 INVESTIGATING THE ROLE OF DISHEVELLED ASSOCIATED ACTIVATOR OF MORPHOGENESIS 2 (DAAM2) IN LUNG DEVELOPMENT

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Emphysema is characterised by the destruction of alveoli which cannot repair themselves. Both lung development and repair heavily rely on collective cell migration which is regulated by the planar cell polarity (PCP) pathway. *Dishevelled Associated Activator of Morphogenesis 2* (Daam2) is a key protein in the PCP pathway and is involved in the polymerisation of actin; however, its role in lung development has not been investigated.

To do this, we analysed the lung architecture of embryonic heterozygous and homozygous Daam2 knockout mice with wildtype littermates. To determine the effect of the Daam2 deletion at different stages of lung development, the width and number of airways in H&E stained sections from lungs of all 3 genotypes were compared at both embryonic days 14.5 and 18.5.

The localisation of key markers for lung development such as platelet cell adhesion molecule (PECAM), surfactant-protein C (SP-C) and smooth muscle actin (SMA) were also investigated by immunohistochemistry to determine the effect on these key proteins in Daam2 mutant lungs.

We found that at embryonic day 18.5, the alveolar airspaces were significantly wider in Daam2 homozygotes' lungs compared to their wildtype counterparts (n=12, $P<0.05$). This indicates disruption to normal lung development in Daam2 mouse mutants.

Furthermore, comparison of the distance from the edge of the mesothelium to the closest epithelial tissue, showed that the mesenchyme was significantly thicker in Daam2 mutant lungs than in the wildtype; another indicator of impaired lung development (n=12, $P<0.01$).

Quantification of SP-C positive cells revealed fewer cells present in Daam2 homozygotes' lungs. As SP-C is a marker of alveolar type II cells, the reduction in SP-C positive cells in Daam2 mutants is another indication of compromised lung development in the absence of Daam2 expression.

Further investigation into the role of Daam2 in lung development would be valuable for studies aimed at stimulating tissue repair to treat emphysema.

S49 COMPARISON OF THE BASAL STEM CELL POPULATION OF THE NASAL AND BRONCHIAL EPITHELIUM

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10.1136/thorax-2020-BTSabstracts.54

Introduction Recent work has shown that tobacco smoke exposure increases the mutational burden and cell-to-cell mutational heterogeneity of the normal bronchial epithelium. However, smoking cessation allows the preferential expansion of low-mutant epithelial cells, which could be responsible for the decline in lung cancer risk on quitting smoking. Although less is understood about the nasal epithelium, the incidence of squamous cell cancer (SCC) in the nose is much lower than in the bronchi. Whether a difference in function or mutational burden underlies this variation is unknown.

Methods Nasal brushings and endobronchial biopsies were enzymatically dissociated and underwent initial analysis by flow cytometry for expression of CK5, ITGA6, PDPN and NGFR (basal cell markers). Subsequently, single bronchial (n=152) and nasal epithelial (n=47) cells were flow-sorted and cultured from an ex-smoker to permit more detailed study of regional inter-cell variability and functionality. Index sorting was performed on the most relevant basal cell

subpopulation marker PDPN. Single cells were clonally expanded *in vitro* and colony-forming efficiency and colony size were calculated. After expansion, DNA and RNA were isolated for downstream analysis.

Results Flow cytometric analysis showed that CK5-positive basal cells constituted a similar proportion of the epithelial cell population in the nose and the bronchus (35% v. 30%, respectively, p=0.8). CK5-positive nasal basal cells compared with CK5-positive bronchial basal cells differed most in their expression of PDPN (6% v. 64% PDPN-positive, respectively, p=0.2). This was coupled with a lower median intensity of PDPN expression in nasal basal cells compared with bronchial basal cells (2437 v. 8434, respectively). Nasal epithelial cells showed lower colony-forming efficiency (15%) than bronchial epithelial cells (35%). In addition, the nasal clones that grew were significantly smaller in area than the bronchial clones (9.84 mm^2 v. 13.26 mm^2, respectively, p=0.0002).

Conclusions The lower colony-forming efficiency, smaller colony size and lower expression of PDPN in the nasal epithelial population suggests nasal basal cells may have a lower stem cell capacity than their bronchial counterparts. Analysis of the mutational burden and transcriptomic profile of both populations is a crucial next step to understand the difference in incidence of SCC in these compartments.

S50 OXIDATIVE STRESS DRIVEN INFLAMMATORY RESPONSES IN LUNG EPITHELIAL CELLS

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Cigarette smoke stimulates an inflammatory response and produces oxidants that cause oxidative stress in the lung, promoting pathophysiological changes related to chronic obstructive pulmonary disease (COPD).[1] Hydrogen peroxide (H_2O_2) is an important oxidant detected in breath condensate of COPD patients.[2] We aim to understand how chronic exposure to H_2O_2 alone or in combination with other inflammatory mediators influences epithelial cell responses relevant to COPD lung pathology.

BEAS-2B cells were exposed chronically to H_2O_2 for 2 h/day for 3 days at different concentrations, alone or in combination with TGF-β (10 ng/ml) or LPS (100 or 500 ng/ml). Cell viability was assessed by MTT assay. Cytokines were measured by ELISA. Intracellular ROS production was detected by CM-H_2DCFDA assay. Data were analysed using one-way ANOVA, followed by Multiple Comparison Test.

Cells tolerated a repeated exposure of H_2O_2 (up to 15 μM) ± TGF-β or LPS without significant loss of viability. Intracellular ROS was significantly elevated in the presence of LPS (mean ± SEM; 217±17%; *p<0.0001*) or H_2O_2(331 ±13%; *p<0.0001*), with an additive effect of combined treatment (H_2O_2, 444±12 vs. LPS + H_2O_2, 604±35%; *p<0.0001*). H_2O_2 stimulated modest release of IL-8 (38±2 pg/ml) and IL-6 (84±13 pg/ml). However, repeated 15 μM H_2O_2 exposure synergistically enhanced TGF-β induced IL-8 (TGF-β, 194±13 vs. TGF-β+ H_2O_2, 279±10 pg/ml; *p<0.0001*) but not IL-6 (TGF-β, 431±22 vs. TGF-β+ H_2O_2, 449±2 pg/ml). H_2O_2 synergistically enhanced LPS secretion of both IL-8 (LPS, 2487±21 vs. LPS+ H_2O_2, 2898±109 pg/ml; *p<0.0001*), and IL-6 (LPS, 2469±72 vs. LPS+ H_2O_2, 3277 ±62 pg/ml; *p<0.0001*).

Oxidative stress appears to be generated in BEAS-2B cells by LPS or H_2O_2 alone, and increased in combination. Repeated exposure to H_2O_2 induced minimal inflammatory response, but synergistically enhanced the effect of TGF-β and LPS on cytokine production. These data suggest combined exposure models may be useful to study the effects of epithelial cell challenges relevant to COPD pathology.

REFERENCES

1. Kirkham P, Rahman I. Oxidative stress in asthma and COPD: antioxidant as a therapeutic strategy. *Pharmacol Ther* 2006;**111**:476–94.
2. Montuschi, P. Exhaled breath condensate analysis in patients with COPD. *Clin Chim Acta* 2005;**356**:22–34.

S51 HUNGRY HUNGRY MACROPHAGES: HOW MULTIPLE PREY AFFECTS MACROPHAGE PHAGOCYTOSIS

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10.1136/thorax-2020-BTSabstracts.56

Background Macrophage phagocytosis is a fundamental process for maintaining tissue homeostasis and controlling infection by removing invading pathogens as well as dying cells. This is especially important in the respiratory tract, where alveolar macrophages patrol the airways, removing inhaled bacteria and mounting an immune response when infection takes hold. Studies looking at macrophage phagocytosis usually consider one prey, but this may not be a true representation of what happens in the lungs, where macrophages are faced with multiple types of bacteria, as well as apoptotic cells which require removal.

Methods Monocyte-derived macrophages from healthy donors were incubated for 4 hours with fluorescently labelled apoptotic neutrophils (AC), non-typable *Haemophilus influenzae* (NTHI), and *Streptococcus pneumoniae* (SP) either alone or in combination, and phagocytosis measured by flow cytometry, with cytokine output measured by ELISA.

Results The percent of macrophages that phagocytosed a single prey ranged from 12% with AC, to 56% for NTHI, or 74% for SP. When macrophages were exposed to two prey - a bacteria (NTHI/SP) and an AC, four populations emerged – cells that had eaten only AC (4%/3%), cells that had eaten only bacteria (23%/39%), cells that had eaten AC and bacteria (16%/11%) and cells that had eaten nothing (57%/47%). When macrophages were exposed to both bacteria (NTHI/SP), four populations emerged – cells that had eaten HI only (6%), cells that had eaten SP only (14%), cells that had eaten both HI and SP (51%) or cells that hate eaten nothing (29%). When all three prey were combined, macrophages ate a combination of all types, with 19% consuming all three prey. Phagocytosis of bacteria induced the release of CXCL-8, IL-6 and TNFa, which was inhibited by uptake of ACs.

Conclusion Macrophages are capable of consuming multiple prey at once. Uptake of an apoptotic cell alongside bacteria inhibited pro-inflammatory cytokine release, thus limiting inflammation. The effects of phagocytosis of multiple prey on macrophage phenotype and stress responses are unknown, but this experiment may be a more physiological model of the lungs and should be considered to understand the impact of macrophages in lung disease.

S52 DEVELOPMENT OF PROTOCOLS FOR MOUSE GLP-TOXICOLOGY STUDIES

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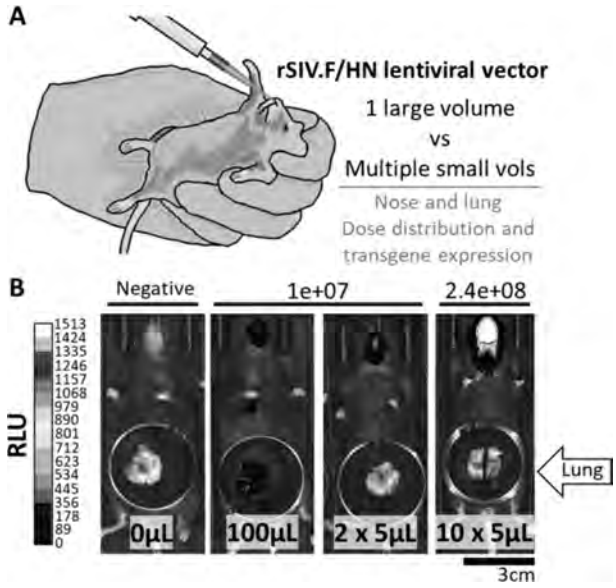
Introduction We have developed a Simian Immunodeficiency Virus (SIV)-based lentiviral vector pseudotyped with the Sendai-virus envelope glycoproteins (F/HN) (rSIV.F/HN) that is effective at transducing pulmonary epithelium *in vivo*. To prepare for a first-in-man clinical trial, we have developed protocols that can be used in a mouse GLP-toxicology study to efficiently transduce nasal-tissue or lungs.

Methods Reporter-imaging, molecular, and radiopharmaceutical tracing methods have been used to quantify intranasally administered lentiviral vector deposition and subsequent tissue-level transgene expression in mice.

Results Nose study. A standard 100 µL vector bolus administration ('nasal sniffing') was compared to slow perfusion via catheter (6.7µL/min) and to small volume pipette dosing (2 × 5µL). All animals received 1e7 TU/mouse of rSIV.F/HN expressing luciferase (n=6/group). 10–12 days after transduction, all methods led to similar gene expression in the nasal cavity. Catheter-based delivery led to significant ($p<0.05$) spill-over into the lung and was discontinued. In contrast to nasal sniffing, pipetting of small volumes abrogated lung transgene expression. Technetium radiotracer (5MBq of ^{99m}Tc-DTPA/mouse) showed that 98±1% of the pipetted dose was retained in the head. In contrast, nasal sniffing retained only 36±12% in the head, with the rest dispersed into lungs (34±16%) and the remaining body (30±5%). To increase vector delivery to the nasal epithelium, 5 and 10 × 5µL doses (at 5 min intervals) were administered, up to 2.4e8 TU/mouse (n=5/group), and a dose-related increase in gene expression was observed ($P<0.0001$, $r^2=0.87$). Importantly, even after 10 × 5µL doses, most radiotracer (90±3%) was retained in the head.

Lung study. Comparing nasal sniffing to an oropharyngeal (OP) delivery method (1e7 TU/50µL dose for both techniques), there was no difference in gene expression between lungs. By technetium radiotracer (5MBq as before, n=5–6/group), there was no difference in dose distribution between lungs (sniffing: 40±18%, OP: 37±11%). However, nasal sniffing can deliver double the volume compared to OP.

Conclusions To optimise target organ vector delivery, we have developed protocols suitable for GLP toxicology studies in the murine nose and lung. By defining dose distribution, effective viral titres and overages can be better calculated and compared to proposed clinical doses in future toxicology studies.



Abstract S52 Figure 1 Development of protocols for mouse GLP-toxicology studies. A) A Simian Immunodeficiency Virus-based lentiviral vector (rSIV.F/HN) has been administered to mice via intranasal pipette delivery in either a single larger (100 µl) or multiple smaller (5 µl) volumes and the nose and lung vector distributions and expressions compared. B) Whole-body and individual lung luciferase-reporter transgene expression 10–12 days after dosing, showing robust signal in nose and lungs with a single larger volume, undetectable lung signal with a similar titre small volume administration, and an increase in nasal-tissue transgene expression with increasing multiple small volume doses, without significant lung spill-over. RLU = relative light units

The care needs of those recovering from COVID-19

S53 WHAT FACTORS INFLUENCE MENTAL HEALTH BURDEN IN PATIENTS RECOVERING FROM COVID-19?

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10.1136/thorax-2020-BTSabstracts.58

Background Respiratory teams should perform a holistic assessment of patients recovering from COVID-19 to identify both physical and psychological needs.[1]Patients may develop psychological sequelae such as anxiety, dysfunctional breathing, depression and post-traumatic stress disorder (PTSD). We investigated the psychological burden at follow-up in people admitted with COVID-19 and the factors associated with this.

Methods SARS-CoV-2 swab-positive patients from two hospital sites had telephone follow-up 8–10 weeks post discharge. We conducted screening questionnaires including the Patient Health Questionnaire 2-item (PHQ-2) for depression and Trauma Screening Questionnaire (TSQ) for PTSD. Demographic, admission, co-morbidity data and symptom burden at follow up (quantified by a numerical rating scale) were also collected.

Results 782 patients completed both screening questionnaires. Patients' baseline characteristics are shown in table 1. 71 (9.1%) and 60 (7.7%) patients screened positive for depression and PTSD respectively. Patients with a background of depression and anxiety were more likely to have higher PHQ-2 scores (11.6% and 11.8%, $p<0.001$); those with anxiety had higher TSQ scores (8.5%, $p=0.009$). Patients who had a greater symptom burden both at admission and at follow-up were significantly more likely to have positive PHQ-2 and TSQ scores. No difference in scores was found in patients who received positive-airway pressure treatment (5.2%) or who were admitted to ITU (11.8%). Patients who returned to work (53.7%) were less likely to have positive TSQ scores ($p=0.006$).

Discussion In this large cohort, patients with a higher physical symptom burden at admission and follow-up are more likely

Abstract S53 Table 1 Patient characteristics and outcomes

Variable	PHQ-2		p - value	TSQ		p-value
	Negative	Positive		Negative	Positive	
N	711	71		722	60	
Demographics						
Age *	62.0 ± 16.6	60.5 ± 16.9	0.471	62.2 ± 16.8	57.3 ± 14.2	**0.028**
Sex – Male (%)	429 (60.3)	35 (49.3)	0.071	438 (60.7)	26 (43.3)	**0.009**
Ethnicity – White (%)	286/573 (49.9)	37/70 (52.9)	0.642	290/585 (49.6)	33/58 (56.9)	0.287
Co-morbidities						
Total number of co-morbidities	4 (3–5)	5 (3–6)	0.170	1 (0–3)	2 (1–3)	0.239
Depression (%)	34/683 (5)	11/68 (16.2)	**<0.001**	39/692 (5.6)	6/59 (10.2)	0.159
Anxiety (%)	14/683 (2)	8/68 (11.8)	**<0.001**	17/692 (2.5)	5/59 (8.5)	**0.009**
Admission data						
Duration of symptoms at admission in days	7 (5–11)	7 (4.5–9)	0.287	7 (5–11)	7 (5–10)	0.357
Total number of symptoms (out of 16)	4 (3–5)	5 (3–6)	**0.014**	4 (3–5)	4 (3–6)	**0.001**
Positive airway pressure (CPAP or NIV)	39 (5.5)	2 (2.8)	0.336	37 (5.1)	4 (6.7)	0.607
Admission to intensive care unit (ITU)	81/674 (12)	11/69 (15.9)	0.346	82/683 (12)	10/60 (16.7)	0.293
Follow up data						
Breathlessness rating 0–10	0 (0–2)	2 (0–5)	**0.003**	0 (0–3)	2 (0–4)	**<0.001**
Cough rating 0–10	0 (0–0)	0 (0–3)	**0.012**	0 (0–0.5)	0 (0–2)	**0.023**
Fatigue rating 0–10	2 (0–4)	5 (3–7)	**<0.001**	2 (0–4)	5 (3–7)	**<0.001**
Sleep quality rating 0–10	0 (0–4)	3 (2–6)	**<0.001**	0 (0–3)	5 (3–8)	**<0.001**
Symptom burden at follow-up (out of 7)	4 (3–5)	5 (3–6)	**<0.001**	0 (0–1)	2 (1–2)	**<0.001**
Back to work	122/216 (56.5)	10/30 (33.3)	0.060	121/213 (56.8)	11/33 (33.3)	**0.006**

to also have psychological burden and this may impact their ability to return to work. Current guidelines[1] highlight mental health screening only for patients who had more severe disease, but our data suggest any patient may be affected.

Whilst more work in this field is required, we suggest clinicians who encounter patients still recovering from COVID-19 should proactively screen for psychological burden and liaise with local psychology services to ensure holistic care is offered.

REFERENCE

1. British Thoracic Society (2020). Guidance on respiratory follow up of patients with a clinico-radiological diagnosis of COVID-19 pneumonia.

S54 'LONG-COVID': THE NEED FOR MULTI-DISCIPLINARY WORKING

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10.1136/thorax-2020-BTSabstracts.59

Background Patients discharged from hospital following admission for COVID-19 may have on-going sequelae and require multidisciplinary input to ensure optimal recovery and early detection of complications. We evaluated our COVID-19 follow-up service to understand on-going patient needs.

Methods The respiratory team at Trust hospital sites established a virtual post-COVID-19 clinic. A bespoke questionnaire was developed to capture demographic data, symptom burden and mental health outcomes to identify those who needed further support. All patients were offered blood tests and a repeat chest radiograph (CXR) if abnormal pre-discharge.

Abstract S54 Table 1 Patient characteristics and outcomes in the post-COVID-19 clinic

Variable	
Baseline Demographics n = 643	
Age (mean ± SD)	62.3 ± 15.6
Male sex	398 (61%)
Caucasian ethnicity	292 (45.4%)
Hospital admission	
Received NIV or CPAP	35 (5.4%)
Admitted to intensive care	72 (11.1%)
Length of stay (median IQR) (days)	8 (4–11)
Symptom burden at follow-up	
Cough - same or worse	148 (23.0%)
Breathlessness - same or worse	106 (16.5%)
Fatigue - same or worse	92 (14.4%)
Myalgia	101 (15.7%)
Anosmia	53 (8.2%)
Diarrhoea and/or abdominal pain	54 (8.4%)
'Fuzzy head'	76 (11.8%)
Chest pain and/or chest tightness	80 (12.4%)
Risk of depression	71 (11.0%)
Risk of PTSD	60 (9.3%)
Do they feel back to normal	284 (44.5%)
Back at work (n=363)	114/363 (31.4%)
Outcomes	
Discharged	372 (57.9%)
Further follow up call	180 (28%)
Face to face respiratory appointment	134 (20.8%)
Repeat imaging – further CXR or CT chest	151 (23.5%)

Results Of patients admitted between March and August 2020 with COVID-19, 908 were eligible for follow-up. 643 (71%) have been assessed thus far. 133 (15%) declined or were unreachable. Patients' demographic data are summarised in table 1. All patients, including the 5.4% who received CPAP/NIV and 11.1% admitted to intensive care, were offered virtual follow-up.

Median follow-up was 63 (54–79) days from discharge. Persistent symptoms (i.e. same or worse since admission) included cough (23.0%), breathlessness (16.5%), myalgia (15.7%) and fatigue (14.4%). Some patients developed new symptoms including 'fuzzy head' (12%), diarrhoea or abdominal pain (8%). 11% and 9.3% were at risk of depression and post-traumatic stress disorder respectively. Under half (44.5%) felt they had fully recovered. Of the 363 who were eligible to return to work, 31.4% felt able to do so.

57.9% were immediately discharged from secondary care after their follow-up assessment. 28% had further virtual follow-up arranged, while 20.8% were scheduled for face-to-face respiratory follow-up. 23.5% had a subsequent repeat CXR or CT scan arranged. Patients who scored highly on mental health questionnaires were offered referral to local psychology services and 49% (n=64) agreed.

Discussion Our data demonstrates a significant proportion of hospital inpatients develop physical or psychological sequelae after COVID-19, 'Long-COVID'. A significant number felt unable to return to work 9 weeks after discharge. Our virtual clinic provided a structured way to identify patients' on-going symptoms and demonstrates the importance of establishing structured multi-disciplinary pathways, particularly with referrals to physiotherapy, cardiology and neurology. We strongly recommend the development of clear follow-up protocols prior to the next wave of disease.

S55 CLINICAL, RADIOLOGICAL, FUNCTIONAL AND PSYCHOLOGICAL CHARACTERISTICS OF SEVERE COVID-19 PNEUMONIA SURVIVORS: A PROSPECTIVE OBSERVATIONAL COHORT STUDY

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10.1136/thorax-2020-BTSabstracts.60

Introduction The 'Long COVID' syndrome, where symptoms persist beyond the acute illness with severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2/COVID-19), is anecdotally described. However, a comprehensive report of clinical, radiological, functional and psychological recovery from COVID-19 is currently lacking. We present a detailed radiological, patient-reported and physiological characterisation of patients attending face-to-face assessment following hospitalisation with COVID-19 pneumonia.

Methods Prospective single-centre observational cohort study at an inner-city South London teaching hospital. All patients admitted with severe COVID-19 pneumonia (admission duration ≥48 hours, oxygen requirement ≥40% or critical care admission) were invited to attend Post-COVID Clinic 6–8 weeks following hospital discharge. Primary outcome: radiological resolution of COVID-19 pneumonitis. Secondary outcomes: demographics and anthropometrics, inpatient clinical course, patient-reported and physiological outcomes at follow-up (symptoms, functional disability, mental health screening, 4-metre gait speed (4MGS), 1-minute sit-to-stand (STS) test).

Results 119 consecutive patients attended clinic between 3rd June and 2nd July 2020, at median (IQR) 61 (51–67) days post discharge. Baseline characteristics are presented in table 1. Despite apparent radiographic resolution of lung infiltrates in the majority (RALE score <5 in 87% of patients), patients commonly reported persistent fatigue (78/115 (67.8%;95%CI 60.0–76.5)), sleep disturbance (65/115 (56.5;47.3–66.1)) and breathlessness (37/115 (32.2;25.2–40.0)). mMRC breathlessness score was above pre-COVID baseline in 55/115 (46.2;37.8–54.6). Burdensome cough was less common (8/115 (7.0; 3.5–10.4)). 56 thoracic computed tomography scans were performed, of which 75% demonstrated COVID-related interstitial lung disease and/or airways disease. Significant depression (PHQ-9 ≥9) or anxiety (GAD-7 ≥9) were present in 20/111 (18.0;11.7–23.4) and 25/113 (22.1;15.0–29.8), respectively. The Trauma Screening Questionnaire was positive (≥6) in 28/113 (24.8;18.1–31.9). Post-COVID functional scale was ≥2 in 47/115 (40.9;33.0–47.8). 4MGS was <0.8 m/s in 44/115 (38.3;29.6–46.1), 39/109 (34.5;26.5–41.6) desaturated by ≥4% during STS, 25/32 (78.1;62.5–93.1) who desaturated also had abnormal CT findings.

Conclusions Persistent symptoms, functional limitation and adverse mental health outcomes are common 8 weeks after severe COVID-19 pneumonia. Follow-up chest radiograph is a poor marker of recovery. Physiological testing to identify oxygen desaturation is useful for triaging patients for further

Abstract S55 Table 1 Baseline characteristics

Age (years)	58.7 ± 14.4
Sex	
Female	45 (37.8; 29.4–46.2)
Male	74 (62.2; 53.8–70.6)
Ethnicity	
BAME (Yes/No)	83 (69.7; 61.3–78.2)
White	36 (30.3; 22.6–37.8)
Black	52 (43.7; 36.1–51.3)
Asian	18 (15.1; 10.1–20.2)
Mixed race	5 (4.2; 1.7–6.7)
Other	8 (6.7; 3.4–10.9)
Index of multiple deprivation score (n=115)	26.6 ± 9.7
Body Mass Index (kg/m^2) (n=118)	30.0 (25.9–35.2)
Charlson comorbidity index	2 (1–4)
Admission PaO_2:FiO_2	168.8 (105.9–272.3)
Critical care admission	41 (34.5; 26.9–42.9)
COVID-19 complications	
None during admission	49 (41.2; 33.6–48.7)
Venous thromboembolism	27 (22.7; 16.8–29.4)
Pulmonary embolism	23 (19.3; 12.6–26.1)
Deep vein thrombosis	6 (5.0; 2.5–7.6)
Acute kidney injury	41 (34.5; 25.2–43.7)
Deranged liver function	17 (14.3; 9.2–20.2)
Delirium	18 (15.1; 10.1–20.2)

Data presented as mean ± SD, median (IQR) or frequency (%; 95% confidence interval). Abbreviations: BAME = Black, Asian or Minority Ethnic, PaO_2:FiO_2 = ratio of arterial partial pressure of oxygen to fraction of inspired oxygen.

investigation. Face-to-face or virtual clinical assessments are recommended to facilitate early recognition and management of post-COVID sequelae in this vulnerable cohort.

S56 FEASIBILITY AND USAGE OF ONE MINUTE SIT-TO-STAND TEST, AS A MEASURE OF RECOVERY IN POST-ACUTE COVID 19 PATIENTS, FOLLOWING HOSPITAL DISCHARGE

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10.1136/thorax-2020-BTSabstracts.61

Background Patients discharged from hospital following treatment for COVID-19 infection, experience ongoing breathlessness during recovery.[1] One minute sit-to-stand test (1MSTS) has been recommended to identify desaturation in these patients during acute and post-acute phase.[2] We aimed to assess the feasibility of 1MSTS to monitor recovery in COVID-19 patients following hospital discharge.

Methods All patients admitted to our hospital, with COVID-19 were offered clinic review approximately 6–8 weeks post discharge. This clinical assessment included 1MSTS, bloods and imaging. If ongoing clinical concern, a second review was offered at 3 months.

We reviewed the 1MSTS in terms of (a) ability to complete test (b) oxygen desaturation $\geq$3%[2] (c) longitudinal improvement in 1MSTS repetitions.

Fisher's exact and Mann-Whitney tests were used to compare variables.

Results 366/413(88%) COVID-19 patients reviewed at initial follow-up clinic completed a 1MSTS and 141 repeated 1MSTS at 3 months. Those who were unable to complete a 1MSTS at initial clinic were older, frailer and had longer hospital admissions with COVID-19 (table 1).

77/366 (21%) patients had desaturation of $\geq$3% on 1MSTS at initial follow-up, which was associated with severe disease during admission (p=0.051) and persisting radiographic abnormalities (p=0.0018). No association between desaturation and symptom burden was noted.

Clinicians found 1MSTS with no desaturation to be helpful in the discharge process if other investigations were normal. Desaturation during initial clinic was not predictive of abnormal cardiac and respiratory investigations at 3 month follow-up (p=0.317).

An improvement in number of repetitions/minute between clinic visits did not correlate with an improvement in VAS breathlessness (p=0.099), MRC score (p=0.267) or imaging (p=0.448).

Conclusion The majority of patients recovering from COVID-19 can perform 1MSTS at follow-up clinic. Those unable were generally more frail, older and with co-morbidities.

1MSTS helped with discharge decisions at 6–8 weeks. However, the wider utility of the 1MSTS results is limited in COVID-19 follow-up. Serial measurements were not helpful in predicting symptomatic or radiological improvement.

REFERENCES

1. Carfì A, *et al*. (2020) Persistent symptoms in patients after acute COVID 19. *JAMA* **324**(6):603–605.
2. Greenhalgh T, *et al*. (2020) Management of post-acute covid-19 in primary care. *BMJ* **370**:m3026

S57 THE DEVELOPMENT AND IMPLEMENTATION OF A VIRTUAL DISCHARGE WARD FOR PATIENTS WITH COVID-19 PNEUMONIA: DATA ON THE FIRST 300 PATIENTS

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Introduction There is little described in the current COVID-19 literature about the outcomes of patients discharged from hospital following COVID-19 pneumonia. We describe the rapid establishment of a 'virtual ward' (VW) for follow-up of patients with a suspected or confirmed diagnosis of COVID-19 pneumonia or pneumonitis upon hospital discharge, characteristics and outcomes for the first 300 patient referrals.

Abstract S56 Table 1 Demographics and clinical descriptors of patients completing and not completing 1MSTS at initial COVID-19 follow-up clinic

	1MSTS completed	1MSTS not completed	p value
Total	366	47	
Male	228 (62%)	19 (40%)	P=0.0067
Age	59 (IQR 50 – 71)	73 (IQR 65.5 – 82)	p=<0.0001
Frailty score	1 (IQR 1-2)	4 (3-6)	p=<0.0001
Presence of ≥ 1 respiratory comorbidity	87 (24%)	16 (34%)	P=0.1510
Presence of ≥ 1 cardiovascular co-morbidity	47 (13%)	12 (25%)	P=0.264
Length of hospital admission (days)	5 (IQR 2-9)	8 (IQR 4-17)	p=0.0005
Max FiO2 requirement during admission ≤ 40%	287 (78%)	35 (74%)	p=0.5753

Fisher's exact and Mann-Whitney test

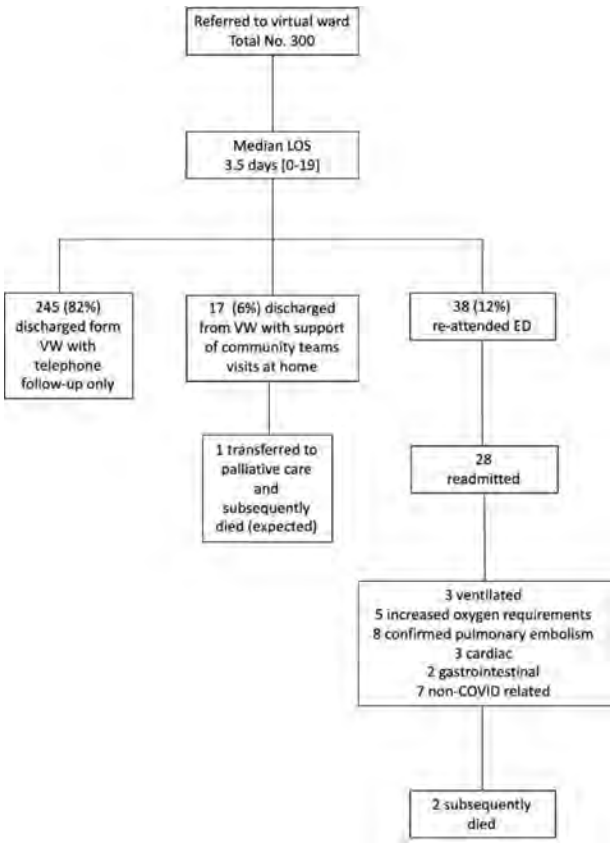
Methods Admitted patients with a confirmed/suspected diagnosis of COVID-19 pneumonia/pneumonitis were referred electronically to the VW on discharge. Pulse oximeters were provided if oxygen saturations were <92%. The 'tracking board' was reviewed daily and phone calls carried out to assess patients for symptom improvement, stability or deterioration. If cause for concern was raised, same-day review for the patient at home was arranged via predetermined community pathways or patients were transferred urgently to hospital.

Results The M:F ratio was 2:1 and 25% of patients were of black and minority ethnic origin. 71% of patients had at least 1 co-morbidity. 31% of patients were SARS-CoV-2 PCR negative on respiratory tract samples but had high clinical suspicion of COVID-19. 70% of patients had radiological changes on CXR/CT formally reported as being consistent with COVID-19.

Median Length of stay (LOS) on the VW was 3.5 days [range 0–19], 85% of patients had a LOS ≤7 days. Around half (158, 53%) of patients had required oxygen during admission. Pulse oximeters were provided to 31 (10%) of patients.

Outcomes are shown in figure 1. Thirty-eight (13%) patients re-attended the Emergency Department; 28 were readmitted; of these, 3 were ventilated for respiratory failure, 5 had increasing oxygen requirements and 8 had confirmed pulmonary embolism. 12 had other reasons for admission. 2 patients readmitted by the VW died, both had underlying terminal diagnoses.

Conclusions To our knowledge, this is the first description of the characteristics of patients discharged from UK hospitals with COVID-19. We have demonstrated that a virtual COVID-19 ward allowed early discharge of patients, offering a safety net and reassurance for patients and clinicians at the time of discharge. Use of pulse oximeters allowed for early identification of clinical deterioration, enabling prompt readmission when required.



Abstract S57 Figure 1 Outcomes

S58 THE IMPACT OF SMOKING ON SYMPTOM AND RADIOLOGICAL SEVERITY AT COVID-19 FOLLOW UP

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Background The relationship between smoking and COVID-19 disease severity is uncertain; one meta-analysis found smoking increases the risk of developing severe COVID-19 two-fold.[1] No previous study has reported whether smokers have worse outcomes at follow-up. We hypothesised that smokers admitted to hospital with COVID-19 would have a greater symptom and radiological severity at follow-up.

Methods We prospectively followed up swab-positive COVID-19 patients in two hospitals discharged between 03.05.20 and 19.06.20. Telephone calls were conducted 8–10 weeks post discharge. Demographics, co-morbidities, smoking history and symptom burden data were collected. Symptom burden was quantified using a numerical rating scale for breathlessness, cough and fatigue. Patients were offered a follow-up chest radiograph (CXR) if abnormal on discharge.

Abstract S58 Table 1 Patient characteristics for smokers and never smokers with follow up data

Variable (%)	Never-smokers	Ex/current Smokers	P - value
N	356	181	-
Demographics			
Age *(years)	60 ± 16	65 ± 16	**<0.0001**
Male Sex (%)	212 (60)	122 (67)	0.076
Black, Asian, Minority Ethnic (BAME) (%)	183 (51)	63 (35)	**<.0001**
Comorbidities			
Hypertension	155 (44)	68 (38)	0.382
Ischaemic Heart Disease	32 (9)	25 (14)	0.088
Diabetes	93 (26)	41 (23)	0.392
Respiratory Background	65 (18)	45 (25)	0.073
Hospital Admission			
Admission NEWS2 Score	4 (2–6)	5 (2–6.25)	0.838
Intensive Care Admission	39 (11)	24 (13.3)	0.462
Symptom Burden at follow up			
Breathlessness rating 0–10	0 (0–2)	1 (0–3)	**0.037**
Cough rating 0–10	0 (0–1)	0 (0–1)	0.594
Fatigue rating 0–10	2 (0–5)	2 (0–5)	0.933
How close to 100% do they feel	90 (75–100)	90 (75–100)	0.969
Returned to Work	92/179 (51)	40/133 (30)	**0.013**
MRC Dyspnoea scale (1–5)	1 (1–2)	2 (1–3)	**0.005**
CXR at follow up			
Normal (%)	86/120 (72)	43/69 (62)	0.184
Significantly improved (%)	25/120 (21)	19/69 (28)	0.294
Unchanged (%)	0	1/69 (2)	0.186
Significantly Worsened (%)	9/120 (8)	6/69 (5)	0.770

*normally distributed parametric data with mean and standard deviation
All other scale data was non-parametric with median and interquartile ranges shown
Abbreviations: NEWS2 (National Early Warning Score 2); MRC (Medical Research Council)

Results 782 patients were reviewed post-discharge, median (IQR) time to review: 63 (54–79) days. Smoking history was obtained for 537 patients. Outcomes for 181 (34%) current/ex-smokers were compared to 356 (66%) never-smokers. Table 1 demonstrates baseline characteristics and symptom burden between groups at follow-up. Never-smokers were significantly younger (59.5±16.3 vs. 65.1±15.5 years, $p<0.001$) and more likely to be from ethnic minority groups (51.4% vs 34.8%, $p<0.001$). Ex/current smokers had significantly increased self-reported breathlessness (1 (0–3) vs 0 (0–2); $p=0.037$) and higher Medical Research Council (MRC) dyspnoea score (2 (1–3) vs 1(1–2); $p=0.013$). They were less likely to have returned to work (30% vs 51%; $p=0.013$). Regression analyses demonstrated no significant impact of age and ethnicity on self-reported breathlessness ($p=0.317$) but demonstrated a significant impact of age on the MRC score ($p<0.001$). There were no significant differences in CXR findings at follow-up.

Conclusion In this large clinical cohort, ex/current smokers had significantly increased self-reported breathlessness at follow-up. These results should be interpreted with caution as the burden of breathlessness prior to admission is unknown. Interestingly, there were no significant differences in other symptoms, nor any differences in radiology findings. Further work is required to understand the mechanisms underlying these findings in order to mitigate the effect of COVID-19 in current/ex smokers. We should continue to routinely and optimally treat current smokers for their tobacco dependence.

REFERENCE

1. Zhao Q., *et al*. *J Med Virol* 2020 Apr 15.

Challenges in pulmonary embolism

S59 8 YEAR RETROSPECTIVE ANALYSIS OF THE AMBULATORY PULMONARY EMBOLISM (PE) PATHWAY – A SAFE AND EFFECTIVE SERVICE

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10.1136/thorax-2020-BTSabstracts.64

Background The suspicion of PE is a common reason for both hospital admission and hospital stays. Being able to prevent admission in low risk PE patients has previously shown to be safe and cost effective with an established ambulatory service running in our hospital since 2010. In this study we describe the findings from an 8 year retrospective analysis of this service, building on a previous 2 year study.

Method An 8 year retrospective analysis from June 2010 to January 2018 was carried out using the PE database. Patients with suspected PE referred to the service using acceptance criteria (appendix a). PE risk was then stratified using the PE severity index (PESI) (3). D-dimers were performed in the low and intermediate probability groups. Those with negative d-dimers were discharged, those with high risk or positive d-dimer underwent imaging in the form of CT pulmonary angiography (CTPA) or ventilation-perfusion (VQ) scanning. This was generally a same day service. For a subset of 418 patients (admitted April-December 2017) 30-day mortality was determined.

Results 3767 patients were referred to the service. Out of these patients 2651 (70%) were female and 1116 (30%) were male. 1474 (40%) referrals came from general practice, 898 (24%) from bed bureau, 621 (17%) came from the clinical decisions unit and 562 (15%) came from the emergency department. 106 (3%) of referrals came from other sources. 269 (7%) had a confirmed PE out of which 265 (99%) were managed as outpatients. 1438 CTPAs were performed, 226 (18%) were positive. 416 VQ scans were performed, 27 (6%) were positive. 30-day mortality was zero.

Conclusions The analysis shows ambulatory PE care to be effective with 99% of those with confirmed PE being managed without admission. This is an improvement of 27% from the previous study. The service is safe with zero 30-day mortality in a recent subgroup. Summarizing, this is the largest ambulatory PE study which demonstrates the effectiveness and safety of an outpatient ambulatory pulmonary embolism (PE) pathway. Similar services such as this should be implemented in other centres.

REFERENCE

1. https://www.ncbi.nlm.nih.gov/pubmed/16020800

S60 UTILITY OF A NOVEL RADIOLOGICAL SCORE IN PREDICTING CLINICAL OUTCOMES IN LARGE PULMONARY EMBOLISM. A COMPARISON WITH SIMPLIFIED PESI SCORE

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10.1136/thorax-2020-BTSabstracts.65

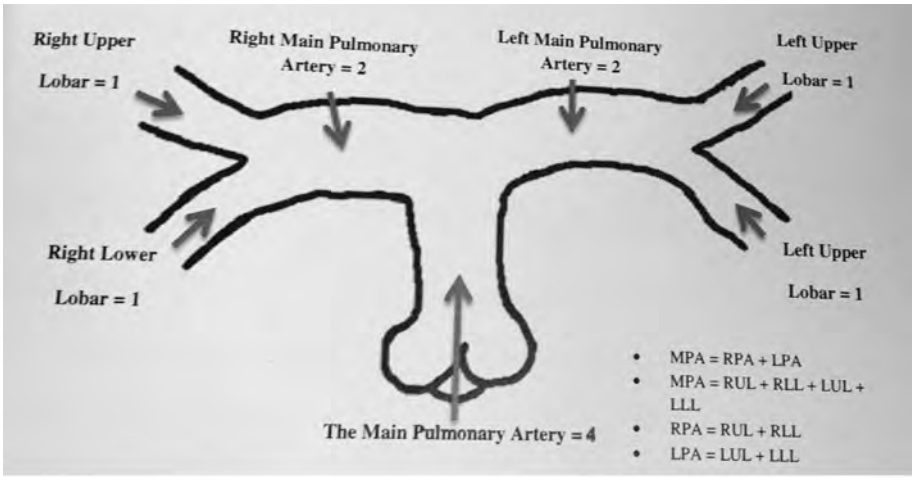
Introduction Pulmonary Embolism (PE) is associated with a notable risk of morbidity and mortality. CT pulmonary angiograms (CTPA) are used in the diagnosis of pulmonary embolism and also to determine the clot burden and right ventricular strain.

University Hospital of North Midlands (UHNM) PE score is a radiological score created to optimize risk analysis (haemodynamic instability) of patients with large PE using radiological features. The score assesses location of clot (L) in major pulmonary arteries (scores 1, 2 and 4), the degree of occlusion (o) (score 1,2 and 3) and the impact on the right ventricle (RVR) (scores 1,2 and 3). Interventricular septum morphology (S) is also assessed (scores 1, 2, 3 and 4). Multipliers are used to obtain the total score, $[(L \times O) \times RVR] + S$. Maximum score is 64. This score is correlated with clinical outcome. The PE severity is classified into mild (1–9), moderate (10–14) and severe $\geq$15. **(Figure 1)**

Methods A retrospective analysis of CTPAs (From 1/3/2014 till 1/07/2018) was performed. A total of 485 patients, whose CTPA showed Large PE/Saddle embolism, were included in study. All CTPAs showing segmental/sub-segmental PEs and CTPAs with poor quality imaging were excluded. S-PESI was calculated retrospectively using clinical notes.

Results Out of 485 patients, 99 patients had S-PESI score of 0 (20.4%), these patients had average UHNM PE score of 9 and their average inpatient hospital stay was 5 days. 5 patients out of 99 ended up in having thrombolysis, 7 had inpatient cardiothoracic referral for surgical intervention. 3 patients out of 99 died in 30-day period.

Conclusion UHNM PE score has comparable performance in identifying the risk of haemodynamic compromise in large PE.



Abstract S60 Figure 1

It improves the specificity by risk stratifying large PEs into 3 groups, hence can be utilized in clinical decision making regarding appropriate treatment and predicting clinical outcomes. Further studies are needed to validate its utility before its universal application.

S61 PULMONARY EMBOLISM LYSIS TEAM (PELT) TO GUIDE THE MANAGEMENT OF ACUTE PULMONARY EMBOLISM IN THE PUERPERIUM

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10.1136/thorax-2020-BTSabstracts.66

Introduction Venous thromboembolism risk is higher in the puerperium and pulmonary embolism (PE) is a leading cause of maternal death. IV unfractionated heparin (UFH) is considered first line treatment but favourable outcomes following thrombolysis have been recorded. The ESC guidelines recommend the use of a multidisciplinary team to plan the management of these women.[1]

Aim To review the management and outcomes of pregnant and post-partum women admitted to a tertiary referral centre with intermediate-high risk (IHR) and high risk (HR).

Method A retrospective case notes review of pregnant and post-partum patients admitted with IHR and HR PEs between 2014 and 2019. All patients were reviewed by PELT (comprising specialists in respiratory, haematology, interventional radiology and obstetric medicine in conjunction with imaging, PESI score, troponin and NT-proBNP). All treatment decisions were made in conjunction with informed patient consent.

Results Seven patients with IHR or HR PE (6 pregnant and 1 post-partum) were admitted. Of these, 4 were transferred from other hospitals. Three of the patients (gestations 10/40, 22/40 and 37+4/40) received UFH alone, two (gestations 31/40 and 38/40) were treated with catheter directed thrombolysis (CDT) and one patient (gestation 22/40) received half-dose systemic thrombolysis after haemodynamic collapse. One patient presented 4 weeks post-partum and received CDT. There were no major and only one minor bleeding complications. All patients clinically improved, with resolution of echocardiographic changes and improvement in cardiac biomarkers. There was no maternal mortality. One woman who initially presented with vaginal bleeding at 10 weeks, was treated with UFH and went on to suffer a miscarriage. All other patients went on to complete pregnancy successfully. One patient who underwent CDT had an elective caesarean section during her inpatient stay.

Conclusion The management of PEs in pregnancy is difficult and treatment decisions should be patient specific. Thrombolysis and CDT give good outcomes in carefully selected patients. A PELT team with the input of Obstetric Medicine specialists is invaluable in making these decisions.

REFERENCE

1. Konstantinides, *et al*. 2019. 'ESC Guidelines for the diagnosis and management of the acute pulmonary embolism developed in collaboration with the ERS'. *ERJ*. Vol **56** Issue 2.

S62 THE PREDICTION OF PULMONARY EMBOLISM & CTPA FINDINGS IN THE COVID-19 CRISIS

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10.1136/thorax-2020-BTSabstracts.67

Objective To determine if the key features used to predict and diagnose pulmonary embolism (PE) in the hospital setting were affected by the COVID-19 crisis. Our hospital protocol utilises a two-tier Wells probability score with values of 4 or less requiring a positive D-dimer test to determine if imaging is necessary. The components of a Wells score and D-dimer levels may be affected by coincident coronavirus infection.

Methods Observational data has been collected for patients presenting to acute services with a possible PE at our trust as part of ongoing pathway development. A representative month (April 2019) was used to provide a cohort for comparison with the COVID-19 patients who were investigated for PE during April 2020.

Results During April 2020, 126 patients had a CTPA with 30 diagnosed PEs (23.8%) compared with 2019 when only seven PEs were diagnosed from 59 scans (11.8%). The calculated Wells score for the 2020 cohort had a mean of 4.5 and median of 4.5, in 2019 the mean Wells was 4.0 with a median of 4.5. The most common components of the Wells score seen in 2020 were: PE most likely diagnosis (n=89),

heart rate >100bpm (n=88), immobile for >3 days (n=61). The available D-dimer results indicate they were significantly higher in the COVID cohort (12097 n=72) than the 2019 group (3367 n=28, p<0.05 t-test). During COVID D-dimer levels were significantly higher in patients with a PE (25207)) than those without PE (7000, p<0.01). From the 126 CTPAs 50 cases had CT features consistent with COVID-19 disease, ten of whom also had a PE. 75 cases had COVID proven on viral swab PCR or CT criteria. COVID proven patients had higher platelet count, ferritin and CRP with lower lymphocyte count (all p<0.05 t-test) compared with the rest of the 2020 cohort. The COVID proven patients with a PE also had a significantly higher D-dimer than without a PE (38156 vs 3855 p<0.01) and a trend towards a prolonged INR (1.52 vs 1.11 p=0.09).

Conclusion The COVID-19 crisis was associated with an increase in PE diagnoses and diagnostic rates on imaging with higher D-dimer levels. Thresholds and predictionmodels may need to be re-evaluated.

Therapeutic advances in cystic fibrosis: today and tomorrow

S63 IVACAFTOR IN 4- TO <6-MONTH-OLD INFANTS WITH CYSTIC FIBROSIS AND A GATING MUTATION: RESULTS OF A 2-PART, SINGLE-ARM, PHASE 3 STUDY

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10.1136/thorax-2020-BTSabstracts.68

Introduction and Objectives ARRIVAL, a single-arm Phase 3 study, characterises pharmacokinetics, safety and tolerability of ivacaftor in children aged <24 months with *CFTR* gating mutations. Data from 6 to <12 and 12 to <24 months cohorts show that ivacaftor is safe and well tolerated (Davies JC, *et al*. Presented at ECFS 2019; Rosenfeld M, *et al. Lancet Respir Med*. 2018;6:545–53); results for the 4 to <6 months cohort are presented here.

Methods Infants received ivacaftor q12h for 4 days (Part A; 5 to <7 kg: 25 mg; 7 to <14 kg: 50 mg) and 24 weeks (Part B; <6 months: 25 mg q12h; ≥6 months: weight-based dosing per A). Primary endpoints: safety (A, B), including serum lipase and amylase, and pharmacokinetics (A). Secondary/tertiary endpoints (B): pharmacokinetics, changes in sweat chloride (SwCl), growth, faecal elastase-1 (FE-1) and serum immunoreactive trypsinogen (IRT).

Results Twelve infants, six each in A (mean [SD] age, 4.2 [0.98] months) and B (4.5 [0.55] months), received ivacaftor. Pharmacokinetics was consistent with older groups; most AEs were mild/moderate. Most common AE in B was cough (n=3; 50%). Two infants had SAEs (A: thrombocytopenia [suspected causal agent: omeprazole]; B: bronchiolitis), both assessed as not/unlikely related to ivacaftor. No deaths or AEs leading to treatment interruption/discontinuation occurred. No notable transaminase elevations or clinically relevant findings in laboratory tests (except one thrombocytopenia), vital signs or electrocardiogram parameters were reported. Improvements were seen in SwCl and FE-1 (Table). Baseline elevations of serum IRT and lipase, although not amylase, improved. All growth parameters increased on average.

Conclusions This first CFTR modulation study in infants aged 4 to <6 months suggests ivacaftor can be dosed safely in infants; no notable liver function test elevations were observed. Substantial improvements in SwCl indicate improved CFTR function. Improvements in lipase, IRT and FE-1 demonstrate potential of ivacaftor to reduce pancreatic inflammation and obstruction and improve function. Findings are consistent with observations in children aged 6 to <12 and 12 to <24 months treated with ivacaftor supporting treating the underlying cause of CF in children aged ≥4 months. Further data will accrue during the extension 770–126 study (NCT03277196).

Please refer to page A239 for declarations of interest related to this abstract.

Abstract S63 Table 1 Changes in laboratory parameters from baseline to week 24

Parameter (reference range)	SwCl, mmol/L (<30)	FE-1, µg/g[a] (>200)	IRT, ng/mL[b] (NA)	Lipase, U/L (NA)	Amylase, U/L (NA)	Weight-for-age *z* score (NA)	Length-for-age *z* score (NA)	Weight-for-length-for-age *z* score (NA)
Baseline, mean (SD), n	97.4 (16.4), 6	184.0 (190.8), 5	1200.0 (0.0), 5	308.83 (168.28), 6	69.2 (30.3), 6	−0.65 (0.98), 6	−0.12 (1.71), 6	−0.66 (0.97), 6
Week 24, mean (SD), n	37.7 (2.9), 3	398.3 (117.5), 4	724.9 (438.2), 5	50.17 (32.98), 6	58.8 (27.4), 6	0.18 (0.97), 6	0.44 (1.59), 6	0.02 (0.53), 6
Absolute change, mean (SD), in infants with paired samples, n[c]	−50.0 (17.3), 3	181.0 (122.9), 4	−593.8 (402.5), 4	−258.67 (158.41), 6	−10.3 (37.2), 6	0.82 (0.54), 6	0.56 (0.86), 6	0.68 (1.12), 6

[a]Three infants had baseline FE-1 values ≤200 µg/g, of whom two had paired data at baseline and week 24 and two had concentrations >200 µg/g at week 24. Two infants had baseline FE-1 values >200 µg/g at baseline and remained >200 µg/g throughout the study. [b]The upper limit of quantification of the IRT assay is 1200.0 ng/mL. [c]Calculated from the group with data available at both time points

FE-1, faecal elastase-1; IRT, serum immunoreactive trypsinogen; SwCl, sweat chloride

S64 REAL-WORLD OUTCOMES IN CHILDREN AGED 2–5 YEARS WITH CYSTIC FIBROSIS TREATED WITH IVACAFTOR

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10.1136/thorax-2020-BTSabstracts.69

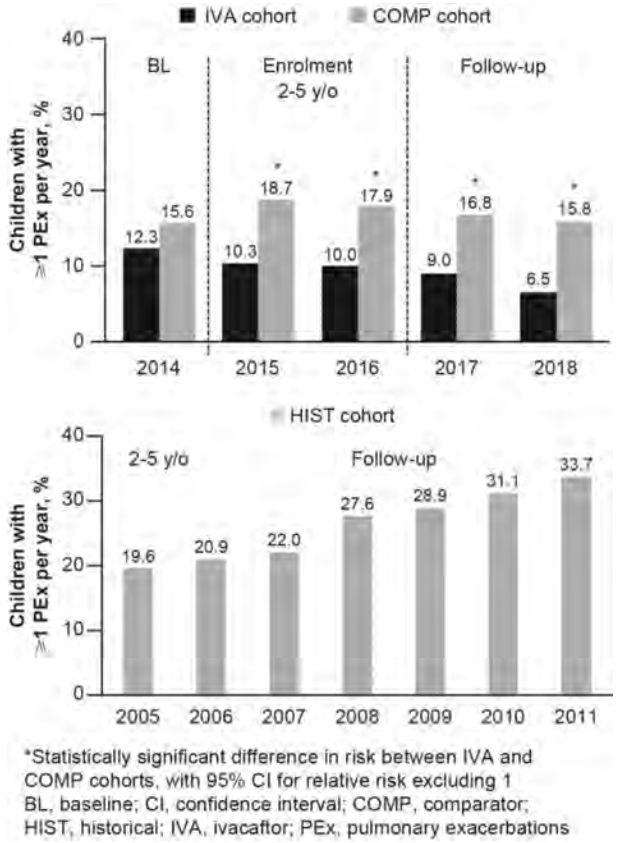
Introduction and Objectives Ivacaftor, a CFTR potentiator, was shown as safe and beneficial over 24 weeks in young children with CF and a gating mutation (Davies JC, *et al. Lancet Respir Med*. 2016;4:107–15). This prespecified interim analysis of an ongoing observational study evaluates long-term effectiveness of ivacaftor in children aged 2–5 years with gating mutations vs concurrent comparator (COMP) and historical (HIST) cohorts untreated with CFTR modulators.

Methods US CF Foundation Patient Registry and UK CF Registry data were analysed; enrolment periods: 18 March 2015 to 31 December 2016 (US); 1 January to 31 December 2017 (UK). Two matched cohorts were established per registry: ivacaftor cohort, including children aged 2–5 years with a gating *CFTR* mutation at ivacaftor initiation; COMP cohort, including children homozygous for *F508del-CFTR* who were CFTR modulator therapy-naïve and matched up to 5:1 to the ivacaftor cohort on age, sex and BMI *z* score. Cohorts are being followed up to evaluate and compare patterns in key outcomes, including pulmonary exacerbations (PEx), hospitalisations, nutritional parameters and *Pseudomonas aeruginosa* prevalence, among others. Interim analyses based on follow-up through December 2018 are presented; final analysis will include data through December 2022. Given the COMP cohort attrition over time due to *CFTR* modulator therapy initiation, HIST cohorts, including CFTR modulator-naïve children aged 2–5 years with gating mutations (2005 [US] or 2008 [UK]), provide important additional context.

Results US ivacaftor, COMP and HIST cohorts included 150, 728 and 112 children; UK cohorts included 52, 236 and 36 children, respectively. In the US, ivacaftor-treated children (mean exposure, 38.4 months) had significantly lower annual risk of PEx than the COMP cohort; trends were also favourable vs the HIST cohort (figure 1). Similarly, favourable trends were observed in patterns of hospitalisations (PEx and other reasons), nutritional parameters and *P. aeruginosa* prevalence. UK cohort findings (mean ivacaftor exposure, 20.6 months) were generally consistent with US data. No new safety concerns were identified (no discernible trends in transaminase elevations; no deaths or transplants [ivacaftor cohorts]).

Conclusions Interim results show favourable trends across multiple clinical outcomes, supporting the effectiveness of ivacaftor in children aged 2–5 years at initiation.

Please refer to page A239 for declarations of interest related to this abstract.



Abstract S64 Figure 1 Risk of pulmonary exacerbations, US cohorts (US CF Foundation Patient Registry)

S65 IMPACT OF ELEXACAFTOR/TEZACAFTOR/IVACAFTOR TRIPLE COMBINATION THERAPY ON HEALTH-RELATED QUALITY OF LIFE IN PEOPLE WITH CYSTIC FIBROSIS HETEROZYGOUS FOR F508DEL AND A MINIMAL FUNCTION MUTATION (F/MF): RESULTS FROM A PHASE 3 CLINICAL STUDY

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10.1136/thorax-2020-BTSabstracts.70

Introduction and Objectives Efficacy and safety of elexacaftor/tezacaftor/ivacaftor (ELX/TEZ/IVA), a novel CFTR modulator therapy, were evaluated in a Phase 3, randomised, double-blind, placebo-controlled study (NCT03525444) in people with cystic fibrosis aged ≥12 years with *F*/MF genotypes; people with cystic fibrosis were randomised 1:1 to receive ELX/TEZ/IVA or placebo for 24 weeks. Primary and secondary outcomes, including marked improvement in clinical outcomes and Cystic Fibrosis Questionnaire–Revised (CFQ-R) respiratory domain scores, were reported previously. The aim of this analysis is to report the effects of ELX/TEZ/IVA on 11 other CFQ-R domains.

Abstract S65 Table 1 Absolute change from baseline in CFQ-R non-respiratory domain scores:* ELX/TEZ/IVA vs PBO

CFQ-R domain	Mean difference vs PBO (95% CI) through 24 weeks, points	CFQ-R domain	Mean difference vs PBO (95% CI) through 24 weeks, points
Physical functioning	**12.5 (9.9, 15.0)**	Health perceptions	**17.0 (14.1, 20.0)**
Vitality	**13.1 (10.5, 15.8)**	Weight	**13.1 (8.3, 17.9)**
Emotional functioning	**3.4 (1.5, 5.2)**	Digestion	2.5 (−0.1, 5.1)
Body image	**3.8 (1.2, 6.5)**	Role functioning	**6.8 (4.6, 9.1)**
Eating problems	**4.9 (2.6, 7.1)**	Social functioning	**5.9 (3.7, 8.0)**
Treatment burden	**6.8 (4.5, 9.2)**		

*Analyses with *P* values <0.05 are bolded; these *P* values are considered nominal because analyses for CFQ-R non-respiratory domains were not controlled for multiplicity
CFQ-R, Cystic Fibrosis Questionnaire–Revised; CI, confidence interval; ELX/TEZ/IVA, elexacaftor/tezacaftor/ivacaftor; PBO, placebo

Methods The CFQ-R, a validated health-related quality of life instrument, was administered at study visits in the Phase 3 trial. Absolute change from baseline in CFQ-R respiratory domain score was a prespecified secondary endpoint; other domains were prespecified other endpoints. A mixed-effects model for repeated measures was used to calculate the change from baseline in CFQ-R domain scores vs placebo. Although a minimal clinically important difference has not been determined for non-respiratory domain scores, score increases signify improvement.
Results 403 people with cystic fibrosis were randomised and dosed in the study. Improvements with ELX/TEZ/IVA over placebo were observed in all non-respiratory domain scores except digestion (Table), including vitality, physical functioning and health perceptions.
Conclusions ELX/TEZ/IVA improved multiple aspects of health-related quality of life in people with cystic fibrosis with *F*/MF genotypes, illustrating broad benefits of treatment beyond previously reported respiratory and other clinical improvements.

Please refer to page A239 for declarations of interest related to this abstract.

S66 IMPACT OF ELEXACAFTOR/TEZACAFTOR/IVACAFTOR TRIPLE COMBINATION THERAPY ON HEALTH-RELATED QUALITY OF LIFE IN PEOPLE WITH CYSTIC FIBROSIS HOMOZYGOUS FOR F508DEL (F/F): RESULTS FROM A PHASE 3 CLINICAL STUDY

[1]C Majoor, [2]K Van Brunt, [3]C Daines, [4]I Durieu, [5]I Fajac, [6]J Goralski, [7]H Heijerman, [8]C Knoop, [2]J Booth, [2]SM Moskowitz, [2]J Savage, [2]C Wang, [9]A Quittner. *[1]Department of Respiratory Medicine, Amsterdam University Medical Centers, University of Amsterdam, Amsterdam, Netherlands; [2]Vertex Pharmaceuticals Incorporated, Boston, USA; [3]University of Arizona, Banner University Medical Center, Tucson, USA; [4]Hospices Civils de Lyon, Adult Cystic Fibrosis Centre, Université de Lyon, Lyon, France; [5]AP-HP. Centre – Université de Paris, Paris, France; [6]Division of Pulmonary and Critical Care Medicine, University of North Carolina, Chapel Hill, USA; [7]University Medical Center Utrecht, Utrecht, Netherlands; [8]Department of Chest Medicine, Hôpital Erasme, Brussels, Belgium; [9]Nicklaus Children's Research Institute, Nicklaus Children's Hospital, Miami, USA*

10.1136/thorax-2020-BTSabstracts.71

Introduction and Objectives Efficacy and safety of elexacaftor/tezacaftor/ivacaftor (ELX/TEZ/IVA), a novel CFTR modulator therapy, were evaluated in a Phase 3, randomised, double-blind, active-control study (NCT03525548) in people with cystic fibrosis aged ≥12 years with *F*/*F* genotypes; people with cystic fibrosis were randomised 1:1 to receive ELX/TEZ/IVA or TEZ/IVA for 4 weeks, after a 4-week TEZ/IVA run-in. Primary and secondary outcomes, including marked improvement in clinical outcomes and Cystic Fibrosis Questionnaire–Revised (CFQ-R) respiratory domain scores, were reported previously. The aim of this analysis is to report the effects of ELX/TEZ/IVA vs TEZ/IVA on 11 other CFQ-R domains.
Methods The CFQ-R, a validated health-related quality of life instrument, was administered at study visits in the Phase 3 trial. Absolute change from baseline in CFQ-R respiratory domain score was a prespecified secondary endpoint; other domains were prespecified other endpoints. A mixed-effects model for repeated measures was used to calculate the change from baseline in CFQ-R domain scores vs TEZ/IVA. Minimal clinically important differences have not been determined for non-respiratory domains; score increases signify improvement.
Results 107 people with cystic fibrosis were randomised and dosed in the treatment period. Improvements with ELX/TEZ/IVA over TEZ/IVA were seen in 7 of the 11 non-respiratory domain scores (Table), including vitality, physical functioning and health perceptions.
Conclusions ELX/TEZ/IVA improved multiple aspects of health-related quality of life in people with cystic fibrosis

Abstract S66 Table 1 Absolute change from baseline in CFQ-R non-respiratory domain scores:* ELX/TEZ/IVA vs TEZ/IVA

CFQ-R domain	Mean difference vs TEZ/IVA (95% CI) at 4 weeks, points	CFQ-R domain	Mean difference vs TEZ/IVA (95% CI) at 4 weeks, points
Physical functioning	**11.8 (6.5, 17.0)**	Health perceptions	**9.5 (3.6, 15.4)**
Vitality	**12.5 (6.0, 19.0)**	Weight	**12.5 (4.1, 20.9)**
Emotional functioning	1.8 (−1.4, 5.1)	Digestion	0.9 (−5.1, 6.9)
Body image	2.4 (−1.7, 6.6)	Role functioning	**6.0 (1.1, 10.9)**
Eating problems	**6.8 (1.3, 12.4)**	Social functioning	**5.4 (1.2, 9.6)**
Treatment burden	3.4 (−2.0, 8.7)		

*Analyses with *P* values <0.05 are bolded; these *P* values are considered nominal because analyses for CFQ-R non-respiratory domains were not controlled for multiplicity
CFQ-R, Cystic Fibrosis Questionnaire–Revised; CI, confidence interval; ELX/TEZ/IVA, elexacaftor/tezacaftor/ivacaftor; TEZ/IVA, tezacaftor/ivacaftor

with *F/F* genotypes over TEZ/IVA, illustrating broad benefits of treatment beyond previously reported clinical improvements.

Please refer to page A239 for declarations of interest related to this abstract.

S67 LOW LEVELS OF LENTIVIRUS-MEDIATED CFTR GENE TRANSFER ARE SUFFICIENT TO GENERATE ION TRANSPORT CORRECTION IN AIR-LIQUID INTERFACE CULTURES FROM CYSTIC FIBROSIS PATIENTS

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10.1136/thorax-2020-BTSabstracts.72

Introduction We have developed a lentiviral vector pseudotyped with the F and HN proteins from Sendai virus (rSIV.F/HN) for cystic fibrosis (CF) gene therapy and are now progressing towards a first-in-man clinical trial. Here we assessed the transduction efficiency of rSIV.F/HN expressing EGFP in human bronchial epithelial cells from healthy control (HC) and CF donors grown in air-liquid interface culture (ALI). We also assessed the degree of correction of ion transport by rSIV.F/HN-CFTR in this model.

Methods Fully differentiated ALIs (MucilAir, Epithelix) were transduced with rSIV.F/HN-EGFP or Sendai virus (SeV)-GFP and GFP expression was quantified at multiple time points using fluorescence microscopy or flow cytometry. The ion transport in HC, CF, and CF ALIs transduced with rSIV.F/HN-CFTR was measured at 7 days in Ussing chambers (stepwise protocol: chloride buffer as baseline, 100 μM amiloride, 100 μM DIDS, low chloride, 10 μM forskolin/100 μM IBMX, 30 μM ΔCFTR inhibitor-172).

Results Transduction efficiency was generally <1% of cells (% GFP area: 0.46±0.05%, Flow cytometry: 0.60±0.14%, n=9/group). There was no difference in transduction efficiency between HC and CF ALIs. Sendai virus, which transduces lung epithelium with high efficiency *in vivo* also only produced low level transduction in these cultures (HC: 2.2 ±1.1%, CF: 0.72±0.13%, n=6/group).

In Ussing chambers, there was no difference in baseline short circuit current between HC and CF ALIs, while forskolin/IBMX-mediated chloride secretion was significantly higher in HC samples compared to CF (HC: 8.9±1.4 μA/cm^2, CF: 1.16±0.33 μA/cm^2, n=14–17/group).

We then assessed whether transduction of CF ALIs with rSIV.F/HN-CFTR was able to correct the chloride transport defect. Chloride transport increased significantly ($p<0.05$) in transduced CF ALIs compared to CF controls (CF-CFTR: 3.8±0.7 μA/cm^2, CF: 1.16±0.3 μA/cm^2, n=14–19/group). Corrected CF ALI cultures achieved ~40% of the HC response (CF-CFTR: 3.8±0.73 μA/cm^2, HC: 8.9±1.4 μA/cm^2).

Conclusion These data suggest that *ex vivo* transduction efficiency of differentiated human ALIs is low and may not reflect the *in vivo* performance of gene transfer agents. However, even at this low transduction efficiency, functional correction of ~40% of chloride transport was achieved in CF patient-derived ALI cultures following transduction with rSIV.F/HN-CFTR.

S68 TOWARDS A FIRST-IN-HUMAN TRIAL WITH A PSEUDOTYPED LENTIVIRUS

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10.1136/thorax-2020-BTSabstracts.73

The UK CF Gene Therapy Consortium has previously demonstrated that repeated delivery of a CFTR-liposome (GL67A) complex can stabilise lung function in a double-blind placebo-controlled Phase 2b trial. However, the magnitude of benefit did not warrant continued progression in the context of the welcome benefit provided by small molecule modulators. We have, in parallel, developed a Simian Immunodeficiency Virus (SIV)-based lentiviral vector pseudotyped with the Sendai-virus envelope glycoproteins (F/HN). In preclinical studies we have shown that:

- This is considerably more effective at transducing the respiratory epithelium than the clinically benchmarked non–viral GL67A formulation. Specifically, we observe >15% of target cells transduced in vivo in multiple species
- This transduction is maintained after three repeated applications
- Expression is maintained for up to the lifetime of a mouse from a single application
- We see no evidence for acute toxicity in comparison to GL67A, nor integration site hotspots or clonal expansion

To prepare for a first-in-human clinical trial, we have partnered this product with Boehringer Ingelheim and Oxford BioMedica and are moving rapidly through the preparatory steps including:

- Developing manufacturing at scale sufficient to support a combined nasal and pulmonary Phase 1/2a study
- Establishing toxicology protocols suitable for both murine and higher species studies
- Assessing extra-pulmonary biodistribution and shedding potential
- Developing single cell transduction assays that can be used in both preclinical studies and the clinical trial
- Focusing on the initial trial population which will predominantly be recruited from the ~15% of people with CF with unmet need

The above data will be discussed in the context of delivering a gene therapy trial against a background of people with CF, increasingly treated with small molecule modulators.

An update in lung cancer patient stratification: from screening to pre-treatment assessments

S69 LUNG CANCER SCREENING – CUMULATIVE RESULTS FROM FIVE UK-BASED PROGRAMMES

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10.1136/thorax-2020-BTSabstracts.74

Introduction Lung cancer remains the leading cause of cancer related death globally. Low-dose CT (LDCT) screening of high-risk individuals reduces lung cancer specific mortality. An important requirement for any screening programme is to minimise harms, especially in those who do not have cancer. Data from randomised controlled trials is often used as the primary source from which to extrapolate risks of harm but they do not reflect modern, real-world practice. In this paper we present cumulative data on screening harms from five UK-based lung cancer screening programmes.

Methods In the UK, several implementation pilots and research studies have demonstrated that screening can be successfully delivered within or aligned to the NHS. These include: UK Lung Cancer Screening Trial (UKLS), Lung Screen Uptake Trial, Manchester Lung Health Checks, Liverpool Healthy Lung Project and Nottingham Lung Health MOT. Most sites used BTS nodule management guidelines. Positive results were defined as those referred for more than a repeat LDCT. False positives were those positive screens without an eventual diagnosis of lung cancer. Harms were categorised according to the need for further imaging, invasive investigations and/or surgery. Complications were categorised as per the National Lung Screening Trial (NLST).

Abstract S69 Table 1 Details of cumulative reported harms

Reported screening related harm		Total% (n)	Per 1000 screening scans
False positive rate	As a proportion of all LDCT scans	1.9% (219)	17
	As a proportion of all positive scans (i.e. false discovery rate)	46.7% (219)	-
Invasive investigation* for benign disease (excluding surgery)		0.5% (61)	5
Surgical resection for benign disease	As a proportion of all surgeries	4.6% (8)	1
	As a proportion of all LDCT scans	0.07% (8)	-
Major complication+ from invasive investigation/ treatment for benign disease		0% (0)	0
Deaths from invasive investigation/treatment for benign disease		0% (0)	0

*image guide biopsies or bronchoscopic procedures; +as defined by NLST

Results A total of 11,815 screening LDCTs were performed across the five programmes (2016–2020). Overall, 85.5% of screening scans were categorised as negative, 10.5% as indeterminate and 4% as positive. Lung cancer detection was 2.1%, ranging from 1.7% to 4.4% across sites. The surgical resection rate was 66.0%. Details of the cumulative reported harms are summarised in **table 1**.

Discussion This collaborative work provides up-to-date data on lung cancer screening performance and harms. The rate of positive (4%) and false positive (1.9%) screening results were significantly lower than NLST and the majority of European screening trials. Harms from investigation and treatment of non-malignant disease was minimised with no reported major complications or deaths. This provides reassurance that with the use of evidence-based practice and experienced MDTs, harms from false positive results can be minimised within screening. This information is important in the planning of larger scale implementation of lung cancer screening within the UK and beyond.

S70 THE WAKEFIELD LUNG HEALTH CHECK PILOT: BASELINE LUNG CANCER RELATED OUTCOMES

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10.1136/thorax-2020-BTSabstracts.75

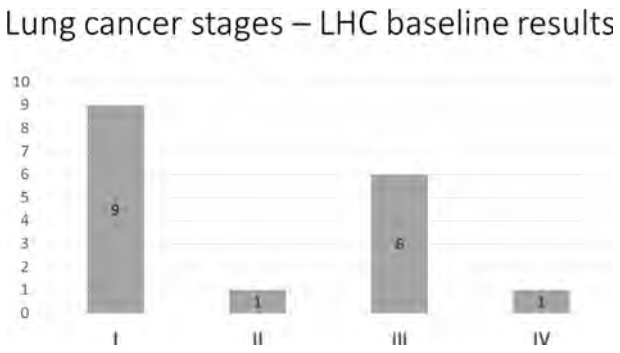
Introduction Lung cancer typically presents at an advanced stage when it is associated with poor survival. Screening asymptomatic patients at high risk of lung cancer has been shown to reduce lung cancer mortality. In partnership with the West Yorkshire and Harrogate Cancer Alliance we conducted a community based targeted lung health check (LHC) pilot programme in Wakefield. Here we report our baseline cancer related outcomes.

Methods Ever smokers aged 55 to 75 registered at three large GP practices in deprived areas in Wakefield were invited to a community based LHC. They were assessed for symptoms and offered spirometry and smoking cessation. Lung cancer risk was assessed using the $PLCO_{m2012}$ tool. Those patients whose risk was $\geq$ 1.51% were offered a low dose CT (LDCT) on a mobile scanning unit within the local community. CT scan reports indicating possible lung cancer were referred directly to the diagnostic lung cancer MDT and the fast track clinic.

Results Of the eligible population, 1990 patients underwent a LHC and 697 proceeded to LDCT. 17 (2.4%) were diagnosed with lung cancer. 10 (58.8%) of cancers were diagnosed at stage I and II. Stage distribution is shown in figure 1.

Adenocarcinoma was the most common histological subtype in 6 (35.2%) patients. Other histology included; squamous cell carcinoma 3 (17.6%), small cell 2 (11.6%), carcinoid 2 (11.6%) and 1 (5.8%) mucoepidermoid carcinoma. In 3 (17.6%) the diagnosis of lung cancer was made on radiological grounds by the MDT.

Radical intent treatment was delivered to 15 (88.2%) of the 17 cancers. Modalities included; surgery 9 (52.9%), radical radiotherapy 3 (17.6%), chemoradiotherapy 2 (11.7%) and SABR 1 (5.8%). Two patients received best supportive care including palliative care.



Abstract S70 Figure 1

183 (26.2%) patients had indeterminate scans with pulmonary nodules requiring surveillance.

Conclusion Community based Targeted LHC is an effective way of diagnosing lung cancer at an earlier stage. This leads to more patients receiving curative intent treatment and potentially improves outcomes. Whilst we are not able to demonstrate a survival advantage in this small group, the trends are encouraging in indicating a shift towards early diagnosis.

S71 THE PREVALENCE OF ADDITIONAL FINDINGS IN A COMMUNITY BASED LUNG HEALTH CHECK PILOT

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10.1136/thorax-2020-BTSabstracts.76

Introduction The Targeted Lung Health Check Programme is being rolled out nationally with the primary aim of detecting early stage lung cancer in high risk individuals using low dose CT (LDCT). These scans can also detect other pulmonary or extra-pulmonary findings, which could potentially require further management or specialist referral. We aim to identify the prevalence of these additional findings in a community based Lung Health Check Pilot.

Methods Ever smokers between the ages of 55 and 75 were invited for a lung health check including a risk assessment for lung cancer using a standardised tool. If they were considered to be at high risk of lung cancer, they were invited for a LDCT. Significant other findings requiring further review and action were highlighted by radiologists using a coding system. Potential lung cancer and pulmonary nodules were excluded from this analysis.

CT scan reports of all patients who underwent a LDCT as part of the pilot were reviewed. We identified all additional pulmonary and extra-pulmonary findings described, irrespective of whether further action was recommended or not. The proportion of additional findings coded as significant by radiology was documented.

Results Out of the total 697 patients, 440 (63.1%) had additional findings documented on their LDCT reports. 53.8% of patients had pulmonary findings, the majority of which were emphysema (40.3% of all patients). Inflammatory changes/atelectasis (11.3%) was the next most common finding.

Extra-pulmonary findings were documented in 135 patients (19.4%). Adrenal abnormalities (5.5% of all patients) were the most common followed by musculoskeletal abnormalities (3.6%), which included osteoporosis and bone lesions.

Out of the 440 patients with other (pulmonary or extra-pulmonary) findings, 163 (37.0%) were highlighted according to the radiology reporting protocol as significant findings requiring further assessment or intervention.

Abstract S71 Table 1

Problem	Number of patients	% of all patients
Pulmonary	**375**	**53.8%**
Emphysema	281	40.3%
Inflammatory changes/atelectasis	79	11.3%
Bronchiectasis	60	8.6%
ILD/fibrosis	26	3.7%
Other	18	2.6%
Extra-pulmonary	**135**	**19.4%**
Adrenal	38	5.5%
MSK	25	3.6%
Thyroid	17	2.4%
Cardiac	17	2.4%
Kidney	16	2.3%
Breast	13	1.9%
Other	27	3.9%

Conclusions The Lung Health Check programme provides a good opportunity for identifying other significant pulmonary and extra-pulmonary findings in this patient group, which may not have otherwise come to light. The influence of this on clinical services needs to be further evaluated as there will be an impact on resources.

S72 IS THERE MERIT IN CT SURVEILLANCE OF NON-DISCRETE INFLAMMATORY CHANGE SEEN ON CT THORAX?

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10.1136/thorax-2020-BTSabstracts.77

Introduction Lung nodules are a common incidental finding on CT imaging, with many nodules requiring surveillance. CT surveillance is sometimes also recommended for CT changes that do not represent discrete nodules, including consolidation and inflammatory changes that may not be visible on chest x-ray. We aim to assess the outcomes of our CT surveillance programme.

Methods We reviewed all patients under surveillance through our virtual 'nodule' clinic at any time between April 2015 and November 2018. The index CT report that recommended surveillance was reviewed and coded according to whether this described (1) the presence any discrete pulmonary nodule; and (2) the presence of presumed benign inflammatory change. We identified subsequent lung cancer diagnoses from collected for the National Lung Cancer Audit submissions.

Results 1249 patients were identified, with index CT scans from May 2010 to September 2018. Rates of lung cancer diagnosis in each group are shown in table 1.

98 patients had surveillance for reported inflammatory change in the absence of a discrete nodule, 3 (2.6%) of whom subsequently developed lung cancer. Index CT scans in these cases were reviewed by a consultant chest radiologist, who concluded:

Case 1) Reported 'peripheral consolidation' was visible on CXR.

Case 2) Reported 'nodular consolidation' represents as a discrete solid nodule.

Case 3) Reported 'ill-defined consolidation' represents a discrete part-solid nodule.

Abstract S72 Table 1 Rates of lung cancer according to coding of index CT scan

Inflammatory changes	Pulmonary nodule	Number	Lung cancer diagnosis within 1000 days
Yes	No	98	3 (3.1%)
No	Yes	899	64 (7.1%)
Yes	Yes	213	17 (8.0%)
No	No	39*	1 (2.6%)
All	All	1249	85 (6.8%)

*Predominantly lobar collapse (not suitable for bronchoscopy) and suspicious pleural changes.

Conclusion 6.8% of patients under surveillance in our virtual nodule clinic were diagnosed with lung cancer within 3 years. The incidence of lung cancer in patients under surveillance for inflammatory change without a true nodule is very low. Chest x-ray surveillance should be considered in these cases, where feasible.

S73 BRAIN IMAGING IN THE MANAGEMENT OF PEOPLE WITH LUNG CANCER PRIOR TO THERAPY WITH CURATIVE INTENT: MULTI-CENTRE REVIEW OF THE ASSUMPTIONS MADE IN THE NICE GUIDELINE NG122 EVIDENCE REVIEW

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10.1136/thorax-2020-BTSabstracts.78

Introduction In March 2019, NICE published a lung cancer update evidence review (NICE Guideline NG122) recommending brain imaging for those patients who have stage II or III non-small cell lung cancer prior to treatment with curative intent. We present a multi-centre retrospective review of real world data, looking at the prevalence of brain metastases in our lung cancer cohort. We review the impact on management and compare it with the assumptions made in the economic modelling from the NICE Guideline.

Methods Consecutive patients with clinical stage II and stage III lung cancer in the calendar year 2018 (01/01/2018 – 31/12/2018) from 11 acute trusts across the UK were retrospectively reviewed. Patients who had brain imaging as part of their investigations pre-treatment were reviewed to see the impact on radical management. Data was collected on those

Abstract S73 Table 1 Comparison of outcomes from multi-centre data (MCD) versus NICE guideline economic modelling assumptions

	Stage II			
	1–3 mets MCD (n=1)	1–3 mets NICE	≥4 mets MCD (n=0)	≥4 mets NICE
Overall Cancer treatment				
% still having curative intent therapy	100%	75%	-	0%
% of curative intent treatments that are surgery	100%	20%	-	0%
% switching to palliative therapy	0%	25%	-	100%
Brain metastases treatment				
% treated with SRS for BMs	100%	75%	-	0%
% treated with brain resection	0%	10%	-	0%
% treated with WBRT	0%	10%	-	92.5%
	Stage III			
	1–3 mets MCD (n=10)	1–3 mets NICE	≥4 mets MCD (n=1)	≥4 mets NICE
Overall Cancer treatment				
% still having curative intent therapy	30%	0%	0%	0%
% of curative intent treatments that are surgery	0%	0%	0%	0%
% switching to palliative therapy	70%	100%	100%	100%
Brain metastases treatment				
% treated with SRS for BMs	60%	10%	0%	0%
% treated with brain resection	0%	0%	0%	0%
% treated with WBRT	30%	0%	100%	92.5%

who presented with brain metastases within 6 months of treatment, who had not previously undergone brain imaging. Patients who died within 6 months of treatment were excluded.

Results Data from 579 patients was analysed. Overall the prevalence of brain metastases was 5.5% (10/182) in stage II disease (Pre-treatment cohort 2% (1/51), post-treatment cohort 6.9% (9/131)) versus NICE model prevalence 9.5% (14/161). The prevalence was 6.3% (25/397) in stage III disease (Pre-treatment cohort 4.8% (11/227), post-treatment cohort 8.2% (14/170)) versus NICE model prevalence 9.3% (11/123). Table 1 compares outcomes for the pre-imaged cohort to the data from NG122.

Discussion Our large data set from 11 Trusts across the UK demonstrates the prevalence of brain metastases in stage II and III lung cancer is lower than that used in the economic modelling from NICE. We show that 30% of stage III patients who have brain metastases on pre-treatment imaging continue to undergo radical lung cancer treatment (NICE assumption 0%). A much higher percentage of stage III patients undergo brain specific treatments than was assumed in NICE economic model, even when treatment intent is changed to palliative. This data strengthens the argument to consider re-examining the economic analysis with real-world data.

S74 'SETTING THE STAGE' – CAN WE IMPROVE PATIENT SELECTION FOR PRE-OPERATIVE MEDIASTINAL STAGING WITH EBUS TBNA IN SUSPECTED NSCLC WITHIN THE ERA OF COVID-19?

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Introduction Mediastinal staging for patients with resectable non-small cell lung cancer (NSCLC) is essential prior to surgery. However, given the COVID-19 pandemic, Endobronchial Ultrasound Guided Transbronchial Needle Aspiration (EBUS-TBNA) staging should only be performed for those with significant risk of radiologically occult metastases. The European Society of Thoracic Surgeons (ESTS) recommend pre-operative EBUS-TBNA staging if the tumour is centrally located, larger than 3 cm or associated with N1 disease on imaging.[1] No gold standard definition for a central tumour exists and most centres rely on expert opinion from a Radiologist.[2]

We aim to establish the prevalence of occult N2/3 disease amongst NSCLC patients in a London Hospital, who meet ESTS criteria for EBUS-TBNA,[1] and whether this is influenced by the method used for defining tumour location.

Methods Data was retrospectively collected from patients who underwent staging EBUS-TBNA (based on ESTS guidelines) between 2015–2019.[1] Patients referred for a central tumour and patients who were found to have occult N2/3 disease, had their CT-imaging reassessed by another Radiologist using two protocols adapted from previously published definitions.[2] Protocol 1 (P1) defined a central location as the inner third of the hemithorax. Protocol 2 (P2) used the inner two-thirds.

Results 86 patients underwent pre-operative EBUS-TBNA. Overall, 10 (11%) had occult N2/3 disease, with 4 (4.7%) found by EBUS-TBNA. No MDT-defined central tumours were amongst these. 7/10 cases were retrospectively associated with a P1- or P2-defined central tumour combined with another criteria (Table 1).

Abstract S74 Table 1

Tumour characteristics		Occult N2/3 identified by EBUS TBNA n (%)	Occult N2/3 at Surgery n (%)	Total n
Central location only	MDT	0	0	0
P1	0	0	0	
P2	0	0	0	
> 3 cm only		0	0	0
N1 disease only		1	3*	4
> 3 cm & Central (P2 only)		1	0	1
N1 & Central (P2 only)		0	1	1
N1 & > 3 cm & Central (P1 only)		0	0	0
N1 & > 3 cm & Central (P2 only)		1	2	3
N1 & > 3 cm & Central (P1 & P2)		1	0	1
Total, n		4	6	10

Tumour characteristics associated with cases of radiologically occult N2/3 disease - identified either by EBUS TBNA or by Surgery. MDT = Tumour considered to be in a central location according to the cancer Multidisciplinary Team, P1 = Central tumour identified using Protocol 1, P2 = Central tumour identified using Protocol 2. Asterix(*) denotes one case from this group which had no imaging available for review so P1 and P2 could not be used. The tumour was not considered central by the MDT

14 patients had tumours identified by the multidisciplinary team (MDT) as central. P1 identified 11 patients as having a central tumour and P2 identified 13.

Conclusions When excluding other factors (N1 disease or size), there were no cases of N2/3 disease associated with a central tumour, regardless of the definition used. Thus EBUS-TBNA may not be warranted these patients.

REFERENCES

1. Vilmann, P.et al. Combined endobronchial and esophageal endosonography for the diagnosis and staging of lung cancer: ESGE Guideline, in cooperation with the ERS and the European Society of Thoracic Surgery.*Endoscopy* **47**,545–559(2015).
2. Casal, R.F.et al. What Exactly Is a Centrally Located Lung Tumor? Results of an Online Survey. *Ann.Am.Thorac.Soc*.**14**,118–123(2017).

Basic science in ILD: what drives progression?

S75 HYPERPOLARISED 129-XENON MRI IN DIFFERENTIATING BETWEEN FIBROTIC AND INFLAMMATORY INTERSTITIAL LUNG DISEASE AND ASSESSING LONGITUDINAL CHANGE

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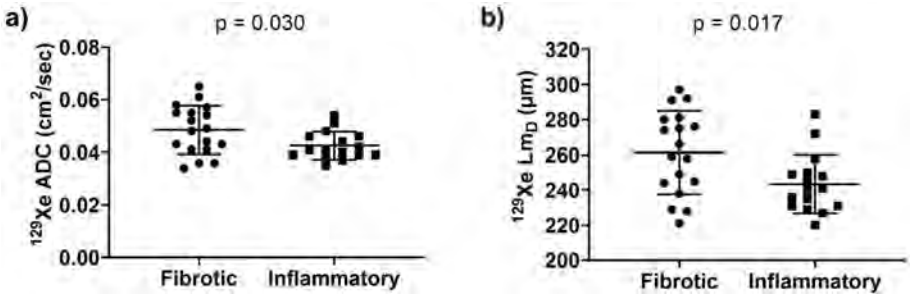
10.1136/thorax-2020-BTSabstracts.80



Abstract S75 Figure 1 Difference between the fibrotic and inflammatory groups in mean ^{129}Xe ADC (a) and Lm_D (b) at baseline study visit

Introduction and Objectives Apparent diffusion coefficient (ADC) and mean diffusive length scale (Lm_D) are diffusion-weighted (DW) MRI measurements of alveolar gas diffusion, providing novel lung microstructure information. Hyperpolarised 129-xenon (^{129}Xe) MR spectroscopy is a quantitative marker of gas exchange, using the ratio of uptake of ^{129}Xe in red blood cells to tissue/plasma (RBC:TP).

The objective was to evaluate hyperpolarised ^{129}Xe MRI in differentiating between fibrotic and inflammatory ILD and assessing longitudinal change.

Methods A prospective, multicentre study of ILD patients including connective tissue disease ILD (CTD-ILD), drug induced ILD (DI-ILD), hypersensitivity pneumonitis (HP), idiopathic non-specific interstitial pneumonia (iNSIP) and idiopathic pulmonary fibrosis (IPF). Hyperpolarised ^{129}Xe MRI was performed on a 1.5T scanner. Baseline HRCT scan was performed within a year prior to the MRI scan. Semi-quantitative visual CT analysis was performed by two consultant chest radiologists. In the non-IPF subtypes, a ground glass opacity score <2 and ≥ 2 was used to define fibrotic and inflammatory ILD respectively. All IPF subjects were classified as fibrotic.

Results To date, 34 patients (5 CTD-ILD, 9 DI-ILD, 7 HP, 2 iNSIP, 11 IPF) have complete MRI scan data for two separate visits (6 weeks apart for DI-ILD/HP/iNSIP and 6 months apart for CTD-ILD/IPF). There were 18 patients in the fibrotic group and 16 in the inflammatory group. At baseline visit there was no significant difference in mean RBC:TP between the fibrotic and inflammatory groups (0.17 vs 0.14; p=0.083), but a significant difference between the fibrotic and inflammatory groups in mean ADC (0.048 vs 0.043; p=0.030) (figure 1a) and mean Lm_D(261.3 vs 243.4; p=0.017) (figure 1b). In longitudinal change, there was a significant difference in mean RBC:TP between the fibrotic and inflammatory groups (-0.026 vs 0.0016; p=0.023), but no significant difference between the fibrotic and inflammatory groups in mean ADC (0.00089 vs -0.00025; p=0.25) and mean Lm_D (2.1 vs -0.19; p=0.39).

Conclusions ^{129}Xe DW-MRI could have a role in differentiating changes in the airway microstructure between fibrotic and inflammatory ILD. ^{129}Xe RBC:TP has sensitivity to longitudinal change with a decline in gas exchange observed in the fibrotic group but not in the inflammatory group.

S76 MENDELIAN RANDOMIZATION STUDY OF CIGARETTE SMOKING IN IDIOPATHIC PULMONARY FIBROSIS

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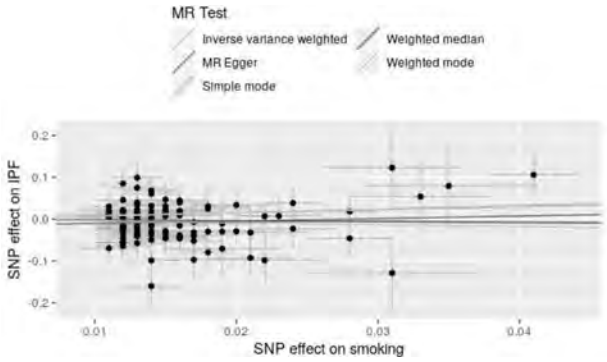
10.1136/thorax-2020-BTSabstracts.81

Introduction and Objectives A cigarette smoking – idiopathic pulmonary fibrosis (IPF) association has been observed in several case-control studies. However, it is not known whether smoking causes IPF or if the observed association arises as a result of confounding (for example many studies have used population controls and may be vulnerable to selection bias).

Mendelian randomization can offer an opportunity to investigate causality between cigarette smoking and IPF.

Methods Genetic instruments for lifetime smoking score[1] (taking into account smoking duration and heaviness) were obtained from a genome-wide association study (GWAS) performed in UK Biobank (462,690 individuals, European ancestry). We used variants that were significantly associated with smoking at $p<5 \times 10^{-8}$, which together explained 0.36% percent of variation in lifetime smoking. GWAS summary data for IPF were obtained from The Collaborative Group of genetic studies of IPF[2] (2,668 IPF cases and 8,591 controls, European ancestry). Analysis was performed using the TwoSampleMR package of R.

Results 118 variants were used as instruments. In the main analysis, the odds ratio per standard deviation increase in lifetime smoking score was 0.6 (95%CI 0.4–1, p=0.07). Similar results were obtained in statistical sensitivity analyses.



Abstract S76 Figure 1

Conclusions This Mendelian randomization analysis does not provide evidence to support the notion that smoking causes IPF. It may be that confounding is responsible for the association in observational studies. Clearly, there is a strong case for stopping smoking for other reasons.

REFERENCES

1. Wootton RE, Richmond RC, Stuijfzand BG, Lawn RB, Sallis HM, Taylor GM, Hemani G, Jones HJ, Zammit S, Smith GD, Munafò MR. Evidence for causal effects of lifetime smoking on risk for depression and schizophrenia: a Mendelian randomisation study. *Psychological Medicine* 2019 Nov **6**:1–9.

2. Allen RJ, Guillen-Guio B, Oldham JM, Ma SF, Dressen A, Paynton ML, Kraven LM, Obeidat ME, Li X, Ng M, Braybrooke R. Genome-wide association study of susceptibility to idiopathic pulmonary fibrosis. *American Journal of Respiratory and Critical Care Medicine* 2020 Mar 1;**201**(5):564–74.

S77 THE G PROTEINS GαQ/11 AND Gα12/13 DRIVE UNIQUE MYOFIBROBLAST FUNCTIONS TO PROMOTE PULMONARY FIBROSIS

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10.1136/thorax-2020-BTSabstracts.82

Introduction Idiopathic pulmonary fibrosis (IPF) is relentlessly progressive with a poor prognosis. In IPF, excessive scar tissue replaces normal lung parenchyma following alveolar injury. There is currently no treatment that can reverse fibrosis.

Myofibroblasts drive fibrosis through contraction and extracellular matrix (ECM) generation. Increasing ECM stiffness promotes fibroblast-to-myofibroblast differentiation, ECM production, and activation of the profibrotic cytokine transforming growth factor-β (TGFβ). However, the precise mechanisms that drive this feedback loop are uncertain.

Signalling by G protein coupled receptors (GPCRs) has been implicated in IPF. Messages from hundreds of GPCRs converges on four G_{α} subunit families, however the role of these molecules in myofibroblast activity in IPF is unknown.

Aim Understand the role of $G_{\alpha q/11}$ and $G_{\alpha 12/13}$ in profibrotic myofibroblast functions.

Methods Wild-type (WT), $Gnaq^{-/-}$;$Gna11^{-/-}$ ($G_{\alpha q/11}{}^{-/-}$), and $Gna12^{-/-}$;$Gna13^{-/-}$ ($G_{\alpha 12/13}{}^{-/-}$) murine embryonic fibroblasts (MEFs) and human lung fibroblasts (HLFs) were stimulated with lysophosphatidic acid (LPA, 50μM). TGFβ signalling was measured using Smad2 phosphorylation.

MEFs were cultured on gels of fibrotic (100kPa, 36kPa) and physiological (5kPa) stiffness. Myofibroblast differentiation was assessed using α smooth muscle actin (αSMA) expression.

MEFs and HLFs cultured on thin gels were stimulated with GPCR agonists (LPA 30μM, SFLLRN 20μM and TFLLRN 20μM), and time lapse images taken. Gel wrinkling was used to quantify contraction.

Results $G_{\alpha q/11}$ and $G_{\alpha 12/13}$ knockdown both reduced LPA-induced TGFβ signalling in MEFs and HLFs compared with controls ($p<0.05$, $n=4$). Rho-associated kinase (ROCK) inhibition reduced LPA-induced TGFβ signalling, suggesting that cellular contraction mediates LPA-induced TGFβ activation.

HLFs from IPF donors were more contractile than non-diseased HLFs (91 vs 42 wrinkles/image, $p=0.02$, $n=5$ per group). MEFs and HLFs lacking $G_{\alpha 12/13}$ had reduced baseline and GPCR agonist-induced contraction ($p<0.05$), and $G_{\alpha 12/13}{}^{-/-}$ MEFs had abnormal cytoskeletal appearances on immunofluorescence. $G_{\alpha q/11}$ knockdown did not affect contractility or cytoskeletal appearance.

$G_{\alpha q/11}{}^{-/-}$ MEFs had reduced αSMA expression when transferred to soft tissue culture conditions ($p<0.05$, $n=4$), whereas WT and $G_{\alpha 12/13}{}^{-/-}$ MEFs did not.

Conclusions Myofibroblast activity is enhanced in IPF. $G_{\alpha q/11}$ and $G_{\alpha 12/13}$ both mediate TGFβ signalling, but via different mechanisms, and they drive distinct myofibroblast profibrotic functions. A greater understanding of these processes could identify new treatments for IPF.

S78 A DISTINCT IMMUNE REGULATORY RECEPTOR PROFILE LINKED TO ALTERED MONOCYTE SUBSETS IN SARCOIDOSIS

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10.1136/thorax-2020-BTSabstracts.83

Introduction and Objectives In sarcoidosis, blood monocytes display enhanced inflammatory responses, reduced expression of the regulatory receptor CD200R, and altered subsets defined by CD14 and CD16. We investigated the relationship between sarcoidosis monocyte subsets and expression of CD200R and other regulatory receptors.

Methods We studied live monocytes from 25 treatment-naïve patients with pulmonary sarcoidosis and age-matched healthy controls.

Results Non-classical monocytes were expanded in sarcoidosis and exhibited significantly lower expression of CD200R, SIRP-α, and CD47 than classical or intermediate monocytes. All sarcoidosis monocyte subsets had significantly reduced CD200R and CD47 expression compared with healthy controls.

Conclusions We provide the first description of significantly reduced regulatory receptor expression on non-classical monocytes. Expansion of these non-classical monocytes in sarcoidosis, together with reduced levels of specific regulatory molecules (CD200R and CD47) on all sarcoidosis monocyte subsets compared with controls, will favour heightened inflammatory responses. This sarcoidosis monocyte phenotype could be assessed as a prognostic or therapeutic biomarker in future studies.

S79 PREVALENCE OF THE INDETERMINATE FOR UIP CT FEATURE AND POTENTIAL LINK BETWEEN MONOCYTE AND NEUTROPHIL LEVELS AND PROGRESSION TO IPF – A SINGLE CENTRE ANALYSIS

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10.1136/thorax-2020-BTSabstracts.84

Introduction Idiopathic pulmonary fibrosis (IPF) is a progressive fibrotic lung disease with poor prognosis. Identifying patients early may allow intervention which could limit progression. The 'indeterminate for UIP' (iUIP) CT pattern could be a precursor to IPF.

Aims To evaluate prevalence and progression of patients with 'iUIP' to a clinical diagnosis of IPF, and explore factors contributing to progression.

Methods We performed a retrospective analysis of an IPF cohort seen in the Oxford ILD Service between 2013–2017. We analysed all HRCTs performed for each patient up to August 2019. HRCT images were re-categorised according to the 2018 IPF guideline to identify those with iUIP CT pattern. These were categorised as 'non-progressors' or 'progressors' depending on whether there has been change in CT scan in terms of extent of disease or change in pattern of disease to 'definite' or 'probable' UIP pattern.Radiological features, lung function trends, haematological data and patient demographics were examined to explore potential contribution to progression using a univariate Cox proportional hazard model.

Results 230 individual patients with a clinical diagnosis of IPF were screened. 48 (21%) cases with iUIP pattern were identified. 32 patients had at least one follow-on CT scan. Of these evaluable cases, 23 (71%) demonstrated progression and 9 (29%) cases demonstrated no progression. Of the progressors; 26% (6 cases) demonstrated increase in extent of iUIP (over 3.1 ±0.8 yrs), 48% (11 cases) progressed to 'probable UIP' (over 3.8 ±1.6 yrs) and 26% progressed to 'definite UIP' (4.1 ±2.4 yrs). All those with 'definite' or 'probable UIP' were diagnosed as IPF by ILD MDT.

Using Cox regression, CT-contemporaneous monocyte count $>0.90 \times 10^3/\mu L$ [HR 3.9 (1.3–12), p=0.017] and neutrophils $>7.5 \times 10^3/\mu l$ [HR 43 (4.2–430), p=0.001] were significantly associated with progression to IPF. There was also trend towards male gender, lower baseline FVC and TLCO, presence of GGO on CT and ex-smoker status in the progressor group.

Conclusion 53% of evaluable iUIP patients progressed to a clinical diagnosis of IPF over 3.9 years (±1.9). Baseline monocyte ($>0.90 \times 10^3/\mu L$) and neutrophil ($>7.5 \times 10^3/\mu l$) counts were significantly associated with progression. These data provide a single-centre analysis of the evolution of patients with iUIP CT pattern, and first signal for potential factors associated with progression to IPF.

Genetic insights to respiratory health

S80 CYCLICAL MECHANICAL STRETCH REGULATES ALVEOLOGENESIS VIA MESENCHYMAL GαQ/11-MEDIATED TGFβ2 SIGNALLING

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10.1136/thorax-2020-BTSabstracts.85

Introduction Bronchopulmonary dysplasia (BPD) is characterised by arrested alveolarisation and lifelong lung function impairment. There are no treatments that can reactivate normal alveologenesis.

Alveolarisation involves tightly regulated signalling between several cell types. Pericytes are mesenchymal cells that drive many developmental processes, particularly by differentiating into myofibroblasts. Transforming growth factor-β (TGFβ) regulates cellular differentiation and is important in alveologenesis, but must be activated to exert any effects. Signalling by the G protein α subunit $G_{\alpha q/11}$ activates TGFβ in epithelial cells. However, the role of mesenchymal cell $G_{\alpha q/11}$ in TGFβ signalling and alveolarisation is unknown.

Aim Understand how mesenchymal $G_{\alpha q/11}$ influences TGFβ signalling in alveologenesis.

Methods Pdgfrb-Cre$^{\pm}$ and Gnaq$^{fl/fl}$;Gna11$^{-/-}$ mice were crossed, producing Pdgfrb-Cre$^{\pm}$;Gnaq$^{fl/fl}$;Gna11$^{-/-}$ offspring which lack $G_{\alpha q/11}$ in pericytes, fibroblasts, and myofibroblasts. Lungs were collected for histology.

Breathing-related cyclical mechanical stretch (CMS) was applied to wild-type (WT) and Gnaq$^{-/-}$;Gna11$^{-/-}$murine embryonic fibroblasts (MEFs), and human lung fibroblasts (HLFs) using Flexcell® apparatus. Integrin (αv and β1), ROCK (Y27632) and serine protease (AEBSF) inhibitors were used. TGFβ signalling was assessed by Smad2 phosphorylation. Gene expression was assessed using qPCR.

Results Pdgfrb-Cre$^{\pm}$;Gnaq$^{fl/fl}$;Gna11$^{-/-}$ lungs had a BPD-like appearance, with enlarged airspaces, thickened alveolar walls, and reduced cellular proliferation and secondary septation compared with controls ($p<0.05$). Pdgfrb-Cre$^{\pm}$;Gnaq$^{fl/fl}$;Gna11$^{-/-}$ lungs contained thickened peripheral pulmonary vessels, suggesting impaired pericyte migration.

Pdgfrb-Cre$^{\pm}$;Gnaq$^{fl/fl}$;Gna11$^{-/-}$ lungs contained less α-smooth muscle actin (αSMA), elastin and collagen than controls. Furthermore, Gnaq$^{-/-}$;Gna11$^{-/-}$ MEFs expressed less Acta2, Col1a1, Col3a1, and Eln mRNA compared with WT MEFs ($p<0.05$).

CMS-induced TGFβ signalling was reduced in MEFs and HLFs lacking $G_{\alpha q/11}$ ($p<0.05$), but was unaffected by ROCK and integrin inhibition. Serine protease inhibition reduced CMS-induced TGFβ signalling ($p<0.05$), implicating TGFβ2, which undergoes integrin-independent activation. Pdgfrb-Cre$^{\pm}$;Gnaq$^{fl/fl}$;Gna11$^{-/-}$ lungs contained less TGFβ2 than controls ($p<0.05$), and HLFs lacking $G_{\alpha q/11}$ expressed less TGFβ2 than controls ($p<0.05$).

Conclusion These data demonstrate a novel mechanism of breathing-related CMS-induced TGFβ2 activation. This $G_{\alpha q/11}$- and serine protease-dependent pathway controls essential processes in alveolarisation, including pericyte-to-myofibroblast differentiation, myofibroblast function, and pericyte migration. This is the first study to identify an isoform-specific role for TGFβ2 in alveologenesis. Further study of this pathway may identify novel therapeutic targets for BPD.

S81 CYCLICAL MECHANICAL STRETCHING OF PRECISION CUT LUNG SLICES TO MIMIC BREATHING RESULTS IN ACTIVATION OF TGFB

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10.1136/thorax-2020-BTSabstracts.86

The lungs are an inherently mechanical organ due to the cyclical nature of breathing. Cells and tissues respond to changes in force and/or their mechanical environment through mechanobiology. Transforming growth factor-b can be activated in response to changes in mechanical force in cells and tissues. The aims of this study were to adapt the commercially available Flexcell cell stretching system to impose cyclical stretch on precision cut lung slices (PCLS) for the first time to mimic breathing, and use the system to investigate whether tidal breathing causes TGFb activation.

PCLS from mouse and human lung tissue were adhered to the deformable membranes of BioFlex culture plates using cyanoacrylate glue at 4–5 points around the PCLS perimeter. 15% cyclical stretch was imposed using the Flexcell Cell Tension system at either 0.3Hz or 1Hz for human and mouse tissue respectively (reflecting differences in breathing rates between species). PCLS viability was determined using MTT and lactate dehydrogenase assays. TGFb activation was assessed using both a PSmad2 ELISA and a TGFb reporter cell assay. QPCR was utilised to measure changes in gene expression.

Viability of either mouse or human PCLS tissue (n=3 individual animals/donors) was not affected following adherence to the Bioflex membranes, nor following a 24-hour stretching regime. Cyclical mechanical stretching of both

human (n=3 donors) and mouse (n=3 animals) PCLS for 24 hours caused an increase in PSmad2 levels and luciferase activity in TGFb reporter cells, indicative of TGFb activation. Furthermore, stretching of human PCLS (n=4 donors) for 24 hours caused increased expression of *PAI1*, *COL3A1* and *FN1*. To investigate whether breathing-induced TGFb activation is altered in asthma we used PCLS prepared from mice subjected to a chronic ovalbumin model. 15% stretched caused a significant increase in PSmad2 in the saline treated group but not in the ovalbumin treated group, although the basal PSmad2 levels were higher in the unstretched PCLS controls.

We have demonstrated for the first time that the Flexcell stretching system can be used to stretch PCLS. We have used this breathing lung slice model to demonstrate that tidal breathing can cause TGFb activation in lung tissue.

S82 QUANTIFICATION OF MRNA AND PROTEIN FROM SINGLE CELLS FOR CYSTIC FIBROSIS GENE THERAPY

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10.1136/thorax-2020-BTSabstracts.87

Introduction and Objectives Gene therapy for cystic fibrosis is approaching clinical trials. Using a lentiviral vector pseudotyped with Sendai virus fusion and hemagglutinin-neuraminidase proteins, the cystic fibrosis transmembrane conductance regulator (*CFTR*) gene can be inserted into airway cells leading to the long-term production of functional CFTR protein in animal models. To evaluate the success of a therapy in the clinic, methods are needed that can accurately and sensitively quantify the number of cells transduced, measure RNA, and measure protein from limited human clinical trial samples. Here we develop RNAscope, reverse transcriptase droplet digital PCR (RT-ddPCR), and digital proximity ligation assay (dPLA) techniques that can be used to detect and quantify lentivirus RNA and Enhanced Green Fluorescent Protein (EGFP) from single cells of tissues transduced in vitro, ex vivo, and in vivo.

Methods HEK293T, A549, human air liquid interface cultures, mouse nasal brushings, mouse airway, and human nasal epithelial cells were transduced with lentivirus encoding EGFP and the woodchuck hepatitis post-transcriptional regulatory element (WPRE). Following transduction, cells were spun and fixed onto slides for RNAscope using a probe against WPRE. Alternatively, transduced cells were single-cell flow-sorted into 96-well plates. RNA and protein were measured from the same cell. For RNA quantification, one-step RT-ddPCR was performed with a probe against WPRE. For protein quantification, dPLA used oligonucleotide conjugated antibodies against GFP.

Results RNAscope successfully stained for WPRE in A549, mouse airway cells, and human nasal brushings. In mouse airways cells, RNAscope measured a median of 33.9% and 24.9% of WPRE+ cells 7 and 28 days after transduction, respectively. RT-ddPCR and dPLA successfully detected WPRE containing RNA and EGFP from all tissues analysed. In mouse nasal brushings, RT-ddPCR measured a median of 951.0 WPRE RNA copies/cell and dPLA measured a median of 9908 dPLA templates/cell 28 days after transduction. Additionally, EGFP protein levels significantly correlated to EGFP fluorescence levels measured during cell sorting (R^2 = 0.94, p < 0.0001).

Conclusions RNAScope, RT-ddPCR, and dPLA can successfully detect lentiviral RNA and EGFP from multiple tissue sources. These methods could prove useful for testing therapeutic vector transduction efficiency both in pre-clinical studies and clinical trials.

S83 GENETICALLY RAISED SERUM URATE AND LUNG CANCER: A COHORT STUDY AND MENDELIAN RANDOMISATION USING UK BIOBANK

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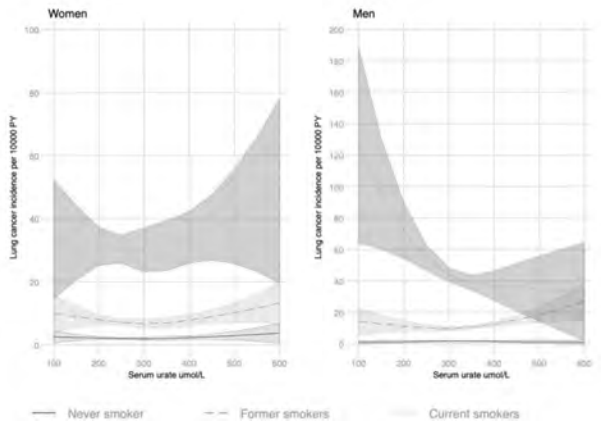
10.1136/thorax-2020-BTSabstracts.88

Background Serum urate is the most abundant small molecule with antioxidant properties found in blood and the epithelial lining fluid of the respiratory system. Moderately raised serum urate is associated with lower rates of lung cancer amongst smokers but is not known whether these relationships reflect antioxidant properties or residual confounding.

Objective Investigate the observational and causal relationships between serum urate and lung cancer incidence using one-sample Mendelian randomisation (MR) and UK Biobank.

Methods We instrumented serum urate level using variants that explain ~5% of population-level variability. Lung cancer events occurring after recruitment were identified from national cancer registries. Observational and genetically instrumented incidence rate ratios (IRRs) and risk differences per 10,000 person-years (PYs) by smoking status were estimated.

Results We included 376,771 participants and 2002 lung cancer events. The relationships between observed urate levels and lung cancer were generally U-shaped but varied by sex at birth with the strongest associations in current smoking men. After adjustment for confounding variables, current smoking men with low serum urate (100 μmol/L) had the highest lung cancer incidence at 125/10,000PY (95%CI: 56–170/10,000PY) compared with 45/10,000PY (95%CI: 38–47/10,000PY) for those with the median level (300 μmol/L). The associations



Abstract S83 Figure 1

were weaker for women. We found no strong evidence of a causal relationship between genetically predicted serum urate and lung cancer using MR.

Conclusion Although low serum urate levels might be useful for identifying male smokers at highest risk, we found no evidence that the purported antioxidant properties of urate can protect against lung cancer.

S84 MODIFICATION OF THE ASSOCIATION OF DIETARY PUFA WITH LUNG FUNCTION BY FADS GENE VARIANTS IN ADOLESCENTS: RESULTS FROM THE GINIPLUS AND LISA BIRTH COHORTS

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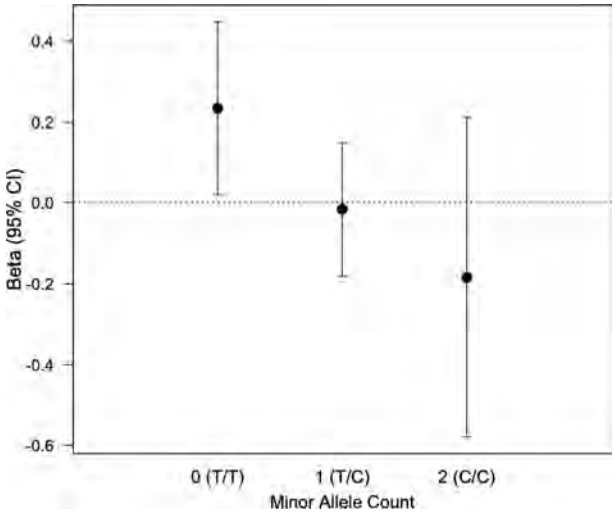
10.1136/thorax-2020-BTSabstracts.89

Background Lipid mediators derived from omega-6 and omega-3 polyunsaturated fatty acids (PUFA) contribute to the regulation of inflammatory processes in the lung. Adolescence represents an important stage of lung growth, and modifying the availability of PUFA through diet might hold potential for improved lung function. However, effects may depend on individual differences in PUFA metabolism. We assessed the association of rich sources of dietary PUFA with lung function in adolescents, and evaluated the modifying role of 17 single nucleotide polymorphisms (SNP) in the *FADS* gene cluster involved in PUFA metabolism.

Methods 1931 participants of the 15-year follow-up of the GINIplus and LISA birth cohort studies, with data on dietary intake (food-frequency questionnaire), spirometry, and genotyped SNPs of the *FADS* cluster, were included. Cross-sectional associations of rich dietary sources of omega-6 (margarine) and omega-3 (oily fish) PUFA with lung function z-scores (FVC and FEV1), were assessed by linear regression, adjusting for covariates (sex, age, height, BMI, parental education, asthma, daily calories). Genotypes were coded following an additive model (minor allele count: 0/1/2). Interactions between dietary PUFA and each SNP were independently tested. Following a significant interaction, analyses were additionally stratified by the relevant SNP genotype. Correction for multiple testing was performed according to Nyholt.

Results Mean GLI z-scores of FVC and FEV1 were -0.51 and -0.54, respectively. Margarine and oily fish each represented <1% of daily caloric intake. No significant cross-sectional associations were observed between these sources of PUFA and lung function. Although a single nominal effect was found for the interaction between oily fish and rs174449, with respect to FVC (see figure 1 for the association of oily fish and FVC stratified by genotype), it was no longer significant after correction for multiple testing.



Abstract S84 Figure 1 Oily fish intake and FVC z-score stratified by rs174449 genotype. Beta and 95% confidence interval for a 1% increase in contribution to daily calories from oily fish

Conclusion The intakes of margarine and oily fish (as rich sources of dietary PUFA), were not associated with lung function in this large, representative cohort of German adolescents. Our findings hint toward a possible role of genetic variability in modifying the effect of oily fish omega-3 PUFA on lung growth, but this remains to be confirmed in future studies e.g. addressing other common dietary PUFA sources.

TB: still playing the long game

S85 BEDAQUILINE RESISTANCE IN MYCOBACTERIUM TUBERCULOSIS PREDATES ITS CLINICAL USE

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10.1136/thorax-2020-BTSabstracts.90

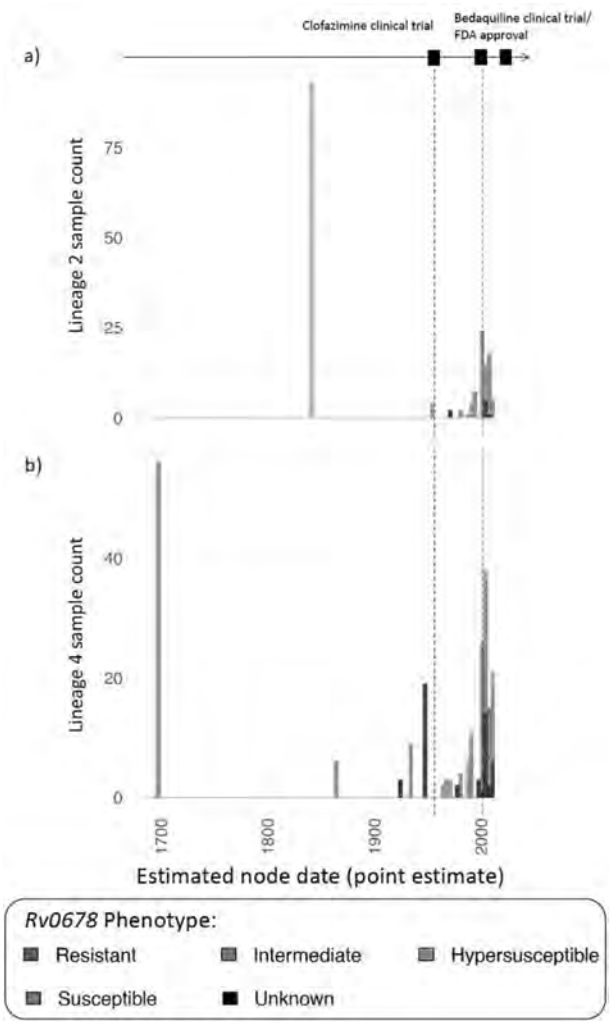
Background Bedaquiline has become a key drug for treatment of drug-resistant tuberculosis. Most clinical resistance is conferred by mutations in *Rv0678*, a negative repressor of the MmpL5 efflux pump, and confer clofazimine cross-resistance. Here, we estimate the date of emergence of several *Rv0678* variants in global *Mycobacterium tuberculosis* lineages.

Methods We constructed global whole genome sequence datasets of thousands of lineage 2 and 4 isolates using newly generated and publicly available data. We enriched these by screening public repositories for sequences containing all previously reported *Rv0678* variants. We built a whole genome maximum likelihood phylogenetic tree using RAxML-Ng and dated the nodes of this phylogeny using BEAST. The lineage 2 dataset contained 1514 sequences from isolates collected between 1994–2019. The lineage 4

dataset contained 2168 sequences including three from 18th century mummies.

Results We identified 483 non-synonymous and promoter variants in 439 sequences. 25 sequences were from isolates collected prior to bedaquiline clinical trials in 2007 and 21 of these contained bedaquiline resistance-associated variants. Most *Rv0678* mutations occurred in sequences carrying other resistance variants.

In lineage 2 we identify 58 unique emergences of resistance estimated to have occurred between 1988–2018 (figure 1), of which 40 were represented by a single genome. In lineage 4 we identify 85 unique emergences estimated to have occurred between 1701–2019 (figure 1), of which 59 were represented by a single genome. We also identified a clade of 65 samples carrying the Ile67fs variant that we estimated to have arisen in 1701 (1657–1732). This predates the first use of clofazimine or bedaquiline.



Abstract S85 Figure 1 Estimated age of emergence of *Rv0678* nonsynonymous variants.
Inferred point estimates for the dates of clades with *Rv0678* variants for the lineage 2 (a) and lineage 4 (b) datasets. Predicted *Rv0678* phenotype is given by the colour as defined in the legend at bottom.

Conclusions *Rv0678* mutations conferring bedaquiline/clofazimine resistance have been in circulation since before the antibiotic era, implying non-synonymous mutations in *Rv0678* have little fitness cost. This pre-existing reservoir of resistant strains is likely to expand with increasing bedaquiline and clofazimine use.

S86 PREDICTORS OF ADVERSE TREATMENT OUTCOMES AMONG PEOPLE WITH DRUG-RESISTANT TUBERCULOSIS IN SIERRA LEONE: A NATIONAL, RETROSPECTIVE COHORT STUDY

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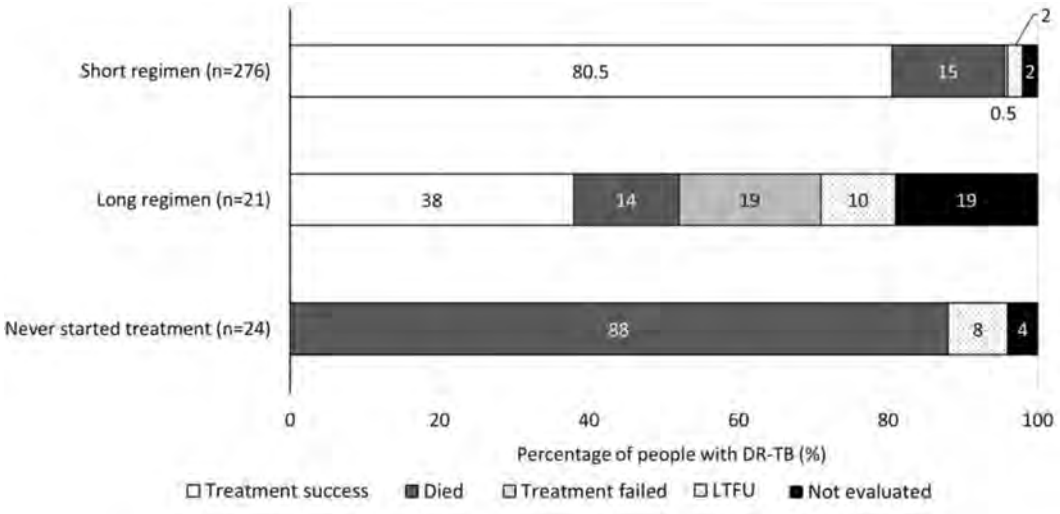
10.1136/thorax-2020-BTSabstracts.91

Background Drug-resistant tuberculosis (DR-TB) is a global public health emergency. In April 2017, the National Tuberculosis Programme (NTP) of Sierra Leone, a high TB burden country, began using WHO-approved second-line drugs in short and long DR-TB treatment regimens. We analysed treatment outcomes for people with DR-TB to inform future refinements in DR-TB healthcare provision.

Methods This national, retrospective cohort study recruited all people notified with DR-TB (rifampicin or multi-drug resistant) in Sierra Leone between April 2017 and September 2019 and followed-up to June 2020. We used NTP register data routinely collected at diagnosis to construct a multivariable logistic regression model of baseline sociodemographic and health characteristics associated with WHO-defined adverse treatment outcomes including death, loss to follow-up, treatment failure, or no evaluation.

Findings 365 people with DR-TB were notified and 331/365 (91%) started treatment. Median age was 35 years (IQR=26–45), 263/365 (72%) were male, 51/365 (14%) HIV-positive, 127/365 (35%) severely underweight (BMI<16.5), 12/365 (3.3%) had chronic renal disease, and 82/365 (22%) had chronic lung disease. 234/365 (64%) people had treatment success, 87/365 (24%) adverse outcome, and 44/365 (12%) were still on treatment. People receiving the short regimen had the highest success rates (figure 1). Of those who never started treatment, 21/24 (88%) died. Factors associated with adverse outcome *vs* treatment success were age 45–64 years (adjusted odds ratio [aOR]=2.8, 95%CI=1.3–6.1), severe underweight (aOR=4.1, 95%CI=1.8–9.6), chronic renal disease (aOR=5.6, 95%CI=1.4–22) and chronic lung disease (aOR=2.3, 95%CI=1.1–4.8).

Conclusions DR-TB treatment success rates in Sierra Leone were similar to global rates. People receiving short DR-TB regimens had the highest treatment success rates. Underweight, older age, advanced disease, and non-communicable comorbidities (NCDs) were associated with adverse DR-TB treatment outcomes. These findings suggest nutritional support, active case-finding, and linkage with NCD management should be evaluated as potential strategies to mitigate adverse DR-TB outcomes in Sierra Leone.



Abstract S86 Figure 1 TB treatment outcome of people with MDR-TB by treatment regimen (n=321)
People with TB who were still on treatment at the time of analysis (n=44) are excluded here. Treatment outcomes were defined according to World Health Organisation criteria and treatment regimens were defined by the Sierra Leone National TB Program. The short regimen is at least 9 months and consists of an intensive phase lasting a minimum of 4 months including kanamycin, Clofazimine, prothionamide, moxifloxacin, ethambutol, pyrazinamide, and high dose isoniazid; and a continuation phase lasting 5 months including moxifloxacin, clofazimine, pyrazinamide, and ethambutol. The long treatment regimen is at least 20 months and consists of: an intensive phase lasting 8 months including kanamycin, levofloxacin, cycloserine, prothionamide, pyrazinamide, isoniazid and 12 months of levofloxacin, cycloserine, and priothionamide. A minority of patients (n=4) switched from short to long regimens due to failure to culture convert or culture reversion during treatment and their outcomes are combined here with the long regimen data. The figure shows the percentage of people with MDR-TB with key outcomes including treatment success, death, treatment failure, loss-to-follow-up (LTFU), and no evaluation

S87 DISCOVERY AND VALIDATION OF A PERSONALISED RISK PREDICTOR FOR INCIDENT TUBERCULOSIS IN SETTINGS AIMING TOWARDS PRE-ELIMINATION (PERISKOPE-TB)

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Background The lifetime risk of tuberculosis (TB) among individuals with latent Mycobacterium tuberculosis infection (LTBI) is commonly estimated as 5–10%, but is highly variable between individuals. Validated estimates of personalised risk are needed to facilitate precise targeting of preventative treatment. We aimed to characterise population-level TB risk among people tested for LTBI, and to develop and validate a prognostic model to estimate personalised risk of disease.

Methods We pooled individual-level data from 18 systematically-identified cohort studies conducted in 20 countries with low TB transmission (annual incidence ≤20/100,000 persons). We estimated population-level incident TB risk using flexible parametric survival models with random effect intercepts by source study. We then developed and validated a flexible parametric survival prediction model for incident TB using the internal-external cross-validation framework, iteratively discarding one contributing dataset from model development and using it for validation.

Findings In pooled data including 80,468 individuals tested for LTBI and 803 TB cases, 5-year cumulative risk of incident TB among people with untreated LTBI was 15.6% (95% CI 8.0–29.2) for child contacts, 4.8% (3.0–7.7) for adult contacts, 5.0% (1.6–14.5) for migrants, and 4.8% (1.5–14.3) for immunocompromised groups. We found highly variable estimates within risk groups, necessitating a personalised approach to risk-stratification. We thus developed a prognostic model that combines a quantitative measure of T cell sensitisation and clinical covariates. These covariates included age, history of TB exposure (household contact of smear-positive index case, other contact, migration from high TB burden country or no exposure), HIV status and receipt of a solid organ or haematological transplant. Validation of this model achieved a random-effects meta-analysis C-statistic of 0.88 (0.82–0.93) for

incident TB over 2 years. Decision curve analysis revealed that applying the model improved clinical decision-making for targeting LTBI treatment.

Interpretation TB incidence rates are heterogeneous among people identified as having LTBI by current standards, even after stratification by indication for screening. We present a freely available and directly data-driven personalised risk predictor for incident TB (www.periskope.org). PERISKOPE-TB will facilitate a programmatic paradigm shift by allowing a fully evidence-based and patient-centred approach to TB risk stratification in settings aiming towards pre-elimination globally.

S88 NEGATIVE INTERFERON-GAMMA RELEASE ASSAYS RELIABLY RULE OUT PROGRESSION TO ACTIVE TB IN PATIENTS WHO HAVE INFLAMMATORY CONDITIONS AND ARE STARTING BIOLOGIC THERAPY

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10.1136/thorax-2020-BTSabstracts.93

Introduction Interferon-gamma release assays (IGRAs) are the major tool used to screen patients for latent tuberculosis infection (LTBI) before commencing biologic therapy. Anergy due to immunosuppression from drugs may result in false negative IGRAs.

There is therefore concern that clinicians may be falsely reassured by negative IGRAs, exposing patients to risk of TB reactivation by commencing biologics.

This study assesses the negative predictive value of IGRAs in patients on, or due to start, immunosuppressive therapy with biologics.

Methods We conducted a retrospective cohort analysis of IGRA test results of patients on biologics between 2013 and 2019, in ICHT. Patients were identified using trust pharmacy data and matched with North-West London Pathology Laboratory records. The London TB Registry was searched to identify cases of active TB.

Abstract S88 Table 1 Diagnostic accuracy of IGRAs

	Specificity %	Sensitivity %	Negative predictive value (NPV)	Positive predictive value (PPV)
Binary analysis excluding borderline results (CI)	93.84 *(93.01 - 94.61)*	51.56 *(38.73 – 64.25)*	99.09 *(98.83 – 99.29)*	12.99 *(10.24 – 16.36)*
Borderline results regarded as positive results (CI)	91.37 *(90.42 - 92.26)*	53.03 *(40.34 – 65.44)*	99.09 *(98.82 – 99.29)*	9.92 *(7.89 – 12.38)*
Borderline results regarded as negative results (CI)	94.00 *(93.19 - 94.75)*	50.00 *(37.43 – 62.57)*	99.06 *(98.80 – 99.26)*	12.99 *(10.20% - 16.40)*

* CI = 95% Confidence Interval

Patients frequently were tested multiple times, and analysis was performed on test rather than patient level. Notification of active TB with a positive IGRA was considered a 'true positive'. Absence of active TB notification and a negative IGRA was a 'true negative'. Exclusions were indeterminate or unreadable IGRA results.

No distinction has been made between those tested whilst on biologics or immunosuppressants and those tested before commencing them.

Results 4414 IGRAs in 2705 patients were performed. 3399 were negative with 31 tests belonging to patients who developed active TB during the study period. 254 IGRAs were positive although only 33 of these progressed to active TB, potentially reflecting either LTBI treatment or a poor specificity which is outside the scope of this analysis. Of 99 borderline results, only 2 results (2 patients) developed active TB.

Conclusions Within this heterogeneous immunosuppressed population, IGRAs have a high NPV. This remains true even if all borderline results are regarded as negative for TB, suggesting suppression of the interferon-gamma response, may have a negligible effect on clinical practice in our study population.

IGRAs have a low PPV which may reflect their poor specificity for progression to disease or efficacy of LTBI treatment given.

Our results suggest clinicians can generally be confident in negative IGRA results for assessing the risk of developing TB in patients about to start biologic therapy.

S89 DETECTION OF M. TUBERCULOSIS DNA IN CD34-POSITIVE PERIPHERAL BLOOD MONONUCLEAR CELLS OF ASYMPTOMATIC TB CONTACTS

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10.1136/thorax-2020-BTSabstracts.94

Introduction Haematopoietic stem cells expressing the CD34 surface marker have been posited as a niche for *M. tuberculosis* complex (MTBC) bacilli during latent tuberculosis infection (LTBI).

Methods We conducted a cross-sectional study in Ethiopia to determine whether MTBC DNA was detectable in peripheral blood mononuclear cells (PBMC) isolated from 100 ml blood taken from 197 asymptomatic adults with a history of recent household TB contact and/or HIV infection, using digital polymerase chain reaction (dPCR). A nested prospective study was conducted in a sub-set of 43 HIV-infected individuals to evaluate whether administration of isoniazid preventive therapy (IPT) was effective in clearing MTBC DNA from PBMC.

Results MTBC DNA was detected in PBMC of 156/197 participants (79.2%; 95% CI 73.5% to 84.9%). Where present, it was found more frequently in CD34-positive vs. CD34-negative PBMC (154/155 [99.4%] vs. 46/155 [29.7%], P<0.001). Prevalence of dPCR-detected MTBC DNA did not differ between QuantiFERON-negative vs. QuantiFERON-positive participants (77/99 [77.8%] vs. 79/98 [80.6%], P=0.73), but

it was higher in HIV-infected vs. HIV-uninfected participants (67/75 [89.3%] vs. 89/122 [73.0%], P=0.006). By contrast, the proportion of QuantiFERON-positive participants was lower in HIV-infected vs. HIV-uninfected participants (25/75 [33.3%] vs. 73/122 [59.8%], P<0.001). Administration of IPT reduced prevalence of dPCR-detected MTBC DNA from 41/43 (95.3%) at baseline to 23/43 (53.5%) post-treatment (P<0.001), but it did not influence prevalence of QuantiFERON-positivity (17/43 [39.5%] at baseline vs. 13/43 [30.2%] post-treatment; P=0.13).

Conclusions We report a novel molecular microbiological biomarker of LTBI with properties that are distinct from those of a commercial interferon-gamma release assay. Our findings implicate the bone marrow as a niche for *M. tuberculosis* in latently infected individuals. Detection of MTBC DNA in PBMC has potential applications in the diagnosis of LTBI, in monitoring response to chemoprophylaxis and as an outcome measure in clinical trials of interventions to prevent or treat LTBI.

Pulmonary arterial hypertension: drugs, sox and cytokines

S90 SOX17-SILENCED HUMAN PULMONARY ARTERY ENDOTHELIAL CELLS MARKEDLY INDUCE CXCL10 AND CXCL11 EXPRESSION

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10.1136/thorax-2020-BTSabstracts.95

Introduction SOX17 (SRY-related high-mobility group box family member 17) has recently been identified as a novel risk gene of pulmonary arterial hypertension (PAH). As such, the contribution of impaired SOX17 to the pathogenesis of PAH is poorly understood. Aberrant endothelial inflammation, such as excessive chemokine production, is a key pathogenetic driver of pulmonary vascular remodeling in PAH. However the role of pulmonary artery endothelial loss of SOX17 on inflammatory mediator induction has not been explored. Thus, we hypothesized that SOX17-knockdown in human pulmonary artery endothelial cells (HPAECs) would result in elevated cytokine and chemokine expression.

Methods HPAECs were transfected with an siRNA directed against SOX17 (siSOX17) or with a non-targeting control (siControl). A semi-quantitative membrane-based cytokine antibody array was used to determine the relative expression levels of 105 different inflammatory markers in siControl and siSOX17 culture supernates. Gene expression of differentially expressed markers were validated using qPCR.

Results siSOX17-treated HPAECs exhibited a 3-fold and 17-fold upregulation in soluble CXCL10 and CXCL11 release, respectively, as detected via the cytokine array. Further, ST2, MCP-1 and pentraxin 3 were shown to increase by approximately 1.5-fold versus siControl. siSOX17-knockdown in HPAECs mediated a 20.7±6 (p<0.05) and 21.0±5 (p<0.01) fold-increase in CXCL10 and CXCL11 gene expression, versus siControl.

Conclusion Elevated CXCL10 and CXCL11 release may be a feature of pulmonary artery endothelial dysfunction associated with functional loss of SOX17 in PAH.

S91 PATTERNS OF CYTOKINES AND GROWTH FACTORS IN PULMONARY ARTERIAL HYPERTENSION PATIENTS WITH BMPR2 MUTATIONS AND PAH PATIENTS WITHOUT DRIVING MUTATIONS AND THEIR INFLUENCE ON SURVIVAL

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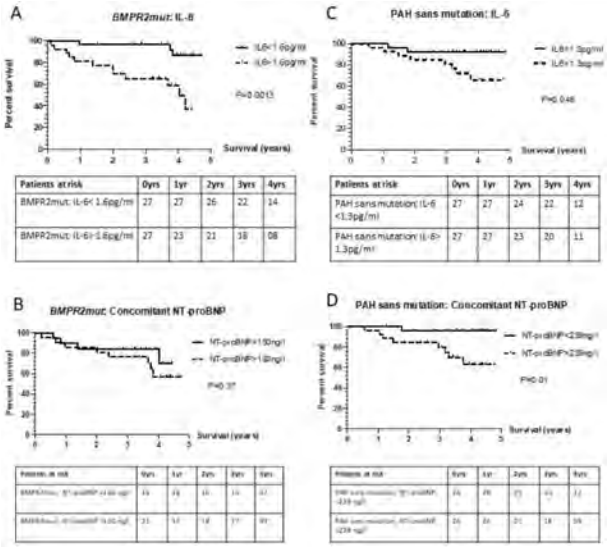
10.1136/thorax-2020-BTSabstracts.96

Background Pulmonary arterial hypertension (PAH) covers a range of life-limiting conditions characterized by increased mean pulmonary arterial pressures leading to right heart failure and eventually death, if left untreated. In approximately 25% of cases of idiopathic PAH genetic analysis reveals a mutation in one of several genes, the most common being bone morphogenetic type II receptor (*BMPR2*). There is substantial evidence implicating inflammation in the pathogenesis of PAH. We questioned whether potential inflammatory drivers were different in BMPR2-mutation positive PAH and in PAH without any mutations.

Methods Patients with confirmed mutations in *BMPR2* (*BMPR2mut*, n=54) and patients without any driving mutations (n=56) were recruited from the national UK- PAH cohort. Levels of IL-6, IL-8, IL-10, TNF-α, VEGF-A and G-CSF were measured in plasma samples from these and healthy controls (n=56).

Results Both *BMPR2*-mutation positive and PAH patients without mutations had high levels of IL-6, IL-8, TNF-α and VEGF-A compared to controls. Only PAH patients without mutations had higher levels of IL-10 while only *BMPR2*-mutation carrying patients had higher levels of G-CSF compared to controls. VEGF-A levels were substantially higher in PAH without mutation compared to the *BMPR2mut* group. Only IL-6 was a significant discriminator for mortality in the *BMPR2mut* cohort (cumulative survival for patients with an IL-6 level of ≥1.6 pg/ml at 3 years is 65% compared to 96%



Abstract S91 Figure 1 Kaplan-Meier curves based on cytokine levels in BMPR-2 mutation positive patients (A,B) and PAH without driving mutations (CD). Graphs show cumulative survival curves based on median levels of IL-6 (A,C) and NT-proBNP (B,D).

for patients with an IL-6 level of <1.6 pg/ml, $P=0.0013$, figure 1A). IL-6 appears to outperform NT-proBNP in this respect (cumulative survival for patients with an NT-proBNP level of >130 ng/ml at 3 years was 76% compared to 84% for patients with an NT-proBNP level of ≤130 ng/ml, $P=0.37$, figure 1B). The converse was true in PAH without mutation (cumulative survival for patients with an IL-6 level of >1.3 pg/ml at 3 years is 81% compared to 92% for patients with an IL-6 level of ≤1.3 pg/ml, $P=0.048$, figure 1C). Cumulative survival for patients with a NT-proBNP level of >239 ng/ml at 3 years was 80% compared to 96% for patients with NT-proBNP level of <239 pg/ml, ($P=0.01$, figure 1D).

Conclusions BMPR2-mutation positive patients have a different inflammatory profile compared to PAH patients without mutations. The selection of biomarkers of inflammation to predict clinical outcomes may therefore differ between these groups.

S92 HEPCIDIN AND INTERLEUKIN-6 DOWNREGULATE BMPR2 AND DYSREGULATE BMPR2 DOWNSTREAM PATHWAYS; IMPLICATIONS FOR PULMONARY ARTERY HYPERTENSION

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10.1136/thorax-2020-BTSabstracts.97

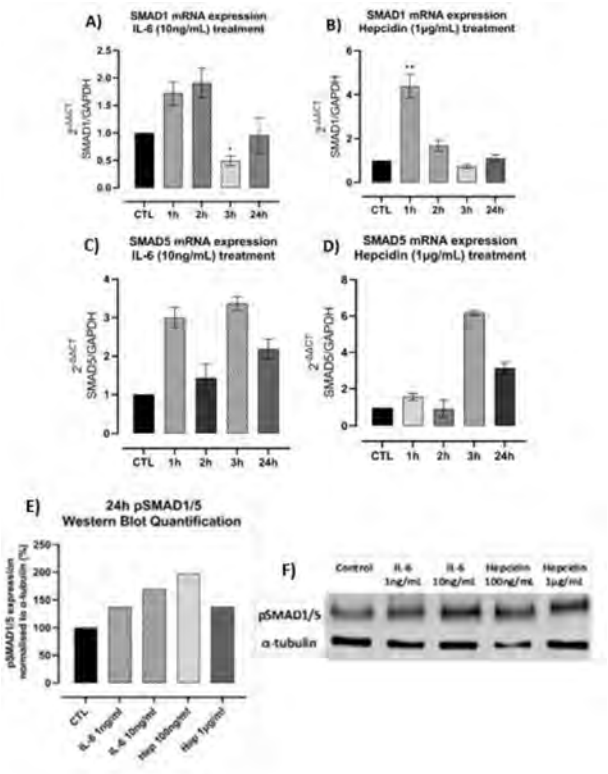
Background Pulmonary Arterial Hypertension (PAH) is a condition resulting from vascular remodelling and elevated pulmonary arterial pressure. Bone Morphogenetic Protein Receptor II (BMPR2) mutations have been strongly associated with heritable forms of PAH. Previous studies have demonstrated that the hepcidin/ferroportin axis acts to downregulate BMPR2 and promote proliferation in pulmonary artery smooth muscle. However, the role of hepcidin on pulmonary artery endothelial cells (PAEC) and BMPR2 downstream pathways is yet to be elucidated.

Aims To investigate the influence of Hepcidin/IL-6 on PAEC proliferation, mitochondrial dysfunction, as well as BMPR2 and downstream pathway perturbation.

Methods PAECs were treated with Hepcidin-25 (100 ng/mL or 1μg/mL) or Interleukin-6 (IL-6) (1 ng/mL or 10 ng/mL). Proliferation was determined using CyQuant assay, gene transcription was analysed using real-time PCR and protein expression by Western Blot (WB) and Enzyme-linked Immunosorbent Assay (ELISA).

Results Hepcidin and IL-6 after 24h treatment cause PAECs to proliferate (n=4; p<0.05). Hepcidin and IL-6 treatments both upregulate hepcidin mRNA and protein expression (n=4 and n=17; p<0.05). BMPR2 mRNA and protein expression, as measured by rt-PCR (n=4; p<0.05) and WB analysis (n=1) is downregulated in PAECs by hepcidin and IL-6. However, WB and mRNA analysis also show that hepcidin treatment increases expression and phosphorylation of SMAD1/5 at different time-points (figure 1). Furthermore, ID mRNA expression was dysregulated at several time-points compared to control. Hepcidin upregulates PINK1 mRNA expression 6-fold compared to control (n=4; p<0.0001).

Conclusions These study findings uncover the complexity of the relationship between hepcidin and BMP-signalling in PAECs. Disruption in iron homeostasis and elevation in hepcidin levels have been reported in PAH populations, thus a role for a dysregulated hepcidin/ferroportin axis and downstream pathway disruption presents a potential mechanism for these observations. Nonetheless, further research is pivotal to fully elucidate the role of hepcidin in disrupting PAEC iron homeostasis and BMP-signalling.



Abstract S92 Figure 1 qPCR of SMAD protein expression A) SMAD1 mRNA expression by IL-6 (10 ng/mL) at different time points (n=4) B) SMAD1 mRNA expression by Hepcidin (1μg/mL) treatment at different time points (n=4) C) SMADS MRNA expression by IL-6 (10 ng/mL) at different time points (n=2) D) SMADS mRNA expression by Hepcidin (1μg/mL) treatment at different time points (n=2).
Western Blot analysis of phosphorylated SMAD1/5 expression by hPAECs E) Western Blot quantification of pSMAD1/5 expression after 24h treatment with IL-6 (Ing/ml and 10 ng/ml) and Hepcidin (100 ng/ml and lug/ml), n=1. Protein expression normalized to α-tubulin F) Image of Western Blot qPCR expression data is normalized to GAPDH. t-tests were performed against each respective control. Data presented as meant ±SEM

S93 REPAIR: LONG-TERM EFFECTS OF MACITENTAN ON THE RIGHT VENTRICLE (RV) IN PULMONARY ARTERIAL HYPERTENSION (PAH)

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10.1136/thorax-2020-BTSabstracts.98

Introduction and Objectives In a study of patients with PAH (REPAIR), macitentan improved RV stroke volume (RVSV)

Abstract S93 Table 1

	BL* Mean (SD)	n	BL to Week 26 change† (95% CL)	n	BL to Week 52 change† (95% CL)
RVSV (mL)#	52.2 (17.2)	71	12.0 (8.4, 15.6)[¶‡]	63	12.0 (8.4, 15.6) [¶‡]
RV end diastolic vol (mL)	149.8 (49.1)	70	−6.2 (−12.8, 0.4)[§]	63	−5.3 (−12.0, 1.4)[§]
RV end systolic vol (mL)	90.2 (40.6)	70	−16.1 (−20.0, −12.2)[‡]	63	−17.0 (−22.1, −12.0)[‡]
RV ejection fraction (%)#	37.7 (14.3)	70	10.6 (7.9, 13.3)[‡]	62	9.5 (7.0, 12.0)[‡]
RV mass (g)	110.4 (47.5)	70	−10.5 (−14.0, −7.1)[‡]	63	−9.2 (−12.9, −5.5)[‡]

*Patients included in the Week 26 analysis. †ANCOVA model adjusted change #From pulmonary artery flow. ¶96% CI. ‡p<0.0001. §p>0.05.

and measures of RV function at Week 26. This study aimed to assess whether the effects of macitentan at Week 26 were maintained at Week 52.

Methods REPAIR (NCT02310672) was a 52-week, multicentre, open-label, single-arm phase 4 study. Macitentan 10 mg was initiated in treatment-naïve PAH patients, in patients receiving stable background phosphodiesterase type-5 inhibitor (PDE5i) at baseline (BL), or in initial combination with PDE5i. RV cardiac magnetic resonance imaging (cMRI) variables, 6-minute walk distance (6MWD) and WHO functional class (FC) were assessed at Weeks 26 and 52.

Results Analyses included 71 patients (80% female; BL: median age 45 years, median 6MWD 395 [Q1, Q3: 323, 483] m, 98.6% FC II/III). At Weeks 26 and 52, mean (95% CL) change from BL in 6MWD was 36 (19, 52) and 38 (19, 57) m; FC improved in 40/70 (56%) and 34/65 (48%) patients; no patients worsened. The table 1 shows RV parameter changes at Weeks 26 and 52.

Conclusions Improvements in RV mass, volume and function observed with macitentan at Week 26 were maintained at Week 52.

Please refer to page A240 for declarations of interest related to this abstract.

S94 LONG-TERM OUTCOMES WITH INITIAL TRIPLE ORAL THERAPY IN PULMONARY ARTERIAL HYPERTENSION (PAH): INSIGHTS FROM TRITON

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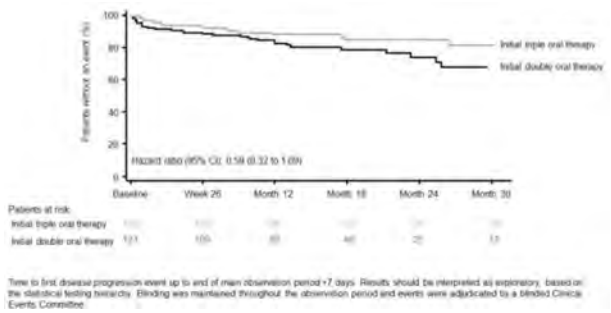
10.1136/thorax-2020-BTSabstracts.99

Introduction and Objectives In the randomized controlled TRITON (NCT02558231) study, both initial triple oral (macitentan, tadalafil, selexipag) and initial double oral (macitentan, tadalafil, placebo) therapy improved pulmonary vascular resistance (primary endpoint; by 54% and 52%) and 6-minute walk distance (secondary endpoint; by 55 and 56 m) at week 26 in patients with newly diagnosed PAH, with no difference between groups. This analysis further explored long-term outcome data in patients initiated on triple versus double oral therapy in TRITON.



Abstract S94 Figure 1

Methods We analysed the treatment effect on the secondary endpoint of time to first disease progression event (centrally adjudicated) until end of the observation period +7 days and time to all-cause death (post-hoc) until end of the observation period (Cox regression model).

Results Baseline characteristics were balanced between the initial triple (n=123) and initial double therapy (n=124) groups, median follow-up was 77.6 and 75.8 weeks, respectively. There was a 41% reduction in the risk of first disease progression event with initial triple vs initial double therapy (hazard ratio 0.59, 95% CI 0.32–1.09; figure 1), driven by PAH-related hospitalisation and all-cause death. Adverse events were consistent with known safety profiles of study drugs. Two patients died in the initial triple therapy group and 9 in the initial double therapy group (hazard ratio 0.23, 95% CI 0.05–1.04).

Conclusions Exploratory analysis indicated a signal for improved long-term outcome with initial triple versus initial double therapy.

Please refer to page A240 for declarations of interest related to this abstract.

Prognostic tools to treatments in COVID-19

S95 THE UTILITY OF ESTABLISHED PROGNOSTIC SCORES IN COVID-19 HOSPITAL ADMISSIONS: A COLLABORATIVE TRAINEE-LED, MULTI-CENTRE PROSPECTIVE EVALUATION OF CURB-65, NEWS2, AND QSOFA

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10.1136/thorax-2020-BTSabstracts.100

Introduction and Objectives The COVID-19 pandemic is ongoing yet, due to the lack of a COVID-19 specific tool, clinicians must use pre-existing illness severity scores for initial prognostication. However, the validity of such scores in COVID-19 is unknown. The aim of this study was to

determine the performance characteristics of these scores in the context of COVID-19 and to investigate potential components of a COVID-19 specific prognostication tool for future validation.

Methods The North West Collaborative Organization for Respiratory Research (NW-CORR), a group of research-interested higher specialty trainees, performed a multi-centre prospective evaluation of adult patients admitted to hospital with confirmed COVID-19 during a two-week period in April 2020. Clinical variables measured as part of usual care at presentation to hospital were recorded, including the CURB-65, NEWS2, and qSOFA scores. Outcomes of interest were 30-day and 72-hour mortality. Scores were compared in terms of calibration and discrimination with multivariable logistic regression performed to assess individual components of each score.

Results Data were collected for 830 people with COVID-19 admitted across 7 hospitals. By 30 days, a total of 300 (36.1%) had died and 142 (17.1%) had been in ICU. Calibration plots suggested all scores underestimated mortality compared to their original validation in non-COVID-19 populations, and overall discriminatory ability was generally sub-optimal (AUCs 0.62–0.77). Among the 'low risk' categories (CURB-65<2, NEWS2<5, qSOFA<2) 30-day mortality was 16.7% (vs 1.5% in CAP), 32.9% (vs 5.5% in sepsis) and 21.4% (vs 4.3% in infection) respectively. The diagnostic performances of each score are presented in table 1. Multivariable logistic regression identified features associated with respiratory compromise rather than circulatory collapse as most relevant prognostic variables.

Abstract S95 Table 1 Diagnostic performance of individual scores for 30-day and 72-hour mortality

	Score (n)	Death (%)	Sensitivity	Specificity	PPV	NPV
Death by 30 days						
CURB-65	<2 (324)	54 (16.7%)				
(n=730)	≥2 (406)	216 (53.2%)	0.80	0.59	0.53	0.83
	<3 (514)	141 (27.4%)				
	≥3 (216)	129 (59.7%)	0.48	0.81	0.60	0.73
NEWS2	<5 (215)	46 (21.4%)				
(n=730)	≥5 (515)	224 (43.5%)	0.83	0.37	0.43	0.79
qSOFA	<2 (596)	196 (32.9%)				
(n=730)	≥2 (134)	74 (55.2%)	0.27	0.87	0.55	0.67
Death within 72 hours						
	Score(n)	**Death (%)**	**Sensitivity**	**Specificity**	**PPV**	**NPV**
CURB-65	<2 (324)	9 (2.8%)				
(n=730)	≥2 (406)	50 (12.3%)	0.85	0.47	0.12	0.97
	<3 (514)	23 (4.5%)				
	≥3 (216)	36 (16.7%)	0.61	0.73	0.17	0.96
NEWS2	<5 (215)	5 (2.3%)				
(n=730)	≥5 (515)	54 (10.5%)	0.92	0.31	0.10	0.98
qSOFA	<2 (596)	34 (5.7%)				
(n=730)	≥2 (134)	25 (18.7%)	0.42	0.84	0.19	0.94

Abbreviations: PPV=Positive predictive value; NPV=Negative predictive value

Conclusion ll existing prognostic scores evaluated here underestimated adverse outcomes and performed sub-optimally in the COVID-19 setting. New prognostic tools including a focus on features of respiratory compromise rather than circulatory collapse are needed. We provide a baseline set of variables which are relevant to COVID-19 outcomes and may be used as a basis for developing a bespoke COVID-19 prognostication tool. This collaborative project demonstrates the ability of regional trainee networks to collate large datasets to address important clinical questions.

S96 SOUTH WEST EXPERIENCE OF CONTINUOUS POSITIVE AIRWAY PRESSURE NON-INVASIVE VENTILATION FOR COVID-19

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10.1136/thorax-2020-BTSabstracts.101

Introduction Continuous positive airway pressure non-invasive ventilation (CPAP) was recommended by NHS England for patients with COVID-19 and hypoxaemic respiratory failure either as a ceiling of treatment, trial to avoid intubation or as a bridge to intubation.[1] However, In the absence of clinical trials, its role in the treatment of COVID-19 is poorly understood. We collected observational data on outcomes of patients with COVID-19 requiring CPAP.

Methods Data was collected by members of the PRISM trainee research network. Patient demographics, comorbidities, Rockwood clinical frailty scale (CFS) and outcomes (death or discharge) were collected for patients requiring CPAP for hypoxaemic respiratory failure with confirmed or clinically suspected COVID-19 across 6 sites in the South West over 11 weeks from March – June 2020.

Results Data was collected for 164 patients. Ages of patients ranged from 30 – 88 years (mean 62.13), 110 (61.1%) male. Most patients received CPAP on a respiratory ward (79.3%).

A treatment escalation plan was recorded for 153 (85%) of patients on admission to hospital. Of 100 patients eligible for escalation to intensive care (ICU), 50 required intubation and invasive mechanical ventilation (IMV) despite CPAP therapy.

CFS scores ranged from 1 to 7 (mean 2.5). Average CFS score those eligible for IMV was 1.75, compared to 3.67 for those who were deemed ineligible for IMV. Mortality data are shown in table 1. Average length of stay for survivors was

Abstract S96 Table 1 Mortality of different patient groups. *p<0.01 comparing mortality of those who received CPAP as a ceiling of care vs those eligible for IMV.

	Number (n)	Mortality (%)
All patients	164	68 (41.5%)
Patient who received CPAP as ceiling of treatment	64	47 (73.4%)
Patients eligible for IMV	100	21 (21%)*
Patients who required intubation and IMV	50	19 (38%)
Patients eligible for intubation but in whom this was not required	50	2 (4%)
CFS score 1–4 (non-frail)	151	59 (39.1%)
CFS 5–7 (frail). NB No patient had CFS score above 7	13	9 (69.2%)

15.6 days (1 – 63). The average number of days from admission to death was 8.6 (0 – 48).

Conclusion In our cohort of patients who received CPAP as a ceiling of treatment mortality was high, especially compared to patients eligible for invasive mechanical ventilation. We highlight the need for early treatment escalation decisions, informed discussions with patients and relatives and involvement of palliative care where appropriate. These data are potentially limited by variation in practice between sites, and further robust evidence is needed to establish patient selection and timing of CPAP.

REFERENCE

1. NHS England and NHS Improvement Guidance for the role and use of non-invasive respiratory support in adult patients with COVID19 (confirmed or suspected), 6 April 2020, Version 3.

S97 THE PERFORMANCE OF THE NATIONAL EARLY WARNING SCORE AND NATIONAL EARLY WARNING SCORE 2 IN HOSPITALISED PATIENTS INFECTED BY THE SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUS 2 (SARS-COV-2)

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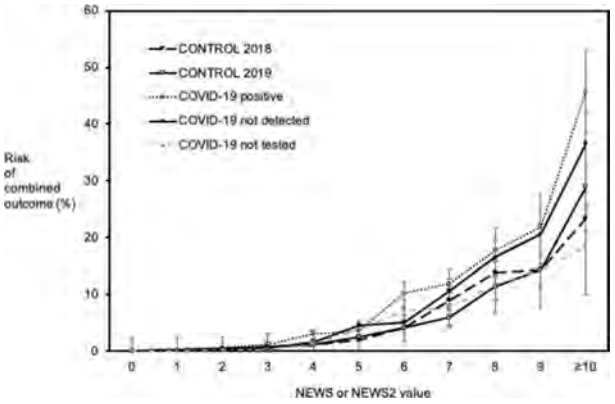
Introduction The National Early Warning Score (NEWS) and its update, NEWS2, are validated scoring systems for identifying patient deterioration in a range of clinical conditions, including infection and sepsis. Coronavirus disease 2019 (COVID-19), caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), has a variable clinical presentation from asymptomatic to life-threatening multi-organ failure. There is little research demonstrating NEWS/NEWS2 performance in COVID-19. Therefore, we sought to evaluate their predictive ability.

Methods In the study hospital, all patient vital signs are documented in real-time using commercially available, electronic software and we extracted this data. Using receiver-operating characteristic analyses, we used the area under the receiver operating characteristic (AUROC) curve to evaluate the performance of NEWS/NEWS2 to discriminate the combined outcome of either death or intensive care unit (ICU) admission within 24-hours of a vital sign set in five cohorts: COVID-19 positive (n=405), COVID-19 not-detected (n=1717), COVID-19 not tested (n=2952), Control 2018 (n=6275), Control 2019 (n=6524).

Results After exclusions, the main data extract (01/01/2018 – 03/05/20) contained 2,867,313 vital sign sets from 97,669 admissions. Admissions in the COVID-19 positive and COVID-19 not-detected cohorts were older ($p<0.001$), and those in the COVID-19 positive cohort were more likely to be male ($p<0.001$), with a higher mean EWS during their stay. Figure 1 demonstrates an increasing risk of the combined outcome with increasing NEWS/NEWS2 value in all 5 cohorts. The AUROC values for NEWS/NEWS2 for the combined outcome of either death or ICU admission were: COVID-19 positive 0.880 (0.866–0.894); COVID-19 not-detected 0.881 (0.867–0.895); COVID-19 not tested 0.869 (0.842–0.896); Control 2018 0.896 (0.886–0.906) and Control 2019 0.844 (0.831–0.857).



Abstract S97 Figure 1

Conclusions This study demonstrates that NEWS/NEWS2 are good discriminators of either death or ICU admission within 24-hours of a vital sign set in patients with COVID-19. There was very little difference between the AUROC values in the COVID-19 positive cohort compared to any of our other study cohorts suggesting amendments to NEWS/NEWS2 are unnecessary when evaluating patients with COVID-19. Our results support the recommendations by the RCP, WHO and NICE for the use of NEWS/NEWS2 for the assessment of acute-illness severity in patients with COVID-19.

S98 IMPROVED COVID-19 SURVIVAL IN ACUTE HOSPITAL SETTINGS FOLLOWING IMPLEMENTATION OF A REAL-TIME CLINICAL DECISION SUPPORT TOOL

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10.1136/thorax-2020-BTSabstracts.103

Introduction COVID-19 mortality rates are high, particularly in patients requiring invasive ventilatory support, developing a cytokine storm, or experiencing thromboembolic disease. Our goal was to determine if traffic-light driven, personalised care was associated with improved survival in acute hospital settings.

Methods Outcomes were evaluated during two implementation phases of a real-time clinical decision support tool that had been developed as part of a Trust's COVID-19 response, using a reporting and bioinformatics team to support Clinical and Operational teams. Following optimisation, the tool defined patients' clinical status in terms of risk of preventable complications based on blood test results (D-dimer, C reactive protein and ferritin). Feedback to ward-based clinicians enabled rapid modification of care pathways, in the first phase following a daily review, and in the second phase, in real-time (dashboard updated every 10 minutes).

Results 1039 COVID-19 positive patients were admitted by 21/05/2020. Focusing on the first 939 completed encounters to death or home discharge (median age 69ys; 60% [563/939] male), 568/939 (60.4%) received thromboembolism risk flags, and 212/939 (22.5%) cytokine storm flags. The maximum thromboembolism flag discriminated

completed encounter mortality between no flag (9.97% [37/371]); medium-risk (28.5% [68/239]); high-risk (51.2% [105/205]); and suspected thromboembolism (52.4% [65/124]), Kruskal Wallis p<0.0001. 173 of 535 consecutive COVID-19 positive patients whose hospital encounter completed before real-time introduction died (32.3% [95% confidence intervals 28.0, 36.0]), compared to 46 of 200 (23.0% [95% CI 17.1, 28.9]) admitted after implementation of real-time traffic light flags (p=0.013). The real-time cohort were older (median age 72ys compared to 67ys, p=0.037), and were more likely to flag at risk of thromboembolism on admission. However, adjusted for age/sex, the probability of death was 0.33 (95% confidence intervals 0.30, 0.37) before real-time implementation, and 0.22 (0.17, 0.27) after real-time implementation (p<0.001). In subgroup analyses, older patients, males, and patients with hypertension (p≤0.01) and/or diabetes (p=0.05) derived the greatest benefit from admission under the real-time traffic light system.

Conclusion Personalised early interventions were associated with a reduction in mortality. We suggest benefit predominantly resulted from early triggers to review/enhance anticoagulation management, without exposing lower-risk patients to potential risks of full anticoagulation therapy.

S99 THE ROLE OF ANTICOAGULATION THERAPY IN MANAGEMENT OF COVID-19 PATIENTS

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10.1136/thorax-2020-BTSabstracts.104

Introduction Hypoxemia, acute respiratory distress syndrome and coagulopathy are common issues experiences by pts with severe COVID-19 disease.[1] The aim of this study was to evaluate the efficacy of anticoagulation therapy in COVID-19 patients.

Methods This is a retrospective observational study for patients admitted to a busy district hospital during the peak period of the COVID-19 pandemic. All patients aged >18 with suspected or confirmed RT-PCR COVID-19 and raised D-Dimer were included in this study. Data including demographics, comorbidities, and effects of anticoagulation on mortality were examined.

Results A total of 628 pts with more males (n = 365; 58.1%), and 48.7% >75 years were included in the study. 27.9% were obese (BMI ≥ 30); and 25% were overweight (BMI 25 – 29.9). 448/628 (71.3%) had a positive swab for coronavirus and a further 70 patients (11.1%) had probable infection based on clinic-radiological suspicion. Nearly half (n = 311; 49.5%) of the patients had hypertension and a quarter (n = 166; 26.4%) had diabetes. A total of 226 (36%) pts died of which 85.8% (n = 194) had a positive swab compared to 12.8% (n = 29) with negative swab. This was statistically significant with a p-value of 0.001. Patients with a raised D-dimer 150/628 (23.8%) received therapeutic dose anticoagulation and 408/628 (64.9%) received prophylaxis or no anticoagulation. 53 patients (22.5%) of those who received treatment dose died compared to 183 (77.5%) who received prophylactic dose or no anticoagulation due to comorbidities. This was statistically significant (p value 0.02).

Abstract S99 Table 1 Association of swab PCR with Anticoagulants, D-Dimer in Mortality

Variables		Mortality with SWAB				p-value
		Positive (n=236)		Negative (n=41)		
		n	%	n	%	
Anticoagulant	Yes	206	87.3	38	92.7	0.32
	No	30	12.7	3	7.3	
Treatment Dose Anticoagulant	Yes	53	22.5	16	39.0	0.02*
	No	183	77.5	25	61.0	

Conclusion Therapeutic anticoagulation significantly reduces mortality in COVID-19 patients with a high D-dimer.

REFERENCE

1. Klok F, Kruip M, van der Meer N, *et al*. Incidence of thrombotic complications in critically ill ICU patients with COVID-19. *Thromb Res* 2020 Apr 10. [Epub ahead of print]

Baby and bathwater: not all lung infections are COVID-19

S100 VITAMIN D SUPPLEMENTATION TO PREVENT ACUTE RESPIRATORY INFECTIONS: SYSTEMATIC REVIEW AND META-ANALYSIS OF AGGREGATE DATA FROM RANDOMISED CONTROLLED TRIALS

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10.1136/thorax-2020-BTSabstracts.105

Background A 2017 meta-analysis of data from 10,933 participants in 25 randomised controlled trials (RCTs) of vitamin D supplementation for prevention of acute respiratory infections (ARI) revealed a protective effect. Since then, data from 15 new RCTs with over 20,000 participants have emerged.

Methods Systematic review and meta-analysis of data from RCTs of vitamin D for ARI prevention using a random effects model. Pre-specified sub-group analyses were done to determine whether effects of vitamin D on risk of ARI varied according to baseline 25-hydroxyvitamin D (25[OH]D) concentration or dosing regimen. We searched MEDLINE, EMBASE, the Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science, ClinicalTrials.gov and the International Standard RCT Number (ISRCTN) registry from inception to 1st May 2020.

Findings We identified 40 eligible RCTs (total 30,956 participants, aged 0 to 95 years). Data were obtained for 29,841 (96.5%) of 30,909 participants in 39 studies. For the primary comparison of vitamin D supplementation vs. placebo, the intervention reduced ARI risk overall (Odds Ratio [OR] 0.89, 95% CI 0.81 to 0.98; P for heterogeneity 0.009). No statistically significant effect of vitamin D was seen for sub-groups defined by baseline 25(OH)D concentration. However, protective effects were seen for trials using a daily dosing regimen

Abstract S100 Table 1 Placebo controlled RCTs: Proportion of participants experiencing at least one acute respiratory infection, overall and stratified by potential effect-modifiers

Variables	No of trials	Proportion with ≥1 ARI, intervention group (%)	Proportion with ≥1 ARI, control group (%)	Odds ratio (95% CI)	I^2%	P for heterogeneity
Overall	34	8307/14155 (58.7)	8196/13660 (60.0)	0.89 (0.81 to 0.98)	40.0	0.009
Baseline 25(OH)D, nmol/L						
<25	19	1348/1798 (75.0)	1388/1819 (76.3)	0.78 (0.53 to 1.16)	47.2	0.012
25 – 49.9	27	3411/4637 (73.6)	3337/4491 (74.3)	1.03 (0.91 to 1.17)	4.1	0.40
50 – 74.9	28	1607/2761 (58.2)	1531/2542 (60.2)	0.90 (0.75 to 1.07)	14.1	0.25
≥75	24	923/1520 (60.7)	895/1458 (61.4)	0.97 (0.81 to 1.16)	0.0	0.74
Dosing frequency						
Daily	18	1056/2134 (49.5)	1020/1871 (54.5)	0.75 (0.61 to 0.93)	52.5	0.005
Weekly	5	4357/6288 (69.3)	4388/6274 (69.9)	0.97 (0.88 to 1.06)	0.0	0.41
Monthly or less frequently	11	2894/5733 (50.5)	2788/5515 (50.6)	1.00 (0.91 to 1.09)	0.0	0.50
Daily dose equivalent, IU[a]						
<400	2	482/1175 (41.0)	511/1133 (45.1)	0.65 (0.31 to 1.37)	86.3	0.007
400–1000	10	656/1236 (53.1)	627/1069 (58.7)	0.70 (0.55 to 0.89)	31.2	0.16
1001–2000	14	4693/7885 (59.5)	4712/7817 (60.3)	0.96 (0.87 to 1.06)	8.0	0.37
>2000	7	2291/3462 (66.2)	2250/3444 (65.3)	1.05 (0.84 to 1.31)	37.1	0.15
Trial duration, months						
≤12	28	1852/4754 (39.0)	1807/4307 (42.0)	0.82 (0.72 to 0.94)	39.9	0.017
>12	6	6455/9401 (68.7)	6389/9353 (68.3)	1.03 (0.95 to 1.11)	0.0	0.97

[a] Data from one trial that included higher-dose, lower-dose and placebo arms[18] are excluded from this sub-group analysis, since the higher-dose and lower-dose arms spanned the 1,000 IU/day cut-off, rendering it unclassifiable

(OR 0.75, 95% CI 0.61 to 0.93); at daily dose equivalents of 400–1000 IU (OR 0.70, 95% CI 0.55 to 0.89); and for a duration of ≤12 months (OR 0.82, 95% CI 0.72 to 0.94). Vitamin D did not influence the risk of experiencing a serious adverse event. Risk of bias within studies was assessed as being low for all but two trials. A funnel plot showed asymmetry, suggesting that small trials showing non-protective effects of vitamin D may have been omitted from the meta-analysis.

Interpretation Vitamin D supplementation was safe and reduced risk of ARI, despite evidence of heterogeneity across trials. The overall effect size may have been over-estimated due to publication bias. Protection was associated with administration of daily doses of 400–1000 IU vitamin D for up to 12 months. The relevance of these findings to COVID-19 is not known and requires investigation.

S101 PREDICTORS OF AND TIME FRAME FOR READMISSION FOLLOWING HOSPITALISATION WITH COMMUNITY ACQUIRED PNEUMONIA

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Background There is a paucity of UK data to aid healthcare professionals in predicting which patients hospitalized with Community Acquired Pneumonia (CAP) are at greatest risk of readmission and to determine which readmissions may occur soonest.

Methodology An analysis of CAP cases admitted between 1/1/2017 and 31/3/2019 to 9 hospitals in Northwest England participating in the Advancing Quality Pneumonia program. For entry into the AQ program, patients hospitalised with CAP require the diagnosis to be made by a Consultant Physician along with a chest radiograph compatible with pneumonia

Results 12,144 subjects with CAP (mean age 73 years (SD 16)) were admitted during the study period. Mean Charlson Comorbidity Index (CCI) was 9.47 (SD 8.81) and in-hospital mortality was 14.7%. 2691 (26%) were readmitted within 30 days of discharge. Readmission was predicted by severe liver disease (aOR = 2.43), non-metastatic cancer (aOR = 1.72), Diabetes with complications (aOR = 1.64), Chronic Kidney Disease (aOR = 1.25), Congestive Cardiac Failure (aOR = 1.16), Ischaemic Heart Disease (aOR = 1.16) and longer Length of Stay (LOS). 24% of those readmitted had Pneumonia as the principal readmission diagnosis. 41% of readmissions occurred within 7 days of discharge; 25% between day 8–14 and the remaining 34% between 14 to 30 days post discharge. Comparing patients readmitted within 14 days with those readmitted 14–30 post discharge, earlier readmissions were older (72 years (SD 14.72) v 71 years (SD 14.08) p=0.01) and have a diagnosis of metastatic cancer (6.6% v 4.4%; p=0.02). Of the readmitted patients who had a comorbidity, none with Severe Liver Disease had a principal readmission diagnosis of Pneumonia compared with 23% of those with Ischaemic Heart Disease, 20% with Congestive Cardiac Failure, 27% with Metastatic Cancer and 23% with Non-Metastatic Cancer.

Discussion A quarter of patients who survive to discharge following hospital admission for CAP are subsequently

readmitted within 30-days; of those, two thirds are readmitted within 2 weeks pointing to an unacceptable quality of care. Many readmissions may be preventable by measures including implementation of in-hospital cross-speciality comorbidity management, convalescence in intermediate care, targeted rehabilitation and early clinical review in the community.

S102 WHY DO PATIENTS WITH PNEUMONIA READMIT?

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10.1136/thorax-2020-BTSabstracts.107

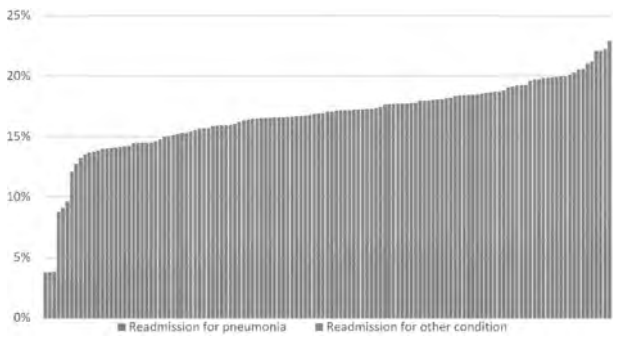
Pneumonia is a common reason for medical admission with over 100,000 cases occurring in England and an annual mortality of around 20,000 patients (ONS). Patients with chronic lung diseases such as Chronic Obstructive Pulmonary Disease (COPD) and Asthma are often readmitted within 30 days, but there is limited information about circumstances surrounding and causes of readmission in England.

As part of the 'Get It Right First Time' (GIRFT) programme we have reviewed readmissions for pneumonia in England.

Methods Using Hospital Episode Survey (HES) data in 2017/18 and 2019, we have looked at the number of admissions for pneumonia and those who were readmitted within 30 and 90 days broken down by age bracket, for each hospital in England.

Results There was only minor variation in readmission rate at 30 days between age groups, with those aged 18–40 least likely to be readmitted (12.4%), whereas, those aged 66–80 or over 80 were most likely (17.8% and 17.0% respectively). Rate of readmission at 90 days increased for all age groups, with over a quarter of those aged 66–80 and over 80 being readmitted (27.1% and 26.9% respectively). Figure 1 shows the readmissions for 146 trusts in England and the number of 30 day readmissions, highlighting the marked variability between trusts.

Approximately two thirds of readmissions are for non-pneumonia reasons. The most common reason for readmission in the 41–65 and 66–80 age groups was COPD (12% and 15.2% respectively), however other comorbidities such as heart failure were a greater cause of readmission in the 66–80 age group (4.6%). Throat pain, lower respiratory tract infection, and asthma were the commonest causes of readmission for those aged 18–40.



Abstract S102 Figure 1 Variability in rates of readmission for pneumonia and other conditions across 146 trusts in England

Discussion There is marked variability in 30 day readmission across England with age, although reasonable consistency in terms of the majority of readmissions being due to other reasons than pneumonia. The percentages for readmission in different age groups are reasonably consistent but the reasons for readmission show marked variability. Given the variety in comorbidities that patients in older age brackets have, optimising underlying conditions prior to discharge may limit the number of readmissions.

REFERENCE

1. ONS. (April 2020). *Deaths from pneumonia in hospitals, England and Wales, 2001–2018*. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/adhocs/11662deathsfrompneumoniainhospitalsenglandandwales2001to2018.

S103 BASELINE CT THORAX IN PATIENTS UNDERGOING ALLOGENEIC HAEMATOPOETIC STEM-CELL TRANSPLANTATION AND RISK OF INVASIVE FUNGAL DISEASE- A PROSPECTIVE 5-YEAR STUDY

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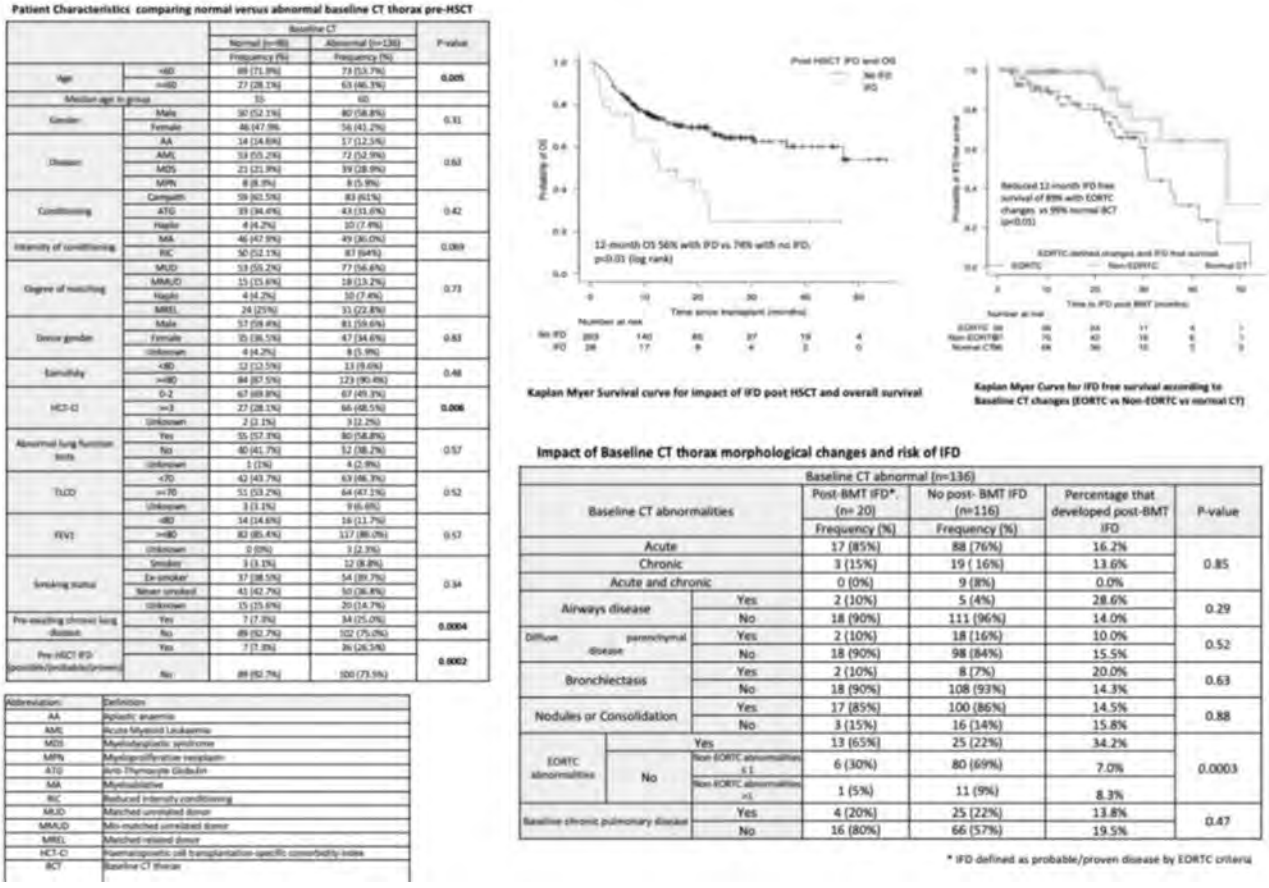
10.1136/thorax-2020-BTSabstracts.108

Invasive fungal lung disease (IFD) is a well-recognised complication post haematopoietic stem-cell transplant (HSCT), occurring in approximately 5–21% of patients, despite tri-azole anti-fungal prophylaxis. Baseline CT thorax (BCT) pre-HSCT is increasingly considered as standard practise to evaluate lung disease, however evidence on outcomes from previous studies has been limited by either small or heterogenous cohorts (Ceesay *et al* 2018, Bitterman *et al* 2019).

Kings College Hospital is one of the largest HSCT centres in the UK, as such IFD accounts for a significant patient morbidity and hospital bed days. We conducted a single centre prospective analysis of patients with myeloid malignancies and aplastic anaemia (n=350) who underwent T-cell deplete allo-HSCT between Jan 2015 and April 2019. BCT was performed in 235 patients. IFD was defined by by EORTC criteria. See figure 1 for baseline characteristics.

Post HSCT, IFD developed in 9.1% of total patients (n=32/350) and in 12.3% (n=29/235) of those who had BCT. Patients with European Platform of Cancer Research (EORTC) defined changes on BCT developed significantly more IFD (34.2% vs 9.4%, p=0.0004). Univariate analysis of baseline characteristics identified that a significantly higher proportion of those with pre-HSCT IFD developed post-HSCT IFD (33.3% vs 8.3%; P=0.003). Reduced intensity conditioning, poor baseline performance status and co-morbidities, and gas transfer (TLCO <70%) significantly influenced the development of IFD.

Abnormal BCT did not influence overall survival, however in patients with EORTC defined changes on BCT, there was a significant reduction in median IFD-free survival (30.5 months vs 47 months, p=0.009) when compared to non-EORTC and normal CT findings. There was a significant reduction in



Patient Characteristics comparing normal versus abnormal baseline CT thorax pre-HSCT

		Baseline CT		P-value
		Normal (n=88)	Abnormal (n=136)	
		Frequency (%)	Frequency (%)	
Age	<60	69 (71.9%)	73 (53.7%)	0.005
	>=60	27 (28.1%)	63 (46.3%)	
Median age in group		55	60	
Gender	Male	50 (52.1%)	80 (58.8%)	0.31
	Female	46 (47.9%)	56 (41.2%)	
Disease	AA	14 (14.6%)	17 (12.5%)	0.62
	AML	53 (55.2%)	72 (52.9%)	
	MDS	21 (21.9%)	39 (28.9%)	
	MPN	8 (8.3%)	8 (5.9%)	
Conditioning	Campath	59 (61.5%)	83 (61%)	0.42
	ATG	33 (34.4%)	43 (31.6%)	
	Haplo	4 (4.2%)	10 (7.4%)	
Intensity of conditioning	MA	46 (47.9%)	49 (36.0%)	0.069
	RIC	50 (52.1%)	87 (64%)	
Degree of matching	MUD	53 (55.2%)	77 (56.6%)	0.73
	MMUD	15 (15.6%)	18 (13.2%)	
	Haplo	4 (4.2%)	10 (7.4%)	
	MREL	24 (25%)	31 (22.8%)	
Donor gender	Male	57 (59.4%)	81 (59.6%)	0.83
	Female	35 (36.5%)	47 (34.6%)	
	Unknown	4 (4.2%)	8 (5.9%)	
Ethnicity	<80	12 (12.5%)	13 (9.6%)	0.48
	>=80	84 (87.5%)	123 (90.4%)	
HCT-CI	0-2	67 (69.8%)	67 (49.3%)	0.006
	>=3	27 (28.1%)	66 (48.5%)	
	Unknown	2 (2.1%)	3 (2.2%)	
Abnormal lung function tests	Yes	55 (57.3%)	80 (58.8%)	0.57
	No	40 (41.7%)	52 (38.2%)	
	Unknown	1 (1%)	4 (2.9%)	
TLCO	<70	42 (43.7%)	63 (46.3%)	0.52
	>=70	51 (53.2%)	64 (47.1%)	
	Unknown	3 (3.1%)	9 (6.6%)	
FEV1	<80	34 (34.8%)	16 (11.7%)	0.57
	>=80	82 (85.4%)	117 (88.0%)	
	Unknown	0 (0%)	3 (2.3%)	
Smoking status	Smoker	3 (3.1%)	12 (8.8%)	0.34
	Ex-smoker	37 (38.5%)	54 (39.7%)	
	Never smoked	41 (42.7%)	50 (36.8%)	
	Unknown	15 (15.6%)	20 (14.7%)	
Pre-existing chronic lung disease	Yes	7 (7.3%)	34 (25.0%)	0.0004
	No	89 (92.7%)	102 (75.0%)	
Pre-HSCT IFD (possible/probable/proven)	Yes	7 (7.3%)	36 (26.5%)	0.0002
	No	89 (92.7%)	100 (73.5%)	

Abbreviation:	Definition
AA	Aplastic anaemia
AML	Acute Myeloid Leukaemia
MDS	Myelodysplastic syndrome
MPN	Myeloproliferative neoplasm
ATG	Anti-Thymocyte Globulin
MA	Myeloablative
RIC	Reduced intensity conditioning
MUD	Matched unrelated donor
MMUD	Mis-matched unrelated donor
MREL	Matched related donor
HCT-CI	Haematopoietic cell transplantation-specific comorbidity index
BCT	Baseline CT thorax

Kaplan Myer Survival curve for impact of IFD post HSCT and overall survival

Kaplan Myer Curve for IFD free survival according to Baseline CT changes (EORTC vs Non-EORTC vs normal CT)

Impact of Baseline CT thorax morphological changes and risk of IFD

Baseline CT abnormalities		Baseline CT abnormal (n=136) Post-BMT IFD*. (n= 20) Frequency (%)	No post- BMT IFD (n=116) Frequency (%)	Percentage that developed post-BMT IFD	P-value
Acute		17 (85%)	88 (76%)	16.2%	0.85
Chronic		3 (15%)	19 (16%)	13.6%	
Acute and chronic		0 (0%)	9 (8%)	0.0%	
Airways disease	Yes	2 (10%)	5 (4%)	28.6%	0.29
	No	18 (90%)	111 (96%)	14.0%	
Diffuse parenchymal disease	Yes	2 (10%)	18 (16%)	10.0%	0.52
	No	18 (90%)	98 (84%)	15.5%	
Bronchiectasis	Yes	2 (10%)	8 (7%)	20.0%	0.63
	No	18 (90%)	108 (93%)	14.3%	
Nodules or Consolidation	Yes	17 (85%)	100 (86%)	14.5%	0.88
	No	3 (15%)	16 (14%)	15.8%	
EORTC abnormalities	Yes	13 (65%)	25 (22%)	34.2%	0.0003
	No: Non-EORTC abnormalities ≤1	6 (30%)	80 (69%)	7.0%	
	No: Non-EORTC abnormalities >1	1 (5%)	11 (9%)	8.3%	
Baseline chronic pulmonary disease	Yes	4 (20%)	25 (22%)	13.8%	0.47
	No	16 (80%)	66 (57%)	19.5%	

* IFD defined as probable/proven disease by EORTC criteria

Abstract S103 Figure 1

overall survival at 12 months post HSCT in those who developed IFD (62% vs 76%, p=0.001, log rank).

Previous IFD, EORTC BCT changes and abnormal TLCO pre-HSCT influence IFD related outcomes and we suggest early respiratory optimisation pre-HSCT to reduce risk of IFD-related mortality. Further evaluation of impact of interventions in patients with abnormal BCT is warranted.

S104 PREVALENCE AND CLINICAL SIGNIFICANCE OF LUNG PATHOLOGY DETECTED IN A VIRTUAL PNEUMONIA CLINIC

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10.1136/thorax-2020-BTSabstracts.109

Introduction and Objectives The British Thoracic Society recommend that all patients whose symptoms persist or those at higher risk of malignancy (smokers or aged > 50) should have a repeat chest x-ray 6 weeks after presenting with community acquired pneumonia.[1] This is based on grade D evidence. A virtual pneumonia clinic was setup in 2019 at Torbay Hospital to enable formal follow up of 6-week chest x-rays for all patients who were admitted to hospital with pneumonia. The aim of this study is to assess the outcomes of the patients reviewed in the virtual pneumonia clinic. We hypothesize that a low number of malignancies are detected through this process.

Methods The notes of all patients who were referred to the virtual pneumonia clinic from March 2019 to February 2020 were reviewed to determine the outcome of repeat imaging.

Results 408 patients, with a mean age of 71, were referred to the virtual pneumonia clinic in the 12 months from March 2019. 174 (42.6%) were referred from the respiratory ward with the remaining from other specialties. 52 patients (12.7%) did not attend the 6-week chest x-ray. 51 out of 356 that attended (14.3%) had an abnormal 6-week chest x-ray. 42 patients went on to have a further x-ray or CT as 9 patients did not attend further imaging. Of the 356, 13 patients (3.6%) had abnormal further imaging. Four patients (1.1%) were found to have malignancy, four (1.1%) pleural effusions, two (0.6%) interstitial lung disease, two (0.6%) bronchiectasis and one (0.3%) pleural thickening secondary to rheumatoid arthritis.

Conclusions Our study found that only 3.6% of patients who attended the virtual pneumonia clinic had an underlying abnormality, with only 1.1% found to have malignancy. This suggests that routinely repeating a chest x-ray at 6 weeks for all patients with pneumonia may not be an efficient use of resources in screening for malignancy.

REFERENCE
1. Lim WS, Baudouin SV, George RC, *et al*. BTS guidelines for the management of community acquired pneumonia in adults: update 2009. *Thorax* 2009;**64**: iii1–iii55.

Lungs at work: occupation and lung health

S105 STOP (THE STAFF SMOKING PROJECT): DESIGNING A SUSTAINABLE SMOKING CESSATION PROGRAMME FOR NHS STAFF

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10.1136/thorax-2020-BTSabstracts.110

Background NHS staff are an integral part in smoking cessation advice and treatment, however an estimated 73,000 NHS staff currently smoke, costing the NHS over £2,800 a year per smoker. Although NICE guidance states that NHS staff should be offered smoking cessation support on site, in work hours, this is not always the case and less than 50% of UK trusts achieve this. We designed and implemented a new smoking cessation programme at Portsmouth Hospitals University Trust, to be delivered in the workplace, during work hours and with access to on site pharmacotherapy.
Methods A randomised control trial was designed and 30 trust employees who smoke were enrolled and randomised. In the intervention group, participants completed a 13-week programme involving group and 1:1 sessions, with regular carbon monoxide monitoring and free pharmacotherapy, and the control group received standard care (self-referral to local smoking cessation services). Participants completed a series of questionnaires (e.g. self-efficacy, intention to quit, smoking behaviour) at four-time points. At the end of the intervention, participants from both groups were interviewed to discuss their experience of the intervention. Those who had been in the control group were then offered the chance to receive the intervention.
Findings At the 6-month follow up the intervention group significantly quit smoking compared to the control group (χ^2, N =21 = 7.07, p = 0.002). Of the intervention group, 9 people chose Varenicline and 6 chose nicotine replacement therapy (NRT). Three people changed from Varenicline to NRT during the study. No significant differences were found between the intervention and control cohorts in their intention to quit smoking, self-efficacy, positive and negative outcome expectancies. Participants in the intervention group enjoyed the group aspect and the support received from occupational health staff. They then became smoking cessation ambassadors, to continue this in their workplaces.
Discussion The intervention successfully helped the majority of participants to stop smoking. Based on these results, this programme has been added to the Occupational Health wellbeing programme and is running at least biannually. More interventions in NHS Trusts need to be developed to support staff to quit smoking.

S106 UNDERSTANDING THE BARRIERS AND ENABLERS TO IMPLEMENTING A SMOKE FREE SITE ACROSS ACUTE CARE TRUSTS IN GREATER MANCHESTER; RESULTS OF A HOSPITAL STAFF SURVEY

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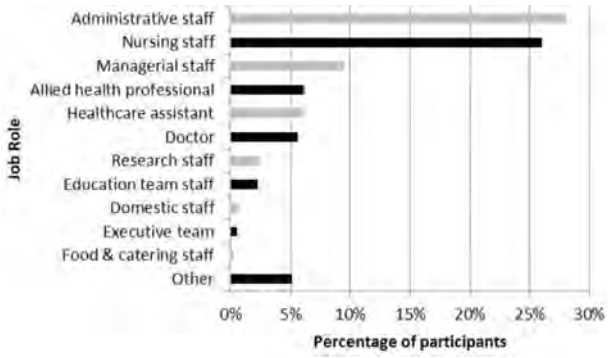
10.1136/thorax-2020-BTSabstracts.111

Introduction The current study aims to: 1) provide an understanding of smoking and vaping behaviour across acute care NHS staff, 2) understand the existing opinion and knowledge base in tobacco dependency and vaping, in order to identify barriers and enablers to implementing smoke free NHS sites.
Methods A self-reported staff survey was conducted using a 30 minute web-based questionnaire. Staff members from six acute care NHS trusts in Greater Manchester were invited to complete the survey via repeated internal email communications, screensavers with QR codes and flyers with QR codes. The majority of questions used a five-point likert scale, with a thematic analysis conducted on the qualitative data.
Results A total of 588 participants completed the questionnaire, with respondents holding a wide range of roles within their respective trusts (figure 1). 19% (114/588) of hospital staff were current smokers and 10% (61/588) were currently vaping. 26% and 39% of current smoked within 5 minutes and 30 minutes of waking respectively. 60% of smokers and 66% of vapers smoked and vaped at work respectively. Responses illustrated a strong staff support for the implementation of smoke free sites (61% and 67% agreed or strongly agreed that patients/visitors and staff should not be allowed to smoke on hospital grounds respectively) and strong support for staff smokers being offered help to stop smoking (68% agreed or strongly agreed that the hospital had a



Abstract S106 Figure 1 A bar chart, illustrating the percentage of participants within the following areas of employment within their Trust: administrative (n = 165), nursing (n = 153), managerial (n = 56), allied health professional (n = 36), healthcare assistant (n = 35), doctor (n = 33), research (n = 14), education team (n = 13), domestics (n = 4), executive team (n = 3), food & catering (n = 1) or other (n = 30). 45 respondents did not specify their job role

responsibility to provide this). The most recommended methods to achieve this were: drop-in stop smoking clinics and free access to stop smoking medications. Only 35% of staff agreed or strongly agreed that e-cigarettes were less harmful than cigarettes and 81% were either unsure or felt that e-cigarette vapour was harmful/very harmful. 41% of staff disagreed/strongly disagreed with vaping being allowed on the hospital site.

Discussion Enablers to a smoke free hospital site are the provision of comprehensive services and support for staff not to smoke at work (rather than strict enforcement of no smoking) and providing an educational package for staff regarding vaping. Barriers to a smoke free site include current negative views on vaping as a facilitator for smoke free sites.

S107 OCCUPATIONAL LUNG DISEASE SPECIALIST ASSESSMENT FOR PATIENTS WITH USUAL INTERSTITIAL PNEUMONIA, AS PART OF AN INTERSTITIAL LUNG DISEASE MULTI-DISCIPLINARY TEAM – A SINGLE CENTRE EXPERIENCE

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10.1136/thorax-2020-BTSabstracts.112

Introduction and Objectives The characteristic radiological pattern of usual interstitial pneumonia (UIP)-pattern fibrosis is common to both idiopathic pulmonary fibrosis (IPF) and asbestosis. It is essential to exclude asbestosis when deciding on a working diagnosis of IPF, as the medical treatment for each condition differs. Currently, only patients with IPF are eligible for NICE-approved anti-fibrotic treatment, but medicolegal compensation may be available for patients with asbestosis.

Between January -December 2019, we piloted a service arranging an Occupational Lung Disease (OLD) specialist assessment for all new patients with UIP-pattern fibrosis and a previous exposure to asbestos, prior to review in the Interstitial Lung Disease (ILD) clinic, to estimate the prior asbestos exposure in fibre/ml/years, in order to firmly diagnose or exclude asbestosis.

Methods Referrals were received directly from primary or secondary care, or following ILD multidisciplinary team (MDT) discussion. Patients were then assessed by an OLD specialist, where a detailed occupational history was taken and each case was discussed between two consultants in the clinic MDT meeting. If asbestosis was excluded then subsequent review in the ILD clinic was arranged to consider anti-fibrotic treatment. If a diagnosis of asbestosis was made, medicolegal advice was offered.

Results A total of 67 patients were seen by an OLD specialist team (mean age 80, 95% male). 39 (58%) were radiologically probable UIP pattern. 23 (59%) were diagnosed with asbestosis. Of these, 21 (91%) were given medicolegal advice in clinic (if a prior compensation claim had not already been made). 2 (9%) patients with asbestosis were referred for Nintedanib on the compassionate access scheme. The remaining 16 (41%) had MDT-ratified IPF. Out of which 8 (50%) were initiated on antifibrotic medication in the OLD clinic by the ILD team.

Conclusions We demonstrated that introducing specialist OLD assessment into the review of patients with UIP-pattern fibrosis aids accurate diagnosis of asbestosis, facilitating the provision of medicolegal advice. In patients where asbestosis was excluded and the diagnosis was IPF, by initiating anti-fibrotic medication in clinic supported by the ILD team, we were able to ensure patients still received prompt and appropriate management of their IPF.

S108 OUTCOMES OF FIREFIGHTER APPLICANTS WITH A HISTORY OF ASTHMA

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10.1136/thorax-2020-BTSabstracts.113

Introduction Firefighters work in a 'safety critical role' and undergo comprehensive pre-employment screening. Applicants with a history of asthma (often made in childhood) are regularly referred to our specialist occupational lung disease service for additional assessment including measurement of non-specific bronchial hyper-responsiveness (NSBHR).

No studies have reported the impact of a pre-existing asthma diagnosis on future employment as a firefighter; most have studied current firefighters[1] or others in safety critical roles.[2] We sought to identify factors associated with a positive NSBHR test amongst UK firefighter applicants, and to link these to symptoms and employment status around one year later.

Methods We reviewed case notes for all firefighter applicants referred between 2005–2019; we defined NSBHR as a fall in FEV_1 of at least 20% (provocation concentration (PC)20) following inhalation of <8 mg/ml histamine. Around one year after their initial appointment we contacted them for follow up, including enquiring about their application outcome and current respiratory symptoms.

Results Clinical data were available on 120 applicants of whom 19 (16%) had a positive NSBHR test (see table 1).

Follow-up data were available on 116 applicants. Those with a positive NSBHR test (n=17; 14.7%) were less likely to be accepted into the fire service than those with a negative test (76.5% vs 95.0% respectively, p=0.026). However, of the 4 with a positive NSBHR and not accepted by the fire service, only 2 were due to asthma. Of the 90 serving firefighters at follow-up, only 2 (2.2%) reported any recent trouble with asthma.

Conclusions NSBHR is associated with atopy and a lower FEV_1 but it was not otherwise possible to predict NSBHR. Although many applicants had a history of asthma and 16% a positive NSBHR result, encouragingly, only two individuals' applications were rejected due to their asthma; individuals with a history of asthma should not be deterred from applying to become a firefighter. Specialist assessment may be useful in determining evidence of asthma amongst firefighter applicants prior to recruitment.

REFERENCES

1. Miedinger D. *Chest*, 2007;**131**:1760–1767.
2. Miedinger D. Clinical & Experimental Allergy, 2010;**40**:224–231.

Abstract S108 Table 1 Findings stratified by NSBHR test result (data are presented as n(%) unless otherwise stated. P-values are calculated excluding the 'not recorded' data)

	All n=120	NSBHR+ (PC20 <8 mg/ml) n=19	NSBHR- (PC20 ≥8 mg/ml) n=101	P-value
Male	105 (87.5)	16 (84.2)	89 (88.1)	0.705
Age, median (range)	26 (23–31)	29 (22–35)	26 (23–31)	0.375
Smoking				
Current	9 (7.5)	0 (0.0)	9 (8.9)	
Ever	24 (20.0)	5 (26.3)	19 (18.8)	0.334
Never	81 (67.5)	14 (73.7)	62 (66.3)	
Not recorded	6 (5.0)	0 (0.0)	6 (5.9)	
Atopic to common aeroallergens				
Yes	87 (72.5)	18 (94.7)	69 (68.3)	
No	19 (15.8)	0 (0.0)	19 (18.8)	0.038
Not recorded	14 (11.7)	1 (5.3)	13 (12.9)	
Self-reported atopic disease				
Yes	74 (61.7)	17 (89.5)	57 (56.4)	
No	23 (19.2)	1 (5.3)	22 (21.8)	0.063
Not recorded	23 (19.2)	1 (5.3)	22 (21.8)	
Adult symptoms/treatment				
Yes	84 (70.0)	15 (79.0)	69 (68.3)	
No	34 (28.3)	4 (21.1)	30 (29.7)	0.590
Not recorded	2 (1.7)	0 (0)	2 (2.0)	
Last treatment as an adult (any)				
Never	47 (39.2)	4 (21.1)	43 (42.6)	
> 1 year ago	25 (20.8)	3 (15.8)	22 (21.8)	0.062
<1 year ago	42 (35.0)	11 (57.9)	31 (30.7)	
Not recorded	6 (5.0)	1 (5.3)	5 (5.0)	
Childhood asthma (treatment and/or diagnosis)	100 (83.3)	14 (73.7)	86 (85.2)	0.219
FEV_1%predicted; mean (sd)	101.09 (12.5)	93.1 (15.5)	102.6 (11.3)	0.002
FVC% predicted; mean (sd)	110.8 (12.0)	106.6 (15.2)	111.7 (11.2)	0.090
FEV_1/FVC, mean (sd)	0.78 (0.09)	0.74 (0.06)	0.79 (0.09)	0.023

S109 IS COVID-19 AN OCCUPATIONAL DISEASE?

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10.1136/thorax-2020-BTSabstracts.114

Aim To retrospectively analyse current occupation in patients needing higher level respiratory support (Continuous Positive Airway Pressure) for COVID-19 to determine if certain occupational groups were seen more frequently and considered higher risk in this cohort.

Background NHS workers during the first wave of COVID-19 infections in 2020 were frequently highlighted in news and media stories in the UK as having an occupational risk for developing infection. The effect occupation has on the likelihood of developing severe COVID-19 infection defined as requiring ventilator support in a district hospital setting is unknown.

Data collection All patients admitted to the respiratory ward in a district general hospital with COVID-19 and who required CPAP between 01/04/2020 and 12/05/2020 were included. We collected data on their age, gender, ethnicity and occupation.

Results In total, 16 patients were identified. The demographics are shown below:

Occupation

- NHS/Care workers - 8
- Taxi drivers - 2
- Teachers - 2
- Unemployed - 2
- Video game designer - 1
- Unknown - 1

Gender

- Male - 11
- Female - 5

Age

- Range 35 to 70
- Mean - 55.6
- Median - 58

Ethnicity

- White British - 9
- African - 5
- Chinese - 1
- Other White background - 1

Discussion 50% of the cohort who required CPAP ventilation worked in the NHS, and 75% of the cohort worked in occupations that could be considered high risk as they would routinely be in contact with people who may be carrying COVID-19. This included NHS/care workers, taxi drivers and teachers. The NHS and care workers had a wide range of

roles. There is also a clear gender difference with most patients being male and the majority of patients were aged >55 as reported elsewhere.

Conclusion Patients with COVID-19 who required CPAP were more likely to work in occupations such as the NHS or taxi driving. While it is not possible to say how strong the link is due to our small sample size, we believe our data supports that COVID-19 infection should be considered an occupationally related disease.

S110 WHAT GOOD CAME OUT OF THE COVID-19 EPIDEMIC? A CLUSTER OF CASES WITH OCCUPATIONAL LUNG DISEASE

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10.1136/thorax-2020-BTSabstracts.115

The Covid-19 epidemic has resulted in many workers having prolonged periods away from work, opening an opportunity to clarify the effect of occupational exposures on workers with equivocal diagnoses, and the effectiveness of previous relocation of workers with confirmed occupational asthma. However, investigations have been confounded by many clinics and physiology departments not running during the epidemic. We report a cluster of cases from an office building where previous investigations including two workplace visits with the ventilation engineer and a workplace challenge had been equivocal, but where prolonged periods away from work clarified the occupational cause for the symptoms. The index case was an intelligence officer (forensic computing) who developed cough and recurrent episodes of 'bronchitis' and voice change within weeks of moving into a large air-conditioned office with air supply delivered from the suspended floor and separate cooling delivered through the ceiling. Oasys ABC analysis of serial PEF records showed one positive timepoint (outside the 95% CI for days off work) in the evening after work but a negative ABC score and normal diurnal variation. A second record showed similar results (one late positive timepoint) making it highly likely that the changes were associated with work.

Figure 1 shows the mean 2-hourly PEF on workdays (crosses) and days away from work (squares). The lower grey line shows the 95% CI for days away from work from the Oasys plotter. The mean of 11 workdays between 1830–20.30 is significantly lower than the 16 days away from work.

At least two others working nearby were affected, a computer programmer had similar work-related symptoms and a data information officer more obviously asthmatic symptoms. The building has been closed during the epidemic and all substantially improved and are currently repeating PEF measurements, which are the only physiological tests readily available at present. The nature of the disease in the index case remains unclear. The PEF changes could be the very earliest indication of occupational asthma, could be due to hypersensitivity pneumonitis, which usually results in bigger PEF changes, or could represent occupational upper airways disease, but the late fall in PEF is unusual.

Living with and caring for respiratory disease during COVID-19

S111 RESPIRATORY PATIENT EXPERIENCE OF MEASURES TO REDUCE RISK OF COVID-19: FINDINGS FROM A DESCRIPTIVE CROSS-SECTIONAL UK WIDE SURVEY

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10.1136/thorax-2020-BTSabstracts.116

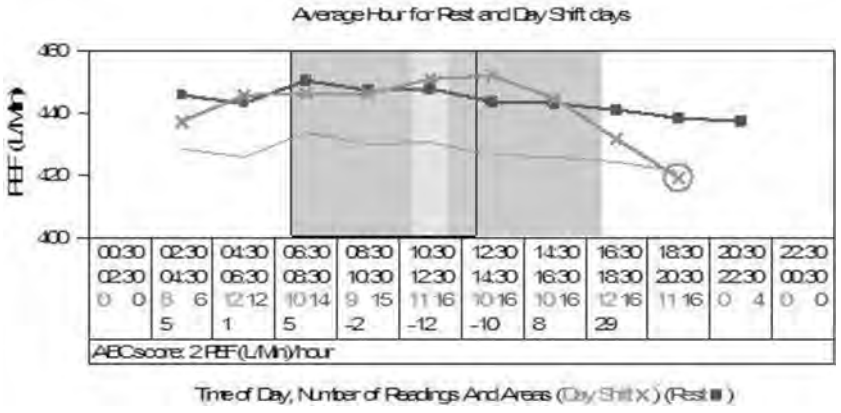
Objectives To assess the experience of people with long-term respiratory conditions regarding the impact of measures to reduce risk of COVID-19.

Design Analysis of data (n=9,515) from the Asthma UK and British Lung Foundation partnership COVID-19 survey collected online between 1st and 8th of April 2020.

Setting Community

Participants 9,515 people with self-reported long term respiratory conditions. 81% female, age ranges from ≤17 years to 80 and above, from all nations of the UK. Long term respiratory conditions reported included asthma (83%), Chronic Obstructive Pulmonary Disease (COPD) (10%), bronchiectasis (4%), Interstitial Lung Disease (ILD) (2%), and 'other' (<1%) (e.g. lung cancer and pulmonary endometriosis).

Outcome measures Study responses related to impacts on key elements of health care, as well as practical, psychological and



Abstract S110 Figure 1

social consequences related to the COVID-19 pandemic and social distancing measures.
Results 45% reported disruptions to care, including cancellations of appointments, investigations, pulmonary rehabilitation, treatment, and monitoring. Other practical impacts such as difficulty accessing healthcare services for other issues, and getting basic necessities such as food, were also common. 36% did not use online prescriptions and 54% had not accessed online inhaler technique videos. Psycho-social impacts including anxiety, loneliness and concerns about personal health and family were prevalent. 81% reported engaging in physical activity. Among the 11% who were smokers, 48% reported they were planning to quit smoking because of COVID-19.
Conclusions COVID-19 and related social distancing measures are having profound impacts on people with chronic respiratory conditions. Urgent adaptation and signposting of services is required to mitigate the negative health consequences of the COVID-19 response for this group.

S112 COVID-19 RELATED CONCERNS OF PEOPLE WITH LONG-TERM RESPIRATORY CONDITIONS: A QUALITATIVE STUDY

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10.1136/thorax-2020-BTSabstracts.117

Background The COVID-19 pandemic is having profound psychological impacts on populations globally, with increasing levels of stress, anxiety, and depression being reported, especially in people with pre-existing medical conditions who appear to be particularly vulnerable. There are limited data on the specific concerns people have about COVID-19 and what these are based on.
Methods The aim of this study was to identify and explore the concerns of people with long-term respiratory conditions in the UK regarding the impact of the COVID-19 pandemic and how these concerns were affecting them. We conducted a thematic analysis of free text responses to the question 'What are your main concerns about getting coronavirus?', which was included in the British Lung Foundation/Asthma UK (BLF-AUK) partnership COVID-19 survey, conducted between the 1st and 8th of April. This was during the 3rd week of the UK's initial social distancing measures.
Results 7,039 responses were analysed, with respondents from a wide range of ages, gender, and all UK nations. Respondents reported having asthma (85%), COPD (9%), bronchiectasis (4%), interstitial lung disease (2%), or 'other' lung diseases (e.g. lung cancer) (1%). Four main themes were identified: 1) vulnerability to COVID-19; 2) anticipated experience of contracting COVID-19; 3) wide-reaching uncertainty; and 4) inadequate national response.
Conclusions The COVID-19 pandemic is having profound psychological impacts. The concerns we identified largely reflect objective, as well as subjective, aspects of the current situation. Hence, key approaches to reducing these concerns require changes to the reality of their situation, and are likely to include i) helping people optimise their health, limit risk of infection, and access necessities; ii) minimising the negative experience of disease where possible, iii) providing up-to-date, accurate and consistent information, iv) improving the government and healthcare response.

S113 TELEPHONE CONSULTATION – THE PATIENT PERSPECTIVE

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10.1136/thorax-2020-BTSabstracts.118

Background Our regional assisted ventilation service has a cohort of almost 1000 patients receiving Long Term Ventilation (LTV) in the community. The clinical review of these patients has historically been delivered in the outpatient setting, either at the base hospital or at outreach clinics elsewhere in the region. During the early part of the COVID-19 pandemic, it was recognised that face-to-face contact with this shielded group of patients was impractical, therefore the routine outpatient review was replaced with a telephone consultation. Patients who required urgent assessment or review were prioritised, and were seen face-to-face either in the outpatient department or in the community, observing strict infection prevention and control measures in either setting.
Objective To gain an understanding of the perspective of LTV patients about their clinical review being provided by telephone.
Method We sent a survey to 930 patients asking:

- Whether they had received a telephone consultation during the last few months
- If so, to score how helpful the telephone consultation was
- Whether they would consider changing some of their future consultations to telephone/video
- To score what their preferred method of consultation would be in the future

Results We received feedback from 355 respondents who had participated in a telephone consultation. Most patients (98%) rated their telephone consultation as helpful. 66% would consider changing their future consultation to telephone review. When asked about future management, one third would prefer face-to-face consultation, one third would prefer telephone review and one third would prefer a mixture of both.
Discussion Throughout the COVID-19 pandemic, due to reduced face-to-face clinical contact, LTV patients have demonstrated a significant level of independence in self-managing their health care. This is an opportunity to embrace the flexibility in the way health care delivery has evolved during this time.
Conclusion The patient perspective on how their health care is delivered is critically important. LTV services will continue to need to apply clinical judgement when organising their patient review process, but this feedback demonstrates that most patients would be happy for telephone consultations to replace some, if not all, of the face-to-face review they have previously had.

S114 CLINICIAN AND PATIENT PERSPECTIVES OF TELEPHONE CONSULTATIONS DURING COVID-19 PANDEMIC

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10.1136/thorax-2020-BTSabstracts.119

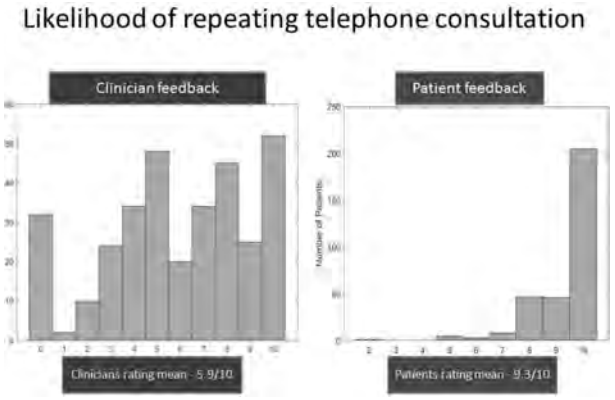
Introduction COVID-19 has significantly reduced clinicians practice to undertake face to face outpatient clinics and telephone consultations have become the new normal. We have undertaken a survey of clinicians and patients opinions on telephone consultations.

Methods Survey questionnaires were filled by the clinicians who had undertaken the clinics and subsequently patients had phone calls asking how they felt about the consultation. Consultations were performed between Mar 2020 –May 2020 and we obtained responses from 319 clinicians and patients.

Results Clinician's feedback- 36.5% felt they were unable to clinically assess the patients. 12% of patients had to be telephoned more than once as no initial response was obtained. Negative comments included: patient not had investigations by time of consultation; patient was not expecting a phone call, difficult telephone conversation, unable to communicate because of patient hearing problems or poor phone line, unable to communicate as patient had learning disability or mental illness, language barrier and family translating for patient.

Patient's feedback- 44% felt seeing clinician face to face is better than telephone consultations. 29% felt telephone clinics are better and 28% were unsure. Overall positive feedback noted in 71.5%.

Conclusions In our cohort of patients during the COVID-19 pandemic, patients were more satisfied than clinicians with telephone consultations. This survey also highlighted the positives and negatives related to undertaking telephone consultations. We need to address the negative points as it is expected that the telephone consultations will continue for the foreseeable future even after face to face consultations are resumed.



Abstract S114 Figure 1

S115 'WE, WHO HAVEN'T BEEN DIAGNOSED, ARE SORT OF OUT OF THE PICTURE…' BREATHLESS WITHOUT A DIAGNOSIS: THE UK COVID-19 LOCKDOWN EXPERIENCE

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10.1136/thorax-2020-BTSabstracts.120

Aim To describe experiences during the COVID-19 pandemic of people living with chronic breathlessness without a diagnosis.

Methods As part of a wider mixed methods study (Breathlessness - DiagnosE Early in Primary care: Breathe-DEEP), semi-structured interviews were undertaken with people referred

Abstract S115 Figure 1 Results Table: Themes and quotes for interviews during UK lockdown for COVID-19

Theme 1. Unintentional de-prioritisation of diagnosis by patients.

'I mean obviously you don't want to be phoning the doctors, because they're there only for emergency now' (Participant 5)

'I ain't getting any healthcare at the moment. You know, I won't bother the doctors with this at the moment... And I wouldn't want to go doctors to be seen because I wouldn't, there's a risk of catching anything.' (Participant 19)

'…it's inhibited me from going to see my GP to try and get kind of follow-up on what's going on.' (Participant 18)

'Yeah they just said they'll contact me when it's possible to start doing things again, you know, because it's not an urgent thing.' (Participant 7)

Theme 2. Following the guidance for the general population – is this enough?

'General guidance, yes, that helps, but mostly for my health. I'm maybe a little bit frightened in case, I think if I got it I wouldn't get over it because of my breathing. And yes when you can't get your breath it is frightening, so I think that's, obviously I don't want to go just yet so.' (Participant 19)

'It feels like you're being a bit of a bother for nothing, because I've not been actually diagnosed you see… So we don't even know what we're meant to be doing... So we're stuck.' (Participant 5)

'Because I have said to my husband, if I get this, it's going to be serious because I have problems breathing anyway.' (Participant 28)

Theme 3. Impact of lockdown on coping strategies for managing breathlessness.

Engaged coping

'I mean like I said I'm doing exercises nearly every day and practising yoga…'(Participant 27)

'Yeah I've got a lady who comes on the tablet and she does yoga with me, tells me what to do. I do that twice a week.' (Participant 22)

Disengaged coping

'It is very depressing not being able to go out anywhere. Even though I can't walk that far without getting out of breath, I could still visit people, you know… but now I can't at the moment, it's just being indoors all the time.'' (Participant 14)

'It affects you mentally when you can't see anybody, because obviously my strategies for my mental health are going out and things.' (Participant 5)

for investigation of chronic breathlessness across ten GP practices. The interview guide included questions around experiences of breathlessness, healthcare interactions and the impact of COVID-19 pandemic. Telephone interviews were audio-recorded, transcribed, coded and reviewed by the study team using thematic analysis.

Results Over six weeks during the UK lockdown for the COVID-19 pandemic, 20 participants were interviewed (12 female, mean age 65 yrs). Five participants lived alone, two were working and three recently received a confirmed diagnosis for their breathlessness. None of the participants experienced COVID-19. Three key themes were identified.

1. Unintentional de–prioritisation of diagnosis by patients. The COVID–19 pandemic has led to a reduction in seeking healthcare for this group. Some described their breathlessness as a 'non–urgent' problem, and others felt worried about burdening their GP and the National Health Service (NHS) at this time.
2. Following UK 'lockdown' guidance for the general population, is this enough? This group are not identified as vulnerable but have a clear perception that they are at increased risk if they were to contract COVID–19.
3. Impact of lockdown on coping strategies for managing breathlessness. People have expressed modified behaviour to help them cope with lockdown. Some people are obliged by the nature of lockdown to use disengaged coping strategies which has a negative impact on managing their breathlessness and mental health.

Conclusion The existing unpredictable pathway to diagnosis for people living with chronic breathlessness has been further interrupted during the COVID-19 pandemic. People expressed concern about only following general population advice, rather than shielding, due to not having a diagnosis. Patients and clinicians need to re-engage with the pathway to diagnosis and management of chronic breathlessness.

S116 RESILIENCE, ANXIETY AND DEPRESSION IN NURSES WORKING IN RESPIRATORY AREAS DURING THE COVID-19 PANDEMIC

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10.1136/thorax-2020-BTSabstracts.121

Nurses who work with respiratory patients, have been at the forefront of the pandemic response. Lessons need to be learnt from these nurses' experiences in order to support these nurses during the existing pandemic and retain and mobilise this skilled workforce for future pandemics.

This study explores UK nurses' experiences of working in a respiratory environment during the COVID-19 pandemic. We distributed an e-survey via professional respiratory societies [Association of Respiratory Nurse Specialists (ARNS), British Thoracic Society (BTS) and the Primary Care Respiratory Society (PCRS)] and social media in May 2020. The survey included a resilience scale, the GAD7 (anxiety) and the PHQ9 (depression) tools.

255 complete responses were received, predominately women (89%), aged over 40 (71%). Over 95% of the respondents were white, with a very small sample of BAME. 58% usually worked in an acute setting, 57% had changed their role due to the pandemic, and 49% were undertaking aerosol generating procedures. There were significant differences in anxiety and depression scores for those undertaking aerosol generating procedures (both $p<0.001$) and who worked in different clinical settings (depression only, $p<0.05$) Just over 50% experienced minimal symptoms of anxiety, 28.3% experienced mild symptoms and just over 20.9% experience moderate-to-severe symptoms. Nearly 52% experienced minimal depression symptoms, 30.9% experienced mild symptoms and 17.2% experienced moderate-to-severe symptoms. 45.8% had a moderate or moderately high resilience score. Regression analysis showed that being younger, having fewer years of nursing experience, and feeling unable to support your household were key predictors of increased symptoms of anxiety and depression.

This is the first UK study to look at resilience in nurses working in respiratory clinical areas during the COVID-19 pandemic. The average resilience scores were moderate – indicating some resilience which needs strengthening. Age and experience were shown to be significant predictors of resilience. Anxiety and depression levels were low but a proportion of respondents had high levels of anxiety and depression. Our findings show that younger, BAME, less experienced nurses have higher levels of anxiety and depression. We need to develop interventions to support them and help staff to maintain and improve their levels of resilience.

An update in lung cancer: interventions and outcomes

S117 EARLY OUTCOMES FROM THE MACMILLAN SCOTTISH MESOTHELIOMA NETWORK – A NATIONAL MULTIDISCIPLINARY TEAM FOR SCOTLAND

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10.1136/thorax-2020-BTSabstracts.122

Introduction The Macmillan Scottish Mesothelioma Network was launched in April 2019, funded by a consortium of partners, including Macmillan Cancer Support, Mesothelioma UK and NHS Greater Glasgow & Clyde. The network funds sessional time for Lead Clinicians, Clinical Nurse Specialists and administrative support in Glasgow, Edinburgh, Dundee, Aberdeen and Inverness, and coordinates a weekly video-linked MDT meeting. We retrospectively reviewed MDT activity and outcomes over the first 12 months of operations.

Methods All 42 MDTs held between 12.4.19–03.4.20 were reviewed retrospectively, using referral and MDT documentation and electronic case records.

Results 223 patients from 25 Scottish hospitals were referred, prompting 331 case discussions. 89% (n=199) were male. The median age was 74 years. 140/223 (63%) patients described asbestos exposure. 181/223 patients were diagnosed with Mesothelioma. Performance status was recorded in 210/223 94% of cases, and was 0–1 in 148/223 (66%). 203/223 (91%) had histological sampling, which was definitive in 198/203 (98%) patients, via the following methods: Surgical Thoracoscopy (64/203 (32%)), Local Anaesthetic Thoracoscopy (54/203 (27%)), image-guided biopsy (63/203 (31%)), Abrams biopsy (6/203 (3%)), unrecorded (16/203 (8%)). Standard histology was supplemented by molecular studies in 34% cases (BAP1 in 59/203 (29%): P16 FISH in 37/203 (18%) resulting in the following sub-typing: Epithelioid (68%), Biphasic (13%), Sarcomatoid (12%), Desmoplastic (2.4%), Undifferentiated (1.2%) Transitional (0.6%). Disease stage was recorded 87% of MPM cases (54% stage 1, 10% stage II, 24% stage III, 12% stage IV). 16/203 (8%) patients had Peritoneal mesothelioma.

Clinical trials, including MARS2, CONFIRM, ATOMIC-Meso, INFINITE, SYSTEMS2, TRIZELL, MESO-Trap were recommended in 84/181 (46%) patients. 26/84 (31%) patients were recruited, most frequently to MARS2 trial, representing 16% of the MPM population. A Palliative Care specialist was present for 32/42 (76%) MDT meetings, facilitating direct palliative care referral in 52/223 (23%) patients.

Conclusion This review demonstrates the value of a fully funded national clinical network and associated MDT. Over the first 12 months of operation the network has provided high quality diagnostic services and a consistent approach to therapeutic options, based on international guidelines. Ensuring equitable access to a broad portfolio of clinical trials will remain a major priority for the network.

S118 INTERVENTIONS FOR THE MANAGEMENT OF MALIGNANT PLEURAL EFFUSIONS: A NETWORK META-ANALYSIS

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10.1136/thorax-2020-BTSabstracts.123

Introduction and Objectives Wider availability of interventions such as indwelling pleural catheters (IPCs) has increased the range of treatment approaches for patients with malignant pleural effusion (MPE). We have updated the 2016 Cochrane review to define the optimal management strategy for MPE in terms of pleurodesis success. Secondary outcomes were adverse events, breathlessness, quality of life, cost, mortality, survival, duration of inpatient stay and patient acceptability.

Methods Databases (including CENTRAL, MEDLINE and Embase) were searched to June 2019 for randomised controlled trials of intrapleural interventions for adults with symptomatic MPE. We performed network meta-analysis (NMA) of primary outcome data and secondary outcomes with sufficient data, and pairwise meta-analysis of direct comparisons. Sensitivity analyses explored causes of heterogeneity. We assessed the certainty of evidence using GRADE.

Results Our primary NMA on pleurodesis failure included 55 studies of 21 interventions. The pleurodesis failure rate of talc poudrage (TP) compared to talc slurry (TS) was similar (OR 0.50, 95% Cr-I 0.21, 1.02), with direct meta-analysis demonstrating comparable breathlessness control (100 mm visual analogue dyspnoea scale mean difference 4.00 mm, 95% CI -6.26, 14.26).

IPCs were less likely to effect a pleurodesis than TS (OR pleurodesis failure 7.60, 95% Cr-I 2.96, 20.47). Daily IPC drainage or instillation of talc via IPC may enhance

Abstract S118 Table 1

Summary of findings for the primary outcome: pleurodesis failure rate in adults with malignant pleural effusion

Total studies: 55 **Total participants:** 3758 **No. interventions in network:** 21	**Relative effect** **Odds ratio** **(95% Cr-I)** Network estimate	**Relative effect *** **Odds ratio** **(95% Cr-I)** Network estimate from studies at low risk of bias	**Anticipated absolute effect (95% Cr-I) ****		**Interpretation of findings**
			With talc slurry	**With intervention**	
Talc slurry	Reference comparator1.	Reference comparator	18 failures per 100 participants (11 to 24)	Not estimable	Reference comparator
Talc poudrage	0.50 (0.21 to 1.02)	0.78 (0.16 to 2.08)	18 failures per 100 participants (11 to 24)	10 failures per 100 participants (4 to 19)	Probably comparable
Bleomycin	2.24 (1.10 to 4.68)	3.93 (1.10 to 16.94)	18 failures per 100 participants (11 to 24)	32 failures per 100 participants (17 to 52)	May be inferior
IPC - not daily drainage	7.60 (2.96 to 20.47)	8.60 (2.26 to 30.15)	18 failures per 100 participants (11 to 24)	62 failures per 100 participants (36 to 82)	Probably inferior
Doxycycline	2.51 (0.81 to 8.40)	1.89 (0.32 to 8.84)	18 failures per 100 participants (11 to 24)	35 failures per 100 participants (13 to 65)	May be inferior
Placebo	15.90 (3.76 to 79.90)	17.46 (3.33 to 97.26)	18 failures per 100 participants (11 to 24)	77 failures per 100 participants (42 to 95)	Probably inferior

Footnotes:
* Network estimate from sensitivity analysis of studies at low risk of bias. These data are included within the summary of findings to reflect the ORs and Cr-Is from the network estimates in which we have the greatest level of certainty in the evidence.
** Calculated using data from primary outcome network of pleurodesis failure.

pleurodesis rates. In direct meta-analysis, participants with an IPC required fewer repeat invasive pleural procedures than those receiving TS pleurodesis (OR 0.25, 95% CI 0.13, 0.48) with comparable breathlessness control (mean difference -6.12 mm, 95% CI -16.32, 4.08). Networks evaluating fever, pain and mortality found uncertain evidence of minimal differences between interventions.

Heterogeneity was reduced in sensitivity analysis of studies at low of risk of bias.

We summarised our data using summary of findings tables (see table 1).

Conclusions This is the largest systematic review of the evidence for interventions for MPE in the literature. Our updated NMA, demonstrating that TS, TP and IPCs offer comparable breathlessness control, highlights the importance of informed patient choice. IPCs confer a lower risk of requiring a repeat invasive pleural procedure. Future research to determine the healthcare utilisation associated with IPC use, including potential burden of community drainages would be beneficial.

S119 PRE-OPERATIVE NODAL STAGING OF NON-SMALL CELL LUNG CANCER AND RISK OF LUNG CANCER RECURRENCE IN THE WEST OF SCOTLAND

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10.1136/thorax-2020-BTSabstracts.124

Introduction Precise staging of non-small cell lung cancer (NSCLC) determines initial treatment and provides more accurate prognostic information for patients.

Aim To determine presurgical nodal staging accuracy and its effect on 2-year recurrence in a cohort of patients who had modern staging investigations including Positron Emission Tomography–Computed Tomography (PET-CT) and Endobronchial Ultrasound (EBUS).

Methods Patient data were prospectively collected from 11 local MDTs. We included consecutive patients in the West of Scotland who underwent surgical resection from 2015 to 2017. Clinical and pathological nodal stages were recorded and compared and we investigated the effect of nodal stage change on recurrence. Recurrence at two years was determined using electronic case notes.

Results 973 patients had complete data and fulfilled the inclusion criteria. Concordance between clinical and pathological nodal staging was achieved in 783 patients (80%). 123 patients (13%) were pathologically upstaged, and 67 (7%) were downstaged post-surgery.

In 173 patients with clinical N1 or N2 disease on CT or PET-CT, invasive mediastinal staging was indicated according to the current National Institute for Health and Care Excellence (NICE) guidance. Among those patients, staging EBUS was performed in 55 patients (32%) and mediastinoscopy in 5 patients. 113/173 (65%) did not undergo invasive staging. After adjusting for covariates, age (odds ratio (OR)=1.05, p=0.02) and staging EBUS (OR=2.0, p<0.05) were independent predictors of staging accuracy.

Inaccurate clinical nodal staging was associated with increased risk of disease recurrence 2 years post-surgery, independent of pathological nodal stage. This was the case for both post-surgical upstaging (p<0.05) and downstaging (p=0.001) (Table 1).

Abstract S119 Table 1 Logistic regression analysis of factors for 2-year post-surgical recurrence in patients for non-small cell lung cancer

		Hazard ratio	95% confidence interval	p-value
Pathological nodal stage	N0	1		
	N1	1.91	1.11–3.28	0.02
	N2	4.43	2.45–8.01	
Nodal stage	Unchanged	1		0.001
	Post-surgical downstaged	2.38	1.39–4.05	0.001
	Post-surgical upstaged	1.82	1.01–3.27	<0.05

*Age, sex, performance status, location of the primary tumor, approach and type of surgery, histology, waiting time until surgery and the diagnosis year were not significant on univariate analysis.

Conclusions A significant minority of patients had incorrect preoperative nodal staging which could be improved with staging EBUS in accordance with the NICE guideline. Inaccurate preoperative nodal staging was associated with a higher disease recurrence rate 2 years post-surgery, independent of pathological nodal stage.

S120 OUTCOMES FOR LUNG CANCER SURGERY IN OCTOGENARIANS. DO THEY DO WORSE THAN THEIR YOUNGER COHORT?

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10.1136/thorax-2020-BTSabstracts.125

Introduction and Objectives Management of Octagenarians with lung cancer is an ever-increasing clinical scenario, with surgery often regarded as high risk. Understanding the short and long term outcomes of lung cancer surgery in this cohort is fundamental to refine our assessment and management in this group. We aimed to assess the length of stay (LOS) on intensive care, in hospital, postoperative morbidity and mortality of lung cancer surgery in this group.

Methods A retrospective analysis of all of patients aged 80 and over undergoing lung cancer surgery at our tertiary cardiothoracic centre between 2015 and 2018 was conducted. 176 patients were identified and analysed for performance status (WHO-PS), stage, pathological subtype, length of stay (LOS) and mortality at 30, 90 and 365 days.

Results 47% of patients were male and 53% female with a mean (SD) age of 82 (2.2). The vast majority (81%) underwent an open procedure. The median LOS in intensive care (ICU) was 1 day (IQR 0–2) with only 1 patient being readmitted to ICU. The median LOS was 6 days (IQR 4–9). Overall 30 day mortality was 3.8% and decreased throughout the years from 6.8% in 2015 to 2.5% in 2018. Survival at 1 year was 86% in 2015 and 95% in 2018. (Table 1) Overall 1 year survival (92.7%) was higher than the all age survival (88.7%) quoted in the national lung cancer audit data (2016).[1] The commonest cause of death in this cohort was post-operative

Abstract S120 Table 1 Post-operative LOS, mortality and complications

LOS ICU (days)	0–67 (mean 2.5, median 1, IQR 0–2)
LOS Total (days)	2–34 (mean 8.2, median 6, IQR 4–9)
Mortality 2015–2018 (%) (N=176)	
30 day	7 (3.9)
90 day	9 (5)
365 day	13 (7.3)
Cause of Death (% of all deaths)	
Disease Reoccurrence	4(31)
Death during post-operative period	7(54)
Disease Progression	2(15)
Cause of Post-operative Death (% of post-operative deaths)	
Aspiration	3(43)
Stroke	1(14)
Hospital Acquired Pneumonia	2(29)
Unclear	1(14)

complications including aspiration (n=3), hospital acquired pneumonia (n=2) and stroke (n=1). Other causes of death included disease reoccurrence accounting for 31% of all deaths and disease progression.

Conclusions Octagenarians who are suitable for surgery with curative intent have short ICU stays, slightly higher than average overall stays but comparable survival rates at 30, 90 and 365 days to their peers, suggesting good selection equates to good outcomes. Streaming lung cancer pathways, refinement of high-risk MDT processes and recognition of the need for pre-operative optimisation with management of co-morbidities and onco-geriatric support has improved this.

REFERENCE

1. The National Lung Cancer Audit report 2016. London: RCP; 2016. Royal College of Physicians.

S121 RESECTION MARGINS AND PATTERNS OF RECURRENCE FOLLOWING SURGICAL RESECTION OF NON-SMALL CELL LUNG CANCER

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10.1136/thorax-2020-BTSabstracts.126

Background Failure to gain complete microscopic resection (R0) for Non-Small Cell Lung Cancer (NSCLC) affects prognosis and guides further treatment. There is a lack of data regarding the impact of pattern of disease recurrence and the proposed uncertain resection margin status (R(Un)).

Methods A single institute retrospective analysis of patients undergoing resection of NSCLC between 01/04/2008 and 30/3/2017. Data was retrieved from case and histopathology records. The certainty of resection margin (R0 vs R(Un)) was derived. The pattern of first recurrence (PoR, defined as locoregional or distant) was determined from digitally held radiology records. Correlations were assessed between continuous and categorical variables, using standard statistical methods. Survival and recurrence-free survival differences were assessed using univariate and multivariate analysis models.

Results After the exclusion of non-anatomic resections, second primary NSCLCs or new non-pulmonary cancers within the follow-up period, 1503 patients remained within the study. After a minimum follow up period of 38 months, 514 (34.1%) had tumour recurrence and 691 (46.0%) were alive. There were correlations between PoR and grade of tumour differentiation (p=0.002), T-Stage (p<0.001), N-Stage (p<0.001) and Conventional R-Status (p<0.001). There was no difference in PoR between R(Un) and R0 cases. A Locoregional pattern at first recurrence was strongly prognostic of survival in univariate and multivariate analyses (median survival 42 vs 67 months, HR 2.55, p<0.001). T stage, N stage and the presence of lymphatic invasion were independent predictors for the presence of disease recurrence.

Conclusion The correlations with PoR were as expected. However, whilst R(Un) has previously been shown to have a worse prognosis than R0, R(Un) was not associated with increased locoregional recurrence or a reduced time to recurrence. A distant PoR at first recurrence was strongly negatively prognostic compared to other patterns of recurrence.

Abstract S121 Table 1 Proposed R-status and pattern of first recurrence

	Pattern of First Recurrence N (% of Cases)			Chi-Squared Locoregional vs Distant
Proposed R-Status	**No Recurrence**	**Locoregional**	**Distant ± Locoregional**	0.122
R0	411 (69.5)	79 (13.4)	101 (17.1)	
R(Un)	505 (66.3)	134 (17.6)	123 (16.1)	
R1	73 (48.7)	43 (28.7)	34 (22.7)	

S122 RELATIONSHIP OF PDL1 HISTOLOGICAL FINDINGS TO PROGNOSIS AND IMMUNOTHERAPY RESPONSE IN NSCLC: A SYSTEMATIC REVIEW

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Introduction/Objectives Therapies targeting Programmed Death 1 (PD1) or its ligand (PDL1) are licensed for the management of advanced non-small cell lung cancer (NSCLC), and are currently recommended according to baseline tumour PDL1 expression. However, biopsy sampling biases and inconsistent correlation with patient outcomes suggest this biomarker may be unreliable, thus preventing patients likely to benefit from receiving this therapy. Therefore, we sought to determine the correlation between PDL1 expression and risk of death among patients with NSCLC receiving PD1 and PDL1 immunotherapy and identify alternative correlates of effectiveness.

Methods In this systematic review, six databases were searched for randomised controlled trials (RCTs) and observational studies investigating nivolumab, pembrolizumab, atezolizumab or durvalumab. Study selection was performed independently by two reviewers. In this secondary analysis, risk of death pertaining to any reported baseline characteristic was analysed both by meta-analysis and descriptively. The primary results pertaining to treatment efficacy are reported separately.

Results 39 studies were included. In 24 of these studies, PDL1 tumour proportion score (TPS) had an unclear relationship

Abstract S122 Table 1 Meta-analysed risk of death among patients in real-world observational studies

Patient or disease characteristic	n	Risk of death (HR, 95% CI)	p value	I^2 value
PDL1 TPS				
<1% vs ≥ 1%	4	0.64 (0.39 – 1.04)	0.07	11%
NSCLC histology				
Non-squamous vs squamous	2	0.50 (0.27 – 0.91)	0.02	9%
Squamous vs. adenocarcinoma	2	0.88 (0.47 – 1.66)	0.70	59%
Metastases				
Liver metastases vs. none	2	1.63 (1.27 – 2.10)	0.0002	0%
CNS metastases vs. none	4	1.89 (1.11 – 3.54)	0.02	87%
Bone metastases vs. none	3	1.42 (0.87 – 2.30)	0.16	79%
Any metastases vs. none	9	1.69 (1.23 – 2.32)	0.001	88%
ECOG PS				
2 vs 0 – 1	3	1.95 (1.54 – 2.48)	0.44	0%
0 – 1 vs 2	2	0.44 (0.20 – 0.95)	0.10	64%

with risk of death. Among RCTs, patients with a PDL1 TPS ≥10% or ≥50% had a lower risk of death than patients with PDL1 TPS <1%. However, observational studies directly comparing PDL1 TPS <1% to ≥1% found no significant difference (Table 1).

Additional factors correlating with risk of death included presence of metastases, EGFR mutation status, ECOG performance status (PS) and the neutrophil-to-lymphocyte ratio (NLR) (Table 1). Unlike the RCTs, numerous real-world studies found patients with metastases had a significantly higher risk of death. In RCTs, EGFR wildtype patients had a lower risk of death. In observational studies, a higher ECOG PS and NLR were associated with a higher risk of death.

Discussion Our results suggest the current PDL1 threshold for stratifying patients may be redundant. This is problematic because immunotherapy has potential to harm patients and is very costly. However, we also identified several additional correlates of effectiveness which may be better indicators of patient prognosis. Therefore, future research could apply these findings to local cohorts, to test more suitable ways to stratify patients to receive this therapy.

Clinical considerations in ILD

S123 PLEUROPARENCHYMAL FIBROELASTOSIS: CLINICAL, FUNCTIONAL AND MORPHOLOGIC DETERMINANTS OF MORTALITY

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Introduction and Objectives Progressive pleuroparenchymal fibroelastosis (PPFE) is associated with a high symptom burden and frequently co-exists with a separate interstitial lung disease. The prognostic impact of such combinations is unclear and the clinical and computed tomographic (CT) determinants of mortality remain poorly characterised.

Methods Patients with a diagnosis of PPFE (2004–19) were retrieved from the Royal Brompton Hospital ILD databases. CTs were evaluated for radiologic features, including: 1) the cranio-caudal extent and the severity of PPFE; 2) the hilar position (ratio of the lung apex to the 'hilar point' distance/lung apex to the diaphragmatic dome distance); 3) upper lobe volume loss, and 4) presence of co-existent ILD.

Results 139 patients (75 [54%] female; median age 63.5, IQR 52–71.5) were evaluated, including 51 (36.7%) with idiopathic PPFE, 41 (29.5%) with concomitant idiopathic UIP, 17 (12.2%) with hypersensitivity pneumonitis and 8 (5.8%) with autoimmunity. Histopathological information was available in 50 (36%) patients, including from 39 surgical biopsies. 51 deaths were recorded among 130 patients with longitudinal data, yielding a median survival of 3 years. The mean severity of PPFE was negatively correlated with hilar position (r = -0.38, $P<0.0005$). Unadjusted hazard ratio (HR) analysis for mortality showed: age (HR 1.03 [95% CI: 1.01–1.05; $P<0.01$), DLco (HR 0.97 [95% CI: 0.95–0.99; $P=0.01$), composite physiologic index/CPI (HR 1.04 [95% CI: 1.01–1.07; $P<0.005$), right and left upper lobe volume loss (HR 0.97 [95% CI: 0.95–0.99]; $P<0.01$ and HR 0.95 [95% CI: 0.92–0.99; $P<0.005$, respectively) and the average of the right and left hilar position (HR 1.08 [95% CI: 1.04–1.13; $P<0.0005$). Although PPFE severity ($P<0.001$) and co-existent ILD ($P<0.0005$) were revealed as determinants of the hilar position ($R^2=0.26$), multivariable adjustment confirmed that only CPI (HR, 1.04 [95% CI: 1.00–1.07; $P<0.05$), increased age (HR, 1.03 [95% CI: 1.01–1.06; $P=0.01$) and mean hilar position (HR, 1.06 [95% CI, 1.01–1.12; $P=0.02$) independently predicted mortality.

Conclusions Patients with progressive PPFE have a poor outcome, with a median survival that is comparable to IPF. Identifiable and measurable changes in specific clinical, physiologic and radiologic parameters appear to characterise the adverse prognostic profile of these individuals.

S124 AZITHROMYCIN FOR SARCOIDOSIS COUGH: AN OPEN LABEL EXPLORATORY TRIAL

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Introduction and Objectives Cough is a distressing symptom for some patients with pulmonary sarcoidosis. Long term treatment with azithromycin may improve cough. We aimed to assess potential efficacy of azithromycin in patients with pulmonary sarcoidosis with self-reported cough.

Methods We did a non-controlled, single arm, open label clinical trial of azithromycin 250 mg once daily for 3 months in patients with pulmonary sarcoidosis who reported a chronic cough. The primary outcome was 24-hour cough count using an automated home-based cough recorder. Secondary outcomes were cough visual analog scales (VAS) and scores on the Leicester Cough Questionnaire (LCQ) and King's Sarcoidosis Questionnaire (KSQ). Safety outcomes included QTc interval on ECG. Measurements were made at baseline and at 1 and 3 months on treatment.

Results All 21 patients were white, median age 57 years, 9 males/12 females, median 3 years since diagnosis. Five were taking oral steroids and no patients were taking other immunosuppressants. 20 patients completed the trial.

The median (range) number of coughs in 24h was 228 (43–1950) at baseline, 122 (20–704) at 1 month, and 81 (16–414) at 3 months (p=.002, Friedman's test). The median reduction in cough count at 3 months was 49.6%. There were improvements in all patient-reported outcomes. Azithromycin was well tolerated.

Conclusions In a non-controlled, open-label trial in people with sarcoidosis who reported a chronic cough, 3 months of treatment with azithromycin led to improvements in a range of cough metrics. Azithromycin should be tested as a treatment for sarcoidosis cough in a randomised placebo-controlled trial.

S125 ESTABLISHING PRESCRIBING HABITS AND COMPLICATION AWARENESS OF NITROFURANTOIN, AND THE IMPACT OF ADVERSE EFFECTS FOLLOWING PROPHYLACTIC PRESCRIPTION

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Introduction Nitrofurantoin (NF) is prescribed for urinary tract infections (UTIs). Associated adverse pulmonary and hepatic side-effects are known. Current monitoring guidelines[1] [2] lack specific recommendations for monitoring. This work formed part of a clinical effectiveness project to raise awareness of side effects of prophylactic NF and allow recommendations for monitoring.

Methods We undertook 1) Audit (1st-31st July 2020) of GP surgeries in local clinical commissioning group (CCG) who prescribed prophylactic NF and assessed their monitoring habits. (2) Assessment of GPs' and urologists' prescribing habits and awareness of complications associated with prophylactic NF. (3) Audit of patients diagnosed with nitrofurantoin-induced interstitial lung disease (NFILD) by our ILD center (2014–2020).

Results 503 patients in local CCG were prescribed prophylactic NF at time of audit. 265/503 were on prophylaxis for 0–2 years, 40% of these for >6 months to 2 years. Of those patients on NF >6 months to 2 years, 45% received no monitoring, 21% received both lung and liver monitoring, 20% received only liver monitoring and 14% received only lung. 238/503 patients were on prophylaxis for >2 years; in this cohort 20% received no monitoring, 44% received both lung and liver monitoring, 21% received only liver monitoring and 15% received only lung.

Of 125 questionnaire respondents prescribing prophylactic NF, 82% were GPs and 12% urologists. 47% followed CCG guidelines whilst 38% followed national guidelines. 58% were aware of liver complications and 72% aware of respiratory. However, 41% and 53% were never monitored for liver and lung complications respectively.

Our centre diagnosed 46 patients with NIILD. 80.4% were female, mean age 72 years. 70% were prescribed NF for recurrent UTIs and 58.7% were prescribed for >6 months. Of this cohort, 61% displayed resolution (complete/with minimal fibrosis) on HRCT following removal of NF, 16% developed fibrosis and 23% showed no interval change. There was no difference in subset analysis of those treated with steroids from those not.

Conclusion NF complications can bear significant impact on patient's health. Improving awareness and monitoring is crucial and must be addressed. Increased clarity of monitoring guidelines will circumvent side effects of NF.

REFERENCES

1. https://bnf.nice.org.uk/drug/nitrofurantoin.html
2. https://remedy.bnssgccg.nhs.uk/media/3207/recurrent-utis-in-women-may-17.pdf

S126 THE PHARMACIST-LED ACCELERATED TRANSFER OF PATIENTS TO SHARED CARE FOR THE MONITORING AND PRESCRIBING OF IMMUNOMODULATORY THERAPY DURING COVID-19

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Introduction and Objectives Shared care allows for optimal local management of patients with support and guidance from the specialist secondary/tertiary care multidisciplinary teams. Implementing shared care for patients managed with immunomodulatory medicines by an interstitial lung disease (ILD) service was accelerated during the COVID-19 pandemic to minimise the risks associated with travelling to a specialist clinic for consultation, monitoring and supply of medication.

Methods Patients were deemed eligible for shared care if they had been prescribed a stable dose of immunomodulatory medication included in the shared care guideline for 3 months. The specialist pharmacist(s) sought permission from the patient and requests were sent to general practitioners (GPs) with a primary care decision form to be returned within 2 weeks. Reminders were sent for shared care responses not received within this timeframe. All patients that had shared care accepted were transferred to GP for the monitoring and supply of immunomodulatory therapy. All other patients were monitored remotely and had medications supplied via specialist centre.

Results Of 352 eligible patients, 350 agreed to requesting shared care with primary care providers for immunomodulatory medication(s). Acceptance of shared care was received for 226 patients (65%) and refusal for 17 patients (5%). The barriers to transferring care included no response from GP (104 patients, 30%), hospital only status of medicine under local Clinical Commissioning Group (CCG), patient deemed complex by GP and/or poor adherence.

Conclusions This study demonstrates how different healthcare providers worked together effectively to deliver high standards of integrated care, tailored to the individual needs of patients with ILD, during the COVID-19 pandemic. Uptake of shared care could be improved by direct communication pathways with GPs, increased education in the management of immunomodulatory medicine(s) for primary care providers and review of CCG categorisation of medicines included in the shared care agreement. Shared care may improve accessibility to medicines and reduce environmental impact. We suggest further studies to assess monitoring in primary care, patient feedback, impact on specialist clinic capacity and financial implications.

S127 OROPHARYNGEAL SWALLOWING PATHOPHYSIOLOGY IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS: A CONSECUTIVE DESCRIPTIVE CASE SERIES

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Introduction Research into swallowing dysfunction (dysphagia) in IPF is limited. Dysphagia is seen in other respiratory conditions such as COPD, increasing the risk of pulmonary complications secondary to aspiration.

Aim Explore the oropharyngeal swallow of IPF patients.

Methods Ten consecutive IPF patients from the Newcastle Interstitial Lung Disease clinic were recruited. Each had videofluoroscopy, and were given measured amounts of food and drink. Videofluoroscopies were analysed using validated scales: Penetration-Aspiration Scale (PAS); Modified Barium Swallow Impairment Profile (MBSImP).

Abstract S127 Figure 1 Videofluoroscopy indicating accumulation of Barium-labelled liquid in oropharyngeal cavity with penetration (arrowed) in IPF patient.

Results Seven males, three females, mean age 66 (52–78) were recruited. Three had airway penetration. One aspirated liquid without a cough response. Mean MBSImp for oral impairment was 4 (95%CI 4–4) and pharyngeal impairment 8.3 (95%CI 5.6–11.0), indicating mild alterations to swallowing physiology.

Conclusion To our knowledge, this is the first report on Swallowing Pathophysiology in IPF. We believe a proportion of this group may be at risk of aspiration. Further work is indicated to fully explore swallowing in this vulnerable group.

S128 WHAT IS BEST IN THE FOLLOW UP OF UNCLASSIFIABLE PULMONARY FIBROSIS?

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Current UK guidelines suggest at least 1 year of follow-up for Unclassifiable Pulmonary Fibrosis (UPF), to identify those who develop progressive lung disease, and require therapeutic intervention. There is no reliable evidence base as to the optimum duration of follow-up. The aim of this study was to determine appropriate follow up duration, and which investigations were most informative.

A tertiary Interstitial Lung Disease (ILD) centre, UPF patients over a 8 year period (2011–2019), and a contemporaneous group of IPF patients (diagnosed at ILD MDT) were identified. Parameters collated included lung function (PFTs), oxygen saturations, symptoms, and review duration.

Diagnosis revision in the UPF group was recorded, as was its trigger (radiology, serology, symptom/PFT decline). All patient deaths were recorded, and where possible, cause of death.

Mean difference in baseline PFT values between IPF and UPF were estimated by t-tests. Linear regression models were used to estimate the mean difference adjusting for baseline values. Kaplan-Meier survival curves were calculated for IPF and UPF patients. Standard deviation and boxplots were used to describe the distribution of PFT parameters in each group.

Abstract S128 Table 1

Mean baseline values of PFTs for IPF and UFP patients & mean difference

	IPF		UPF			
	N	Mean% predicted (SD)	N	Mean% predicted (SD)	Difference (95% CI)	P
FEV1	529	86.3 (19.8)	162	97.4 (19.9)	-11.1 (-14.6, -7.6)	<0.001
FVC	679	79.3 (19.2)	175	95.3 (19.9)	-16.1 (-19.3, -12.8)	<0.001
TLC	423	67.8 (13.1)	119	81.6 (14.5)	-13.9 (-16.6, -11.1)	<0.001
DLCO	494	48.3 (14.0)	136	62.6 (14.4)	-14.3 (-17.0, -11.7)	<0.001

Decline in PFTs (absolute decline%/year) in IPF and UPF groups

	IPF		UPF				
	N	Mean absolute decline%/year (SD)	N	Mean absolute decline%/year (SD)	Difference (95% CI)	Difference adjusted for baseline (95% CI)	P
FEV1	396	4.7 (15.5)	132	1.1 (9.8)	3.6 (0.8, 6.4)	4.5 (1.6, 7.4)	0.002
FVC	554	6.4 (17.3)	134	0.4 (11.0)	6.0 (2.9, 9.0)	7.8 (4.6, 11.0)	<0.001
TLC	202	3.3 (6.7)	71	2.2 (6.0)	1.0 (-0.7, 2.8)	1.5 (-0.5, 3.4)	0.14
DLCO	233	6.2 (9.4)	77	3.8 (6.3)	2.4 (0.2, 4.7)	2.5 (-0.03, 5.0)	0.053

Results are presented (table 1). It can be seen that the difference in the rate of decline in FEV1 (p= 0.002) and FVC (<0.001) when comparing the IPF to the UPF group was significant. This decline is documented in the literature, demonstrating our patient population is reflective of that described. There was a significantly smaller percentage of deaths in the UPF group (11%) than in the IPF group (50%). Fewer UPF deaths were attributable to a respiratory cause than in the IPF group.

19/201 of UPF group had a diagnosis revision, 10/19 had a treatment alteration post revision. 2 year follow up would have missed 2 patients with a management plan alteration post revision. However, the trigger was symptom deterioration in both patients; both were self identifying.

We propose UPF follow-up be for 2 years, with periodic PFT and symptom monitoring. After this, further follow-up is not necessitated, as there is not a clinically significant progression, resulting in a beneficial intervention.

Sleep and ventilation: masks …. need help!

S129 SOCIAL DEPRIVATION APPEARS TO BE A BARRIER TO REFERRAL FOR INVESTIGATION OF OBSTRUCTIVE SLEEP APNOEA

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Background We are investigating access to sleep services for OSA knowing there are large numbers undiagnosed in the community. In the Track and Know project (EU-AG780754) we analysed referrals for OSA assessing the impact of social deprivation.

Methods We tested the null hypotheses that: per capita equal numbers are referred from areas of high and low deprivation and the threshold for referral is the same regarding symptoms and severity of OSA. People referred were divided approximately equally between 5 groups by the index of multiple deprivation (IMD) score associated with their postcode. This initial analysis compares characteristics between the quintiles from areas with highest and lowest IMD.

Results The records of 3912 people referred for investigation of OSA in 2019 were examined. There were 780 in the group from the most and 750 from the least deprived areas. OSA risk factors and sleep study outcomes are shown in table 1. Patients from the most deprived areas were more likely to be obese, have diabetes and smoke. Per capita fewer people were referred to our service from areas with a high IMD score than from more prosperous areas and were more symptomatic, less likely to have normal sleep studies and more likely to have severe OSA (ODI >30).

Conclusions Our results show that living in an area of high social deprivation acts as a barrier to referral for sleep diagnostics. These areas are likely to be home to more retired people and have been associated with higher levels of obesity and so we would expect a higher not lower incidence of OSA compared to average or more prosperous regions. In our cohort people from these disadvantaged areas are likely to be more symptomatic and have worse sleep apnoea when referred than people from areas of low deprivation. More 'worried well' people are referred from areas with lower social deprivation. We plan to investigate next whether these differences are driven by the knowledge and attitudes of the GP referrers or the patients so that focused interventions can be implemented to reach undiagnosed people from these areas improving equity of access to treatment.

S130 CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) COMPLIANCE IN OBSTRUCTIVE SLEEP APNOEA/OBESITY HYPOVENTILATION SYNDROME PATIENTS: CAN WE USE DIGITAL DATA TO IDENTIFY PREDICTORS OF COMPLIANCE?

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Background CPAP is an effective first-line treatment for moderate to severe sleep-related breathing disorders such as Obstructive Sleep Apnoea Syndrome (OSAS) and Obesity Hypoventilation Syndrome (OHS). Modern CPAP devices

Abstract S129 Table 1 Comparison between people referred from high and low deprivation areas. Data shown as means (SD), compared using unpaired T tests. Proportions compared using Chi square - marked as *. BMI = body mass index, ESS = Epworth sleepiness scale score, ODI = oxygen desaturation index 24% per hour overnight.

	High deprivation area	Low deprivation area	P value
IMD range	(24.06 - 92.73)	(00.86 - 07.95)	
Referred	n = 785	n = 780	
n per 10,000	5.7	6.6	0.005
Age (years)	50.5 (14.5)	51.8 (14.7)	0.114
Sex (% male)	60.3	64.0	0.187
BMI (kg/m2)	36.8 (9.6)	33.3 (8.5)	<0.00001
BMI >40	31.0%	16.4%	<0.001*
Diabetes mellitus (type II)	16.8%	8.4%	<0.001*
Current smoker	20.9%	10.6%	<0.0002*
ESS	12.0 (5.8)	10.9 (5.4)	0.001
ODI (per hr)	14.6 (193)	11.9 (17.2)	0.011
ODI< 5 (per hr)	35%	45%	<0.001*

Abstract S130 Table 1 Unadjusted generalised linear models to show associations with usage days/90 for all participants (n=200)

Characteristics	β (95% confidence interval)	P
Age	0.811 (-0.346, 0.508)	0.710
Female	-0.120 (-11.4, 11.2)	0.983
IMD (n=198)	0.001 (-0.0001, 0.001)	0.102
Hypertension (n=198)	1.44 (-9.87, 12.8)	0.803
Diabetes Mellitus (n-198)	10.1 (-5.3, 25.4)	0.199
Atrial Fibrillation (n=198)	7.01 (-15.3, 29.3)	0.538
Cardiovascular disease (n=198)	-0.221 (-18.2, 17.7)	0.981
Pulmonary disease (n=198)	-8.41 (-20.8, 4.02)	0.185
Mental Health (n=198)	-10.5 (-21.7, 0.710)	0.066
AHI	0.228 (0.019, 0.437)	0.032
ODI	0.259 (0.034, 0.484)	0.024
ESS at time of diagnosis (n=198)	-0.279 (-1.289, 0.729)	0.588
Maximum average leak (90 days) L/min (n=146)	-0.435 (-0.702, -0.168)	0.001

Where data is missing, numbers of participants with available data are shown in brackets

allow for remote collection of in-depth digital data including compliance and mask leak.

Aims To report trends in compliance in a large sleep service cohort; to attempt to identify predictors of poor compliance; and to highlight patients at risk of treatment failure, ensuring more tailored follow-up is implemented.

Methods Data from 5.776 OSAS/OHS patients, collected over a five-year period was acquired via ResMed AirView. Full compliance was defined as CPAP usage >75% of nights monitored, and >75% of nights monitored, CPAP was used for >4 hours. Individual data has been collected on 200 patients to date including demographics, past medical history, compliance, mask leak and diagnostic sleep study results.

Results Of 5,776 patients, 2,686 were deemed fully compliant. Analysis suggests that patients who are fully complaint or non-compliant at 28 days will remain as compliant (or non-compliant) over time. Rise in non-compliance over time may be explained by 'partially compliant' patients becoming non-compliant at ~18–24 months. Preliminary analysis of individual patient data suggests that maximum average leak (L/min) (p=0.001), greater AHI (p=0.032) and greater ODI (p=0.024) are associated with poorer compliance.

Conclusions Large scale compliance data provides an opportunity to improve patient care by identifying individuals who may have certain risk factors for treatment non-compliance. Identifying these individuals could allow sleep services to develop a targeted follow-up pathway, focusing resources on those patients needing greater input.

S131 THE EFFECT OF TELEMONITORING ON IMPROVING CONCORDANCE WITH CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) IN OBSTRUCTIVE SLEEP APNOEA (OSA)

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Introduction Improving concordance with CPAP therapy has been the central challenge in the management of OSA. Some benefits of CPAP demonstrated in clinical trials, especially the cardiovascular ones, are difficult to deliver in real life due to the lack of concordance. We set out to analyse the effect of a Telemonitoring(TM)-related intervention on concordance as part of a quality improvement project.

Methods Concordance was defined as being compliant (70% of night with ≥4 hours), being adherent (expressed as percentage of nights patient attempted CPAP use) and having an average usage of ≥4 hours. Concordance was checked in the cohort of patients commenced on CPAP Feb-Mar-Apr 2019 (historical 'controls' before active intervention with TM: n=142) and the TM cohort commenced on CPAP in May-Jun-July 2019 (n=166). The 'control'-cohort received standard care with clinic follow up whereas the TM-intervention cohort received a phone-call or letter 4 weeks post CPAP set up with feedback on their usage. Concordance at 30 days and 90 days were checked for both cohorts. Age, gender, Epworth Sleepiness score (ESS), body mass index (BMI) and apnoea-hypopnoea index (AHI) at diagnosis were recorded for all patients.

Results The historical 'control' and TM-cohorts showed no significant difference in age, gender, AHI, ESS. Wilcoxon Rank Test and Mann-Whitney U-test were used for statistical analysis (results reported as mean±SD). There was a significant reduction in compliance (56 ±36 Vs 52±39% of days ≥4 hours; p=0.0072), average usage (255 ±152 Vs 236±163 Minutes; p=0.0003) and adherence (79±25 Vs 70±34% of days use; p=0.0001) in the 'control'-cohort compared to the baseline at 90 days. There was a significant increase in compliance (50.84 ±32.6 Vs 56.1±37.2% of days ≥4 hours; p value= 0.0075) and average usage (234 ±134 Vs 252 ±156 Minutes; p value= 0.0456) in the TM-intervention cohort compared to the baseline, though adherence (73 ±29 Vs 74 ±34% of days use; p=0.221) was not significant.

Conclusion Telemonitoring is effective at improving overall concordance with CPAP therapy, suggesting its potential beneficial role in the community setting. Future studies are needed to see how sustainable the improvements in concordance are.

S132 LATE FAILURE AND RELAPSE IN PATIENTS RECEIVING NON-INVASIVE VENTILATION FOR EXACERBATIONS OF COPD: A UK PROSPECTIVE STUDY

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Introduction In patients treated with non-invasive ventilation (NIV) for exacerbations of COPD (ECOPD), late failure, defined as recurrent respiratory acidaemia during NIV but after 24 hours following normalisation of pH, or relapse, defined as recurrence of respiratory acidaemia during admission but after 24 hours following cessation of NIV, are associated with poor survival and frailty.[1] However, the UK

Abstract S132 Table 1

	Total Population (n=733)	Late Failure (n=45)	Relapse (n=52)
Age*	70.5(9.3)	72.4 (7.7)	69.7 (9.4)
eMRCD†	5a(4–5a)	5a(4–5a)	5a (4–5a)
FEV_1% predicted*	37.2% (15.39)	35.3% (14.5)	34.3 (13.6)
LTOT^	28.6%	37.8%	42.3%‡
Body Mass Index†	24.1 (19.6–29.7)	21.9 (17.6–26.5)‡	22.1 (18.7–26.0)
Previously had acute NIV^	35.9%	46.7%	36.5%
Left Ventricular Systolic Dysfunction^	14.1%	24.4%‡	23.1%
Atrial Fibrillation^	18.7%	17.8%	25.0%
Chest X-Ray Consolidation^	38.1%	35.6%	44.2%
NIV decision pH†	7.27 (7.22–7.30)	7.26 (7.23–7.30)	7.26 (7.22–7.30)
NIV decision $PaCO_2$†	9.60 (8.20–11.60)	10.50 (9.20–12.70)‡	10.00 (8.65–12.17)
NIV decision HCO_3^-*	30.5(6.8)	34.7 (7.5)‡	31.4 (7.2)
NIVO Score	3 (2-5)	3 (2–5)	3 (2–5)
Hospital Mortality	20.1%	35.6%‡	40.4%‡

*Mean (SD), comparisons with t-test. †Median (IQR), comparisons with Mann Whitney U test. ^Percentage of population, comparisons with Chi Square test. ‡Significant ($p<0.05$) difference from the population not experiencing this outcome. eMRCD= extended medical research council dyspnoea score; FEV_1= Forced expiratory volume in 1 second; NIV=Non-invasive ventilation; pH= potential of Hydrogen; $PaCO_2$= partial pressure of carbon dioxide; HCO_3= bicarbonate; NIVO score= Non-invasive ventilation outcomes score.

prevalence and outcome of late failure and relapse is unknown.

Methods Unique, consecutive patients who had spirometry confirmed ECOPD requiring NIV for respiratory acidaemia were prospectively recruited to the NIV Outcomes study (ISRCTN22921168) in 10 NHS trusts. The prevalence and outcomes of patients with late failure and/or relapse was investigated.

Results Of the 733 patients recruited, 41(5.6%) developed late failure alone, 48(6.5%) experienced relapse alone and 4 (0.5%) developed both. The time to late failure was 2.8(1.8–5.8) days from NIV starting and 2.3(1.5–3.6) days from initial pH correction. Population descriptors are shown in the table 1. Following late failure, NIV was continued in 95.6% of patients, with 60% having changes to ventilatory settings and 31.1% having changes to improve patient-ventilator synchrony. Only 2.2% were invasively ventilated following late failure. Overall hospital mortality was 31.7% in late failure patients, 37.5% in patients who relapsed and 75% if both occurred. This compares with 17.7% mortality in patients without late failure or relapse.

Discussion Late failure and/or relapse is relatively common, occurring in around 10% of NIV patients and is associated with worse hospital mortality. Both the prevalence of late failure, and inpatient mortality are lower here than described in a previous single centre study.[2]Patients with late failure/relapse tend towards worse lung function, lower BMI, more LTOT and left ventricular systolic dysfunction. The majority continued on NIV following optimisation of ventilatory settings, and 60–70% survived to discharge. It may be that in patients who have optimised NIV (ventilator settings or synchrony) failure to improve is not due to failure of the ventilatory interface (NIV rather than invasive ventilation), but rather failure of the lungs due to the severity of the underlying disease and acute insult.

REFERENCES

1. Lancet Respir Med 2018;**6**:935–47
2. *Thorax* 2000;**55**(10):819–25

S133 BI-LEVEL POSITIVE AIRWAY PRESSURE (BIPAP) CAN BE USED TO MANAGE TREATMENT RESISTANT OBSTRUCTIVE SLEEP APNOEA (OSA) AND EARLY OBESITY HYPOVENTILATION SYNDROME (OHS)

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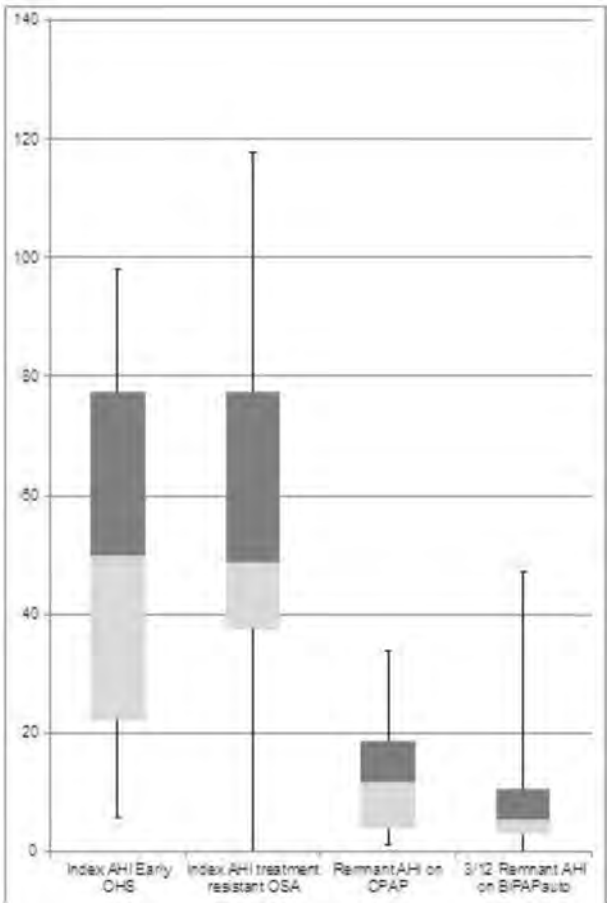
Introduction and Objectives Treatment resistant OSA results in a remnant apnoea hypopnea index (AHI) and/or ongoing nocturnal hypoxia despite continuous positive airway pressure (CPAP) therapy. Early OHS patients present with overnight hypoxia and/or hypercapnia related to obesity. The BiPAPauto device (Philips Respironics, Murraysville) delivers a maximum pressure support of 8 cmH2O via spontaneous mode ventilation. Our aim was to assess the short term effectiveness of the BiPAP auto for treatment resistant OSA and early OHS.

Methods Data were collected retrospectively from patients commenced on BiPAPauto between Jan 17-Sept 19. Demographics, spirometry, capillary blood gas (CBG), baseline and remnant AHI and, compliance were collected from patients records and BiPAP auto data downloads.

Results 64 patients were treated with BiPAPauto; M:F(49:15), age 57±14 years. 42% (n=27) were previously treated with CPAP and had severe OSA (mean AHI 52) with hypoxia (mean Total Sleep Time SpO2 <90%= 44%) and were daytime eucapnic (mean $PaCO_2$5.36kPa).

The commonest reasons for commencing BiPAPauto were: 1) hypoxia on the index sleep study (n=25 (37.5%)); 2) a remnant AHI on CPAP (n=13 (20.3%); 3) ongoing hypoxia on CPAP (n= 11 (17.2%). Other reasons for commencing BiPAPauto treatment included; intolerance of CPAP (n=4), daytime hypercapnia $PaCO_2$ >6.5kPa (n=3), remnant AHI and ongoing hypoxia on CPAP (n=2), remnant AHI and high CPAP pressures (n=1), stepped down from NIV (n=1) and persistent Type II respiratory failure with excessive mask leak (n=1).



Abstract S133 Figure 1

There was a trend towards a higher index AHI for patients with treatment resistant OSA. There were improvements in AHI (mean difference 44.5(26.7), 95% CI 36.53 to 52.56, p<0.001) (figure 1.) and Epworth Sleepiness Score (mean difference 6(95% CI 2.08 to 9.92) p=0.008) three months after commencing BiPAP auto treatment compared to initial treatment. 3 patients required change in treatment to non-invasive ventilation.

Conclusion BiPAPauto is an effective alternative PAP therapy. Our data suggest BiPAPauto is more effective and better tolerated than CPAP for patients where CPAP is ineffective in controlling their sleep disordered breathing. Further phenotyping of sleep disordered breathing is required to identify which PAP therapy is most appropriate for patients.

S134 WHAT ARE THE LONG TERM OUTCOMES FOR PATIENTS USING NON-INVASIVE VENTILATION (NIV) FOR CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) FAILURE?

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Introduction Current evidence is inconclusive in recommending mode of positive airways pressure (PAP) for the treatment of obesity related respiratory failure (ORRF). We wished to understand the phenotype of patients failing Continuous Positive Airway Pressure (CPAP) and to evaluate whether treatment escalation improved patient outcomes. CPAP Failure was defined as; a high remnant Apnoea Hypopnoea Index (AHI) despite CPAP, persistent hypercapnia or hospital admission with type 2 respiratory failure (T2RF).

Aim To assess whether Non-invasive Ventilation (NIV) improves Apnoea Hyponoea index (AHI), $PaCO_2$, compliance and somnolence at one year in patients who have failed CPAP therapy.

Methods We retrospectively identified 91 patients between July 2011 and August 2019 in whom CPAP had failed and been exchanged for NIV. 36 patients had baseline data available at the time of their switch to NIV. We explored patient records to identify phenotype of sleep disordered breathing, reason for exchange to NIV, capillary blood gas, compliance and Epworth Sleepiness Score (ESS) at exchange and 12 months.

Results Data were obtained for 36 patients, mean (SD) age 63.5 (12.5) years, BMI kg/m^{2}39.24 (10.76). Sleep study at diagnosis showed AHI 38.31 (32.43), $SpO_2$85.93 (4.82)%, total sleep time SpO_2 <90% 66.17 (32.21)%. Phenotypes identified were; 55.6% (n=20) OSA/OHS overlap, 30.6% (n=11) OSA alone, 11.1% (n=4) COPD-OSA overlap and 2.8% (n=1) obesity hypoventilation syndrome. 54.5% (n=19) were commenced on NIV due to hospital admission with T2RF and the remaining 51.5% (n=17) were exchanged to NIV in outpatient clinics. At exchange, patients had received CPAP for 18.12 (21.5) months. 1.8% (n=5) patients died within the first year of exchange to NIV. Table 1 shows clinical data at baseline, prior to exchange to NIV and 12 months post-exchange with improvements in several variables at 12 months, particularly compliance and $PaCO_2$.

Abstract S134 Table 1 Clinical data at time of exchange and 1 year post exchange

Clinical Measure	Baseline Mean (SD)	Prior to exchange Mean (SD)	12 months post exchange Mean (SD)	Mean difference between time of exchange and 12/12 post exchange (95% CI, p-value)
BMI kg/m^2	39.24(10.76)	42.42(14.63)	-	
AHI (events/hr)	38.31(32.43)	6.55(5.85)	6.16(6.04)	- 0.40 (-2.58 to 1.79), p=0.713
pH	-	7.39(0.31)	7.39(0.03)	0.000 (-0.02 to 0.02), p=0.961
$PaCO_2$ (kPa)	-	6.16(0.73)	5.57(0.73)	- 0.587 (1.12 to -0.06), **p=0.033**
Compliance (hours)	NA	5.63 (2.01)	7.21(2.79)	1.58 (0.41 to 2.75), **p=0.010**
Compliance (%)	NA	67.86(31.28)	80.02(29.9)	12.16 (-4.34 to 26.67), p=0.141
ESS (24)	11.75 (6.32)	10.00(5.66)	8 (8.49)	-2.00 (-27.41 to 23.41), p=0.500

Conclusion Switching from CPAP to NIV in this cohort resulted in significant improvement in compliance and $PaCO_2$ with other variables demonstrating trends towards improvement. This highlights the importance of reassessment and revising appropriate PAP treatment plans according to patient phenotype in order to improve patient outcomes. The high rate of hospital admissions suggests patients require ongoing monitoring of PAP therapy.

Disease modulation within severe asthma

S135 DUPILUMAB EFFICACY VS STANDARD OF CARE IN PATIENTS WITH UNCONTROLLED, PERSISTENT ASTHMA – A META ANALYSIS

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Introduction and Objectives Dupilumab, a fully human monoclonal antibody, blocks the shared receptor component for interleukin (IL)-4/IL-13, key drivers of type 2 inflammation in multiple diseases. We conducted a direct meta-analysis of effect of dupilumab vs standard of care (SOC) on annualized severe exacerbation rates (AER) and lung function in subgroups of asthma patients with an eosinophilic phenotype.

Methods 3 eosinophilic patient subgroups were identified from the phase (P) 3 QUEST (NCT02414854; N=1,902) and P2b (NCT01854047; N=465) studies with baseline characteristics that matched the key inclusion criteria of clinical trials of anti-IL-5 biologics: (1) benralizumab (medium-/high-dose ICS/LABA, eosinophils ≥300 cells/μL, ≥2 previous exacerbations, age ≥12 years); (2) mepolizumab (high-dose ICS/LABA, eosinophils ≥150 cells/μL, ≥2 previous exacerbations, age ≥12 years); and (3) reslizumab (medium-/high-dose ICS/LABA, eosinophils ≥400 cells/μL, ≥1 previous exacerbation, age ≥18 years). Using frequentist meta-analysis, the estimates of effect of dupilumab vs SOC on AER (rate ratio [RR]) and mean difference in change in FEV_1 from baseline at Week 24 were pooled from the P3/P2b studies for each subgroup. Number needed to treat (NNT, the inverse of the absolute rate reduction) for 1 fewer severe exacerbation per year for dupilumab vs SOC was estimated.

Results Subgroup 1 had 439 (23.1%)/100 (21.5%); subgroup 2, 406 (21.3%)/112 (24.0%); and subgroup 3, 556 (29.2%)/128 (27.5%) patients from the P3/P2b studies, respectively. Dupilumab 200/300 mg every 2 weeks significantly reduced the AER in all 3 subgroups vs SOC. The exacerbation RR (95% CI) for subgroups 1, 2, 3, respectively, were 0.26 (0.21–0.33), 0.36 (0.29–0.44), and 0.29 (0.23–0.36), representing 64–74% relative exacerbation rate reduction. The NNT (95% CI) for severe exacerbations was 0.91 (0.853–1.005), 1.033 (0.931–1.18), and 1.107 (1.034–1.228), respectively. The SOC adjusted change from baseline at Week 24 in FEV_1 (95% CI) in respective subgroups was 0.22L (0.14–0.31), 0.18L (0.04–0.31), and 0.25L (0.18−0.31).

Conclusions Dupilumab significantly reduced severe exacerbation rates and improved lung function in subgroups of patients with uncontrolled, persistent, eosinophilic asthma. NNTs indicated that only 1 patient would need dupilumab treatment instead of SOC to have 1 fewer severe asthma exacerbation per year.

S136 LONG-TERM SAFETY AND EFFICACY OF DUPILUMAB IN PATIENTS WITH ASTHMA: LIBERTY ASTHMA TRAVERSE OPEN-LABEL EXTENSION STUDY

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Introduction and Objectives Dupilumab, a fully human monocolonal antibody, blocks the shared receptor component for interleukin (IL)–4 and IL–13, key and central drivers of type 2 inflammation in multiple diseases. The efficacy and safety up to 52 weeks of dupilumab in asthma have been demonstrated in phase 2 and phase 3 studies. We assess the long-term safety and efficacy of dupilumab in the open-label extension (OLE) LIBERTY ASTHMA TRAVERSE study (NCT02134028) in adult and adolescent patients who had completed a dupilumab asthma study (phase 2b DRI, phase 2 EXPEDITION, phase 3 QUEST, or phase 3 VENTURE).

Methods Patients with moderate-to-severe or oral corticosteroid (OCS)-dependent severe asthma received add–on subcutaneous dupilumab 300 mg every 2 weeks (q2w), up to 96 weeks. Treatment-emergent adverse events (TEAEs), annualized rate of severe asthma exacerbations (AER) during the treatment period, and change from parent study baseline (PSBL) in forced expiratory volume in 1 second (FEV_1) and biomarkers up to Week 96 were assessed.

Results Of 2,930 patients randomized in the parent studies, 78% enrolled into the OLE; of 2,282 patients enrolled and exposed in the OLE, 96% had a study duration of 48 weeks and 54% had a study duration of 96 weeks. Long-term safety profile was consistent with the parent studies (**table 1**). The low unadjusted AER and improvement in FEV_1 observed in the parent studies were sustained during the OLE. Similar efficacy was seen in patients with elevated type 2 biomarkers from DRI/QUEST. By Week 96, blood eosinophils decreased to below PSBL levels in patients from DRI/QUEST and were near PSBL levels in patients from VENTURE; total IgE levels decreased by 82% (median percent change from PSBL).

Conclusions Long-term use of dupilumab was well tolerated and showed sustained efficacy in asthma patients up to 96 weeks.

Abstract S136 Table 1 Summary of outcomes in exposed populations rolled over from previous dupilumab asthma clinical studies into the LIBERTY ASTHMA TRAVERSE OLE study.

Outcome	Patients from DRI and QUEST[1] (n = 2,062)	Patients from EXPEDITION[2] (n = 33)	Patients from VENTURE[3] (n = 187)
Primary endpoint			
Patients with any TEAE			
Parent study, n (%)	121 (77.6),[4] 515 (81.5)[5]	–	64 (62.1)[5]
n (%)	1,660 (80.5)	31 (93.9)	144 (77.0)
nP/PY (nP/100 PY)[6]	1,660/1,208.4 (137.4)	31/4.1 (752.3)	144/110.8 (129.9)
Patients with any treatment-emergent SAE			
n (%)	210 (10.2)	4 (12.1)	22 (11.8)
nP/PY (nP/100 PY)[6]	210/3,206.7 (6.5)	4/38.0 (10.5)	22/244.8 (9.0)
Patients with any TEAE leading to death			
n (%)	4 (0.2)	0	0
nP/PY (nP/100 PY)[6]	4/3,373.7 (0.1)	0/40.2	0/262.4
Patients with any TEAE leading to permanent treatment discontinuation			
n (%)	65 (3.2)	3 (9.1)	9 (4.8)
nP/PY (nP/100 PY)[6]	65/3,355.4 (1.9)	3/39.3 (7.6)	9/259.9 (3.5)
Secondary endpoints			
Unadjusted AER during the treatment period[7]			
PSBL, mean (SD) over the prior year	2.37 (2.29),[4] 2.02 (1.86)[5]	–	2.01 (2.08)[5]
Parent study	0.332,[4] 0.560[5]	–	0.646
Overall patients	n = 2,062; 0.334	n = 33; 0.121	n = 187; 0.349
Non-OCS dependent patients with blood eosinophils ≥ 150 cells/µl or FeNO ≥ 25 ppb at PSBL	n = 1,679; 0.305	–	–
Pre-bronchodilator FEV_1, L			
Overall patients			
PSBL, mean (SD)	n = 2,062; 1.79 (0.59)	n = 33; 2.56 (0.63)	n = 187; 1.58 (0.57)
Change from PSBL at Week 48 of OLE, mean (SD)	n = 1,938; 0.33 (0.49)	n = 27; 0.14 (0.35)	n = 170; 0.32 (0.51)
Change from PSBL at Week 96 of OLE, mean (SD)	n = 1,148; 0.29 (0.46)	n = 7; 0.11 (0.35)	n = 60; 0.31 (0.57)
Non-OCS dependent patients with blood eosinophils ≥ 150 cells/µl or FeNO ≥ 25 ppb at PSBL			
PSBL, mean (SD)	n = 1,679; 1.80 (0.59)	–	–
Change from PSBL at Week 48 of OLE, mean (SD)	n = 1,576; 0.37 (0.49)	–	–
Change from PSBL at Week 96 of OLE, mean (SD)	n = 958; 0.32 (0.46)	–	–
Blood eosinophils, Giga/L			
Overall patients			
PSBL, median (Q1, Q3)	n = 2,060; 0.260 (0.140, 0.450)	n = 33; 0.350 (0.240, 0.520)	n = 187; 0.260 (0.140, 0.500)
Change from PSBL at Week 48 of OLE, median (Q1, Q3)	n = 1,898; −0.050 (−0.180, 0.050)	n = 24; −0.065 (−0.135, 0.020)	n = 169; 0.010 (−0.120, 0.170)
Change from PSBL at Week 96 of OLE, median (Q1, Q3)	n = 1,136; −0.060 (−0.210, 0.030)	n = 6; −0.070 (−0.120, −0.070)	n = 59; 0.010 (−0.110, 0.160)
Serum total IgE, IU/mL			
Overall patients			
PSBL, median (Q1, Q3)	n = 531; 190.0 (78.0, 432.0)[8]	–	–
Change from PSBL at Week 48 of OLE, median (Q1, Q3)	n = 518; −127.0 (−323.0, −49.0)[8]	–	–
Change from PSBL at Week 96 of OLE, median (Q1, Q3)	n = 441; −152.0 (−369.0, −63.0)[8]	–	–

Eligible patients rolled over from DRI completed the 16-week post-treatment follow-up period of the parent study before being rolled over into the OLE study; eligible patients rolled over from EXPEDITION, QUEST, and VENTURE studies rolled over into the OLE study on the same day as the end-of-treatment visit for the parent study. Patients enrolled prior to October 31, 2016 participated in the 96-week treatment period; patients enrolled after October 31, 2016 participated in the 48-week treatment period. During the OLE treatment period, patients continued the background therapy dose regimen as maintained in the parent study or as modified based on the investigator's judgement. OCS were allowed as background controller medication for the patients from VENTURE only.
[1]Patients with moderate-to-severe asthma rolled over from phase 2b DRI (NCT01854047) and phase 3 QUEST (NCT02414854) studies were pooled.
[2]Patients with moderate asthma rolled over from the phase 2 EXPEDITION study (NCT02573233); the design and conduct of the EXPEDITION study were sufficiently different from the DRI and QUEST studies that the data from this study were not combined.
[3]Patients with OCS-dependent, severe asthma patients rolled over from the phase 3 VENTURE study (NCT02528214).
[4]Dupilumab 300 mg q2w treatment arm of the phase 2b DRI study (safety population, n = 156; intent-to-treat population, n = 157).
[5]Dupilumab 300 mg q2w treatment arm of the phase 3 QUEST study (safety population, n = 632; intent-to-treat population, n = 633).
[6]Dupilumab 300 mg q2w treatment arm of the phase 3 VENTURE study (safety population, n = 103; intent-to-treat population, n = 103).
[7]For patients with event, PY are calculated up to the date of the first incidence; for patients without event, PY correspond to the length of study observation period.
[8]The total number of events that occurred during the treatment period divided by the total number of PY followed in the treatment period.
[9]Data collected for patients rolled over from DRI only.
FeNO, fractional exhaled nitric oxide; n (%), number and percentage of patients with ≥ 1 TEAE; nP, number of patients with any event; nP/100 PY, number of patients with ≥ 1 event per 100 PY; ppb, parts per billion; PY, patient-years; Q, quartile; SAE, serious adverse event; SD, standard deviation.

S137 BENRALIZUMAB IS EFFECTIVE AT REDUCING AIRWAY INFLAMMATION IN SEVERE ASTHMA PATIENTS FOLLOWING NON-RESPONSE TO MEPOLIZUMAB ASSOCIATED WITH PERSISTENT SPUTUM EOSINOPHILIA

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Background Anti-IL-5 monoclonal antibodies reduce systemic corticosteroid use, exacerbation rate, and airway inflammation in severe asthma. Different effectors of the eosinophil IL-5 pathway are targeted, but algorithms to choose the most appropriate biologic for each patient are still being refined. Our team regularly monitors severe asthma patients' airway inflammation using sputum eosinophils.

Aims To investigate clinical outcomes of patients that switched to benralizumab after non-response to mepolizumab associated with persistent sputum eosinophilia.

Methods We prospectively monitored sputum cell counts of patients starting MDT-approved benralizumab after:

- failing to respond to mepolizumab,
- and whose positive sputum eosinophils remained above the threshold of 3%.

Additional clinical parameters were recorded including corticosteroid dose, ACQ, AQLQ, and blood eosinophils. Lung function testing was severely impacted by the COVID pandemic.

Results Fifty-one of 183 (27.9%) mepolizumab patients to date have been identified as candidates for a switch of therapy with residual positive sputum eosinophils, of which 44 have received their first doses of benralizumab and 16 have completed 6 months of treatment with available sputum eosinophil results.

After 6 months on benralizumab therapy, clinically and statistically significant improvements in ACQ and mAQLQ were observed compared to baseline.

Abstract S137 Table 1 Evolution of clinical parameters on starting benralizumab and after 6 month of treatment, comparison made using Wilcoxon's signed rank test. * Baseline sputum eosinophils whilst patients still on mepolizumab at time of MDT decision to switch therapy

		Benralizumab				Statistical analysis
		Baseline		6 months		Baseline to 6 months
	n=	Median	min-max	Median	min-max	p-value
Sputum eosinophils (%) *	16	8.5	3.8-38	0	0-41	0.013
Blood eosinophils (10^9 cells/l)	13	0.21	0.02-1.36	0	0-2.79	0.064
ACQ	16	4.0	0.0-6.0	3.0	0.0-5.0	0.001
AQLQ	7	2.2	1.80-6.53	2.66	1.86-6.90	0.018
ICS (µg BDP equivalent)	16	1600	0-7360	1600	0-5840	0.465
OCS (mg prednisolone)	16	4	0-50	0	0-50	0.204

All but two patients had negative sputum eosinophils (< 3%) compared to levels on mepolizumab (**Table**).

Both also had elevated blood eosinophils: one patient was sampled during an exacerbation, the other is being investigated for parasitic infestation due to frequent foreign travels.

At baseline 81% of patients were taking maintenance oral corticosteroids compared to 44% at 6 months (NS).

Conclusions More than a quarter of patients failed to respond to mepolizumab and displayed persistent airway eosinophilia. Of these, 88% achieved negative airway inflammation on benralizumab with significant clinical improvement (ACQ, AQLQ) and clinically (though not statistically on this small sample size) significant fall of OCS.

Benralizumab appears to prove effective at reducing inflammation at tissue level in patients previously unable to achieve this on a different anti-IL-5 therapy. As more patients progress through their treatment, repeat monitoring at 12 months will establish if this benefit is maintained and is associated with long term steroid dose reduction, and exacerbation rate.

S138 EFFECT OF TEZEPELUMAB ON EXACERBATIONS IN PATIENTS WITH SEVERE, UNCONTROLLED ASTHMA, ACCORDING TO BASELINE BODY MASS INDEX: RESULTS FROM THE PHASE 2B PATHWAY STUDY

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10.1136/thorax-2020-BTSabstracts.143

Introduction and Objectives Tezepelumab is a human monoclonal antibody that blocks activity of thymic stromal lymphopoietin (TSLP), an epithelial cytokine implicated in asthma pathogenesis. In the PATHWAY study (NCT02054130), tezepelumab consistently reduced annualized asthma exacerbation rates (AAER) versus placebo in adults with severe uncontrolled asthma, irrespective of baseline disease characteristics. This analysis evaluated the efficacy of tezepelumab by baseline body mass index (BMI).

Methods Patients aged 18–75 years with severe, uncontrolled asthma were randomized to receive subcutaneous tezepelumab (70 mg every 4 weeks [Q4W], 210 mg Q4W, 280 mg every 2 weeks) or placebo, for 52 weeks. AAER was estimated for baseline BMI subgroups of <25, 25 to <30 and ≥30 kg/m^2.

Results Overall, 550 patients were randomized. Lower BMI was associated with younger age, higher baseline blood eosinophil counts and higher fractional exhaled nitric oxide levels. Among placebo recipients, AAER over 52 weeks was similar by BMI subgroup (0.70–0.76 exacerbations per person-year). AAER over 52 weeks was reduced by 79% (95% CI: 57–89), 70% (95% CI: 41–85) and 50% (95% CI: 6–73) for pooled tezepelumab groups versus placebo in patients with a BMI of <25 (n=175), 25 to <30 (n=185) and ≥30 kg/m^2 (n=190), respectively. In the 210 mg Q4W dose group, AAER was reduced by 83% (95% CI: 49–94) (n=39), 62% (95% CI: 4–85) (n=45) and 68% (95% CI: 13–89) (n=53), respectively, versus placebo.

Conclusions Tezepelumab reduced exacerbations in patients with severe, uncontrolled asthma irrespective of baseline BMI, providing further evidence that tezepelumab can meaningfully reduce exacerbations in a broad population of patients with severe asthma.

S139 EFFICACY OF TEZEPELUMAB IN PATIENTS WITH LOW AND HIGH BRONCHODILATOR REVERSIBILITY IN PATHWAY

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10.1136/thorax-2020-BTSabstracts.144

Introduction and Objectives In the phase 2b PATHWAY study (NCT02054130), tezepelumab reduced annualized asthma exacerbation rates (AAER) by up to 71% versus placebo in adults with severe, uncontrolled asthma. We evaluated the effect of tezepelumab on exacerbations in patients from PATHWAY with low and high bronchodilator reversibility.

Methods Adults with severe, uncontrolled asthma were randomized to receive tezepelumab (70 mg every 4 weeks [Q4W], 210 mg Q4W or 280 mg every 2 weeks) or placebo for 52 weeks. AAER and the rate of exacerbations resulting in hospitalization or emergency room (ER) visits were estimated for patients with low (<20%) and high (≥20%) forced expiratory volume in 1 second (FEV_1) reversibility at baseline.

Results Of 550 randomized patients, 299 and 251 had low and high FEV_1 reversibility, respectively. Tezepelumab 210

mg (phase 3 dose) reduced AAER over 52 weeks by 70% (95% confidence interval [CI]: 41, 85) and 72% (95% CI: 32, 88) versus placebo in patients with low and high FEV_1 reversibility, respectively. For pooled tezepelumab doses, AAER was reduced by 69% (95% CI: 50, 81) and 60% (95% CI: 26, 78) in the low and high groups, respectively. Data were similar for 70 and 280 mg. Exacerbations resulting in hospitalizations or ER visits were reduced by 85% (95% CI: 21, 97) and 78% (95% CI: −32, 96) versus placebo in patients with low and high FEV_1 reversibility, respectively, for tezepelumab 210 mg, and by 84% (95% CI: 51, 94) and 64% (95% CI: −18, 89) in the pooled tezepelumab group, respectively.

Conclusions Tezepelumab treatment reduced AAER irrespective of baseline bronchodilator reversibility, further supporting its potential benefits in a broad population of patients with severe asthma.

S140 BETA-2-ADRENERGIC RECEPTOR GENE POLYMORPHISMS IN SEVERE ASTHMA: A SYSTEMATIC REVIEW

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10.1136/thorax-2020-BTSabstracts.145

Background Differences in response to adrenergic b2 (ADRb2) agonists in severe asthma can be attributed to genetic variation, with 49 different single-nucleotide polymorphisms (SNPs) in one exon on chromosome 5q31–33 of the ADRb2 receptor gene. The Arg16Gly/Gln27Glu polymorphisms enforces differential agonist-stimulated receptor down-regulation in airway smooth muscle cells. The Thr164Ile polymorphism reduces receptor-binding affinity.

In this systematic review we aimed to determine which of these polymorphisms of the ADRb2 gene are associated with severe adult asthma.

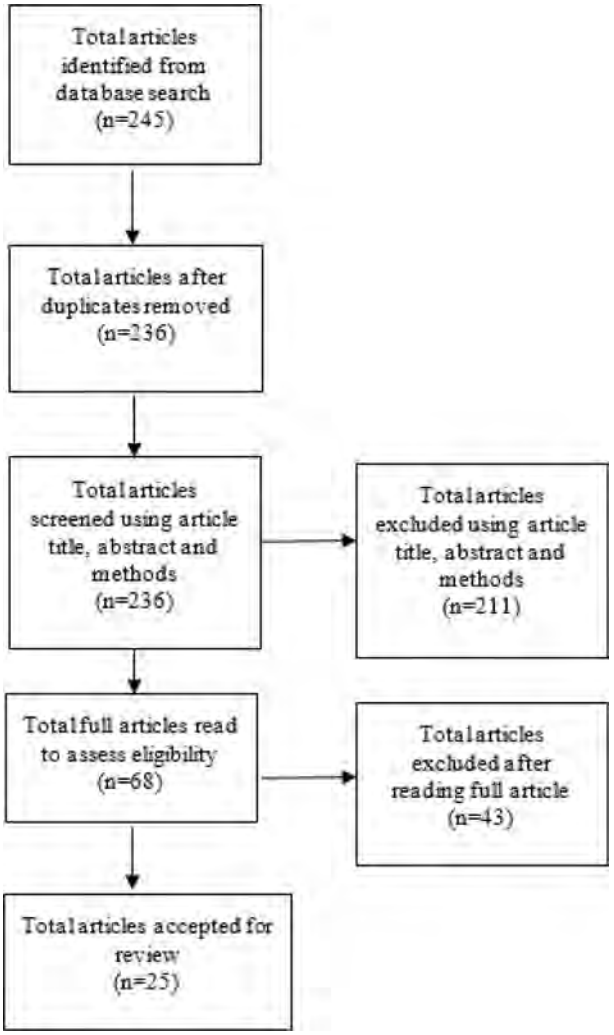
Methods Two independent reviewers carried out the systematic search on PubMed and Cochrane Library databases using appropriate MESH key words on 1st July 2020. Asthma severity was determined following GINA and ATS/ERS 2019 guidelines and the critical appraisal skills programme (CASP) quality assessment tool was used to assess quality of articles. Relevant data including the ADRb2 polymorphisms and location, clinical effect and patient demographics were recorded.

Results From an initial 245 articles, 25 were selected for this systematic review (**figure 1**): twelve were population-wide studies looking at association of single nucleotide polymorphisms (SNPs) with severe asthma phenotype; and thirteen were pharmacogenetics studies.

The most common SNP associated with severe asthma was Arg16Gly, Gln27Glu. Allele frequency varied between Caucasians Gly16 (0.61)/Gln27 (0.57) *versus* Asians, Gly16 (0.40)/Gln27 (0.80) with asthma. The rare variants Thr164Ile and −376 In-Del were observed in Hispanics/African- Americans.

SNPs with clinical implications in severe asthma:

- Arg16Gly, Gln27Glu: associated with down–regulation and uncoupling of β 2–adrenoreceptors, bronchial hyper responsiveness and decreased bronchodilator response.



Abstract S140 Figure 1 PRISMA flow chart of Beta-2-adrenergic receptor gene polymorphisms in severe asthma: a systematic review. A total of 245 articles were identified through PubMed and the cochrane library database. A total of 25 articles fit the inclusion criteria after being assessed by two independent researchers

- Gly16: associated with bronchodilator desensitisation and found in increased frequency in severe (70%) versus mild asthma (59%) and non–asthmatic controls (60%) (two studies).
- Gly16, Gln27, Ile164 were not risk factors for fatal/near–fatal asthma in Caucasians.
- Thr164Ile:
  - Salbutamol refractoriness in Indians & African Americans (two studies).
  - Increases likelihood of severe asthma exacerbation requiring hospitalisation in Caucasians
  - −376 In–Del rare variant: poor symptom control/increased exacerbations requiring hospitalisation in African Americans.

Conclusions ADRb2 polymorphisms have been associated with varied adverse disease characteristics in severe asthma, but replication of findings is needed, as is investigation of clinical impact for example in guiding therapeutic strategies.

Lessons from COVID-19

P1 THE ADOPTION OF DIGITAL TECHNOLOGY IN RESPIRATORY EDUCATION IN RESPONSE TO THE COVID-19 GLOBAL PANDEMIC

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10.1136/thorax-2020-BTSabstracts.146

Introduction The Covid-19 pandemic has led to major disruption to junior doctor training. Workload pressures and social distancing requirements have stalled rotations, changed working patterns and cancelled teaching. The use of digital technology such as mobile learning, video conferencing and social media has thus been accelerated. Digital technology offers a flexible, interactive means of learning and facilitates interaction with peers and tutors allowing sharing of resources. Our aim was to use digital technology to find an innovative way of enhancing learning for junior doctors at Nottingham University Hospitals and Sherwood Forest Hospitals. Ultimately, this would improve patient safety by increasing the confidence of junior doctors in managing patients with respiratory problems.

Methods We developed an innovative regional teaching programme for junior doctors working in a tertiary centre and district general hospital. We designed, moderated and ran four sessions utilising problem-based learning techniques to cover pneumonia, pleural effusions, non-invasive ventilation (NIV) and lung cancer on the interactive, social networking platform, WhatsApp. We posted material daily to trigger discussion and supplemented each topic with a weekly lecture via Microsoft Teams. Pre- and post-course questionnaires, using a 5-point Likert scale, were completed and results analysed using a Wilcoxon signed-rank test.

Results 110 junior doctors participated of which 71 responded to the survey. 64% were foundation trainees, 17% internal medicine trainees and the remainder included clinical fellows and GP trainees. 60% had never worked in a Respiratory department. Feedback was universally positive and survey responses demonstrated statistically significant improvements in knowledge and confidence in managing respiratory problems such as pleural effusions and NIV (Table 1).

Conclusion Despite the challenges posed by the Covid-19 pandemic, our innovative programme allowed a collaborative and interactive approach to learning. It encouraged learners to contribute content and resources as well as reflect on practice. Although digital learning is not a substitute for the real workplace experience junior doctors require with patients, it is sustainable and facilitates knowledge acquisition and participation. Given the uncertainty regarding how long this situation will persist, our programme presents a reproducible method to facilitate future teaching as well as trainee induction to new specialities.

Abstract P1 Table 1 Pre and post-course median results (Likert Scale). Wilcoxon matched-pairs signed-rank test used to test significance

	Pre-course median	Post-course median	Significance (p value)
Likelihood of using social media for e-learning	3	3	Not significant
Confidence in chest x-ray interpretation	4	4	Not significant
Confidence in pleural fluid analysis	3	4	0.0028
Confidence in management of chest drain complications	2	3	0.0018
Confidence in recognising indications for non-invasive ventilation (NIV)	3	4	0.0009
Confidence in recognising contraindications for NIV	3	4	0.0027
Confidence in managing NIV settings	2	3	0.0007
Confidence in recognising when to initiate long-term oxygen therapy	2	3	0.0015
Confidence in managing severe breathlessness in COPD	3	4	0.0099

P2 COVID-19 SPACES INITIATIVE REDUCES STAFF EXPOSURE WHILE MAINTAINING THE QUALITY OF CARE

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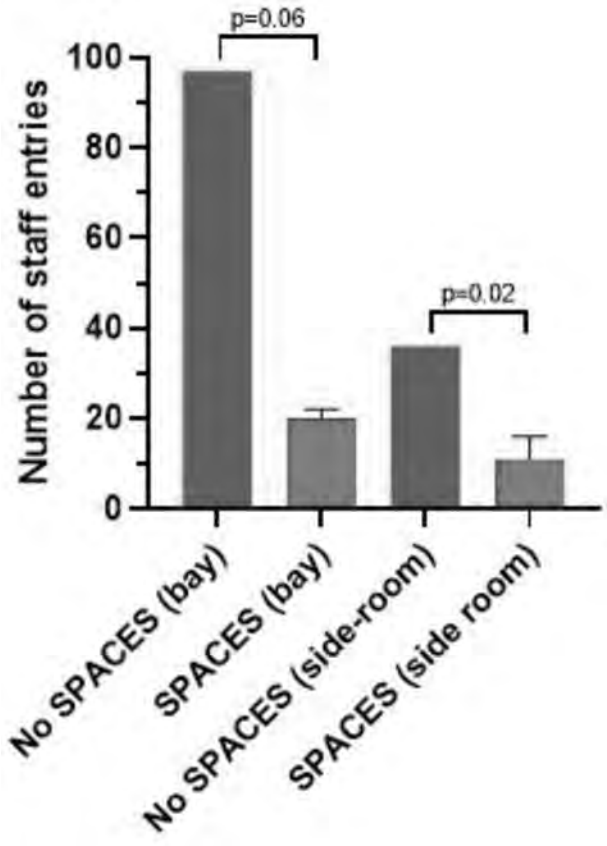
10.1136/thorax-2020-BTSabstracts.147

Introduction and Objectives The COVID-19 pandemic brought new challenges to the healthcare system, with every patient contact a potential risk to staff. This required rapid changes to traditional working methods in order to protect healthcare staff from virus exposure, reduce staff anxiety, and manage limited Personal Protective Equipment (PPE) supplies. We



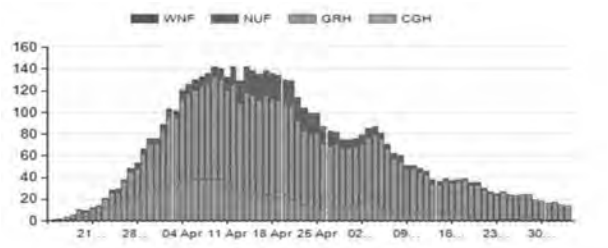
Abstract P2 Figure 1 Number of staff entries into bays and side-rooms over 24 hours with SPACES compared to estimates without. Median with inter-quartile range shown for 5 bays and 7 side rooms surveyed. P-value is Wilcoxon signed rank test

aimed to rapidly implement a new strategy for ward working, which would maintain high-quality patient care while reducing staff virus exposure and PPE consumption.

Methods We developed an integrated team working concept called SPACES (Shared Patient Assessments Cuts Exposure for Staff) to gain maximum benefit from every staff-patient contact, regardless of the individual's team role. For example, a doctor undertaking a ward round would also perform observations, deliver meals, drinks and medication, and undertake procedures such as venesection, at one single visit saving patient contacts by other healthcare colleagues. All staff applied the same principle for each patient contact. We recorded individual staff entries into each bay (n=5) and side room (n=7) over 24 hours using the SPACES approach, and compared this to pre-SPACES estimates. We also reviewed Ward patient and staff feedback pre- and post-SPACES.

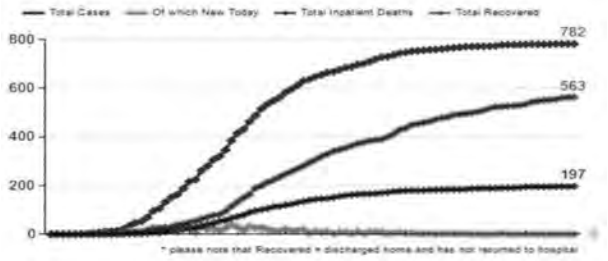
Results We estimated that pre-SPACES there were 97 individual staff entries into a bay of 4 patients, and 36 into each side room, per 24 hours. Using SPACES, we reduced this to a median [IQR] of 20 [12–22] entries per bay and 11 [10–16] entries per side room (p=0.06 and 0.02 respectively). This decreased PPE consumption by approximately 75%. Patient satisfaction survey responses before and after implementing SPACES were unchanged. Staff feedback on SPACES reflected high levels of satisfaction, increased sense of teamwork, and reduced anxiety of contracting COVID-19.

Conclusions We showed that using the SPACES initiative in a COVID-19 ward decreased staff exposure to highly infectious patients, with resultant PPE use reductions, while maintaining a high standard of patient care and strengthening team spirit and staff morale. Following our successful trial period, SPACES received support from the British Thoracic Society and the Royal Colleges of Physicians and Nursing. It has been adopted throughout our trust, and by many centres internationally.



1a. Beds occupied by COVID-19 patients as of midnight each day

1b. Yellow lanyards used by specialist respiratory nurses



1c. Cumulative total COVID-19 positive cases by day

Abstract P3 Figure 1 The yellow lanyards - Gloucestershire Foundation NHS Trust COVID-19 initiative

P3 THE YELLOW LANYARD TEAM – GLOUCESTERSHIRE FOUNDATION NHS TRUST COVID-19 INITIATIVE

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10.1136/thorax-2020-BTSabstracts.148

Background Anticipating the COVID-19 pandemic burden, Gloucestershire NHS Foundation trusts Associate Chief Nurse Craig Bradley proposed the yellow lanyard initiative to utilise specialist respiratory nurses to educate, train and support trust wide health care staff in managing these patients; albeit outside their clinical speciality. The yellow lanyards allowed early identification of this frontline specialist respiratory nursing team integral to ensuring adequate clinical standards were maintained whilst delivering a 24/7 holistic care to the ever increasing COVID-19 patient admissions (figure 1a & 1b).

What we did The yellow lanyard team consisted of 40 nurses working on two sites across the Trust [(Gloucester Royal (GRH) and Cheltenham General Hospitals (CGH)]. Our role particularly focused on non-ventilatory training (Continuous positive airway pressures) a leadership strategy employed by the Trust to manage COVID-19 patients with high FiO2 requirement in a respiratory high dependency unit (HDU) setting. The respiratory HDU was expanded to 31 beds compared to a normal capacity of 10 and all patients requiring non-ventilatory support only were managed on it unless deemed at high risk. We also liaised with our lung physiology department daily for equipment calibration and programming enabling us to manage the quick turnover of patients admitted. Additionally we offered training opportunities to all staff including NEWS monitoring, documentation, adequate use of personal protective equipment, oxygen management, initiating Hi-Flow nasal oxygen, and escalation of patients to intensive care alongside delivery of conventional respiratory care.

Outcome Our strategies upskilled healthcare worker to manage the ever increasing case load of COVID-19 patients using enhanced decision making, critical thinking and improved communication skills preparing them to work in the ever changing environment. The yellow lanyard team was an asset during the pandemic available 24/7 and successfully managed patients to recover from their illness (figure 1c).

Future plans The trust aims to expand the respiratory HDU currently being used for patients receiving aerosol generating procedures and utilise the skill set of our trained staff with the prospect of offering immediate support for patients in case of a second wave of COVID-19.

P4 USE OF THE 1-MINUTE SIT TO STAND TEST IN PATIENTS PRESENTING WITH SUSPECTED COVID-19 TO ASSESS NEED FOR HOSPITAL ADMISSION

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10.1136/thorax-2020-BTSabstracts.149

Introduction The clinical presentation of Covid-19 varies widely with only a small proportion of those infected requiring hospitalisation. The ability to risk stratify patients upon presentation to the Emergency Department (ED) facilitates early safe discharge, with or without enhanced monitoring, which benefits hospital capacity management and infection control. In other lung parenchymal conditions oxygen desaturation during exercise has been used as an indicator of more severe disease. The exercise modality has typically been a field walking test or a bicycle or treadmill test which are impractical for delivery in ED. We investigated whether an alternative test, the 1-minute sit to stand test (1SST), was deliverable within an ED at the height of the COVID-19 pandemic.

Methods During April to June 2020 at two large hospitals we performed 1SST in 201 people presenting with suspected Covid-19 and measured test performance (reps) plus change in pulse and oxygen saturations. Subsequently we identified clinical outcomes for all individuals diagnosed with Covid-19. A positive test was defined as 4% desaturation.

Results The test was deliverable with 193/201 (96%) able to complete (2 were too unsteady, 6 failed to complete the minimum 5 reps). 111 (55%) were female, mean age of 49 (SD 16) years and an average of 17 (SD 7) reps completed. Mean fall in saturations was -1.6% and rise in pulse was 22. 34 people were diagnosed with Covid-19 based on a) positive swab or b) negative swab but diagnosed with 'clinical Covid-19' by a senior clinician based on clinical and radiological features. 1 person was unable to complete the 1SST test. The outcomes for people with a positive or negative test are shown in the table 1. In the early part of the study we were only able to swab people admitted to hospital so data from 109 further people is not included in the primary analysis.

Conclusion The 1SST is feasible for people presenting acutely with Covid-19. It effectively identifies exercise induced oxygen desaturation and therefore augments the decision making relating to hospital admission.

Abstract P4 Table 1

	Positive 1SST	Negative 1SST	p value
Number of subjects	9	24	
Sex – M/F	3/6	13/11	0.26
Age (SD)	50.2 (±14.9)	47.6 (±16.2)	0.68
Reps (SD)	15.6 (±6.75)	18.9 (±7.1)	0.29
Change in oxygen saturations (SD)	-7.22 (±3.23)	0.12 (±1.44)	**<0.01**
Change in heart rate (SD)	22.43 (±12.93)	21.69 (±20.18)	0.96
Number admitted to hospital	8/9 (89%)	6/24 (25%)	**<0.01**
Length of stay (days)	6.22 (±9.6) range 0–31	1 (±1.89) range 0–7	**0.01**
Required oxygen	5 (56%)	1 (4%)	**0.01**
Required ventilation	1 (11%)	0 (0%)	0.09

P5 A MULTI-PROFESSIONAL EDUCATION AND IMPROVEMENT PROCESS TO GUIDE CLINICAL PRACTICE IN THE DEVELOPING MANAGEMENT OF COVID-19: THE TRAINEE EXPERIENCE

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10.1136/thorax-2020-BTSabstracts.150

Introduction and Objectives On March 1st 2020 the World Health Organisation dashboard had recorded 1 897 cases of COVID-19, rising to 75 008 by April 1st 2020. In this time, there were rapidly emerging changes in clinical knowledge and management, challenging the work of hospital teams caring for these patients. This project specifically aimed to rapidly bring together cross-speciality medical trainees in teams to develop a distanced weekly education update to help manage this 'infodemic', including real-time audit and quality improvement projects, local case reports, and a virtual journal club.

Method Initial opportunities were created for trainees to join projects including: rapid follow up of local admissions examining demographics and clinical outcomes; anti-microbial audit; bi-weekly oxygen usage audit, and thrombosis prophylaxis. These were carried out in a quality improvement style with education and re-evaluation. Cases and journal articles were selected for educational interest. A weekly update was sent online to those working within the COVID-19 inpatient departments. There was input from over 35 individuals.

Results The overall data collection ran for 7 weeks, from March 13th to May 1st, rapidly assessing 874 patient presentations and tracking the progress of 329 COVID-19 positive patients. 42 patients were admitted to level 2 care, with positive outcomes similar to national data associating with shorter lengths of stay, female gender, younger age, and lower peak CRP.

An antimicrobial audit on 2 occasions found 100% adherence to local guidance. Prevalence of antimicrobial use did not differ from a concurrent audit in non covid wards (31%). Oxygen usage work showed the majority of our patients had stepwise improvement in adherence to saturation targets by week 5, in keeping with NHS England guideline of 92–96%. The thrombosis prophylaxis project found an improvement in adherence from 88% to 100% as evidence emerged of a possible increased risk of pulmonary vascular complications. A total of 5 cases of complex COVID-19 were presented during this period.

Outcomes This cross-department education process allowed for multiple trainee-led projects and presentations to guide local education, and ensured that our clinical practices were reviewed and in line with evolving national guidance during a pandemic.

P6 POSTGRADUATE MEDICAL EDUCATION AND STAFF WELLBEING DURING THE COVID-19 PANDEMIC: WHAT HAVE WE LEARNED?

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10.1136/thorax-2020-BTSabstracts.151

Introduction The COVID-19 pandemic presented an unprecedented challenge to the NHS and its workforce necessitating redeployment of staff and significant changes to postgraduate education and training.

At Royal Brompton Hospital, we devised a strategy with the overall aim of protecting our staff's physical and mental wellbeing whilst ensuring all staff worked within their competency and were adequately informed and supported to maintain resilience. The strategy implemented focused on a) education and training b) clinical and psychological support c) rota re-design d) provision of rest facilities and e) adequate access and training on PPE. These measures were co-ordinated and delivered through collaborative working between the Medical, Surgical and Intensive Care Teams, Human Resources and Medical Education department.

Methods We aimed to evaluate the impact of these rapid measures, to understand ways to improve our approach in the event of a future surge. An online survey was sent between May and June 2020 to all doctors working at the Royal Brompton Hospital during the pandemic with a focus on the strategy aims.

Results 80 responses were collected (40% response rate). Respondents had adequate training prior to redeployment (59%) and if returning from out of programme (88%). 94% felt they had adequate supervision with 93% working within their competency. Good access was provided to rest facilities, food, car parking and accommodation (figure 1). Timely communication around rotas (60%) and contracts (55%) was noted with 80% not facing any issues with contracts or pay. Good access and training was provided around PPE. Factors causing psychological distress in doctors included frustration, guilt, anxiety, threat perception, loneliness and fatigue. 70% reported adequate signposting of psychological support. The majority of doctors (59%) reported no concerns about progression through their training programme. Free-text answers provided constructive comments on improving the experience further.

Conclusion Our multi-faceted approach to support doctors' training and wellbeing was successful despite little planning. In the event of a future surge, we will build on existing measures such as the current rota template and upskilling of doctors through the use of simulation training and online resources, whilst improving communication through early identification of junior representatives and providing better support for staff who are shielding.

P7 HOW HAS COVID-19 IMPACTED ON THE WELLBEING AND TRAINING OF JUNIOR DOCTORS?

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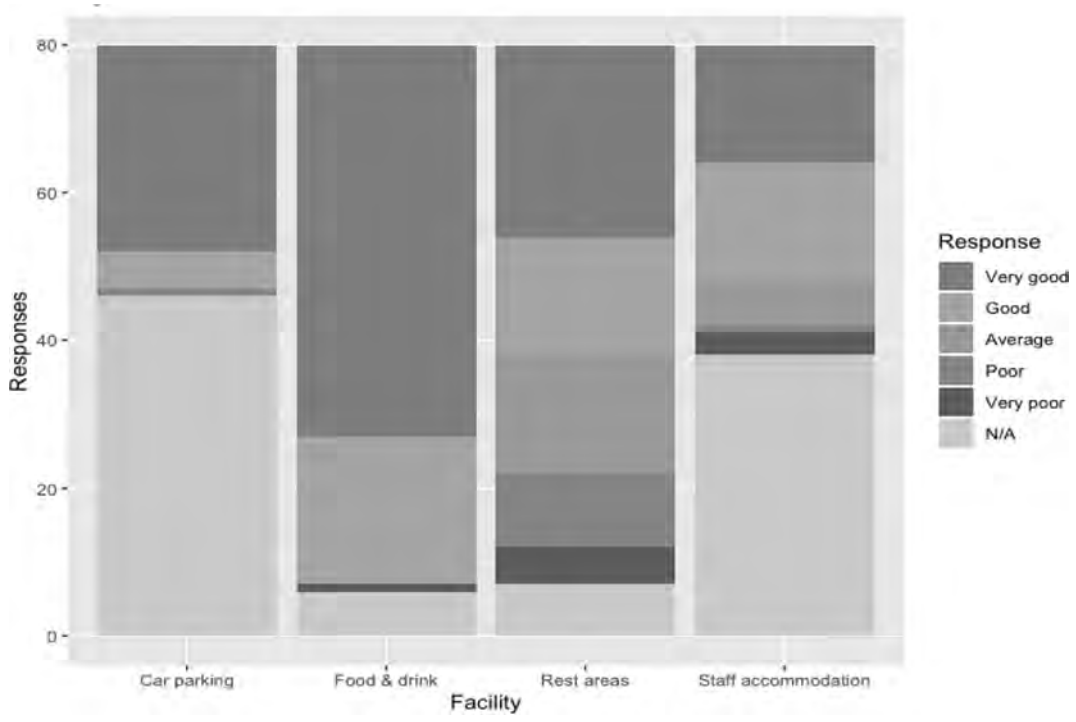
10.1136/thorax-2020-BTSabstracts.152

Introduction and Objectives The impact of the COVID-19 pandemic on the wellbeing and training of junior doctors in the UK remains under-evaluated, with limited published literature. The restructuring of rotas, redeployment of specialities and daily risk of COVID-19 exposure are all likely to have had a significant effect on frontline doctors. We conducted an anonymous survey with the aim of analysing the impact of COVID-19 on the wellbeing and training of junior doctors at a large tertiary London hospital

Methods An anonymous online survey was sent to 600 junior doctors, three weeks after the peak of COVID-19 admissions to obtain feedback on perceptions of the effects of COVID on their wellbeing and training.

Results Wellbeing: 161 junior doctors responded to the survey, with 34% (n=47) of doctors reporting a high level of concern regarding risk to their personal health and 71% (n=102)



Abstract P6 Figure 1 Access to facilities

reporting a negative effect on their sleep; with 67% (n=64) finding this stayed the same or worsened through the pandemic. **Clinical capabilities:** 26% (n=34) of doctors reported high levels of concern related to their clinical competency in dealing with COVID-19 patients, with surgeons making up the majority of this group. **Support:** 82% (n=112) of doctors felt supported during the pandemic, with friends, family and informal peer support groups being the most used coping systems. 22% of trainees (n=31) adapted their living arrangements with 52% (n=13) of those moving accommodation to protect their families. **Training:** 40% (n=52) of doctors felt the pandemic was going to have a long-lasting effect on their careers, with reduced training opportunities and clinical exposure. 44% of surgeons (n=7) and 50% of non-acute specialties (n=12) wanted training to be formally extended.

Conclusion This study highlights the need for hospital trusts and national training bodies to recognise the impact of, and implement robust strategies in response to, the COVID-19 pandemic. The perceptions of existing formal hospital well-being and psychological support systems, which were not widely accessed by this group, require further analysis, in order to aid the development of initiatives to adequately support junior doctors.

P8 VENTILATION IN COVID-19: LESSONS TO BE LEARNT?

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10.1136/thorax-2020-BTSabstracts.153

COVID-19 posed unprecedented challenges on healthcare systems globally especially on inpatient beds, oxygen and ventilatory support: continuous positive airway pressure (CPAP), high flow nasal oxygen and invasive mechanical ventilation (IMV). West Herts NHS Trust, a secondary care provider for a population of 650,000 had 1200 admissions during the first wave (March to June) with a 30% mortality.

Ventilatory outcomes in 116 consecutive admissions were analysed to assess the utility of CPAP in a respiratory specialist ward versus ITU, and prompt versus delayed invasive mechanical ventilation (IMV). Respiratory support was provided in four pathways: CPAP in intensive care unit (ITU) (n=18), CPAP in respiratory ward setting (usually as ceiling of care, n=50), IMV after initial trial of CPAP (n=21) and IMV with no delay or interim CPAP (n=27).

The demographics, comorbidities, functional status, severity of presentation and outcomes differed greatly between the ward group and all the ITU arms. Within the ITU arms, patients were younger, had worse chest x-rays, higher CRP as well as had lower lymphocyte counts, PF (PaO2/FiO2) ratios and comorbidities. Delayed intubation with a trial of CPAP was associated with significant mortality compared to prompt IMV. All ventilatory outcomes were poor in patients over 80 years.

Mortality rate was significantly lower in prompt IMV, 37%, compared to 95% in those with a delayed intubation by a median of 6 days with a prior CPAP trial. Median PF ratio on admission for patients with prompt IMV was 73 mmHg vs 115 mmHg in those with CPAP prior to IMV.

In summary, ward CPAP as ceiling of care for older patients and with comorbidities is safe and associated with a relatively similar mortality rate compared to ITU CPAP but must be reviewed regularly to ensure improvement on treatment. Mortality is significant in those with lower PF ratios especially if IMV is delayed. Whilst acknowledging the heavy burden on clinicians to rationalise treatment during times of limited resources, we believe that careful assessment of age, comorbidities (cardiac and frailty), PF ratios, CRP and a 24 hourly review should be undertaken to prevent delayed IMV in appropriate patients.

Abstract P8 Table 1 Clinical characteristics and outcomes of ventilator support in COVID-19 patients

COVID-19	ITU CPAP	Ward CPAP	CPAP to IMV	IMV
N (died)	18 (11)	50 (26)	21 (20)	27 (10)
Age >70	1	24	4	6
<70	17	26	17	21
Comorbidities				
Frailty	1	10	3	3
Cardiac	3	21	7	1
Lung	7	15	9	6
BMI > 30	11	21	10	16
Smoking history	4	11	3	3
CXR zone	4.5	4.02	4.38	4.7
PF ratio	78	274	115	75
CRP	131	128	167	200
Lymphocytes	0.84	0.89	0.9	0.88
Time to ETT (days)			6	
Mortality	61%	52%	95%	37%

P9 DO PERSISTENT CHEST RADIOGRAPH CHANGES CORRELATE WITH ONGOING RESPIRATORY SYMPTOMS IN PATIENTS RECOVERING FROM COVID-19 PNEUMONIA?

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10.1136/thorax-2020-BTSabstracts.154

Introduction and Objectives In May 2020, BTS published guidelines on radiological follow-up for patients with COVID-19 pneumonia, advising an initial repeat chest radiograph at 12 weeks to assess resolution.[1] It is unclear whether persistent chest radiograph changes are clinically significant. Our aim was to assess whether there is a correlation between post-COVID chest radiograph appearances and ongoing respiratory symptoms.

Methods Inpatients at two trust hospital sites diagnosed with COVID-19, either clinically or from a positive nasopharyngeal swab, were followed-up via telephone approximately 6–8 weeks post-discharge. Patients were offered a chest radiograph and blood tests if abnormal and a symptomatic assessment via a proforma. Patients subjectively rated their degree of breathlessness, cough and fatigue using a numerical rating scale. Chest radiograph reports were coded by consultant radiologists as per BSTI guidelines[2] and grouped into 'improvers' (PCVCX0/1) and 'non-improvers' (PCVCX2/3 i.e. static or worsening appearances). Patients who had both an initial and follow-up chest radiograph, and who completed a proforma were included for retrospective analysis.

Abstract P9 Table 1 Differences in symptom burden in patients with improved vs. non-improved chest radiographs

Demographic	Chest radiograph appearance		p-value
	Improvers n=356 (93%)	Non-improvers n=26 (7%)	
Age (years)	58.9 ± 14.7	63.23 ± 12.7	0.103
BMI (kg/m^2)	27.7 ± 5.43	26.7 ± 4.50	0.331
Male sex (n,%)	224 (62.9)	21 (80.8)	0.154
BAME (n,%)	165 (46.3)	10 (38.5)	0.268
Current or ex-smoker (n,%)	112 (31.4)	9 (34.6)	**0.008**
Underlying respiratory disease (n,%)	62 (17.4)	3 (11.5)	0.737
ITU admission (n,%)	41 (11.5)	10 (38.5)	**<0.001**
Symptoms			
Breathlessness*	1 (0 – 3)	2 (0 – 4)	**0.010**
Cough*	0 (0 –1)	0 (0 – 2.5)	0.090
Fatigue*	2 (0 – 5)	2 (0.5 – 4.5)	0.773
How close back to 100% of usual do you feel?*	90 (80 – 100)	85 (75 – 97.5)	0.500
MRC dyspnoea scale*	1 (1 – 2)	1 (1 – 3)	**0.021**

*non-parametric data presented as median and IQR, all other data are presented as mean ± standard deviation

Results 382 patients were included, with a median (IQR) time to follow-up of 56 days (44 – 68). Baseline characteristics are shown in **table 1.** 93% of patients had significantly improved radiographs. Patients with radiographs that were classified as 'non-improvers' were significantly more breathless subjectively compared to improvers [NRS 2 (0 – 4) vs. 1 (0 – 3), p= 0.01], [MRC scale 1 (1 – 3) vs. 1 (1 – 2), p= 0.021]. They were also more likely to have been admitted to ITU [10/26 (38.5%) vs. 41/356 (11.5%), p< 0.001].

Conclusions In our cohort, patients recovering from COVID-19 pneumonia with a 'non-improver' chest radiograph are more likely to have been admitted to ITU and remain breathless at follow-up. We conclude that 'non-improver' chest radiographs at follow-up are an indicator of who may have ongoing respiratory pathology. These patients can thus be prioritised for further respiratory investigation.

REFERENCES

1. British Thoracic Society (2020). Guidance on Respiratory Follow Up of Patients with a Clinico-Radiological Diagnosis of COVID-19 Pneumonia. https://www.brit-thoracic.org.uk/document-library/quality-improvement/covid-19/resp-follow-up-guidance-post-covid-pneumonia/
2. British Society of Thoracic Imaging (2020). Post-COVID-19 CXR Report Codes. https://www.bsti.org.uk/media/resources/files/BSTI_PostCOVIDCXRtemplatefinal.28.05.201.pdf

P10 CHEST RADIOGRAPH FEATURES OF THE COVID-19 INFECTION: COMPARISON OF THE INITIAL AND FOLLOW-UP CHANGES

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10.1136/thorax-2020-BTSabstracts.155

Objectives In December 2019, an outbreak of coronavirus (COVID-19) started in Wuhan, China, and quickly spread across the world. We describe the features seen on chest radiograph (CXR) at disease onset, the natural history of these changes after an approximate two-month follow-up period, and the further respiratory investigations requested following discussion with patients who recovered from the illness.

Materials and Methods From March 16, 2020, to June 4, 2020, the CXR features of 86 patients (23–87 years, 50 males) who were admitted to the medical take with COVID-19 were analysed. The initial and follow-up CXRs, obtained a mean of 7.9 days and 63.8 days from illness were retrospectively assessed for the severity and progression of changes. Patients were then contacted by telephone to discuss any ongoing respiratory symptoms, and further investigations requested using the BTS guidelines for COVID-19 follow-up.

Results 65 of the 80 (83%) patients with abnormal initial CXRs had more than 1 lobe affected, with most (53/80, 66%) having changes in the lower lobes. A diffuse distribution was most common (37/80, 46%), followed by peripheral (28/80, 35%). These abnormalities were predominantly consolidation (61/80, 76%). At follow-up, just over half of CXRs (44/80, 55%) were reported as normal. Of those with ongoing changes, the dominant features were pneumonitis (5/36, 14%), inflammatory change, and atelectasis (4/26 each, 11%). 74 patients have been reviewed, and around half (35/74, 47%) have been discharged from our service. Of the 25 requiring further investigation with cross-sectional imaging, we have identified 1 pulmonary embolus and 4 cases of fibrosis (2 of which look to be asbestos-related and likely pre-date the diagnosis of COVID-19 pneumonia).

Conclusions We observed an even split between patients demonstrating complete resolution of initial CXR changes and the persistence of radiological features at six weeks. At follow-up, a significant proportion of patients continued to feel symptomatic despite an improvement in radiological features or a lack of positive findings with cross-sectional imaging. This underlines the importance of adopting a holistic approach and the need to exclude other causes of breathlessness in patients with no CXR or CT evidence of cause.

P11 COVID 19: UTILITY OF PLAIN CHEST RADIOGRAPH SCORING SYSTEM TO PREDICT DISEASE SEVERITY AND OUTCOMES

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Introduction Plain chest radiograph (CXR) is the most common imaging modality used to evaluate respiratory symptoms. CXR severity scoring has been shown to be an independent predictor of need for hospital admission and intubation and mechanical ventilation (I&MV) in COVID19 patients, but its role in predicting mortality is yet to be explored.

Aim We evaluated the predictive value and prognostic utility of CXRs in adult patients with COVID 19 infections.

Methods A retrospective analysis of 200 consecutive patients between March 2020 to May 2020 admitted to our tertiary centre with confirmed COVID 19 infection was conducted. Lung fields on CXRs were divided into 6 zones: right and left upper, mid and lower zones. Mild changes were defined as unilateral changes zones 1–3; moderate changes were: bilateral changes zones 2–3; severe changes: changes zones 4–6. CXRs were reviewed and scored independently by 2 reporters: thoracic radiologist and acute medical physician

who were blinded to baseline patient characteristics and outcomes.

Results 200 patients (median age: 79 (IQR 63–86) years) were included, 108 of which were females and 92 males. 61 (30.5%) died and 139 (69.5%) were discharged. During admission, 19 (9.5%) were admitted to ITU, 2 (1%) to the Non-invasive ventilation (NIV) unit and 179 (89.5%) to COVID Medical wards. Of the 61 patients (median age: 82 (IQR 73–89) years; 27 (44.3%) male, 34 (55.7%) female) who died: 3 (4.9%) were admitted to ITU, 1 (1.6%) to NIV unit and 57 (93.4%) to COVID medical wards; 45 (73.8%) received oxygen up to 15L, 1 (1.6%) received nasal high flow oxygen, 2 (3.3%) received CPAP and 3 (4.9%) received I&MV. CXR changes on admission were not an independent predictor of mortality; no CXR changes (p=0.099), Mild CXR changes (p=0.416), Moderate CXR changes (p=0.283), Severe CXR changes (p=0.994). Severe CXR changes was an independent predictor of I&MV (OR 2.298; 95% CI 1.156–4.566; p=0.018).

Conclusion We conclude that a CXR severity score is an effective tool to predict risk for hospital admission and the need for I&MV. Further larger studies will help validate this score by following up repeat CXRs to determine disease trajectory.

Lung cancer: treatment options and care pathways

P12 THE IMPACT OF THE COVID-19 PANDEMIC ON BRIGHTON AND SUSSEX UNIVERSITY HOSPITAL'S (BSUH) LUNG CANCER SERVICE; MORE OF THE SAME OR A NEED TO CHANGE?

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10.1136/thorax-2020-BTSabstracts.157

Introduction and Objective Epidemiological modelling suggests there will be excess cancer related mortality as a result of covid-19 and its impact on healthcare delivery and patient behaviour. We examined lung cancer presentations at BSUH NHS Trust over two time points to better understand the implications on presentation, diagnosis, staging and treatment. Further work is underway to examine the pathway in more detail, including barriers to diagnosis, and overall accessibility for patients and clinicians alike. The outcome of our research will influence preparation for the service over a potential second wave, and perhaps how we need to operate indefinitely.

Methods We performed a retrospective comparative analysis of patients recorded in the Somerset Cancer Register at BSUH between 1st Feb – 30th Jun in 2019 and 2020, examining the route of referral, stage of disease, diagnostic pathway and treatment given.

Results The percentage of emergency referrals, confirmed to be lung cancer, was higher during the pandemic (2020: n=47 [50%] vs 2019: n=40 [36%]).

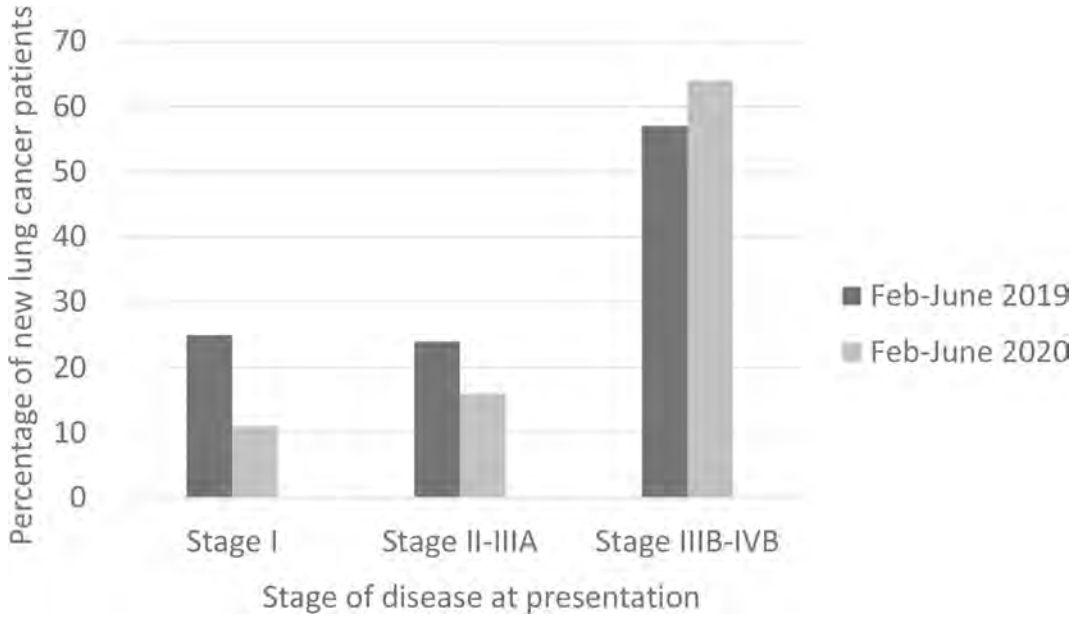
Overall, more patients presented with advanced stage disease (IIIB-IV) in 2020 compared with 2019 (64/94 [68%] vs 57/111 [51.3%]) – see figure 1.

The overall proportion of emergency referrals with late-presenting disease (stage IV) was 10% higher during the pandemic.

The proportion that received active anticancer treatment (surgery, radiotherapy or chemotherapy) was lower during the pandemic (46% vs 62%).

Access to diagnostic tests were unchanged other than an 11% decrease in cases proceeding to bronchoscopy or EBUS to confirm a cancer diagnosis (n=29 v n=15).

Conclusions Our Trust has demonstrated an increase in advanced stage and emergency presentations during the worst peak of Covid-19 which both correlate to worse outcomes and survival in lung cancer. This is likely to be replicated nationally and will result in a significant impact on survival statistics in lung cancer, which already lag behind many other countries in Europe.



Abstract P12 Figure 1 Profile of patients by percentage with newly confirmed lung cancer and their staging at presentation Feb-Jun 2019 versus Feb-Jun 2020 (Covid19 pandemic)

This raises the challenge of how to sustain services in the next wave of infection, and how to increase earlier diagnosis more rapidly than the current planned rollout of Lung Health Checks, taking into account the changes in behaviour of patients and clinicians alike during this pandemic.

P13 MAPPING THE LUNG CANCER PATHWAY

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Introduction and Objectives The National Optimal Lung Cancer Pathway (NOLCP) describes the process of referral to treatment for lung cancer patients. It is linked to performance targets such as the 28-day faster diagnosis standard. To measure performance of the whole pathway and individual components we mapped the pathway to enable a database tool to be created to give close to real time performance outputs.

Methods The pathway was mapped based on the NOLCP and an Excel-based tool created. Critical pathway events were defined and mapped to national targets. Outputs were generated that allowed timings of events and tests on the pathway to be visually displayed. Real patient pathway data from different cancer database systems was inputted into the tool to validate the model and refine the outputs in an iterative manner.

Results Two Trusts contributed large datasets from their cancer databases. The tool is able to map.csv files to create outputs of relevant pathway timings. Mapping the individual patient pathways is complex. Defining the start of the pathway and the order of events is challenging. We found 83 individual combinations of early pathway events in 1018 suspected lung cancer patients. 90% of pathways were accounted for by 31 unique combinations of events, the most common of which was CXR followed by referral then CT and then pathway exit with no cancer, accounting for only 11% of pathways.

Conclusions We present a tool that is able to take data files from commonly used cancer databases and extract pathway timing information and information on individual investigations. This is useful to monitor and improve pathway performance. Individual pathways are often complex and do not fit a linear progression model. The model will be further developed with the aim of creating tool that can provide near real time data on performance that will make QI easier.

P14 LUNG CANCER REFERRALS: THE IMPACT OF THE CORONAVIRUS PANDEMIC

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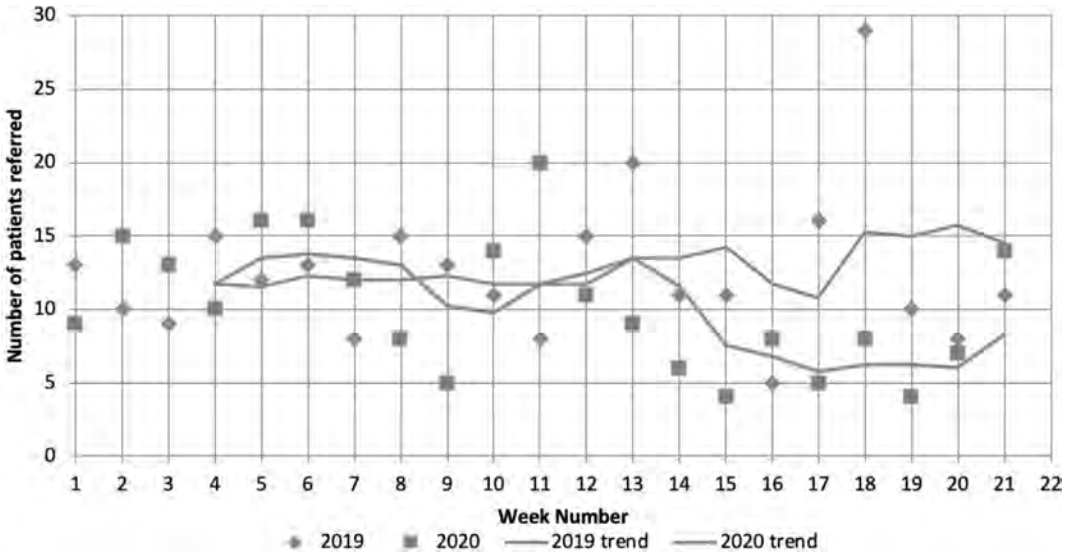
10.1136/thorax-2020-BTSabstracts.159

Introduction Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), has been declared a global pandemic.[1] A national lockdown was announced in the UK from 23rd March 2020, with a public health campaign encouraging patients to stay home. Healthcare services, including the NHS, had to urgently adapt to the demands of COVID-19, with changes in primary and secondary care.

At our hospital trust we have reviewed the referrals to our lung cancer services during the pandemic. Suspected lung cancers in the community are referred using the cancer 2-week pathway. Survival estimates for lung cancer are poor compared to most other primary cancers and NICE advocates for quick referral to a specialist for patients whom lung cancer is suspected [2]. We have looked at the impact of the pandemic on the referrals to our services.

Method We have reviewed the referrals to lung cancer services, via the lung cancer 2-week pathway at our hosptial trust, between the same periods in 2019 and 2020.



Abstract P14 Figure 1 A comparison in the number of 2-week wait lung cancer referrals between 2019 and 2020 at out hospital trust. The trend lines drawn show a moving average based on 4 data entries. The number of referrals is comparable up to week 13, the week in which the UK lockdown was introduced. From week 13 onwards there has been a reduction in the number of referrals lung cancer services

Results There has been a noticeable reduction in the number of referrals to the lung cancer services from the 23rd March, in comparison to same period in 2019 (see graph 1). Between weeks 13 and 19 of 2020 there was a 56.85% reduction in the number of referrals made compared to 2019.
Conclusion There are several likely reasons for the reduction in referral rate shown, including the nationwide advice to 'stay home to protect the NHS', changes to service provision and alterations to clinical set-ups. Timely referral of patients to lung cancer services and prompt diagnosis are essential, directly relating to lung cancer outcomes. We all, therfore, have a responsibility to ensure we learn from the COVID-19 pandemic, to help develop robust services, on top of appropriate clinical awareness, ensuring essential medical services can be provided irrespective of other pressures on the NHS.

REFERENCES

1. W.H.O. WHO Director-General's opening remarks at the media briefing on COVID 2020 [Available from: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020.Last accessed on 22June2020.
2. NICE. NICE impact Lung cancer, 2019 [Available from: https://www.nice.org.uk/about/what-we-do/into-practice/measuring-the-use-of-nice-guidance/impact-of-our-guidance/niceimpact-lung-cancer. Last accessed on 22June2020.

P15 LUNG CANCER MULTIDISCIPLINARY MEETING – DOES THE PRESENCE OF EMPHYSEMA ON CT IMAGING CORRELATE WITH OBSTRUCTIVE SPIROMETRY OR TRANSFER FACTOR?

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10.1136/thorax-2020-BTSabstracts.160

Introduction and Objectives Spirometry is routinely performed prior to the lung cancer multidisciplinary meeting (MDM). However, smoking related lung disease in the setting of normal spirometry is thought to be relatively prevalent.[1] We sought to evaluate if there was any correlation between common variables used in the assessment of patient fitness.
Methods We performed a retrospective chart review of all patients discussed at the MDM from 1/1/2018 – 4/11/2019 who had a transfer factor (TLCO) < 80, as we would expect these patients to have the highest incidence of obstructive spirometry. We recorded three key variables; spirometry FEV1/FVC, TLCO < 50 or 50–80, and presence or absence of emphysema on imaging. These variables were compared using chi^2 test. We subsequently stratified each patient into either treatment with curative intent or palliation.
Results Of the 104 patients who had a TLCO measured, 70 (67%) had obstructive spirometry (FEV1/FVC <0.7). A TLCO of < 50 was recorded in 24 of the 104 patients (23%). Emphysema was reported on CT thorax in 58 patients (56%).

A TLCO < 50 was associated with the presence of emphysema on CT thorax (p = 0.001). There was no significant association between obstructive spirometry and TLCO < 50 (p = 0.68), or between obstructive spirometry and emphysema on CT (p = 0.41). Indeed, 41% of patients with obstructive spirometry do not have emphysema on CT, while 50% of patients with non-obstructive spirometry have emphysema on CT imaging.

When considering the MDM decision regarding treatment with curative intent versus best supportive palliative care, no individual variable was found to be significant (obstructive vs non-obstructive spirometry, p = 0.22; TLCO < 50 vs 50–80, p = 0.31; emphysema on imaging vs none, p = 0.43).
Conclusion We suggest that TLCO < 50 is more predictive than obstructive spirometry at identifying patients with emphysema on CT imaging. Spirometry alone can lead to significant respiratory disease being underdiagnosed; this highlights the need for multimodality, comprehensive assessment.

REFERENCE

1. Lowe KE, Regan EA, Anzueto A, *et al*. COPDGene® 2019: Redefining the diagnosis of chronic obstructive pulmonary disease. *Chronic Obstr Pulm Dis* 2019;**6**(5):384–399.

P16 PATIENT-ASSESSED VERSUS PHYSICIAN-ASSESSED PERFORMANCE STATUS IN LUNG CANCER CARE – DO DIFFERING OPINIONS AFFECT PATIENT OUTCOMES?

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Objective To discern differences between physician and patient self-assessed performance status (PS) scores. As treatment decisions at MDT are based on PS this study aims to calculate the number of patients whose cancer management could have been affected by this discrepancy.
Methodology This prospective, service improvement project involved patients presenting to a One Stop Lung Cancer Clinic between March and August 2019. Patients self-assessed their Eastern Cooperative Oncology Group (ECOG) PS (scale 0–5) through the medium of an assessment questionnaire and flow chart tool. The physician in clinic independently allocated the patient an ECOG PS following their assessment. Data analysis was conducted to compare the differences between the physician and patient opinion, and patient outcomes were reviewed in April 2020.
Results 56 patients were included in the study with a mean age of 69 years and a male to female ratio of 1.8:1.0. In 43% of cases, there was no discrepancy in the PS given by the patient and physician. The patient-rated PS was higher in 46% and lower in 11%.

Patients self-rating their PS higher were older, with a median age of 74 compared to 68 years for those whose score agreed with or was lower than the physician's.

55% of female patients over-estimated their PS compared to the physician's assessment, whereas this was the case in 44% of males.

60% of late stage lung cancer patients (stage IIIB-IV) overestimated their PS compared to the physician's assessment, compared to 44% with early stage (stage IA-IIIA).

Overall, there was no significant discrepancy between PS ratings in senior versus junior doctors' assessments compared to patients' PS ratings.
Conclusion A greater proportion of patients assessed themselves as having a higher PS than the physician assigned them, with age, sex and stage of disease influencing patient-rated PS.

Although perceived differences in PS had the potential to influence management in 39%, when reviewed retrospectively there were no incidents where this had a significant impact on patient care/treatment decisions. Self-reporting PS through the medium of flow charts and questionnaires still requires validation, but could assist and help standardise decision-making in the management of lung cancer.

P17 THE SUMMIT STUDY: RESULTS PROCESSING TIME

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10.1136/thorax-2020-BTSabstracts.162

Introduction The SUMMIT Study aims to assess the implementation of Low-Dose Computed Tomography (LDCT) for lung cancer screening in a high-risk population and to validate a multi-cancer early detection blood test. LDCT results are communicated to participants and their GPs by standardised letter. We aim to evaluate the turnaround time from the scan report to the subsequent management and communication of results via letter.

Methods Results are automatically sent to participants and GPs according to pre-defined management plans based on findings collected via proformatised radiology report. Possible outcomes from these reports are: urgent referrals for suspicious findings, nodule surveillance LDCT at 3 months, 12 month surveillance LDCT, or suitable for randomisation at Year 1 to annual or biennial LDCT (see figure 1). Participants with suspicious findings are reviewed by the study clinicians. Where appropriate an urgent referral to the participant's local hospital is completed manually after discussion with the participant; the automated letters in these cases are delayed until contact is made with the participant and a clinical plan confirmed.

Results We report outcomes from the first 11,551 SUMMIT Study participants with completed baseline LDCT reports. We aim to action results within 5 days: 11,319 (98.0%) of all results letters were mailed to participants and 11,423 (98.9%) to their GPs within 5 days.

645 (5.6%) participants required further review and consideration of an urgent referral. For these, 84.6% of results letters were mailed within 5 days, and 95.5% within 12 days. As expected, increased mailing times were observed in cases that were more complex, requiring liaison with an external clinical team or review of imaging at our internal weekly radiology meeting.

Discussion Timely reporting of results is crucial in establishing wider roll-out of lung cancer screening in the UK. The vast majority of results are automated and are reliably sent as programmed. A minority require further clinical input and image review, prior to completion of an onwards referral. We demonstrate a scalable and feasible approach to feeding back results following LDCT.

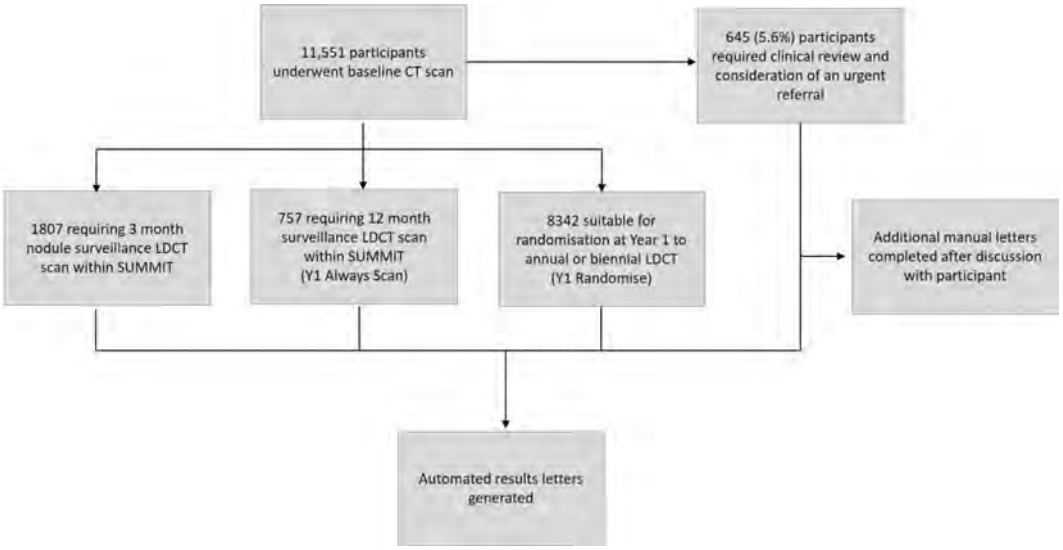
P18 THE SUMMIT STUDY: UPTAKE FROM RE-INVITATION

[1]JL Dickson, [2]SL Quaife, [1]C Horst, [1]S Tisi, [1]H Hall, [1]P Verghese, [3]A Mullin, [3]R Sarpong, [3]J Teague, [3]L Farrelly, [4]V Bowyer, [4]K Gyertson, [4]H Pervez, [4]F Bojang, [4]C Levermore, [5]T Anastasiadis, [6]K Sennett, [1]N Navani, [3]A Hackshaw, [1]SM Janes. *[1]Lungs for Living Research Centre, University College London, London, UK; [2]Research Department of Behavioural Science and Health, University College London, London, UK; [3]Cancer Research UK and UCL Cancer Trials Centre, University College London, London, UK; [4]University College London Hospitals NHS Foundation Trust, London, UK; [5]Tower Hamlets Clinical Commissioning Group, London, UK; [6]Killick Street Health Centre, London, UK*

10.1136/thorax-2020-BTSabstracts.163

Introduction and Objectives The SUMMIT Study aims to assess the implementation of low-dose Computed Tomography (LDCT) for lung cancer screening (LCS) in a high-risk population and to validate a multi-cancer early detection blood test. Invitees are identified via primary care records and invited to attend a Lung Health Check (LHC), where if eligible, LDCT is offered. Uptake of LCS has been low, whilst UK studies have demonstrated higher rates, these are still lower than other screening programmes. Research in other cancer screening settings suggests that re-invitation strategies improve uptake among non-responders, with recall routine practice in existing national screening programmes. We aim to quantify the uptake to re-invitation, something not previously tested in the LDCT screening context.

Methods Re-invitation and re-invitation reminder letters were sent to individuals who had not responded to the initial series of invitation letters (pre-invitation, invitation, reminder) within four months or longer. The content of the letters was designed using behavioural science evidence for strategies effective for non-responders in the colorectal cancer screening



Abstract P17 Figure 1

context, including the principles of scarcity, social norms for participation so far, personalisation to local London borough and GP endorsement. Responses from the first ten re-invited practices were analysed. Re-invitations were sent between 22nd January and 5th February 2020 and reminders between 5th and 19th February 2020. Data were analysed 21 days after the last reminder was sent.

Results 2,000 non-responders were sent re-invitation letters. 310 (15.5%) of those re-invited responded (range: 8.3%–21.2% per practice). The average response time was 19 days. Of those who responded, 186 (60.0%) were eligible for a LHC and 182 (97.8%) of those eligible booked a LHC appointment. Four people (2.2%), did not attend their booked appointment. Of those attending, 154 (86.5%) were eligible, of which 133 (86.4%) consented.

Conclusions The re-invitation strategy impacted positively on screening uptake and participation by non-responders. These results may be an underrepresentation of the true effect, as invitees could contact the study team after the date of analysis. Work continues to assess the demographic and smoking-related characteristics of those who respond to re-invitation and how it interacts with the overall invitation strategy.

P19 DOES CONCOMITANT INTERSTITIAL LUNG DISEASE (ILD) INFLUENCE SURVIVAL FOLLOWING CHEMOTHERAPY FOR ADVANCED LUNG CANCER?

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10.1136/thorax-2020-BTSabstracts.164

Introduction Lung cancer is relatively common in patients with fibrotic ILD. The presence of ILD can influence patient selection for treatment and raises concerns about treatment risks and outcomes.

Aim To investigate the prevalence of ILD among patients with advanced lung cancer who received chemotherapy as an initial treatment and to explore clinical features and prognosis in this group compared to other lung cancer patients without ILD.

Method We studied consecutive lung cancer patients in the West of Scotland Lung Cancer Database treated with chemotherapy in one year (2017). Pre-treatment chest CT scans were evaluated by two radiologists with double reading of a proportion to assess consistency. If present, ILD was further classified into 3 groups: usual interstitial pneumonia (UIP), possible UIP, and inconsistent with a UIP pattern according to ATS/ERS/JRS/ALAT guidance.

Results 448 patients were included in the study, with 44 (9.8%) identified as having ILD (15 UIP, 14 possible UIP and 15 inconsistent with UIP). Compared with those without ILD, patients with ILD were older (mean:72 vs 66 years, $p<0.001$), predominantly male (77% versus 46%, $P > 0.01$), had a significantly higher performance status score ($p=0.014$) and earlier TNM stage (49% stage IV versus 70% stage IV, $p=0.009$). Small Cell Lung Cancer was the most common histologic type in the ILD group (50%), while in the non-ILD group adenocarcinoma (37.4%) was followed by squamous cell carcinoma (36.4%). Pre-treatment pulmonary function tests showed that patients with ILD had significantly lower forced vital capacity (FVC) (median: 92% versus 105%, $P = 0.002$) and diffusing capacity for carbon monoxide (DLco) (median: 55% versus 72.5%, $P<0.001$).

Median survival times for ILD and non-ILD group were not significantly different at 319 and 344 days respectively (log-rank test $P=0.3$).

Conclusion Lung cancer patients with concomitant ILD have specific demographic, histological and functional features. However, concomitant ILD does not confer a survival disadvantage after receiving chemotherapy in this group with advanced lung cancer. These patients should not be denied the chance of treatment based solely on their underlying ILD.

P20 THE IMPACT OF PD1 AND PDL1 IMMUNOTHERAPY ON NSCLC OUTCOMES BEYOND OVERALL SURVIVAL: A SYSTEMATIC REVIEW

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10.1136/thorax-2020-BTSabstracts.165

Introduction/Objectives Despite comprising many cancer diagnoses, few treatments are suitable for patients with advanced non-small-cell lung cancer (aNSCLC). Trials suggest blockade of Programmed Death 1 (PD1) or its ligand (PDL1) may be effective for improving overall survival among patients with aNSCLC. However, the impact of this therapy on outcomes other than survival and real-world outcomes remains largely unknown. Therefore, we investigated whether PD1 and PDL1 immunotherapy is more effective than chemotherapy and placebo, focussing on clinical outcomes beyond overall survival, and comparing real-world to trial outcomes.

Methods In this systematic review, six databases were searched for randomised controlled trials (RCTs) and observational studies investigating nivolumab, pembrolizumab, atezolizumab or durvalumab. Study selection was performed independently by two reviewers. Data regarding overall survival, progression-free survival, adverse effects (AEs), quality of life (QoL) and cost-effectiveness were descriptively analysed. The extent to which RCT data was recapitulated by observational studies was assessed.

Results From 5,423 search results, 139 full texts and abstracts were included. Immunotherapy was associated with a longer overall survival than chemotherapy and placebo; this benefit was sustained across study designs. In RCTs, the incidence of treatment-related AEs was approximately 20% lower among patients using immunotherapy compared to chemotherapy.

However, no other consistent benefits were observed. Progression-free survival was inconsistent. The profile of AEs was similar between treatment arms in RCTs, and a broader range of AEs was observed in real world data. Improvements to QoL varied according to the instrument used; however, QoL was not recorded widely.

The main difference between RCT and observational data was in the incidence of AEs; a lower treatment-related AE incidence was reported among observational studies.

Discussion Despite benefits to overall survival, it is unclear whether PD1 and PDL1 immunotherapy is more effective than chemotherapy among patients with aNSCLC when considering other clinical outcomes. By considering both trial and real-world studies, these findings are significant in providing one of the most realistic estimates of treatment effectiveness to date. Given the expense associated with this therapy, our findings suggest future research should focus on identifying patients most likely to derive benefit.

P21 IMPACT OF AN INTERVENTIONAL SERVICE ON THE MANAGEMENT OF CENTRAL AIRWAYS OBSTRUCTION

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10.1136/thorax-2020-BTSabstracts.166

Introduction Central airways obstruction (CAO) carries significant morbidity and mortality. Previous local auditing demonstrated a small number of lung cancer patients with CAO underwent interventional bronchoscopy. Following service development we prospectively re-audited.

Methods We prospectively recorded cases referred to our interventional service between October 2018 and February 2020. Details on referrals of diagnoses, treatments performed and outcomes were collected. Comparisons were made with our baseline audit data from 2014.

Results During the prospective audit period, 32 patients were recorded. The median[interquartile range] age was 68[59.5–73.3] years with 20/32(62.5%) being female. In 22/32(69%) cases, referral was based on index presentation. Of these, 69% were formally reported in CT scan. Symptomatic disease was noted in 23/32(72%), and 24/32(75%) had performance status of ≤2. Lung cancer was the primary diagnosis in 26/32 (81%) of cases, with NSCLC-adenocarcinoma being the commonest. Rigid bronchoscopy was performed in 19/32(59%) of patients referred, and time from CT to procedure was 11 [6.5–22.5] days. Debulking was the commonest intervention, while stents were placed in 3/19(16%) cases. In those patients undergoing interventional bronchoscopy, 12/19(63%) were alive at 3 months. Rigid bronchoscopy was not performed in 13/32(41%) patients. Intervention was deemed to carry too high a risk/benefit ratio in 3/13(23%) patients and 3/13(23%) patients with small cell lung cancer were referred for systemic therapy over interventional bronchoscopy.

In comparison with the previous audit cohort – gender distribution, age and cancer represented were similar. More patients with CAO underwent intervention ($p<0.001$). Non-significant trends in improvement in time to rigid bronchoscopy and survival at 3 months were noted. Reporting of CAO on CT was unchanged.

Conclusion Establishing a dedicated interventional service may impact on number of interventions, and potentially reduce time to procedure in a patient group that has a poor prognosis. However, improving recognition, standardising reporting and referral is required, as the true burden of disease remains underestimated in routine practice. Despite this, understanding reasons for not intervening need further study, as even with a pro-active team, of those referred, half of patients still did not undergo intervention.

P22 CLINICAL CHARACTERISTICS CONTRIBUTING TO LUNG CANCER RECURRENCE FOLLOWING SURGICAL RESECTION

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10.1136/thorax-2020-BTSabstracts.167

Introduction Lung cancer is the most commonly diagnosed cancer worldwide and drives a significant mortality. In the UK, more than 39000 new cases of lung cancer are diagnosed each year. Surgical resection is the primary mode of curative treatment for early stage non-small cell lung cancer. We aimed to identify the contributing factors for lung cancer recurrence following surgical resection.

Method Clinical history of patients who underwent curative surgical resection for primary lung cancer between 2015 and 2019 were retrospectively extracted. Tumour histology, type of surgical resection, time of recurrence and the use of adjuvant chemotherapy were recorded.

Results Out of a total of 129 patients (mean (SD) age: 71.3 (8.6) years, 63.4% adenocarcinoma and 65.9% lobectomy), 24.8% had recurrence within 5 years. The majority (67.7%) had recurrence within 24 months following surgery. Patients who had a recurrence of lung cancer had a higher pack year smoking history (46.1 pack-years) than those who did not (37.9 pack-years). However, this did not reach statistical significance ($p=0.08$). There was also a trend toward increased recurrence rate in patients with a smoking history (27.5%) compared to those who never smoked (6.7%, $p=0.07$). There was no difference in recurrence rate based on histology or the type of surgical resection. The recurrence rate was significantly higher (37.5%) in patients who underwent adjuvant chemotherapy ($n=48$) compared to those who did not (16%, $p=0.019$). This is likely due to the more advanced stage of disease at the time of resection in those who received adjuvant chemotherapy: whilst 65.3% of those who received adjuvant chemotherapy had stage 2B lung cancer or higher, 87.8% of patients who did not receive adjuvant chemotherapy had stage 1 disease.

Abstract P22 Table 1

Characteristics	Total Number	Percentage of patients with recurrence of lung cancer following surgery
Smoking History		
Current Smoker	34	29.4%
Ex-smoker	77	26.7%
Never Smoker	15	6.7%
Histology		
Adenocarcinoma	83	21.7%
Squamous Carcinoma	31	29%
Small Cell Carcinoma	2	50%
Other	9	33.3%
Type of Surgery		
Wedge Resection	37	24.3%
Lobectomy	81	25.9%
Segmentectomy	1	100%
Pneumonectomy	4	0
Adjuvant Chemotherapy		
Yes	48	37.5%
No	75	16%

Conclusion Lung cancer recurrence rate is significant after curative surgery. Despite post-surgical adjuvant chemotherapy in more advanced disease, the recurrence remains to be higher compared to disease at earlier stage. Further research focusing on detection of early cancer recurrence is needed to improve patient outcomes.

P23 DO PATIENTS COMMENCING MULTI-MODALITY TREATMENT FOR STAGE III-N2 LUNG CANCER COMPLETE THEIR TREATMENT?

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10.1136/thorax-2020-BTSabstracts.168

Introduction Multimodality treatment, with surgery in addition to chemo-radiotherapy, may be considered for patients with stage IIIA-N2 non-small cell lung cancer (NSCLC) that are medically operable, have single station N2 disease and a primary tumour that is resectable with a lobectomy. This strategy has been demonstrated to improve survival compared to chemo-radiotherapy without surgery.

In comparison to definitive treatment with concurrent chemo-radiotherapy, neoadjuvant treatment uses lower radiotherapy doses and fewer chemotherapy cycles. Patients that receive neoadjuvant treatment but do not proceed to surgery are at risk of receiving suboptimal oncological treatment. Careful patient selection is key to optimising outcomes in this cohort.

We have audited the treatment outcomes for patients with stage IIIA-N2 NSCLC.

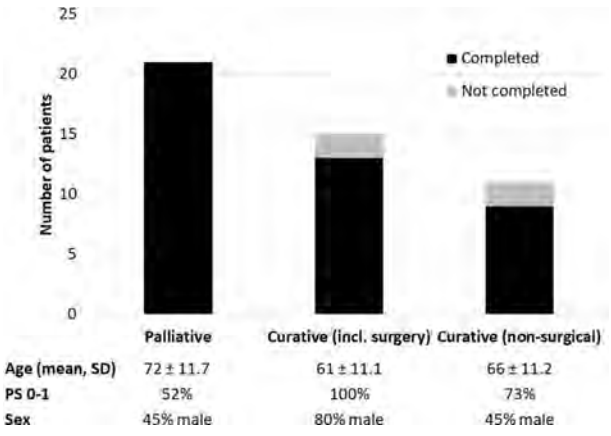
Methods Patients diagnosed with lung cancer in 2016–2017 were identified from local electronic health records. Those with pathologically confirmed NSCLC, radiological stage IIIA-N2, and performance status 0–2 were included.

Results 47 patients met the inclusion criteria. 26 patients (55%) commenced curative treatment, none of whom had a Pancoast tumour. Patient demographics and the proportion of patients completing their planned treatment are shown in figure 1.

13 of 15 patients (87%) planned for curative treatment that included surgery completed their planned treatment. Those that did not had performance status ≤1 and were of comparable age to those that completed surgical treatment (± 0.5 SD of mean age).

9 of 11 patients (82%) that were planned for curative non-surgical treatment completed their planned treatment. Those that did not complete treatment were performance status 2 and one patient was elderly (>80 years).

Conclusion The demographics of the treatment groups were as expected, with a younger age and more favourable performance status found in those planning to undergo surgical treatment. The majority of patients completed their planned curative treatment, including those planned for surgery. Assessing the proportion of patients that complete planned treatment at a local level is important to inform decision making within the MDT.



Abstract P23 Figure 1

P24 EFFICACY OF AGE ADJUSTED D DIMERS IN EXCLUDING PULMONARY EMBOLISM IN PATIENTS WITH CANCER

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10.1136/thorax-2020-BTSabstracts.169

Introduction Cancer is a strong provoking factor for pulmonary embolism (PE). D-dimer levels are frequently elevated in cancer patients and its specificity decrease with age, hence resulting in frequent unwarranted CT pulmonary angiogram (CTPA). There is growing evidence on the utility of age adjusted d-dimer (AADD) in patients >50 years of age. The objective of this study is to test the efficacy of AADD in ruling out PE in cancer patients when compared to conventional d-dimer cut-off.

Methods Retrospective analysis of consecutive patients undergoing CTPA within 48 hours of admission at our institution from 01/04/18 – 30/09/18. Patients <50 years of age, non-cancer patients and patients who had no d-dimer done, were excluded. AADD values were calculated from electronic patient records.

Results 807 CTPAs were performed over the 6-month period. 247 patients with cancer were included in further analysis of which 69 (28%) had PE. 60/178 patients (33%) with negative CTPAs had d-dimers positive and AADD negative, whilst only 3/63 CTPAs had positive d-dimers with negative AADD.

In essence, 60 patients could have avoided an unnecessary CTPA by using AADD in place of conventional d-dimer, at the expense of missing 3 sub-segmental PE.

Conclusion AADD has comparable performance in cancer patients and improves the specificity while retaining sensitivity of d-dimer. It can prevent significant number of inappropriate CTPAs but can potentially miss a few sub-segmental PEs. Further studies are needed to validate its utility before its universal application.

REFERENCE

1. Wilts, *et al*.*Thrombosis Research* 2017 Apr;**152**:49–51

Service innovation for lung health during COVID-19

P25 POSTAL SET UP OF CPAP: A POSITIVE INNOVATION DURING THE COVID 19 PANDEMIC

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10.1136/thorax-2020-BTSabstracts.170

Introduction and Objectives Traditionally at this unit, patients diagnosed with OSA have been initiated on CPAP at a face to face (F2F) appointment. Patients are followed up via telephone consultation at 4 weeks with a virtual review of CPAP usage.

Abstract P25 Table 1

	All patients			Severe OSA			Moderate OSA			Mild OSA		
	F2F CPAP	Postal CPAP	P value *	F2F CPAP	Postal CPAP	P value	F2F CPAP	Postal CPAP	P value	F2F CPAP	Postal CPAP	P value
Total Patients	191	59		94	34		44	8		53	17	
Mean improvement in Epworth Score post CPAP trial	7.4	6.4	0.11	7.3	6.4	0.24	7.4	7.0	0.47	7.8	6.0	0.06
Percentage of patients feeling better or much better post CPAP trial	83.25%	84.75%	0.78	80.85%	82.35%	0.84	81.82%	75%	0.65	88.68%	94.12%	0.51
Mean hours used per night	5.5	5.8	0.11	5.3	5.7	0.18	5.6	6.1	0.17	5.7	5.9	0.31
Mean percentage of nights used (actual nights used/possible nights)	85%	89%	0.06	83%	87%	0.18	85%	92%	0.07	89%	92%	0.22

*(unpaired t test or Chi Square test)

During the Covid-19 pandemic this department adapted their practices to reduce F2F interactions. Patients were sent a CPAP machine via the post and a YouTube video link of how to use the CPAP.

The aim of this study is to compare outcomes in symptoms and compliance between the patient groups to evaluate the effectiveness of a postal CPAP service.

Methods Patients initiated on CPAP between September and November 2019 (F2F CPAP) were compared to patients initiated on CPAP between April and June 2020 (Postal CPAP). Data was obtained from the electronic records. Patients were only included in the study if all data regarding symptoms, Epworth score and compliance was complete.

Results 346 patients were initiated on F2F CPAP between and 185 were sent postal CPAP during the said period. Of these, 191 (55%) and 59 (32%) respectively had full data recorded. Table 1 compares outcomes in symptom improvement and compliance between both groups. Common causes of missing data were unable to contact patient or extended trial.

The majority of patients felt their symptoms were better on CPAP. There was no significant difference between the groups in terms of ESS improvement, hours used per night and percentage of nights used.

Conclusions Overall, symptom improvement and compliance were similar in both groups. While it is possible that the outcomes were exaggerated as patients who did not respond well or were non-compliant were excluded as they were not contactable, however that is applicable to both groups & hence comparable. This study has huge implications for how the OSA CPAP service is run in future and supports a case that the initiation of CPAP can be done remotely via postal CPAP without impacting on patient outcomes, with fewer hospital visits, PPE use & clinic room utilization. Future studies should look at long term compliance in this group.

P26 'PLEURAL TRIAGE' FACILITATES EFFECTIVE MANAGEMENT OF A PLEURAL SERVICE IN THE COVID-19 ERA

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10.1136/thorax-2020-BTSabstracts.171

Aims The COVID-19 pandemic has created new challenges for management of pleural diseases. Pleural patients can be highly vulnerable to infection and often have conditions for which treatment cannot be safely delayed. We reviewed our pleural service to implement changes that allowed maintenance of a service whilst maximising patient and staff safety.

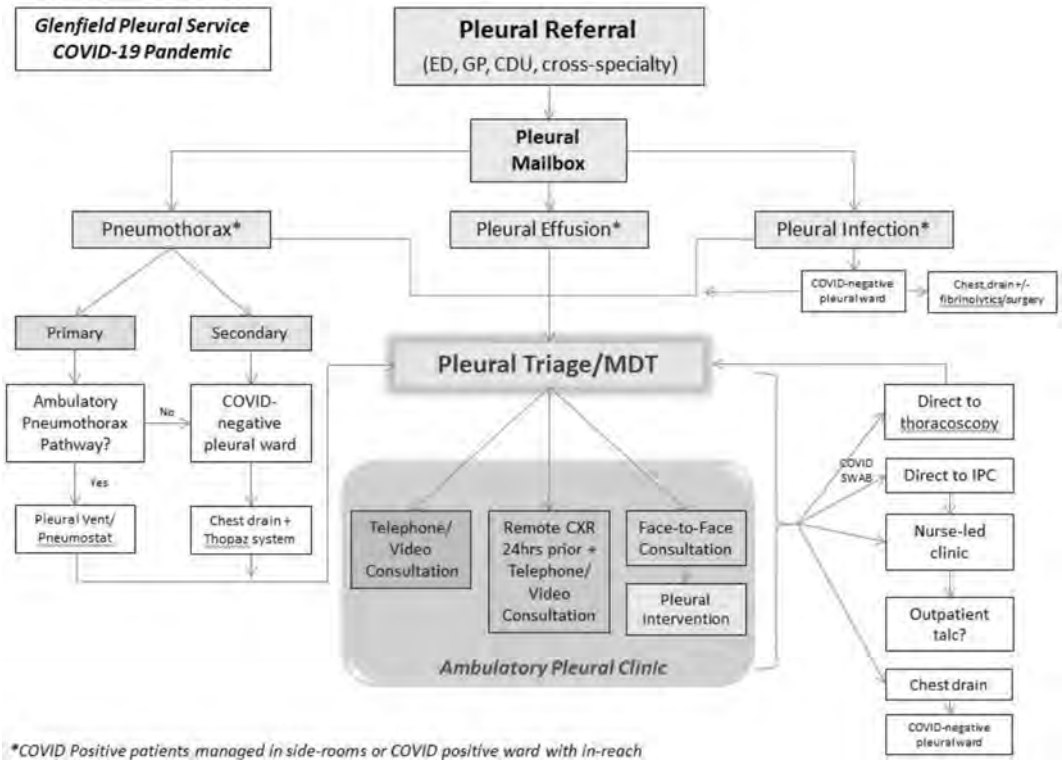
Method Establishment of a Pleural Triage MDT meeting 48 hrs prior to pleural clinic to review all referrals and stream patients to i) telephone consultation only, ii) remote CXR (24 hrs pre-clinic) plus telephone consultation iii) face-to-face (F2F) review or iv) direct to a procedure. We reviewed case numbers post lockdown for March-August 2020 and compared to 2019.

Results During the COVID pandemic outpatient pleural management was implemented where possible, including adaptation of our ambulatory pneumothorax pathway to comply with COVID-19 recommendations. March-August 2019 there were 293 F2F pleural consultations. March-August 2020 there were 408 consultations [103 telephone only, 168 remote CXR + telephone consult (11 declined) and 123 F2F (3 declined)]. The 14 declines had telephone consults only. Previously all these patients would have been F2F. COVID-19 symptom screening occurred if attending for CXR/F2F. F2F consults were held in designated outpatient areas with access to CXR and procedure rooms, with timings to maintain social distancing. Where required, definitive pleural intervention was undertaken on the same visit. Direct-to-procedure pathways for thoracoscopy or IPC were implemented with COVID-testing 48 hrs prior. Patients with malignant effusions were counselled on management options and uptake of day-case IPC increased [March-August 2020 vs 2019 IPC = 44 vs 35] compared to elective admission for drain and talc pleurodesis. During the April 2020 COVID peak there were 12 admissions for chest drain vs 50 in April 2019. The pleural/cancer themed ward was designated a COVID-negative area for inpatients.

Conclusion In the ever-changing situation of a global pandemic it is possible to successfully implement changes to maintain and enhance the safety and efficiency of pleural services, with selected changes likely to remain post-pandemic. Further evaluation of these changes over time could help to shape the future of pleural medicine.

REFERENCE

1. Guidance on pleural services during the COVID-19 pandemic; https://www.brit-thoracic.org.uk/document-library/quality-improvement/covid-19/



Abstract P26 Figure 1

P27 THE IMPACT OF COVID-19 ON PATIENTS PRESENTING WITH LUNG CANCER – THE MISSING FIFTH

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10.1136/thorax-2020-BTSabstracts.172

Background The Coronavirus Disease-19 (COVID-19) pandemic continues to cause significant disruption worldwide. Within the UK there were considerable adjustments in all healthcare settings to ensure appropriate management of patients affected by COVID-19, with consequent disruption to existing services.

Lung cancer is associated with a high mortality rate, not least because there are often delays in diagnosis. We examined referrals before and during the COVID-19 pandemic to determine whether this affected the number of patients seen and the speed to diagnosis.

Methods We compared referrals to our Lung Cancer Service during the four months prior to and immediately following the onset of the UK COVID-19 pandemic in March 2020. We collected data relating to the numbers and origins of referrals, as well as the time intervals at different stages of our diagnostic pathway.

Results Our service received fewer referrals following the onset of the pandemic, with a mean of 97 patients per month from November 2019 to February 2020, compared to 79 patients per month between March and June 2020. Urgent cancer referrals from General Practitioners ('two-week-wait') were reduced (50% to 44%) during the pandemic. A greater proportion of patients presented via alternative pathways, including A&E, suggesting a later presentation. The gender of patients referred remained similar between both timeframes, although during the COVID-19 pandemic, the mode average age was slightly younger at 73 years (79 years previously), with an age range 29–97 years (21–93 years pre-COVID-19).

After receiving a referral, the time to first review remained stable (98% vs 99%). The mean time from referral to diagnosis remained 14 days. 91% of patients received a lung cancer diagnosis within 28 days of referral, despite the COVID-19 pandemic (94% previously).

Conclusion Time to lung cancer diagnosis was not affected by changes to our clinical service during the COVID-19 pandemic. However, there was a significant reduction in the overall number of referrals (almost one fifth). We will monitor to review whether there is an increase in late presentations in the coming months due to delays in referral. The fear is that future increases in COVID-19 cases nationally will further delay these patients presenting.

P28 THE IMPACT OF THE COVID-19 PANDEMIC ON PLEURAL AND LUNG CANCER ACTIVITY AT PLYMOUTH NHS TRUST

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10.1136/thorax-2020-BTSabstracts.173

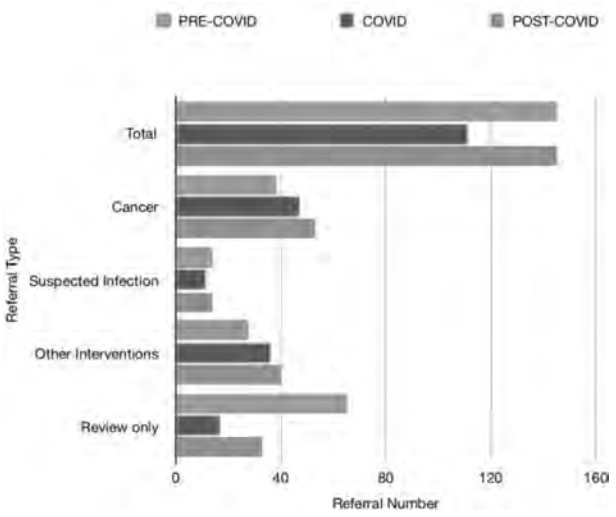
Background The UK lockdown introduced on 23rd March 2020 to flatten the curve of the COVID-19 pandemic was associated with a decrease, or cessation, of most non-COVID-19 NHS services, affecting other patient groups requiring time-critical access to NHS services.

Objectives We assessed the impact of COVID-19 on our pleural service.

Methods All patients referred to the pleural service during the official period of lockdown 23/3/20–11/5/20 (7 weeks) were identified alongside those referred in the preceding and following 7 weeks. Patient demographics, number and type of referrals (2 week wait, in-patient or out-patient), length of time to see the patient, procedures performed and ultimate diagnosis from the referral were collected. We defined cancer based on new diagnosis or management of malignant effusions and suspected pleural infection based on investigation for pH<7.2.

Results During this 21 week period 401 patients were referred to the pleural service. The mean±SD age was 67.4± 15.4 years and 285/401 (71%) were male. Referrals dropped by 23% during lockdown returning to normal in the 7 weeks post lockdown. From baseline cancer diagnoses increased by 24% during lockdown and 53% in the 7 weeks following lockdown (Graph 1). This increase in cancer diagnosis was secondary to in-patient referrals (pre, during and post lockdown: 6/23(26%), 14/22(63%) and 15/25(60%) respectively (p=0.02). Suspected pleural infection referrals reduced by 21% during the lockdown. Time from referral to review increased from 1[1–2]days to 3[1–5]days during the lockdown, reducing to 2[0–4]days post lockdown (p=0.002). The subsequent delays driven by mandatory swabs to exclude SARS-CoV-2 infection prior to review.

Conclusion Due to the national lockdown a reduction in referrals to our pleural service was observed, particularly affecting reviews and suspected pleural infection, but interestingly not cancer diagnoses. However, consequently we have seen an increase in diagnosis in malignancy and pleural infection driven through our in-patient cohort rather than 2 week wait referrals, indicating a probable delay in seeking medical attention or higher threshold for referral during the lockdown. COVID swabbing has impacted our timeliness to review urgent outpatients. The effect of COVID-19 lockdown will continue, and the true impact is yet to be determined.



Abstract P28 Figure 1

P29 MAINTENANCE OF BRONCHOSCOPY SERVICES DURING THE COVID-19 PANDEMIC: EXPERIENCE FROM A TERTIARY CARE CENTRE

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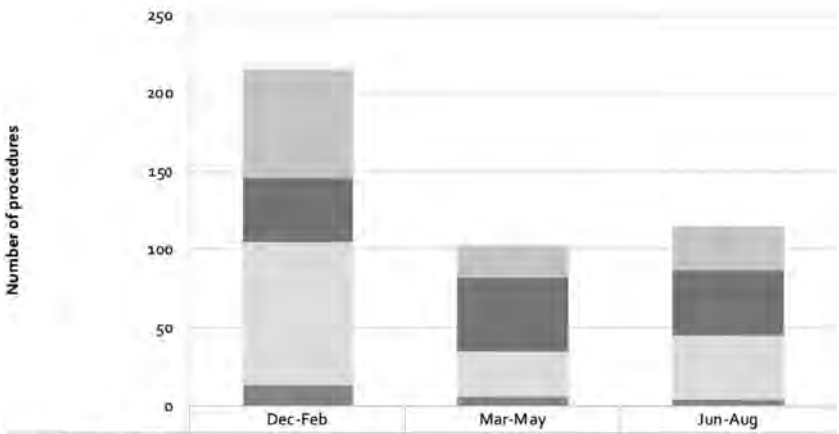
10.1136/thorax-2020-BTSabstracts.174

Bronchoscopy is an aerosol-generating procedure (AGP) and the COVID-19 pandemic has necessitated changes in provision of our service. This retrospective analysis reviews our institutional response to maintaining safe and efficient bronchoscopy services throughout the COVID-19 pandemic.

Aim To analyse changes in numbers of and indications for flexible bronchoscopy (FB) and endobronchial ultrasound (EBUS) between December 2019 – August 2020, and the mitigating measures introduced by our centre to keep the service operating.

Method Data was pulled from our procedure database for the three months pre-COVID-19 (December 2019 - February



Abstract P29 Figure 1

2020), the COVID peak (March to May 2020) and the 'recovery' phase (June - mid August 2020). Patient records were analysed for the indication for procedure and diagnosis. Cancelled procedures and research bronchoscopies were excluded.

Results 433 procedures were undertaken during the study period. Figure 1 shows the number of endoscopic procedures by indication and procedure type.

There was an overall decrease in procedures during the pandemic, with predominantly EBUS cancer procedures being undertaken. The number of cancer cases performed across all three periods was comparable.

Pre-procedure COVID swabs became mandatory in our institution from 29th April 2020. Of 167 cases, two were postponed (1 positive test and 1 febrile patient on procedure day). No patients were cancelled during pre-procedural telephone COVID-19 screening.

Discussion Bronchoscopy procedures declined during the COVID-19 pandemic. However, our service maintained 4 lists per week during the peak with reinstatement of six lists during the COVID-endemic period. Bronchoscopy training was maintained with all lists having an assigned trainee. AGP-related air exchange protocols limited the number of procedures per list and elective procedures were postponed early in the pandemic.

Our centre had a proactive approach to running the service, introducing mandatory pre-procedure COVID swabbing early together with telephone screening pre-BTS guidance. Staff safety was prioritised via universal use of powered air-purifying respiratory (PAPR) use which eliminated the need for mask-fit testing and seeking FFP3 mask availability.

It is feasible to maintain a safe and efficient bronchoscopy service in the midst of a pandemic with the implementation of appropriate pathways and provision of adequate personal protective equipment.

P30 AN ANALYSIS OF WAIT TIMES FOR BRONCHOSCOPY REFERRALS DURING THE COVID-19 PANDEMIC IN A TERTIARY CARE CENTRE

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10.1136/thorax-2020-BTSabstracts.175

The COVID-19 pandemic has reshaped the structure of healthcare provision. Bronchoscopy is an essential diagnostic tool for investigating patients with malignant and non-malignant respiratory diseases, but is an aerosol generating procedure. In our centre, essential endoscopic services continued during the COVID-19 pandemic, with several measures to ensure patient and staff safety.

Aim We aimed to identify whether there was a significant delay in access to flexible bronchoscopy (FB) and endobronchial ultrasound (EBUS) for urgent cases during the COVID-19 pandemic.

Method We reviewed the numbers of procedures and wait time from referral to endoscopy for three periods: three months prior to the COVID-19 pandemic (December 2019 – February 2020), three months during the 'peak' COVID-19 pandemic (March – May 2020) and during the 'recovery' period (June – mid August 2020). Data was analysed with ANOVA and chi-square tests for statistical significance.

Abstract P30 Table 1

	December 2019-February 2020	March – May 2020	June – mid August 2020
Number of procedures (n)			
Total	257	128	147
FB	136	47	58
EBUS	121	81	89
Mean wait (days)			
Total	8.17	8.23	7.40
FB	6.76	7.94	6.83
EBUS	9.09	9.42	8.17

Results 532 patients underwent FB or EBUS from December 2019-August 2020 (table 1).

There was a significant reduction in total and FB procedures during the peak pandemic which has persisted during the recovery period.

When comparing pre-COVID months to COVID peak, there was no significant difference in wait for total endoscopy procedures ($p=0.8442$) or EBUS ($p=0.0624$), respectively. There was a significant increase in wait for FB ($p\leq0.001$). There was an improved wait time for total endoscopy procedures and EBUS after June 2020 ($p\leq0.001$ for both).

Discussion The COVID-19 pandemic resulted in a significant reduction in the total numbers of FB and EBUS procedures performed but did not result in a significant increase in waiting time for procedure. The prioritization of cancer services over alternative indications for bronchoscopies is the most likely explanation for this difference in numbers performed. The patient-related consequences of these changed diagnostic pathways is unclear. The introduction of mandatory COVID-19 swabbing on the 29th April did not lead to significant delays.

Our review demonstrates that it is possible to maintain rapid-access bronchoscopy services in the height of the COVID-19 pandemic.

P31 THORACIC SURGERY IN THE COVID-19 ERA: A TERTIARY SINGLE CENTRE REPORT

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10.1136/thorax-2020-BTSabstracts.176

Introduction and Objectives The impact of COVID-19 on the UK National Health Service (NHS) has been dramatic. Reconfiguration of medical facilities, redeployment of staff and implementation of COVID-19 hospital pathways became daily practice overnight. On the 17th of March, additional measures to reduce the nationwide spread of COVID-19 were introduced. Elective surgery was largely postponed, maximizing critical care capacity for the predicted number of COVID-19 patients requiring respiratory support. The delay to intended curative surgical procedures for early stage lung cancer might result in disease progression and reduced survival. We herein evaluated our performance in a thoracic surgery centre during the COVID-19 pandemic in 2020 compared to the equivalent period of time in 2019.

Methods For this retrospective analysis, data was collected from prospectively populated databases and patients' medical records during the COVID-19 outbreak in the UK between 16th March to 31st May 2020 and the same period in 2019.
Results Between 16th March and 31st May 2019, 220 patients (60% male) underwent thoracic procedures compared to significantly less 145 patients (57% male) in the same period in 2020 [*p=0.01*]. The median age with 67 years (IQR 54, 74; 2019) and 63 years (IQR 55, 72; 2020, [*p=0.24*]) was comparable. Patients operated in 2020 had higher ASA grades [*p<0.0001]*, however less current smokers underwent operations [*p=0.004*]. 40% of the procedures were lung resections in both years and the rate of pulmonary resections for primary NSCLC was maintained with 25.9% (N=57, 2019) vs. 27.6% (N=40, 2020, [*p=0.72]*). The number of bronchoscopies was intentionally reduced to minimize the risk of SARS-CoV-2 spreading (N=125 in 2019; N=29 in 2020, [*p<0.0001]*) and no SARS-CoV-2 infection was diagnosed postoperatively. No difference in median LOS 5 days (IQR 2, 7.5; 2019) versus 4 days (IQR 1, 6.5; 2020, [*p=0.14]*) was detected. The mortality remained on the same low level [*p=0.49*].
Conclusion Despite unprecedented pressures and restrictions due to COVID-19, we were able to adapt and run an effective thoracic service. With prioritization of urgent cancer procedures, we have shown that we maintained our lung resection rate, whilst ensuring maximal safety for patients and staff.

P32 REDUCTION IN THE RATE OF ACUTE EXACERBATIONS OF COPD AND ASTHMA DURING THE COVID-19 PANDEMIC

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10.1136/thorax-2020-BTSabstracts.177

Introduction and Objectives The COVID-19 pandemic has had a devastating impact on a number of patient populations, not least those with airways disease. Despite initial conflicting data, subsequent research has shown COPD patients to be at increased risk from the virus. Other coronaviruses are also well recognised as viral precipitants of exacerbations in airways disease. Therefore, it was reasonable to anticipate that COVID-19 would take a particular toll on this population. We investigated the rate of acute exacerbations in a cohort of our airways disease patients to determine the impact the virus had.
Methods Telephone consultations and review of electronic records of 149 patients from the COPD/asthma clinic at a South London district general hospital during the period March 23rd – June 23rd 2020 were reviewed. This corresponded to the date the United Kingdom was placed into lockdown due to the pandemic.

This was used to establish whether, i) they had presented to ED with exacerbation symptoms, ii) required inpatient admission, iii) self-reported episodes of exacerbations (and corroborated this with dispensation of rescue packs from GP records). This data was then compared to the same period in 2019 using this methodology.
Results In total, in the equivalent time period in 2019 there were 72 reported exacerbations of COPD, with 25 requiring inpatient admission. In the corresponding time period in 2020 there were 55 reported exacerbations, with 20 requiring inpatient admission. This represents a 23.6% and 20% decrease respectively. In the asthma group there was a decrease in total number of exacerbations from 13 in 2019 to 7 in 2020 (46.2%) and those requiring inpatient admission from 4 in 2019 to 1 in 2020 (75%).
Conclusion We observed a reduction in the number of acute exacerbations in our cohort during the lockdown period of the coronavirus pandemic in 2020 compared to the same period in 2019. This may reflect effective shielding by these patients, minimising exposure to precipitant pathogens. However, it may also be related to other consequences of the lockdown period, such as reduced air pollution. These findings are notable and may provide further insights into future management of airways disease.

P33 EFFECT OF COVID19 ON AECOPD ADMISSIONS

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10.1136/thorax-2020-BTSabstracts.178

Background Since the beginning of Covid19, we have noticed reduced hospital attendances and increased mortality for hospital admissions. Elderly patients with multiple comorbidities were found to be having higher mortality. We wanted to assess the effect of Covid19 on COPD hospital admissions for this year and compare with previous years in our district general hospital.
Methodology Data of all the patients that were admitted to the hospital with a diagnosis of Acute Exacerbation of COPD between March to June for the years 2018, 2019 and 2020 was collected. Further analysis was made of mean age, LoS and inpatient mortality to compare the difference between the current Covid19 year of 2020 to previous years.
Results and Observations There was no difference in the average age (74 years) and all the patients were in the age range of 33–98 years for all the years.

The number of admissions due to AECOPD during Covid19 time reduced by half. This could be due to patients fear of coming to hospital or increase in non- COPD primary diagnosis.

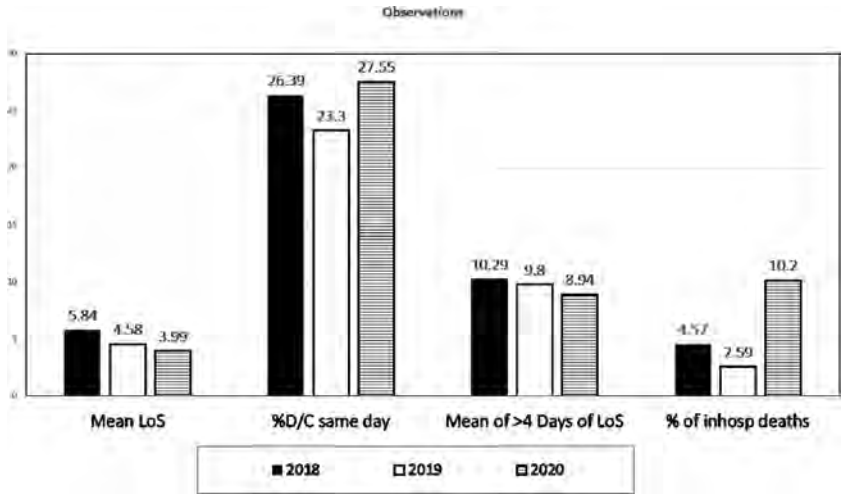
Average LoS(3.99 days) was much lower than the previous couple of years (4.58 & 5.84 days). The patients with >4 days of LoS was also reduced as compared to previous couple of years.

Inhospital deaths increased significantly to 10% of the admissions as compared to less than 5% in the previous years.

There was not much difference in between percentage of patients discharged the same day.
Conclusion and Discussion Admissions due to AECOPD were reduced with reduction in LoS during the covid19 times with increased inhospital mortality.

It would be useful do a study to find out what has happened in the community especially related to exacerbations and mortality during the Covid times.

A further study with regards to Covid status, severity of COPD, Charlston index, delay in discharges due to covid status or repeat swabs to be undertaken.



Abstract P33 Figure 1

P34 MITIGATING THE COVID-19 IMPACT ON COPD CARE: RAPID DEVELOPMENT OF REMOTE RECRUITMENT PROCESSES TO A DIGITAL SELF-MANAGEMENT SERVICE

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10.1136/thorax-2020-BTSabstracts.179

Background Shielding requirements and interruptions to routine care resulting from the COVID-19 pandemic present substantial risks to COPD patient's outcomes. Adverse impacts including increased winter admissions, nosocomial infection risks, impaired quality of life and high service costs are anticipated. A digital remote-management service can potentially mitigate these by supporting routine COPD care and self-management.

In the InnovateUK funded 'DYNAMIC' project we've developed a fully integrated COPD digital support service. Patient-held smartphone progressive web application prompts daily patient reported outcome (PRO) completion with red-amber-green self-management advice, rescue medication and linked resources including inhaler, exercise and dyspnoea management videos. Secure asynchronous patient-clinician messaging and EHR-integrated clinician dashboard with PRO data visualisation and structured clinical data enables self-management support and provides a new channel for scheduled care.

Methods As COVID-19 pandemic emerged we paused the RECEIVER trial (NCT04240353) and undertook rapid co-design, governance approval and deployment of an SMS invite and web-based registration system https://support.nhscopd.scot This provides access and remote setup to the DYNAMIC COPD service for all patients in our organisation. Website tracking analytics support service evaluation and process optimisation. Feedback was obtained from 57 patients who registered an interest via website but didn't progress to setup in the service.

Results 2373 high-risk COPD patients were identified from secondary care datasets. 797 patients did not have a known mobile phone number. 1576 SMS invites were sent in batches May – July 2020. 599 unique visits to support site (38%) with 195 completed applications (12.3%) to the digital service were obtained. As of August 2020, 112 patients (7.1%) have completed service setup, which includes clinician virtual review with optimisation of COPD interventions, self-management planning and COPD MDT input as required. Patient app usage in this scale-up cohort matches positive experience from the RECEIVER trial. Qualitative data highlighted requirement for increased information about the service at invitation, which has been addressed.

Conclusions Novel processes for digital recruitment and remote setup have widened access to NHS Scotland COPD support service. This is a model strategy for service implementation and evaluation. Further cycles of mail-based and SMS invites and media awareness campaign will follow.

P35 DELIVERING A COMMUNITY-BASED COVID-19 REHABILITATION SERVICE USING EXISTING PULMONARY REHABILITATION TEAMS IS SAFE AND FEASIBLE

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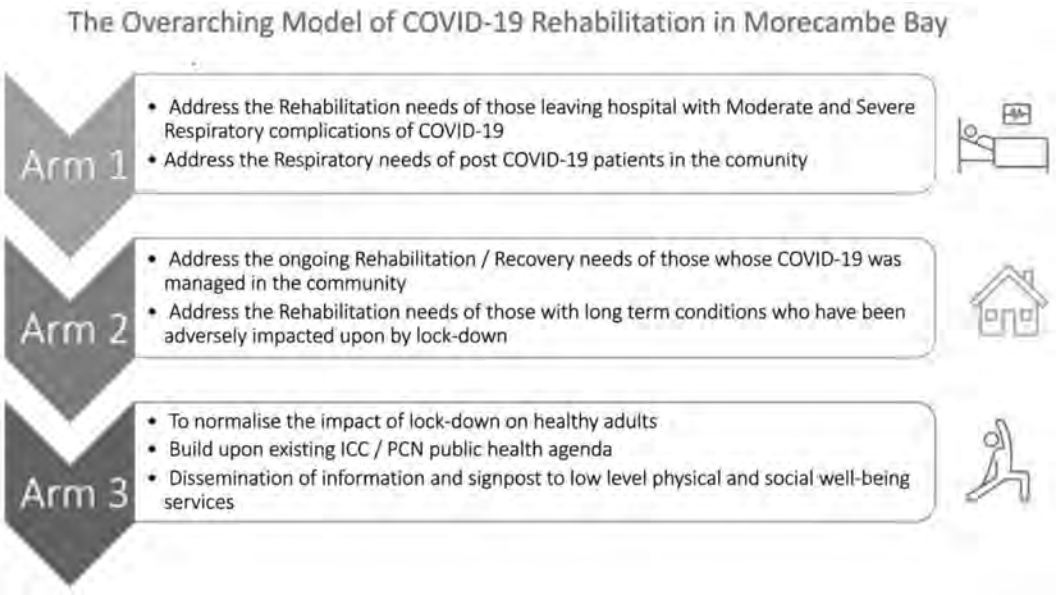
10.1136/thorax-2020-BTSabstracts.180

Background University Hospitals of Morecambe Bay NHS Trust, witnessed an early peak of COVID-19 with related hospital admissions in early 2020, this created a need for a co-ordinated approach to post COVID-19 rehabilitation needs across the area.

Objectives A three-armed COVID-19 rehabilitation pathway was devised in March 2020 with Arm 1 aiming to assess and address the immediate rehabilitation needs of those leaving hospital following an admission for respiratory complications of COVID-19.

Methods Existing Pulmonary Rehabilitation teams were repurposed by integrated care network (MBRN) to be a new 'Virtual' rehabilitation service. A register of patients discharged from hospital sites was remotely screened for pathway suitability. Then, using a multi-professional template a holistic assessment needs was conducted using telephone and/or home visit consultations. Clinical assessment tools were built into the assessment process. Weekly 'acute-community' virtual in-service training sessions and multi-disciplinary case discussions supported the clinicians.



Abstract P35 Figure 1

Results To date 207 patients have entered the service for virtual triage, 138 patients were deemed suitable for further assessment and interventions. 427 direct clinician consultations were delivered to these 138 patients [*122 initial telephone assessments; 53 initial home visit assessments; 168 follow-up telephone consultations; 84 follow-up home visits*]. Two of the 138 patients assessed died, both were expected deaths. No clinical incidents occurred and no staff contracted COVID-19 during this period. Feedback from the services' staff survey was very positive highlighting the supportive value of virtual training and MDT and the enjoyment of being part of creating and delivering this new service to patients recovering from COVID-19.

Conclusions Utilising the skills of pulmonary rehabilitation staff to deliver a holistic rehabilitation and treatment service to those discharged from hospital after suffering respiratory complications of COVID-19 was feasible, safe and well tolerated by staff and patients. This service is now being used to address the needs of post-COVID-19 patients presenting with respiratory needs in the community. We aim also to assess clinical outcome.

P36 COUGH PROVOKED BY LUNG FUNCTION TESTING – SHOULD LUNG FUNCTION TESTING BE TREATED AS AN AEROSOL GENERATING PROCEDURE POST COVID-19?

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10.1136/thorax-2020-BTSabstracts.181

Introduction Lung function testing is not listed as an aerosol generating procedure (AGP) by Public Health England.[1] However, the tests may often generate droplets or aerosols due to the production of high flow rates and cough post manoeuvre. This has led to the BTS/ARTP to recommend appropriate precautions during laboratory assessment.[2] The aim of the study was to investigate cough occurrence during lung function tests.

Method Patients (male = 64, female = 58) age m=62 (24–89), BMI m=28 (14–50), with Asthma (n=13), Cancer (n=11), Bronchiectasis (n=4), COPD (n=7), ILD (n=34), undiagnosed (n=24), post COVID (n=24) and other (n=5), were referred for urgent lung function testing during the COVID-19 pandemic response between June and August. The occurrence of cough was recorded in the laboratory prior to testing, during and after spirometry (FEV_1: 0.45–5.06L, FVC: 1.39–6.11L), transfer factor (TLCO: 1.69–12.21 mmol/min/kPa, KCO: 0.43–1.89 mmol/min/kPa/L) and static lung volumes (TLC: 1.59–8.95L). Pre-existing cough was checked prior to testing.

Results Lung function tests provoked cough as shown in the following table (table 1). Lung function tests provoked a cough in patients who had a pre-existing cough and also those who did not have a pre-existing cough. Spirometry results did not predict cough occurrence during the test, FEV_1: m=82% predicted (19–129% predicted) and FVC: m=92% predicted (39–138% predicted).

Conclusion More than half of patients attending for spirometry coughed immediately after the procedure. Spirometry was more likely to provoke cough, although transfer factor and static lung volume measurements were also associated with post-test cough. Additionally, a patient's coughing history does not predict the absence of coughing. Lung function tests

Abstract P36 Table 1 Cough occurrence during lung function

Cough Occurrence			
	Total	**Pre-existing Cough**	**No pre-existing cough**
Spirometry	*Total*=122	*Total*=44	*Total*=78
	51.64% (*n*=63)	86.36% (*n*=38)	32.05% (*n*=25)
Transfer Factor	*Total*=75	*Total*=27	*Total*=48
	34.67% (*n*=26)	77.78% (*n*=21)	10.42%(*n*=5)
Lung Volumes	*Total*=67	*Total*=26	*Total*=42
	23.53% (*n*=16)	53.85% (*n*=14)	7.14% (*n*=2)

therefore pose a considerable risk for the spread of infection to individuals and surrounding surfaces within test areas.

REFERENCES

1. ARTP COVID19 Group. (2020). *COVID19 Infection Control Issues for Lung Function.* ARTP.
2. Pasnick, S. (2020). SARS-CoV-2 transmission and the risk of aerosol-generating procedures. American Journal of Respiratory and Critical Care Medicine, 13–14.

P37 SHIELDING, USE OF FACE MASK AND HAND HYGIENE: COULD THIS BE THE ANSWER TO WINTER PRESSURES?

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10.1136/thorax-2020-BTSabstracts.182

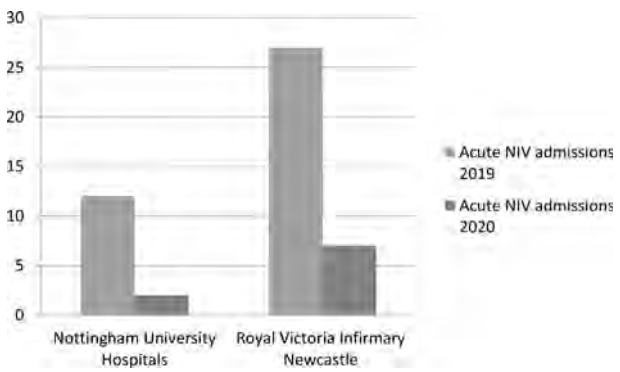
Background Shielding for clinically vulnerable members of the population during the COVID-19 pandemic has had significant impacts on healthcare delivery. This study investigates whether shielding reduces hospital admissions amongst patients requiring long term ventilation (LTV) and whether there may be a role for shielding and adopting other hygiene methods every winter to reduce hospital admissions.

Methods 603 LTV patients in two large centres completed a questionnaire about shielding and COVID-19 symptoms during the lockdown. A comparative retrospective study of hospital admissions for acute hypercapnic respiratory failure requiring non-invasive ventilation (NIV) between the periods March-June 2019 and March – June 2020 during the peak of the COVID-19 pandemic, was also carried out.

Results 522(88.57%) of the 603 patients reported observing strict adherence to shielding whilst the remaining 81(13.43%) observed isolation precautions to various degrees. 30 (4.98%) reported having developed COVID-19 symptoms with just 2 (0.33%) testing positive but none required invasive ventilation and there were no deaths. Admissions requiring acute NIV in 2019 was 39(6.47%) compared to 9(1.49%) during the 2020 COVID19 peak.

Conclusion Compared to 2019, there was a drop in the number of admissions in patients requiring acute NIV during lockdown. COVID 19 incidence was also low in this shielded cohort. These suggest a case can be made for advocating shielding every winter for LTV patients and potentially for all patients with chronic respiratory disease.

Widespread use of masks and improved hand hygiene could also help reduce spread of other viral illnesses like influenza which account for a significant number of admissions in patients with chronic respiratory conditions over the winter months.



Abstract P37 Figure 1

Adopting a blanket strategy to shield all patients with chronic respiratory illness during winter is probably impractical. A stratify-and-shield policy requiring an adaptive social distancing strategy to keep the load on critical care services within manageable limits[1] has been advocated. We anticipate our findings will generate exciting debate for and against shielding our most clinically vulnerable respiratory patients during winter.

REFERENCE

1. Smith George Davey, Spiegelhalter David. Shielding from covid-19 should be stratified by risk BMJ **2020**; 369 :m2063

COPD: clinical science

P38 IS A DATABASE SEARCH AND CLINICAL TRIAGE USING THE GP RECORD FEASIBLE AS A TARGETED CASE-FINDING APPROACH FOR IDENTIFICATION OF UNDIAGNOSED COPD IN PRIMARY CARE?

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10.1136/thorax-2020-BTSabstracts.183

Introduction Identifying undiagnosed COPD is high priority.[1] Systematic, targeted case-finding in ever-smokers is cost-effective, outperforming routine primary care; however, even within the research setting of TargetCOPD, only 38% responded to screening questionnaires determining spirometry need.[1] We explored the feasibility of an alternative - database search and triage of patient record by GP, to create an at-risk group for spirometry, as part of an integrated respiratory service development.

Methods An EMIS GP database search was iteratively developed to identify patients at risk of COPD, which included ever-smokers 35–90 years, who had also received relevant medication or had multiple respiratory consultations. In protected time, three non-specialist GPs reviewed the record to identify likely airways disease and triaged to screening spirometry, diagnostic spirometry, no testing indicated or coding required (as diagnostic criteria already present). The patient and their GP were informed of COPD and asthma diagnoses.

Results Of 1231 patients in 20 practices who were highlighted by the search and received triage of their record, 8% (98) required coding, 41% (500), were triaged to screening spirometry and 15% (180) direct to diagnostic spirometry. 37% (453) were considered irrelevant. Triage time was 12 patients/hour. In total, 81 COPD and 53 asthma cases were identified.

65% (93/143) of patients attended on first invitation for spirometry and 55% of those who had diagnostic spirometry had airways disease; COPD (22) and asthma (14). After screening spirometry, 20%(7) went on to be diagnosed with COPD. At project termination due to COVID-19, 537 patients had yet to be invited for spirometry and no second invitations had been sent.

Availability of diagnostic spirometry and its interpretation in primary care was variable, especially when complex; specialist support was required.

Conclusions Our search strategy was specific, creating a manageable sample for clinical triage and follow-up spirometry in

routine settings. The process resulted in a high rate of diagnoses after spirometry and allowed rapid recognition of uncoded patients, equating to ≈69 additional COPD cases over routine care[1].

REFERENCE

1. Jordan RE, *et al*. Targeted case-finding for chronic obstructive pulmonary disease versus routine practice in primary care (TargetCOPD): a cluster-randomised controlled trial. *LancetRespir Med*.2016;**4**(9):720–730

P39 SELF-MANAGEMENT INTERVENTIONS FOR PEOPLE WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD). DO THEY WORK? A SYSTEMATIC REVIEW AND META-ANALYSIS

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10.1136/thorax-2020-BTSabstracts.184

Introduction A key role in caring for people with long term respiratory conditions such as COPD, is to support and empower them to manage their own condition. However, the evidence to support self-management in COPD is not clear.

Aims/Objectives This systematic review aimed to review and summarise the current evidence base surrounding the effectiveness of self-management interventions (SMIs) for improving health related quality of life (HRQOL) in people with COPD.

Methods Systematic reviews that focused upon SMIs were eligible for inclusion. Intervention descriptions were coded for behaviour change techniques (BCTs) that targeted self-management behaviours to address 1) physical symptoms, 2) physical activity, and 3) mental health. Meta-analyses and meta-regression were used to explore the association between health behaviours targeted by SMIs, the BCTs used, patient illness severity, and modes of delivery, with the impact on HRQOL and emergency department (ED) visits.

Findings/Results Data related to SMI content were extracted from 26 randomised controlled trials identified from 11 systematic reviews. Patients receiving SMIs reported improved HRQOL (standardised mean difference =-0.16; 95% confidence interval [CI] =-0.25, -0.07; P=0.001) and made fewer ED visits (standardised mean difference =-0.13; 95% CI =-0.23, -0.03; P=0.02) compared to patients who received usual care.

Patients receiving SMIs targeting mental health alongside physical symptom management had greater improvement of HRQOL (Q=4.37; P=0.04) and fewer ED visits (Q=5.95; P=0.02) than patients receiving SMIs focused on symptom management alone. Within-group analyses showed that HRQOL was significantly improved in 1) studies with COPD patients with severe symptoms, 2) single-practitioner based SMIs but not SMIs delivered by a multidisciplinary team, 3) SMIs with multiple sessions but not single session SMIs, and 4) both individual- and group-based SMIs.

Summary/Conclusion/Recommendations for Practice SMIs can be effective at improving HRQOL and reducing ED visits, with those targeting mental health being significantly more effective than those targeting symptom management alone. Self-management plans should include managing physical symptoms, physical activity, and mental health. Respiratory nurses are ideally placed to do this.

P40 SHARED DECISION MAKING IN PULMONARY REHABILITATION: A QUALITATIVE NEEDS ASSESSMENT

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10.1136/thorax-2020-BTSabstracts.185

Introduction and Objectives Pulmonary rehabilitation (PR) is an evidence-based treatment for patients with COPD. However, the national audit reveals significant under-referral and uptake to the programme,[1] which will likely continue during the Coronavirus Disease 2019 (COVID-19) pandemic because of restrictions to PR delivery.

At University Hospitals of Leicester NHS Trust (UHL) a choice of centre-based and home-based programmes exist to support individual patient needs but are not routinely offered at referral. To support referral and uptake to PR, exploring the barriers and facilitators to the current approach and a new menu-based approach to PR is warranted.

Methods Individual, semi-structured interviews were conducted with respiratory healthcare professionals (rHCPs) who refer patients with COPD to PR and COPD patients who were PR naive and had received a referral.

Interviews were audio-recorded, transcribed verbatim and analysed using The Enhanced Critical Incident Technique.[2] Categories were generated to reflect helping, hindering and wish list items, then validated and reviewed by a collaborating and independent expert.

Figure 1: Participant quotes to illustrate mediators of PR engagement

Broad level category	Frame of Reference	Example participant quotes
Understanding PR/menu-based programmes	Current PR pathway	***Helping item: Patient stories*** AB01H: "I've told that story lots of times about the patient that couldn't walk for 2 minutes and [after PR] could walk for 15 minutes. And you can see sort of a lightbulb… people thinking 'Well you know what I can only walk for 2 minutes."
	Menu-based approach pathway	***Wish list: Development and distribution of promotional materials for the menu of PR options*** AB11H: "I think also for people that perhaps, clinicians that aren't perhaps very familiar with pulmonary rehabilitation, if we could prompt to just think about what you're talking to people about and programme."
Perceived ability to access PR	Current PR pathway	***Hindering item: A reduced menu due to Coronavirus Disease 2019*** AB22P: And there is the other thing as well. If I'm doing exercising [at home] and I actually fall or hurt myself… there'd be nobody here to, you know, to ring for help".
	Menu-based approach pathway	***Helping item: Facilitating choice*** AB06P: "You've made it available to me. I can't drive, I'm working full time and it's available."
		Hindering item: Time AB04H: "It's just that there's far too many patients and far too much to do to discuss the different ways of delivering pulmonary rehab in the community"
Desire to accept PR	Current PR pathway	***Helping item: Making PR meaningful*** AB07H: "What would you like to do here? From this, what's this going to make a difference you know in terms of your disease? How is that going to impact on people who are important to you if you can now do this?'… 'How are other people going to feel about it? What's your worst your case scenario of not doing it? What's your best case scenario of doing it?'"
Referring practitioner's support of PR	Current PR pathway	***Helping item: Healthcare professional-patient relationship*** AB04H: "…being in synch with somebody's health behaviours and psychology I think is really important… That can only be developed over time and as a relationship evolves when they start trusting the health professional that's involved."
	Menu-based approach pathway	***Hindering item: Beliefs about the menu of PR programmes*** AB04H: "…I think perhaps the web-based and the leaflet-based ways of teaching it have a role after you've gone to [traditional PR]."
Understanding COPD	Current PR pathway	***Wish list items: Building knowledge of COPD and self-management*** AB06P: "I need somebody to explain to me what I can and can't do. I know it's common sense that tells you that I can do this and I can't do that because I'm out of breath but I need a bit of reassurance and a bit of help to tell me 'Look this is how far you can actually push yourself and not worry about it.'"

Abstract P40 Figure 1 Participant quotes to illustrate mediators of PR engagement

Results 22 participants were recruited (rHCPs=14; COPD patients=8).

276 critical incidents generated 108 hindering, 108 helping and 60 wish list categories. The identified mediators of PR engagement were: Understanding PR/menu-based programmes, Perceived ability to access PR, A desire to accept PR, A referring practitioner's support of PR, and Understanding COPD (see figure 1).

Conclusion The menu-based approach offers increased opportunity for patients to engage in PR particularly during the COVID-19 pandemic. However, its poor identity limits its feasibility and acceptability. Building the identity of COPD, PR/menu of programmes, further integrating PR in COPD care and developing tools to illicit patient-centred discussions is recommended.

The findings support the development of a shared decision making intervention to facilitate patient-centred discussions regarding the menu of PR programmes available at UHL.

REFERENCES

1. Steiner M, Holzhauer-Barrie J, Lowe D, Searle L, Skipper E, Welham SRC (2015). National COPD Audit Programme: Pulmonary Rehabilitation: Time to breathe better.
2. Butterfield LD, Borgen, WA, Maglio, A-ST, & Amundson NE. (2009). Using the Enhanced Critical Incident Technique in Counselling Psychology Research. In Canadian Journal of Counselling/Revue canadienne de counseling (Vol. 43).

P41 PULMONARY REHABILITATION CAN IMPROVE COGNITIVE IMPAIRMENT IN COPD PATIENTS

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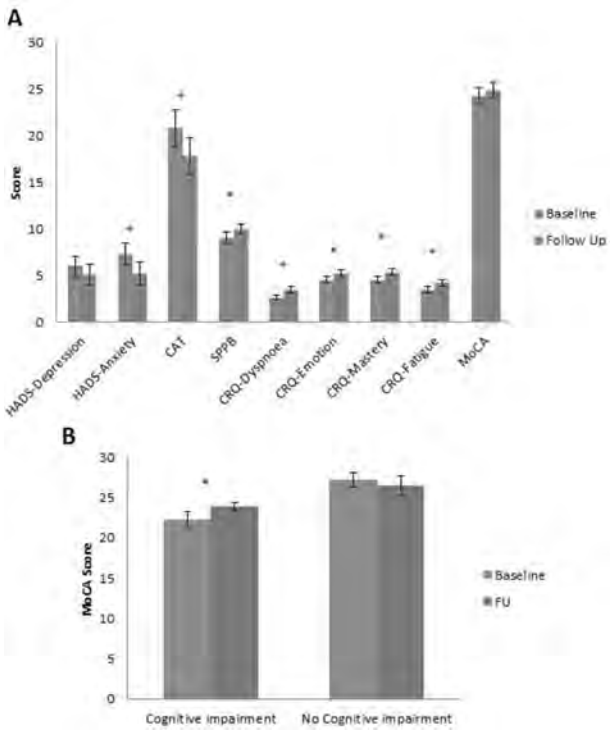
10.1136/thorax-2020-BTSabstracts.186

Background An acute exacerbation of COPD (AECOPD) causes deterioration in health and cognition, and although the symptomatic recovery post-hospitalisation is well documented, less is known regarding the recovery of cognition. Pulmonary rehabilitation (PR) is an established intervention for patients with COPD, in both the post-AECOPD and stable phase. PR is known to improve symptoms and health-related quality of life but the effect of PR on cognition is not well understood.

Aims To examine the recovery of cognition and other health-related outcomes following discharge after hospitalisation for AECOPD, and following PR in COPD patients with stable symptoms.

Methods AECOPD patients were assessed during hospital stay and at 6 weeks post-discharge and stable COPD patients were assessed before and after a 6 week PR programme. All patients were evaluated for cognition (Montreal Cognitive Assessment (MoCA), with cognitive impairment defined as <26/30), psychological well-being (HADS), COPD symptoms (CAT and CRQ) and physical function (Short Physical Performance Battery (SPPB)). Data were analysed using paired t-tests.

Results 28 AECOPD patients (mean±SD, age 67±9 yrs, 16 male) were recruited. At 6 weeks, a significant improvement was seen in depression, anxiety, COPD symptoms and physical function but there was no improvement in cognition (MoCA: 24.0±3.8 vs 23.25±3.7, p=0.21). 42 stable COPD patients were recruited and PR resulted in an improvement in symptoms of anxiety (Δ2.0±3.6, p=0.002), CAT (Δ3.0±4.9, p<0.001), SPPB (Δ0.9±1.2, p<0.001), CRQ-Dyspnoea (Δ0.8±1.4, p<0.001), CRQ-Emotion (Δ0.7±1.3, p=0.001), CRQ-Mastery (Δ0.8±1.4, p=0.001) and CRQ-Fatigue (Δ0.7±1.1, p<0.001), but no change in MoCA or symptoms of depression (figure 1A). Patients with cognitive impairment at baseline showed a significant increase in MoCA score following PR (Δ1.6±2.4, p=0.004), with no significant change for the NCI group (Δ-0.8±2.8, p=0.276) (figure 1B).



Abstract P41 Figure 1 A: Change in outcome measures following PR; B: MoCA Score for cognitively impaired and non-cognitively impaired patients following PR (error bars represent 95% CI; all p<0.05)

Conclusions For AECOPD patients, cognition did not improve post-hospitalisation despite improvements in symptoms, physical function and health status over 6 weeks. PR showed an improvement in anxiety, physical function and respiratory symptoms, and for those who were cognitively impaired, PR resulted in an improvement in cognition. Due to the lack of natural recovery of cognition post-hospitalisation, AECOPD patients should be actively encouraged to attend and complete PR.

P42 EFFECT OF STRUCTURED REVIEW OF COPD PATIENTS REFERRED FOR PULMONARY REHABILITATION; DOES THIS IMPROVE ACCESS TO LUNG VOLUME REDUCTION?

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10.1136/thorax-2020-BTSabstracts.187

Aim To assess the impact of virtual consultant review of COPD patients referred to pulmonary rehabilitation (PR), with reference to lung volume reduction suitability (LVR).

Introduction NICE recommends that COPD patients that have completed PR, but continue to experience breathlessness affecting quality of life and meet certain criteria should be considered for LVR.[1] However, whose responsibility this should be is not clear.[2]

Abstract P42 Figure 1
OPA - out-patient appointment
OPC - out-patient clinic
LVR - lung volume reduction

Methods Notes and imaging of 100 consecutive COPD patients, referred for PR (one provider), were reviewed by one clinician regarding suitability for further assessment. Identified patients were offered out-patient appointments (OPA). From January 2019-November 2019 patients were reviewed on completion (40 patients). From November 2019- onwards reviews were on commencing PR (60 patients). Sources of data were clinical records and PACS radiology.

Results The cohort was 52%/48% female/male. Mean age 68 years. Mean FEV1 57% (range 134% to 22%). Using NICE grades of airflow obstruction (AFO), 14% had mild AFO, 47% moderate AFO, 31% severe AFO and 8% very severe AFO. A subjective assessment of degree of hyperinflation on CXR was made; 45% had no hyperinflation, 25% had mild hyperinflation and 30% had significant hyperinflation. 54% had an existing CT; 19% had no emphysema, 57% had some emphysema, and 24% had severe emphysema.

28 patients were offered OPA. Following further assessment, 6 were suitable for referral to a hyperinflation service. To date one successful procedure has been performed and 3 patients are awaiting procedures (figure 1).

11 patients suitable for LVR on radiology and physiology were not referred due to too good functional levels, co-morbidities including mental health, and continued smoking.

Conclusion Embedding assessment for potential LVR within PR is an efficient process and is likely to lead to more patients being referred for a treatment that can improve quality of life.

REFERENCES

1. National Institute for Health and Care Excellence. nice.org.uk. [Online].; 2019 [cited 2020 August 17. Available from: https://www.nice.org.uk/guidance/ng115/chapter/Recommendations.
2. Dr Jo Congleton. Lung volume in COPD: when less is more. *Drug and Therapeutics Bulletin*. 2020 March; **58**(4): 50.

P43 DIAPHRAGMATIC ULTRASOUND AS A MARKER OF CLINICAL STATUS AND EARLY READMISSIONS AFTER ACUTE EXACERBATIONS OF COPD: PRELIMINARY RESULTS FROM A PROSPECTIVE COHORT STUDY

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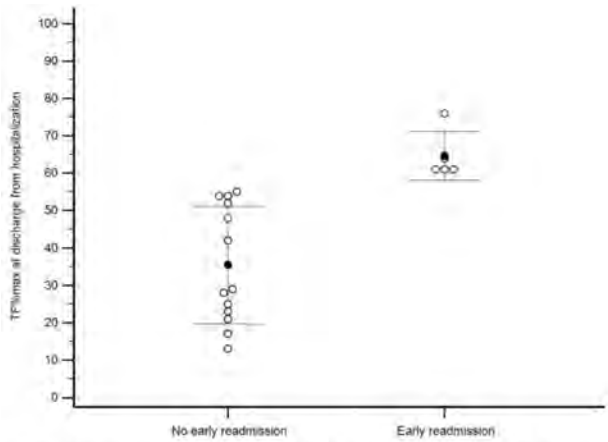
10.1136/thorax-2020-BTSabstracts.188

Introduction The management of acute exacerbation of COPD (AECOPD) is complicated by the lack of a specific biomarker related to clinical course and readmission/treatment failure risk. As AECOPD are characterized by an acute worsening of lung hyperinflation and increased respiratory work, which can lead to diaphragm weakness and/or fatigue, we hypothesized that the serial monitoring of diaphragm function during an AECOPD could provide clinically relevant information on the clinical status of patients and their treatment failure risk.

Methods Patients with AECOPD requiring hospitalization in our center were prospectively recruited. Diaphragm thickening fraction (reported as the ratio of tidal to maximal thickening fractions of the diaphragm – TF%max) was measured using ultrasonography within 24h of admission and within 24h of discharge. The difference in TF%max value between admission and discharge was reported as **Δ**TF. In addition to clinical and demographic characteristics, National Early Warning Score (NEWS), COPD Assessment Test (CAT) and blood gases were retrieved at the time of admission. Treatment failure was defined as a readmission to the emergency department/hospital <30 days after discharge.

Results 18 patients were recruited [mean (±standard deviation) age 74±7 years, $FEV_1$39±17%, residual volume 153±69% and CAT score 26±6]. Mean TF%max decreased from 54 ±20% on admission to 43±19% at discharge (p=0.06). Mean **Δ**TF was -10±50%. 5 patients (28%) were readmitted within 30 days. In these patients, TF%max at the time of discharge



TF%max at discharge in the patients without early readmission and in the patients with early readmission.
Each white dot indicates an individual patient. In each group, black dots indicate average and horizontal lines 1 standard deviation (1SD).

Abstract P43 Figure 1

and the change in TF%max during hospitalization were significantly different than in those without readmission (65±7 vs 35±16%, p=0.001 and 30±66 vs -27±35%, p=0.02, respectively) (figure 1). **Δ**TF was significantly correlated to length of hospital stay (rho=0.49, p=0.04), but TF%max, NEWS, CAT score and pCO2 measured on admission were not (all p>0.05).

Conclusions TF%max, measured using ultrasonography, is responsive to clinical evolution during episodes of AECOPD, and may be able to predict the risk of early readmission. Further data is required to better delineate the role of diaphragm ultrasound in this setting and to identify clinically relevant threshold values associated with negative outcomes.

P44 EASE OF COMPLETION OF PROGNOSTIC TOOLS FOR ONE-YEAR MORTALITY IN PATIENTS HOSPITALISED WITH AN EXACERBATION OF COPD

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10.1136/thorax-2020-BTSabstracts.189

Introduction Patients with COPD suffer a higher symptom burden than those with lung cancer, have high mortality, and are inarguably in need of greater access to specialist palliative care and advance care planning.[1] The unpredictable health decline seen in COPD is a significant barrier to this. Prognostic tools predict outcome better than clinician judgment alone; several have been developed to predict readmission and mortality. Busy frontline clinicians will be more likely to use a tool that is easy to complete at the bedside, but there has been little focus on assessing the ease of completion of such tools to date.

Methods As part of the MoSHCOPD study (NCT03657121) unique, consecutive patients surviving admission for an exacerbation of COPD across two centres were prospectively recruited. Nine prognostic tools (ADO, BARC, BODEX, CODEX, DOSE, GSFPIG, PEARL, SPICT and a novel as yet unpublished tool) were scored for each patient, and a 10-point Likert scale (1 difficult to 10 easy) was used to contemporaneously assess the ease of completion of each tool for each patient. Four assessors (medical registrars) recruited patients and completed Likert scores. Comparisons were made with the Mann-Whitney U test.

Results 447 patients were recruited between January and October 2019, with full ease of completion data on 441 (missing data: GSFPIG = 6; all tools = 1). The boxplot shows the distribution of Likert scores for each tool. GSFPIG was the easiest to complete and significantly better than the next best tools, PEARL (<0.0001) and ADO (<0.0001). PEARL showed the least variation in scores.

Discussion The GSFPIG performs significantly better than other tools in terms of ease of completion, though there is a significant minority in whom it is more challenging. PEARL and ADO could also be considered broadly acceptable in this context. However, assessing ease of completion alone is inadequate; this must be balanced with the prognostic performance of a tool for one-year mortality. Both outcomes are being assessed within MoSHCOPD to inform selection of the most practical tool to use to target specialist palliative care and advance care planning.

REFERENCE

1. Gore JM, *et al*. *Thorax* 2000;**55**:1000–1006.

P45 MORTALITY RISK BY EXACERBATION STATE IN THE ETHOS STUDY

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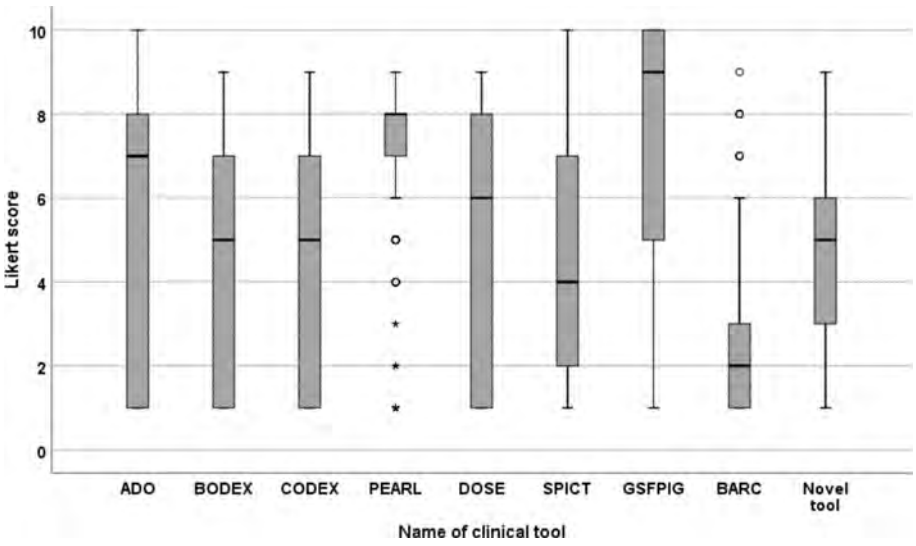
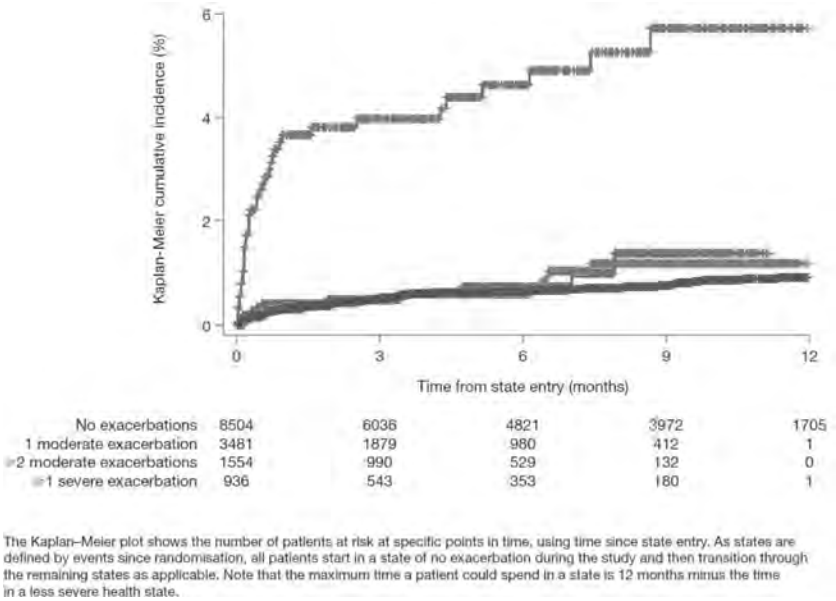
10.1136/thorax-2020-BTSabstracts.190

Background Chronic obstructive pulmonary disease (COPD) exacerbations, especially severe exacerbations characterised by hospitalisation, cause patients' health to worsen and can lead to the deterioration of existing comorbidities, and increased mortality. We assessed the time to death from progressive states of exacerbations using data from the recent Phase III ETHOS study (NCT02465567).



Abstract P44 Figure 1



The Kaplan–Meier plot shows the number of patients at risk at specific points in time, using time since state entry. As states are defined by events since randomisation, all patients start in a state of no exacerbation during the study and then transition through the remaining states as applicable. Note that the maximum time a patient could spend in a state is 12 months minus the time in a less severe health state.

Abstract P45 Figure 1

Methods ETHOS evaluated the efficacy and safety of the inhaled corticosteroid/long-acting muscarinic antagonist/long-acting β_2-agonist (ICS/LAMA/LABA) fixed-dose combination budesonide/glycopyrronium/formoterol fumarate dihydrate metered dose inhaler (BGF MDI) 320/14.4/10μg and 160/14.4/10μg versus the LAMA/LABA glycopyrronium/formoterol fumarate dihydrate (GFF) MDI 14.4/10μg and the ICS/LABA budesonide/formoterol fumarate dihydrate (BFF) MDI 320/10μg, administered over 52 weeks as two actuations twice-daily via an Aerosphere™ inhaler, in patients with a history of exacerbations in the prior year. In this post-hoc analysis, we present Kaplan-Meier curves for time to death (cumulative incidence) from time of entry to 4 progressive exacerbation states arising post-randomisation: i) no exacerbation, ii) 1 moderate exacerbation, iii) ≥2 moderate exacerbations, but no severe exacerbation and iv) ≥1 severe exacerbation. We evaluated the risk of dying during the time patients were in a specific state, censoring patients at the time of transition to another state or treatment discontinuation. Analysis, based on a time-dependent Cox model, was performed to estimate the hazard ratio of dying during the severe exacerbation state versus in the absence of a severe exacerbation.

Results Risk of death was considerably higher after the occurrence of ≥1 severe exacerbation (figure 1); hazard ratio, 8.3 (95% CI, 5.6–12.3); however, it was noted that only 32% of patients who died suffered a previous severe exacerbation during the study.

Conclusion The risk of dying after a severe exacerbation was higher than the risk before a severe exacerbation had occurred. Further research is needed to estimate the risk of patients transitioning from a moderate exacerbation state to a severe exacerbation state, and to understand whether there is a difference in the cause of death between patients who had a severe exacerbation versus those who had not. This analysis stresses the importance of appropriate clinical risk management, specifically for severe exacerbation prevention to lower the risk of mortality.

P46 EFFECT OF EXTRA-FINE TRIPLE THERAPY (BDP/FF/GB) PRESSURIZED METERED-DOSE INHALER (PMDI) ON PATIENT REPORTED OUTCOMES IN EAST ASIAN PATIENTS WITH COPD: TRIVERSYTI STUDY INTERIM ANALYSIS RESULTS

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10.1136/thorax-2020-BTSabstracts.191

Introduction and Objectives The COPD Assessment Test (CAT) and Saint George Respiratory Questionnaire (SGRQ) are reliable instruments for monitoring health status changes in clinical trials. We present here the interim analysis results of the TRIVERSYTI study on these secondary patient-reported outcome measures in East Asian patients with COPD.

Methods TRIVERSYTI is an ongoing phase III multi-centre (China, South Korea and Taiwan), randomized, parallel group trial comparing a 24-week treatment with (BDP/FF/GB) 100/6/12.5 μg pMDI, 2 puffs bid to BUD/FF 160/4.5 μg DPI (Turbuhaler®, AstraZeneca) 2 inhalations bid, in adults with COPD, post-bronchodilator FEV_1 <50% predicted, FEV_1/FVC ratio < 0.7, and a history of ≥1 exacerbation in the past year. The CAT was assessed at each study timepoint, and the SGRQ was assessed at week 0 (randomisation visit), 12, and 24. The between-treatments difference in CAT and SGRQ total score are presented as change from baseline to Week 24. Percentage of SGRQ responders (defined as a decrease from baseline to Week 24 of ≥ 4 units) are compared between the treatments. An independent data monitoring committee reviewed efficacy and safety data from the prespecified interim analysis and recommended early

recruitment termination based on demonstration of superiority in all primary endpoints.

Results 614 patients were randomized and included in the interim analysis, of whom 498 (81%) were Chinese. Treatment with BDP/FF/GB resulted in improvement of -1.34 (p=0.005; all patients) and -1.37 points (p=0.010; Chinese participants) vs BUD/FF in the CAT Score, and in improvement of -3.08 (p=0.009; all patients) and -3.37 points (p=0.006; Chinese participants) in the SGRQ Total Score. There were 41.4% SGRQ 'responders' in BDP/FF/GB compared to 34.1% in BUD/FF (OR: 1.41; p=0.053) among all patients, and 43.3% SGRQ responders compared to 34.1% in the Chinese participants (OR: 1.50; p=0.040).

Conclusions Extra-fine triple therapy with BDP/FF/GB pMDI significantly improves COPD health status compared to ICS/LABA with BUD/FF DPI in Asian and Chinese patients with severe COPD.

P47 DRY POWDER INHALER RESISTANCE DOES NOT LIMIT THEIR USE AMONG PATIENTS WITH COPD

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10.1136/thorax-2020-BTSabstracts.192

Background With rising concern on the global warming potential of propellants in pressurized metered dose inhalers (pMDIs) it has become increasingly important to identify patients who are able to safely switch from pMDI to dry powder inhaler (DPI). Clinicians have been concerned whether patients with COPD can achieve sufficient inspiratory flow rates (PIFR) through DPIs due to the devices internal resistance.

Aim To study PIFR through Easyhaler® inhalers (EH-mono and -combi) and Handihaler® (HH) and to evaluate suitability of In-Check Dial® training device in inhaler selection.

Methods Subjects used the inhalers as instructed by manufacturers and pneumotachograph was used to record inspiratory profiles. PIFR was also measured with In-Check Dial using resistance settings of the inhalers.

Results 100 healthy volunteers and 100 patients with COPD were recruited in Finland and Estonia. Patients were classified to GOLD groups A(20 patients), B(58), C(8), and D(14). All subjects were able to achieve required PIFR (≥30 L/min) with EH. One COPD patient and one healthy volunteer did not archieve 30 L/min flow rate with HH device. The distributions of PIFRs are presented in the table 1. Patients showed lower PIF with In-Check Dial than with the inhalers. The difference was 3.0 (SD 8.5) L/min, 8.0 (SD 7.5) L/min, and 8.1 (SD 7.8) L/min for EH-mono, EH-combi and HH, respectively.

Abstract P47 Table 1

Flow rate (L/min)			
	EH-mono	EH-combi	HH
COPD 10th	45.0	53.1	37.6
COPD 50th	58.8	68.5	47.6
COPD 90th	70.7	82.6	63.2
Healthy 10th	50.7	54.9	36.0
Healthy 50th	61.2	73.1	45.7
Healthy 90th	74.5	88.3	62.3

Conclusions Patient performance is not a limiting factor for use of DPI for vast majority of patients with COPD. In this study In-Check Dial underestimated the PIFR for these inhalers, but it correctly classified the PIFR to be in the appropriate range in all cases.

P48 BIOPLAUSIBLE INSIGHTS CAPTURED FROM COPD PATIENTS: ALIGNING BIOMETRIC DATA WITH EXACERBATION EVENTS AND THERAPY CHANGES USING A COMMERCIAL WEARABLE DEVICE

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10.1136/thorax-2020-BTSabstracts.193

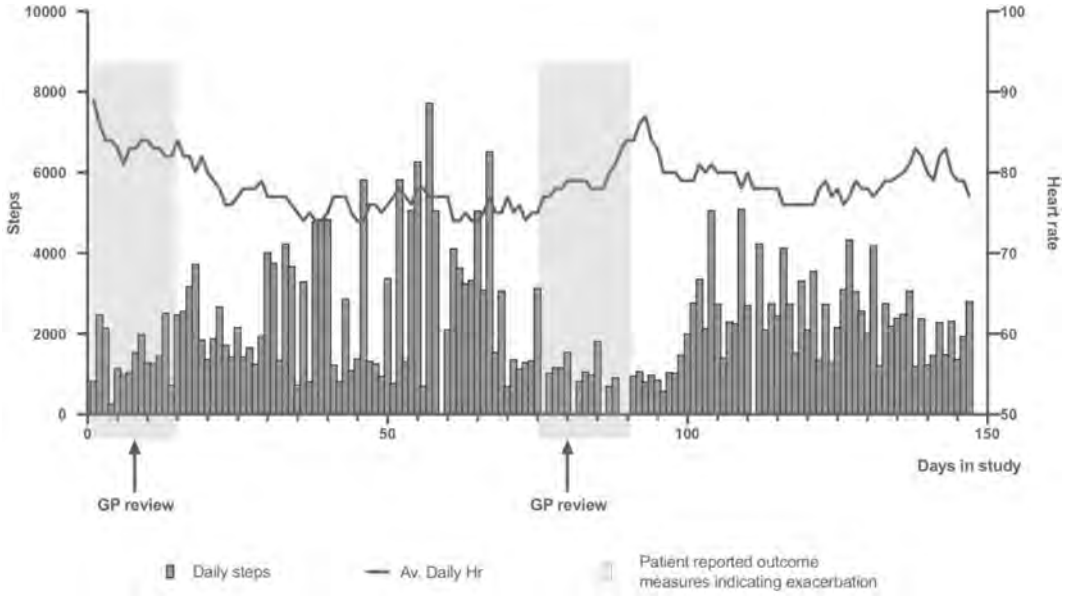
Physical activity is a predictor of survival in COPD. Patients undertaking some level of regular exercise have a lower rate of COPD related admissions and mortality. Increases in daily physical activity have been noted following exacerbations and optimisation of COPD management. There has been a steady uptake in ownership of consumer-based fitness trackers which can capture continuous physiology data over prolonged periods. With advancements in cloud computing, there is now the potential to integrate data from these wearable devices with electronic health record systems. Data can be reviewed by clinicians to monitor physical activity and physiology in patients with COPD, but value-add and clinician capacity are uncertain. Application of machine-learning analyses could generate predictive actionable insights, allowing clinician data review requirements to be focused.

Aim Explore the potential insights to be gained from capturing continuous physiological measurements in COPD patients using commercially available wearable technology.

Method As part of the RECEIVER digital innovation study (NCT04240353), high risk COPD patients were given Fitbit Charge 3 devices linked to a co-designed web app which also captures daily patient reported outcomes and exacerbation events. Exacerbation events, hospital admissions and treatment changes were plotted with daily step counts and daily average heart rate to evaluate potential patterns which would justify more extensive analyses.

Results Data from 32 patients with sustained FitBit recordings were reviewed as part of planned 6 month interim analyses. Average days of available data = 58 (8–147). We identified notable trends in daily step count and heart rate around exacerbation events (figure 1). Increased daily step counts and reduction in heart rate were observed following commencement of home NIV.

Conclusion Notable bio-plausible insights are present, with correlation between Fitbit data, exacerbations and treatment interventions. Further evaluations of the capability of commercially available wearable sensors to track and predict COPD events are indicated. Results from this evaluation have directed the further analyses of the RECEIVER trial data. This includes expansion of the digital connectivity to incorporate intra-day wearable data, integration with patient-reported outcome and clinical summary data, and application of machine-learning



Abstract P48 Figure 1 Specimen event and Fitbit data from patient enrolled in RECEIVER trial
Changes in step count align with exacerbation and precede GP review events. Increase in step count and decrease in heart rate is noted post-exacerbation

algorithms targeting a risk of exacerbation decision support prediction model.

P49 USING A HOME OXYGEN REVIEW PROFORMA IN COPD CARE TO INCREASE SAFETY AND ADDRESS GAPS IN HIGH VALUE INTERVENTIONS

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10.1136/thorax-2020-BTSabstracts.194

Background As a respiratory team we provide annual reviews for local patients prescribed home oxygen. The aim of these reviews is to optimise oxygen benefit, reduce risk of harm, and address gaps in value-based interventions. We developed and introduced a Home Oxygen Review Proforma to support this approach. The aim of this study was to evaluate the impact of this proforma as an enabler of high-value COPD interventions and patient safety.

Methods All 2019 Home Oxygen Review Proformas completed for patients with COPD were analysed for: demographics, spirometry, oxygen saturations on air (SpO2) and carbon monoxide (CO) readings; and actions taken following review: value-based interventions (influenza vaccination, tobacco dependence treatment, referral to pulmonary rehabilitation (PR)) and 'oxygen alerts' (Patient Specific Protocols ('PSPs')) for patients with raised serum bicarbonate.

Results 52/55 (26M;26F) patients with COPD prescribed oxygen were reviewed at home. Mean age was 73 (range 52–89) years. Mean (SD) FEV1 was 0.71 (0.37) L; n=52, FVC 1.59 (0.77) L; n=51 and SpO2 87(5)%; n=50.

Smoking status was confirmed with CO testing; 43/50 (86%) normal (0–4 ppm); none with CO>10ppm (smoking). 7/50 (14%) were 'possibly smoking' (5–9ppm) with no evidence of smoking in home, hence monitored.

39/52 (75%) patients were up-to-date with influenza vaccination; 9/52 (17%) were referred for vaccination; 4 declined vaccination offer. 40/52 (77%) had previously completed PR; 7/52 (13%) were referred for PR; 3 declined referral; 2 did not meet criteria.

46/52 had serum bicarbonate measured: raised in 27/46 (59%); 19 had 'PSP' already and 7 (26%) were referred for new 'PSP' to prevent oxygen poisoning.

Discussion This Home Oxygen Review Proforma for patients with COPD using home oxygen was an enabler of increased safety; specifically CO validation of smoking status, and serum bicarbonate identifying nearly 60% of patient as at risk of oxygen poisoning. While the majority of patients reviewed had received value-based interventions, it was also an effective way to identify gaps;17% had missed out on, and were referred for: influenza vaccination, 13% referred for PR and 26% for a 'PSP'. This proforma is now used for all home oxygen reviews across two CCGs.

P50 PILOTING A STANDARDISED APPROACH TO MANAGEMENT OF PATIENTS WITH PREVIOUSLY UNDIAGNOSED COPD PRESENTING WITH EXACERBATIONS

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10.1136/thorax-2020-BTSabstracts.195

Introduction Approximately one third of people with a first hospital admission for a COPD exacerbation have no previous diagnosis.[1]

The Integrated Respiratory Team (IRT) consists of specialist nurses and physiotherapists and provides holistic reviews of patients with known COPD, prioritising high value interventions. Patients without a prior COPD diagnosis previously were directed to the respiratory registrar for review. Due to multiple commitments of the registrars a proportion of patients do not receive inpatient review and are discharged without follow up or initiation on inhaled therapy whilst awaiting formal diagnosis leading to discrepancies in care. Informal feedback from the IRT identified low staff

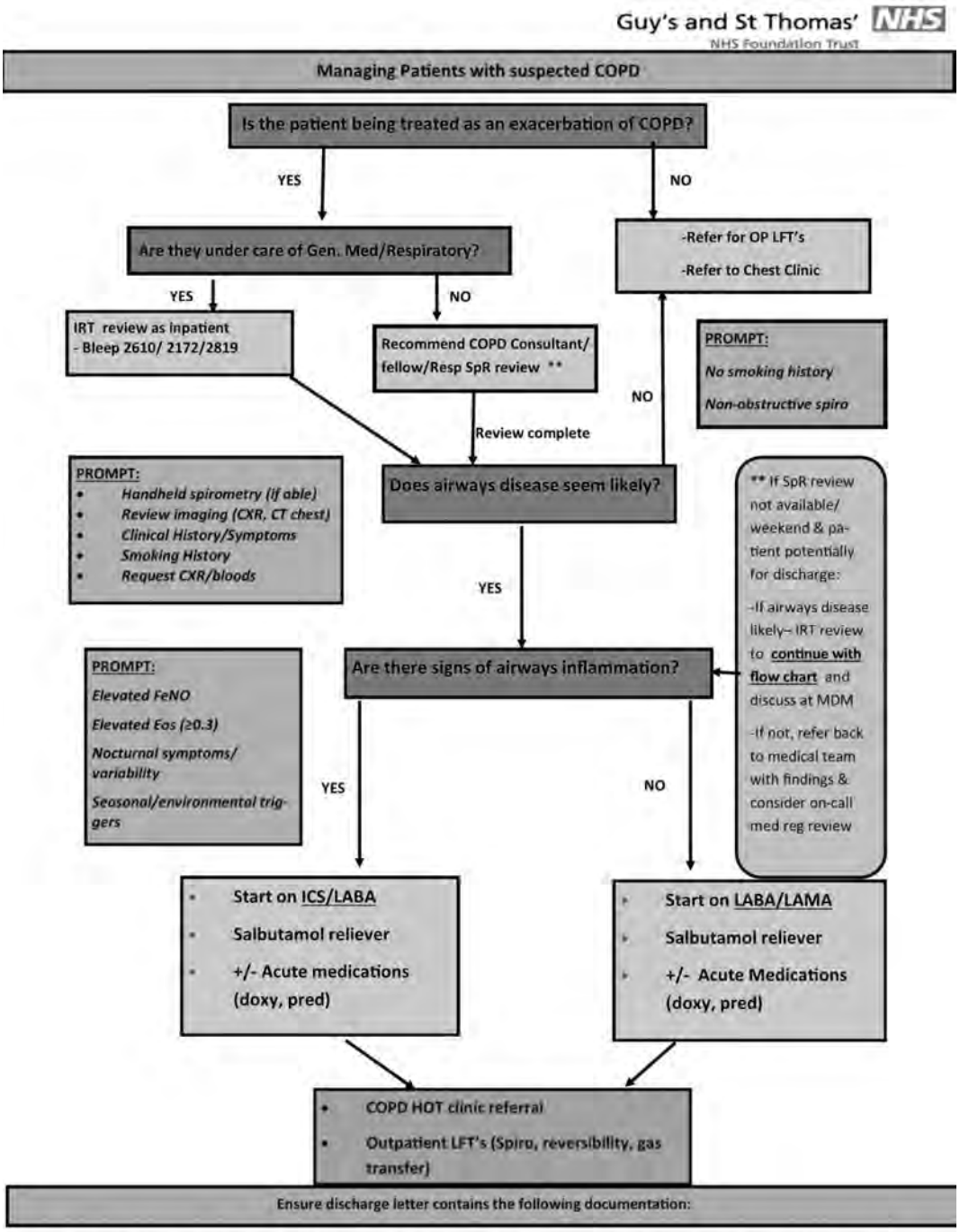
confidence when reviewing these patients and concern about scope of practice.

Aim To assess staff confidence in reviewing patients treated for an exacerbation of COPD without prior diagnosis and implement changes to increase staff confidence in reviewing these patients.

Methods Staff confidence was assessed using a questionnaire including a 0–100 numerical rating scale (NRS) and open questions to explore views on how their confidence could improve. Suggested interventions were subsequently implemented based on questionnaire results and the questionnaire repeated after to determine the effect of the interventions on confidence.

Results 13 staff were surveyed, mean NRS for confidence pre-intervention was 70% (range 50% to 100%). Analysis of how staff confidence could increase identified two themes, 'staff training' and 'a guideline to support practice'.

In response to the questionnaire, a Standard Operating procedure (figure 1) was developed and training programme implemented.



Abstract P50 Figure 1

The follow up questionnaire was completed by 11 staff. 84% reported increased confidence levels. Mean NRS for confidence increased by 7% to 77%. Staff were asked if anything else would help increase their confidence, one respondent identified teaching refreshers, and three further stated more clinical experience.

Conclusion Implementing a SOP and training programme increased team confidence in reviewing patients with undiagnosed COPD. Overall improvement may have been limited due to COVID redeployment between both questionnaires. Facilitating the IRT to review this patient cohort improves patient access to specialist services and timely diagnosis and reduces variations in patient care.

REFERENCE

1.. NHS (2019). The NHS Long Term Plan. www.longtermplan.nhs.uk

P51 THE CONSIDERATION OF FRAILTY SIGNIFICANTLY IMPACTS CLINICAL DECISION MAKING IN ACUTELY-ILL CHRONIC RESPIRATORY INPATIENTS

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10.1136/thorax-2020-BTSabstracts.196

Introduction and Objectives Frailty occurs in chronic respiratory patients at early age and causes increased mortality in this population.[1] Consideration of frailty is essential to guide appropriate ceiling of care and an early shared-decision making. The main objective of the study was to gauge the impact of frailty in clinical decision making (ceiling of care/escalation plan) of acutely-ill chronic respiratory inpatients.

Methods An observational study of 60 patients admitted to the respiratory ward was done. Rockwood clinical frailty scale was used to assess frailty. The impact of consideration of frailty at the initial medical evaluation was measured by the change in the ceiling of care/escalation plan and the significance was calculated. Finally, the outcome in terms of death, re-admission, prolonged admission and discharge was calculated at 4 and 12 weeks.

Results Out of the 60 inpatients (mean age: 73 ±11.5 years), 49 (82%) were frail, 10 (17%) were prefrail and 1 (1%) was non-frail. 50% (30/60) of the patients had COPD and rest had various chronic lung diseases.

Among the frail patients (n=49), frailty was considered in deciding the ceiling of care in 15 patients and was not considered in 34 patients. If frailty would have been considered in those in whom it was not considered (n=34), 23/34 (67.6%) would have had their ceiling of care changed as compared to 11/34 (32.3%) in whom the ceiling of care remained unchanged (p-value= 0.034).

Among the frail patients, mortality at 4 weeks and 12 weeks were 14.3% and 22.4% respectively, as compared to non-frail or prefrail in whom it was nil. Similarly, high rate of prolonged admission and low discharge rate was observed in frail patients as compared to prefrail or non-frail.

Conclusion The consideration of frailty significantly impacts decision making in the ceiling of care of acutely-ill chronic respiratory inpatients. Furthermore, frailty in acutely-ill hospitalized chronic respiratory patients is associated with increased mortality, prolonged admission and low discharge rate.

Abstract P51 Table 1 Outcome at 4 and 12 weeks

1.1 Outcome at 4 weeks				
	Death	Inpatient	Readmitted	Discharge
Total (60)	7 (11.6%)	10 (16.7%)	10 (16.7%)	33 (55%)
Frail (49)	7 (14.3%)	9 (18.4%)	7 (14.3%)	26 (53%)
Pre/Non-frail (11)	0	1 (9.1%)	3 (27.3%)	7 (63.6%)
1.2 Outcome at 12 weeks				
Total (60)	11 (18.3%)	4 (6.7%)	11 (18.3%)	34 (56.7%)
Frail (49)	11 (22.4%)	4 (8.2%)	9 (18.4%)	25 (51%)
Pre/Non-frail (11)	0	0	2 (18.2%)	9 (81.8%)

REFERENCE

1. Mittal N, Raj R, Islam EA, Nugent K. The frequency of frailty in ambulatory patients with chronic lung diseases. *J Prim Care Community Health*. 2016 Jan;**7** (1):10–5

Ventilatory strategies in COVID-19

P52 IMPACT OF PRONE POSITIONING ON OXYGENATION OF CONSCIOUS SELF-VENTILATING PATIENTS DURING THE COVID-19 PANDEMIC

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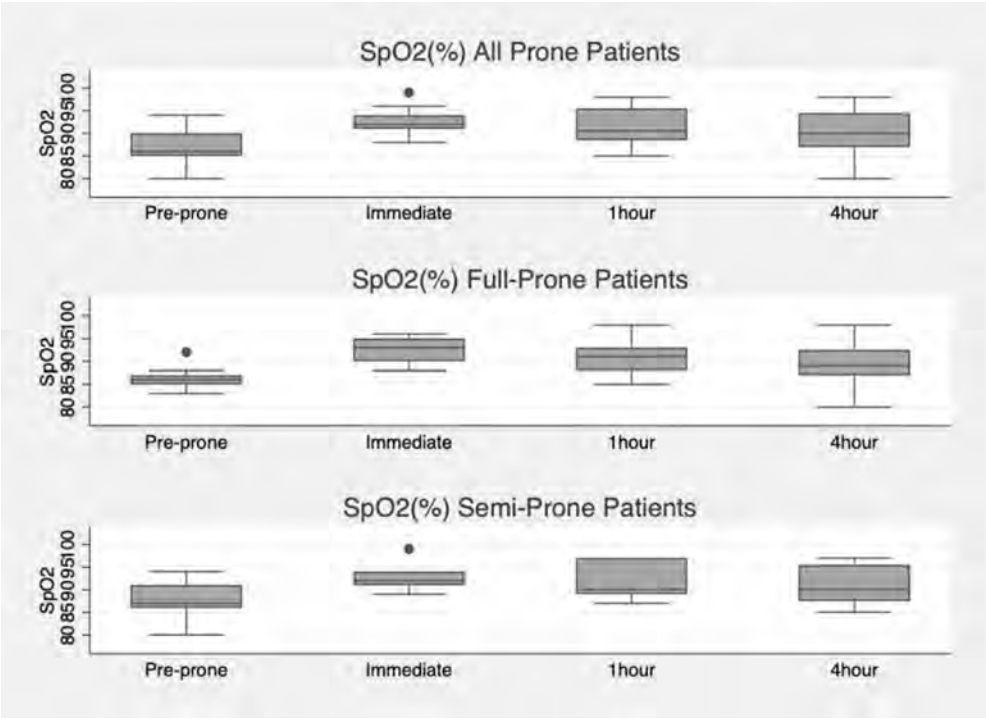
10.1136/thorax-2020-BTSabstracts.197

Introduction and Objectives During the COVID-19 pandemic unparalleled numbers of patients presented with clinical features similar to those found in acute respiratory distress syndrome. Awake prone positioning (aPP) was posited to improve oxygenation in COVID-19. We aimed to assess the efficacy of aPP in improving oxygenation in self-ventilating patients with COVID-19.

Methods In this observational retrospective study we recorded pulse oximeter oxygen saturation (SaO_2) before and after aPP for adults with COVID-19 on medical wards. SaO_2 was recorded immediately after aPP, then at 1 and 4 hours. Patients were included whenever aPP was attempted by the treating physician. We recorded outcomes for improvement to discharge, requirement for escalation to ICU, or death.

Results 24 patients were assessed, of median age 65 years (IQR 58–69). aPP was attempted on day 3 of admission (IQR 2–5) and the median duration was 4 hours (IQR 3–12). All were on maximal ward-based oxygen therapy (15 litres per minute via a reservoir facemask) when aPP was attempted. aPP produced an increase from a median of 86% SaO_2 (IQR 84.5 – 89) prior to intervention, to a median of 92% SaO_2 (IQR 90.5 – 94%) immediately post-prone. The median SaO2 after one hour was 90% (IQR 88 – 95%) and after four hours 90% (IQR 87 – 94%). Among patients who improved without assisted ventilation the median pre-proning SaO_2 was 91% (IQR 90.5 – 91.5%). Lower SaO_2 prior to aPP was associated with a need for assisted ventilation (median pre-proning $SaO_2$86% [IQR 85 – 87]), or re-orientation towards end-of-life care (median pre-proning $SaO_2$83% [IQR 77 – 86]). All four patients who were not for CPR or ITU-level care died subsequent to prone-positioning.

Conclusion Our study suggests that aPP of the non-intubated self-ventilating patient produces short-term improvements in



Abstract P52 Figure 1

SaO_2 and may delay the need for critical care or assisted ventilation. None of those who were not for CPR survived to discharge after aPP, suggesting that the treating clinician should carefully consider whether aPP will be in the patient's best interest. Further work is needed to see whether earlier or prolonged prone positioning can reduce need for intubation and critical care.

P53 THE ROLE OF A 'MULTIDISCIPLINARY PRONING TEAM' IN MANAGING SARS-COV-2 PATIENTS WITH HYPOXEMIC RESPIRATORY FAILURE ON AN ACUTE RESPIRATORY CARE UNIT

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Background Early awake proning (EAP) in SARS-CoV-2 as an intervention outside of intensive care unit (ICU) is gaining interest but large scale studies are lacking. Anticipating a significant surge in SARS-CoV-2 related admissions and to reduce the burden on ICU, we developed a dedicated 'multidisciplinary proning team' (MPT) consisting of respiratory physiotherapists and Acute Respiratory Care Unit (ARCU) staff who undertook this intervention.

Method Patients with either suspected or confirmed SARS-CoV-2 with worsening hypoxemia (PaO2 < 8 kpa or resting saturations of <92% on a minimum of 40% FiO2 or acute hypercapnic respiratory failure pH < 7.35, PCO2 > 6.5) were admitted to ARCU for consideration of respiratory support. Along with the standard supportive measures, patients were also assessed for EAP and suitable patients were proned driven by patients' preference. This was led by the MPT. Patient demographics, Length of stay (LOS), clinical characteristics, proning duration and outcomes between survivors and non- survivors were evaluated.

Results 39 patients [age: mean ± SD= 63±16, males-64%] were proned on 99 sessions [median (IQR) = 2 (1–4) sessions per patient, each session lasting for 2–4 hours]. The median (IQR) LOS was 5 (4–9) days. Patients who survived were significantly younger as compared to those who did not survive (55 years v/s 69 years, P= 0.007). There was a significant difference in the saturations at admission (96% v/s 91%, P= 0.04; mean diff= -4.38) and Sp02 change on proning was similar between survivors and non-survivors (Δ 5%,P=0.46). Majority of patients in both the groups were managed with CPAP + PS but patients who survived required a lower supplemental fio2 as compared to those who did not survive (55% v/s 70%, P= <0.0001, mean diff= 22%). Overall proning failure was 10% and there was no difference in baseline RR, ABG measurements and specific SARS-Cov-2 blood parameters.

Discussion EAP may be considered outside of ICU and a dedicated proning team may be helpful. Further large scale studies are warranted to evaluate the various effects of awake proning. Age at presentation and the degree of hypoxemia are vital factors when assessing and managing patients.

P54 POSITIVE ROLE OF CONTINUOUS POSITIVE AIRWAY PRESSURE FOR INTENSIVE CARE UNIT PATIENTS WITH SEVERE HYPOXAEMIC RESPIRATORY FAILURE DUE TO COVID-19 PNEUMONIA: A SINGLE CENTRE EXPERIENCE

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Objectives Continuous positive airway pressure (CPAP) may be a useful treatment strategy for patients with severe COVID-19 pneumonia but its effectiveness in preventing mechanical ventilation is unknown. We aimed to evaluate the outcomes of COVID-19 patients treated with CPAP and determine predictors of CPAP response.

Methods This was a retrospective observational cohort study which took place in the intensive care unit at Royal Papworth Hospital (RPH) in Cambridge, UK. We included all consecutive patients with confirmed COVID-19 pneumonia who were transferred from neighbouring hospitals between 14th March and 6th May, 2020 for consideration of ventilatory support. We instituted the use of CPAP for all patients who arrived in RPH not intubated and were not making satisfactory progress on supplemental oxygen alone.

Results Of 33 self-ventilating patients included in this study, 22 (66.7%) were male and the mean age was 54±13. 23 patients received CPAP. They were more hypoxaemic than those treated with oxygen alone (PaO_2/FiO_2 ratio; 84.3±19.0 vs 170.0±46.0 mmHg, p= 0.001). There was a significant improvement in PaO_2/FiO_2 ratio 1–2 hours after CPAP initiation (167.4±49.0 from 84.3±19.0 mmHg, p= 0.001) with no indication that CPAP augmented minute ventilation (pH actually fell from 7.48±0.04 to 7.45±0.04, p=0.000 and PaCO2 increased from 4.55±0.78 mmHg to 4.88±0.83 mmHg, p=0.001). 14 (61%) patients responded to CPAP and 9 required intubation. There was no difference between these two groups in terms of the severity of baseline hypoxaemia but CPAP responders had significantly lower C-reactive protein, interleukin-6 and D-dimer (see table 1). CT pulmonary angiogram was performed in 6 out of 9 intubated patients and demonstrated pulmonary emboli in 5 of them. All patients were discharged from ICU and there were no fatalities.

Conclusions In this cohort, CPAP was an effective treatment modality to improve hypoxaemia and prevent invasive ventilation in a substantial proportion of patients with severe respiratory failure. Accepting the small sample size, we also found that raised biomarkers of inflammation (CRP and IL-6) and coagulopathy (D-Dimer) to be more useful predictors of CPAP responsiveness than the severity of hypoxaemia, and could help to guide intubation decisions in this clinical setting.

Abstract P54 Table 1 Comparison of respiratory parameters and laboratory biomarkers between continuous positive airway pressure responders and non-responders

	CPAP responders (n= 14)	CPAP non-responders (n= 9)	P value
Age, mean±SD, years	54±12	54±18	0.89
PaO2/FiO2 ratio prior to CPAP therapy, mean±SD, mmHg	84.5±16.0	83.9±23.0	0.94
PaO2/FiO2 ratio change on CPAP therapy, mean±SD, mmHg	+83.7±43.0	+82.4±40	0.95
pH prior to CPAP therapy, mean±SD	7.47±0.03	7.49±0.04	0.39
pH change on CPAP, mean±SD	-0.02±0.02	-0.04±0.03	0.11
PaCO2 prior to CPAP therapy, mean±SD, mmHg	4.6±0.66	4.4±0.98	0.44
PaCO2 change on CPAP, mean±SD, mmHg	+0.23±0.4	+0.51±0.42	0.13
*Tidal Volume on CPAP, mean±SD, ml	475±179	498±186	0.80
RR before CPAP therapy, mean±SD, $minute^{-1}$	28±9	29±4	0.8
RR change on CPAP, mean±SD, $minute^{-1}$	+1.6±7.0	+0.9±9.1	0.84
CRP, mean±SD, mg/L	176±83	274±63	0.01
IL-6, median±IQR, pg/mL	30±47	139±148	0.04
D-dimer, median±IQR, ng/mL	321±267	941±1990	0.001
High sensitivity troponin, median±IQR, ng/L	11.0±4.2	9.7±34.0	0.57
N/L ratio, median±IQR	7.9±10.0	8.8±8.9	0.55
Serum ferritin, mean±SD, ug/L	1407±1079	1396±1056	0.9

Abbreviations: CPAP= continuous positive airway pressure, SD= standard deviation, PaO2/FiO2 ratio= ratio of arterial oxygen partial pressure to fractional inspired oxygen, RR=respiratory rate, CRP= C-reactive protein, IL-6= interleukin-6, IQR= interquartile range, N/L= neutrophil/lymphocyte.
*Tidal Volume was recorded following CPAP initiation in 13 CPAP responders and 6 non-responders.

P55 GLOUCESTERSHIRE NHS FOUNDATION TRUST EXPERIENCE – COVID-19 ASSOCIATED MORTALITY IN MECHANICAL VENTILATION VS NON MECHANICAL VENTILATION

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Background COVID-19 is associated with significant mortality and morbidity in high risk groups requiring ventilatory support as per the Intensive Care National Audit & Research Centre (ICNARC).[1] Mechanical (IMV) and non-mechanical ventilation modalities [Continuous positive airway pressure (CPAP)/High Flow Nasal Oxygen (HFNO)] support acute respiratory failure in COVID-19 but the mortality data comparing these modalities is limited.

Gloucestershire NHS Foundation Trust admitted a total of 860 COVID-19 patients, 130 requiring ventilatory support between February-July 2020; the highest number in the South-West. Respiratory High dependency (HDU) and Intensive care units (ITU) were reconfigured in anticipation of clinical demand with HDU expanded to 31 beds compared to a normal capacity of 10 and ITU expanded to 36 beds, compared to a usual capacity of 12. Patients requiring CPAP only were managed on HDU unless deemed at high risk of deterioration to require IMV.

Method We conducted a prospective observational study to assess comparative mortality in all COVID-19 patients admitted to HDU/ITU with acute respiratory failure and treated with IMV versus CPAP/HFNO or both. Parameters assessed included age, gender, clinical frailty score (CFS), co-morbidities, smoking and resuscitation status. Comparative mortality was assessed statistically by calculating relative risk ratio and p-value using Welch's t-test.

Results 130 patients were treated with CPAP/HFNO, IMV or both. Overall mortality was 33% (n=43). Resuscitation status and treatment escalation plans were reviewed for all patients on admission. 1.5% patients (n=2) had a pre-

Abstract P55 Table 1 *Mortality associated with ventilatory modalities, demographic characteristics and co-morbidities

		CPAP only	IMV only	CPAP and IMV	HFNO	% of entire cohort
Total Patients (n =130)		55% (n=71)	26% (n=34)	18.5% (n=24)	0.8% (n=1)	
Mean Age and Standard Deviation (SD)		61.7	58.8	56	n/a	
		(SD 11.5)	(SD 13.2)	(SD 12.8)	(age = 56)	
Recovered		70% (n=50)	62% (n=21)	62.5% (n=15)	100% (n=1)	67% (n=87)
Mortality		30% (n=21)	38% (n=13)	37.5% (n=9)	0% (n=0)	33% (n=43)
Relative Risk vs CPAP			1.3	1.3		
95% Confidence Interval			[0.740, 2.259]	[0.676, 2.378]		
P-value			0.18	0.24		
Test applied			Welch's t-test	Welch's t-test		
Gender	**Male**	68% (n=48)	80% (n=27)	70% (n=17)	100% (n=1)	72% (n= 93)
		*29% (n=14)	*38% (n=13)	*47% (n=8)	*Nil	*27% (n=35)
	Female	32% (n=23)	20% (n=7)	30% (n=7)	0% (n=0)	28% (n=37)
		*22%(n=5)	*43% (n=3)	*0% (n=0)	*Nil	*6% (n=8)
Clinical Frailty Score (CFS)	**Score < 3**	58% (n=41)	100% (n=34)	96% (n=23)	100% (n=1)	76% (n=99)
		*10% (n=4)	*38% (n=13)	*9% (n=2)	*Nil	*15% (n=19)
	Score ≥3	42% (n=30)	0% (n=0)	4% (n=1)	0% (n=0)	24% (n=31)
		*60% (n=18)	*Nil	*100% (n=1)	*Nil	*15% (n=19)
Smoking Status	**Non smoker**	48% (n=34)	29% (n=10)	54% (n=13)	100% (n=1)	45% (n=58)
		*15% (n=5)	*20% (n=2)	*23% (n=3)	*Nil	*8% (n=10)
	Ex-smoker	35% (n=25)	35% (n=12)	29% (n=7)	0% (n=0)	34% (n=44)
		*44% (n=11)	*67% (n=8)	*71%(n=5)	*Nil	*19% (n=24)
	Current	3% (n=2)	9% (n=3)	0%(n=0)	0% (n=0)	4% (n=5)
		*100%(n=2)	*33% (n=1)	*Nil	*Nil	*2% (n=3)
	Unknown	14% (n=10)	26% (n=9)	16% (n=4)	0% (n=0)	18% (n=23)
		*30% (n=3)	*22%(n=2)	*25%(n=1)	*Nil	*5% (n=6)
Comorbidities	**Asthma/Chronic Obstructive**	16% (n=11)	18% (n=6)	30% (n=7)	0%(n=0)	19% (n=24)
	Pulmonary Disease (COPD)	*45.5% (n=5)	*68% (n=2)	*14% (n=1)	*Nil	*6% (n=8)
	Obstructive Sleep Apnoea (OSA)	14% (n=10)	3% (n=1)	4%(n=1)	0% (n=0)	9% (n=12)
		*40% (n=4)	*Nil	*100% (n=1)	*Nil	*4% (n=5)
	Obesity	21% (n=15)	12% (n=4)	21% (n=5)	100% (n=1)	19% (n=25)
		*33% (n=5)	*Nil	*Nil	*Nil	*4% (n=5)
	Diabetes	30% (n=21)	6% (n=2)	12.5% (n=3)	100% (n=1)	21% (n=27)
		*33% (n=7)	*50% (n=1)	*66% (n=2)	*Nil	*8% (n=10)
	Hypertension	52% (n=37)	18% (n=6)	33% (n=8)	0%(n=0)	40% (n=51)
		*38% (n=14)	*67%(n=4)	*63% (n=5)	*Nil	*18% (n=23)
	Ischaemic heart disease (IHD)	13% (n=9)	3% (n=1)	4% (n=1)	100% (n=1)	9%(n=12)
		*33% (n=3)	*Nil	*Nil	*Nil	*2% (n=3)
	Chronic Kidney disease (CKD)	10% (n=7)	3% (n=1)	4% (n=1)	0% (n=0)	7% (n=9)
		*57% (n=4)	*100% (n=1)	*100% (n=1)	*Nil	*5% (n=6)
	Immunosuppression	8.5% (n=6)	12% (n=4)	4% (n=1)	0%(n=0)	9% (n=11)
		*50% (n=3)	*75% (n=3)	*Nil	*Nil	*5% (n=6)

existing DNAR and CPR was not deemed appropriate for 23% patients (n=30). 62% patients (n=58) required IMV out of 72% patients (n=93) deemed suitable for it. Comparative mortality between all 3 subgroups is summarised in table 1.

Discussion Overall mortality was higher among COVID-19 patients requiring IMV reflecting disease severity. Male gender, previous smoking history, airways disease, hypertension, diabetes, CKD and immunosuppression were associated with higher mortality in patients requiring IMV. Interestingly CFS of ≥ 3 was associated with increased mortality in the CPAP cohort compared to CFS of <3 in the IMV cohort. This is likely to reflect selection bias of patients deemed appropriate for IMV.

REFERENCE

1. ICNARC Reports.[https://www.icnarc.org/Our-Audit/Audits/Cmp/Reports.August 2020]

P56 HIGHER BODY MASS INDEX (BMI) IS ASSOCIATED WITH IMPROVED CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) OUTCOMES IN PATIENTS WITH HYPOXIC RESPIRATORY FAILURE SECONDARY TO COVID-19

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Background During the COVID-19 pandemic, the use of continuous positive airway pressure (CPAP) for type 1 respiratory failure (T1RF) has been shown to possibly delay or avoid the need for intubation.[1] However, no study has identified patient characteristics that may be associated with more favourable outcomes. We hypothesised that patients with a higher body mass index (BMI) would have better outcomes with CPAP as they are more likely to have undiagnosed obstructive sleep apnoea (OSA) and upper airway resistance.

Methods We retrospectively reviewed use of CPAP in a ward setting for T1RF secondary to COVID-19 between 20.3.20 and 20.4.20. In addition to patient demographic data and co-morbidities, we assessed: oxygen requirements pre-CPAP, mean CPAP pressures and survival with CPAP alone (CPAP success).

Results 41 ward patients received CPAP. Patients' baseline characteristics are shown in table 1. All were deemed suitable for intubation and ventilation (I&V) prior to commencing CPAP. Nine out of 41 (22%) did not require I&V and survived to discharge with CPAP alone. CPAP failed in 32 patients (78%); 30 required I&V (ITU survival 67%) and two patients were palliated. Patients with CPAP success all had BMI >25 kg/m^2 (median BMI 30.0 (28.1–37.0) kg/m^2). This was significantly higher than in those where CPAP failed (47% had BMI >25 kg/m^2; median 24.9 kg/m^2 (22.9–28.1), p=0.005). 37.5% (n=12) of patients where CPAP failed had a smoking history, (of which only 1 (8.3%) had a diagnosis of COPD), compared to 0% of CPAP success patients (p=0.023).

Conclusion In our small cohort, CPAP alone was successful in 22%. This was lower than another recent study (1), however, our patient cohort had more co-morbidities. Patients with a higher BMI had significantly greater CPAP success. This may be due to an increased number of undiagnosed OSA in this cohort and merits further investigation. While smokers had an increased risk of CPAP failure, none of the patients were current smokers and there was limited data on pack-year history. Further studies are necessary to identify factors that may point to greater CPAP success during COVID-19.

Abstract P56 Table 1 Demographics, co-morbidities, investigations, observations and Continuous Positive Airway Pressure (CPAP) data for all patients

Variable	CPAP Success	CPAP Failure	p - value
N	9	32	-
Demographics			
Age	54 ± 15.4	61 ± 9.9	0.104
Male Sex (%)	6 (66.7)	21 (65.6)	0.954
Ethnicity – BAME (%)	3 (33.3)	22 (68.7)	0.054
BMI*	30.3 (28.1 – 37.0)	24.9 (22.9 – 28.1)	**0.005**
Comorbidities			
Hypertension (%)	5 (55.5)	19 (59.4)	0.837
Diabetes (%)	5 (55.5)	10 (31.3)	0.181
Ischaemic Heart Disease (%)	1 (11.1)	1 (3.1)	0.326
Hypercholesterolaemia (%)	5 (55.5)	8 (25)	0.082
Respiratory disease (%)	0 (0)	4 (12.5)	0.256
Smoking history (%)	0/8 (0)	12 (37.5)	**0.023**
Respiratory function prior to CPAP			
SpO2%*	91 (75.8 – 97.2)	90 (86 – 93)	0.203
FiO2%	71.7 ± 17.0	78.1 ± 13.8	0.251
Respiratory Rate	32.9 ± 8.4	33.4 ± 7.4	0.852
CPAP			
Number of days*	2 (1.5 – 3)	1 (1–2)	0.103
Max PEEP*	9.75 (9.13 – 10)	10 (10–12)	0.255

*Non-parametric data, therefore median and interquartile ranges presented. All other data are presented as means ± standard deviation
Abbreviations: CXR – Chest X-ray

REFERENCE

1. Nightingale R., *et al*. *BMJ Open Respir Res* 2020 Jul;**7**(1):e000639.

P57 EARLY USE OF CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) IN PATIENTS WITH RESPIRATORY FAILURE DUE TO COVID 19 PNEUMONIA

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Introduction and Objectives Up to 5% of patients with COVID 19 become seriously unwell due to respiratory failure of which a proportion require referral to the Intensive Care Unit (ICU). We designed a protocol to use CPAP early on the respiratory ward in confirmed Covid patients to reduce the need for ICU. Clinical trials are ongoing examining the effectiveness of CPAP versus other forms of oxygen delivery in reducing mortality.[1]

Methods Covid patients in respiratory failure for escalation to ICU were considered for a trial of CPAP when their oxygen requirements exceeded 4L/minute. CPAP was started at a positive end expiratory pressure (PEEP) of 5 cm H2O and up

Abstract P57 Table 1 Differences between CPAP responders and CPAP non responders in Covid Pneumonia patients

Variable	CPAP responder (n=23)	CPAP non responder (n=20)	p value
Mean Age (years)	52.9 (±12.8)	52.7 (±9.1)	p=0.95
Gender (%)	42% male 70% female	57% male 30% female	p=0.07
Comorbidites-			
Hypertension	5/23 (22%)	7/20 (35%)	p=0.5
Ischaemic heart disease	0/23	0/20	p=1
Diabetes	3/23 (13%)	5/20 (25%)	p=0.43
COPD	2/23 (9%)	0/20	p=0.4
Body mass index (BMI)	29.5 (28–37)	31.5 (29–39)	p=0.4
FiO2 pre CPAP	0.32 (0.32–0.6)	0.4 (0.32–0.5)	P=0.6
Median Initial PEEP (cmH2O)	5 (5–10)	5 (5–10)	p=0.9
Median Maximum PEEP (cmH2O)	10 (8–10)	10 (10–10)	p=0.7
Median days on CPAP	5 (3–7)	1 (0–2)	p≤0.001*
Hospital length of stay (days)	10 (8–11)	18 (14–39)	p≤0.0001*
Hospital discharge	100%	100%	
60-day survival	100%	100%	

titrated to maintain oxygen saturations greater than 94%. Demographic information, PEEP pressures, duration on CPAP, time to intubation if CPAP failed, ICU admission, hospital discharge and 60 day mortality was collected on CPAP responders and CPAP non responders over a six-week period.

Results 43/353 patients (12%) admitted with Covid pneumonia to our hospital in respiratory failure were deemed suitable for a CPAP trial and were for escalation to ICU if CPAP failed. (Table 1). 23/43 (54%) responded favourably to CPAP and avoided ICU. Males were more likely to fail CPAP (48% vs 75%, p=0.07) within the first day (5 vs 1 day, p≤0.001). Hospital length of stay in CPAP responders was considerably shorter than CPAP non responders.

Conclusions Over half of patients trialled on CPAP tolerated it well and avoided ICU admission with a shorter hospital stay. These were younger patients with relatively few comorbidities. Those who failed CPAP were mostly male and did so within the first 24 hours. The non-responders to CPAP all survived to hospital discharge. Early CPAP use in this group has had no adverse outcomes to date. More work is needed to look at the use of early CPAP in older patients with more medical co-morbidities in respiratory failure due to Covid pneumonia.

REFERENCE

1. RECOVERY-RS Respiratory support : respiratory strategies in COVID-19; CPAP, High-flow, and standard care. Available: http://www.isrctn.com/ISRCTN16912075

P58 REVIEWING THE ROLE OF CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) IN PATIENTS WITH SEVERE COVID-19: A MULTI-SITE OBSERVATIONAL STUDY

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Introduction and Objectives The COVID-19 pandemic saw unprecedented pressure placed upon healthcare services and demand for additional Critical Care capacity. National guidance recommended CPAP as a treatment option for patients with severe hypoxaemic respiratory failure. We present our experience and clinical outcomes of patients with severe COVID-19 treated with CPAP.

Methods Clinical data was prospectively collated for all patients treated with CPAP for COVID-19 at two hospital sites. Both sites used the same treatment algorithm, involving a stepwise progression of oxygen therapy, CPAP and escalation to mechanical ventilation if appropriate. CPAP was delivered within ED resus, respiratory ward CPAP area, respiratory HDU or Intensive Care Unit (ICU). Inclusion criteria included confirmed SARS-CoV2 infection by nasopharyngeal swab PCR; age³18; $FiO_2$³0.4 with increased work of breathing or $FiO_2$³0.6 to maintain target oxygen saturation; Level 2 or 3 treatment escalation plan (TEP); treatment with CPAP.

Results 115 patients were identified, 22% female. Median age was 67(36–92) years, and Clinical Frailty Score 2(1–9). At initiation of CPAP, S:F ratio was 118(87–245) and supplemental oxygen was FiO_2=0.8). Diabetes was present in 64%, hypertension in 61%, cardiac disease in 22% and respiratory disease in 17%.

84 patients had a Level 3 TEP. 30-day mortality in this group was 29%. 50% required escalation to invasive ventilation and 30-day mortality was 50%, reflective of early national data. In those who avoided intubation, mortality was 11%. 31 patients had a Level 2 TEP, where CPAP was the ceiling of treatment. 30-day mortality was 74%. Admission to ICU was avoided in 67 of 115 patients. Mortality in this group was 40%. Median CPAP use was 3(1–11) days. Survivor length of stay was 55(18–94) days in ICU mechanically ventilated patients vs. 11(5–53) days in ward treated patients.

Conclusion In patients with COVID-19 and severe hypoxaemic respiratory failure, mortality was high. Our results showed that intubation can be avoided in 50% of patients treated with CPAP. 30-day mortality in patients subsequently mechanically ventilated was 50% but was only 11% in those who avoided intubation. Further work is needed to assess the impact of CPAP on clinical outcomes in patients with COVID-19 pneumonia.

P59 SELF-PRONING IN COVID-19 PATIENTS ON LOW-FLOW OXYGEN THERAPY. A CLUSTER RANDOMISED CONTROLLED TRIAL

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10.1136/thorax-2020-BTSabstracts.204

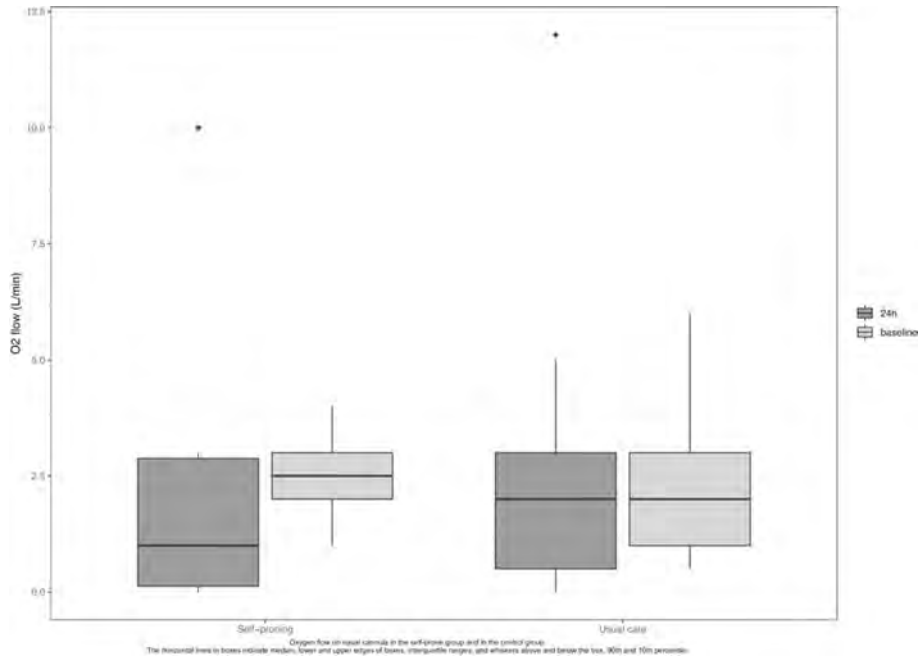
Introduction and Objectives Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-associated pneumonia is associated with severe hypoxemic respiratory failure requiring treatment in intensive care units (ICUs) in approximately 5–10% of hospitalized patients. Lung protective mechanical ventilation and intermittent prone positioning are standard care and evidence-based strategies in the management of severe acute respiratory distress syndrome. These strategies are presented in Surviving Sepsis Campaign guidelines for the management of critically-ill adults with coronavirus disease (COVID-19).

Prone positioning as a complement to oxygen therapy to treat hypoxemia in COVID-19 pneumonia in spontaneously breathing patients has been widely adopted, despite a lack of evidence for its benefit.

The objective of this single-center, cluster-randomised controlled trial is to test the hypothesis that a simple incentive to self-prone would decrease oxygen needs in patients admitted to the ward for COVID-19 pneumonia on low-flow oxygen therapy.

Methods Twenty-seven patients with confirmed COVID-19 pneumonia admitted to our University Hospital medical ward were included in the study. Ten patients were randomised to self-prone positioning and 17 to usual care.

Main Results Oxygen needs assessed by oxygen flow on nasal cannula at inclusion were similar between groups. Twenty-four hours after starting the intervention, the median oxygen flow was 1.0 L/min (interquartile range, 0.1–2.9) in the prone position group and 2.0 L/min (interquartile range, 0.5–3.0) in the control group (P = 0.507) (figure 1). Median oxygen saturation/fraction of inspired oxygen ratio was 390 (interquartile



Abstract P59 Figure 1

range, 300–432) in the prone position group and 336 (interquartile range, 294–422) in the control group (P = 0.633). No serious adverse events were observed.

Conclusions Self-prone positioning in patients with COVID-19 pneumonia requiring low-flow oxygen therapy resulted in a clinically meaningful reduction of oxygen flow, without reaching statistical significance. Early interruption of the trial after the first wave most probably resulted in underpower of our study. Self-prone positioning was easy to implement and well tolerated. Given the rapid increase of cases during the COVID-19 pandemic, any simple intervention to limit the progression of hypoxemia and avoid transfers of patients to ICUs may be of benefit for the management of hospital resources.

P60 EVALUATION OF VENTILATION PARAMETERS ON AEROSOL DELIVERY DURING MECHANICAL VENTILATION OF COVID-19 PATIENTS

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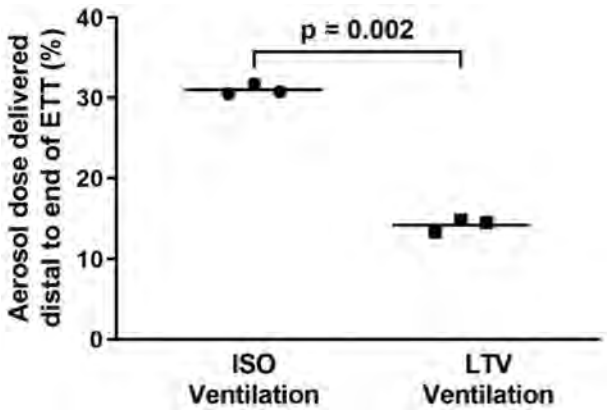
10.1136/thorax-2020-BTSabstracts.205

Introduction and Objectives COVID-19 can cause serious respiratory complications. One form of treatment utilises aerosolised therapeutics concurrently with mechanical ventilation (MV). Clinicians have adopted low tidal volume ventilation (LTV) strategies (4–6 mL/kg body weight)1 in these patients. Nebuliser performance is typically characterised in accordance with international ventilatory standard ISO274272 (ISO ventilation). The objective of this study was to compare the aerosol dose delivered to a simulated adult model with either LTV ventilation or ISO ventilation settings.

Methods A 2.5 ml dose of 1 mg/ml of salbutamol (GlaxoSmithKline Ltd., Ireland) was aerosolised with a vibrating mesh nebuliser (VMN) (Aerogen Ltd., Ireland) positioned on the dry side of the humidifier within a dual limb circuit (Fisher & Paykel, New Zealand) during simulated MV (Servo-I, Maquet, Sweden). Two adult breath patterns were generated: 1) ISO ventilation, Tidal Volume VT: 500 mL, Breathing Rate BR = 15 BPM, Inhalation Exhalation ratio I:E: 1:1, and 2) LTV, VT: 400 mL, BR = 20 BPM, I:E: 1:2. A capture filter (Respirgard, Baxter, Ireland) was placed between the ETT (8.0 mm, Flexicare Medical Inc., UK) and the test lung. The mass of drug was determined using UV spectrophotometry (276 nm). Results are expressed as the percentage of the nominal dose placed in the nebuliser's medication cup. All testing was performed in triplicate.

Results The results of this study, presented in figure 1, highlight the difference in the aerosol dose delivered to the simulated patient at the two different ventilatory settings.

Conclusions Study results confirm that a simulated adult patient undergoing MV utilising LTV ventilation strategy would receive approximately half of the aerosol dose delivered



Abstract P60 Figure 1 Plot of the statistical analysis of aerosol dose delivered distal to the end of the ETT (%) in a simulated adult patient on mechanical ventilation utilising ISO and LTV ventilation settings

in comparison with the ISO ventilation parameters typically used in reporting nebuliser performance.

These findings should provide clinicians with an approximation of the administered dose that is delivered. This may be useful when optimising aerosol dosing strategies during LTV ventilation in COVID-19 patients.

REFERENCES

1. Acute Respiratory Distress Syndrome Network. 'Ventilation with lower tidal volumes as compared with traditional tidal volumes for acute lung injury and the acute respiratory distress syndrome.' New England Journal of Medicine 342.18 (2000): 1301–1308.
2. ISO27427:2019 – Anaesthetic and respiratory equipment – Nebulising systems and components.

P61 MECHANICAL VENTILATION UTILIZATION IN COVID-19: A SYSTEMATIC REVIEW AND META-ANALYSIS

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10.1136/thorax-2020-BTSabstracts.206

Introduction and Objectives In December 2019, SARS-CoV-2 caused a global pandemic with a viral infection called COVID-19. The disease usually causes respiratory symptoms but in a small proportion of patients can lead to pneumonitis, Adult Respiratory Distress Syndrome and death. Invasive Mechanical Ventilation (IMV) is considered a life-saving treatment for COVID-19 patients and a huge demand for IMV devices was reported globally. This review aimed to provide insight on the initial IMV practices for COVID-19 patients in the initial phase of the pandemic.

Methods Electronic databases (Embase and MEDLINE) were searched for applicable articles using relevant keywords. The references of included articles were hand searched. Articles that reported the use of IMV in adult COVID-19 patients between December 2019 and 23rd of April were included in the review. The NIH quality assessment tool for cohort and cross-sectional studies was used to appraise studies.

Results 106 abstracts were identified from the databases search, of which 16 were included. 4 studies were included in the meta-analysis. In total, 9988 patients were included across all studies. The overall cases of COVID-19 requiring IMV ranged from 2–75%. Increased age and pre-existing comorbidities increased the likelihood of IMV requirement. The reported mortality rate in patients receiving IMV ranged between 50–100%. On average, IMV was required and initiated between 10–10.5 days from symptoms onset. When invasively ventilated, COVID-19 patients required IMV for a median of 10–17 days across studies. Little information was provided on ventilatory protocols or management strategies and was inconclusive.

Conclusions In these initial reporting studies for the first month of the pandemic, patients receiving IMV were older and had more pre-existing co-morbidities than those who did not require IMV. The mortality rate was high in COVID-19 patients who received IMV. Studies are needed to evaluate protocols and modalities of IMV to improve outcomes and identify the populations most likely to benefit from IMV.

P62 A MULTI-CENTRE OBSERVATIONAL STUDY OF TRACHEOSTOMY OUTCOMES DURING THE FIRST SURGE OF THE COVID-19 PANDEMIC

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10.1136/thorax-2020-BTSabstracts.207

Introduction In March 2020, it was recognised the COVID-19 pandemic posed a major risk to the National Health Service (NHS) in terms of intensive care units (ICU) capacity. Several studies have shown the benefits of tracheostomy in reducing length of stay (LoS) and duration of mechanical ventilation. As a result, it was recognised the use of tracheostomy would facilitate increased ICU capacity during the COVID-19 surge. The primary aim of this investigation is to report on clinical outcomes in adult patients diagnosed with COVID-19 requiring tracheostomy over the time period March 2020 to July 2020, at three University College London Partner organisations.

Method A prospective multi-centre observational study was undertaken from 17th March 2020 to 3rd July 2020 on all tracheostomised COVID-19 positive patients (aged > 16 yrs). Patients with long term tracheostomies were excluded. Data were collected by multiprofessional ventilation weaning teams. Data collected included; initial diagnosis, indication for tracheostomy, tube insertion procedure, type of tube, tube changes, complications, decannulation, time to first cuff deflation/speaking valve and patient outcomes.

Results 139 patients were included. Mean(SD) age 58.3(11.01) with a higher proportion of male:female (M:F 108:31). The primary indication for tracheostomy was prolonged ventilation (n=111, 79%). The secondary indication was low arousal (n=16, 11%). A higher prevalence of surgery tracheostomies was found (n=89, 63%). The mean(SD) time from intubation to tracheostomy insertion was 21(9)days. The mean(SD) days to first cuff deflation was 34(14). The mean(SD) ICU LoS was 39(16)days and total hospital LoS was 51 (22) days. The mean(SD) time to decannulation from tracheostomy insertion was 25(16)days and time to decannulation from intubation was 46(18)days. A mortality rate of 10%(n=14) was observed. There was no correlation between ICU LoS and age (r=-0.022) (p=0.804). There was a weak significant correlation between ICU LoS and timing of tracheostomy (r=0.393, p≤0.0001).

Conclusion The low mortality rate suggests appropriate patient selection for tracheostomy, but also makes analysis of potential influences on mortality difficult to ascertain. Our data suggests timing of tracheostomy could impact on ICU LoS. This data could inform practice surrounding tracheostomy insertion during future global pandemics.

Abstract P62 Table1 The impact of timing of tracheostomy on Intensive Care Unit Length of Stay

	Mean(SD) ICU LoS (days)	P value
Early tracheostomy (<10 days) n=10	31(14)	p=0.005
Late tracheostomy (≥10 days <27 days) n=82	38(15)	
Delayed tracheostomy (≥27 days) n=32	46(17)	

Primary care and paediatric asthma

P63 CLINICAL SPECTRUM OF PATIENTS ASSESSED IN A PRIMARY CARE RESPIRATORY DIAGNOSTIC HUB; INFORMING REFERRAL CRITERIA

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10.1136/thorax-2020-BTSabstracts.208

Background Whilst the largest majority of care of patients suffering from asthma and chronic obstructive pulmonary disease (COPD) resides in primary care, lack of access to essential diagnostics often leads to diagnosis without objective confirmation or on referrals to local hospitals. Creation of in-community diagnostic hubs has been advocated to provide early correct diagnosis, prevent unnecessary referrals to secondary care, or identify and refer early those who require specialist care.
Aim To evaluate the clinical characteristics of patients reviewed at a pilot primary care Respiratory Diagnostic Hub (RDH) that would inform referral criteria.
Methods We have set up a pilot RDH in primary care in cosmopolitan inner city Birmingham as a collaborative between primary and secondary care, commenced in July 2019. The RDH formed of a multidisciplinary team of clinicians, nurses and physiologists, provided lung function testing and applied national guidelines for asthma and COPD diagnosis. Demographics and the key interim parameter indices are presented.
Results A total of 100 patients were reviewed (51 females, mean age 48.5 years range 16–82, Caucasian=46, Asian=38, African=9, others=7). The mean $FEV_1$2.49±0.81L: FEV_1/FVC ratio 74.5±12.8, mean blood eosinophils 0.3±0.23 × 10^9/L, mean FeNO 33±43ppb. There were more referrals for suspected asthma (61%) than COPD (39%). Asthma was confirmed in 21/61 (34%), remained suspected in 8/61 (13%) and 32 (53%) had an alternative diagnoses (intractable cough, COPD, gastro-oesophageal reflux, others). In the confirmed asthma, FEV1% predicted was <50% in 2/21 (10%), 50–80% in 8/21(38%), and > 80% in 11/21(53%). The asthma control test (ACT) was <15 in 11/21 (52%), 15–19 in 7/21 (33%), and >20 in 3/21 (14%).

COPD was confirmed in 12/39 (31%), remained suspected in 2/39(5%), and alternative diagnosis (included bronchitis, asthma, GORD, restrictive lung disease, no diagnosis) in 25/39 (64%). In confirmed COPD group, FEV_1% predicted was <50% in 1/12 (8%), 50–80% in 4/12 (33%), and >80% in 7/12 (58%). The COPD assessment test 'CAT' scores distribution were <10 in 1/11(9%), 10–20 in 4/11(36%), and >20 in 5/11(46%).
Conclusion In this pilot, significant proportion of referred cases had alternative diagnoses to asthma or COPD, with observed discordance between symptoms scores and lung function impairment in confirmed cases.

P64 APPLICATION OF NICE GUIDANCE TO DIAGNOSE ASTHMA IN A PRIMARY CARE DIAGNOSTIC HUB; A CASE FOR GUIDELINE REVISION

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Background Asthma is one of the most common chronic diseases in general practice. Due to overlap of symptoms with other diseases, objective confirmation of diagnosis is warranted. NICE and BTS/SIGN guidelines recommend different pathways with NICE advocates fraction exhaled nitric oxide (FeNO) as a cornerstone to diagnosis. However the role of FeNO in asthma diagnosis remained uncertain due to asthma heterogeneity.
Aim To study the clinical application of NICE guidance to asthma diagnosis in a pilot primary care respiratory diagnostic hub (RDH) as compared to an MDT BTS/SIGN based diagnosis.
Methods All patients with suspected asthma referred to RDH undergone assessment that included, systematic clinic review, FeNO measurement, lung functions including bronchodilator reversibility testing (BDR) which informed an MDT (BTS/SIGN) diagnosis of asthma as confirmed, remain suspected, or excluded. The MDT outcome was compared to NICE criteria diagnosis.
Results Of 100 reviews 61 patients were referred with suspected diagnosis of asthma (mean age 43.5 range 16–75 years, females 32 (53%), BMI 28.5±6.7 kg/M2, mean FEV1 2.6±0.8L and 81.7±19%predicted, FEV1/FVC ratio 75.8 ±12.5, mean FeNO 35.8±40 ppb, mean eosinophils 0.25 ±0.25 × 10^9/L). Asthma was confirmed in 21/61 (34%), remained suspected in 8/61 (13%), and excluded in 32/61 (53%). Mean FeNO was 58.7±50, 26.3±21.5, and 23.5 ±31.7ppb in confirmed, suspected and excluded cases respectively (p=0.009). FeNO was <40ppb in 9/21 (43%), 7/8 (86%), 25/28 (89%) of confirmed, suspected and excluded cases respectively. Agreement of BTS/SIGN MDT and NICE diagnosis was observed in 57% of cases, with 7/9 of confirmed low FeNO cases were on inhaled corticosteroid treatment.
Conclusion FeNO may aid in asthma diagnosis confirmation, but significant minority of asthmatics do not meet the NICE recommended criteria. Guidelines should allow for this phenotypic heterogeneity (FeNO low asthma) and consider factors that influence FeNO.

P65 RELATIONSHIP BETWEEN ASTHMA MEDICATION ADHERENCE, ASTHMA CONTROL AND LUNG FUNCTION PARAMETERS IN CHILDREN MANAGED IN UK PRIMARY CARE

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10.1136/thorax-2020-BTSabstracts.210

Introduction and Objectives Previous studies have shown that adherence to preventer inhalers is poor in children with asthma managed in primary care[1] resulting in poor asthma control. There are no primary care studies reporting the association between poor adherence and lung function in children with asthma. Our study aim was to investigate the relationship between preventer medication adherence and objective tests of asthma control in children managed in UK primary care.
Methods Anonymised data were collected from children (5–16 years) attending routine asthma reviews (n=160) in three Leicestershire primary care practices. The medication adherence rate was based on the number of prescriptions requested as a

Abstract P65 Table 1 Characteristics of children attending for asthma review (n = 160)

	Adherence Quartile				
	Quartile 1 (0 to 24%)	Quartile 2 (25 to 49%)	Quartile 3 (50 to 74%)	Quartile 4 (75 to 100%)	P value
Mean Number of Exacerbations (SEM)	0.08 (0.03)	0.06 (0.03)	0.17 (0.07)	0.10 (0.07)	0.362
Mean Number of SABA inhalers/year (SEM)	1.55 (0.25)	4.15 (0.37)	4.66 (0.77)	4.20 (0.53)	<0.001
Median ACT (IQR)	21 (5)	20 (7)	20 (7)	17 (11)	0.381
Median CACT (IQR)	21 (5)	21 (7)	21 (4)	23 (8)	0.972
Mean FEV1% Predicted (SEM)	92.4 (2.25)	91.4 (1.81)	95.1 (2.49)	93.8 (2.59)	0.685
Mean FEV1 z-score (SEM)	-0.64 (0.19)	-0.72 (0.15)	-0.40 (0.20)	-0.52 (0.22)	0.654
Mean FEV1/FVC (SEM)	0.91 (0.01))	0.90 (0.01)	0.88 (0.02)	0.93 (0.01)	0.214
Mean FEV1/FVC z-score (SEM)	0.59 (0.24)	0.58 (0.22)	-0.00 (0.29)	0.82 (0.23)	0.260
Mean BDR% (SEM)	7.3 (1.13)	6.7 (0.94)	5.6 (1.61)	5.22 (1.08)	0.629
Number of children with BDR ≥ 12% (%)	10/34 (29.4%)	10/48 (20.8%)	2/22 (9.1%)	1/19 (5.3%)	0.098
Median FeNO (IQR)	45 (39)	41 (63)	18 (27)	36 (34)	0.414
Number of children with FeNO ≥ 35 ppb (%)	14/21 (66.7%)	15/29 (51.7%)	4/10 (40%)	5/9 (55.6%)	0.534

proportion of their intended treatment regimen over the past year and expressed as a percentage.

Asthma control test (ACT), Children's Asthma Control Test (CACT), Spirometry and FeNO data were recorded and compared to adherence rates.

Results Of 205 eligible children 160 (78%) attended their annual asthma review (median age 9 years, IQR 8–12 years, 56.6% male). Mean (SEM) adherence was 36.2% (2.1), only 14.6% had adherence of ≥ 75%.

We analysed patient data in quartiles of adherence (table) and found no significant difference in asthma control scores, FEV_1, FEV_1/FVC or FeNO between the different quartiles. There was a trend towards fewer children with positive BDR ≥ 12% with increasing adherence. 20/82 (24%) with adherence < 50% compared to only 3/42 (7%) of children with ≥ 50% adherence showed BDR ≥ 12% (p = 0.022).

We found no significant difference in adherence between ethnic groups. Mean adherence (SEM): White 0.36 (0.03), Black 0.36 (0.10), Asian 0.39 (0.04), Other/Mixed 0.30 (0.05); (p=0.615).

Conclusions Prescription data is easily accessible to GPs using the SystmOne computer system.

Overall adherence with asthma preventer inhalers in children was poor (similar to previous reports). There was no difference in FEV_1, FEV_1/FVC or FeNO in children with good or poor adherence. Significantly more children with <50% adherence had BDR ≥ 12% compared to children with ≥ 50% adherence.

REFERENCE

1. Engelkes M, *et al*. Adherence to inhaled corticosteroids in asthmatic children in Dutch primary care. *ERJ* 2015:**46**:PA1275.

P66 THE EFFECTIVENESS OF A PRIMARY CARE RESPIRATORY DIAGNOSTIC HUB IN INNER CITY COSMOPOLITAN POPULATION

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10.1136/thorax-2020-BTSabstracts.211

Background Asthma and chronic obstructive pulmonary disease (COPD) are the most prevalent respiratory diseases, yet the lack of accessible standardised diagnostics in primary care often lead to erroneous or delayed diagnosis. In-community standardised respiratory diagnostic hubs (RDH) may improve patient access and diagnosis quality of asthma and COPD.

Aim To evaluate the effectiveness of a RDH in primary care in establishing diagnosis in patients with suspected asthma and COPD.

Methods A pilot multidisciplinary RDH was set up in inner city cosmopolitan Birmingham, to provide diagnostic services to the local population. Referred patients with suspected asthma, COPD had structured review inclusive of lung function and fraction exhaled nitric oxide 'FeNO' measurement. The interim diagnostic outcomes of this RDH are presented.

Results Of 100 referred cases, 61 were for suspected asthma and 39 for suspected COPD. In the suspected asthma group, there were 12 (20%) cases on the asthma quality outcome framework 'QOF' register. Following RDH assessment, asthma was confirmed in 3/12(25%), excluded in 8/12 (67%), and remained suspected in 1/12 (8%), whilst in the 49/61 (80%) suspected asthma not on QOF register, asthma was confirmed in 18/49 (37%), remained suspected in 7/49 (14%) and an alternative diagnosis was established in 24/49 cases (49%). In the overall suspected asthma group, asthma was confirmed in 21/61 (34%) of cases, excluded in 32/61 (53%) and remained suspected in 8/61 (13%), demonstrating a diagnostic outcome in 53/61 (87%) cases.

In suspected COPD, only 4 patients were on the COPD QOF register but the diagnosis was excluded in 3 of these cases following RDH assessment. In not-QOF registered suspected COPD, 11/35 (31%) had COPD confirmation, 22/35 (63%) had an alternative diagnosis and 2/35 (6%) remained suspected for COPD. RDH provided a diagnostic outcome in 37/39 (95%).

Conclusion This pilot primary care RDH achieved a diagnostic outcome in the vast majority of referred cases, with asthma and COPD diagnoses excluded in over half of all referred cases. Additionally, asthma and COPD diagnoses were excluded in more than half of cases on the QOF register, prompting the need for applying this model of service at wider scale in the NHS.

P67 HOW COMMUNITY PHARMACISTS CAN ENGAGE, EMPOWER AND EDUCATE ADULT ASTHMA PATIENTS BY USING DATA DRIVEN CARE

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Introduction and Objectives Community pharmacists are increasingly being asked to guide adult asthma patients in the management of their condition[1,2]. A particular concern is

overuse of SABAs, and under-use of preventer inhalers.[1 2] We therefore examined whether consultations supported by use of data-generating tools could improve self-management.

Methods I9 pharmacies were involved in this NW London study utilising a model used previously for COPD. Patients were invited opportunistically to a first consultation (FC) plus follow-up (FU) consultation, 3–4 months later. Structured questionnaires were used in combination with discussions with patients, Asthma Control Tests (ACT), CO, Peak Flow (PF) measurements; Patient Medication Records (PMR) and the Asthma Right Care (ARC) SABA slide-rule.

Results 98 consenting patients attended FC and 71, FU. Some questionnaires were not fully completed.

Compared with asthma prevalence data, older patients and females were over-represented. Overall, ethnicity matched census information, but Black, Mixed and Other men were under-represented compared to White and Asian men ($P<0.05$ for both; $\chi 2$). Patient satisfaction evidence included: increased confidence in managing their asthma (67/68FU), and in using inhalers in the right way on the right occasions (67/68FU). Education and support provision included: SABA discussion (all consultations), recommending online inhaler demonstrations (74/98FC); checking inhaler technique (68/69FU); raising PF meter ownership to 96/97FC; raising awareness of Person Asthma Action Plans from 23/98FC and assisting with their completion. Tool value evidence included: reported usefulness of home PF meters for monitoring lung function (55/61FU); record keeping of PF readings (47/68FU); ACT scores for the cohort correlating negatively with patient-reported SABA puffs during the previous week (PPW; FC: Rs = -0.577p<0.0001, FU: Rs = -0.708p<0.0001); and PMR (previous 12-month SABA supply) correlating positively with PPW (FC: Rs = 0.528p<0.00005). No correlation found between ACT and PF or PMR.

Conclusions Every specific component of the patient consultation was included because of published recommendations[1]. There is nevertheless a shortage of real-world evidence of the improvement in self-management that can be achieved by patient engagement, empowerment and education in a community pharmacy setting. All three elements interact, and this study has demonstrated the benefit of including all three.

REFERENCE

1. https://www.pharmaceutical-journal.com/news-and-analysis/opinion/insight/uk-asthma-mortality-is-too-high-but-pharmacy-can-help/20206055.article?firstPass=false
2. https://psnc.org.uk/wp-content/uploads/2019/10/PSNC-Briefing-042.19-Pharmacy-Quality-Scheme-Asthma-referrals.pdf

P68 SCOPE TO IMPROVE ASTHMA OUTCOMES IN PRIMARY CARE: OUTCOMES OF A COMMUNITY OUTREACH PROGRAMME

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Introduction The National Review of Asthma Deaths England identified inadequate routine asthma care in over two thirds of patients and frequent sort-acting beta agonist (SABA) use was a marker of adverse outcomes. Correct inhaler technique and a personalised asthma action plan have been suggested as positive interventions. Novel biologic therapies are licensed for the management of severe eosinophilic asthma and improve outcomes for patients. We undertook a pilot outreach programme of multidisciplinary specialist asthma clinics in primary care. We present the key findings of this programme.

Methods We undertook 7 clinics in 3 general practices between June and October 2019. Patients to be seen in these clinics were identified in primary care; suggested criteria were frequent SABA use (≥6 per year), recurrent courses of prednisolone or poor symptoms control. Each consultation encompassed asthma specialist nurse and consultant review in 3 stages: 1. spirometry, FeNO, symptom and QoL questionnaires, and prior asthma treatment review; 2. respiratory physician review; and 3. action plan and inhaler technique training. A standard dataset was collected, which included documentation of highest eosinophil levels in the preceding 12 months as well as exacerbations requiring prednisolone.

Results 52 asthma patients participated in the programme (Table 1). 77% reported having had an asthma review in the past year with 67% reporting having had inhaler technique assessed and 21% having an asthma action plan. 58% had an eosinophil count (eos) recorded within the past year of whom 36% had eos ≥300cells/μL. Those with eos >300 cells/μL had numerically lower lung function and higher SABA and OCS use. 6 (12%) participants met NICE eos and exacerbation requirements for biologic therapy; however, none were on optimal therapy.

Conclusion Despite being identified as having poor asthma control, patients may not have had simple interventions such as inhaler technique assessment done and may be unknown to specialist services. A proportion of these patients may be

Abstract P68 Table 1 Baseline characteristics of programme participants and sub-groups with eosinophil counts within the last year. Data are presented as mean [SD] unless otherwise stated

Characteristic	All participants	Eos ≥300cells/μL	Eos <300cells/μL
n	52	11	19
Age	55 [16]	64.1 [11.2]	52.2 [15.6]
M:F	22:30	8:3	6:13
Age at diagnosis:			
- Childhood	25	3	13
- Adult Onset	25	7	5
- Unrecorded	2	2	2
Smoking Status			
- Current	11	2	3
- Ex	20	3	5
- Never	21	6	11
BMI	33 [7.9]	33 [7]	34 [10]
FEV-1	2.35 [0.87]	1.94 [0.53]	2.45 [0.99]
% predicted	85 [26]	71 [18]	86 [33]
FVC	2.98 [0.98]	2.79 [0.73]	3.11 [1.13]
% predicted	92 [25]	81 [15]	95 [23]
Ratio	0.76 [0.11]	0.71 [0.15]	0.78 [0.09]
FeNO	26.9 [29.1]	36.8 [30.5]	17.1 [7.5]
ACQ-6	2.42 [1.2]	2.25 [1.05]	2.49 [1.09]
EQ5D-VAS	60 [18]	69 [18]	57 [14]
Number of OCS courses in past year	2.6 [3.2]	3.4 [2.5]	1.7 [2.4]
Number of SABA issues in past year	11.2 [7.4]	11.9 [5.4]	9. [4.4]

eligible for biologic treatment if they fail to improve on otherwise optimal therapy. A community outreach service may help in the identification and management of severe asthma patients.

P69 PEAK FLOW VARIABILITY IN ASTHMA DIAGNOSIS – WHICH IS THE BEST THRESHOLD TO USE IN PRACTICE?

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Introduction Although peak flow variability (PEFv) is one of the diagnostic tests in the NICE guidance for asthma (NG80), instructions on how to calculate PEFv are brief; PEFv can be expressed as amplitude% mean (A%M) or amplitude% highest (A%H, a simpler calculation). A positive test can be recorded if the average daily amplitude ≥20% (A%M20, advised in NG80), ≥15% (A%M15) or ≥10% (A%M10). We investigated the effect of changing the way a positive PEFv test is defined on the classification of adults and children with symptoms in keeping with asthma.

Methods Adults and children with symptoms in keeping with asthma were referred by primary care for a thorough evaluation. Participants were asked to record PEF at least twice per day for two weeks with an electronic PEF meter. Participants completed a detailed panel of lung function tests and were treated with ICS for 8 weeks. All tests and response to treatment were evaluated by a panel of consultant respiratory physicians and participants were diagnosed with asthma or not asthma (or insufficient evidence). We calculated sensitivity and specificity of different PEFv thresholds in diagnosing asthma

Results Of the 117 symptomatic participants recruited into the study, 91 (50 adults) completed PEF measurements for ≥4 days (median 10 days [IQR 8–12 days]). A significant correlation (R=0.927) was found between PEFv for patients who collected ≥10 days PEF and their first 5 days of PEF data. Of 47 adults with sufficient data, 31 were diagnosed with asthma. Of 31 children with sufficient data, 23 had asthma. Sensitivity and specificity of different thresholds of PEFv are shown in table 1. Only 3 adults with asthma had PEFv A% M20, indicating this threshold is too high. Expressing results as A%M or A%H made little difference in sensitivity or specificity, as did using the first 5 days of data rather than all data collected.

Conclusion PEFv could be calculated as A%H10 for 5 days as part of the NICE CG80 diagnostic algorithm, as this is simpler to collect and to calculate, is more sensitive, and has little loss in specificity compared to A%M20 for 2 weeks.

Abstract P69 Table 1 Sensitivity = TP/(TP+FN) Specificity = TN/(TN+FP)

	Sensitivity All available readings	Specificity All available readings	Sensitivity using 1st 5 days only	Specificity using 1st 5 days only
Adults A%M20	9.7%	100%	12.9%	100%
Adults A%H20	6.4%	100%	3.2%	100%
Adults A%M15	16.1%	100%	22.6%	100%
Adults A%H15	16.1%	100%	19.4%	100%
Adults A%M10	54.8%	75%	45.2%	81.3%
Adults A%H10	54.8%	81.3%	41.9%	93.4%
Children A%M20	43.4%	100%	34.8%	100%
Children A%H20	17.4%	100%	30.4%	100%
Children A%M15	56.5%	87.5%	60.7%	87.5%
Children A%H15	47.8%	87.5%	52.2%	100%
Children A%M10	78.2%	87.5%	82.6%	87.5%
Children A%H10	73.9%	87.5%	69.6%	87.5%

P70 THE UTILITY OF ASSESSING BETWEEN-VISIT VARIABILITY OF SPIROMETRY IN ASTHMA DIAGNOSIS

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Background The defining feature of asthma is variability in symptoms and airflow obstruction over time. Historical variation in forced expiratory volume in 1 second (FEV_1) is a diagnostic indicator in asthma. We aimed to investigate the variability of spirometry measurements between diagnostic visits in untreated patients with a high clinical suspicion of asthma.

Method Patients with symptoms consistent with asthma, but diagnosis- and treatment-naive, were prospectively recruited from primary care. Clinical history and examination were carried out, then spirometry and fractional exhaled nitric oxide (FeNO) measured on two visits. An asthma diagnosis was confirmed or refuted using full diagnostic testing and assessment of response to inhaled corticosteroids.

Results Of 116 patients, 81% completed spirometry measurements on both clinical visits [58.5% adults, 43.6% male, mean (SD) age: 23.5 (15.6) years]. The median (IQR) duration between clinics was 21 (15–28) days. Of these, 59.6% had definite asthma, 30.9% did not have asthma, and 9.5% could not be classified. The change in FEV_1:FVC and% change in FEV_1 (difference between-visits/the lower measurement) was higher in asthmatics [median (IQR): 2.9 (1.3–5.3)% and 6.9 (2.6–11.3)%, respectively] compared to non-asthmatics [1.6 (0.6–3.7)% and 4.3 (1.8–6.5)% respectively, p=0.02]. The% change in FEV_1 correlated with% change in FENO between visits in adults (r=0.45, p=0.001). Seventeen (18%) patients had ≥12% change in FEV_1 between visits, of which 76.5% were asthmatics (accounting for 23% of all asthma patients) and 11.8% were non-astmatics. Seven (of which 6 asthmatics) patients had FEV_1:FVC straddling the fixed diagnostic cutoff (70%) between clinic visits.

Conclusion Clinically meaningful variability in spirometry was observed in one-fifth of patients with confirmed but untreated asthma between clinical visits, and so may be useful in asthma diagnosis for a minority. This variability in airflow correlated

with that in inflammation (FeNO). Validation of novel tests more sensitive to change in both parameters, and/or more targetted test-timing (e.g. morning/evening) may increase the utility of this diagnostic strategy.

P71 PEAK INSPIRATORY FLOW MEASURED AT DIFFERENT INHALER RESISTANCES IN PATIENTS WITH ASTHMA

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Patients' peak inspiratory flow rate (PIFR) may help clinicians select a suitable inhaler device. The In-Check® device has gained some status as a simple tool to estimate PIFR (scale reflecting inhaler resistance from R0 to R5). It has been suggested that some patients with asthma may not be able to generate sufficient PIFR with high resistance devices (R5) to satisfy the minimum requirements of 30 L/min.

We conducted a prospective service evaluation study to identify what proportion of patients with asthma are able to generate a correct PIFR at In-Check device R0-R5 resistance settings and what the phenotypical features of those patients are.

As part of UK general practice asthma review service, sequential patients were recruited from 41 centres by 10 respiratory specialist nurses. Patients had PIFR checked at the resistance corresponding to their current preventer inhaler device, at R5 (high resistance dry powder inhaler (DPI) setting), and, at R0 (no resistance, pressurised metered dose inhaler (pMDI) setting. Correct PIFR (pass) was defined for R5 as 30–90 L/min, and, for R0 as 20–60 L/min.

994 adults (female 64.3%) were included, of whom 90.4% currently used a preventer inhaler (71.5% MDI (R0), 0% R1, 6.3% R2, 14.5% R3, 4.9% R4, 2.8% R5). 93.7% of patients passed at R5 resistance, compared to 70.5% at R0 ($p<0.0001$). This difference was observed in all age groups: among younger patients (18–24 years) 100% passed at R5 compared to 73.7% at R0, and among the older patients (>71 years) 90.2% passed at R5 compared to 71.0% at R0.

Conclusion Patients with asthma can achieve adequate inspiratory flow 30–90 L/min with high resistance DPI (R5).

P72 DIAGNOSIS OF ASTHMA IN CHILDREN – ARE THEY ABLE TO COMPLETE THE REQUIRED TESTS?

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Background National guidance for asthma diagnosis in children within the UK (NICE NG80 2017) requires children to perform multiple sequential objective tests. All tests within the diagnostic algorithm require forced or prolonged expiratory manoeuvres. The feasibility of children completing the tests is unknown. We investigate feasibility of completing the required tests and the impact this will have on completing the algorithm.

Methods Symptomatic children aged five to sixteen years with suspected asthma were referred into the RADicA (Rapid Access Diagnostics in Asthma) study. Fractional exhaled nitric oxide (FeNO), spirometry, and bronchodilator reversibility (BDR) were performed during the visit. Children were then asked to complete peak expiratory flow (PEFv) measurements twice a day for two weeks using an electronic peak flow meter. All tests were performed by trained staff experienced in paediatric lung function measurements at a tertiary respiratory centre.

Results Fifty-two children [median (IQR) age 9(7–12)yrs, 54% male] were recruited. Of these, only 33(63.5%) successfully completed all four tests. This reduced to 17(50%) in children under twelve years. All children completed spirometry and BDR. 40(77%) completed PEF monitoring, poor compliance was the main reason for failure to complete this test. 42(81%) completed FeNO, inability to perform the test was the reason for failure in all of our children. Of those under twelve years (n 34), only 24(71%) could perform FeNO despite clear instructions and multiple attempts during the initial visit. We were able to complete the sequential diagnostic algorithm in 67% of all children, this reduced to 56% in those under twelve years. This improved to 79% and 74% if additional FeNO practice was provided at a subsequent visit.

Conclusions Significant proportion of children failed to complete the paediatric diagnostic algorithm recommended by NICE, despite multiple visits in a tertiary setting with experienced staff. We have concerns over the feasibility of the paediatric algorithm within a primary care setting. Diagnostic tools with less demand on technique are urgently required in this age group.

P73 A CLINICAL PREDICTION MODEL TO SUPPORT THE DIAGNOSIS OF ASTHMA IN CHILDREN AND YOUNG PEOPLE IN PRIMARY CARE

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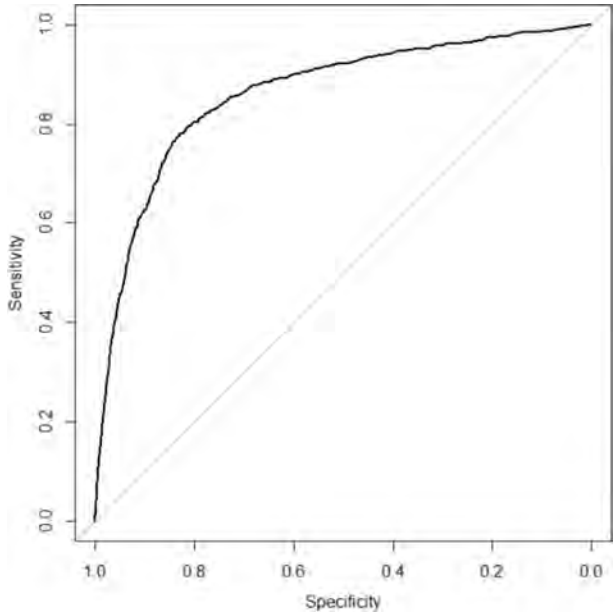
Aim Making an accurate diagnosis of asthma can be challenging. Approaches used to assess the probability of asthma vary between clinicians; a prediction model could help to standardise clinical assessment. We aimed to derive and internally validate a clinical prediction model to support health professionals in primary care to assess the probability of an asthma diagnosis in children and young people presenting with symptoms suggestive of asthma.

Methods We created a dataset from the Avon Longitudinal Study of Parents and Children (ALSPAC) enhanced with data from linked primary care electronic health records. Individuals with at least three inhaled corticosteroid prescriptions in one year and a 'specific' asthma Read code were designated as having asthma. Potential candidate predictors were included if data were available in at least 60% of participants. Remaining missing data were handled using multiple imputation. The prediction model was derived using logistic regression. Bootstrap re-sampling was used to internally validate the model.

Results 11972 individuals aged <25 years (49% female) were included, of whom 994 (8%) had asthma. Model performance was good; after internal validation, the area under the receiver



Abstract P73 Figure 1 Receiver operating characteristic curve for the asthma diagnosis model

operating characteristic (AUROC) was 0.86 (figure 1; 95% CI 0.85 to 0.87). The calibration slope was 0.99. The items included in the final model were wheeze, cough, breathlessness, hay fever, eczema, food allergy, social class, maternal asthma, childhood exposure to cigarette smoke, previous prescription of a short acting beta agonist and the recording of lung function/reversibility testing in the past.

Conclusion Information readily available from a patient's electronic health records can support primary care clinicians weigh up the likelihood of a child/young person having asthma. We plan to externally validate the prediction model in a dataset created from primary care electronic health records. We will then develop the prediction model into a clinical decision support system (CDSS), co-produced with clinicians and patients, and test the feasibility of using the CDSS in clinical practice prior to prospective evaluation.

P74 RAISED NEUTROPHIL ELASTASE ACTIVITY IN ASTHMA SUPPORTS A NEUTROPHILIC-ASTHMA ENDOTYPE

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Introduction Asthma is a common, chronic lung disease marked by reversible airflow obstruction driven by inflammation. There is increasing evidence for a neutrophil-dominant inflammatory endotype[1] with clear mechanistic potential for neutrophil elastase (NE) to cause clinical manifestations of disease. However, the relationship between neutrophil proteinases and asthma pathophysiology remains uncertain.

We hypothesised that patients with a neutrophilic-endotype would have increased NE activity compared to other asthma endotypes and healthy smokers.

Methods Patients with respiratory physician-confirmed asthma diagnosis were recruited. Controls without asthma were age-matched with normal lung function and no symptoms suggestive of asthma/alternative respiratory disease Asthma patients were divided into endotypes by analysis of sputum cellular composition as previously described.[1] NE activity was measured in plasma using an ELISA based on specific fibrinogen-cleavage product Aα–Val^{360}.[2]

Results Forty-five asthma patients (Mean (SD): age 60.6 years (10.3); 40% male) and 45 controls (age 60.2 years (10.1); 51% male) were recruited. Asthma patients had evidence of airflow obstruction (mean (SD): FEV1/FVC% predicted asthma 64.3 (11.7) versus controls 77.5 (6.3), $p<0.0001$). Both populations had similar pack-year smoking history (median (IQR): controls, 16 (6.5–31.0), asthma 18 pack-years (3.3–35.5), $p=0.4205$).

When considered together, patients with asthma had a significantly higher NE activity footprint than controls (mean (SD): asthma 12.7 nM (5.7), control 9.4 nM (3.1), $p=0.0011$)

When divided into phenotypes, patients with neutrophil-dominant asthma (n=15) had increased activity footprint compared to a specifically age-matched sub-group of controls (n=15, Mean (SD): asthma 15.0 nM (5.9), control 8.9 nM (2.9), $p=0.0034$). There were no differences between the NE activity footprint comparing patients with eosinophilic (n=11, 11.4 nM (5.5) $p>0.9999$) or paucigranulocytic (n=14, 10.3 nM (5.4) $p>0.9999$) endotypes to controls.

In neutrophilic asthma, there was no correlation between NE activity and neutrophils in sputum (%) ($R^2=0.02677$, $p=0.5601$), age ($R^2=0.08626$, $p=0.2880$), FEV1/FVC% ($R^2=0.04410$, $p=0.4911$), or smoking exposure ($R^2=0.5515$, $p=0.4766$).

Conclusions These findings suggest that there is a differing systemic proteolytic enzyme activity in neutrophil–dominant asthma patients compared to controls and between neutrophilic asthma and paucigranulocytic asthma, which may influence disease pathophysiology.

REFERENCES

1. Simpson JL, *et al. ERJ* 2014.
2. Carter RI, *et al. Thorax* 2015.

P75 THE ROLE OF GENERALISED ANXIETY IN ASTHMA OUTCOMES: EXPERIENTIAL AVOIDANCE AND SELF-EFFICACY AS MEDIATORS

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Introduction Although generalised anxiety (GA) has a substantial influence on asthma outcomes, the underlying mechanisms remain unclear. This study examined individuals' 'Self-efficacy' (SE) or their own belief in their ability to manage their asthma and 'Experiential Avoidance' (EA), the tendency to avoid unpleasant internal states as potential mechanisms that mediate the relationship between GA and asthma outcomes.

Methods Four NHS Scotland Outpatient Respiratory clinics included adults with asthma aged 16 to 75 years. 65 participants completed cross-sectional questionnaires: The

Generalised Anxiety Disorder Questionnaire, Brief Experiential Avoidance Questionnaire, Perceived Control of Asthma Questionnaire, Mini Asthma Quality of Life Questionnaire and Asthma Control Test. Correlations and path analyses were used to explore relationships between variables and mediating effects. Key asthma outcomes included: Asthma Quality of Life (QoL), Asthma Control and Short-Acting Beta Agonist (SABA) use.

Results Higher levels of GA were significantly correlated with poorer asthma control (r=-0.428**), poorer asthma related QoL (r=-0.540**) and higher SABA use (r=0.412*). Higher GA was also significantly correlated with lower SE to manage asthma (r=-0.525**) and higher EA (r=0.565**). Significant indirect effects were found from increased GA to both decreased asthma control and QoL through decreased SE (b=-0.117, SE=0.061, 95%CI=[-0.262,-0.025]) and (b=-0.709, SE=0.239, 95% CI=[-1.21,-0.025]) respectively. The indirect effects from increased GA to both decreased asthma control and QoL through increased EA were also significant (b=-0.110, SE=0.049, 95%CI=[-0.214,-0.021]) and (b=-0.582, SE=0.259, 95%CI=[-1.16,-0.137]) respectively. Indirect effects from GA to SABA through SE and EA were not significant. These findings could not be explained by other covariates such as steroid medication use, SABA use or years living with asthma. P values (*p<0.005,**p<0.001).

Conclusions These findings highlight the significance of Self-efficacy and Experiential Avoidance as potential mechanisms through which co-morbid Generalised Anxiety impacts on poorer asthma control and Quality of Life. It provides preliminary support for the use of psychological interventions which focus on these factors such as the Cognitive Behavioural Therapy and Acceptance and Commitment Therapy but will require replication in a longitudinal study.

Virtually systematic: current interventions and digital delivery in pulmonary rehabilitation

P76 WHICH FUNCTIONAL OUTCOME MEASURES CAN WE USE AS A SURROGATE FOR EXERCISE CAPACITY DURING REMOTE CARDIOPULMONARY REHABILITATION ASSESSMENTS? A RAPID NARRATIVE REVIEW

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Introduction The COVID-19 pandemic has seen many cardiopulmonary rehabilitation services delivering programmes remotely. One area of concern is how to assess exercise capacity when a supervised exercise test is not possible. The aim of this review was to examine the relationship between functional exercise tests with gold standard measures of exercise tolerance.

Methods Rapid narrative review. Searches were conducted by 2 authors, with a third reviewer for any discrepancies on screening.

Participants: Adults, all long-term conditions.

Intervention: Any/none.

Outcome: Duke activity status index (DASI), Sit to stand (STS 30 second, 1 minute and 5 repetition), short physical performance battery (SPPB), 4 metre gait speed (4MGS) or step test (Chester/others) AND directly compared to one of the gold standard tests: six minute walk test (6MWT), incremental shuttle walk test (ISWT) or cardiopulmonary exercise test (CPET) in terms of reporting agreement/correlation.

Study design: primary research only, controlled trials or observational studies.

Abstract P76 Table 1 New abbreviations in the table: CV: cardiovascular, ICC: intraclass correlation coefficient, r: correlation coefficient, IPF: idiopathic pulmonary fibrosis

First author Year (reference)	Outcome measure	N=	Disease	Agreement/correlation to gold standard	Risk of bias
Briand 2018 (24)	1 minute STS	107	ILD	1minute STS and 6MWT r=0.5	Moderate
Carter 2002 (25)	DASI	119	COPD	DASI and 6MWT r=0.53.	High
Coute 2017 (26)	DASI	100	CV	Predicted METs from DASI and maximum exercise METs r=0.38.	High
Crook 2017 (27)	1 minute STS	255 (2 studies comb-ined)	COPD	1 minute STS and r=0.59 study 1 at baseline and r=0.67 at follow-up. r=0.64 study 2 at baseline and r=0.68 at follow-up.	Moderate
Di Thommazo-Luporini 2015 (28)	Step Test (6 minute)	56	Obesity	CPET r=0.56.	High
Jones 2013 (29)	5STS	475	COPD	ICC with ISWT -0.59.	Low
Kon 2013 (30)	4MGS	586	COPD	4MGS and ISWT r= 0.78, 4MGS and ISWT% predicted 0.72.	Moderate
Matkovic 2017 (31)	4MGS	111	COPD	4MGS and 6MWT r=0.85.	Moderate
Mori 2019 (32)	SPPB	53	Charcot-Marie-Tooth	ICC with 6MWT 0.35.	High
Meriem 2015 (33)	1 minute STS	49	COPD	1 minute STS and 6MWT r = 0.47.	Moderate
Nolan 2018 (34)	4MGS	46	IPF	4MGS and 6MWT r=0.76.	Low
Ozalevli 2007 (35)	1 minute STS	53	COPD	1 minute STS and 6MWT r = 0.75.	Moderate
Reed 2020 (36)	DASI and Chester Step test	50	CV	Step test and CPET r=0.69, DASI and CPET r=0.38.	Moderate
Reyschler 2018 (37)	1 minute STS	42	COPD	1 minute STS and 6MWT r= 0.72.	Moderate
Wilkinson 2018 (38)	1 minute STS and 5STS	41	CKD	5STS and ISWT r=0.55 time point 1 and r=0.74 at 6 weeks. 1 minute STS r not reported.	Moderate
Zhang 2018 (39)	5STS and 30 second STS	128	COPD	5STS and 6MWT r= -0.51, 30 second STS and 6MWT r=0.53.	Moderate

Data extraction was performed by all authors manually and transcribed to an excel spreadsheet. A brief risk of bias assessment was conducted at the same time using the COSMIN taxonomy: Measurement Properties of Outcome Measurement Instruments.[1]

Results 16 articles (249 screened) were included (table 1). N=2271 patients. Most studies (10/16) were moderate risk of bias. Overall there was weak-strong correlations for the included tests with a gold standard r=0.38- 0.85. There were few reported issues with feasibility or safety of the tests. However all tests were supervised in a clinical setting. The test that correlated highest with gold standard was the 4MGS with the ISWT (r=0.78) and with the 6MWT (r=0.85).

Discussion The 4MGS correlates highest with gold standard measures of exercise tolerance. However it may be difficult to standardise in a remote assessment or prescribe exercise from. Clinicians should strive for face-to-face standardised exercise tests where possible to be able to guide exercise prescription.

REFERENCE

1. Mokkink LB, de Vet HCW, Prinsen CAC, Patrick DL, Alonso J, Bouter LM, *et al*. COSMIN risk of bias checklist for systematic reviews of patient-reported outcome measures. *Qual Life Res* 2018 May;**27**(5):1171–9.

P77 PSYCHOLOGICAL FACTORS INFLUENCING PATIENT ACTIVATION IN HEALTH-COACHING PROGRAMMES IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE. A SYSTEMATIC REVIEW AND NARRATIVE SYNTHESIS

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Introduction Chronic obstructive pulmonary disease (COPD) requires effective strategies to support the humanistic and economic challenges involved in managing the complex symptom burden experienced by people living with COPD. Health coaching aims to achieve collaboration between patients and healthcare professionals to enhance patient activation with health-promoting behaviours. This review aimed to identify psychological factors that positively influence the implementation of health-coaching programmes in COPD thus providing insight into how health-coaching can enhance patient activation and improve outcomes in COPD care.

Methods A comprehensive systematic search of the literature was performed using multiple electronic databases: AMED, CINAHL, EMBASE, EMCARE, Medline, PsychINFO and PubMed from 2009–2019. Studies of any research design reporting qualitative or quantitative data investigating the influence of patient psychological factors in health-coaching in COPD were included. Study quality was assessed using the Critical Appraisal Skills Programme and AXIS critical appraisal tools. An integrative thematic analysis approach was used to synthesise data from eligible studies and summarise findings.

Results A total of 682 abstracts were screened and 48 full-text articles reviewed. Fourteen studies including seven qualitative and seven cross-sectional studies met the criteria for inclusion. The heterogeneity of the results made pooling and meta-analysis difficult although several valuable themes emerged from the integrative analysis. The qualitative datasets included a total of 244 patients and demonstrated two crucial themes in patients being activated with health-coaching programmes: the desire to maintain independence in activities of daily living and the need to have ownership of their disease. The cross-sectional studies included 2674 participants and highlighted fundamental characteristics associated with low activation for health-coaching: increased levels of anxiety and depression and a negative illness perception.

Conclusions This systematic review triangulated rich in-depth perspectives along with associations between psychological factors and patient activation during health-coaching in COPD. The holistic understanding of these identified factors provides an opportunity to optimise the efficacy of health-coaching in clinical practice, particularly given the intricacies of human nature and the complexity of health-coaching interventions.

P78 SMALL AIRWAYS RESPONSE TO BRONCHODILATOR IN ASTHMA AND COPD: A SYSTEMATIC REVIEW

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Introduction and Objectives The airways response to bronchodilators (BDR) has been used as a test to diagnose asthma and to differentiate it from other obstructive pulmonary diseases. The main outcome in assessing BDR is FEV_1, mainly a large airway measure. Measures of small airways are not included in everyday practice for BDR testing, although evidence suggests small airways dysfunction is found in asthma and COPD patients. This systematic review assessed the current evidence on small airways response to short-acting inhaled bronchodilators in asthma and COPD.

Methods The protocol was registered in PROSPERO (CRD42020164140). Electronic medical databases (EMBASE and Medline) were searched using related keywords. Abstracts and full texts were screened independently by two reviewers. Studies that reported the change of physiological small airways function (spirometric, oscillometry, multiple breath washout) and FEV_1 were included. The revised Cochrane risk of bias tool for RCT and the NIH quality assessment tool for cohort and cross-sectional studies were used to evaluate the studies.

Results Of 934 articles identified from the databases search, 13 met the inclusion criteria, with asthma (n=10) and COPD (n=3) patient studies. A total of 1110 participants were included; 911 were asthmatic, 90 COPD and, 109 were controls. Heterogeneity between studies was noted in the (1) diagnostic criteria for asthma or COPD, (2) agreed criteria for demonstrating BDR using standard spirometry, (3) methods used to deliver aerosolised medications and, (4) included measures of small airways function. Using spirometry, MMEF showed higher percentage of change (5.3–47%) in asthma and (3.6–25%) COPD, than FEV_1 which was (3.9–32%) in asthma and (2.8–16.3%) COPD [**Abstract P78 figure 1**]. The contrary was noted in severe asthma patients. Using oscillometry, BDR was observed with total resistance change of (R5) in asthma patients (-0.16 kPa/L/s) and between (-9.0— -22.4 kPa/L/s) in COPD patients.

Conclusions Small airways function appears to change following BDR, but currently studies are too heterogeneous to recommend their inclusion in clinical practice. More research is needed to form a consensus on how to assess BDR in general and in small airways in specific, and whether this adds utility to the diagnosis and management of airway disease patients.

P79 INSPIRATORY MUSCLE TRAINING FOR IMPROVING INSPIRATORY MUSCLE STRENGTH AND FUNCTIONAL CAPACITY IN OLDER ADULTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction The ageing process can result in the decrease of respiratory muscle strength and consequently increased work of breathing and associated breathlessness during activities of daily living in older adults. This systematic review and meta-analysis aims to determine the effects of inspiratory muscle training (IMT) in healthy older adults given that reduced respiratory muscle strength is associated with a decline in pulmonary function, reduced physical performance, and constitutes an independent risk factor for myocardial infarction and cardiovascular mortality.

Methods A systematic literature search was conducted across four databases (Medline/Pubmed, Web of Science, Cochrane Library and CINAHL) using a search strategy consisting of both MeSH and text words including older adults, inspiratory muscle training, and functional capacity. The eligibility criteria for selecting studies involved controlled trials investigating IMT via resistive or threshold loading in older adults (>60 years) without a long-term condition. Meta-analyses were performed for maximal inspiratory pressure (PI_{max}) and six-minute walk distance (6MWD) using a random-effects model with change scores to obtain effect sizes reported as standard mean differences. Pearson's correlation analysis was performed to determine the association between baseline PI_{max} and change in PI_{max} following IMT within included studies.

Results Seven studies provided mean change scores for inspiratory muscle strength and 3 studies for functional capacity. A significant improvement was found for PI_{max} following training (n=7, 3.03 [2.44, 3.61], p≤0.00001) but not for 6MWD (n=3, 2.42 [-1.28, 6.12], p=0.20; figure 1). The average increase in PI_{max} was 26.3±4.9 cmH_2O within the experimental groups compared to a non-significant average change of 3.7± 4.1 cmH_2O within the control groups. There was no significant correlation between baseline PI_{max} and post-intervention change in PI_{max} values (n=7, r=0.342, p=0.453).

Discussion This study suggests that IMT is beneficial in terms of improving inspiratory muscle strength in older adults without a long-term condition. IMT was also found to be beneficial in older adults regardless of their initial degree of inspiratory muscle weakness. Further research is required to investigate the effect of IMT on functional capacity and quality of life in older adults.

P80 INTERNET USAGE AND INTERVENTION DELIVERY PREFERENCES IN THE PULMONARY REHABILITATION POPULATION

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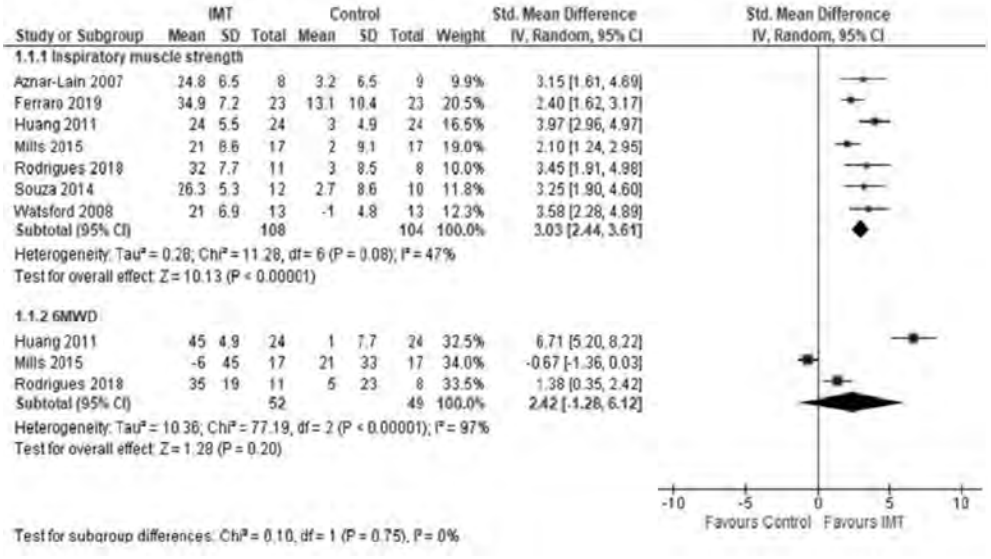
10.1136/thorax-2020-BTSabstracts.225

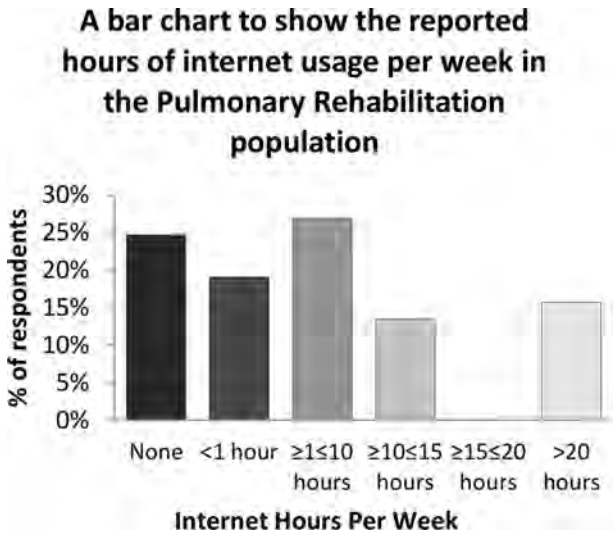
Introduction Due to COVID-19, conventional Pulmonary Rehabilitation (PR) has adapted to a home-based paper and telephone alternative. Web-based PR is available and has the potential to be an effective alternative to conventional PR.[1] However, recent research suggests that patients are unable or unwilling to access it.[2] The aim of the study was to explore internet usage and rehabilitation delivery preferences for those referred to PR.

Methods A survey was conducted between May and August 2020. Information collected included: demographics, qualifications, device ownership, internet hours per week, PR delivery preference and barriers to PR.

Results 89 responses were received from patients (Mean [SD] age 69 [10.5] years, 51 (57.3%) female). 68 (76.4%) reported having internet capable devices (Smartphone 50.6%, PC/Laptop 47.2%, Tablet 36.0%). 67 (75.3%) used the internet weekly. 50 (56.2%) responders used the internet regularly (>1 hour/week) and 26 (29.2%) very regularly (>10 hours/week). There was a weak correlation between age group and hours



Abstract P79 Figure 1 Mean difference (95% CI) from baseline of the effect of inspiratory muscle training on inspiratory muscle strength (measured by maximal inspiratory pressure; n=7) and six-minute walk test distance (n=3) compared to control



Abstract P80 Figure 1

spent on the internet per week (ICC -0.29, *p=0.006*). There was also a weak correlation between those who reported having qualifications and hours spent on the internet (ICC 0.34, *p=0.009*).

Overall, hospital face-to-face (55.1%) was preferred to other PR delivery interventions (home booklet and telephone 18.0%, community face-to-face 13.5%, web programme-based 5.6%, virtual classes 2.2%). No responders who used the internet infrequently (<1 hour/week) listed internet-based interventions as preferable.

Conclusion Despite having access (76.4%), only a small group of patients would prefer rehabilitation delivered via web programme or virtual classes (10.3% of the 76.4%). This presents challenges for implementing online interventions such as virtual classes for the wider PR population, however, may be useful for selected groups of patients.

REFERENCES

1. Chaplin E, Hewitt S, Apps L, Bankart J, Pulikottil-Jacob R, Boyce S, Morgan M, Williams J. and Singh S, 2017. Interactive web-based pulmonary rehabilitation programme: a randomised controlled feasibility trial. *BMJ Open*, **7**(3).
2. Polgar O, Aljishi M, Barker R, Patel S, Walsh J, Kon S, Man W and Nolan C, 2020. Digital habits of PR service-users: implications for home-based interventions during the COVID-19 pandemic. *Chronic Respiratory Disease*, **17**.

P81 THE FEASIBILITY AND ACCEPTABILITY OF DELIVERING VIRTUAL PULMONARY REHABILITATION DURING THE COVID-19 PANDEMIC

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10.1136/thorax-2020-BTSabstracts.226

Introduction Pulmonary Rehabilitation (PR) services have been unable to provide face-to-face PR due to covid-19. Our service developed a virtual PR (VPR) programme and sought to understand its feasibility and acceptability.

Methods Our PR programme was adapted to an online format in conjunction with patients. Multiple video conferencing platforms were trialled with both clinicians and patients preferring Zoom. Exercise intensity was pragmatically prescribed using the BORG scale. One clinician demonstrated exercises and another provided feedback. Education consisted of facilitated group discussions.

We recruited patients from PR classes and waitlists. One-to-one assessments took place over a video platform (AccuRx). Exercise capacity was assessed using the 1-minute sit to stand (1STS). Health status was measured using the Chronic Respiratory Disease Questionnaire (CRQ) and COPD Assessment Test (CAT). Other measures included the Hospital Anxiety and Depression scale (HADS) and Lung Information Needs Questionnaire (LINQ). We collected patient and clinician feedback.

Results We screened 58 patients for VPR- 18 (31%) accepted, 21 (36%) were unsuitable (20-unwell, 1- language barrier), 19 (33%) had no internet access or declined. The participants (10 male) had an average age of 69 years (37–84). Respiratory pathology included COPD (11), Asthma (3), Bronchiectasis (2) and Interstitial lung disease (2). Average MRC was 3 (2–4) and $FEV_1$66% (29%–114%).

We undertook VPR in 3 cohorts (2x/week for 6 weeks). 18 (100%) patients completed. No adverse events occurred. Over 50% of patient's achieved the MCID for exercise capacity, health status (CRQ) and learning needs (see figure 1).

10 patients responded to our post-VPR survey. 100% found VPR beneficial with 80% stating Zoom was 'very easy' or 'easy to use'. Benefits included reduced social isolation, not having to travel and confidence in home-based exercise. Clinician feedback was positive, but challenges were noted. VPR increased staff time for IT support and individualised exercise prescription proved difficult. The cohort model used may increase wait times but could allow for pathology specific groups.

Abstract P81 Figure 1 Virtual Pulmonary Rehabilitation Outcomes

Outcome Measure	Mean change (range)	% meeting MCID (number)	% meeting MCID in PR Clinical Audit 2019
1-minute Sit to Stand (1STS)	2 (-10 – 9)	56% (10)	59.8%[1]
CRQ-Dyspnoea	0.65 (-0.8 – 3)	56% (10)	58.6%
CRQ-Emotional Function	0.75 (-1.29 -3.6)	56% (10)	53.7%
CRQ-Fatigue	0.75 (-1.50–3.25)	61% (11)	59.0%
CRQ-Mastery	0.51 (-2.25–3)	44% (8)	58.2%
CAT	0 (-6 -8)	28% (5)	58%
LINQ	-3 (-8 -2)	83% (15)	*
HADS (Anxiety)	1 (-3 -7)	11% (2)	*
HADS (Depression)	0 (-4 – 8)	28% (5)	*

[1] as per the minimal clinically important difference (MCID) for incremental shuttle walk test (ISWT)/6-minute walk test (6MWT) *No audit data available. CRQ-Chronic Respiratory Disease Questionnaire, CAT- COPD Assessment Test, LINQ-Lung Information needs questionnaire, HADS-Hospital Anxiety and Depression scale.

Conclusion VPR was feasible and acceptable during the closure of face-to-face PR. The future role of VPR warrants further investigation- particularly around remote assessment, who can access VPR and exercise prescription.

P82 COMPARISON OF VIRTUAL PULMONARY REHABILITATION PLATFORMS USE IN A REGIONAL NETWORK

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Background Our region has run a pulmonary rehabilitation (PR) clinical network since 2010. During the Covid19 pandemic lockdown when PR services were suspended, PR clinicians were encouraged in fortnightly support video calls to move to virtual PR assessment and programme delivery, using platforms of their service's choosing.

Method An e-survey was undertaken of virtual PR platforms (both digital and paper-based) offered to patients between 1/3/20–7/8/20. Analysis included aggregation of individual PR services data. The total number of patients offered, accepting, and actively using the separate platforms was then summed. Percentage of patients, both accepting and actually using, relative to total offered each platform, was calculated, as was percentage of patients actually using, relative to accepting each platform.

Results Data are available on 13 of 15 providers (figure 1); one service was restructuring, and another was unable to extract data at the time of submission. Most providers offered both digital and paper-based options. 1058 patients were offered at least one virtual platform; 228 (22%) preferred to wait for a traditional programme. Although currently digital interventions are burgeoning across the healthcare sector and use encouraged, the British Lung Foundation Exercise Handbook (BLFEH) had the highest percentage (39%) of active users to platform offered. Locally produced paper-based Home Exercise Programmes (HEP) had the highest take-up (84%), but lowest active use, relative to both take-up (14%) and total offered (12%). Digital options (myCOPD, SPACE for COPD, BLF Stay Active, Stay Well videos) all had lower take-up than paper-based (25%, 36% and 40%), but show levels of active use relative to take-up (67%, 67% and 52%) comparable to the BLFEH (65%). As so few patients have completed a programme to date, completion and outcome data are unavailable as yet.

Conclusion Paper-based platforms had a higher take-up rate than digital; active use relative to take-up was also highest for the BLFEH. Active use relative to take-up was lowest in locally produced HEPs. Further data collection and analysis may reveal reasons. Completion rates and clinical outcomes are awaited. Qualitative data are required to understand attitudes towards virtual platforms and their place alongside traditional PR.

P83 PULMONARY REHABILITATION IN THE COVID-19 ERA: SERVICE MODEL REDESIGN, PATIENT'S DIGITAL ACCESS AND CHOICE

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Introduction Pulmonary Rehabilitation (PR) is an evidenced based face-to-face group intervention. During the COVID-19 pandemic, non-essential face-to-face activity was suspended, including PR. Re-opening PR services in the new world of COVID-19 has required significant changes and innovation. However, this is dependent upon patients' ability to access and manage virtual platforms.

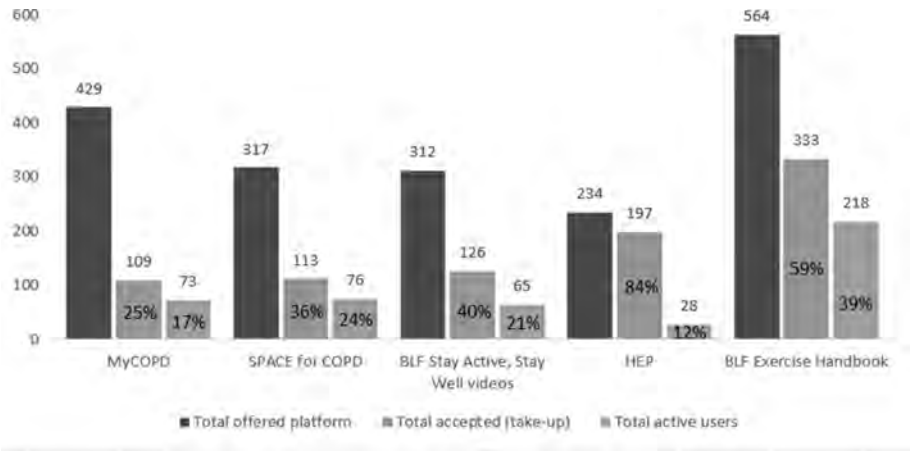
Four different models of PR delivery were designed: two virtual and two non-virtual models:

- Real Time Virtual PR (RTVPR): two classes per week via BlueJeans platform
- Self-directed PR: video link for pre-recorded exercise and education with telephone support
- Home Exercise PR Programme (HEP): education and exercise booklets with telephone support
- Socially distanced face-to-face (F2F) PR

This study aims to explore PR patients' digital access and their preferred PR choice.

Methods Patients were telephone screened with questions about their access to technology and their interest in participating in one of the four PR models. Questions asked:

- digital access to computer, tablet, or mobile phone with audio, microphone, camera and internet access
- willingness to download software and use virtual platforms
- safe place to exercise at home



Abstract P82 Figure 1 Patients offered, accepting, and using virtual Pulmonary Rehabilitation platforms

Abstract P83 Table 1 Patient Digital Access and Choice of PR Model

Digital access		Choice of PR Model			
		Virtual		Non-Virtual	
		RTVPR	Self-directed	HEP	F2F
Yes	367 (56%)	316	45	4	2
No	292 (44%)	0	0	250	42
Total	659 (100%)	316 (48%)	45 (7%)	254 (38%)	44 (7%)

RTVPR, real time virtual PR; HEP, Home exercise PR programme; F2F, Face-to-face PR

- patient preference regarding delivery model of PR
- ability to understand written instruction and literature

Results A total of 659 patients were screened and allocated a PR model based on their access and choice (Table 1); 367 (56%) had digital access. The most popular PR model chosen was RTVPR, followed by HEP. The least chosen models were Self-directed and F2F.

Conclusion In this study, 56% of patients had digital access versus 44% that did not. Of patients who had digital access, only 2% chose a non-virtual model, implying a lack of confidence in using technology. Most patients without digital access chose HEP rather than F2F.

The majority of all patients did not want face-to-face contact during COVID-19, which should be reflected in PR models provided during this pandemic. This presents major challenges to all PR providers. Further study regarding the outcomes of these models will be required.

P84 EXPERIENCES AND USABILITY OF A DIGITAL PULMONARY REHABILITATION PROGRAMME: SPACE FOR COPD®

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Introduction Following the outbreak of COVID-19, and the suspension of face to face activity, Pulmonary Rehabilitation (PR) services have had to think differently around service provision and alternative ways of delivery. Although there is wide variability in internet access and confidence by service users[1], remote models of PR became a popular option.

Methods SPACE for COPD® web programme was offered to PR services. Telephone or video training was provided by the SPACE for COPD team at UHL NHS trust. Clinical services were then set up to be able to give their patients access, monitor and progress them 'remotely' via the admin site. A staff survey was sent to services that signed up to use the web programme to understand their perceptions on using platform as part of their service.

Results 191 enquiries were received in total (176 from the UK; 15 overseas); 73 clinical services were set up with over 600 patients accessing the on-line programme.

Of the 24 survey responses, 91.7% of staff found the admin website user friendly. 16.7% had problems logging on to the admin site, but were resolved. 87.5% had no problems navigating the admin site. All staff found creating registration codes for patients easy to complete. 68.2% found the patient registration process easy to input and follow. 54.2% of staff said that patients found the website accessible and acceptable to use. 87% said that the walking and strength diaries were easy to input and navigate. 79.2% of staff stated that the remote training gave sufficient information and support when setting up SPACE for COPD.

Discussion Over the last few months the uptake of SPACE FOR COPD shows there is a place and need for digital programmes. It has been an exciting opportunity to be able to share this and hopefully may even be an alternative option to offer patients in the future.

REFERENCE

1. Polgar O., Aljishi M, Barker, *et al*. (2020). Digital habits of PR service-users: implications for home-based interventions during the COVID-19 pandemic. *Chronic Respiratory Disease*. https://doi.org/10.1177/1479973120936685

P85 VIRTUAL PULMONARY REHABILITATION: A WORTHWHILE INTERVENTION?

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Introduction and Objectives The Covid: 19 pandemic has had a monumental effect on healthcare services. Within the NHS, the majority of services are delivered face to face, and during the height of the pandemic, this became impossible.

There is an undeniable body of evidence that traditional PR classes offer those living with chronic lung disease an opportunity to learn and understand how best to manage their condition. There are well established Virtual PR platforms in the UK but most have expensive licence fees.

Recognising many months without intervention would have a detrimental effect to the health of service users, it became essential to offer virtual pulmonary rehabilitation (VPR).

Outcomes from VPR have been gathered and analysed against those from traditional PR to see if the new intervention was safe, effective and worthwhile, whilst providing meaningful changes to exercise capacity and psychological wellbeing.

Methods Participants completed a seven week course run by Qualified Physiotherapists and Occupational Therapists. They were given a programme of aerobic and strength exercises were advised to complete twice weekly exercise sessions building up intensity and frequency as the weeks progressed. During the intervention patients were contacted up to twice weekly via telephone or video call. Education was provided informally in booklet format. Patients were assessed pre-and post-intervention using the 1 minute sit-to stand test, Chronic Respiratory questionnaire – self reported (CRQ-SR), GAD-7 and PHQ-9, and MRC.

Results 40 participants have completed VPR in the first wave. 61% of participants achieved the MCID for the 1 minute STS test. 52% achieved the MCID in all domains of CRQ-SR. Average MRC scores improved from 3.2 to 2.7; an average improvement of 0.5.

Conclusions The Covid pandemic offered an opportunity to explore the potential of VPR. There is evidence of good individual successes, however upon reflection, outcomes were collectively less favourable than traditional PR. Longterm, VPR

offers a welcome alternative method of accessing PR services for those unable to access traditional PR. However, further research should be completed into identifying characteristics of those who will be most likely to succeed at VPR.

P86 PHYSIOTHERAPIST-LED ONLINE EXERCISE SESSION FOR PEOPLE WITH CYSTIC FIBROSIS (CF) DURING THE COVID-19 PANDEMIC: A SERVICE EVALUATION

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10.1136/thorax-2020-BTSabstracts.231

Background Public Health England guidance advised people with CF to shield during the COVID-19 pandemic. We were concerned about patients struggling with isolation, lack of team contact and the inability to exercise. As such, we set up interactive exercise sessions for patients attending our unit, with the aim of supporting our patients to remain active while complying with the guidance and creating a holistic support network.

Methods Over the 4 months of shielding, we developed eleven interactive online sessions per week, with different levels of intensity, and delivered these simultaneously to inpatients and outpatients. All patients at the Leeds Adult CF Unit, regardless of session attendance, were invited to answer an evaluation questionnaire for the service. Feedback from the multidisciplinary team (MDT) was also collated.

Results Overall 75 patients attended the sessions at least once, and 36% of them provided feedback. 70% of patients found it harder to motivate themselves without the sessions and 83% reported exercising more frequently as a result. Over 75% of patients thought the sessions were enjoyable and would continue after shielding. Among those who did not attend the sessions, 22% of patients responded to our survey and the majority reported that they already achieved the minimum activity levels.

Feedback from the MDT was very positive as the sessions allowed staff to identify patients needing greater input to optimise care and enable individualised reviews. Staff morale and well-being was also positively affected by the sessions.

Conclusion The interactive online exercise sessions gave our patients the opportunity to engage in a physiotherapy-led exercise programme during shielding. Both active and inactive patients participated as a result of offering different intensity training options. Through the medium of live online classes, we were able to give people in shielding social contact, peer-support from others in the same situation and enhancement of physical health. Direct contact with the familiar physiotherapy team allowed advice to be given as required. This service will be monitored and reviewed in a further 3 and 6 months post cessation of shielding.

P87 FACTORS INFLUENCING PATIENT ATTENDANCE OF A PULMONARY REHABILITATION PROGRAM IN RESOURCE-SCARCE SETTINGS

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The overwhelming evidence for the benefits of pulmonary rehabilitation (PR) in patients with chronic respiratory diseases has become indisputable. However, it is still underutilised in low-middle income countries such as Pakistan. We aim to identify factors that affect patient attendance of, and adherence to, PR in order to improve our efforts to increase uptake.

We conducted a retrospective analysis on referrals to an 18-session PR program at a free-of-cost, charity-based hospital in Karachi, Pakistan. Patients were categorised into attendance (0 or > 0 sessions) and adherence (≤ 12 or > 12 sessions) groups. Data collected included sociodemographic factors (age, gender, smoking, marital and employment status, distance from healthcare facility, free transport service usage and health-related factors (exposure to indoor biomass burning, body mass index (BMI), forced expiratory volume (FEV1), and home oxygen use). Statistical analysis was performed using Stata 14.

Of 86 referred patients, 38.4% did not attend, 24.4% were not adherent, while 37.2% were adherent. Univariate analysis showed patients exposed to indoor biomass (non-attendance: 21%, non-adherence: 33%, adherence: 47%), those with lower mean FEV1 levels (0.89L, 0.75L, 0.71L), and those who were females (39%, 48%, 63%) were associated with attendance and adherence groups. The average travelling distance from the healthcare facility for non-attendance and non-adherence groups were 11.3 and 10.5 kilometres respectively, while the adherence group travelled 6.9 kilometres. Multiple linear regression showed shorter travelling distances to attend PR ($p=0.046$) and use of free transport ($p=0.006$) were independent predictors of attendance and adherence groups. No significant differences were seen in other factors.

Many eligible patients did not attend, or adhere to, an available PR program. Distance travelled and/or use of free transport services significantly influenced attendance and adherence. Thus, further implementation steps in our setting may focus on increased transport facilities or developing home-based PR services to maximise attendance.

P88 ENHANCING THE PERFORMANCE OF ELITE ATHLETES, ARE WE MISSING SOMETHING IN THE AIR?

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10.1136/thorax-2020-BTSabstracts.233

Introduction Fitness testing forms an important role in evaluating an individual's athletic performance and potential. Its assessment is a complex, multifaceted process comprising of cardiovascular endurance, strength, and flexibility testing as well as body composition evaluation. The respiratory element of this is commonly overlooked and undervalued despite dyspnoea, upper airway distress, recurrent infections and coryzal symptoms being a notable cause of underperformance in athletes. Previous studies have postulated that airway hyperresponsiveness or repeated injury and repair process of the respiratory epithelium, can lead to structural and functional changes, and are then responsible for the underlying airway dysfunction in athletes. It therefore seems feasible that understanding this could allow management and subsequent improved athletic performance.

Objectives
1. To examine the prevalence of airways disease in athletes attending a dedicated sports cardiology service
2. To evaluate the correlation between respiratory physiology and exercise performance.

Method Over 12 months the data of 82 athletes, comprising of team sports and individual endurance athletes, attending a dedicated sports cardiology service were retrospectively evaluated including clinical history, baseline spirometry and cardiopulmonary exercise test (CPET). FeNO and spirometry with reversibility were performed in individuals with respiratory symptoms or abnormal baseline spirometry.

Results 14/82 (17%) had abnormal baseline spirometry defined by lower limit of normal, of which 6/14 had significant reversibility and 4/14 had FeNO >40ppb. A further 6/82 (7.3%) had FeNO >40ppb with normal baseline spirometry. 24.3% of the athletes had pulmonary function testing highly suggestive or diagnostic of airways dysfunction. 13/82 (15.9%) were commenced on inhaled therapy based on the results of these investigations. Using a Welch's t-test to analyse the data there was a statistically significant difference between FEV_1, FEV_1/FVC ratio and breathing reserve for those with normal versus abnormal investigations.

Abstract P88 Table 1

	Normal spiro (mean±SD) n=62	Abnormal spiro or FeNO (mean ±SD) n=20	p values
Age (years)	37(16)	41(19)	0.38
m(f)	51(11)	15(5)	0.82
FEV_1% predicted	104(9)	91(12)	0.0002
FEV_1/FVC ratio	82(6)	69(9)	8.061e-06
VO_2 max% predicted	114(17)	111(21)	0.5506
Peak Ventilation% predicted	132(31)	125(17)	0.0919
Breathing reserve%	22(15)	13(12) (p<0.05)	0.0159

Conclusion These results demonstrate airway disease is highly prevalent in an athletic population. Results suggest that premature encroachment on ventilatory reserves may negatively affect performance in high achieving athletes. Addressing this could potentially have a positive influence on performance. A prospective study to further evaluate the prevalence of airways disease and impact on performance is underway.

Monitoring and care delivery for children with respiratory disease

P89 IMPULSE OSCILLOMETRY IN CHILDREN WITH BRONCHIECTASIS-CORRELATION OF R5(REVERSIBILITY) AND R5-R20(REVERSIBILITY) WITH AX

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10.1136/thorax-2020-BTSabstracts.234

Introduction Impulse oscillometry is an effort independent test done during tidal breathing. It requires minimal cooperation and is suitable for children five years and less. IOS is a validated test for assessment of distal airway obstruction. Low frequency(5Hz) impulse travels through proximal airway all the way to the distal or small airway; whereas a high frequency (20Hz) impulse reaches the proximal airways only. Difference of resistance at lower and higher frequency (R5-R20) and area under reactance (AX) are markers of small airway disease; and are superior to conventional spirometry. In adults, AX has been reported as a more sensitive marker compared to R5 and R5-R20.

Methods This is a retrospective analysis of children who underwent impulse oscillometry at our tertiary care centre. We performed IOS manoeuvres in accordance with the American Thoracic Society standards. Jaeger MS-IOS Digital Viasys was used for IOS. It was calibrated using a 3L syringe before measurements. All study subjects were asked to breathe tidally for 30 seconds for IOS manoeuvre. Recommended coherence values (r2 > 0.6 at 5 Hz and r2 > 0.9 at 20 Hz) were used as markers of good technique. A variability of 10% for two out of three attempts was deemed acceptable. Bronchodilator reversibility was assessed by giving 400 mcg of salbutamol by a metered dosed inhaler through a spacer device and then measuring lung function fifteen minutes later.

Results Our study sample size was 44(M=18, F=26). Children with a confirmed diagnosis of CF(n=32) or PCD(n=12) were included in this study. There were 14 children with bronchiectasis. Mean age and median height for the whole population was 8.1 years and 124 cm respectively. In children with bronchiectasis, both R5 reversibility (r=0.46, p=0.028) and R5-R20 reversibility (r=0.50, p=0.012) strongly correlated with AX. In children without bronchiectasis, R5 reversibility (r=0.12) and R5-R20 reversibility(r=0.28) had a weak positive correlation with AX.

Abstract P89 Table 1 IOS parameters in bronchiectasis

	No bronchiectasis(n=30)	Bronchiectasis(n=14)
Age in years (Mean± SD)	7.3(±2.9)	9(±3.1)
Height in cm (Median-IQR)	117.8(19.63)	131.8(20.7)
R5% reversibility (Mean± SD)	13.7(±12.8)	17.2(±11.5)
R5-R20% reversibility (Mean± SD)	19.1(±17.09)	25.1(±18.8)
AX (Mean± SD) kPa/L/s	4.65(±2.23)	3.16(±2.0)
Fres (Mean± SD) Hz	27.18(±10.3)	23.2(±6.67)

Conclusion This is the first study reporting IOS parameters in children with bronchiectasis. Both R5 and R5-R20 reversibility can be interchangeably used to diagnose reversible distal small airway obstruction in children with CF or non-CF bronchiectasis.

REFERENCE

1. Galant, Stanley P, *et al*. 'The case for impulse oscillometry in the management of asthma in children and adults.' Asthma, & Immunology vol. **118**,6 (2017): 664–671.

P90 IMPULSE OSCILLOMETRY IN PRESCHOOL CHILDREN-TYPES OF AIRWAY DEFECTS

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Introduction Many tests commonly used in school going children are now gaining prominence in children less than five years of age. One recent study indicated that impulse oscillometry (IOS) reliably measures distal airway function in preschool children. IOS values during preschool years correlate well with lung function in adolescence by spirometry. We aimed to assess the different types of airway defects IOS can pick up in children less than 5 years of age.

Methods Children aged 3–5 years with CF, PCD and preschool wheeze referred for assessment of lung function from outpatient clinics were included in this study. Jaeger MS-IOS Digital Viasys was used for IOS. It was calibrated using a 3L syringe before measurements. Children were asked to breathe tidally for 30 seconds for IOS manoeuvre. Recommended coherence values (r2 > 0.6 at 5 Hz and r2 > 0.9 at 20 Hz) were used to ensure adequate technique. A variability of 10% in values for two out of three attempts was deemed acceptable.

Results This study was conducted over four months. Thirty-two children were included in the study. Median age was 5 years. Mean height was 114.5 cm (SD ±10.1). The study sample consisted of 14 males and 18 females. 17(53%) children included in the study were clinically diagnosed to have preschool wheeze or probable asthma. There were 11(34%) children with CF and 4(13%) with PCD. Pearson coefficient(r) for BDR(R5) and BDR(R5-R20) in distal obstruction or small airway disease was 0.73(p=0.003). We also analysed association of AX with R5 BDR (r=0.21,p=0.001) and R5-R20 BDR (r=0.35, p=0.0007) for children with distal airway obstruction.

Abstract P90 Table 1 (IOS indices in proximal obstruction, distal obstruction and restrictive defects)

	Distal obstruction (n=12)	Proximal obstruction (n=2)	Restrictive (n=2)	Normal (n=16)
Fres (Mean ±SD) Hz	26.69(±11.2)	51.17(±10.9)	21.04(±0.8)	25.8(±8.6)
AX (Mean ±SD) kPa/L/s	5.75(±1.5)	6.33(±1.1)	3.71(±1.8)	2.88(±1.4)
R5 BDR% (Mean ±SD)	22.86(±14.9)	6.70(±9.5)	16.8	11.6(±11.4)
R5-R20 BDR% (Mean ±SD)	29.8(±18.1)	3.84(±5.4)	20.4	21.5(±19.2)

Conclusion IOS has an important place in lung function in preschool children as it is an effort independent test and requires passive cooperation only. Evidence suggests that it can detect small airway disease earlier than spirometry.

REFERENCE

1. Lauhkonen E, Riikonen R, Törmänen S, Koponen P, Nuolivirta K, Helminen M, Toikka J, Korppi M. Impulse oscillometry at preschool age is a strong predictor of lung function by flow-volume spirometry in adolescence. *Pediatr Pulmonol* 2018;**53**(5):552–558.

P91 CARDIOPULMONARY EXERCISE TESTING IN CF ADOLESCENTS AFTER STARTING TEZACAFTOR/IVACAFTOR

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10.1136/thorax-2020-BTSabstracts.236

Background Aerobic exercise capacity, as assessed by Cardiopulmonary exercise testing (CPET) is an independent predictor of mortality and morbidity in cystic fibrosis (CF). There is limited evidence on the change in exercise tolerance for patients treated with CFTR modulators. The aim of our study was to review the impact of Tezacaftor/Ivacaftor (Tez/Iva) on exercise capacity in our cohort of CF adolescents.

Method Eligible CF adolescents performed CPET testing immediately before initiating Tez/Iva combination therapy with repeat testing at 7 to 8 months after commencing treatment.

Results Four adolescents (Three males, mean age 16.3 years) participated in this study to date. All of them performed technically acceptable CPET, the results are shown in table 1.

Peak VO_2 decreased slightly in 3 of our 4 patients. In these 3 patients, the mean peak VO_2% predicted reduced by 15%, 4% and 4% respectively; it improved by 22% predicted in the fourth patient. A low mean anaerobic threshold at the beginning of the study suggested some element of deconditioning. The VO_2 values at anaerobic thresholds improved in all four patients by 4%, 14%, 19% and 79% respectively. The mean anaerobic threshold (calculated as VO_2 AT/VO_2max predicted), improved by 3%, 7% and 23% in three of our patients, there was no change noted in the fourth patient. Three children had an increase in their BMI.

Abstract P91 Table 1 Comparison of CPET parameters, lung function and BMI prior to and after starting Tez/Iva

Parameter	Prior to starting Tez/Iva	7–8 months after starting Tez/Iva
Mean FEV_1% predicted (SD)	89.5 (13.4)	90.0 (14.7)
Mean FEV_1 - Z-Scores (SD)	-0.9 (1.12)	-0.88 (1.28)
Mean BMI (SD)	20.95 (2.93)	21.55 (2.97)
Mean $VO_{2\ in}$ L/min (SD)	2.29 (0.34)	2.36 (0.53)
Mean VO_2% Predicted (SD)	88.75 (7.12)	87.5 (16.13)
Mean AT in% (SD)	39 (6.4)	47.25 (7.01)

Conclusion Tez/Iva treatment improved the anaerobic threshold in our patients. Larger and longitudinal studies are required to ascertain the impact of these treatments on cardiopulmonary fitness in CF patients.

REFERENCE

1. Hulzebos EH, Bomhof-Roordink H, van de Weert-van Leeuwen PB, *et al*. Prediction of mortality in adolescents with cystic fibrosis. *Med Sci Sports Exerc* 2014;**46**(11):2047–2052.

P92 IMPLEMENTATION OF PHYSIOTHERAPY LED PAEDIATRIC RESPIRATORY CLINICS

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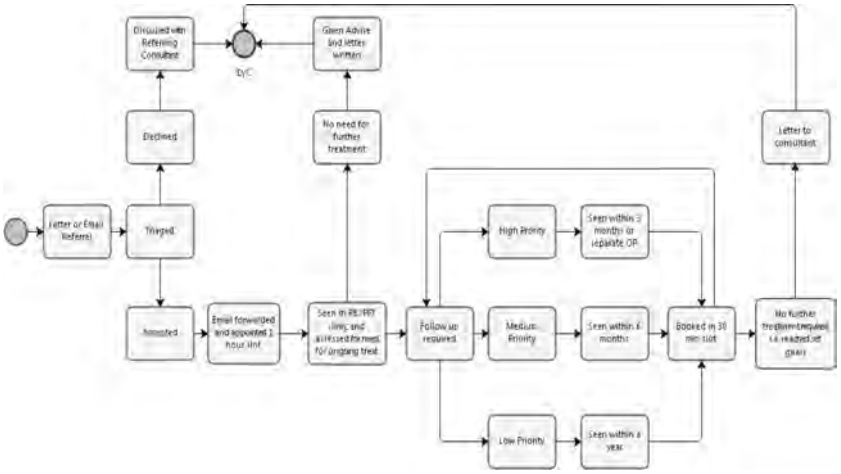
Introduction The adult BTS bronchiectasis guidelines recommend patients have access to a physiotherapist to teach airway clearance, and that this is reviewed every 3 months (Hill *et al* 2019). While there are no guidelines for children, Chang *et al*(2018) reports that mild Bronchiectasis in children can be reversed if treated early enough. Although



Abstract P92 Figure 1

airway clearance is paramount in bronchiectasis, respiratory physiotherapy service provision for children with non-cystic fibrosis bronchiectasis is variable across UK centers. Often these children are seen in general respiratory clinics by a single clinician. We describe the outcomes of a novel pathway-based respiratory physiotherapist clinic for children with non-cystic fibrosis bronchiectasis at a tertiary Children's Hospital in the UK.

Method A physiotherapy led clinic was established to run twice a week, with follow ups based on a scoring of low/medium/high priority. Prospective data collected between September 2012 and September 2013 is compared to data collected one year after implementing the new clinic, between April 2017 and April 2018. Data for clinic utilization, demographic information and waiting times was collected and analysed.

Results

- 157% increase in children seen in the clinic, from 90 up to 231
- 72% increase in children seen with Bronchiectasis, from 36 to 62
- 82% of new patients are now given a review within 3 months, this was previously only 5%
- Slot utilisation has improved by 17%, meaning there are fewer DNA's.
- Discharges increased from 27 to 42 patients
- Positive feedback has been received from families

Conclusion Patients requiring airway clearance were seen in a physiotherapy led clinic in a timely fashion and follow up was based on a priority scoring system. This approach has streamlined the care of children and young people with a variety of respiratory conditions, especially those with suspected or confirmed bronchiectasis. Regular access to appropriate airway clearance minimises the number of exacerbations (BTS 2019). This prevents further damage, optimises lung development and as a result less medical intervention is needed (Chang *et al* 2018).

REFERENCES

1. Chang A, Bush A and Grimwood K. Bronchiectasis in children: diagnosis and treatment. *The Lancet* 2018;**392**(10150);pp. 866–879
2. Hill A, *et al*. 2019. BRITISH THORACIC SOCIETY GUIDELINE FOR BRONCHIECTASIS IN ADULTS. Thorax, [Online]. 74/1, 1–69. Available at: https://www.brit-thoracic.org.uk/quality-improvement/[Accessed 30 September 2019].

P93 ASSESSING THE UTILITY OF A STANDARDISED BREATH SAMPLER IN ASTHMATIC PAEDIATRIC PATIENTS

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Introduction There is no ideal way to diagnose and monitor asthma in children and there is an urgent need for non-invasive biomarkers.[1] A growing body of research suggests that volatile organic compounds (VOCs) in breath may have a role in diagnosing and monitoring asthma. The ReCIVA (Owlstone Medical Limited) is a breath sampler designed to standardise the collection of breath samples for the offline analysis of VOCs. However, it's utility for paediatric sampling has not yet been fully established.

Objective To discover whether the ReCIVA is effective at collecting breath samples from paediatric asthma patients.

Methods We collected ReCIVA samples from 64 children (aged 5–15 years) with acute and stable asthma and healthy controls. The ReCIVA is a hand-held device consisting of a face mask, pressure and CO_2 sensors, and sorbent tubes which sit above two pumps. As mask pressure changes with the breath cycle the pumps are activated, with the aim of collecting the end-tidal breath portion onto sorbent tubes.

We evaluated the metadata to assess the validity and effectiveness of paediatric sampling using the ReCIVA. This included exploring pump activation alignment with the phase of breath, exhaled breath volume sampled, sample collection time and recorded errors in relation to two ReCIVA serial numbers, 42 and 53.

Results Of 90 samples, 70 (77.8%) reached the 1L target breath volume collection. Similar sample characteristics were found between asthmatics and controls (table). 21 (23.3%) samples had recorded errors, the most common being a 'leak detected' error. Discrepancies were found in the timing of pump activation which appeared to be random. Differences occurred between the two ReCIVA serial number sample characteristics. Two samples were aborted, and one sample had almost no breath sampled despite a full collection time.

Conclusions Overall, the results indicate that the ReCIVA is a viable option for standardised breath sampling in the

Abstract P93 Table 1 ReCIVA sample characteristics for the three patient groups, excluding the two aborted samples and one sample with almost no volume sampled despite a full collection time

	Acute asthmatics	Stable asthmatics	Healthy controls	P-value
Number of samples	27	49	11	-
Median volume of exhaled breath sampled, ml (range)	Left: 1000.0 (623.3–1000.0) Right: 1000.0 (627.5–1000.0)	Left: 1000.0 (518.7–1000.0) Right: 1000.0 (510.6–1000.0)	Left: 1000.0 (892.5–1000.0) Right: 1000.0 (889.0–1000.0)	0.38
Median breath sample collection time, s (range)	756.4 (517.9–900.1)	731.0 (477.5–900.1)	739.1 (438.1–900.1)	0.90
Samples with 1L sampling volume for both TD tubes, n (%)	22 (81.5)	38 (77.6)	10 (90.9)	0.59
Median breath sample collection time for samples with 1L sampling volume for both TD tubes, s (range)	686.7 (517.9–897.1)	655.0 (477.5–815.7)	733.3 (438.1–874.4)	0.35

paediatric population. Exploration of pump activation misalignments with the phase of breath is required to determine the reasons behind this. Further work is also needed to investigate whether a wider range of mask sizes improves the 'leak detected' error rate.

REFERENCE

1. Breathe 2019;**15**(1):e20–7

P94 TOO MANY ROUTINE PH STUDIES DONE AT THE TIME OF BRONCHOSCOPY IN CHILDREN

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10.1136/thorax-2020-BTSabstracts.239

Introduction Gastro-oesophageal reflux disease (GORD) in children is reflux together with symptoms or complications (e.g. oesophagitis or pulmonary aspiration). This can cause respiratory symptoms but is also an important comorbidity in children with underlying respiratory disease. In our tertiary centre we regularly perform pH/impedance studies, particularly at the time of a flexible bronchoscopy when investigating significant respiratory symptoms (e.g. chronic wet cough, recurrent pneumonia). When performing a study; either a single or dual probe is passed with the oesophageal sensor at T8 and position confirmed on X-ray. Following concerns that the percentage of abnormal studies was low and that there was a high number of failed studies, we reviewed our data.

Methods A retrospective analysis of our database and electronic patient records reviewing all pH/Impedance studies carried out in 2018. Studies were categorised as abnormal; normal; indeterminate; or a failed study. (See definitions in table 1). Reasons for testing, results and outcome were recorded.

Results 196 studies were performed; 148 pH post-bronchoscopy, 34 pH alone, and 14 impedance studies alone. The predominant finding was that there was a low rate of abnormal studies, the majority were normal. For patients undergoing impedance studies however there was a higher rate of abnormal studies. Another important finding was that patients <1 year had a high failure rate with pH only studies due to the limited time the gastric contents were acidic (23% of failed Bronchoscopy studies and 78% of failed elective studies.)

Conclusion Changes to practice were implemented. Due to the high failure rate of pH studies among younger patients, impedance studies are now used in all ≥ 6-month olds, and a one-month trial of a Proton Pump Inhibitor in older children prior to a study. Implementation of the change in practice is hoped to result in less failed studies as referrals will only be made for patients when there is a strong clinical suspicion of reflux. Additionally, many more bronchoscopies can be done as a day admission as there will no longer be an overnight admission for pH study.

Abstract P94 Table 1

	Abnormal studies pH<4 for ≥ 7% of time	Normal studies pH<4 for < 3% of time	Indeterminate studies pH<4 for 3–7% of time	Failed studies
Bronchoscopy (n=148)	13 (9%) Median age- 2.4	85 (57%) Median age-4.4	33 (22%) Median age-3.5	17 (12%) Median age-2.3
Elective admissions (n=34)	2 (6%) Median age- 4.78	19 (56%) Median age-1.43	4 (12%) Median age-2.68	9 (26%) Median age-0.72
Impedance (n=14)	6 (43%) Median age- 2.82	6 (43%) Median age-1.47	1 (7%) Median age-2.45	1 (7%) Median age-4.82

P95 FROM HOSPITAL TO HOME: VIRTUALLY OBSERVED ADMINISTRATION OF BIOLOGICS IN CHILDREN WITH SEVERE ASTHMA DURING COVID-19

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Introduction and Objectives Children with severe asthma receiving biologic injections, require 2–4 weekly hospital visits. Omalizumab and mepolizumab are licensed for home use, however data on the safety of home administration in children is lacking. In March 2020 due to Covid-19, services urgently needed to be redesigned to reduce footfall within the hospital and protect shielding patients and we trialled home administration.

Methods Families suitable for home-administration were identified by the multidisciplinary team (MDT). If they accepted, they were then consented and attended hospital for a face to face, two-hour training session with the Clinical Nurse Specialist (CNS). Subsequent injections were supervised by video call with the CNS. Spirometry, measured using a home spirometer (Nuvoair®), Asthma Control Test (ACT), Paediatric Asthma

Quality of Life Questionnaire (PAQLQ), oral corticosteroid (OCS) requirement and unscheduled healthcare visits were documented 4 weekly.

Results Of 23 patients, 16 (70%) were identified by the MDT as suitable for home-administration; 14 families agreed to this recommendation and 2 patients agreed to local services administering it. All were trained within four weeks. 7 patients were unsuitable (dose not licensed for home administration n=1; parent not wanting to administer n=2; safeguarding concerns n=2, previous mild reaction n=1; not fully established on biologic, n=1).

We initially encountered some problems including parents not giving a full dose (1) and breaking the syringe (1). However, video call supervision ensured issues were addressed in real time and appropriate action taken. There were no adverse effects.

Forced expiratory volume in one second (FEV_1) remained unchanged, unscheduled healthcare visits and OCS courses did not increase with virtually observed home-administration of biologics. ACT and PAQLQ scores improved during the first 4 months of home-administration.

Conclusions Virtually observed home-administration of omalizumab and mepolizumab is a feasible and safe option.

To our knowledge we were the first UK paediatric centre to implement this model, with home spirometry and video calls supporting home-administration. Consequently, this has changed our practice and once established, virtually observed home-administration can be offered to suitable families, being mindful of the financial and time implications this high level service requires.

P96 SURVEY OF PAEDIATRIC RESPIRATORY PHYSICIANS' EXPERIENCES OF RESPIRATORY CARE AND TRANSITION OF PATIENTS WITH NEURO-DISABILITY

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Introduction The number of children with neuro-disability surviving childhood and transitioning to adult services continues to grow. These children have complex needs, and many have respiratory issues including recurrent chest infections, aspiration, scoliosis and disordered breathing. Despite this healthcare provision for these children and young people can be variable; and the process of transitioning to adult services can be unclear. We sought to explore these issues further through a survey of experiences of UK paediatric respiratory physicians.

Method A survey link was sent out to members of the British Paediatric Respiratory Society with ten questions pertinent to the outpatient respiratory care and transition of paediatric patients with neuro-disability.

Results There were 22 responses in total for the survey. The majority of patients were seen in a general paediatric clinic, and just over 50% of patients had access to a specialist nurse or respiratory physiotherapist in clinic. Most patients are transitioned at 18 years of age, with the majority being referred to a respiratory physician at a local secondary care hospital. For some clinicians the choice of where to transition to was determined by clinical need. The majority of clinicians reported a lack of clear transition pathway for these patients and felt the transition process was inadequate.

Further results are shown in figure 1.

Abstract P96 Figure 1 Results of questions related to outpatient clinics

	Yes (%)	No (%)
Do you see neuro-disability patients in a general paediatric clinic?	91	9
Do you have a separate clinic for neuro-disability patients?	32	68
Do you have respiratory physiotherapy support in clinic?	59	41
Do you have nurse specialist support in clinic?	55	45
Do you do joint clinics with another speciality?	18	82

Abstract P96 Table 2 Results of questions related to transition

		%
At what age do you transition patients to adult services?	16 years	18
	17 years	27
	18 years	46
	19 years	0
	20 years	9
Where do you generally transition patients to for ongoing respiratory care?	GP	41
	Respiratory physician secondary care	64
	Respiratory physician tertiary care	32
	Depends on clinical situation	27
	Yes (%)	No (%)
Do you have a designated pathway for the transition of respiratory care for neuro-disability patients?	9	91
Do you feel that the respiratory transition process for patients with neuro-disability is adequate?	9	91

Conclusion This limited survey provides a snapshot of respiratory care of paediatric patients with neuro-disability. It reveals the variation in care and access to multi-disciplinary team input; which arguably should be available for all patients. It also highlights the lack of a clear transition pathway for these patients to adult services, the variation in patient experience – and the fact that the overwhelming majority of physicians feel that the transition pathway is inadequate. Many of these patients are likely to experience ongoing and deteriorating respiratory issues into adult life. It is important that this gap in care is addressed to improve not only patient care, but to also prevent hospital admissions – which may be avoided if the basics in care and transition are addressed. Further work is needed to address these inconsistencies.

P97 ADHERENCE TO GOVERNMENT COVID-19 SHIELDING GUIDANCE BY CHILDREN WITH CYSTIC FIBROSIS AND THEIR FAMILIES

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Introduction and Objectives In March 2020, individuals with cystic fibrosis (CF) were advised by the UK Government to shield to keep safe from COVID-19. This included guidance such as; 'do not leave your home', 'keep two metres away from others', 'do not go out for shopping' and 'use a separate bathroom'. We explored how children with CF and their families adhered to this guidance.

Methods All families known to the children's CF team were invited to participate in a telephone survey in July 2020. Verbal consent was gained and answers anonymised. Questions explored different aspects of the Government guidance and their ability to adhere.

Results The survey was completed by 45/63 (71%) households caring for 49 children with CF. All 45 households received the Government guidance. The make-up of the households and age of children with CF is displayed in table 1. 24 (53%) families chose to shield as a unit, whilst for 21 (47%), at least one family member did not shield. In 13 (29%) this was because a family member continued to go to work. One child with CF kept solely within the four walls of their house, 28 (62%) were limited to their house and garden and 14 (31%) also went out for socially distanced exercise. In 17 (38%) households, a parent continued to go to the shops, whereas 28(62%) relied soley on deliveries. Most of the children with CF (87%) slept separately to other family members but only 5 (11%) were able to use a separate bathroom.

Conclusions It was challenging for families to adhere to government COVID-19 shielding guidance. The main contributing factor was the difficulty in socially distancing from a child within the home. Many families concluded that the safest course of action was to shield as a unit, relying on food and pharmacy deliveries. Some parents were forced to choose between whether to continue to work or shield with their child, with varying degrees of support from their employer. Future shielding guidance needs to recognise the individual needs of families of vulnerable children.

Abstract P97 Table 1 Make-up of the households and age of children with CF

Per Household (n=45)	Median (range)
Total people	4 (2–7)
Adults	2 (1–6)
Children (<18 yrs)	2 (1–3)
Children with CF	1 (1–2)
Shielding	1(1–5)
Age of child with CF(n=49)	**Total (%)**
<5 yrs	14 (29)
6–10 yrs	13 (27)
11–16 yrs	22 (45)

Emerging evidence on the use of biological agents in severe asthma

P98 STEROID-SPARING EFFECTS OF BENRALIZUMAB IN PATIENTS WITH EOSINOPHILIC GRANULOMATOSIS WITH POLYANGIITIS

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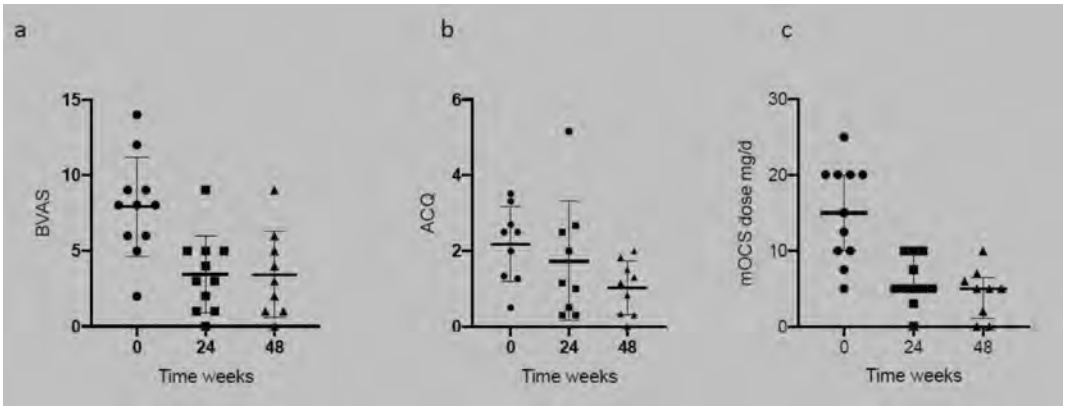
Background Eosinophilic granulomatosis with polyangiitis (EGPA) is a rare, ANCA-associated vasculitis characterised by asthma, chronic rhinosinusitis and blood eosinophilia which may be accompanied by neurological, cardiac, cutaneous and renal involvement. Interleukin-5 (IL-5) is a key cytokine implicated in eosinophil survival. We present our experience with benralizumab, a humanised monoclonal antibody that interferes with the IL-5 receptor alpha (IL-5Rα), and its effect on patient-reported outcomes and oral corticosteroid (OCS) requirements.

Methods Patients with established EGPA and on OCS maintenance therapy were commenced on benralizumab 30 mg



Abstract P98 Figure 1 Reduction from baseline to 48 weeks in a) Birmingham Vasculitis Activity Score (BVAS) (p=0.0007); b) Asthma Control Questionnaire score (ACQ) (p=0.012), c) maintenance oral corticosteroid (mOCS) dose (p = 0.0018): Data are presented as mean (SD) (a and b), median (IQR)

administered by subcutaneous injections. Patient reported outcomes were assessed by the Birmingham Vasculitis Activity Score (BVAS) and the the Asthma Control Questionnaire (ACQ). OCS dose, lung function, blood eosinophil count and exacerbation rate were recorded at baseline, 24 weeks and 48 weeks of treatment.

Results Eleven patients (6 female) with a mean age of 50±14 years completed 24 weeks of treatment; nine completed 48 weeks. A significant improvement in BVAS from baseline 7.91 (±3.27) to 3.45 (±2.52) at 24 weeks (p=0.0001) and 3.44 (±2.88) at 48 weeks (p=0.0007) was recorded. The ACQ changed from baseline 2.13 (±0.98) to 1.73 (±1.57) at 24 weeks (p = 0.47) and 1.03 (±0.71) at 48 weeks (p=0.012). After 24 weeks, there was a median reduction in OCS of 50%; 8/11 (73%) patients were able to reduce their dose by [3] 50%. After 48 weeks, the median reduction in mOCS was 65% and 8 (89%) were able to reduce their dose by ≥ 50%. The median prednisolone dose was reduced from 15 (IQR 10–20) mg to 5 (IQR 5–10) mg at 24 weeks and 5 (IQR 1–6.5) mg at 48 weeks (p = 0.0018) (figure 1).

No significant changes were observed in lung function. Eosinophil counts were totally depleted. No increase in exacerbations was seen. Benralizumab was well tolerated and no adverse effects were recorded.

Conclusion We report significant reductions in mOCS requirements and improved measures of disease control following benralizumab therapy in patients with EGPA. Further research exploring the mechanism(s) of residual disease in eosinopaenic patients is needed and will compliment upcoming prospective controlled trials of this therapy in EGPA.

P99 THE VALUE OF ORAL PREDNISOLONE IN PATIENTS WITH SEVERE EOSINOPHILIC ASTHMA ON MEPOLIZUMAB TREATMENT

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Background Mepolizumab and prednisolone have overlapping anti-inflammatory effects so the clinical effects of prednisolone might be attenuated in severe eosinophilic asthma (SEA) patients treated with mepolizumab.

Methods We tested this hypothesis in a randomized, double-blinded, placebo-controlled, crossover trial of prednisolone (0.5 mg/kg/day, 2 weeks) after ≥12 weeks of mepolizumab. Symptoms and quality of life (QoL) questionnaire scores, lung function including oscillometry and markers of inflammation were measured before and after prednisolone and placebo.

Results There were no significant changes in asthma symptoms and QoL questionnaire scores following prednisolone treatment. In comparison to placebo, prednisolone improved FEV_1 by 100 ml (p=0.019) and FEF_{25-75} by 200 ml/s (p=0.006). Median FeNO at baseline was 37ppb. Prednisolone reduced FeNO by 13.0ppb (p=0.001), blood eosinophil count by 0.02 × 10^9/L (p=0.003) and sputum eosinophil percentage of total cell count by 1.4% (p=0.002) in comparison to placebo. Post-prednisolone and post-placebo SNOT-20 questionnaire scores indicated there were no improvements in nasal symptoms following prednisolone in patients on mepolizumab.

Abstract P99 Table 1 Prednisolone vs placebo response in patients with severe eosinophilic asthma treated with ≥12 weeks of mepolizumab (n=26)

	Median Δ with pred (95% CI)	Median Δ with placebo (95% CI)	Median difference in Δ (95% CI)	p
ACQ-5 score	0.0 (-0.6, 0.4)	0.0 (-0.2, 0.4)	0.0 (-0.2, 0.2)	0.437
Mini-AQLQ score	0.0 (-0.1, 0.3)	0.0 (-0.2, 0.2)	0.0 (-0.1, 0.2)	0.929
SGRQ score	-0.7 (-4.2, 2.7)	0.3 (-3.3, 6.2)	0.4 (-0.7, 2.3)	0.611
VAS overall symptoms	0.0 (-0.8, 0.1)	-0.1 (-0.8, 0.0)	0.0 (-0.3, 0.4)	0.896
SNOT-20 total	13.5 (2.0, 34.0)*	10.0 (3.0, 32.0)*	0.0 (-1.0, 3.0)	0.882
Oscillometry				
R5-20 (cmH2O.s/L)	0.2 (-0.2, 0.4)	0.1 (-0.2, 0.4)	0.1 (-0.2, 0.2)	0.686
AX (cmH2O/L)	**2.6 (0.6, 6.9)**	0.9 (-2.2, 2.5)	1.0 (-0.4, 4.9)	0.150
X5 (cmH2O.s/L)	-0.2 (-0.8, 0.2)	0.1 (-0.2, 0.4)	0.0 (-0.3, 0.2)	0.518
FeNO (ppb)	**-13.0 (-31.0, -1.0)**	-2.0 (-13.0, 13.0)	**-13.0 (-20.5, -4.0)**	**0.001**
Spirometry				
FEV_1 (L)	0.1 (-0.1, 0.1)	-0.0 (-0.2, 0.1)	**0.1 (0.0, 0.2)**	**0.019**
FEF_{25-75} (L/s)	**0.2 (0.0, 0.5)**	-0.1 (-0.2, 0.1)	**0.2 (0.1, 0.5)**	**0.006**
Blood cell count				
Neutrophils ($x10^9$/L)	**4.0 (2.9, 5.3)**	0.2 (-0.5, 1.0)	**3.5 (2.9, 5.0)**	**<0.001**
Eosinophils ($x10^9$/L)	**-0.02 (-0.07, 0.00)**	0.01 (-0.01, 0.02)	**-0.02 (-0.05, -0.01)**	**<0.001**
Sputum cell count				
Neutrophils% of total (%)	5.4 (-8.4, 28.5)	-1.1 (-14.4, 17.5)	-1.8 (-8.2, 2.5)	0.433
Eosinophils% of total (%)	**-2.0 (-8.0, 0.0)**	**1.2 (0.0, 2.5)**	**-1.4 (-4.0, -0.5)**	**0.002**

Results are shown as median (IQR). Statistically significant changes are highlighted in **bold**.
*SNOT-20 was measured post-prednisolone and post-placebo only.
Acronyms: ACQ, Asthma Control Questionnaire; AQLQ, Asthma Qualify of Life Questionnaire; SGRQ, St George's Respiratory Questionnaire; VAS, visual analogue scale; SNOT, Sino-Nasal Outcome Test; FeNO, fractionated exhaled nitric oxide.

Conclusion In patients with severe eosinophilic asthma treated with mepolizumab, prednisolone has no significant effects on symptoms or quality of life but improves FEV_1 and small airway function and reduces FeNO.

P100 REAL WORD EFFECTIVENESS OF ANTI IL-5/IL-5R THERAPIES IN SEVERE ASTHMA WITH FUNGAL SENSITISATION

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Introduction Severe asthma with fungal sensitisation (SAFS) is a complex clinical phenotype associated with poorly-controlled T2 inflammation and significant morbidity from both the disease itself and a high steroid burden. There are limited data

on the effectiveness of biologic therapies targeting the IL-5/eosinophil pathway in this patient group.

Methods We assessed the real-world effectiveness of treatment with mepolizumab or benralizumab in patients with SAFS and compared the outcomes with severe atopic asthmatics without fungal sensitisation (SAA) and severe non-atopic asthmatics (SNA). Baseline clinical characteristics and clinical outcomes at 48-weeks were evaluated. A sub-group analysis was performed of SAFS patients who met criteria for serological ABPA.

Results 193 patients treated with mepolizumab (n=63) or benralizumab (n=130) were analysed. 42 patients were defined as SAFS, 99 as SAA and 52 as SNA. Patients with SAFS had a higher baseline IgE compared to patients with SAA and SNA (mean ± standard deviation: 1135±1563 IU/ml vs 343±530 and 142±171, respectively; both p<0.0001). No differences in baseline eosinophil count, FeNO, lung function, ACQ-6 score, maintenance oral corticosteroid (mOCS) dose or exacerbation frequency were observed between groups. There were significant improvements in ACQ-6, exacerbation frequency and reduction in mOCS dose across all groups. No significant between group differences in outcomes were observed at 48 weeks. Patients with ABPA (n=10) had a significant reduction in exacerbation frequency (p=0.005) and trend towards reduction in mOCS dose at 1-year (p=0.06).

Discussion Patients with SAFS demonstrated similar improvements in clinical outcomes to severe eosinophilic patients without fungal sensitisation. A subgroup of patients with ABPA demonstrated reduction in exacerbation frequency. These data highlight the clinical effectiveness of targeting eosinophilic inflammation in SAFS and ABPA.

P101 OUTCOMES WITH MEPOLIZUMAB AND BENRALIZUMAB IN SEVERE EOSINOPHILIC ASTHMA

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Introduction Benralizumab and mepolizumab are subcutaneous monoclonal antibodies licensed for the treatment of severe eosinophilic asthma. Benralizumab acts by blocking the anti-IL5 α receptor whilst mepolizumab binds to IL-5 inhibiting it binding to eosinophils. There is currently an absence of head-to-head data but trial outcomes have found a similar reduction in exacerbation frequency.

Aim To compare clinical outcomes of patients receiving benralizumab or mepolizumab at 6 and 12 months of treatment.

Method A retrospective review of 50 mepolizumab and 50 benralizumab patients was carried out. The mepolizumab group reviewed had started treatment immediately prior to introduction of benralizumab to ensure a similar patient population. Measurements at baseline, 6 months and 12 months of treatment were compared for the following: daily oral corticosteroid dose (OCS); asthma control scores; blood and sputum eosinophils; FeNO. We also examined adherence to inhaled corticosteroid (ICS) at baseline.

Results Statistically significant differences were seen in FeNO, ACQ scores, blood and sputum eosinophils at 6 and 12 months (table). Blood eosinophils were undetectable in 75% (n=33) of patients on benralizumab and 2% (n=1) on mepolizumab at 6 months, and at 12 months 77% (n=10) and 8% (n=2) respectively. Likewise sputum eosinophils were undetectable at 12 months in 83% (n=5) on benralizumab and 16% (n=2) in mepolizumab. Mean (SD) adherence to ICS in patients initiating benralizumab was 88 (11)% versus 80 (3)% in mepolizumab (p<0.001). Lung function and FeNO measurements were not available at 12 months due to COVID-19 restrictions.

Abstract 101 Table1 Analysis of patient outcomes at baseline, 6 and 12 months. * p < 0.05 between benralizumab and mepolizumab groups at that timepoint

		Baseline	6 months	12 months
OCS dose, median (IQR) mg	Benra	8 (0–50), n=50	5 (0–45), n=50	0 (0–25), n=18
	Mepo	10 (0–40), n=50	7 (0–40), n=46	5 (0–40), n=26
FEV_1, mean (SD)% predicted	Benra	63 (23), n=46	64 (24), n=30	No data
	Mepo	71 (21), n=45	70 (23), n=39	
FeNO, median (IQR) ppb	Benra	33 (0–184), n=46	**27 (7–161), n=29**	
	Mepo	21 (5–97), n=42	**16 (3–108), n=39** *	
ACQ, mean (SD)	Benra	3.0 (1.5), n=50	**2.4 (1.6), n=48**	**1.6 (1.6), n=16**
	Mepo	3.4 (1.3), n=49	**4.3 (1.6), n=45** *	**4.4 (1.6), n=22** *
Blood eosinophils, mean (SD) $x10^9$/L)	Benra	**0.2 (0.0–0.8), n=48**	**0.0 (0.0–0.7), n=44**	0.0 (0.0–0.15), n=13
	Mepo	**0.4 (0.3–1.8), n=48** *	**0.0 (0.0–0.35), n=44** *	0.03 (0.0–0.3), n=24
Sputum eosinophils, median (IQR)%	Benra	6 (0–35), n=17	**0 (0–41) n=20**	**0 (0–1), n=6**
	Mepo	0 (0–3), n=6	**1 (0–4), n=16** *	**2 (0–26), n=12** *

Conclusion There was a higher proportion of patients on benralizumab achieving complete suppression of blood and sputum eosinophils at six and 12 months compared to those on mepolizumab. Asthma control scores after treatment were also superior with benralizumab compared to mepolizumab. Despite higher levels of adherence in the benralizumab group these patients had a higher FeNO after treatment.

P102 SPIROMETRY VERSUS AIRWAVE OSCILLOMETRY FOR ASSESSMENT OF MEPOLIZUMAB EFFICACY IN SEVERE EOSINOPHILIC ASTHMA

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Background Airwave oscillometry (AO) can detect small airway dysfunction and measure treatment response to inhaled corticosteroids and bronchodilators.[1] We compared spirometry and AO changes in severe eosinophilic asthma (SEA) patients treated with mepolizumab to identify the preferred method for assessing mepolizumab efficacy.

Methods SEA patients from two UK specialist asthma centres, due to start mepolizumab at clinic, were recruited prior to receiving the first treatment dose. Spirometry (Vitalograph alpha, Vitalograph Ltd., Buckingham, UK), AO (Tremoflo,

Thorasys, Montreal), exhaled nitric oxide (FeNO), blood eosinophils, induced sputum eosinophils, symptom and quality of life questionnaire scores were measured before and after ≥12 weeks of mepolizumab.

Results Thirteen patients completed assessments at both timepoints, of which 54% were female, 92% were Caucasian and mean (SD) age at study entry was 53 (15). 23% of patients were ex-smokers and none were current smokers.

At baseline, mean (SD) R5-20 was 0.31 (0.44) cmH2O.s/L, AX was 9.83 (9.62) cmH2O/L and X5 was -0.15 (1.12) cmH2O.s/L. Mean FEV_1% predicted was 74%, FEV_1/FVC was 69% and FEF_{25-75}% predicted was 51%.

After 12 weeks, mean FEV_1 and% predicted improved by 230 ml ($p<0.01$) and 9.4% ($p<0.01$), respectively. FEF_{25-75}% predicted increased by 10.2% ($p<0.05$). There were no significant changes in FeNO or AO parameters. ACQ-5 score improved by 1.23 (MCID 0.5, $p=0.02$) and SGRQ improved by 16 points (MCID 4.0, $p<0.01$).

Change in ACQ-5 score correlated with FEV_1 ($r=-0.57$, $p=0.04$), but not with change in R5-20 ($r=-0.09$, $p=0.78$). Change in sputum eosinophils was significantly associated with change in FEV_1 ($r=-0.94$, $p<0.001$), but not AO indices. A relationship between changes in R5-20 and FEV_1 or FEF_{25-75} was not observed.

Conclusion Spirometry detected improvements in lung function after 12 weeks of mepolizumab in the absence of airwave oscillometry changes. There was a strong association between change in FEV_1 and sputum eosinophil response to mepolizumab.

Abstract P102 Table 1 Changes in symptom control, quality of life, lung function and T2 inflammation markers after 12 weeks of mepolizumab

	n	Mean at baseline (SD)	Mean change (SD)	*p*
ACQ-5 score	13	2.59 (1.38)	-1.23 (1.59)	**0.02**
Q1 – nocturnal awakening		2.08 (1.71)	-1.31 (1.60)	**0.01**
Q2 – morning symptoms		2.85 (1.73)	-1.69 (1.65)	**<0.01**
Q3 – activity limitations		2.31 (1.44)	-0.85 (1.82)	0.12
Q4 – shortness of breath		2.77 (1.59)	-1.00 (1.83)	**0.07**
Q5 – wheeze		2.92 (1.26)	-1.31 (1.84)	**0.03**
Mini-AQLQ score	13	4.23 (1.39)	0.57 (1.44)	0.18
SGRQ score	13	51.26 (15.00)	-16.29 (15.91)	**<0.01**
Symptoms		71.24 (18.44)	-36.20 (23.55)	**<0.01**
Activity		59.97 (15.87)	-12.81 (19.89)	**0.04**
Impact		40.03 (18.66)	-12.03 (15.98)	**0.02**
FeNO (ppb)	13	46.08 (22.40)	-11.00 (20.76)	0.08
Oscillometry	13			
R5 (cmH2O.s/L)		3.21 (0.92)	-0.26 (1.24)	0.46
R5-20 (cmH2O.s/L)		0.31 (0.44)	0.03 (0.24)	0.66
AX (cmH2O/L)		9.83 (9.62)	1.53 (5.80)	0.36
X5 (cmH2O.s/L)		-0.15 (1.12)	0.07 (1.30)	0.85
Spirometry	13			
FEV_1 (L)		2.45 (0.82)	0.23 (0.26)	**<0.01**
FEV_1% of predicted		74.00 (10.07)	9.38 (9.44)	**<0.01**
FVC (L)		3.52 (0.94)	0.27 (0.27)	**<0.01**
FVC% of predicted		85.69 (6.45)	8.38 (8.28)	**<0.01**
FEV_1/FVC (%)		68.69 (9.40)	1.77 (5.21)	0.25
FEF_{25-75} (L/s)	12	2.10 (1.24)	-0.37 (0.88)	0.18
FEF_{25-75}% of predicted	12	51.00 (17.40)	6.67 (10.22)	**<0.05**
PEF (L/min)	13	444.46 (141.41)	31.15 (62.76)	0.10
Blood neutrophils ($x10^9$/L)	13	4.01 (0.89)	-0.13 (1.02)	0.66
Blood eosinophils ($x10^9$/L)	13	0.57 (0.33)	-0.51 (0.33)	**<0.01**
Sputum neutrophils% of total	8	56.95 (22.71)	17.97 (36.80)	0.21
Sputum eosinophils% of total	8	14.39 (16.59)	-14.20 (16.63)	**<0.05**

Acronyms: ACQ, Asthma Control Questionnaire; AQLQ, Asthma Quality of Life Questionnaire; SGRQ, St George's Respiratory Questionnaire; FeNO, exhaled nitric oxide; PEF, peak expiratory flow.

REFERENCE

1. SP Galant, *et al*. The case for impulse oscillometry in the management of asthma in children and adults, *Ann Allergy Asthma Immunol* 2017 June.

P103 THE RELATIONSHIP BETWEEN FENO AND RESPONSE TO ANTI-IL5/5R BIOLOGIC THERAPIES IN SEVERE EOSINOPHILIC ASTHMA

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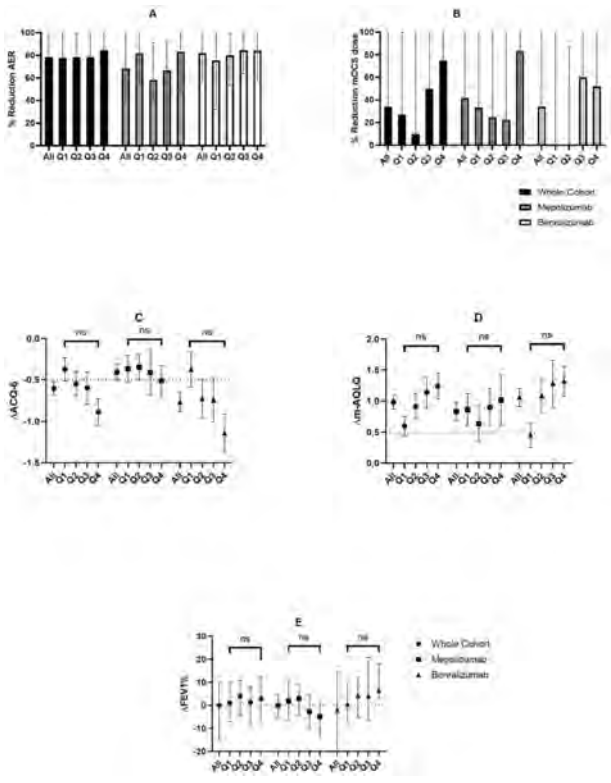
Introduction Mepolizumab and benralizumab target the IL-5/eosinophil pathway and are highly effective therapies for severe eosinophilic asthma (SEA). Fractional exhaled nitric oxide (FeNO) is a marker of IL-13 and elevated baseline levels are associated with an improved response to the anti-IL4R mAb dupilumab. However, FeNO was not measured in the phase 3 program for either mepolizumab or benralizumab and so it is unclear whether this same relationship exists for these therapies as well.



Abstract P103 Figure 1

Methods We performed a retrospective analysis of adult patients with SEA who had received Mepolizumab and Benralizumab at our tertiary severe asthma centre. Clinical characteristics including asthma control (ACQ6), annualised exacerbation rate (AER), maintenance OCS (mOCS) requirements and T2 biomarkers were recorded at baseline and at regular intervals throughout the first year of treatment. Patients were stratified into quartiles according to their baseline FeNO and the clinical effectiveness of mepolizumab and benralizumab compared between FeNO groups.

Results 229 patients (99 mepolizumab, 130 benralizumab) were included in the analysis. Stratifying the cohort according to baseline FeNO produced quartile ranges of <26, 26–43, 44–74 and >74. With the exception of FeNO there was no difference in baseline characteristics between the FeNO groups. Both mepolizumab and benralizumab significantly improved all clinical outcome measures of interest, however, the degree of clinical response did not appear to differ between the FeNO groups (figure 1). Following initiation of anti-IL5/5R treatment, numerically large and statistically significant reductions in FeNO level was seen in only the highest FeNO quartile (Q4): baseline median FeNO 96ppb (IQR 85-136ppb), 1 year median 64.5ppb (IQR 37-107), p <0.001.

Conclusion Although FeNO is a biomarker of IL-13 biology, we highlight that high FeNO is associated with an excellent response to anti-IL5/5R therapies in a real-world setting. This calls into question the unproven notion that severe eosinophilic patients with high baseline FeNO may derive superior outcomes with dupilumab as compared to mepolizumab or benralizumab.

P104 DOES ASTHMA CONTROL CHANGE FOLLOWING TRANSITION TO HOME BENRALIZUMAB ADMINISTRATION?

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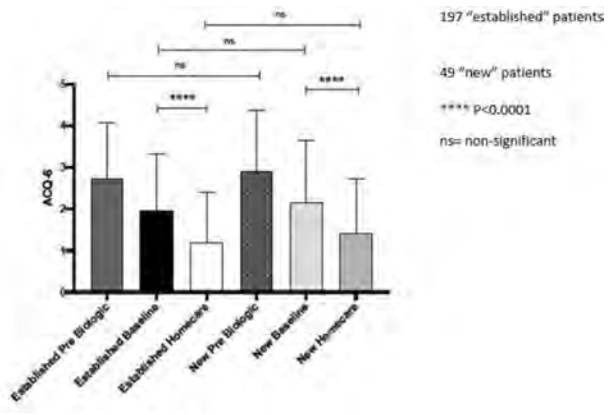
Introduction The COVID-19 pandemic necessitated the rapid transition of large numbers of patients onto homecare to facilitate on-going therapy in a cohort of patients who were 'shielding'. Alongside this, patients continued to need to be initiated on biologic therapy in spite of the pandemic. The impact of administering biologic therapy at home is largely unknown, yet crucial to optimise patient outcome and minimise steroid burden. We investigated whether there was a differential response following transition to homecare of established patients versus those newly started.

Methods Patients with severe eosinophilic asthma receiving home benralizumab were stratified according to those who had received ≥3 doses prior to COVID-19 lockdown on the 15th March 2020 ('established' patients) versus those who were initiated after this date ('new' patients). We compared the last Asthma Control Questionnaire-6 (ACQ6) measured in clinic with that collected by telephone consultation 8–12 weeks after transition to homecare. Patients were excluded if both values were not available.

Results 246 benralizumab patients were included in the analysis, of whom 49 (20%) were new. There was no significant difference in pre-biologic ACQ6, pre-homecare (baseline) ACQ6 or post-homecare ACQ6 between the new and established patient groups. Both cohorts exhibited a similar magnitude of improvement in their ACQ6 following the transition to homecare (-0.73 in the established group *vs* -0.73 in the new group, both P<0.0001) (figure 1).



Abstract P104 Figure 1 Change in ACQ6 following transition to home administration of benralizumab

Conclusions We have demonstrated that early transition to homecare in patients treated with benralizumab is not associated with worse clinical outcomes as assessed by ACQ6. The improvements in ACQ6 were seen irrespective of whether they were 'established' on therapy at time of transition or 'new'. Further research is required to understand the potential influence of lockdown and/or telephone vs face-to-face ACQ reporting.

P105 DOES ASTHMA CONTROL CHANGE WHEN PATIENTS TRANSITION TO HOME ADMINISTRATION OF MEPOLIZUMAB?

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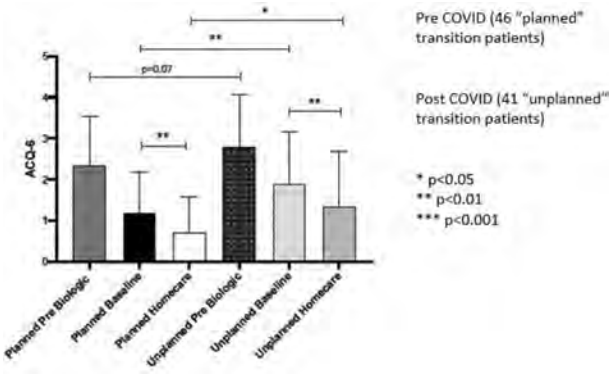
10.1136/thorax-2020-BTSabstracts.250

Introduction Mepolizumab is a biologic agent targeting interleukin (IL)-5 which is currently licensed as add-on therapy for severe eosinophilic asthmatic (SEA). It is usually administered in a hospital setting but with the option of homecare being introduced in 2019, the 4-weekly subcutaneous injections can be self-administered at home. We investigated whether there was a change in asthma control following the transition to home administration and whether a differential response to treatment exists following transition to homecare before and after the onset of the COVID-19 pandemic.

Methods Patients receiving mepolizumab via home care were stratified according to those who had a planned transition to homecare prior to 1st Feb 2020 versus those who had an unplanned transition after this date necessitated by the COVID-19 pandemic. The last Asthma Control Questionnaire-6 (ACQ6) measured in clinic ('baseline') was compared with that collected by telephone consultation 6–8 weeks after transition ('homecare'). Patients were excluded if both values were not available.

Results Of 87 mepolizumab patients included in the analysis, 46 were planned transitions. There was no significant



Abstract P105 Figure 1 Change in ACQ6 following transition to home administration of mepolizumab

difference in the pre-biologic ACQ6 (p=0.07) between groups. Immediately prior to transition to homecare (baseline), the planned group had a lower mean ACQ6 than those in the unplanned group (1.19 vs 1.90, P=0.004). The ACQ6 on homecare decreased significantly in both groups (-0.47 in the planned group *vs* -0.56 in the unplanned group, both P<0.001). The ACQ6 for the planned cohort during homecare was significantly lower than that for the unplanned group (0.72 vs 1.34, P=0.012) (figure 1).

Conclusions We found a significant improvement in ACQ6 for all SEA patients established on Mepolizumab who transitioned to home mepolizumab administration. This improvement occurred irrespective of whether the transition was 'planned' or 'unplanned'. Further research is required to understand the potential influence of shielding during lockdown and the method of ACQ assessment (telephone vs face-to-face ACQ reporting in clinic) on this improvement.

P106 GLOBAL GUIDANCE ON THE USE OF MONOCLONAL ANTIBODIES (MABS) IN SEVERE ASTHMA: TIME FOR CLARITY

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10.1136/thorax-2020-BTSabstracts.251

Background Severe Asthma (SA) is a devastating disease associated with multiple exacerbations, reduced quality of life (QoL) and increased healthcare resource utilisation for which clear treatment guidance is crucial. The emergence of monoclonal antibody (MAB) therapies that target T2 inflammation for the treatment of SA has provided promising targeted therapy for these patients by reducing exacerbations and oral corticosteroid

Abstract P106 Table 1

MAB	Country/Task force/body	Indication for Initiation of therapy	Further assessment and continuation of therapy	Definition of Response to Treatment
OMALIZUMAB	**UK (1)** -NICE	• severe persistent confirmed allergic IgE-mediated asthma and • aged 6 and older and • **IgE 15–1500** • > 4 severe exacerbations or/and • **continuous or ≥4 OCS courses** in previous 12 months • FEV1 < 80% in adults and adolescents	• Initial 16 weeks, • stop treatment if markedly improved	• marked improvement *definition of marked improvement not clear and is subject to interpretation.*
	Australia & New Zealand - Therapeutic Goods Administration (2) -TSAN (2) -Medsafe (3)	• moderate to severe allergic asthma • aged ≥6 years • **IgE ≥ 30IU/ml to ≤ 700IU/ml** • In New Zealand the registered indication is **-IgE ≥ 30 IU/ml,** -symptoms inadequately controlled with ICS	• baseline assessment over 1 month, • **initial 16 weeks** • then assessment after drug withdrawal for between 1 and 3 months.	**Definite responders:** • Improve on omalizumab and deteriorate when therapy withdrawn. Ie • i) for patients on OCS – a ↓**≥25% in OCS dose** with • Fewer clinically significant asthma exacerbations or hospitalisation,↑ QoL & • Similar deterioration on withdrawal. • ii) for patients not on OCS at commencement of omalizumab trial, ↑ACQ by 0.5 and ↓ ACQ off omalizumab RX by 0.5.
	USA -FDA -ERS/ATS (4)	• moderate to severe allergic asthma • ≥6 years old • Uncontrolled with high dose ICS • **IgE: 30–1,300 IU/ml (age 6–11 yr),** • **30–700 IU/ml (age ≥ 12 yr.)**	• assess clinical response after **trial of 3 to 6 months**	• Not clear and left for interpretation
	ERS/ATS Taskforce	a) Severe allergic asthma or severe eosinophilic asthma • >12 years & blood eosinophil count of ≥ 260/µl (>12 years)	None given	None given
	Canada	• ≥6 years old • moderate to severe uncontrolled allergic asthma	A significant ↓rate of seasonal exacerbations	None given
	Brazil	• severe asthma • age ≥ 6 years of age	Evaluate after use for 16 weeks	None given
	GINA	• Severe allergic asthma • serum IgE and weight in dosing range **and** • an exacerbation in last year	None given	None given

Mepolizumab	**UK -NICE (1)**	severe refractory eosinophilic asthma in adults, only if: • The blood **eosinophil ≥300 cells**/microliter in previous 12/12 and • **≥4 exacerbations** requiring systemic CS in the last 12/12 **or** continuous **OCS of ≥ 5 mg** prednisolone daily in previous 6/12.	• After 12/12 • stop treatment if the asthma has not responded adequately	• **≥50%** fewer asthma **exacerbations** needing systemic corticosteroids in those with ≥4 exacerbations in the previous 12/12 or • **A clinically significant ↓ OCS use** while maintaining or improving asthma control.
	Australia –TSAN (2)	• uncontrolled severe eosinophilic asthma • Age **≥12 years** and • blood **eosinophil ≥ 300 cells**/mcl in the last 12/12 • **≥2 exacerbations** in the past 12 months.		Fewer clinically significant exacerbations requiring ED attendance or hospital admissions *Not given and unclear*
	USA -FDA -ATS/ERS (4)	• severe eosinophilic asthma • ≥12 yr. old with • Blood **eosinophil ≥ 150–300 cells/μl**	• Initial assessment 16 wks., • treatment continued indefinitely if a clinical response is achieved	A clinical response should be seen within 4 months. *-definition unclear*
	Canada	• severe eosinophilic asthma • blood eosinophil **≥150 cells/mL (0.15 GI/L) at initiation of treatment or** • **300 cells/mL** (0.3 GI/L) in the past 12 months	• ↓dose of OCS by 50%	Not clear
	Brazil	• severe eosinophilic asthma • age of 6 years	Nil given	Nil given
	ERS/ATS Taskforce (4)	• severe eosinophilic asthma • Blood eosinophil ≥ 150/μL • prior asthma exacerbations	• Asthma exacerbations, symptoms, asthma control, QoL, OCS use	Not clear
	GINA	• severe eosinophilic asthma • Blood eosinophil ≥ 150/μL • prior asthma exacerbations in the last year	Unclear and non-specific	Nil given
Benralizumab	**UK -NICE**	• severe eosinophilic asthma and • blood **eosinophil ≥ 400 cells/μL** or • **≥ 3 exacerbations** needing systemic corticosteroids in the past 12/12 **or** • blood eosinophil **≥300 cells/μL** and ≥4 exacerbations needing systemic corticosteroids in the previous 12 months, **or** • continuous **OCS of ≥5 mg/day** in the previous 6/12	• Assess after 12 months • stop treatment if the asthma has not adequately responded	• A **clinically** meaningful ↓severe exacerbations needing OCS **or** • A clinically significant ↓in continuous OCS use while maintaining asthma control.
	Australia	• uncontrolled severe eosinophilic asthma • adolescents aged ≥12 years **and** • blood **eosinophil ≥ 300 cells**/μL last 12/12	•	• Fewer clinically significant exacerbations requiring ED attendance or hospital admissions • ↓frequent OCS use
	USA	• severe eosinophilic asthma • ≥12 yr old with unresponsive to other GINA step 4–5 therapies. • blood eosinophil ≥ 300 cells/μl	• 4 months treatment and assess for response	• Not clear
	Canada	• eosinophilic asthma in **adult** patients.	• Not clear	• Not clear
	Brazil	• severe eosinophilic asthma • ≥18 years • **≥ 150 cells/μL** at the time of evaluation • or **≥ 300 cells/μL** in the last 12 months	• Not clear	• Nil given
	ERS/ATS Taskforce	• Severe asthma and a • blood eosinophil count of ≥ 400/μL	• assess asthma treatment end points	• Improvement in the main asthma end points • Not clear
	GINA	• severe asthma phenotypes • **eosinophilia ≥ 150/μL** and • an exacerbation of asthma in the last year	•assess asthma treatment end points	• Improvement in the main asthma end points • Not clear

RESLIZUMAB	**UK**	• severe eosinophilic asthma that is inadequately controlled despite standard Tx, only if: • blood **eosinophil ≥400/μL** and • **≥3 severe asthma exacerbations** needing systemic corticosteroids in the past 12/12 and	• Assess after 12/12 • stop treatment if the asthma has not responded adequately	• A clinically meaningful ↓ in no. of severe exacerbations needing SCS **or** • A clinically significant ↓ in cont OCS while maintaining or ↑asthma control.
	Australia	• No guidelines published	-	-
	USA	• severe eosinophilic asthma • ≥18 yr old • **blood eosinophil ≥400/μL**	Nil given	Nil given
	Canada	• severe eosinophilic asthma • **adult** patients • blood **eosinophil count ≥400 cells/mL** at initiation of the treatment	Nil given	Nil given
	Brazil	• Not approved	-	-
	ERS/ATS Taskforce	*Blood eosinophil ≥ 400/μL can be used to guide anti-IL5 initiation in adult patients with severe asthma and a history of prior asthma exacerbations* Very general	• General	Nil given
	GINA	• severe asthma • **eosinophilia greater ≥150 um/l** and • an exacerbation of asthma in the last year	Nil specific	Nil given

(OCS) and have now been approved in many countries. Despite efficacy, these therapies are costly and are not without adverse events and therefore require proper guidelines. However, current guidelines for initiation and definition for responders are unclear. We conducted a review of national and global guidelines to assess consistence in the guidelines.

Method We conducted a search of global, national MAB guidelines and task force recommendations (table 1) to evaluate indications, patient selection, biomarker cut-points (Eosinophils, FENO, IgE), criteria and definition for treatment responses. We searched NICE (UK), FDA (USA), New Zealand, National Asthma Council Australia, Brazilian Thoracic Association (BTA), French Asthma Guidelines, Canadian, ERS/ATS, British Thoracic Society (BTS), GINA and South African guidelines. We specifically assessed for omalizumab, mepolizumab, Reslizumab and Benralizumab.

Results We found heterogeneity, inconsistences for indications, assessment and criteria for MAB response globally. Biomarker cut-points varied across different countries for the same MAB. In most cases, definition of response was subject to interpretation (table 1).

Conclusions Criteria for MAB patient selection, monitoring and treatment response varies across the globe and is subjective. It is time for clarity and have clear guidance taking fully into account individual needs, preferences and patient values. Further studies are required to provide optimal biomarker cut points and treatment response criteria.

P107 THE IMPACT OF ANTI-IL5/5R BIOLOGIC THERAPIES ON SPECIFIC DOMAINS OF THE ASTHMA CONTROL QUESTIONNAIRE

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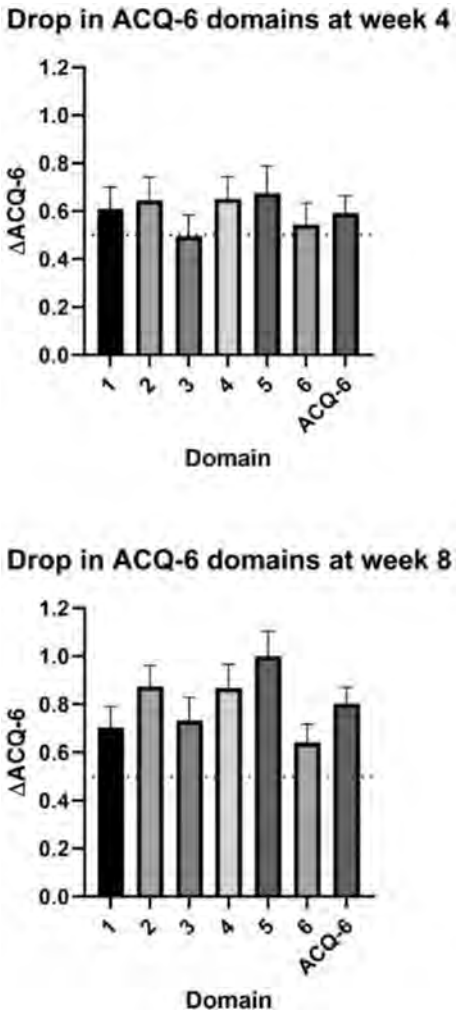
Introduction Mepolizumab and benralizumab are monoclonal antibodies used in the treatment of severe eosinophilic asthma (SEA), targeting interleukin-5 and its receptor respectively. Phase III trials and real-world studies have demonstrated



Abstract P107 Figure 1

improved asthma control with these therapies as measured by the Asthma Control Questionnaire (ACQ). Significant improvements are evident by week 4, however, it is unknown whether specific ACQ domains are particularly dominant in driving the overall ACQ change. Here we aim to assess the contribution of specific ACQ domains on overall improvement in patient symptoms.

Methods We performed a retrospective analysis of adult patients with SEA who had received mepolizumab or benralizumab at our tertiary severe asthma centre. Scores for each of the domains in the ACQ-6 were recorded at baseline, week 4 and week 8 post-initiation of treatment.

Results 229 adult patients with SEA were identified with 22 subsequently excluded due to missing ACQ-6 data leaving 91 mepolizumab and 116 benralizumab treated patients. At weeks 4 and 8 mean ACQ-6 improved by 0.59 (± 0.99) and 0.80 (± 0.97) respectively. The change for each ACQ-6 domain at these time points did not significantly differ from each other (ANOVA, p = 0.751 week 4 and 0.064 week 8). Further sub-group analysis (benralizumab vs mepolizumab, baseline T2 biomarker status, baseline lung function, use of maintenance oral corticosteroids, BMI, 1 year responder status) also failed to demonstrate that 1 or more domains were specifically driving the overall change in ACQ-6.

Conclusion Each of the ACQ-6 domains appear to improve by a similar magnitude following initiation of mepolizumab and benralizumab. Whether the full ACQ-6 offers any advantages over a shorter symptom control questionnaire requires future research.

Diagnostic and management challenges within asthma services

P108 A SYSTEMATIC REVIEW TO EXPLORE THE RELATIONSHIP BETWEEN INDUCIBLE LARYNGEAL OBSTRUCTION AND HEALTHCARE UTILISATION IN ADULTS WITH ASTHMA

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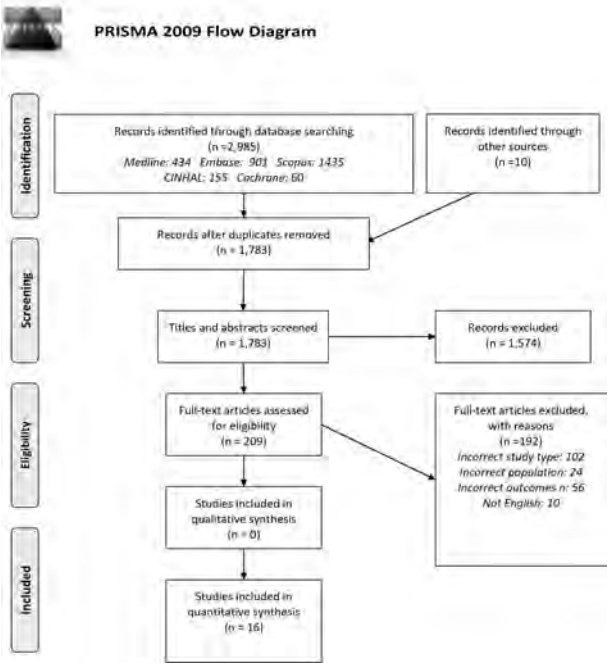
10.1136/thorax-2020-BTSabstracts.253

Background Asthma is common and expensive to treat. Inducible laryngeal obstruction (ILO) can mimic Asthma, risking excessive healthcare utilisation. This study aimed to answer the following research questions:

1. Do adults with comorbid Asthma and ILO (AILO) have higher healthcare utilization than adults with Asthma only?
2. Do patients with AILO have higher healthcare utilization prior to ILO intervention, compared to post intervention?

Methods A systematic review was conducted (PROSPERO: CRD42020165034). Eligibility criteria included: Adults (>15 yrs) with instrumentally confirmed Asthma and/or ILO; all ILO interventions; all healthcare utilisation outcomes; Randomised Controlled Trials (RCTs); cohort and cross-sectional studies. Conference abstracts were included. Five electronic databases (MEDLINE, EMBASE, Scopus, CINHAL, Cochrane Library) were searched between 1983 and 2020; and reference lists from five key texts. Critical Appraisal Skills Programme, and Grading of Recommendations Assessment, Development and Evaluations were used. A narrative synthesis was conducted using tables and data visualisations on healthcare access and medication use.



Abstract P108 Figure 1

Results 1,783 papers were retrieved, 16 met eligibility criteria. Eight intervention studies (534 participants), nine cross-sectional studies (450 participants) but no RCTs were retrieved. The mean age (±SD) was 46.4 (±9.8) years, with 75% females.

An association between ILO and healthcare utilisation was observed, but the certainty of evidence was low. The absence of RCTs, and heterogeneity across studies meant meta-analysis was not possible. Quantitative synthesis of summary measures demonstrated that:

- Patients with comorbid Asthma and ILO accessed healthcare services 39% more than those with Asthma only (n=177/3 studies).
- ILO intervention reduced the number of times patients accessed health services by 50.5%. (n=275/3 studies).
- ILO intervention enabled 74% of patients to reduce or stop Asthma medication, though degree of change was not reported (n=191/4 studies).
- 38% of patients with ILO had previously been misdiagnosed with Asthma for an average of 5.3 years (n=388/4 studies).

Discussion ILO was consistently associated with excessive healthcare use for adults with comorbid Asthma, and adults misdiagnosed as having Asthma. The quality of evidence was downgraded for bias, confounding, poor reporting of diagnostic methods, interventions and outcome measures; and inappropriate summary statistics. More research is needed to determine strength of association.

P109 A REVIEW OF REFERRALS FOR SEVERE ASTHMA PATIENTS TO THE SPECIALIST INDUCIBLE LARYNGEAL OBSTRUCTION SPEECH AND LANGUAGE THERAPY SERVICE

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10.1136/thorax-2020-BTSabstracts.254

Introduction Inducible laryngeal obstruction (ILO) can mimic or coincide with Asthma presenting challenges for diagnosis and management. We aimed to determine the yield of ILO diagnosis in patients from a severe asthma cohort, not purely being assessed for biological therapy, where ILO was suspected, and explore the healthcare utilization of these patients with particular focus on exacerbation frequency.

Method A retrospective review of patients attending our severe asthma service and suspected ILO referred to SLT between June and October 2019 was undertaken. Patients referred to SLT for another reason or without comorbid Asthma were excluded. Baseline demographics were calculated and medical records reviewed to ascertain healthcare utilization in the one year prior to SLT assessment.

Results 58 patients were identified (43, 75%) female. Mean (±SD) age was 52 (14.7). Mean (±SD) BMI was 33 (±7.9). Only one patient was a current smoker.

50 (86%) of included patients had laryngeal impairment. 40 (69%) had laryngoscopically confirmed ILO. 8 (14%) reported co-existing laryngeal symptoms e.g. dysphonia. Of 15 patients with excluded ILO, 11 (75%) received an alternative laryngeal diagnosis (e.g. paresis). Three did not receive nasendoscopy. Only 4/58 (6.9%) patients had normal SLT assessment

32% of confirmed ILO cases were ex-smokers, compared to 20% with excluded ILO (p=0.19). Significantly more (p=0.03) patients with confirmed ILO (48%) had 3 or more exacerbations *(Med: 3/IQR 1–4)* 12 months prior to SLT assessment, compared to patients with excluded ILO (20%) *(Med: 1.5/IQR 0.75–2.5)*.

9 (16%) were on biologic treatment at time of SLT assessment; 9 others (16%) were under investigation for biologic treatment through the Severe Asthma MDT.

Conclusions The yield of ILO diagnosis was high and alternative diagnoses were highly likely when ILO absent. The very low rate of normal assessments raises the possibility of pathology in patients not being referred. Although an established essential part of assessing patients for biological therapy, our data raised the question as to the more routine role for SLT assessment in a more unselected asthma cohort. Healthcare utilization is (expectedly) high in this cohort and the impact of any SLT intervention on this warrants further investigation.

P110 DIAGNOSIS AND MANAGEMENT OF ILO AND BPD FROM SPECIALIST COMPLEX BREATHLESSNESS CLINIC SERVICE IMPROVE PATIENT CLINICAL OUTCOMES

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10.1136/thorax-2020-BTSabstracts.255

Introduction and Objectives Patients with Inducible laryngeal obstruction (ILO) and Breathing pattern disorder (BPD) can mimic severe asthma. ILO and/or BPD can co-exist in patients with severe asthma. Therefore a multidisciplinary team (MDT) approach from Respiratory Physicians, Respiratory specialist nurses, Speech and Language therapists, Physiotherapists and Psychologists to accurately diagnose and manage these conditions is essential. The MDT optimises the patient outcomes as well as reducing healthcare utilisation and costs of pharmacotherapy.

Methods Eighty six patients who attended Bolton complex breathlessness clinic between Apr2017 - July 2019 were involved in this service evaluation. Hospitalisations, Emergency departmental (ED) visits, oral steroid and antibiotic courses 12 months before and after review in the clinic were analysed using paired t-testing with p value <0.05 considered statistically significant.

Abstract P110 Table 1 Results

Patient clinical outcomes				
	Hospital admissions	ED Visits	Booster courses of oral steroids	Booster courses of antibiotics
12 months before seen in CBC (Mean)	1.5	1.57	2.52	2.49
12 months after seen in CBC (Mean)	0.9	1.25	1.6	1.48
P value	0.0031	0.1791	0.0006	0.0001

Conclusions Accurate diagnosis and appropriate interventions for ILO and BPD undertaken from Specialist Complex breathlessness clinic resulted in significant reduction of hospitalisations, booster courses of oral steroids and antibiotics in our cohort of patients.

P111 THE UPTAKE AND EFFECT OF MINDFULNESS BASED COGNITIVE THERAPY ON PATIENTS WITH POORLY CONTROLLED ASTHMA ATTENDING A UK ASTHMA CENTRE

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10.1136/thorax-2020-BTSabstracts.256

Introduction There is a strong association between poorly controlled asthma (PCA) and psychological conditions of stress, depression and anxiety; this can worsen asthma control and quality of life (QoL).[1] Despite this, not all asthma centres have access to clinical psychology and patients can be resistant to referral. Mindfulness based cognitive therapy (MBCT) is a group-based programme aimed to reduce stress and has reported benefit in several chronic diseases. We assessed the attendance rate of patients with PCA at a 10-week mindfulness programme and MBCT efficacy for improving asthma control.

Methods Patients with physician diagnosed asthma attending a difficult asthma clinic were offered referral for MBCT if they had an asthma control questionnaire (ACQ-6) score $\geq$ 1.5 despite optimised asthma medication. Spirometry, FeNO, blood eosinophils, ACQ-6, asthma quality of life questionnaire

Abstract P111 Table1 Results at baseline, end of course, 3 months and 12 months for patients who completed MBCT

Variable	Baseline	MBCT completion	3 months post completion	6 months post completion
ACQ-6	3.3 (2.5,4.2)	3.2 (1.6, 3.8)	2.3 (0.6, 3.2)	2.8 (0.8, 4.8)
AQLQ	3.3 (2.7,4.4)	3.7 (2.9,5.4)	4.8 (3.6, 6.2)	3.3 (2.7, 5.8)
HADS-A	11(8, 13.3)	6 (3,12)	8 (5, 11)	7.5 (3,15)
HADS-D	12 (9.3–13)	6 (2,10)	7 (1.5,1.5)	8.5 (4.3, 13.5)
Cohen PSS	21 (19–22.5)	13 (9.5,24)	17.5 (9.8, 20.8)	16 (6.3, 25.7)
Weight (Kg)	89.9 (75,104.5)	89 (75.6,99.3)	86.2 (73.6, 100.1)	84.9 (75.3,91.7)
Blood eosinophil count (cellsx10^9/L)	0.37 (0.16, 1.18)	0.1 (0.05, 0.28)	0.09 (0.02, 0.16)	0.14 (0.08, 0.27)
FeNO (ppb)	20 (10,31)	11 (4.5, 27)	19 (9, 34)	13.5 (6.8, 20.2)
FEV_1 (L)	1.80 (1.70–2.83)	1.97 (1.79, 2.9)	1.95(1.89, 2.67)	2.25 (1.77, 2.78)
FEV_1%predicted (%)	68.5 (56.5,118.5)	73(57.5, 118)	71.5 (57.5, 106.5)	88 (55.3, 112.5)

Values displayed as median (IQR)
ACQ-6: Asthma Control Questionnaire, AQLQ: Asthma Quality of Life Questionnaire, HADS-A: Hospital Anxiety and Depression Scale – Anxiety
HADS-D; Hospital Anxiety and Depression Scale – Depression, Cohen PSS – Cohen Perceived Stress Scale

(AQLQ), Hospital anxiety and depression scale (HADS-A/HADS-D) and perceived stress scale (PSS) were recorded before and after the MBCT course and at 3- and 6-months following completion.

Results 60 patients were considered for MBCT; 24(40%) did not meet criteria for referral, 14(24%) declined referral, 22 patients (36%) were referred. Of those referred 9(41%) started MBCT, 6(27%) did not attend, 3(14%) patients declined, 1(5%) had newly diagnosed malignancy, 1 was from out-with Glasgow, 2 (10%) were interrupted by the coronavirus pandemic.

Only 5 patients completed MBCT; 2 stopped attending for social reasons, 2 due to intercurrent medical issues. In those who completed; a median reduction in PSS (21 to 13), HADS-A (11 to 6) and HADS-D (12 to 6) was seen by end of course and persisted at 6 months (Table1). A median improvement in ACQ-6 was seen by 3 months; 2.8 from 3.3 (MCID 0.5) which was sustained at 6 months (2.8), and in AQLQ; 4.8 from 3.3 (MCID 0.5) which was not sustained.

Conclusion In the small numbers who completed MBCT, we observed an improvement in asthma symptom control at follow-up and a reduction in stress, anxiety and depression scores. MBCT attendance rate was poor and understanding barriers for attendance is needed for any further study.

REFERENCE

1. Thomas, *et al*. Asthma and psychological dysfunction. *Prim Care Respir* 2011;**20** (3):250–256

P112 THE CONTRIBUTION OF INHALED CORTICOSTEROID EXPOSURE TO ADRENAL INSUFFICIENCY IN A SEVERE ASTHMA COHORT

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10.1136/thorax-2020-BTSabstracts.257

Inhaled corticosteroid therapy (ICS) is increasingly reported as a cause of adrenal insufficiency (AI). The exact prevalence is difficult to ascertain and may be confounded by exposure to oral glucocorticoids (OCS) and potential selection bias. This study aims to establish the relative contribution of OCS and ICS exposure to adrenal suppression in a severe asthma cohort.

Methods Serum cortisol samples (pre 11am) were collected from participants at their last visit in the INCA SUN RCT and analysed using the Roche Elecsys Cortisol II assay. Participants were stratified into three groups based on serum cortisol concentration (suppressed cortisol < 100 nmol/l which our published data has shown would predict a failed short synacthen test (SST), 101–314 nmol/l indeterminate baseline cortisol and > 315 nmol/l which would predict a passed SST). OCS cumulative exposure was recorded during the study and ICS cumulative exposure was calculated using each patients' mean ICS adherence data obtained from their INCA device, an electronic monitoring device which accounts for adherence and inhaler technique.

Results 65 participants were included for analysis. 20% (13/65) of participants had a morning cortisol <100 nmol/l, suggesting AI. 13.8% (9/65) of participants received maintenance OCS, and 63% (41/65) received at least one course of OCS during eight months of study follow up. The predicted prevalence of AI in patients who had no oral steroid exposure in the preceding seven days was 11% (6/51).

Serum cortisol was strongly predicted by cumulative glucocorticoid exposure. Linear regression of serum cortisol versus mean daily ICS exposure showed a reduction in serum cortisol of -120 nmol/L [-224, -22] per milligram increase in fluticasone propionate (FP) exposure ($p=0.02$). When adjusted for cumulative OCS exposure, this relationship remained significant, with an effect size of -90 nmol/L [-13, -175].

Conclusion At least 20% of patients with difficult to treat asthma may have undiagnosed AI. While OCS exposure is strongly associated with serum cortisol, our analysis shows that there is also a strong association between cumulative ICS exposure and the risk of AI.

P113 RISK OF OSTEOPOROSIS AND FRAGILITY FRACTURES IN ASTHMA DUE TO ORAL AND INHALED CORTICOSTEROIDS: TWO POPULATION-BASED NESTED CASE-CONTROL STUDIES

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10.1136/thorax-2020-BTSabstracts.258

Background Inhaled (ICS) and oral (OCS) corticosteroids are used widely in asthma, however the risk of osteoporosis and fragility fracture (FF) due to corticosteroids in asthma is not well-established.

Methods We conducted two nested case-control studies using linked data from the Clinical Practice Research Datalink (CPRD) and Hospital Episode Statistics (HES) databases. Using an asthma cohort, we separately identified patients with osteoporosis or FF and gender-, age-, and practice-matched controls. Conditional logistic regression was used to determine the association between ICS and OCS exposure, and the risk of osteoporosis or FF. The prevalence of patients receiving at least one bisphosphonate was also calculated.

Results There was a dose-response relationship between both cumulative dose and number of OCS/ICS prescriptions within the previous year, and risk of osteoporosis or FF. After adjusting for confounders, people receiving more OCS prescriptions (³9 vs 0) had a 4.50 (95%CI: 3.21–6.11) and 2.16 (95%CI: 1.56–3.32) increased risk of osteoporosis and FF, respectively. For ICS (³11 vs 0) the odds ratios were 1.60 (95%CI: 1.22–2.10) and 1.31 (95%CI: 1.02–1.68). The cumulative dose had a similar impact, with those receiving more being at greater risk. The prevalence of patients taking ³9 OCS and at least one bisphosphonate prescription was just 50.6% and 48.4% for osteoporosis and FF.

Conclusion The findings suggest that exposure to OCS or ICS is an independent risk factors for bone health. Steroid administration at the lowest possible level to maintain asthma control is recommended.

P114 SYSTEMIC ADVERSE EFFECTS FROM INHALED CORTICOSTEROID USE IN ASTHMA: A SYSTEMATIC REVIEW

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10.1136/thorax-2020-BTSabstracts.259

Background Oral corticosteroid (OCS) use increases the risk of systemic adverse effects including osteoporosis, fractures, diabetes, ocular disorders and respiratory infections. We sought to understand if there is an increased risk of these adverse effects from inhaled corticosteroids (ICS) use in adults with asthma.

Methods MEDLINE and EMBASE databases were searched to identify studies measuring adverse effects with ICS use in asthma, with those investigating a majority population of COPD patients excluded. Studies were grouped by outcome: bone mineral density (BMD), respiratory infection (pneumonia, tuberculous or non-tuberculous mycobacterial infection), diabetes and ocular disorder (glaucoma or cataracts). Study information was extracted using the PICO checklist. Risk of bias was assessed using the Cochrane Risk of Bias tool (randomised controlled trials) and ROBINS-I tool (observational studies). A narrative synthesis was carried out due to the low number of studies with the same outcome measurement.

Results Thirteen studies met the inclusion criteria, two trials and eleven observational studies, all analysing the effects of ICS compared with non-ICS use for particular outcomes. Study outcomes by number of studies were: six BMD, six infection (four pneumonia, one tuberculous, one non-tuberculous mycobacterial), one ocular disorder (cataracts) and no diabetes. Studies addressing BMD were limited by study size, lack of generalisability, and short follow-up. BMD was measured from a range of bones via ultrasound or x-ray absorptiometry; most found a loss of BMD. Studies addressing infection suffered from lack of power, misclassification and selection bias; most studies found an increased risk of infection. Only one study assessed ocular disorders, they found an increased risk of cataracts. This study likely suffered from residual confounding. Most studies were unable to fully account for OCS exposure, total ICS exposure or difference between ICS drugs and their varying dosages.

Conclusion There is a paucity of studies assessing systemic adverse effects from ICS use in adults with asthma. Current evidence is limited by multiple biases and lack of generalisability but suggests an increased risk of BMD loss, respiratory infection and cataracts. Further studies are needed to fill this evidence gap, including identifying high risk patients, and quantifying dose-related or specific ICS-related effects.

P115 ADHERENCE TO INHALED CORTICOSTEROIDS (ICS) ACCORDING TO DEMOGRAPHIC CHARACTERISTICS IN ASTHMA

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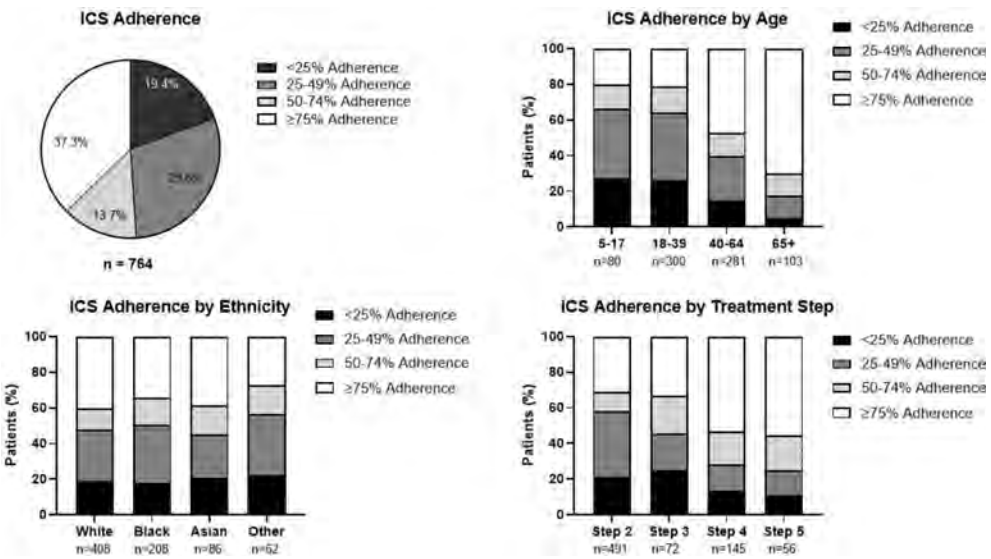
10.1136/thorax-2020-BTSabstracts.260

Background Poor adherence to inhaled corticosteroids (ICS) is a frequent cause of poor asthma control and repeated exacerbations. However, little is known about whether any



Abstract P115 Figure 1

differences in adherence levels exist between ethnic groups, age group or treatment step.

Methods Adherence to ICS was retrospectively assessed by prescription refill data for 764 primary care asthma patients over a 12 month period from February 2019 – February 2020. Demographic characteristics including age, ethnicity and GINA treatment step were also recorded. Adherence levels were stratified into groups of <25%, 25–49%, 50–74% and ≥75% adherence.

Results Overall 37.3% of patients were prescribed ≥ 75% of ICS over the 12 month period with 19.4% of patients prescribed less than 25%. Patients under the age of 40 had significantly lower levels of ICS adherence than older patients with the 65+ age group appearing to be the most adherent. Higher adherence levels were also seen for those on a higher level of treatment (steps 4–5 vs steps 2–3). No significant differences in adherence levels were seen between ethnic groups.

Conclusion Despite increasing awareness amongst healthcare professionals of the role of poor ICS adherence in driving asthma morbidity and mortality, overall adherence rates remain low. This is particularly the case amongst younger patients and those prescribed lower levels of treatment. Enhanced patient education and the introduction of smart inhalers with electronic reminders should hopefully improve adherence levels.

P116 FACTORS ASSOCIATED WITH HOSPITAL ADMISSION FOR PATIENTS PRESENTING WITH AN ACUTE ASTHMA EXACERBATION

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10.1136/thorax-2020-BTSabstracts.261

Background Severe exacerbations of asthma are potentially life-threatening events associated with hospitalisation and significant healthcare costs. We sought to identify whether certain clinical and demographic characteristics are associated with the need for hospital admission versus Emergency Department discharge.

Methods We conducted a retrospective review of all adult patients presenting to our Emergency Department with an asthma exacerbation over a 12-week period from January to March 2019.

Patient's age, gender, background asthma treatment according to GINA, and baseline investigations including blood eosinophil count, CRP, results of throat swabs for respiratory pathogens (AusDiagnostics RPS Panel Upper Respiratory Pathogens), Peak Flow tests and exhaled fraction of nitric oxide (*FENO*) were reviewed. Patients were stratified according to those who needed admission and those who were discharged directly from the Emergency Department.

Results 172 patients (70% female) with a mean age of 49 ±18.4 were included in the analysis. 98/172 (57%) patients, of which 70% were female, needed hospital admission. Patients admitted to hospital were significantly older (52±17.6 vs 43±18.8 years, p<0.01) and had lower Peak Flow readings on admission (221±101 vs 270±109 L/min, p<0.01). They also had higher CRP levels (33.3±60.6 vs 16.7±23.7 mg/L, p<0.05) and more frequently detected upper respiratory pathogens (positive in 35% vs 11%, p<0.01) There was no difference between the two groups in terms of GINA treatment step 4(2–5) vs 3(2–4), blood eosinophil count (0.3 (±0.31) vs 0.21(±0.28) $x10^9$/l) or *FENO* (27(11–53) vs 19 (11–45) ppb) measurement.

Conclusion Patients who require hospital admission for an acute asthma exacerbation are more likely to be older and to have signs of infection. In our patient group, type 2 biomarkers known to be associated with asthma exacerbation risk, did not predict need for hospital admission.

P117 CLINICAL OUTCOMES IN PEOPLE WITH DIFFICULT-TO-CONTROL ASTHMA USING ELECTRONIC MONITORING TO SUPPORT MEDICATION ADHERENCE

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10.1136/thorax-2020-BTSabstracts.262

Background Non adherence is common in difficult-to-control asthma, and can be identified using 7-day FeNO suppression testing where patients take additional fluticasone via Diskus™(Accuhaler) with an INCA™electronic monitoring device attached, and self-measure FeNO at home. However, this is inconvenient for patients attending a tertiary centre and limited by FeNO meter availability. It is not known if this approach alters clinical outcomes.

Objectives and Methods To examine patient acceptability and the effectiveness of replacing usual combination inhaled corticosteroid (ICS)/long-acting b_2-agonist (LABA) therapy with a fluticasone/salmeterol Diskus 500+INCA for 28 days, compared to the 7-day FeNO suppression test. Secondly, to explore the clinical outcomes of patients who have undertaken INCA monitoring.

Results Twenty one of 23 subjects offered replacement of their usual ICS/LABA with fluticasone/salmeterol+ INCA accepted and completed 28 days of monitoring. Fourteen (66.6%) patients reduced their FeNO by >42% (FeNO suppressors), accompanied by improvements in FEV_1, ACQ and blood eosinophils, similar to the 7-day test (n=74). At 1 year, 33.9% of FeNO suppressors progressed to treatment with a biologic therapy, compared to 72.7% of non suppressors (p=0.0005). FeNO suppressor patients taking maintenance prednisolone (n=13) reduced the median baseline dose from 10 mg to 3 mg, with further reductions limited by adrenal suppression.

Conclusion Replacing existing inhaled therapy with fluticasone/salmeterol+INCA for at least 28 days is acceptable to the majority of patients with difficult-to-control asthma, and identifies prior medication non adherence. INCA monitoring coupled with clinical support potentially improves patient adherence and asthma control, and prevents unnecessary progression to biological therapy.

P118 MEASURING FENO IN THE DIAGNOSIS OF ASTHMA DOES REPEATING THE TEST IMPROVE DIAGNOSTIC CERTAINTY IN THE RADICA STUDY?

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10.1136/thorax-2020-BTSabstracts.263

Introduction and Objectives Fractional exhaled Nitric Oxide (FeNO) is an essential test for asthma diagnosis in the NICE algorithm (NG80). A characteristic feature of asthma is the variability of symptoms and signs. Within the setting of our Rapid Access Diagnostics for Asthma (RADicA) research clinic, we investigated whether repeat testing of FeNO in those with borderline or negative results improved diagnostic certainty.
Methods Adults and children with symptoms of cough, wheeze, breathlessness or chest tightness were referred by primary care for a comprehensive assessment. FeNO (NIOX VERO, Circassia) was measured on two separate occasions a minimum of 5 days apart prior to starting inhaled corticosteroids. FeNO result was classified according to NG80 for adults (FeNO $\geq$ 40ppb positive, 25–39ppb borderline, <25ppb negative). In children $\geq$35ppb was positive, 20–34ppb was borderline and <20ppb was negative (ATS recommendations). We compared FeNO between V1 and V2 (Intraclass correlation, Wilcoxon signed rank). Also we investigated what proportion of those with borderline or negative tests showed a positive results when the test was repeated.
Results 112 participants (66% adult, 56% female) achieved FeNO on at least one of these visits; 86 completed both measures. FeNO levels were similar between the two visits (V1 median 22ppb [IQR 54ppb], V2 median 23.5ppb [IQR 45ppb], p=0.52; r=0.91 p<0.001). Nine (5 adults) of 11 participants with a borderline FeNO at V1 repeated the measure an average of 20 days later. One adult and one child were reclassified to positive (22% of the borderline cases). Of the 29 adults who were negative at V1, only 2 were positive at V2; none of the 14 children who were negative went on to have a positive test.
Conclusions Although there was a strong correlation between FeNO measured on 2 separate occasions prior to starting treatment, almost one in four of those with a borderline test went on to have a positive test when given the opportunity to repeat. Repeating FeNO in those with a borderline result would reduce the proportion of patients requiring referral to secondary care, at low cost.

P119 THE EFFECTS OF THE COVID-19 LOCKDOWN ON SEVERE ASTHMA IN PATIENTS TAKING BIOLOGIC THERAPY AND AIR POLLUTION

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10.1136/thorax-2020-BTSabstracts.264

Introduction Whilst Coronavirus Disease 2019 (COVID-19) wreaked havoc, an expected increase in exacerbations of asthma did not materialize. There was significant improvement in quality of air during lockdown period due to reduced traffic and industrial activity as per local metrological data. The aim of this study was to determine the impact of enforced social distancing (i.e. lockdown) and air pollution on patients with severe asthma taking biologic therapy over 12 weeks' period.
Methods A cross-sectional survey of 60 patients with severe asthma receiving biologic therapy was performed with ethical approval.
Results Fifty six (56) patients participated (F39; mean age 47.4 years; response rate 93.3%). Mean time since diagnosis was 19.6 years (SD 11.5 years). All had been on biologic therapy Omalizumab (45), Mepolizumab (7), or Dupilumab (2) for at least three months (mean 38.4 months ± SD 26.5 months). subjectively thirty, 30 (53.6%) patients reported improvement in their asthma symptoms and attributed it to reduced traffic activity. Objective Stratified asthma control test (ACT) scores are detailed in table 1. There was an increase in the proportion of patients who were controlled before and after 12 weeks of the lockdown [23 (41%) vs 34 (60.7%)] When all participants whose ACT scores increased were compared with those whose did not, no statistically significant differences in age, gender, employment status, level of education, marital status, access to medications, oral steroid use, ED visits, or failure to receive scheduled biologic therapy were found. None were admitted to hospital and 38 patients did not escalate their treatment during the 12 weeks' period. Eighteen (32.1%) patients' ACT scores improved $\geq$3 points. The absolute difference in the proportion of patients with controlled asthma was 19.6% (95%CI 1.5%–37.8%).

Abstract P119 Table 1 Asthma control test scores before and after 12 weeks of lockdown

Asthma Control Test score strata	Before COVID-19 N (%)	After lockdown N (%)	p
Uncontrolled ≤15	17 (30.4)	9 (16.1)	0.001
Partially Controlled 16–19	16 (28.6)	13 (23.2)	
Controlled ≥20	23(41.1)	34 (60.7)	

Conclusions During the COVID-19 lockdown period there were significant subjective and objective improvement in asthma symptoms based on ACT Scores over 12 weeks' period. We believe that the major reason for this improvement is a reduction in air pollution due to reduced traffic and industrial activity, though other factors (psychological, behavioral) were beyond the scope of this study.

P120 AN EVALUATION OF THE IMPACT OF SHIELDING TO AVOID COVID 19 INFECTION ON RESPIRATORY SYMPTOMS IN CHILDREN WITH SEVERE ASTHMA

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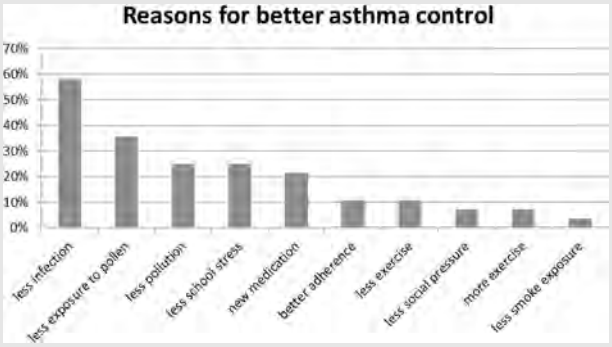
10.1136/thorax-2020-BTSabstracts.265

Introduction and Objectives Asthma is a complex disease with multiple interacting factors determining individual phenotypes. We performed a service evaluation of children attending specialist paediatric respiratory clinics for their asthma at tertiary care hospital as part of routine follow up and whilst shielding according to NHS advice during the COVID 19 pandemic (March- July 2020).
Method Patients and parents/guardians were asked to complete a pre-prepared series of questions about how their asthma had been affected by shielding as a part of telephone/video link follow-up consultations having shielded for between 2–5 months.
Results 58 families (Male 33, Female 25) provided data. Mean age of respondents was 12 years (range 5–18 years). All families were shielding. Only one patient had been admitted for acute asthma whilst shielding. They were COVID-19

Abstract P120 Table 1 Reasons for better asthma control



positive at the end of admission. One other asymptomatic patient was COVID-19 positive through screening. Only 11 (19%) reported being less likely to self-refer for symptoms with 6 (11%) more likely and 41 (70%) no difference. Twenty-three (40%) reported better asthma control, 10 (17%) worse asthma and 25 (43%) no different. Twenty-nine (50%) had an ACT ≥20 indicative of well controlled asthma. 47 (81%) were using the same or less relief medication, 40 (69%) were sleeping the same or better at night and 38 (66%) were the same or less anxious. Comparing asthma control to the same period in the previous year 28 (48%) reported better symptom control, 7 (12%) worse control and 23 (40%) no different.

Reasons reported for improved asthma are shown in table 1.

Reasons for the 7 with worse control included increased seasonal allergic rhinitis 3 (43%) and more indoor aeroallergen exposure 3 (43%).

Thirty-one families (53%) preferred video link (attend anywhere) consultations and 11 (19%) expressed a preference for face to face appointments.

Conclusion Overall severe asthmatics have experienced better symptom control during shielding. Reasons are multiple although decreased infections were identified as a cause by the majority of families. Ongoing care using video link consultations would be acceptable for the majority of families attending our service.

P121 RAISED BLOOD EOSINOPHIL COUNT AS A PREDICTOR OF SEVERE ASTHMA EXACERBATION

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10.1136/thorax-2020-BTSabstracts.266

Introduction and Objectives Asthma is a condition that involves airway inflammation leading to variable bronchial constriction. It is well-established that blood eosinophil counts are often raised in patients with asthma and correlate with increased brochial hyperreactivity.[1] However, blood eosinophils are not currently recommended for monitoring asthma in adults.[2] Many patients admitted to hospital have undergone a full blood count in the year prior to their index attack and this is an easy opportunity to assess their risk of exacerbation and intervene.

Methods We elected to review patients admitted to hospital at the Countess of Chester Hospital NHS Foundation Trust over a 12-month period. We investigated whether a full blood count was available and also, if there was evidence of raised blood eosinophil counts. We also recorded information on treatment and length of stay.

Results 197 patients were included, 58 female and 139 male, with a mean age of 50 years (range 12–13). A total of 135 (68.5%) patients had FBC recorded in the 12 months prior to admission. 87 (64.44%) of these had an eosinophil count of ≥0.3 at least once in the 12 month period. 70 (35.5%) patients had an eosinophil count of ≥0.3 on admission. The average eosinophil count over the 12 months prior to admission was 0.36 (range 0–3.1). Patients with an eosinophil count of ≥0.3 were more likely to be using LABA+ICS combination than their counterparts (51.43% vs 44.09%). No significant difference was noted with other therapies.

Conclusion A high proportion of patients admitted to hospital had a historical FBC available. Two-thirds had recorded an eosinophil count of ≥0.3 in the 12 months leading up to admission suggesting an increased risk of a severe asthma exacerbation. There is an opportunity to intervene to prevent future exacerbations. An incidental raised blood eosinophil count in asthmatics should be regarded as a red flag for future asthma attacks.

REFERENCES

1. Price DB, Rigazio A, Campbell JD, *et al*. Blood eosinophil count and prospective annual asthma disease burden: a UK cohort study. *Lancet Respir Med*. 2015 Nov;**3**(11):849–58.
2. British guideline on the management of asthma 2019. *SIGN*; BTS.

Chronic suppurative lung disease in adults and children

P122 THE IMPACT OF COVID-19 SHIELDING ON THE WELLBEING, MENTAL HEALTH AND TREATMENT ADHERENCE OF ADULTS WITH CYSTIC FIBROSIS (CF)

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10.1136/thorax-2020-BTSabstracts.267

Background People with CF were considered to be extremely vulnerable to COVID-19 and were advised on 23rd March 2020 to 'shield' (stay at home; no outside contacts).

Methods In July an e-mail survey was sent to 137 CF adults to determine how strictly they had shielded, how they had coped and the effect on wellbeing and mental health (GAD-7 & PHQ-9). Treatment adherence (measured with 'chipped nebulisers'- CFHealthHub) and levels of anxiety and depression pre- and during shielding were compared in a subgroup that consented to being identified. Changes were compared with the Wilcoxon rank test.

Results 63 (46%) responded; 19 replied anonymously and 44 (25 men) gave their identity. Mean age (range) was 32.7 (17.5–64) years, $FEV_1$2.1 (0.57–4.86) L, BMI 22.8 (16.4–28.6) kg/m^2 and 33 were on CFTR modulator treatment. Fifty-nine (94%) reported adherence to shielding 'all the time'/'often'. Most (76%) found this difficult, reporting a negative impact on exercise, social support, independence, sleep and daily routines. Most were not concerned about shielding being relaxed but 44% worried that others might not adhere to social distancing with risks of COVID-19 infection (43%). Adherence rates during COVID were available in 42 patients, with a median of 91% (interquartile range 84% to 100%). In

28 patients, pre-COVID adherence results were available, with a median difference of 0 (IQR -4 to 8). In 41 patients with complete data, there was a significant difference in the median pre-COVID versus during-COVID anxiety score (pre= 2, IQR 0.5–6 compared to during =5, IQR 1–11; p=0.002). 'Clinically significant' (mild-severe) anxiety rose from 27% pre-COVID to 54% during COVID. In 43 patients with complete data there was no difference in median pre-COVID versus during-COVID depression scores (pre= 3, IQR 1–10 compared to during= 3, IQR 2–12; p=0.09).

Conclusions These CF patients showed high compliance with shielding, and high rates of adherence with medication, and none developed COVID-19. They coped well, with low depression scores, but negative impacts were reported on exercise, social support, and daily routines. Anxiety levels significantly increased during shielding, and 7 patients requested a psychology consultation from this survey.

P123 REMOTE DELIVERY OF CARE TO PEOPLE WITH CYSTIC FIBROSIS DURING COVID-19 SHIELDING IS NOT DETRIMENTAL TO PATIENT OUTCOMES

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10.1136/thorax-2020-BTSabstracts.268

Introduction and Objectives Intensive surveillance of lung function (FEV_1), body weight and airway microbiology is central to good cystic fibrosis (CF) care. National standards recommend people with CF (pwCF) are reviewed at least three monthly by specialist multidisciplinary teams. COVID-19 'shielding' precautions, set to protect clinically extremely vulnerable people, terminated all but essential face-to-face clinical contact for over four months. Many pwCF remain apprehensive as restrictions ease. The King's Adult CF Unit delivers care to 250 pwCF across south-east England. We discuss the immediate service changes in response to COVID-19, and the effect on patient outcomes of limited clinician review.

Methods At the start of shielding the entire patient cohort was reviewed and grouped as stable or of concern. Telephone and/or video clinics were implemented, and patients identified as high risk were prioritised for remote self-monitoring (FEV_1 with Bluetooth home spirometers, weight, postal sputum samples). Home visits or ward reviews, by specialist nurses or physiotherapists, were arranged if clinically essential. We undertook a cohort review of consecutive patients emerging from shielding to compare clinical parameters before and after lockdown.

Results Since shielding ended, 24 consecutive patients (see table 1) have been reviewed, at a median (IQR) of 167 (155, 180) days after pre-COVID assessments. At review, 2 patients had a clinically significant fall in lung function (10%), however no statistical difference in FEV_1, weight or BMI (n=21) was seen overall following shielding when compared to measurements immediately (29 (21, 46) days) before lockdown ($ppFEV_1$0.0 (-0.1, 0.1), BMI 0.5 (-1.0, 1.6)). 11 (45.8%) patients sent sputum samples, 1 identified a clinically insignificant new microorganism. 13 (54%) patients required treatment for pulmonary exacerbations, 8 (33.3%) with intravenous, 5 (20.8%) with oral antibiotics.

Conclusions Unpredicted changes to CF care delivery at our centre was not detrimental to patient outcomes. In this cohort, key CF clinical indices remained stable over a short period of shielding, supporting safe remote delivery of care. Modulator therapies likely contributed to the stability in lung function seen.

Abstract P123 Table 1 Baseline characteristics and lung function pre- and post- shielding. Data presented as mean ± SD, or median (IQR). *At start of shielding

Age, years*	28 (22, 30)	
Male, n (%)	10 (41.7)	
CFTR modulator therapy, n (%)*		
Ivacaftor	1 (4.2)	
Lumacaftor/ivacaftor	1 (4.2)	
Tezacaftor/ivacaftor	10 (41.7)	
Best measurements in last year		
FEV_1 percent predicted,%	70.8 (23.4)	
Body mass index (kg/m^2)	28.0 (3.6)	
Patients identified as 'high risk'*, n (%)	5 (20.8)	
Pre- and post- shielding		
FEV_1 percent predicted,%	67.2 (27.3)	66.9 (26.3)
Weight, kg (n=21)	66.0 (15.1)	66.9 (12.9)
Body mass index, kg/m^2 (n=21)	23.3 (3.8)	24.0 (3.5)

P124 DELIVERING BRONCHIECTASIS PHYSIOTHERAPY CLINICS REMOTELY: PATIENT PERCEPTIONS AND FUTURE PREFERENCES

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10.1136/thorax-2020-BTSabstracts.269

Background/Aims National guidelines recommend that patients with bronchiectasis should be reviewed by specialist physiotherapists (Polverino *et al*., 2017). These appointments should involve teaching of individualised airway clearance techniques, promotion of exercise and education to optimise self-management. During the covid pandemic, face to face appointments were cancelled. Ways of conducting effective physiotherapy consultations remotely were required. We used telephone and video respiratory physiotherapy consultations. We assessed patient satisfaction with remote consultations and views on future modes of clinic delivery.

Methods All patients contacted for a predetermined physiotherapy clinic between 21/4/20 and 29/6/20 were asked questions regarding their consultation and preferences (Table 1). Telephone and video calls were carried out by PM. Data was collected via follow up phone calls using a pre-selected questionnaire or postal questionnaire. Data was recorded and analysed using Excel plus thematic analysis for free text responses.

Results Thirty telephone and 35 virtual consultations were offered. 12 virtual consultations were converted to telephone due to lack of internet access. Thirty-nine (60%) were new referrals, 26 (40%) were reviews. Median age was 65 (range 21–91). Median telephone call duration was 29 minutes (range 15–40). Beyond covid-19 restrictions, twenty-four (37%) preferred a virtual appointment; twenty-two (34%) telephone, four (6%) face to face consultation and fifteen (23%) had no preference.

Conclusions The majority of respondents (97%) were satisfied with remote consultation during covid restrictions. Interestingly, only 6% preferred to return to face to face appointments. Qualitative exploration of reasoning behind these decisions revealed two main themes: convenience and practicality and medical reasons and beliefs.

In our cohort, 71% of patients preferred to continue remote physiotherapy clinics. Individual preferences on format and location of care are key components of NHS plans. Our data show that patient satisfaction can be maintained with remote delivery of respiratory physiotherapy, yet more work is needed to standardise and improve remote physiotherapy interventions. In addition to patient preference, ascertaining the comparative clinical effectiveness of appointment formats in the longer term will facilitate evidence-based provision of physiotherapy resources.

Abstract P124 Table 1

Data collected	Options	Results	
Patient clinic offered	Telephone	30	
	Video	35	
Patient's 'attending'	Telephone	42	12 patients contacted department to say they could not access the internet
	Video	23 (66% of those offered)	
New referral or Review	New	39 (60%)	
	Review	26 (40%)	
Age	Years (Median/range)	65 (21–91)	
Clinically stable	Yes	62 (96%)	
	No	3 (4%)	
Content with tele/video apt on this occasion	Yes	63 (97%)	
	No	2 (3%)	
Preference for future appointments	Face to face	4 (6%)	
	Virtual	24 (37%)	
	Telephone	22 (34%)	
	No preference	15 (23%)	
What advice/treatment were you provided?	Education/Self-Management advice	22 (45%)	10 missing data fields
	Medication Advice	15 (23%)	
	Airway clearance techniques	49 (87%)	
	Breathlessness Management (Including Pulmonary Rehab referral)	11 (20%)	
Were you directed to any online resources?	Yes	43 (80%)	5 missing data fields
	No	17 (20%)	
If yes, Did you find the online resources helpful?	Yes	43 (100%)	
	No	0	
Call duration	Minutes (Median/range)	60 (15–40)	5 missing data fields
		29	

REFERENCE

1. Polverino, E., *et al*. 2017. European respiratory society guidelines for the management of adult bronchiectasis. *European Respiratory Journal*, **50**(3), p.1700629.

P125 CHRONIC SUPPURATIVE LUNG DISEASE IN CHILDREN – CHARACTERISATION OF A TERTIARY PAEDIATRIC HOSPITAL COHORT

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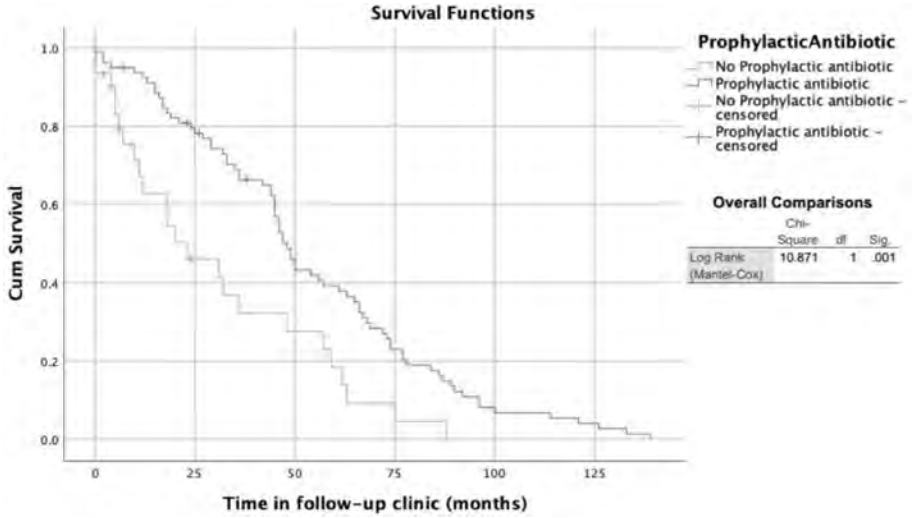
10.1136/thorax-2020-BTSabstracts.270

Background Chronic suppurative lung diseases (CSLDs) comprise lung diseases characterised by chronic productive cough, compromised airway clearance and poor long-term health. Evidence is sparse regarding the best quality of care. We aimed to characterise a paediatric cohort of CSLD, provide epidemiological evidence on risk factors and current management.

Methods CSLD patients (age 0–16) were identified from tertiary paediatric hospital respiratory clinics between 01/2009–06/2019. A database including medical and social history, investigations and treatments was established. Anonymised data were analysed using Microsoft-Excel, MATLAB and SPSS. An intensity map of CSLD prevalence based on the patients' postcodes was built and linked to an index of multiple deprivation.



Abstract P125 Figure 1 Kaplan-Meier survival curve showing the cumulative probability of the patients' symptoms resolving with or without prophylactic antibiotics during the time of follow-up clinics. Log Rank (Mantel-Cox) statistics p= 0.001

Results 110 children were included (n=62, 56% male). Most initially presented with chronic wet cough (n=63, 57%) and final diagnoses included non-CF bronchiectasis (n=36, 33%), protracted bacterial bronchitis (PBB) (n=20, 18%) and primary ciliary dyskinesia (n=7, 6%).

Univariate analysis indicated a family history of respiratory problems as a risk factor for a diagnosis of non-CF bronchiectasis (p=0.027) and PBB (p=0.047). An infectious aetiology was common in this cohort overall and was significantly associated with a diagnosis of non-CF bronchiectasis (p=0.002) but not PBB (p=0.233).

Long-term prophylactic azithromycin was prescribed in 69% (n=76) of children. Kaplan-Meier method showed that patients prescribed prophylactic antibiotics remained in tertiary care follow-up for longer (figure 1). Symptoms resolved in 21 children during follow-up and 62% (n=13) in that group were prescribed prophylactic azithromycin.

Physiotherapy was recommended in 76 cases (69%), with 24 (32%) using mucolytic agents, nearly half (n=13) using DNase. 67% of patients were on the least deprived end of the socioeconomic spectrum. Certain postcode areas showed significantly higher prevalence.

Conclusion Azithromycin and DNase were frequently used despite some international guidelines suggesting otherwise. Prophylactic azithromycin use was common in children with or without symptom resolution and prophylaxis was significantly associated with a longer follow-up, raising questions about what other factors contribute to a faster recovery and better prognosis. Our data could not confirm CSLD as a disease of poverty although bias in access to healthcare may exist. Variation in postcode prevalence needs exploration and may be linked to air pollution.

P126 INSIGHTS INTO PARENTAL EXPERIENCE OF A SPECIALIST BRONCHIECTASIS AND PRIMARY CILIARY DYSKINESIA SERVICE PROVISION – EXPERIENCE FROM A LARGE TERTIARY PAEDIATRIC CENTRE IN UNITED KINGDOM

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10.1136/thorax-2020-BTSabstracts.271

Introduction and Background Non-cystic fibrosis bronchiectasis (NCFB) and primary ciliary dyskinesia (PCD) are increasingly recognised as important respiratory conditions in childhood with considerable morbidity and burden of care. Daily chest physiotherapy, repeated hospitalisations for intravenous antibiotics and frequent oral antibiotic courses remain the cornerstones of therapy.

Aims This study aimed to explore the parental experience of, and satisfaction with, our tertiary paediatric service for children with NCFB and PCD.

Methods Royal Manchester Children's Hospital (RMCH) offers tertiary services to children with complicated respiratory problems, from Greater Manchester and beyond. Parents/carers attending the tertiary NCFB/PCD Clinic at RMCH were invited to take part in a questionnaire-based survey (May - July 2019). This study specifically enquired about parental experience of outpatient and inpatient service provision, emergency care, and access to input from allied health professionals.

Results Of the eligible 105 families (46 with PCD and 59 with NCFB), 30 families took part in this study (16 with PCD). Overall, parents responded overwhelmingly in favour of the quality of care received: 100% of respondents agreed that the team delivered high-quality care with a high level of satisfaction reported in all questions relating to outpatient clinics. 29/30 (97%) reported seeing a physiotherapist regularly but only 5/30 (17%) regularly saw a dietician and 1/30 (3%) a psychologist. 11/30 (37%) patients also had a general paediatrician involved in their care. Areas for improvement identified included planning for elective admissions (28% of parents felt they were given inadequate notice) and clear pathways for seeking emergency advice, with 18% of parents unsure who to contact in an emergency and 22% reporting difficulties contacting a team member. Information leaflets have subsequently been designed to address this.

Conclusions As a service model, a specialist paediatric bronchiectasis clinic provides a high level of parent/carer satisfaction. There may be scope to incorporate additional dietetic and psychology input into such clinics. It is important to ensure good communication around all aspects of care including emergencies and inpatient admissions. Consideration must be given to the role of the local general paediatrician alongside the tertiary respiratory service.

P127 THE LONGITUDINAL EFFECT OF DYSGLYCAEMIA ON THE VENTILATORY AND AEROBIC FUNCTION IN CHILDREN AND ADULTS WITH CYSTIC FIBROSIS

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Introduction Previous cross-sectional studies have reported lower ventilatory and aerobic function (peak oxygen uptake, VO_{2peak}) during exercise in people with cystic fibrosis related diabetes (CFRD), compared to non-CFRD counterparts. Given that VO_{2peak} is highly predictive of mortality, and the pancreas is one of the earliest affected organs in CF, there is a necessity to identify the interaction between exercise parameters and glycaemic status - particularly over time, which has implications for disease management in CFRD.

Objectives To examine differences in ventilatory and exercise-based changes (including $VO2_{peak}$) in people with CF, of differing glycaemic status.

Methods Annual review data, including cardiopulmonary exercise testing and pulmonary function tests, were retrospectively analysed in n = 82 people with CF. Data was analysed in two ways: 1) three groups; normal glucose tolerance (NGT), impaired glucose tolerance (IGT) and CFRD, and 2) a dichotomous division of NGT versus a combined IGT + CFRD group. Data was analysed at baseline (T0) and one-year follow up (T1). Analysis of variance, with Bonferroni-corrected post-hoc tests determined significant differences between variables at different time points.

Results At baseline, absolute forced expiratory volume in one second (FEV_1) and VO_{2peak} were significantly reduced (p =0.01) in the CFRD (n = 19) group compared to NGT (n = 58). At T1, a reduced relative peak power ($W.kg^{-1}$, p = 0.05), VO_{2peak} (p = 0.03) and gas exchange threshold (p = 0.02) were observed from T0 in the combined group (n =

24) compared to the NGT group (n = 58). No change in VO_{2peak} was identified over time, however, a significant decrease was discovered for FEV_1 (%pred) in the NGT group between T0 and T1 (p = 0.02).

Conclusions Patients with CFRD have a reduced aerobic and ventilatory function compared to non-CFRD counterparts. Whilst a decrease in lung function was observed longitudinally, no change in VO2peak was found, thus alluding to how aerobic and ventilatory functions provide different clinical organ and systemic outcomes in CF. Future research building upon these findings should assist with future management strategies to increase the longevity and quality of life of those with CFRD.

P128 THE USE OF THORACIC CT TO DETERMINE BONE MINERAL DENSITY IN ADULTS AND CHILDREN WITH CYSTIC FIBROSIS

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Introduction Cystic fibrosis (CF) related bone disease is a common extra-pulmonary complication associated with low bone mineral density (BMD). It is common practice to undertake routine assessment of BMD using dual-energy x-ray absorptiometry (DXA). Andrade *et al*. Eur Respir J. 2019;53 (6):1900066 showed a significant positive correlation (r 0.74, p<0.001) between the Hounsfield score (HU), an attenuation coefficient measured on standardised computerised tomography (CT), with BMD from DXA in 18 CF children. This could potentially reduce the burden of DXA scanning for patients who have undergone a clinically indicated CT chest. We aimed to confirm this in a larger population of children and adults with CF.

Methods Retrospective cross-sectional study of patients with CF who underwent thoracic CT and lumbar DXA scan within a 12-month interval. HU score was measured in thoracic vertebrae 10–12. Z-scores and BMD (g/cm^{-2}) were recorded for lumbar vertebrae 1–4. Data were tested with Pearson correlation coefficient after normality testing with Kolmogorov-Smirnov. Data is reported as mean (SD).

Results 37 paired scans from 36 patients were evaluated (Table 1). Mean BMD by DXA was 1.10 g/cm^{-2} (0.19) and by CT 234.89 HU (56.26). No significant correlation was observed between these methods in this group (r 0.24, p0.15). A subgroup analysis of paired scans from 27 patients who all underwent CT using identical parameters (120 kV, automatic mA modulation, CT kernel B70f) showed a moderate but significant, correlation (r 0.55, p0.003).

Discussion The difference in correlation compared with Andrade *et al*. may be influenced by discrepancies in patient characteristics, with the pilot study reporting a mean age 16 years and median DXA z-score of 0.65. Andrade *et al*. set a shorter interval between DXA and CT at 3 months, whilst our study allowed 12 months.

Conclusion The data presented here from an interim analysis of 36 patients does not support the use of HU as a measurement of bone density in CF. However, when standardised CT protocols are examined there is evidence of a moderate correlation. At the time of Congress we expect to share results from a five-year period, including longitudinal data for individual patients.

Abstract P128 Table 1 Table of demographic data for 36 patients (37 comparisons between DXA and CT)

Patient Characteristic	Number of DXA and CT comparisons (n = 37)
Median Age in years (IQR)	23 (17; 28)
Gender	9 M : 28 F (24% : 76%)
Pancreatic Insufficiency	28 (76%)
Homozygous *F508del*	12 (32%)
Median BMI (IQR)	20.9 (19.6; 24)
Mean z-score DXA (SD)	-0.18 (1.14)

P129 RADIATION EXPOSURE AMONG ADULTS WITH CYSTIC FIBROSIS: TRENDS AND THEMES

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Introduction Although the average UK dose from medical ionising radiation is 0.44 mSv (PHE-CRCE-026, 2011), people with CF (pwCF) undergo many such investigations for the management of their disease. With improving survival their life-time exposure, a risk factor for the development of malignancy, may be important. We therefore monitored this radiation exposure in our adult CF center and wished to look for any trends over time.

Methods We calculated the estimated effective dose (EED) of ionising radiation using standard reference values (HPA-CRCE-034, 2011; PHE-CRCE-013, 2010), and applied this to all procedures carried out in pwCF at our centre 2017–19, comparing it to that in 2010.

Results There were 2,630 investigations in 327 pwCF 2017–19 and 693 in 253 in 2010 (mean [SD] yearly EED 1.49 ± 3.85 mSv, versus 1.66 ± 3.76 mSv respectively [p=0.56]): 217 pwCF in 2017–19 had an average yearly EED <0.44 mSv.

A similar number of examinations were carried out in each time period (2.7 versus 2.8 per person), predominantly thoracic (76% versus 84%), of which most was CT imaging (89% versus 80% respectively).

In 2017–19, EED was higher in those with chronic *Pseudomonas aeruginosa* infection (1.56 ± 3.90 mSV versus 1.27 ± 3.68 mSv; p<0.001), non-tuberculous mycobacterium (NTM) (1.52 ± 2.57 mSv versus 1.49 ± 4.05 mSv, p<0.001) and CF-related diabetes (1.56 ± 4.04 mSv versus 1.14±3.65 mSv; p<0.001). Thirteen pwCF (4%) had a yearly average EED of ≥10 mSv (16.33 m ± 13.07Sv in those 7 with malignancy).

Conclusions Although radiation exposure remains high amongst pwCF, in keeping with other published reports (Plant *et al*), there was no upward trend in EED over time, and a similar number of procedures were performed per person.

As expected, pwCF with more complications had higher radiation exposure, underlining the need to maintain vigilance for comorbidities in this complex chronic disease.

P130 PSEUDOMONAS AERUGINOSA IMPAIRS GROWTH OF ASPERGILLUS FROM CF AIRWAY SAMPLES

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Objectives Fungal infection is associated with poor lung health in CF but may go undetected. The low sensitivity of standard fungal culture is well recognised but poorly understood. *Pseudomonas aeruginosa* (Pa) has been shown to inhibit growth of *Aspergillus* (Asp) *in vitro*. We hypothesised that similar inhibitory mechanisms may, in part, account for the poor sensitivity of Asp cultures.

Methods We retrospectively studied sputum/BAL standard culture results from all CF patients in our centre between 2012–2017. 16,736 positive airway samples were identified from 1001 subjects. Correlation analysis identified relationships between pairs of relevant CF-pathogens. As part of a previous study, 318 sputum samples had Internal transcribed spacer-2 (ITS2) fungal sequencing data. Samples with <1000 reads were excluded; >1% of total reads aligned to the genus of interest were considered positive. Contingency tables examined fungal culture performance compared with ITS2 sequencing with co-infecting bacteria, using relative risk (RR, [95% CI]) and Fisher's exact test.

Results We observed a strong bias towards single rather than dual growths in patients who had isolated Pa and Asp over the study period. This was not observed with other bacterial/fungal combinations. In the 48% (149/311) of samples Asp positive by ITS2 sequencing, only 19% (28/149) were positive on culture. 39% of the culture results were considered to be false negative for Asp (fn-Asp). Fn-Asp cultures were more likely in Pa-infected than Pa-free samples (RR 1.6 [1.1–2.4], p=0.01). This effect was only seen when non-mucoid (nm)-Pa was present and not when mucoid (m)-Pa was present alone (nmPa (RR 1.90 [1.2–3.0], p=0.006); mn+mPa (RR 1.91 [1.3–2.9], p=0.002), mPa (RR 1.22 [0.8–1.9], ns). The Asp-fn risk was not increased by co-infection with other bacteria. Furthermore, Pa did not impact on fn-culture of *Candida* or non-aspergillus filamentous fungi.

Conclusions In patients who have serial cultures demonstrating both Pa and Asp infections, dual positive cultures are uncommon. Molecular analysis demonstrated a significantly increased false negative Asp culture in the presence of Pa, particularly in it's non-mucoid form. These data suggest that Pa can inhibit Asp growth *in vivo* and/or during culture of sputum and presents an important area for future research.

The nuts and bolts of ILD clinical management

P131 HOME SPIROMETRY AS A CLINICAL ENDPOINT IN FIBROTIC ILD: LESSONS FROM THE INJUSTIS INTERIM ANALYSIS

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Home handheld spirometry enables repeated measurements of forced vital capacity (FVC), offering opportunities for longitudinal evaluation in interstitial lung disease (ILD). Whilst recent studies have not blinded participants to their home spirometry performance, they support feasibility in participants with idiopathic pulmonary fibrosis (IPF). However little data exists for the utility of home spirometry in non-IPF ILD. We assess correlation, agreement and non-inferiority of blinded daily home spirometry over three months relative to hospital spirometry, informing the feasibility of remote monitoring as a primary endpoint in clinical settings.

We utilised interim data from the ongoing INJUSTIS study (NCT03670576). Participants with fibrotic ILD were offered a handheld spirometer linked via bluetooth to a smartphone application and asked to perform daily, blinded FVC for three months. Hospital spirometry was concurrently obtained at baseline and three months. Home FVC values were based on week averages at study timepoints. Correlation, Bland-Altman plots and equivalence tests were used to compare baseline, 3 month and delta. Sensitivity analysis was performed where test dates matched.

82 participants with ILD were included. Mean age was 69.8±8 years, 72.3% were male and mean FVC was 2.96 ±0.88L. Median adherence to daily spirometry was 79.5%, four participants had an adherence <10%. At the time of

Abstract P131 Table 1 Results summary comparing hospital and home spirometry. FVC values shown in L/min

		Comparison			*Agreement*		*Correlation*			*Non-inferiority*	
FVC sample	*N*	*Mean Lab (SD)*	*Mean Home (SD)*	*Mean diff (SD)*	*N Outside limits*	*% Within limits*	*r*	*R2*	*p*	*95%CI*	*Non-inferiority*
Baseline	*82*	*2.96 (0.88)*	*2.65 (0.88)*	*-0.31 (0.46)*	*8*	*90.2*	*0.8644*	*0.7472*	*<0.0001*	*-0.39; -0.22*	*True within 400 ml*
Date-matched	*45*	*2.93 (0.93)*	*2.70 (0.94)*	*-0.23 (0.44)*	*2*	*95.7*	*0.8897*	*0.7916*	*<0.0001*	*-0.34; -0.12*	*True within 400 ml*
3 months	*35*	*2.88 (0.96)*	*2.77 (1.11)*	*-0.13 (0.61)*	*2*	*94.3*	*0.8131*	*0.6611*	*<0.0001*	*-0.33; 0.07*	*True within 400 ml*
3 m Δ	*35*	*-0.05 (0.19)*	*-0.01 (0.54)*	*0.03 (0.58)*	*3*	*91.4*	*-0.0884*	*0.0078*	*0.614*	*-0.16; 0.23*	*True within 400 ml*

censorship, 35 participants had 3 month data for both home and hospital spirometry, 45 participants had date-matched values. High correlation was observed between home and hospital spirometry at baseline (r=0.86) and three-months (r=0.81), changes in 3 month ΔFVC were not correlated (r=-0.09). At least 90% of home spirometry values were within agreement limits of hospital values at baseline (mean difference -0.31L/min,95%CI -0.39;-0.22), three-months (-0.13L/min,95%CI -0.31;0.05) and 3 month ΔFVC (-0.03L/min,95%CI -0.13;0.20). Home values more frequently underestimated hospital values but non-inferiority was confirmed within 400 ml.

Home spirometry in fibrotic ILD is feasible and non-inferior to hospital spirometry. This is particularly relevant in the context of the current covid-19 pandemic, where an urgent need has arisen to consider remote monitoring of lung function. Adherence to daily spirometry was high in blinded participants, but variability in home values was observed when using week-averages, supporting importance of longitudinal modelling for clinical endpoint precision.

P132 THE ROLE OF VITAMIN D IN PULMONARY SARCOIDOSIS AND INFLAMMATION

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Introduction and Objectives Sarcoidosis is a multisystem disease of unknown aetiology characterized by a Th1 granulomatous immune response. Granuloma formation has been linked to a failure of the innate immune system, which could be related to a deficiency in vitamin D. Previous studies have documented low levels of vitamin D in patients with sarcoidosis. We aimed to explore the role of vitamin D in sarcoidosis and its relationship to biomarkers of disease activity and severity.

Methods Baseline demography, mode of presentation, Scadding CXR stage and need for treatment was recorded for 184 patients. Additional data including biochemical markers of disease activity and serum vitamin D levels were performed in 66 patients within a 4-week study period. Disease activity was assessed using lymphocyte trend, inflammatory markers, LFT, serum ACE and IgG, physiological and radiological measures as well as the need for treatment. Vitamin D levels were grouped into 'sufficient' (>50 nmol/L) and 'insufficient or deficient' (<50 nmol/L). Univariate analysis was performed on all data collected.

Results Baseline data was similar between the study group and cohort. In this cohort the average age was 57.6 with median length of disease of 4.8 years (2.1–8.0), the treatment rate was 48%. The majority of patients were sufficient in Vitamin D (64%) at time of testing. A positive association between the need for treatment and previously recognised indicators; including lymphocyte trend, higher CXR staging, and mode of presentation was found. Preliminary analysis suggested an inverse correlation between vitamin D and levels of systemic inflammation -CRP (OR 3.61 p-value 0.01) and ESR (OR 9.59 p-value <0.005). Interestingly lower levels of Vitamin D trended towards a lower treatment need. There was no relationship between levels of vitamin D and CXR stage or lymphocyte trend.

Conclusions The majority of patients were sufficient in Vitamin D. Levels correlated inversely with markers of inflammation but did not appear to be associated with need for treatment or disease severity. This data suggests a link between Vitamin D and systemic inflammation in sarcoidosis and warrants further investigation. Given deficiency may also mimic many symptoms encountered in active sarcoid measurement is useful in robust assessment.

P133 INTEGRATING AMBULATORY OXYGEN ASSESSMENTS INTO A SPECIALIST INTERSTITIAL LUNG DISEASE (ILD) CLINIC

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Introduction Ambulatory oxygen (AO) increases walking distance, reduces exertional breathlessness and has been shown to improve quality of life in patients with exertional desaturation.[1]Patients with ILD often have a high burden of hospital appointments. In response to patient feedback we trialled co-locating AO assessment alongside the specialist ILD clinic rather than at separate AO assessment.

Method Patient experience and service data was collected prospectively for all patients referred for AO assessment over a 6 month period. All patients with ILD were offered AO assessment alongside their appointment in ILD clinic.

Results There were 26 ILD referrals during pilot, 11 in the same time period of the previous year. Other Respiratory disease referrals 40 in pilot, 17 in previous yr. Males 40 in pilot, 12 previous yr. Mean age was 67.8 yrs pilot (range 39–86) and 62.1 yrs (range 33–82) previous yr.

All patients with ILD elected for appointments alongside their specialist ILD appointment. Non-attendance rate in ILD AO clinic was 4% compared to 36% in general AO clinic. Average wait for ILD AO clinic was one week compared to 12 weeks in general AO clinic.

There was no difference in reported patient experience between ILD AO and general AO clinics. 100% (n = 43) of patients would recommend the service. 98% of patients felt involved in decisions about their oxygen prescription and 93% reported feeling better able to manage their condition. Patient and staff feedback favoured AO intgegration into ILD clinic figure 1.

Conclusion Integrating AO assessments into specialist ILD clinics significantly reduced non-attendance rate and waiting times; these efficiencies have enabled us to meet increased

Abstract P133 Figure 1

demands on the service without compromising excellent patient outcomes.

REFERENCE

1. Creamer AW, Barratt SL. Does ambulatory oxygen improve quality of life in patients with fibrotic lung disease? Results from the AmbOx trial. *Breathe (Sheff)* 2019;**15**(2):140–143

P134 OUTCOMES FROM PULMONARY REHABILITATION IN PATIENTS WITH INTERSTITIAL LUNG DISEASE

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Background The benefits of pulmonary rehabilitation (PR) are increasingly recognised in patients with chronic respiratory disease.[1] The majority of evidence has been in patients with COPD. However some studies have shown a short term improvement in exercise capacity and symptoms in patients with interstitial lung disease (ILD).[2]

Aims Identify whether patients with ILD attending a 6 week PR course resulted in an improvement in their exercise tolerance and quality of life.

Methods We evaluated the records of 45 patients with ILD who attended PR between January 2012 and October 2018. Only patients who completed PR were inclusive in this evaluation. The results of their six minute walk test and the Chronic Respiratory Disease Questionnaire (CRDQ) at the start and completion of the programme were recorded.

Results Only 23 had complete record. (20 IPF, 3 NSIP) (Male 18/Female 5) (Mean age: 71) (Current smokers: 4/LLNS: 19) (Mean FVC for IPF 70%/NSIP 77%). Patients had a result from their post PR 6 minute walk test and could be included in our analysis.78% (18/23) of these had a clinically significant improvement of at least 30 m ($p<0.001$).13 patients had a CRDQ completed before and after the course. 100% of patients had a clinically significant improvement of 0.5% in at least one category. There was a statistically significant improvement in the CRDQ domains for dyspnoea (CRDQ-D score pre 2.4, post 3.8, $p<0.001$) and emotional function (CRDQE score pre 5, post 5.3, p 0.002).

Conclusion An improvement in health related quality of life & exercise capacity means that we should recommend and encourage all patients with ILD to attend PR. The next steps are to review how long these benefits are maintained.

REFERENCES

1. BTS guideline for pulmonary rehabilitation August 2013
2. Holland AE, Hill CJ, Conron M *et al*; Short term improvement in exercise capacity and symptoms following exercise training in interstitial lung disease; *Thorax* 2008;**63**:549–554

P135 MAINTENANCE OF ANTIFIBROTIC TREATMENT FOR IPF IN THE SOUTH WEST PENINSULA & EXETER ILD SERVICE – A REAL WORLD STUDY

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IPF is a life-limiting condition with an average prognosis of three years from diagnosis. The two anti-fibrotic therapies that are available, Pirfenidone and Nintedanib, can help slow progression of fibrosis and prolong life, but can have significant and often intolerable side effects. Persistence on these anti-fibrotic treatments can be difficult for patients. In order to maximise patient tolerance, regular input from healthcare professionals is required, and this contact needs to be optimised.

Anti-fibrotic prescribing data from 2011 until 2019 was analysed retrospectively. Cases were included only where a complete data set was available. We included patient age, referring hospital, start and stop dates of treatment and reasons for discontinuation. We analysed the duration patients are maintained on treatment, the primary reasons for stopping treatment and whether there are any variations across the region.

Complete data was analysed for 249 patients prescribed antifibrotics, with first line treatment of 107 patients on Pirfenidone and 142 on Nintedanib. The data shows a clear patient preference for Nintedanib. Average duration of treatment was 497 days for Pirfenidone and 397 days for Nintedanib, with the longest use at 2817 days on Pirfenidone and 2413 days on Nintedanib.

Reasons for discontinuation of anti-fibrotic therapy were in keeping with known side effects. Overall, 27% of patients stopped therapy within the first 6 months of treatment, in line with current literature. There was significant variation across the region, ranging from 21% to 38% at different hospitals. This appears to correlate with the availability of additional nurse specialist support in each area.

Support from healthcare professionals with ILD expertise appears to be of major importance in maintaining patients on anti-fibrotic therapy. This should be a proactive interaction, initiated by the healthcare provider, rather than the patient. According to our data, optimal timing of these interventions may vary between therapy, with the first 6 months being key in Pirfenidone usage, but the first 12 months being key in Nintedanib usage. Adequate ILD staffing levels are critical to sustain therapy and to implement improvements in treatment.

P136 PULMONARY HYPERTENSION AND OUTCOMES IN A SINGLE-CENTRE IPF COHORT

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Introduction Idiopathic pulmonary fibrosis (IPF) often coexists with pulmonary hypertension (PH) and left heart disease (LHD). Estimates of PH prevalence vary, from 8–15% at initial assessment to 30–50% at transplant evaluation. PH conveys increased risk of mortality and acute exacerbation. Ischaemic heart disease (IHD) affects 4–25% of patients. Novel diagnosis during follow-up is associated with increased mortality.

The majority of data predate general clinical uptake of antifibrotics. We reviewed prevalence and impact of PH and LHD in our single-centre IPF cohort in the antifibrotic era.

Methods We collected cardiac data from electronic patient records of patients with MDT-diagnosed IPF from 2013 onwards, diagnosed and treated, with antifibrotics as indicated, as per national guidelines.

Abstract P136 Table 1 Baseline characteristics and mortality comparing patients with echocardiographic evidence of pulmonary hypertension at time of referral to the specialist interstitial lung disease centre, developing echocardiographic signs of pulmonary hypertension during follow-up, and without pulmonary hypertension, since April 2013. SD-standard deviation; BNP=B-type natriuretic peptide; SPAP=estimated systolic pulmonary artery pressure; FVC-forced vital capacity; DLCO-diffusing capacity for carbon monoxide †elevated BNP defined as >69.2 ng/L as per Corte *et al* 2010; ‡Global Lung Function Initiative 2012 regression equations used for calculating percent predicted FVC and 2017 regression equations used for calculating percent predicted DLCO

Characteristic	Pulmonary hypertension at baseline (n = 16)	Pulmonary hypertension developed (n = 20)	No pulmonary hypertension (n = 23)
Age, years, mean (SD)	72.8 (9.9)	75.1 (6.2)	74.1 (6.4)
Male, n (%)	14 (87.5)	18 (90.0)	16 (69.6)
Caucasian Ethnicity, n (%)	11 (68.8)	16 (80.0)	16 (69.6)
Current or ex-smoker, n (%)	13 (81.3)	17 (85.0)	15 (65.2)
Ischaemic Heart Disease, n (%)	2 (12.5)	9 (45.0)	4 (17.4)
Heart Failure, n (%)	2 (12.5)	6 (30.0)	0 (0.0)
Baseline BNP, ng/L, mean (SD)	478.9 (1139.5)	280.4 (370.8)	55.2 (37.6)
Baseline BNP elevated, n (%)†	5 (31.3)	7 (35.0)	2 (8.7)
Baseline sPAP, mmHg, mean (SD)	60 (10.5)	35 (7.1)	32 (3.1)
Peak sPAP, mmHg, mean (SD)	53 (14.3)	50 (14.1)	35 (8.0)
Echocardiographic features of significant left heart disease, n (%)	3 (18.8)	6 (30.0)	1 (4.3)
FVC at baseline, mL, mean (SD)	2813 (1078)	2607 (750)	2842 (1243)
FVC, % predicted, mean (SD)‡	81.8 (23.4)	81.5 (25.4)	89.6 (26.8)
DLCO at baseline, % predicted, mean (SD)‡	51.6 (21.1)	45.4 (14.4)	55.6 (18.0)
Gender-Age-Physiology Index, median (IQR)	4 (3 - 5)	5 (3 - 5)	3 (3 - 4)
Duration of follow-up, months, mean (SD)	47 (40)	38 (25)	38 (18)
Received Pirfenidone, n (%)	7 (43.8)	5 (25.0)	6 (26.0)
Received Nintedanib, n (%)	0 (0.0)	8 (40.0)	12 (52.1)
No antifibrotic, n (%)	9 (56.3)	7 (35.0)	8 (34.8)
52 week mortality, n (%)	2 (12.5)	3 (15.0)	2 (8.7)
Overall mortality, n (%)	8 (50)	13 (65)	11 (47.8)

Significant echocardiographic features were defined as: systolic pulmonary artery pressure (sPAP) $\geq$50 mmHg, right ventricular dilatation or dysfunction for PH; and at least moderate left ventricular systolic dysfunction, valvular disease, or grade 2 diastolic dysfunction for LHD. We compared patient characteristics and outcomes of those without PH, with PH at presentation and developing PH. Differences in proportions between PH and no PH groups were calculated using Fisher's exact test.

Results See table 1. 59 IPF patients had at least one echocardiogram. 36 (61%) had echocardiographic features of significant PH; 16 (27%) at presentation. 35 (59%) received one or both antifibrotics (sequentially). 52-week and overall mortality were not significantly different with or without PH (5/36 versus 2/23, $p=0.69$, and 21/36 versus 11/23, $p=0.59$, respectively).

Discussion PH prevalence is comparatively high but without appearing to influence mortality. Assessment in all patients was undertaken non-invasively, limiting conclusions on degree and aetiology of any pulmonary vascular disease. Further, the cohort is small.

Antifibrotics could theoretically directly and indirectly modulate the pulmonary vasculature. Together with improved access to specialist services facilitating early work-up and appropriate management, the negative impacts of cardiovascular comorbidity are potentially modifiable. Further study is warranted.

REFERENCES

1. Cottin V, Price LC, Valenzuela C. The unmet medical need of pulmonary hypertension in idiopathic pulmonary fibrosis. *Eur Resp J* 2018;**51**:1702596
2. Corte TJ, Wort SJ, Gatzoulis MA, *et al*. Elevated brain natriuretic peptide predicts mortality in interstitial lung disease. *Eur Resp J* 2010;**36**:819–825.

P137 JOINT PULMONARY-RHEUMATOLOGY CLINIC IN LOW-RESOURCE SETTINGS: A ONE YEAR EXPERIENCE

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Lung involvement occurs in one-fifth of patients with Connective Tissue Diseases (CTD). However, addressing the associated morbidity and mortality in low-middle-income

countries is uncoordinated and problematic for patients. Our objective was to establish a joint pulmonology-rheumatology clinic (PRC) at The Indus Hospital; a free-of-cost, charity-based, tertiary care facility in Karachi, Pakistan. We assessed the radiology, lung function, clinical features, and disease progression, as well as, impact on patients' travel for planned clinic visits.

Multidisciplinary meetings were held between a rheumatologist, chest physician and radiologist followed by a monthly PRC. Clinical details were obtained from records in the computerised Health Management Information System, including types of rheumatological and respiratory disorder with respective disease activities. Process mapping was used to compare numbers of planned clinic visits between PRC patients and comparable patients to separate specialty clinics prior to PRC initiation (historical controls).

Thirty-two new patients were referred to the PRC in the first 12 months (96% females, mean age; 52 years). Rheumatoid arthritis (RA) was the commonest rheumatologic disease with lung manifestation (62.5%), followed by systemic sclerosis (18.8%). Computerised tomography (CT) chest findings of undifferentiated interstitial pneumonitis (31.3%), non-specific interstitial pneumonitis (15.6%) and post-infective fibrotic change (9.4%) were made, whilst CT was normal in four patients with CTD. At first presentation, the average Disease Activity Score-28 in RA patients was 5.0 (min-max, 2.8–8.0). This improved in 35.7% of patient, was stable in 28.6% and deteriorated in 35.7%. In RA patients, 80% had respiratory involvement (commonest UIP, n=8). Patients with interstitial lung disease had an average mMRC of 2.06 (median 2) and an average percent predicted FVC of 67.2% (min-max, 12–179%). Process mapping of historical and current patient visits demonstrated that, on average, the number of clinic visits was 14 versus 5 respectively.

Our PRC is the first of its kind in Pakistan. It successfully provides integration of diagnostic and therapeutic clinical care in CTD-ILD, with patients making fewer visits to the hospital. Further research into its cost-effectiveness in this setting is required.

P138 REVIEW OF PATIENT LONGEVITY WHEN MANAGED WITH ANTIFIBROTICS FOR IDIOPATHIC PULMONARY FIBROSIS

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Introduction and Objectives The National Institute for Clinical Excellence (NICE) has recommended the use of nintedanib or pirfenidone for patients with a diagnosis of idiopathic pulmonary fibrosis (IPF) with a forced vital capacity (FVC) between 50 and 80%. There has not yet been a review of real-world data and the impact of antifibrotics on longevity in patients with IPF. This study aims to determine the average duration over which patients with IPF take antifibrotics and whether FVC on initiation impacts this. We hypothesise that patients initiated on an antifibrotic with an FVC above 70% will take antifibrotics for a greater duration.

Methods This is a retrospective analysis of all patients with IPF managed with antifibrotics and includes patients that have stopped therapy as well as those who continue. Data on FVC at initiation, drug therapy, dose and duration was collected from electronic records and analysed.

Results Of 242 patients prescribed antifibrotics, the shortest duration of therapy was less than a month and the longest duration was 67 and 57 months for pirfenidone and nintedanib, respectively. The mean duration of therapy was 14 months for both antifibrotics and there was no significant difference in longevity on antifibrotics based on FVC at initiation.

Conclusions This study demonstrates that within the range of FVC 50 to 80% at initiation most patients prescribed antifibrotics for IPF take therapy for an average of 14 months. We suggest exploring other factors that may impact longevity, including comorbidities.

P139 BLOOD TESTS IN THE DIAGNOSIS OF INTERSTITIAL LUNG DISEASE – WHAT'S THE BLEEDIN' POINT?

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Aim To evaluate the use of blood tests as part of the diagnostic pathway for patients presenting with new interstitial lung disease (ILD).

Method Data for all patients discussed at a local district general hospital ILD multi-disciplinary team (MDT) meeting between 2015 and 2018 was collected by accessing patient electronic records and then analysed.

Results 202 unique patients were discussed in the MDT during the data collection period. The median age of the patients was 73 years. 134 were male and the remaining 68 female.

The most common diagnosis was idiopathic pulmonary fibrosis (34%).

Serum rheumatoid factor levels were checked in 97 patients (48%) with 12 positive results. 6 cases had a known diagnosis of rheumatoid arthritis, with only one new diagnosis of rheumatoid arthritis. Anti-nuclear antibody levels were checked in 99 patients (49%) with 17 positive results, of these 4 had connective tissue disease related ILD, 3 of which were a new diagnosis of connective tissue disease. ANCA levels were checked in 62 patients (31%) with 14 positive results, with no results leading to either a diagnosis of vasculitis or a change in management.

Conclusion Guidance from the British Thoracic Society, NICE and the American Thoracic Society recommends the use of blood tests in the investigation of interstitial lung disease but there is a lack of consensus as to what tests to perform and in whom to perform them. Our data suggests that a wide panel of routine serological testing in all patients had a poor yield in terms of identifying a diagnosis and in changing patient management. Our analysis suggests more judicious selection of blood tests may be helpful in order to avoid patients undergoing unnecessary investigations and to use resources more efficiently.

P140 COMPARISON OF DIFFERENT MEASURES OF DIFFUSION CAPACITY IN SUSPECTED SYSTEMIC SCLEROSIS ASSOCIATED PULMONARY ARTERIAL HYPERTENSION

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Introduction Diffusion capacity of the lung for carbon monoxide (DL_{CO}) incorporates alveolar membrane diffusing capacity (D_M) and pulmonary capillary blood volume (V_C). DL_{CO} is frequently reduced in systemic sclerosis associated pulmonary arterial hypertension (SSc-PAH) due to a reduction in V_C. DL_{CO} may also be reduced in SSc associated pulmonary fibrosis due to lower D_M. Carbon monoxide transfer coefficient ($K_{CO} = DL_{CO}/V_A$) and FVC%/DL_{CO}% incorporate lung volumes and so have been suggested as better markers of gas transfer in patients with SSc.

Methods 850 SSc patients assessed for suspected PAH between 2001–18 were identified. Co-existent extensive lung disease was defined as moderate-severe fibrosis on CT scan or FVC <70% predicted. Correlations with mean pulmonary arterial pressure (mPAP) were calculated using Pearson's test. Receiver Operated Characteristic (ROC) analysis for the presence of mPAP ≥25 mmHg at right heart catheterisation was performed.

Results 700 patients had no/limited lung disease (No/Limited-LD) while 150 patients had extensive lung disease (Ext-LD, table 1). Final pulmonary vascular diagnoses were: 492 SSc-PAH, 128 SSc-PH-Lung, 230 no-PH. Correlations with mPAP in No/limited-LD were stronger for DL_{CO}%(-0.47) and K_{CO}% (-0.45) than for FVC%/DL_{CO}% (0.36), p all <0.001. Correlations with mPAP were weaker in Ext-LD: DL_{CO}%(-0.22), K_{CO}% (-0.22), FVC%/DL_{CO}% (0.18), with only K_{CO}% achieving statistical significance. ROC analysis demonstrated area under the curve (AUC) and optimal thresholds of: DL_{CO}% (0.77, ≤49%), K_{CO}% (0.74, ≤66%), FVC%/DL_{CO}% (0.73, ≥2) for the whole cohort, DL_{CO}%(0.78, ≤50%), K_{CO}% (0.76, ≤66%), FVC%/DL_{CO}% (0.73, ≥2) for No/Limited-LD, and DL_{CO}%(0.76, ≤39%), K_{CO}% (0.65, ≤70%), FVC%/DL_{CO}% (0.72, ≥1.6) for Ext-LD.

Abstract P140 Table 1

	No/Limited lung disease (n=700)	Extensive lung disease (n=150)	p-value
mPAP	36.5	36.8	0.39
PVR	542	515	0.25
FVC%	101	55	<0.001
DL_{CO}%	44	30	<0.001
K_{CO}%	58	61	0.045
FVC%/DLco%	2.6	2.2	0.003

Conclusion Of the three commonly-used measures of diffusion capacity, DL_{CO}% had the strongest correlation with mPAP and the highest AUC for diagnosing PH in patients with no or limited lung disease. Further analysis to identify the optimal measure for assessing likelihood of PH in patients with extensive lung disease is required.

Tools to improve delivery of respiratory care

P141 DEVELOPMENT OF A HEAT MAP TOOL TO ANALYSE VARIATION IN OUTCOMES AND PRESCRIBING FOR PATIENTS WITH ASTHMA IN ENGLAND

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Introduction and Objectives Understanding sub-national variation in asthma prevalence, emergency admissions, prescribing patterns and mortality across England may inform asthma management, treatment, and commissioning. To increase awareness of this variation, AstraZeneca, in collaboration with NHS South, Central and West Commissioning Support Unit, pooled available asthma data from England and developed a visual heat map web-based tool for use by healthcare professionals, patient organisations and policymakers.

Methods Latest available (2012–2019) geographical, statistical and prescribing data from England was sourced from NHS Digital, Public Health England, ONS and IQVIA. Data included locations of hospital sites providing severe asthma treatment, asthma prevalence, mortality, admissions and referrals, excess short-acting beta-agonist prescriptions (defined as six or more in 12 months), prescription fulfilment of inhaled corticosteroid ± long-acting beta-agonist (ICS, ICS/LABA) (defined as 5 inhalers or fewer in 12 months) and more than two prescribed courses of prednisolone in 12 months. Asthma datasets were combined with prescribing data to develop a range of composites. Data was split into quintiles to show variation, and mapped at CCG and, if available, GP practice level. It is believed this was the first time these data sources had been combined in this way.

Results Asthma prevalence was lowest in London and surrounding areas. A 'north-south' divide appears in relation to excess SABA prescribing, with highest prescribing CCGs and GP practices predominately in the north of England (see

Excess SABA prescribing identifies the total number of patients prescribed 6 or more SABA inhalers who were also prescribed a preventer inhaler but not prescribed an antimuscarinic. Figure legends are presented as a proportion of all patients prescribed a preventer inhaler without an antimuscarinic (to attempt to exclude COPD patients).

Abstract P141 Figure 1 Heat map analysis of excess SABA prescribing across CCGs in England

figure 1). Contrasting patterns of variation were seen across ICS and ICS/LABA prescribing, with highest rates in the south of England. GP practices and CCGs with lowest prescribing rates of SABA did not appear to correspond with high rates of prescribing of ICS and ICS/LABA.

Conclusion Sub-national diversity existed in all datasets, with prescribing patterns showing the most significant variation. Asthma is a complex condition confounded by numerous variables, and these patterns could be indicative of other factors e.g. the role of deprivation, air quality etc. - further research would be needed to determine this correlation. However, despite data limitations, this tool could be an important tool across the NHS in England to identify areas to prioritise locally.

P142 A DECREASE IN REFERRALS TO SECONDARY CARE FOLLOWING THE IMPLEMENTATION OF A NOVEL INTEGRATED CARE SYSTEM IN THE NORTH WEST OF ENGLAND

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Promoting integrated care is a key goal of the NHS long term plan to improve population respiratory health. In the Morecambe Bay Clinical Commissioning Group we have built an integrated care system called the Morecambe Bay Respiratory Network (MBRN). The network involves funding Primary Care teams to develop in-house specialist respiratory clinics which are supported by a monthly multi-disciplinary meeting (MDT) with support from secondary care and community teams. Patients are discussed from both diagnostic and management perspectives. This is backed up by a rolling programme of education for all local primary, community and secondary care staff.

This was implemented in 4 practices in North Lancashire in 2016, with a further 10 practices from Barrow-in-Furness joining in 2019. All practices have a designated clinician who leads on respiratory integrated care for their practice. They have direct access to appropriate blood test panels, pulmonary function testing and thoracic CT scanning. Two secondary care consultants provide advice at all MDTs.

Compared to a baseline of 2017/18, in 2019/20 there was an overall reduction in referrals to Respiratory outpatients from MBRN practices of -36%. By contrast referrals from local practices outside the MBRN structure increased by +12% over the same period. The observed reduction in referral to secondary care was not associated with increased non-elective admissions from participating practices (-7% in 2019/20 vs 2017/18 baseline) suggesting that disease control was not adversely affected. Evidence of improved quality of care is reflected in a significant increase in referrals for pulmonary rehabilitation for patients with eligible criteria in March 2020 compared to March 2019 (80% vs 54% in North Lancashire and 71% vs 35% in Furness).

This data from our novel integrated system demonstrates a significant reduction in secondary care referrals and improved patient care within the primary care setting. The data is supported by excellent patient feedback and staff satisfaction surveys.

P143 USING HOSPITAL ADMISSION TO OFFER INFLUENZA VACCINATION TO CLINICALLY AT-RISK ELIGIBLE INPATIENTS; WHAT IS THE NEED AND WHAT IS THE UPTAKE? TWO YEARS EXPERIENCE IN ONE ACUTE TRUST

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Background All Hospital Trusts in England are expected to offer influenza vaccination to eligible inpatients during Winter 2020–21. There is currently no data on which to model need and uptake of this approach by clinicians and patients.

Abstract P143 Table 1 Inpatient influenza vaccinations administered October 2018–19 and 2019–20 in one Acute Trust; patient characteristics, indication for vaccination, reason for admission, specialty ward and snapshot mortality June 2020

	2018–2019	2019–2020	Total
Inpatient vaccinations n	71	88	159
Mean age [range] years	61 (19 – 94)	63 (18 – 94)	62 (18–94)
Mortality at June 2020 n (%)	20 (28%)	12 (14%)	-
INDICATION FOR INFLUENZA VACCINATION			
COPD	28	41	69
Asthma	22	14	36
Bronchiectasis	1	1	2
Interstitial Lung Disease (ILD)	1	4	5
Heart Failure	2	5	7
Diabetes Mellitus	1	6	7
Sickle Cell disease	1	1	2
Immunosuppression	3	5	8
Cancer	4	2	6
Chronic neurological condition	3	7	10
Age alone	5	2	7
REASON FOR ADMISSION			
Exacerbation of COPD	15	24	39
Exacerbation of Asthma	18	12	30
Exacerbation of Bronchiectasis	1	1	2
Exacerbation of ILD	3	2	5
Pneumonia on background of COPD	7	11	18
Pneumonia on background of asthma	2	1	3
Pneumonia (without known respiratory disease)	6	9	15
Lung Cancer complication	5	1	6
Pulmonary Embolism	1	2	3
Pleural Effusion	0	1	1
Pneumothorax	0	1	1
Immunosuppression	1	2	3
Heart Failure	3	3	6
Acute Kidney Injury	2	2	4
Frailty complications	6	12	18
Sickle Cell Crisis	1	2	3
Other	0	2	2
WARD OF ADMISSION	n=71	n=88	n=159
Respiratory	54	60	114
Care of the Older Person	6	16	22
Cardiology	4	1	5
Acute Medicine	3	3	6
Gastroenterology	1	4	5
Surgery	3	4	7

In 2018 addressing vaccination status was added to the COPD 'Bundle' used in our hospital, electronic influenza vaccine prescription was introduced following NICE guidance recommending offering vaccination to eligible inpatients and checking vaccination status and offering to appropriate patients was included in respiratory ward reviews.

Aim To evaluate the uptake and characteristics of inpatients offered and accepting influenza vaccination over Winter 2018–19 and 2019–20 in one Acute Trust.

Methods Data on inpatient influenza vaccine prescriptions between October-March 2018–19 and 2019–20 was obtained from our electronic prescribing system. Electronic records of each admission were reviewed and analysed for patient demographics, reason for admission, indication for vaccination, ward and mortality at June 2020.

Results See table 1 for results. 159 inpatient vaccinations were administered over 2 years. Mean (range) age was 62 (18–94) years and mortality at 1+ year was 28%. 114 (72%) were on our 23-bed respiratory ward. By year 2, 32% (28/88) vaccines were administered on other wards. 2/3 vaccines were for patients with COPD or asthma.

Discussion Our data suggests that offering influenza vaccination to inpatients is a feasible and sustainable intervention for which there is patient demand. Approximately 2 vaccinations/week were administered on a 23-bed respiratory ward. Inpatients were also vaccinated on other wards; with >60% increase on elderly-care wards in year 2. This was largely due to prescribing by trainees who had completed a respiratory rotation and continued to offer vaccination in subsequent roles.

The high snap-shot mortality at June 2020 (28% 1 year+) is a reminder of the high risk of death for inpatients eligible for influenza vaccination. Our findings suggest that clinicians want to offer vaccination and that there are groups of unvaccinated inpatients who take up the offer of influenza vaccination. In the era of COVID-19, it is particularly important this population is vaccinated. Face-to-face contact during admission is an opportunity we should be using to do this.

P144 STANDARDISING FOLLOW UP OF SYMPTOMS, TESTS, AND OUTCOME ASSESSMENT AFTER HOSPITALISATION FOR EXACERBATION OF COPD – A DELPHI SURVEY

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Introduction and Objectives Hospitalised exacerbations of COPD lead to significant morbidity and mortality. Unlike most other common conditions treated in hospital (eg. pulmonary embolism and myocardial infarction), international guidelines do not define clinical characteristics, tests and outcomes to be assessed at time of follow up. We sought to evaluate the current Europe-wide expert view on demographic, clinical characteristics, comorbidities, investigations, and clinical outcomes to be assessed at follow up after a hospitalised exacerbation of COPD.

Methods A modified online Delphi survey of COPD experts was performed. 3 iterative rounds were undertaken. Importance and feasibility of items were assessed. Consensus and stability criteria were pre-defined.

Results 25 COPD experts from 18 European countries completed all 3 rounds of the Delphi survey. Of the 31 clinical signs assessed, 13 (42%) clinical signs achieved consensus as important to capture at time of follow up after hospitalised exacerbation of COPD. Similarly, only five clinical scores and questionnaires were thought to be important to capture at time of follow up after hospitalisation. These were the modified Medical Research Council (mMRC) dyspnoea index, COPD Assessment Test (CAT), the BODE index (BMI, Obstruction, Dyspnoea and Exercise Capacity), the Global initiative for chronic obstructive lung disease (GOLD) I-IV and A-D classifications. Experts agreed by consensus that they would consider most of the scores at time of follow up but would not suggest including them routinely.

Abstract P144 Table 1 Tests at time of follow up after hospitalisation for exacerbation of COPD

Must include	Consider inclusion	Exclude
Arterial Blood Gas	Urea, electrolytes, and creatinine	Liver function tests
Full blood count	Brain Natriuretic Peptide	Phosphate, calcium, magnesium
Spirometry	Sputum microscopy & culture	Lactate Dehydrogenase
Inspiratory capacity	Glucose	Fibrinogen
Diffusion capacity of lung for carbon monoxide	C-reactive protein	D-Dimer
Plethysmography	Electrocardiogram	Immunoglobulins
	Chest X-Ray	Procalcitonin
	Sit to stand	Urine dipstick
	Patient symptom diaries	Urine microscopy and culture
		Viral throat swabs
		Glycated Haemoglobin
		Exhaled Nitric Oxide
		Frequency oscillometry testing

Conclusion Hospitalised exacerbations of COPD are managed and followed up differently throughout Europe. Standardisation will help guide research to improve outcomes

P145 IMPROVING THE FOLLOW-UP OF PATIENTS WITH EXACERBATIONS OF ASTHMA AFTER DISCHARGE FROM THE EMERGENCY DEPARTMENT

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Introduction and Objectives We sought to improve the care of patients who presented with asthma exacerbations based on recommendations from the National Review of Asthma Deaths (NRAD) and the British Thoracic Society (BTS) asthma bundle.

Methods We developed a specialist nurse-led service to follow-up patients with exacerbations of asthma within 48 hours of discharge from the emergency department (ED). We also digitalised the asthma proforma used for assessment of patients by the respiratory specialist nurse team.

We evaluated these changes by collecting data on the proformas and discharge letters completed during follow-up and compared them with the results of an ED audit to determine whether the appointments were better addressing the BTS recommendations. We also compared the updated proformas with previous proformas and recorded the information subsequently relayed to primary care.

Results We identified 63 patients who were referred for outpatient follow-up between January – June 2019, which 55/63 (87%) attended. There was a statistically significant increase in the number of patients having the BTS recommendations addressed compared to the 2015 ED audit where comparable data was available (Table 1).

Comparison of the old assessment proformas with their subsequent discharge letters showed that salient information was often not relayed to primary care e.g. smoking status confirmed in 100% of proformas but only available in 4.2% of discharge letters. Initial testing of the digitalised proformas showed that more recommendations were addressed and relayed to primary care.

Abstract P145 Table 1 Where comparable data were available they were analysed with Chi squared test for independence

Recommendations addressed	2015 audit n=49 (%)	2019 follow-up n=55 (%)	p value
Inhaler technique	10 (20.4%)	34 (61.8%)	<0.0001
Medication review	N/A	55 (100%)	
Self-Management plan	2 (4.1%)	38 (69.1%)	<0.0001
Triggering Factors	N/A	25 (45.5%)	
Follow-up	2 (4.1%)	53 (96.4%)	<0.0001

Conclusion Specialist nurse-led asthma follow-up appointments have improved the quality of care we provide to our asthma patients. Both the number of patients who receive follow-up after an asthma exacerbation and the quality of their assessment have improved in line with BTS recommendations. We hope that ongoing work on the assessment proformas will further increase our adherence to these recommendations and improve communication with primary care.

P146 RESPIRATORY IMPROVEMENT PROGRAMME: COPD REVIEWS IN PRIMARY CARE BY PHYSICIAN ASSOCIATES

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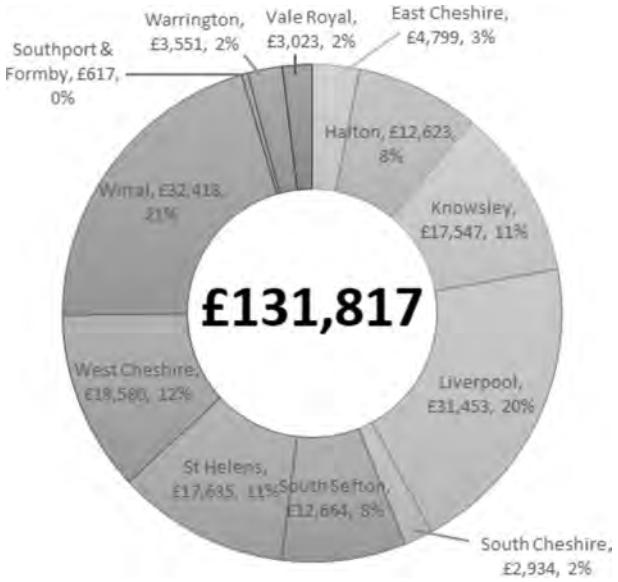
10.1136/thorax-2020-BTSabstracts.291

Background The NHS Long Term Plan prioritised respiratory health, whilst also highlighting difficulties in recruiting a skilled workforce as a significant barrier to service improvement. As a result, Cheshire and Merseyside Health and Care Partnership have been awarded 'transformation funding' to run a Respiratory Improvement Programme in 2019–2020.

Aims The aim of the programme is to deliver the first wide collaborative respiratory workforce, to improve respiratory care for patients with COPD and bring Physician Associates (PA) into the workforce. PA's are a new type of healthcare professional who, while not a doctor, works to the medical model.

Methods Patients with a diagnosis of COPD & prescribed LAMA and ICS/LABA inhalers were reviewed within primary care. Optimisation of medication to either Dual or Triple device was initiated from June 2019 – Dec 2019. The optimisation of inhaled medication is in line with GOLD, (2019) strategy.

Results Following optimisation an end of year saving of £191,280 was predicted. In addition there was an increased up take of pulmonary rehab referrals, smoking cessation intervention and flu vaccinations.



Abstract P146 Figure 1 Savings from inhaler optimisation by CCG

Conclusion The benefits of this implementation demonstrate quality cost saving care as well as appropriate medication switches, providing a favourable impact on health and potential reduction in exacerbations following review from a PA.

P147 IMPACT OF A DEDICATED PALLIATIVE CARE FOCUS WITHIN AN INTEGRATED RESPIRATORY TEAM ON ADVANCE CARE PLANNING

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10.1136/thorax-2020-BTSabstracts.292

Aims and Objectives An integrated respiratory team (IRT) was established as a service innovation pilot project to improve

outcomes for patients with long term non-malignant respiratory conditions. Existing community respiratory services did not include routine provision for specialist palliative care input into symptom control and holistic and integrated end of life care, and advance care planning (ACP) was not routinely undertaken.

Methods Regular MDT meetings were held where community palliative care clinical nurse specialists, and palliative medicine consultants, worked with community respiratory nurses, physiotherapist, occupational therapist, psychologist/CBT therapist and an IRT GP. A lead worker was identified for each patient. Patients were referred following hospital discharge, by community teams or from primary care. All patients had an opportunity for ACP, and DNACPR documentation was updated to be consistent through hospital, community and primary care electronic systems. 'Just in case' subcutaneous medications were made available for those wishing to be cared for at home. Symptom management optimisation included breathlessness management using 'Thinking, Functioning, Breathing' model, and evaluation of psychological factors. Originally provided by telephone, home visits and hospice day centre, support by phone continued through COVID shielding period.

Results 104 patients were on the IRT palliative caseload between July 2019 and July 2020. All patients received assessment of symptom management. 69 patients (66.3%) had completed ACP, 17 (16.3%) had ACP in progress and 18 (17.3%) had no ACP (declined/in progress/none recorded). Of the total 49 deaths, 27 (55%) died in their usual place of residence, 15 (31%) in hospital, and 7 (14%) in hospice. Of the 35 patients who died and had completed ACP, 28 (80%) died in their preferred place of care/death (PPC/D), and 4 patients died in hospital and 3 in a hospice where PPC/D was usual place of residence.

Abstract P147 Table 1 Comparison of place of death between patients under IRT palliative team, previous year Oxfordshire (Oxfordshire CCG) and England (Public Health England end of life care statistics)

Place of death	IRT patients (2019)	England (2018)	Oxfordshire (2018)
Home	41%	23.8%	23.3%
Care home	14%	22.5%	28.3%
Hospital	31%	45.4%	38.4%
Hospice	14%	5.9%	7.2%

Conclusions Embedding a palliative MDT within an integrated respiratory team gave access to palliative care expertise and services which were not previously routinely available to this group of patients. More patients died at home or in a hospice, which for the majority of those who had completed ACP, was in accordance with their wishes.

P148 REDUCING 30-DAY READMISSIONS THROUGH THE ESTABLISHMENT OF A POST DISCHARGE VIRTUAL WARD FOR PATIENTS ADMITTED WITH AN EXACERBATION OF COPD

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10.1136/thorax-2020-BTSabstracts.293

Aims and Objectives An Integrated Respiratory Team (IRT) was established as a service innovation pilot project to improve outcomes for patients with COPD. As part of the IRT pilot, a Virtual ward for patients discharged from hospital within the past 30 days was established, in order to address aspects of care that would impact on 30 day re-admission rates which had peaked at 24% in April and May 2018. Meetings were held weekly including new IRT members of the multi-disciplinary team alongside existing community respiratory team to address factors which might lead to increased risk of readmission.

Methods The IRT pilot project focused on patients within 2 localities within the county covering a population of 315,694 with 3994 diagnosed with COPD (1.26% prevalence)

Weekly meetings were held over 15 months, attended by the Respiratory consultant, IRT lead nurse, Occupational Therapist, Physiotherapist, Psychological Therapist and members of the existing community team. As well as clinical management, aspects of care addressed included referrals to smoking cessation, referrals for home exercise or pulmonary rehabilitation, assessment of psychological status and referral for therapy if indicated, identification of those patients where an advanced care plan would be appropriate, and housing issues (heating, damp) related to environmental risks to health.

Results 267 City patients and 153 North patients were 'admitted' to the virtual ward.

105 (24%) patients were readmitted with a COPD exacerbation during the 15-month duration of project. However, only 37 (8.6%) were readmitted within 30 days of the index admission. During this period, patients outside the IRT area within the county had a 30-day readmission rate of 14.9%, Local COPD re-admission rates had remained around 14.8% for the 5 years up to 2017/18. [1]

Abstract P148 Table 1 Outcomes of intervention within the virtual ward meetings

430 patients					
Smoking cessation	49% ex smokers	27% of smokers referred for support	73% of smokers declined referral		28% Not documented
Pulmonary Rehabilitation PR/ home exercise HE	21% referred for PR	11% referred for HE	21% declined	12% too frail/End of life	35% not documented
Psychological input	10% referred	15% declined	35% assessed and no issues		51% not documented
Advanced Care Planning (ACP)	10% ACP in place	10% agreed to ACP	6% declined Discussion	17% not indicated	57% not documented
Housing and Environmental need	15% referred	2% already in system	56% required no input		26% not documented

This readmission data suggests that for this group of patients who received enhanced multi-disciplinary input from the IRT, there was a reduction in 30 day readmission rates which would lead to improved outcomes for individual patients, and potential health economic benefits if extrapolated to the whole patient population.

REFERENCE

1. 2nd Atlas of Variation in risk factors and health care for respiratory disease in England 2019. http://tools.england.nhs.uk/images/RespiratoryAtlas/atlas.html; Accessed 19/08/2019

P149 TELEHEALTH AND ACCESS TO MEDICATIONS IN AN ERA OF COVID-19. EXPERIENCE FROM VIRTUAL CLINICS FOR PATIENTS WITH SEVERE ASTHMA ON BIOLOGICS

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10.1136/thorax-2020-BTSabstracts.294

Introduction Enforced social distancing (i.e. lockdowns) greatly facilitated control of Coronavirus Disease 2019 (COVID-19). Whilst access to hospitals was restricted, outpatient care continued remotely. At our institute, the biologic therapy for asthma is only prescribed after evaluation by a pulmonologist specializing in severe asthma. The treatment is administered on site by specialist nurses who follow manufacturers' recommendations. The aim of this study was to determine the satisfaction of patients with severe asthma with telemedicine, and the impact of COVID-19 lockdown on their receipt of biologics and other treatments for asthma.

Methods A cross-sectional survey of 58 patients with severe asthma scheduled to receive biologic therapy at our hospital during the lockdown was performed with ethical approval.

Results Fifty-four patients participated (F 37; mean age 46.7 years; response rate 93.1%). Their experience of biologic therapy, medication supply, and telemedicine are displayed in table 1. Mean time since diagnosis was 19.2 years (SD 11.5 years). All had been on biologic therapy Omalizumab (45), Mepolizumab (7), or Dupilumab (2) for over three months (mean 38.4 months± SD 26.5 months).

Fifty (92.6%) had telephone follow-up, 31 (57.4%) were satisfied with telemedicine, 45 (81.4%) agreed that biologic therapy improved their asthma, and 40 (74.1%) received scheduled biologic therapy. Of the 45 patients living in the city, nine did not receive biologic therapy, two cited the lockdown as the reason for this; two did not receive an appointment; two did not perceive any benefit; two had other reasons. Five of the nine patients living outside the city did not receive biologic therapy, 3 because of the lockdown, and 1 for fear of acquiring COVID-19. Alarmingly, 16 (29.6%) suggested that they had insufficient medications, and 27 (50%) reported difficulty obtaining medications.

Abstract P149 Table 1 Patient perceptions on availability of medications, telemedicine and biologic therapy

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Asthma improved with biologic	4	3	2	8	37
Sufficient medications	7	9	3	11	24
Difficulty obtaining medication	21	9	7	10	17
Satisfied with telemedicine	2	3	18	14	17

Conclusions Many patients were satisfied with telemedicine, so this could be used to deliver routine outpatient tertiary care post-pandemic. However, during the lockdown, some patients did not receive scheduled biologic therapy and had insufficient medications. Thus, logistics around supplying medications, and biologics must be considered in plans preparing for a second wave of COVID-19. Teaching patients to self-inject biologic therapy should be considered.

P150 EVALUATION OF MYCOPD, A DIGITAL SELF-MANAGEMENT TECHNOLOGY FOR PEOPLE WITH COPD, IN A REMOTE AND RURAL POPULATION

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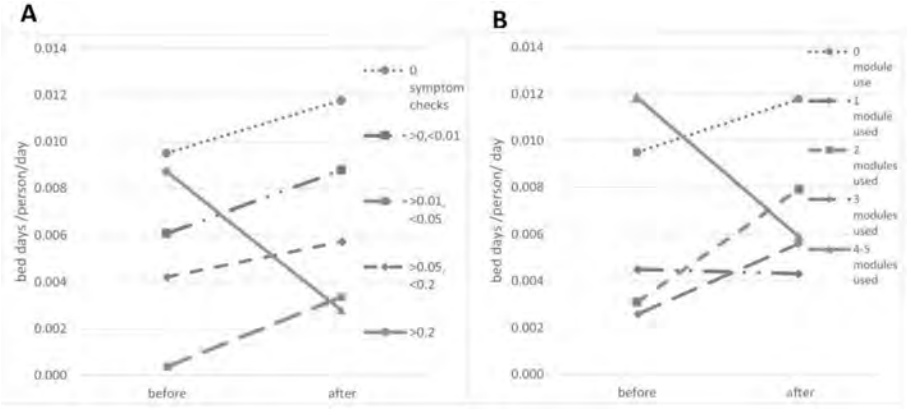
Aim The prevalence of chronic obstructive pulmonary disease (COPD) in poor, remote, and rural populations is twice that of cities (15.4% versus 8.4%).[1] COPD costs the NHS an estimated £1.9bn/year[2] and is characterised by exacerbation frequency and severity. Disease education and self-management are critical to reducing the healthcare burden for patients with COPD.

We evaluated myCOPD, a digital self-management technology in a predominantly remote and rural population. We



Abstract P150 Figure 1 Individuals with a high level of engagement with myCOPD defined either by (A) frequency of symptom scoring or (B) number of modules used show a reduction in bed days (bed days/person/day)

assessed whether myCOPD was effective in reducing hospital admissions, inpatient bed days and other NHS service usage.

Method 120 people were recruited over 6 months. We compared data regarding hospital admissions, inpatient bed days, clinic attendances, out of hours contacts and home visits 12 months before and up to 12 months after myCOPD activation. To account for differences in activation rates and the early termination of the study due to COVID-19 data was reported as daily outcome measures.

Results The average participant age was 67, with a GOLD score 1–4 (average 2.7). The average 6-fold urban-rural score was 4.23 indicating a predominantly remote and/or rural population. 78% of patients activated myCOPD, 70% recorded their symptom score at least once, and 45% used >1 myCOPD module. There was no association between myCOPD use and participant demographics.

There were no statistically significant differences in hospital admissions, inpatient bed days, or other health service utilisation before and after myCOPD activation. However, a subgroup analysis found that those individuals with the greatest degree of myCOPD engagement either by frequency of symptom scoring (figure 1A) or by numbers of modules used (figure 1B) did show a reduction in bed days.

Conclusion These data indicate no association between myCOPD use and either reduced bed days or other NHS service use on a whole group level however it may be of benefit to individuals with higher levels of engagement. Overall these results have significant implications regarding the design and evaluation of novel service innovations in COPD and other chronic disorders.

REFERENCES

1. Raju S, *et al*. Rural Residence and Poverty are independent risk factors for chronic obstructive pulmonary disease in the United States. *AJRCCM* 2019;**199** (8):961–969.
2. Trueman D, *et al*. Estimating the economic burden of respiratory illness in the UK. British Lung Foundation 2017. URL: https://www.blf.org.uk/policy/economic-burden

P151 CO-DESIGNING A DIGITAL SELF-MANAGEMENT PLAN FOR BRONCHIECTASIS

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10.1136/thorax-2020-BTSabstracts.296

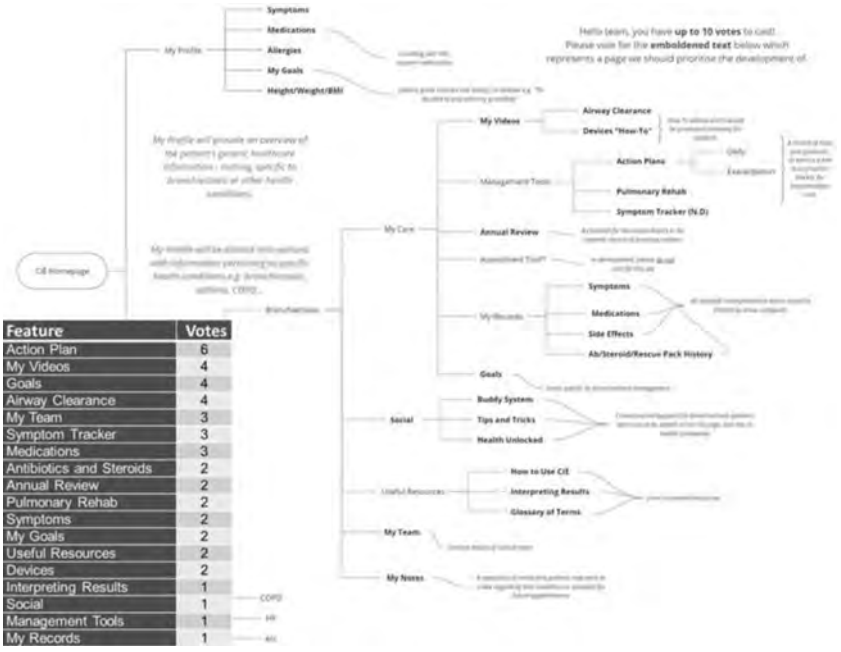
Introduction Bronchiectasis patients rely on self-management to minimise symptoms, prevent exacerbations, and halt disease progression. A collaboration between Imperial College London, the Trust, and three patient partners was developed to transform the current paper-based self-management plan into a digitised tool embedded in the personal health record.

The aims of this project are to improve the appropriateness of healthcare utilisation, provide easy access to care information, share information across the care team, and digitise routine patient education (e.g. airway clearance).

Methods We convened a series of codesign workshops with representatives of the bronchiectasis multidisciplinary team and three public partners who live with bronchiectasis. Participants developed an idealised self-management webpage, in terms of contents, practical use, and potential patient safety risks. The contents of the plan were also informed by an expert panel with national representation.

A priority-setting exercise with the entire multidisciplinary team identified highest-priority features. The prototype was then adapted for inclusion in the patient-facing record. A process evaluation will guide revisions to the plan. Correlations between engagement, health status, and demographic variables will also be explored.

Results The expert panel produced a list of 20 key skills and information for effective self-management. There was a high degree of consensus on what should be included, with 97.2% of participants agreeing on the final set. Topics included: airway clearance, shared decision-making, antimicrobial resistance, and knowing when to seek medical help.



Feature	Votes
Action Plan	6
My Videos	4
Goals	4
Airway Clearance	4
My Team	3
Symptom Tracker	3
Medications	3
Antibiotics and Steroids	2
Annual Review	2
Pulmonary Rehab	2
Symptoms	2
My Goals	2
Useful Resources	2
Devices	2
Interpreting Results	1
Social	1
Management Tools	1
My Records	1

Abstract P151 Figure 1

Figure 1 summarises the key features of the digital self-management plan, as identified by the codesign group. Highest priority features were 1) the exacerbation action plan, 2) videos demonstrating proper airway-clearance techniques, and 3) goal-setting. These three priorities were taken forward for the initial launch.

Discussion Previous implementation research suggests that digital interventions fail when they neglect to account for user experience (van Gemert-Pijnen *et al*. 2011, DOI: 10.2196/jmir.1672). This project produced a digital self-management plan in collaboration with both patient partners and the multidisciplinary team who will use the plan. We plan to quantify the impact of this tool through patient and clinician feedback, as well as engagement data.

P152 IDENTIFICATION OF COMORBIDITIES SUCH AS ANXIETY AND DEPRESSION USING SCREENING QUESTIONNAIRES IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS

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10.1136/thorax-2020-BTSabstracts.297

Introduction and Objectives Comorbidities in idiopathic pulmonary fibrosis (IPF) can impact patient quality of life and reduce survival (Kreuter *et al*. Respiratory Research 2007; 18:139). This study aims to review the routine use of screening questionnaires to aid identification of anxiety, depression, obstructive sleep apnoea (OSA) and assess related quality of life in patients with IPF. We hypothesise that a significant number of patients with previously unmanaged anxiety, depression and OSA will be identified and will report a reduced quality of life.

Methods An electronic tablet with screening questionnaires, including Patient Health Questionnaire-9 (PHQ-9), Generalised Anxiety Disorder-7 (GAD-7), STOP-BANG Sleep Apnoea and King's Brief ILD Questionnaire (KBILD), was provided to each patient with IPF to complete before review with the specialist pharmacist. Patients identified at risk of these comorbidities were referred for further investigation and/or management.

Results A total of 55 patients with IPF completed the screening questionnaires. Of these, 29% (n=16) were identified with some depressive symptoms (16%, n=9) or probable major depression (13%, n=7), 16% (n=9) were identified with mild anxiety (5%, n=3) or significant anxiety (10%, n=6) and 58% (n=32) were identified at high risk of sleep apnoea and referred for further investigations. All of these patients reported a reduced quality of life.

Conclusions Screening questionnaires can be useful for the identification of comorbidities such as anxiety, depression and sleep apnoea in IPF. We suggest ongoing studies to assess how quality of life is affected by these comorbidities and to review impact of intervention over time.

P153 RESPIRATORY IMPROVEMENT PROGRAMME: ADMISSION AVOIDANCE IN THE EMERGENCY DEPARTMENT BY PHYSICIAN ASSOCIATES

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Background The NHS long term plan has prioritised respiratory health and also highlighted difficulties in the recruitment of a skilled workforce as a significant barrier to service improvement. The Cheshire & Merseyside Health & Care Partnership have been awarded 'transformation funding' to facilitate a Respiratory Improvement Programme 2019–2020.

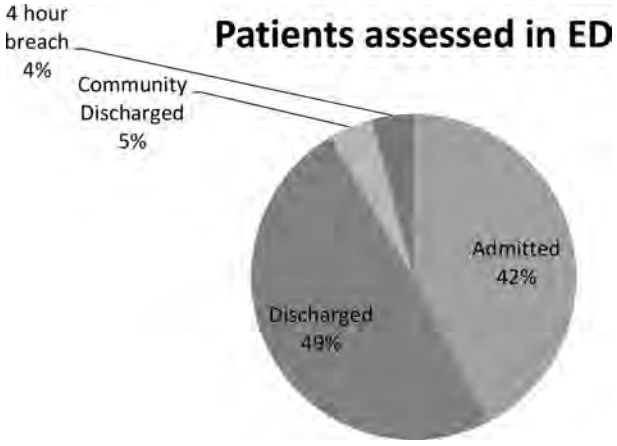
The emergency department (ED) is the forefront of the MDT and team working. The current workforce requirements and difficulty in recruitment and retention of medical staff have prompted the consideration of PAs in the emergency department.

The increase in respiratory illnesses during winter months puts increased pressure on emergency departments and admissions double in winter months, which is challenging for hospital capacity and flow. Traditionally, the NHS delivers the same workforce model all year round for patients with respiratory illnesses, rather than adapting to its workforce based upon this seasonal variation.

Aim The aim of this project was for PAs to manage patients with respiratory illnesses in the ED, improving the care of patients who have an acute exacerbation of their chronic respiratory condition, boost the frontline respiratory workforce in the ED, act as a link between care settings to improve collaborative working, avoiding admissions and utilising Early Supported Discharge where possible.

Method 6 PAs based in emergency departments across 3 acute hospital trusts to support acute respiratory care. PAs would assess and manage any patient triaged as the following; shortness of breath, difficulty in breathing, cough, haemoptysis, chest pain/pleuritic chest pain.

Results PAs assessed a total of 392 patients, admitted 182 (46.43%) and discharged 210 (53.57%). 19 (4.85%) patients were discharged with Community Respiratory Teams. 18 (9.89%) patients were admitted to an Observation Unit to await results due to 4 hour breach and were discharged once results were received.



Abstract P153 Figure 1 Percentage of patient outcome from ED

Conclusion This innovative way of working as part of the MDT not only provided a safer patient flow, but as respiratory PAs, patients received an excellent bundle of respiratory care within the acute setting. The close links with local community respiratory teams and rehabilitation services enhanced the management and transition of care back to the community effectively.

TB or not TB, is that the question?

P154 AN 11-YEAR RETROSPECTIVE REVIEW OF NON-TUBERCULOUS MYCOBACTERIUM ISOLATES IN A SOUTH LONDON TEACHING HOSPITAL, 2008–2019

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10.1136/thorax-2020-BTSabstracts.299

Introduction We describe the 11-year experience of pulmonary non-tuberculous mycobacterial (NTM) infections at a London teaching hospital, looking at the NTMs isolated, their clinical relevance and the demographics of those affected.

Methods A retrospective search of our microbiology database was performed to identify pulmonary microbiological samples containing NTM from January 2008 to December 2019 from adult patient in our institution. Demographic, clinical, and microbiological data were collected

Abstract P154 Table 1 Comparison of the demographics and diagnostic investigations between treated and untreated isolates, and frequency of treatment by NTM isolated. Note: the prevalence of each co-morbidity may be higher than in the overall cohort as some patients appear in both cohorts. Other immunocompromise includes haematological malignancies and congenital immunodeficiencies

	Treated (n = 108 isolates)	Not treated (n = 436 isolates)
Mean age (years)	58.7	61.9
Male (n,% of total)	70, 65%	244, 56%
Co-morbidities	**(n = 103 patients)**	**(n = 381 patients)**
Bronchiectasis (n,%)	57%	161, 42%
COPD (n,%)	50, 49%	125, 32.81%
Asthma (n,%)	8, 7.8%	48, 12.6%
Post-TB bronchiectasis (n,%)	8, 7.8%	25, 6.56%
Type 2 Diabetes Mellitus (n,%)	1, 1%	28, 7.35%
HIV (n,%)	10, 9.8%	28, 7.35%
Other immunocompromise (n,%)	4, 3.9%	10, 2.6%
Diagnostic sample	**(n = 108 isolates)**	**(n = 436 isolates)**
Sputum (n,%)	103, 95%	420, 96%
BAL (n,%)	38, 35%	96, 22%
Tissue (n,%)	2, < 0.1%	3, < 0.1%
NTM treatment	**n (% of treated)**	**n (% of not treated)**
M. kansasii	50, 46%	36, 8%
MAI	31, 29%	140, 32%
M. xenopi	10, 9%	26, 6%
M. abscessus	4, 3.7%	10, 2%
M. chimaera	4, 3.7%	10, 2%
M. mhelonae	3, 2.8%	82, 19%
M. malmoense	2, 1.9%	3, 0.7%
M. gordonae	1, 0.9%	69, 15.8%
M. fortuitum	1, 0.9%)	42, 9.7%
M. simiae	2, 1.9%)	0
M. mucogenicum	0	7, 1.6%
M. peregrinum	0	6, 1%
M. scrofulaceum	0	3, 0.7%)
M. interjectum	0	1, 0.2%)
Mycobacterium spp	0	1, 0.2%

Results A total of 4798 pulmonary samples were processed with 1211 positive NTM cultures, obtained from sputum, bronchoalveolar lavage, and lung biopsies. A different NTM was isolated in 544 instances in 475 unique patients, but 414 of these isolates (381 patients, 80% of total) were felt to be causing no active NTM pulmonary disease as defined in the most recent ERS/ATS guidelines[1]. 59% of patients were male, mean age 60 years. Frequent co-morbidities were bronchiectasis (49%), COPD (39%), and asthma (12%). 5.2% of patients had HIV/AIDS. 15 different species were isolated, the most common being *M. avium* (172 patients, 31%), followed by *M. Kansasii* (88, 16%) and *M. Chelonae* (85, 15.6%). There was no observable trend in the frequency of isolates throughout the study period. 108 cases of NTM lung infection were treated in 103 patients. 5 patients were treated for more than one organism simultaneously. 22 cases of NTM lung infection were not treated for a number of reasons, most frequently due to patient refusal (5 patients, 23%), whilst 4 (18%) were lost to follow-up, 4 (18%) died before treatment could be started, and in 4 (18%) conservative management with chest clearance and observation was the chosen therapeutic strategy. A high proportion of *M. Kansasii* pulmonary infection was treated (86%).

Conclusion There is high species diversity in our isolated NTMs, with a predominance of M. avium, as seen in other studies of UK data[2] but there was a notably higher frequency of M. Kansasii isolated and treated. Unlike other studies, there was no observable trend in the frequency of any of the isolates.

P155 TARGETED TUBERCULOSIS SCREENING PROGRAMME FOR NON-MEDICAL UNIVERSITY STUDENTS: CHARACTERISTICS AND OUTCOMES

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10.1136/thorax-2020-BTSabstracts.300

Introduction and Objectives Case finding of active tuberculosis (TB) and screening for latent tuberculosis (LTBI) in high risk individuals are important cornerstones of the UK's TB control policy. Non-medical university students arriving in the UK from high prevalence TB countries are required to undergo pre-entry active TB screening. There is a scarcity of data available to inform health authorities on this subject and to determine if screening in this group is warranted or cost effective. We assessed the impact of a TB screening programme amongst a non-medical university student population originating from countries with a high TB prevalence.

Methods A prospective, longitudinal study was conducted over a 10 year period at university in the North-East of England. Non-medical students from countries with high TB prevalence (≥40/100 000) were identified and invited to participate in the TB screening programme. A Mantoux skin test or interferon gamma release assay (IGRA) was performed at initial screening following a symptom and medical history questionnaire. Individuals who tested positive for either test were invited for second consultation, where IGRA testing

was performed if the Mantoux test was initially positive, offered HIV and viral hepatitis screening and onward referral to a consultant-led TB clinic for further investigation and management.

Results A total of 628 students (72% male) were invited to participate of which 574 (91.4%) underwent initial screening. 59 students declined or were unsuitable to undergo initial or further screening (dropout rate = 9.4%). 78 students (13.5%) attended a second consultation of which 43 (7.5%) were referred onwards to the consultant-led TB clinic for further assessment. No active cases were identified during the study period and 27 students (4.7% of those tested and 63% of those who screened positive) went on to complete treatment for LTBI.

Conclusions There was a significant uptake of TB screening and a considerable number of students were diagnosed with LTBI. The cost-effectiveness of such a programme was not directly evaluated. The provision of a targeted TB screening programme in this setting may reduce the burden of disease within the UK and the countries to where most of the students return.

P156 A LONDON CENTRE BASED REVIEW OF TUBERCULOSIS POST KIDNEY TRANSPLANTATION

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10.1136/thorax-2020-BTSabstracts.301

The incidence of active tuberculosis (TB) post renal transplantation is much higher than the general population. This has previously been described as presenting in the first year following solid organ transplantation and is predominantly due to reactivation of latent TB infection (LTBI)(1). Diagnosis can be challenging in this patient group who may present with atypical presentations or extra-pulmonary infection. Our aim was to assess the active TB incidence in our post renal transplant population.

In our London based renal transplant centre, retrospective data was collected including demographic data, site of disease and culture positivity. Electronic patient records and our TB database was analysed for case details for rates of active TB.

Abstract P156 Table 1 A table showing the patients that developed active tuberculosis, post renal transplantation

Age/ Gender	Ethnicity	ESRD cause/ (type of Tx)	Time to TB diagnosis post Tx (years)	LTB Screen	TB Prophylaxis at diagnosis	Site of TB	TB Investigations	Drug resistance	Length of TB treatment	(months)	Post TB Prophylaxis
41.2F	Afro-Caribbean	Unknown(DD)	7.8	No	Isoniazid	EPTB	LN Bx IGRA reactive Culture positive	Isoniazid	12	No	
58M	Indo-Asian	IgAN (LD)	5.6	No	No	EPTB	LN Bx (ZN+) Granulomatous dermatitis IGRA N/A Culture negative	N/A	6	No	
36.2F	Afro-Caribbean	Chronic Pyelonephritis (DD)	7.4	No	No	EPTB	FNA caseating granulomas IGRA reactive Culture negative	N/A	6	No	
56.1M	Afro-Caribbean	Hypertension (LD)	1.4	No	Isoniazid	EPTB	Abdominal tissue Bx caseating granulomas IGRA N/A Culture negative	N/A	6	No	
57.9M	Indo-Asian	T2DM (LD)	3.1	No	Isoniazid	EPTB	Laparoscopy. Bx caseating granulomas IGRA negative Culture negative	N/A	6	Yes	
74F	Caucasian	Unknown (DD)	5.8	No	No		Pulmonary	Bx - Necrotising granulomatous inflammation IGRA non-reactive Culture negative	N/A	6	No
31F	Indo-Asian	SLE (ABOi)	0.2	No	Isoniazid	EPTB	CT, LN TB-PCR IGRA indeterminate AFB and culture positive	Isoniazid	12	No	
58F	Other	Donor to father (secondary FSGS) (DD)	0.3	No	No		Miliary (with cerebral TB)	CT, BAL IGRA N/A AFB and culture positive	Fully sensitive	12	Still on treatment

Key: Tx: Transplant, ESRD: end stage renal disease, F: female, M: male, DD: deceased donor, LD: live donor, ABOi: ABO incompatible, IgAN: IgA nephropathy, T2DM: type 2 diabetes, SLE: systemic lupus erythematosus, FSGS: focal segmental glomerulosclerosis, EPTB: extrapulmonary tuberculosis; LN: lymph node, Bx: biopsy; IGRA: interferon-gamma release assay; ZN: Ziehl Neelsen, FNA: Fine needle aspiration, CT: computer tomography, PCR: polymerase chain reaction, BAL: bronchoalveolar lavage.

A total of 2311 patients received renal or simultaneous pancreas kidney transplantation between November 2005 and July 2019. At the time of analysis all patients had at least one year follow up post renal transplantation. In total, 8 patients were treated for active TB. Of these patients the median time to TB diagnosis was 4.35 years (IQR 1.125–6.2). None were screened for latent TB but 4 were on prophylactic isoniazid 150 mg od at the time of diagnosis; of which 2 developed isoniazid resistant disease. A total of 3 cases were culture confirmed tuberculosis. 6/8 cases were extra-pulmonary TB. There was 1 graft rejection and 2 graft losses, none were attributed to TB.

In our cohort, the rate of TB remains comparable to historic data (cumulative rate of 0.36%) however the time to diagnosis was longer than expected, suggesting possible re-exposure. Within our patients who received chemoprophylaxis, there was a high rate of isoniazid resistance. We have worked towards improving pre-transplant screening, appropriate interferon gamma release assay (IGRA) assessment in addition to standardising latent TB treatment. Patients with previous TB or at high risk due to ethnic or geographical background receive TB prophylaxis with isoniazid 300 mg OD and pyridoxine 50 mg once a week for 1 year post transplant.

REFERENCE

1. Abad CLR, Razonable RR. Mycobacterium tuberculosis after solid organ transplantation: A review of more than 2000 cases. *Clin Transplant*. 2018;**32**(6):e13259. doi:10.1111/ctr.13259

P157 MULTIDRUG RESISTANT TUBERCULOSIS – PATIENTS' PERSPECTIVE AND EXPERIENCES IN A LONDON TB CENTRE

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10.1136/thorax-2020-BTSabstracts.302

Background Drug-resistant TB is a growing issue with 484,000 cases of which 78% had multidrug-resistant (MDR) tuberculosis (TB).[1] MDR-TB requires complex treatment regimens, which can often be associated with numerous adverse effects. The global treatment success rate is only 56%.[1] Many studies have reviewed the clinical outcomes of MDR-TB; however, there is a lack of qualitative data exploring patients' perspective in a low burden high-resource area.

Aims To explore the experiences of patients with MDR-TB in London and to identify challenges they face.

Methods All MDR-TB patients at Imperial Healthcare NHS Trust under outpatient follow-up after completing their inpatient stay from April 2018 to August 2020 who were willing to participate in a qualitative semi-structured interview were included.

Interviews explored patients' experiences of being diagnosed with MDR-TB, their inpatient and outpatient experiences. Patients' ideas and understanding of MDR-TB as well as the implications on their lifestyle, work and family were asked about.

Interviews were recorded and transcribed. Two independent researchers analysed the data which was grouped into thematic categories.

Results Nine MDR-TB patients were interviewed. Key themes identified are illustrated in figure 1. All patients mentioned the pill burden and the numerous side effects including nausea, skin discolouration, hearing loss, tinnitus, fatigue, visual changes and peripheral neuropathy.

Abstract P157 Figure 1 Key thematic categories identified from MDR-TB patients

Patients reported several psychological impact using words such as 'isolation' and felt stigmatised. There was also a significant socio-economic burden experienced with some patients losing their jobs, hence adding to their and their families' psychological burden.

Positive comments included good relationships with healthcare professionals. Suggestions made by patients included improvements to the ward environment and for better communication. Patients were keen for patient social groups as well as psychological support.

Conclusion MDR-TB not only poses a clinical challenge but a significant psychological and socio-economic burden on patients and their families. These interviews have provided an insight into patients' experiences and challenges of MDR-TB. A more patient-centred approach promoting access to better facilities in addition to psychological, social and financial support systems would help improve patient care, treatment adherence and ultimately outcomes.

REFERENCE

1. Global tuberculosis report 2019. Geneva: World Health Organization; 2019.

P158 EXTRA-PULMONARY TUBERCULOSIS (EPTB): A COMPARISON BETWEEN UK-BORN AND FOREIGN-BORN POPULATIONS IN EAST LONDON

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Introduction/Objectives Public Health England 2019 report showed that extra-pulmonary tuberculosis represents over half (59.3%) of all diagnosed cases of TB in the UK. Foreign-born population had almost twice as many cases of extra-pulmonary disease (48.5%) compared with those born in the UK (27.8%). Aiming to improve early diagnosis in east London's

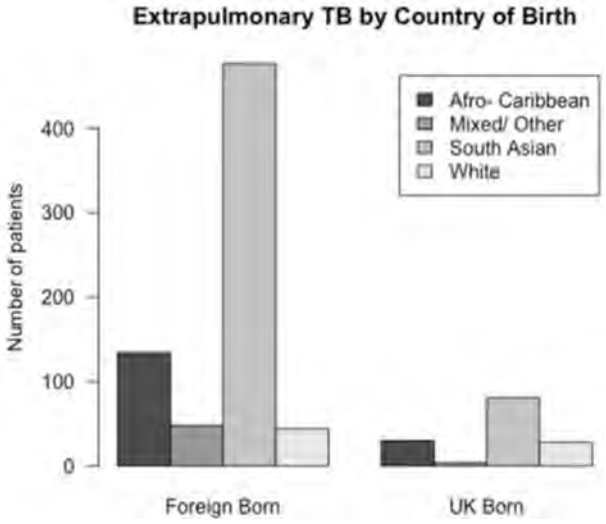
large migrant population, we compare baseline demographics and clinical features between UK-born and foreign-born EPTB cases.

Methods We conducted a retrospective analysis of all TB cases at a large institution in East London between 2016 and 2019. Cases of EPTB were identified and comparison made between UK-born and foreign-born populations. Statistical analyses were performed using R version 4.0.2.

Results 1263 patients were identified from the London TB registry as having been treated for TB between 2016 and 2019. In total we identified 850 patients (67.3%) with extra-pulmonary TB involvement. 78.2% (665/850) had extra-pulmonary disease only while 21.8% (185/850) had both pulmonary TB and extra-pulmonary disease.

69% of people (702/1018) with TB born outside the UK had extra-pulmonary involvement. UK born TB cases also recorded a significant proportion of extra-pulmonary disease at 60.9% (143/235). Foreign-born EPTB cases were significantly older than UK-born with a mean age of 41.8 and 33.2 respectively ($p<0.05$). EPTB cases were more common in people of South Asian ethnicity in both UK-born and foreign-born populations at 56.6% and 67.8% respectively. Median years since entry to the UK among migrants who were subsequently diagnosed with EPTB was 11 years (IQR 5-20).

Central nervous system (CNS) TB was more common in UK-born populations at 15.4% compared to 8.7% in foreign-born ($p=0.02$). Pleural TB was also more common in UK-born at 20.3% compared to 14.7% in foreign-born ($p=0.100$). Foreign-born populations recorded a higher extra-thoracic lymph nodes involvement at 34% compared to UK-born at 27.3% ($p=0.120$).



Abstract P158 Figure 1 Extrapulmonary tuberculosis (TB) cases by country of birth and ethnicity

Conclusion Our data reports way more EPTB cases among the UK-born and foreign-born populations in East London (60.9% and 69% respectively) than the national average. In both population groups, EPTB predominantly affected people of South Asian ethnicity. Foreign-born EPTB cases tend to be older and have been resident in the UK for longer.

P159 MONITORING PROLONGATION OF QT INTERVAL IN PATIENTS WITH MULTIDRUG-RESISTANT TUBERCULOSIS AND NON-TUBERCULOUS MYCOBACTERIUM USING MOBILE HEALTH DEVICE ALIVECOR

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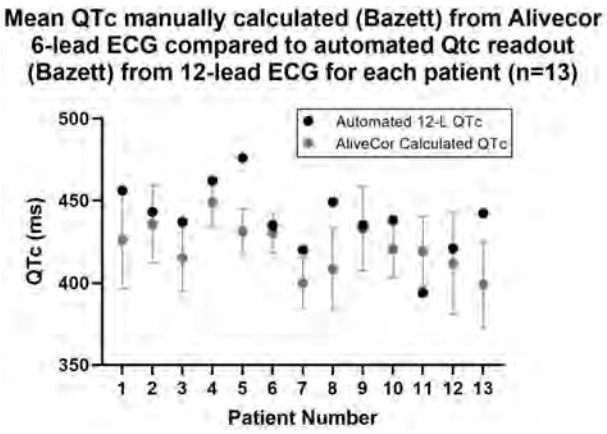
Multidrug resistant tuberculosis (MDR-TB) and non-tuberculous mycobacterium (NTM) infections present challenges due to complex treatment regimens. Extended use of multiple antibiotics exposes patients to higher risks of side effects from anti-mycobacterial medications. A high drug toxicity profile necessitates closer monitoring. One of the more challenging issues is QTc prolongation with non-injectable regimens.

This study investigates the portable AliveCor device and Kardia app to record and measure the QT interval on a 6-lead ECG. This handheld device can record an ECG trace in a minimum of 30 seconds by establishing three points of contact with electrodes to skin: two thumbs and left ankle or knee. A 6-Lead ECG by AliveCor was recorded for each patient at risk of QT prolongation (n=16) and compared to the existing 12-Lead ECG.

The automated QTc readout from the 12-Lead ECG for each patient and mean QTc value calculated from each patients' respective AliveCor tracing were shown alongside each other (figure 1). The general trend suggests the AliveCor underestimates the QTc as 12/13 cases (92%) calculated the AliveCor QTc as lower than their corresponding 12-Lead QTc readout. The mean%difference between the automated 12-Lead and manually calculated AliveCor readings was 3%. The largest%difference between the two readings was 12%. The larger discrepancies could be reflected by the varying quality of the AliveCor tracings. Three patients were excluded due to poor tracings or lack of corresponding 12-Lead ECG.

This study aimed to provide pilot data and evaluate the feasibility of a portable device to monitor QTc intervals for patients on potential cardiotoxic medications. It has allowed us to place in context the role for mobile monitoring in



Abstract P159 Figure 1 For each patient, Alivecor tracings were used to manually calculated QTc with the Bazett formula by 3 independent observers. The mean of the 3 readings shown in grey with error bars representing the standard deviation between observers' readings was plotted alongside the automated QTc readout from each of the patients' respective 12-Lead ECG, shown in black

modern-day clinical practice. Moreover, the recent COVID-19 pandemic has seen increasing relevance for remote monitoring. Remote monitoring can aid progression of treatment whilst protecting vulnerable patients from risk of exposure to illness.

The use of AliveCor could potentially be translated into current clinical practice using calculated QTcs from the device with caution of percentage variation either side. This could facilitate the use of AliveCor as a promising and convenient screening tool before further evaluation by a 12-Lead ECG is required.

P160 OUTCOMES OF NEW ENTRANT LATENT TUBERCULOSIS SCREENING PROGRAMME IN SECONDARY CARE SETUP

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Background Latent TB Infection (LTBI) screening for new entrants (NE) from TB high incidence areas is an effective and cost effective public health intervention, it is recommended by NICE & Collaborative Tuberculosis Strategy for England.[1] In Bolton after liaising with local CCG we have established the NE LTBI screening Programme in the secondary care setup; screening & treating eligible patients (entered UK in the previous 5 years, are aged 16–35 year and from countries with a TB incidence of ≥150 cases/100,000 population) in line with National recommendations.

Aim and Method We have analyzed the outcome of the Bolton NE LTBI screening programme, for the financial year 2018–19. Data was collected from patient notes and data based maintained by the Specialist TB Nurse. We analyzed all records from the invitation for Interferon Gamma Release Assay (IGRA) test to the completion of treatment in cases of proven LTBI.

Results 390 eligible patients (mean age 27 years, 51% male) were referred to the New Entrant TB nurse screening clinic.

262/390 attended with a DNA rate of 33%.

We could analyze data for **259** patients who had IGRA test from the TB nurse screening clinic.

- 82 of these patients were referred from the Asylum/Refuge team after initial health screening & a positive mantoux test which they do part of initial health screening.
- 177 patients were identified from flag 4 data and invited to attend clinic.

62 out of 259 patients (24%) had positive IGRA, 4 had indeterminate results and 4 results were unknown.

1 was confirmed to have active Pulmonary TB, and has completed the treatment.

61 patients were confirmed to have LTBI.

58/61 (95%) attended subsequent Consultant led clinic; accepted and have completed LTBI chemoprophylaxis.

3 patients DNAed despite multiple clinic invitation.

Conclusion NE LTBI screening and treatment programme could be successfully set up in the secondary care with good attendance rate and excellent LTBI chemoprophylaxis treatment completion rate.

REFERENCE

1. Collaborative TB Strategy for England 2015–2020: PHE2015, January.

P161 BLOOD NEUTROPHIL COUNT AT 1 MONTH OF TREATMENT PREDICTS THE RADIOLOGICAL SEVERITY OF POST-TUBERCULOUS LUNG DISEASE

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Background Post-tuberculous lung disease contributes to morbidity in pulmonary tuberculosis (PTB) survivors. However, the determinants of persistent lung damage are not well established and may relate to socio-demographic factors, bacterial burden, delayed presentation to healthcare or host immune responses (especially neutrophils, implicated in bronchiectasis pathogenesis and cavitation). We investigated associations between radiological post-tuberculous lung disease and these potential predictors.

Methods We collected data from patients treated for PTB at our centre over a 5.5 year period excluding those with HIV infection, other known immunodeficiencies or immunosuppressive medication, pre-existing structural lung disease, drug resistant infection or with disease sites not including lungs or pleura. We recorded age, sex, ethnicity, smoking status, duration of symptoms, sputum smear acid fast bacilli grade, time to culture positivity and blood results (C-reactive protein and neutrophil count) at baseline and at 1 month. Chest x-rays performed at baseline, 2 months and end of treatment (at a median of 195 days from treatment initiation) were assessed by two radiologists independently and scored using a validated system. Relationships between predictor variables and radiological outcomes were assessed using linear or binary logistic regression as appropriate.

Results We assessed 156 individuals, mean age 37 years, 62% male. Baseline and 2-month radiological severity correlated with age, ethnicity (higher scores in white patients), grade of sputum smear positivity and blood inflammatory markers and inversely with time to culture positivity. In multivariate analysis only sputum smear grade (p<0.001) and neutrophil count ($p=0.001$) retained significance. At end of treatment, only the 1-month neutrophil count (not baseline neutrophil count) was significantly associated with overall radiological severity ($r=0.32$, $p=0.005$) in multivariate analysis. The 1-month neutrophil count was also the only independent correlate of volume loss (odds ratio (OR)=1.25 per 1×10^9 increase in neutrophils, $p=0.04$) and pleural thickening (OR=1.23, $p=0.04$). 1-month neutrophil counts were higher in patients with persistent cavitation or effusion at end of treatment compared to those without.

Conclusions Persistent neutrophilic inflammation after 1 month of anti- tuberculosis therapy is associated with poor radiological outcome, suggesting both a target for interventions to minimise post-tuberculous lung disease and a means to identify people at greatest risk.

P162 DEVELOPING A TUBERCULOSIS PATIENT COST SURVEY ADAPTED TO THE UK SETTING: RECOMMENDATIONS FROM A NATIONAL MULTI-SECTORAL WORKSHOP

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10.1136/thorax-2020-BTSabstracts.307

Introduction and Objectives Even in countries such as the UK with free TB care, TB patients and their households can face catastrophic costs related to illness and seeking and obtaining care. Costs may be incurred indirectly (e.g. through lost work) or directly (e.g. travel costs). The WHO's End TB Strategy targets elimination of catastrophic costs by 2030, calling for National TB Programmes to undertake country-level TB Patient Cost Surveys (TB-PCS) to determine the magnitude and drivers of costs; measure progress against global catastrophic cost indicators; and inform cost-mitigation interventions. Recognising its importance in the UK, a one-day national workshop was held In March 2019 to inform development of a UK TB-PCS.

Abstract P162 Table 1 Workshop recommendations for a TB patient costs survey adapted to the UK setting

Theme	Recommendation
Design, timing, and location	• Longitudinal study • Data collection at commencement, end of the intensive treatment phase, and towards treatment completion (this may be modified for MDR-TB • Health facility based initial survey interviews with telephone follow up at subsequent interviews
Defining and calculating costs and catastrophic costs	• Adapt travel costs to UK systems (e.g. travel cards & car parking) • Include direct costs and lost income incurred by carers and consider costs of TB screening and latent TB infection treatment • Use locally validated expenditure modules (e.g. Office for National Statistics Living Costs and Food Survey) • Integrate coping strategies into the survey including use of food banks, pay-day loans and credit cards, sub-letting, second jobs, and selling sex • Consider qualitative measures of the financial impact on households
Estimating income and Socioeconomic position	• Establish a proxy for average pre-illness income • Account for employment conditions including people who have variable income due to zero hours contracts • Use validated measures tailored to UK setting to measure socioeconomic position (e.g. UK Household Assets Survey) • Use national categorisations to describe e.g. occupation and level of education
Linking with existing data sources	• Explore linking data collected during the survey with existing electronic databases, including: o Indices of Multiple Deprivation o Hospital Episode Statistics o Department of Work and Pensions database o Enhanced TB Surveillance

Methods 24 participants attended the workshop, including healthcare professionals, charities, TB-affected people, academics, and WHO and PHE policymakers. During the morning session research and experiences were shared from international TB-PCS implementations. In the afternoon session small working groups (facilitated by members of WHO's Catastrophic Costs of TB Taskforce) explored key themes including: survey design and implementation; defining and calculating costs; estimating income and socioeconomic position; and potential linkage of electronic databases.

Results Recommendations for refinements of WHO's generic TB-PCS tool within the UK context were made and are summarised in the table 1. Longitudinal TB-PCS implementation with surveys at multiple time-points during treatment was supported by participants because of perceived improvements in the accuracy of estimated costs. Participants suggested the UK-specific expense and lost income calculations should include public transport and parking costs and types of employment (e.g. zero-hours *vs* salaried). Participants discussed the optimal methods for calculating socioeconomic position including alignment with validated national survey parameters and linkage of national health and economic databases. Finally, participants proposed measurement of coping strategies relevant to the UK including food-bank use, high-interest payday loans, sub-letting, and selling sex.

Conclusions The recommendations of this national workshop are the basis for the development of a context-appropriate TB-PCS tool and protocol. Once funding is obtained, the first UK TB-PCS will be piloted and then implemented, which will inform WHO's catastrophic costs indicator and provide much-needed estimates of the socioeconomic impact of TB in the UK.

P163 SURVEY ON USE AND PERCEPTION OF AMIKACIN FOR TREATMENT OF MYCOBACTERIUM AVIUM COMPLEX LUNG DISEASE IN THE UK

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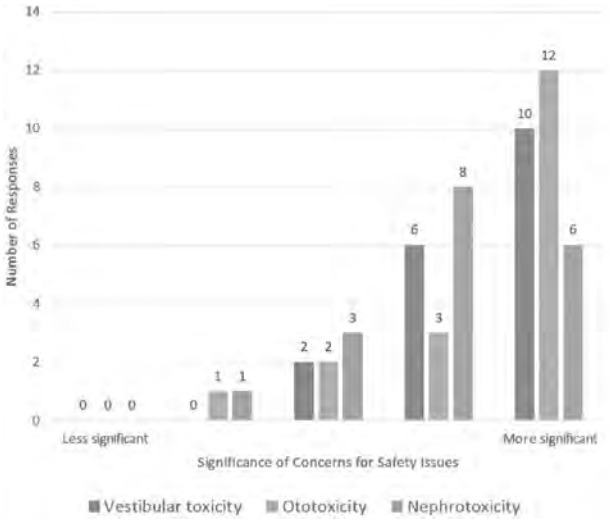
10.1136/thorax-2020-BTSabstracts.308

Background and Aim The British Thoracic Society guidelines for the management of NTM lung disease recommend the use of amikacin as part of multi-drug therapy for treatment of severe and clarithromycin-resistant *Mycobacterium avium* complex lung disease (MACLD). We surveyed physicians regarding the use of amikacin to treat of MACLD including when amikacin treatment is initiated, preferred route of administration (intravenous or nebulized), expected outcomes, and safety concerns.

Methods An anonymised online survey (2019) consisting of primarily open ended and 5-point Likert scale-based (eg, unlikely to likely, less significant to more significant) questions was used to collect responses from UK respiratory consultants with experience managing MACLD.

Results The survey was completed by 18 physicians with $\geq$5 years of experience in managing MACLD; most (72%; n=13/18) routinely managed $\geq$10 patients each year with MACLD. Respondents (44%, n=8) would initiate amikacin in treatment naïve patients mainly in severe disease, such as



Abstract P163 Figure 1

with cavitation or significant degree of inflammatory change in CT scans, with 63% (n=5) preferring the use of nebulised amikacin. Respondents (n=17/18) would consider initiating amikacin in on average 48% of their MACLD patients who failed initial therapy, with 76% of respondents (n=13/17) preferring nebulised amikacin. Of the respondents (n=4/17) that would choose intravenous amikacin as their preferred route of administration, 75% (n=3) gave 'efficacy' as the reason. Respondents stated that administrating amikacin (either IV or nebulised) is fairly likely to lead to increased control of symptoms, halting of cavity progression, reduced microbiological burden, and culture conversion. When initiating amikacin, respondents had most significant safety concerns regarding ototoxicity (figure 1) and all respondents further emphasised ototoxicity as a safety concern in their free language response. All respondents stated that they would initiate amikacin therapy more often if the safety concerns were less significant.

Conclusion Surveyed physicians use amikacin as part of a multi-drug regimen in approximately half of patients who have failed initial therapy, with nebulised amikacin as their preferred route of administration. Respondents had significant concerns regarding ototoxicity when amikacin was initiated. There was a consensus that physicians would initiate amikacin more often to achieve better outcomes for patients if the safety profile of amikacin was of a lesser concern.

P164 IMPROVED TREATMENT COMPLETION FOR TUBERCULOSIS PATIENTS: A CASE FOR A DEDICATED SOCIAL CARE TEAM

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10.1136/thorax-2020-BTSabstracts.309

The increasing social needs of people with Tuberculosis (TB), and the poor adherence to anti-TB therapy (ATT) associated with homelessness, drug or alcohol abuse, and prison history, led the North Central London TB Network (NCLTBN) to introduce a social care team (SCT) in 2008 to support patient engagement with care. We report our experience of a specialist SCT and the impact on treatment outcomes within this large UK network.

Using the Royal College of Nursing-endorsed case management risk assessment, patients with social risk factors (SRF) for non-adherence to ATT are identified and a referral made to the SCT. The SCT provides intensive casework support for areas including homelessness, housing, benefits, debt and immigration, and makes referrals to drug and alcohol and mental health services.

Retrospective data analysis of the NCLTBN social care database from 2017 to 2019 was conducted. Patients who were (n = 170) and were not referred to the SCT (n=734) were compared.

The majority (84.7%) of patients referred had more than 1 SRF. Referrals were most often for benefits (49.4%), and housing (47.1%). Following SCT input, 83.4% of benefits referrals were supported with new and existing benefits applications. For housing referrals, almost two-thirds of issues could be resolved with specialist advice (66.1%). Additionally, 19.4% of patients were referred for homelessness, of which 66.1% were rehoused.

Patients referred to the SCT were significantly more likely to complete their planned ATT than those without reason to be referred (88.2% versus 77.7% respectively, p=0.0025). This remained the case when stratifying by receipt of Directly Observed Therapy and adjusting for possible confounders in a logistic regression model (table 1).

Abstract P164 Table 1 Odds of treatment completion in TB patients referred to social care team (SCT) compared to those not referred, stratified by use of Directly Observed Therapy (DOT)

	Completed Treatment n (%)		Unadjusted Odds Ratio (95% CI)	p-value	Adjusted Odds Ratio* (95% CI)	P
	SCT	Comparator				
Overall	150/170 (88.2%)	570/734 (77.7%)	2.16 (1.31, 3.55)	0.0025	2.35 (1.41, 3.91)	0.001
Received DOT	67/81 (82.7%)	60/87 (69.0%)	2.15 (1.03, 4.49)	0.040	2.18 (1.04, 4.57)	0.040
Did not receive DOT	83/89 (93.3%)	510/647 (78.8%)	3.72 (1.59, 8.69)	0.0025	4.04 (1.71, 9.52)	0.001

*Adjusted Odds Ratios from logistic regression, adjusted for age, gender, ethnicity and pulmonary disease.

The dedicated SCT helped to improve TB patients' living environments and financial security - factors conducive to good treatment adherence. Furthermore, input from the SCT was associated with significantly improved treatment outcome. Given that across England the proportion of TB patients with SRF and complex needs is increasing, our data provide a strong argument for the development of similar SCTs, in addition to planned or existing DOT, within other UK TB services.

P165 IMPLEMENTATION OF THE LTBI SCREENING PROGRAMME: A SURVEY IN PRIMARY CARE

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10.1136/thorax-2020-BTSabstracts.310

Introduction Systematic screening of at-risk migrants for LTBI is a national priority for TB control.

Methods We conducted a survey of LTBI screening delivered by all GP Practices in Tower Hamlets, London. We assessed awareness of the screening programme, LTBI knowledge, participation in training sessions and challenges in implementation of the programme. The survey was completed by GPs and allied healthcare workers (AHW) in each practice.

Results 26 (74%) GP practices completed the survey (30 GPs and 43 AHWs). 61 (84%) were aware of the LTBI screening programme with 49 (67%) aware of the eligibility criteria for screening.33 (77%) AHWs had received LTBI training through practice meetings (6), E-learning modules (6), formal training session (8), CCG training session (9) and one-to-one training (4). 27 (82%) felt that their training was sufficient for their role.16 (53%) GPs received training through practice training sessions (9), CCG training (3), small group training (2), Network Board meeting (1) and E-learning module (1).

Screening was offered during New Patient Registration (22,85%), routine appointments (1) and over the telephone (2).

Common reasons for patients to decline LTBI screening are the belief that pre-entry screening for TB covers LTBI (25), disinterest in LTBI screening (15) and perceiving themselves as not being 'unwell'. 25 (58%) AHWs agree that these patients would benefit from further appointments to explain LTBI screening, 11 disagreed and 7 did not comment.

Common challenges consisted of difficulty in identifying eligible patients, patients' understanding of LTBI, language barriers, time pressures on staff, AHW understanding of LTBI, lack of LTBI training, complexity of LTBI treatment and adverse effects of medication.GPs did not report any difficulty in secondary care referrals for LTBI treatment. 20 GPs (67%) found secondary care support beneficial 29 (67%) AHWs and 18 (60%) GPs felt that a clinical lead for LTBI screening would be beneficial.

Conclusion There is significant variability in the training of staff implementing the LTBI screening programme which has been reported as a key challenge in delivering the programme. Thus it is essential that LTBI training is standardised and adequate support is provided to the GP practices.

P166 EOSINOPHILS, INHALED CORTICOSTEROIDS AND NON-TUBERCULOUS MYCOBACTERIAL DISEASE: ASSESSING THE ASSOCIATIONS IN A TERTIARY RESPIRATORY CENTRE COHORT

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10.1136/thorax-2020-BTSabstracts.311

Introduction Inhaled corticosteroids (ICS) are widely used in airways disease and are known to be beneficial in reducing exacerbations. Peripheral eosinophilia is recognised as a treatable trait to guide ICS treatment.[1] However, studies have shown that ICS use can increase the risk of non-tuberculous mycobacterium (NTM) infection – this carries significant morbidity and treatment burden.[2]

We aimed to identify if blood eosinophilia or steroid use is associated with clinically significant NTM disease.

Methods We performed a retrospective analysis of adult patients with a respiratory microbiological sample positive for NTM between 1st January and 31st December 2019. Electronic patient records were used to identify demographics, underlying diagnoses, whether the patient met American Thoracic Society (ATS)/Infectious Diseases Society of America (IDSA) 2007 criteria for NTM pulmonary disease, eosinophil levels (>0.3 = high), ICS use and NTM treatment. Results were analysed using Microsoft Excel and chi-square tests in SPSS (v27).

Results Total no. patients included was 122. Median age was 68.5 years (IQR 50–76.8), the majority of patients were female (57.4%). The most common underlying diagnosis was bronchiectasis (45.9%) followed by cystic fibrosis (15.6%), COPD (11.5%) and asthma (9.8%). The majority of patients were non-eosinophilic (76.3%).

Patients using an ICS were less likely to meet ATS/IDSA criteria than those not on an ICS (18.6% vs 24.2%) and less likely to be on treatment (15.3% vs 24.2%), however neither comparison reached statistical significance.

Abstract P166 Table 1 Characteristics of the eosinophilic (blood eosinophils >0.3) and non-eosinophilic groups. P- values calculated using chi-square tests

	Eosinophilic (n=27)	Non-eosinophilic (n=87)	P-value
ATS/IDSA criteria met	8 (29.6%)	18 (20.7%)	0.333
NTM treatment initiated/ ongoing	6 (22.2%)	17 (19.5%)	0.762
ICS treatment at time of sample	13 (48.1%)	43 (49.4%)	0.908
Most common isolates (descending)	M. avium (33.3%) M. chimaera (29.6%) M. abscessus (18.5%)	M. chimaera (24.1%) M. avium (21.8%) M. abscessus (13.8%)	-

Conclusions In summary, our NTM-positive cohort demonstrated no significant difference in diagnostic criteria met and treatment between eosinophilic and non-eosinophilic patients. A smaller proportion of patients on steroids recieved NTM treatment, though this did not reach significance. This contrasts with existing research which shows steroids increases risk of NTM infections. Our analysis is limited by small sample size, further research and case-control studies may be beneficial in guiding steroid prescribing decisions.

REFERENCES

1. Pavord, Ian D., and Alvar Agusti. 'Blood eosinophil count: a biomarker of an important treatable trait in patients with airway disease.' (2016): 1299–1303.
2. Brode, Sarah K., *et al*. 'The risk of mycobacterial infections associated with inhaled corticosteroid use.' *European Respiratory Journal* 50.3 (2017).

The clinical experiences of post-COVID-19 recovery

P167 EARLY SYMPTOM OUTCOMES IN HOSPITALISED COVID-19 PATIENTS

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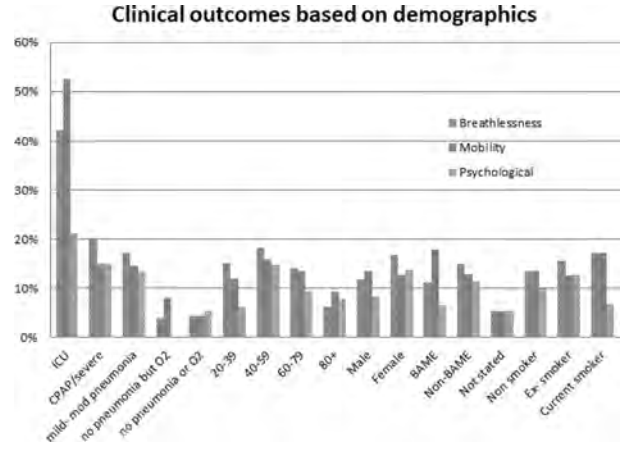
10.1136/thorax-2020-BTSabstracts.312

Introduction and Objectives There has been minimal evidence of early symptom outcomes of hospitalised covid-19 patients in the UK. The British Thoracic Society (BTS) has published guidance on recommended follow up for covid-19 patients with radiological pneumonia, but there is general concern about the respiratory and general health of all covid-19 patients. Less is known about early clinical symptoms, including psychological effects, and what interventions may be required to address these.

Methods We collected data for all hospital admissions to a district general hospital, that were successfully discharged, which tested positive for COVID-19 by nasal swab PCR between 7th March and 20th July 2020. They were stratified into five protocols of severity. All patients were followed-up 4–6 weeks post discharge with a holistic telephone call questionnaire via our virtual ward. The patients were triaged and managed accordingly with phone advice/sending information packs, and discussion at the weekly virtual MDT for those with significant concerns.

Results 312 patients were identified but 55(18%) patients were non-contactable by phone and 18(6%) died post discharge. Of the remaining 239 patients, 167(70%) were considered to have no ongoing issues. Of the 72 patients with issues identified, 43 patients (18%) were found to be more breathless than their baseline, including 6 patients without pneumonia. 42% of ICU discharges and 20% with severe pneumonia were more breathlessness than baseline. 32 patients (13.4%) reported adverse psychological effects, with sleep disturbance in 19 patients (7.9%) and low mood or increased anxiety in 18 patients (7.5%). 41(17.2%) patients' mobility hadn't returned to baseline levels. Only 4 patients (1.3%) had radiological evidence or treated as PE during the admission.

Conclusions The majority of covid-19 admissions had no significant issues at 4 to 6 weeks follow-up. Breathlessness was not exclusive to those with radiological pneumonia but the likelihood was increased in ICU admissions and those with severe pneumonia. There was relatively high burden of new psychological symptoms and impaired mobility, which again was most common in ICU admissions. Virtual follow-up is an effective way of identifying those with symptoms who may benefit from early interventions, and enables faster access to specialist support.



Abstract P167 Figure 1

P168 PATIENT SYMPTOMS FOLLOWING DISCHARGE FROM HOSPITAL AFTER COVID-19 PNEUMONIA

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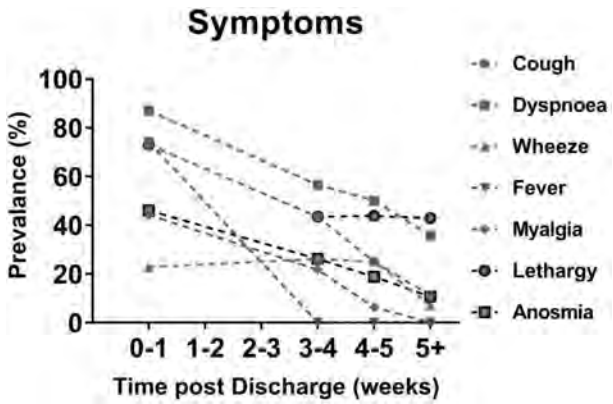
10.1136/thorax-2020-BTSabstracts.313

Introduction The recovery of patients after COVID-19 has been poorly described. Related coronavirus infections (SARS-COV1 and MERS) have protracted recovery time-courses with significant respiratory morbidity,[1] suggesting the same may be true for COVID-19. A service evaluation was therefore undertaken to evaluate the short-term effects of COVID-19.

Methods Respiratory specialist doctors conducted structured telephone consultations of patients admitted between 17th March 2020 and 2nd May 2020 with a diagnosis of COVID-19 pneumonia at a teaching hospital. Using time from discharge patients were allocated into 3 groups: 3–4 weeks, 4–5 weeks and 5+. Patients were asked to recall acute COVID-19 symptoms, current symptoms, activity levels, and exercise capacity after discharge. Exercise capacity was quantified by self-assessment of walking distance on flat (metres), stairs (flights). Patient reported outcome measures (MRC dyspnoea scale and WHO performance status) were also collated.

Results A total of 102 patients were screened, 70 were included in the study, with the rest being unreachable (n=32)

Cough, dyspnoea, fever and lethargy were the most common symptoms at time of admission. All these symptoms, except lethargy, improved following discharge (figure 1). Prevalence in the 5+ week cohort of other symptoms is as follows: dyspnoea 35.7%, cough 11.5%, fever 0%; however,



Abstract P168 Figure 1 Resolution of symptoms post COVID-19: Patients were called at one time point during their follow up and then divided into groups based on that time. Percentage of patients who had persistent cough, dyspnoea, fever, myalgia, lethargy and anosmia in each group

70% of patients had at least 1 symptom 5 weeks after discharge.

Self-reported exercise capacity and MRC dyspnoea score also improved after discharge. Despite this 21.4% of patients had a persistent impairment in walking ability on the flat, 17.8% in stair-climbing with 28.5% persistent deficit in MRC dyspnoea score after 5 weeks. In contrast 40% of patients had a deficit in WHO performance status and this was not affected by time after discharge.

In conclusion patients did improve following discharge from hospital for COVID-19 pneumonia, however many were left with residual symptoms and a functional deficit in short term (5 weeks). It remains to be seen whether this results in long term health problems.

*highlights joint authorship

REFERENCE

1. Hui DS, Wong KT, Ko FW, *et al*. The 1-year impact of severe acute respiratory syndrome on pulmonary function, exercise capacity, and quality of life in a cohort of survivors. *Chest*.2005;**128**(4):2247–2261.

P169 AN INTEGRATED APPROACH TO COVID-19 FOLLOW UP IN STOCKPORT; OUR EXPERIENCE SO FAR

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10.1136/thorax-2020-BTSabstracts.314

Background/Aims The long-term physical and psychological impact on patients admitted with Covid-19 is unknown. NHSE[1] and BTS[2] released guidance on aftercare of these patients.

In Stockport, a Covid-19 recovery group was established to optimise pathways and ensure seamless, joined up care for patients on discharge.

Methods The group included consultants (respiratory, ICU, geriatrician), GPs, CCG leads, LMC members, a psychologist, fatigue specialists, OTs/physiotherapists, the PR/COPD team and Life leisure. A Covid recovery and fatigue management Patient Information Leaflet (PIL) were designed supporting self-care with signposting to local services.

Patients were triaged[2] and all received letters explaining their follow up and a Covid recovery PIL. The pathway ensured all patients had a planned telephone consultation with their GP or respiratory consultant at 6 weeks. If admitted to critical care, they received an ICU clinic and clinical psychologist review at 12 weeks. Secondary care Covid-19 clinics were established to see patients according to BTS guidance, with slots available for urgent GP referrals. Patients were signposted to appropriate specialties/services (fatigue, psychology, physiotherapy, SALT) and a dedicated EMIS Covid review template in primary care was designed; the template facilitated standardised coding, improving understanding of longer-term effects of Covid-19. An online webinar was organised launching the pathway and highlighting available resources.

Activity packs were provided for frailer patients, both individual patients and those in care homes supporting rehabilitation and preventing readmission. Patients were referred to PR if appropriate and one off fatigue management appointments were available.

Results To date around 350 patients have been sent letters/PILs. 29 have been seen/telephoned in Covid-19 Clinics and 26 in ICU clinics.

Initial patient feedback has been extremely positive, with 92% patients finding the PIL very/extremely useful and feeling the leaflet provided everything they needed to know about Covid-19 recovery. 83% patients were completely happy with the care they received post discharge and didn't feel it could be improved.

Conclusion We have developed a novel, multi-disciplinary and integrated approach to following up Covid-19 patients. Whilst many long-term effects remain unknown, the pathway allows patients to rapidly access services when needed. Feedback has been extremely positive from patients to date.

REFERENCES

1. https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/06/C0705-aftercare-needs-of-inpatients-recovering-from-covid-19-aug-2020.pdf
2. https://www.brit-thoracic.org.uk/about-us/covid-19-information-for-the-respiratory-community/

P170 USING THE COPD ASSESSMENT TEST AS A TOOL TO ASSESS SYMPTOMS IN COVID RECOVERY

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Introduction COVID-19 presents with acute symptoms of cough, phlegm and pyrexia and can cause severe acute respiratory distress. Little is known about the symptoms patients face following an acute admission for COVID-19 and there is no validated questionnaire to assess patients. This cross sectional study aims to explore the symptoms patients display following an admission with COVID-19 using the COPD Assessment Test (CAT).

Methods This was an observational cohort study following patients who recovered from COVID-19. Participants were called after discharge to assess their ongoing symptoms including the CAT and their rehabilitation needs. Correlations between characteristics and CAT scores were performed using Spearman's rank test.

Results 131 patients were assessed following their admission (77 (59%) male, mean [SD] age 60[14]). 31% had a pre-

Abstract P170 Table 1

	All	No pre-existing lung disease	Pre-existing lung disease	Non-COPD persons*
	n=131	n=91	n=40	N=481
CAT total	11.39 [7.79]	10.22 [7.57]	14.26 [7.66]	6.9 [6.2]
Cough	1.01 [1.16]	0.92 [1.03]	1.22 [1.42]	1.3 [1.1]
Phlegm	0.76 [1.10]	0.61 [0.93	1.11 [1.37]	0.8 [1.1]
Chest tightness	0.88 [1.30]	0.91 [1.39]	0.81 [1.09]	0.6 [1.0]
Breathlessness	2.10 [1.75]	1.84 [1.65]	2.74 [1.85]	1.0 [1.3]
Activity limitation	1.78 [1.68]	1.64 [1.63]	2.14 [1.77]	0.6 [1.1]
Confidence to leave home	1.28 [1.78]	1.31 [1.83]	1.19 [1.69]	0.2 [0.8]
Sleep	1.54 [1.68]	1.33 [1.55]	2.06 [1.90]	0.9 [1.2]
Energy	2.53 [1.54]	2.49 [1.56]	2.64 [1.50]	1.4 [1.2]

existing respiratory condition. Their mean [SD] hospital stay was 10[12] days and 21 (16%) participants required mechanical ventilation. The mean[SD] time to follow up call was 32 [18] days post-discharge. Total CAT scores ranged from 0 to 34 with mean of 11.4[7.8]. 52% of patients had a CAT score ≥10 with scores highest for the breathlessness, activities, sleep, confidence and energy items. Of the patients without a pre-existing respiratory condition 42% had a score of ≥10 and in patients with a pre-existing respiratory condition this proportion was 75%. Breathlessness, activity limitations and energy and were the highest reported symptoms for both groups. There were no statistically significant correlations for the CAT with length of stay, number of days ventilated, self-reported physical activity or time from discharge.

Conclusion The CAT total and item scores can provide insight into the severity of symptom burden for patients following a hospitalisation from COVID-19. This may be a useful tool to identify rehabilitation needs.

REFERENCES

1. Jones PW, Harding G, Berry P, *et al*. Development and first validation of the COPD Assessment test. *Eur Respir J* 2009:**34**(3):648–54
2. Raghavan N, Lam Y, Webb K, *et al*. Components of the COPD Assessment Test (CAT) associated with a diagnosis of COPD in a random population sample. *Journal of Chronic Obstructive Pulmonary Disease* 2012:**9**:175–183

P171 WARD VS. EMERGENCY DEPARTMENT DISCHARGE IN PATIENTS WITH COVID-19: DOES IT MAKE A DIFFERENCE TO SYMPTOM BURDEN AND RADIOLOGICAL SEVERITY AT FOLLOW UP?

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Background During the COVID-19 pandemic patients were often discharged following assessment within the Emergency Department (ED). However, to our knowledge no data exists on whether these patients are likely to have a better trajectory of recovery. We investigated the symptom burden and radiological severity at follow-up for patients discharged directly from ED compared to those admitted.

Methods Patients diagnosed with COVID-19 between 05.03.20 and 05.05.20 discharged from ED or the ward had telephone assessments 8–10 weeks post-discharge. Demographics, co-morbidities, symptom burden (quantified using a numerical rating scale) and psychological health data were collected. Patients were offered a follow-up chest radiograph (CXR) if abnormal on discharge.

Results During this period we contacted 188 ED and 471 ward discharges, median (IQR) follow up 77.5 days (65–87) and 64 days (55–82) respectively. The baseline demographic data is shown in table 1. Ward patients were significantly older (62.5 vs. 53.8 years, p<0.001), more likely to be hypertensive (49% vs. 27%, p<0.001), diabetic (31% vs. 16%, p=0.004), frailer (median clinical frailty score 2(2–5) vs. 2(2–3), p<0.001) and have a higher NEWS2 score (5 (2–7) vs. 2 (1–4), p<0.001). There were no significant differences in other characteristics including ethnicity, heart disease and smoking.

115 (61%) ED and 340 (72%) ward patients completed follow-up calls. There were no significant differences in symptom burden (breathlessness, cough, fatigue, sleep quality) and psychological burden (assessed by screening questionnaires). No significant difference was noted in the proportion able to return to work (ED vs. ward: 70% vs. 59%, p=0.111). Finally, 5% of ED patients had an unchanged/worsening CXR compared to 9% discharged from the ward (p=0.42).

Abstract P171 Table 1 Demographics, co-morbidities, symptom burden and radiological severity for Ward and ED discharged-patients

Variable (%)	Ward	ED	P - value
N	471	188	-
Demographics			
Age*(years)	62.5 ± 17.5	53.8 ± 16.7	**<0.001**
Male Sex (%)	287 (61)	104 (55)	0.185
Black, Asian, Minority Ethnic (BAME) (%)	153/338 (45)	62/113 (56)	0.064
Comorbidities			
Hypertension (%)	214/437 (49)	24/89 (27)	**<0.001**
Ischaemic heart disease (%)	63/442 (14)	7/90 (8)	0.098
Diabetes (%)	131/427 (31)	14/90 (16)	**0.004**
Respiratory disease (%)	95/442 (22)	13/90 (14)	0.13
Smoking history (%)	115/341 (34)	42/116 (36)	0.627
Clinical Frailty Score	2 (2–5)	2 (2–3)	**<0.001**
NEWS2 Score	5 (2–7)	2 (1–4)	**<0.001**
Number contacted for Follow up			
	340	115	-
Mental Health at Follow up			
Total PHQ2	0 (0–1)	0 (0–2)	0.092
Total TSQ	1 (0–3)	1 (0–4)	0.206
Symptom Burden at follow up			
Breathlessness rating 0–10	0 (0–2)	0 (0–2)	0.683
Cough rating 0–10	0 (0–0)	0 (0–1)	0.287
Fatigue rating 0–10	2 (0–5)	1 (0–4)	0.488
Sleep Quality rating 0–10	0 (0–0)	1 (0–4)	0.536
How close to 100% do they feel	90 (80–100)	90 (75–100)	0.807
MRC dyspnoea scale	2 (1–3)	1 (1–2)	0.147
Back to work (%)	90/153 (59)	47/67 (70)	0.111
Radiological Severity at follow up			
Unchanged/Significantly worsened	17/197 (9)	2/41 (5)	0.42

*Parametric data, mean ± SD presented. All other data non-parametric, median and inter-quartile ranges presented.
Abbreviations: PHQ2 – Patient Health Questionnaire 2-item; TSQ – Trauma Screening Questionnaire; NEWS2 – National Early Warning Score 2

Conclusion Our data confirms that patients admitted to hospital are likely to be more unwell, older, more frail and have hypertension and diabetes. Despite this, there were no significant differences in symptoms or radiological severity at follow up, suggesting that hospitalised patients do not appear to have worse physical or psychological sequelae compared to those discharged directly from ED. We should develop strategies to identify the patients who are more likely to suffer from long-term sequelae post COVID-19, to appropriately establish a targeted follow-up service.

P172 EARLY CLINICAL EXPERIENCE OF A LARGE HOSPITAL TRUST VIRTUAL COVID-19 FOLLOW UP CLINIC

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10.1136/thorax-2020-BTSabstracts.317

Introduction A Virtual Covid-19 Follow-up Clinic was designed in response to the need to review a large number of in-

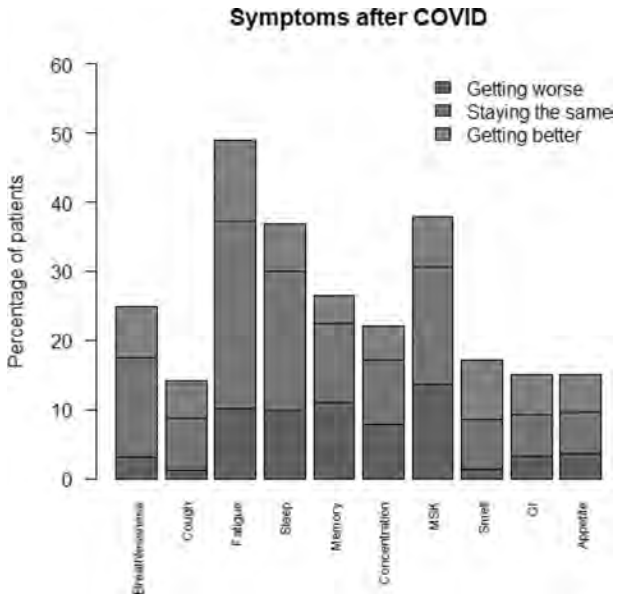
patients, at a large hospital trust, recovering from Covid-19 but without any significant increase in resources.

Methods Patients complete a structured online/telephone symptom and psychological health questionnaire and have a chest x-ray 12 weeks after their illness. These results, and their medical records, are reviewed asynchronously by the medical team in a virtual clinic. Patients are then triaged to further virtual review, telephone review, face to face review, or are discharged. All patients receive comprehensive written information to aid their recovery.

Results During the first 8 weeks of the service, 388 patients have completed the questionnaire (63% online) and been reviewed. Current symptoms are shown in figure 1. The questionnaire has identified the holistic needs of patients and allowed triaged follow-up with 122 discharged and 53 urgent face-to-face review appointments completed. 25 CT pulmonary angiogram scans were arranged for patients with typical symptoms of pulmonary emboli; no thromboembolic disease was identified.

Conclusion This early experience of a new service has highlighted 5 learning points:

1. Virtual review is not necessarily quicker than clinic review in person, with holistic review taking 15 minutes per patient (excluding phone calls).
2. Patients appreciate clinical contact and this is particularly relevant in the post-Covid era of restricted healthcare attendance. All patients who attend for face to face review are extremely grateful.
3. A multidisciplinary team is necessary bringing together respiratory, cardiology, rheumatology, radiology, psychology and immunology in one holistic review. Patients benefit from therapy input, with 13 of 49 patients assessed by the physiotherapist in clinic diagnosed with breathing pattern disorders.
4. Medical staff redeployment during the pandemic, and the extreme pressures at that time, meant aspects of planned care were not arranged at discharge. Virtual review of medical records has addressed this, for example, re-arranging a referral for a pacemaker and arranging haematological review of a patient newly diagnosed with chronic lymphocytic leukaemia.
5. Regular multi-disciplinary strategy meetings have allowed guidelines to be revised weekly, based on increasing evidence, and experience disseminated.



Abstract P172 Figure 1

P173 OUTCOMES OF A COVID-19 RESPIRATORY FOLLOW UP CLINIC IN A LARGE TERTIARY REFERRAL CENTRE

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10.1136/thorax-2020-BTSabstracts.318

Introduction Current guidelines for follow up of COVID-19 patients are based on experience with outbreaks with Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS), with the aim to identify patients likely to develop post infectious fibrosis. The COVID-19 pandemic is on a much larger scale and requires investigation regarding the most effective way to follow up these patients.

Abstract P173 Table 1 Characteristics in those who were still symptomatic at 6 weeks (requiring clinic review) and those who were not (Discharged or X-ray only). Statistics presented: median [IQR], n (%), Kruskal-Wallis test

Characteristic	No ongoing symptoms (therefore not seen in clinic) n= 293	Ongoing symptoms at 6 weeks (seen face to face) n=65	P value
Age	65 [51, 80]	57 [46, 65]	0.001
Male	158 (54%)	35 (54%)	0.814
Previous lung disease	53 (18%)	17 (27%)	0.174
Admission Chest X-ray			
Normal	43 (15%)	7 (11%)	
Mild change	83 (28%)	14 (22%)	
Moderate change	70 (24%)	25 (38%)	
Severe Change	19 (6%)	10 (15%)	
Other non-Covid diagnoses	19 (6%)	3 (5%)	
Not done	59 (20%)	6 (9%)	
Admission CT			
Normal	8 (3%)	1 (2%)	
Mild change	13 (4%)	3 (5%)	
Moderate change	17 (6%)	6 (9%)	
Severe change	14 (5%)	7 (11%)	
PEs	6 (2%)	5 (8%)	
Not done	233 (80%)	46 (71%)	
Smoker (pack years)	20 [5,30]	19 [4.5,40]	0.908
MRC score pre-COVID	1 [1,2]	1 [1,2]	0.470
MRC score post-COVID	2 [1.5,3]	3 [2,4]	0.026
mCAT	4 [1,8]	15 [8, 22.5]	<0.001
GAD questionnaire	11 [8,12]	14 [13,15]	0.02
PHQ questionnaire	7.5 [6.5,10]	17 [14,21]	<0.001
Hospital Anxiety and Depression Score			
Anxiety	1 [0,5]	4 [2,9]	0.007
Depression	1 [0,4]	4 [1,9]	0.003

Methods We set up a pathway to allow us to screen selected discharged patients to identify those who required further investigations. Discharged patients were identified following admission between March and June 2020 using electronic hospital records. Patients who were not suitable to be called were excluded, and a letter was written to their GP explaining this. All other patients were called approximately 6 weeks after discharge. Information was collected including ongoing symptoms, admission radiological changes, and selected questionnaires. Patients with ongoing symptoms were invited back for investigations and face-to-face appointment, and anyone without symptoms but x-ray changes was invited for repeat X-ray at 10 weeks.

Results Of the 828 admissions, 281 died, and a further 182 were unsuitable to call. Of those called, 88% (321) answered, and 65 remained symptomatic and were seen in clinic. 154 people required a repeat chest x-ray, 8 subsequently had a CT thorax and clinic review. 56 people did not attend for follow-up x-ray and were discharged. Of the 73 people seen, 59 had interstitial changes based on radiological criteria; 29 of these were resolving inflammation which did not require further follow up as the patients were also clinically improving. 30 patients, 11 with fibrotic changes, required observation or treatment. Four patients received oral prednisolone and 7 had received intravenous methylprednisolone earlier. In the symptomatic group, PEs, pulmonary hypertension, adenocarcinoma in situ and breathing pattern disorders were also diagnosed.

Conclusion Less than 10% of patients required treatment with steroids after admission with COVID-19 infection. This is lower than previous estimates following MERS/SARS infection. Interestingly, severe radiology changes did not predict the likelihood of developing fibrosis. The screening telephone clinic was a useful way of identifying those with ongoing symptoms who required further investigation.

P174 'UNCOVERED COVID': THE ADDITION OF A CLINICO-RADIOLOGICAL PRE-FOLLOW UP MULTIDISCIPLINARY TEAM REVIEW IMPROVES THE PROVISION OF FOLLOW-UP PATHWAYS IN COVID-19

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10.1136/thorax-2020-BTSabstracts.319

Introductions and Objectives BTS guidelines advise that patients with a clinico-radiological diagnosis of COVID-19 undergo follow-up based on severity of disease: either Group 1 (required ICU/HDU admission or significant respiratory support), or Group 2 (any other admitted patients).

The BTS guidelines themselves address concerns that delivering this follow-up might prove difficult due to disrupted working patterns and large caseloads. To address these concerns, we established a post-COVID-19 Pre-Follow Up Multi-Disciplinary Team (pre-FU-MDT). We have reviewed its impact on COVID-19 follow-up streams.

Methods To capture all relevant patients we cross-referenced a list of all RT-PCR swabs sent for symptomatic purposes against those who had a recent CXR. The CXR reports, coded in real time, were used to establish a list of patients who had CXRs consistent with or indeterminate for COVID-19 pneumonia.

The database was screened by a specialist respiratory nurse who assigned follow-up streams based on level of respiratory support required and CXR report.

All Group 1, Group 2 and Indeterminate cases were discussed at MDT, which consisted of a consultant respiratory physician and a thoracic radiologist. Cases were discussed with discharge summaries, results and imaging. Follow-up streams were reallocated as necessary. Time for MDT was re-allocated from services reduced during the pandemic.

Abstract P174 Table 1 Change in follow-up status caused by the intervention of the pre-follow up multidisciplinary team clinico-radiological review

	Allocated to Group 1 Follow-Up Without Pre-FU MDT	Allocated to Group 2 Follow-Up Without Pre-FU MDT	Patients Requiring No Follow-Up Without Pre-FU MDT	Non-COVID CXRs Without Pre-FU MDT	Indeterminate CXRs Without Pre-FU MDT	Total
Allocated to Group 1 Follow-up With Pre-FU MDT	25	1	0	0	1	**27**
Allocated to Group 2 Follow-up With Pre-FU MDT	2	44	3	0	38	**87**
Patients Requiring No Follow-Up With Pre-FU MDT	5	12	16	6	150	**189**
Non COVID 6/52 CXR (with Pre-FU MDT)	3	8	1	1	65	**78**
Non COVID bespoke follow-up‡ (with Pre-FU MDT)	0	3	0	1	7	**11**
Total	**35**	**68**	**20**	**8**	**261**	**392***

**Consecutive subgroup analysis of 392 patients of the 495 that were reviewed in the COVID-19 pre-Follow Up MDT*

‡'Non-COVID bespoke follow-up' refers to non-COVID respiratory follow-up e.g. review in Pleural Clinic

Results Of 1532 'symptomatic' swabs, there were 495 patients with a potential clinico-radiological diagnosis of COVID-19 pneumonia discussed at the Pre-FU-MDT.

We performed a subgroup analysis on 392 consecutive cases (*Table 1*). The pre-FU-MDT changed the follow-up pathway in 21% of non-indeterminate cases (23/108). Follow up was ceased in 5% (17/108). Patients with indeterminate CXRs represented the largest cohort. The pre-FU-MDT ceased follow-up in 57% (150/261) and the remaining 43% (111/261) were stratified to Group 1, Group 2 or other appropriate non-COVID follow up.

Conclusions A Pre-FU-MDT has significant clinical impact. By redistributing clinicians' time, an efficient mechanism has been created to reduce unnecessary CXRs and clinic appointments, and focus on those most likely to require follow-up. Review of our follow-up outcomes is ongoing and the results will be available at the time of the BTS meeting.

REFERENCE

1. BTS Guidance on Respiratory Follow-Up of Patients with a Clinico-Radiological Diagnosis of COVID-19 Pneumonia (2020)

Abstract P175 Table 1 Self-reported persistence of selected symptoms at initial telephone review (N=57)

	Persisting	Improving	Resolved	Never experienced
Dyspnoea	6 (10%)	25 (44%)	26 (46%)	0
Cough	4 (7%)	1 (2%)	42 (74%)	10 (18%)
Fatigue	14 (25%)	13 (23%)	29 (51%)	1 (2%)

symptom persistence. Prospective studies serially assessing full symptomatology are required. Nevertheless, these data highlight persistent symptoms at 6–12 weeks; particularly exertional dyspnoea and fatigue. 91% of patients were free from cough at this time; investigating for possible alternative causes should therefore be considered in patients experiencing chronic cough.

These data are valuable in planning long-term support for patients following COVID-19 pneumonia, and support the BTS recommendations for early proactive follow up of this cohort.

P175 CLINICO-RADIOLOGICAL RECOVERY FOLLOWING SEVERE COVID-19 PNEUMONIA

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Background The recovery course following COVID-19 pneumonia remains poorly understood. Analysis of routine clinical and imaging follow up of patients admitted with COVID-19 pneumonia undertaken in accordance with British Thoracic Society (BTS) guidance offers an opportunity to improve our understanding of the recovery course following acute infection.

Methods All patients requiring Intensive or Respiratory High Dependency Unit care with COVID-19 pneumonia who survived to discharge were offered telephone review and interval chest radiograph (CXR) at 6 and 12 weeks respectively in accordance with BTS guidance. Patients were contacted in chronological order by discharge date. The data presented here covers discharges between 25/03–03/05/20 inclusive. All chest radiographs were reported by a consultant radiologist.

Results A total of N=73 patients were identified (74% male, mean age 57.6 years, range 22–84). N=41 (56.1%) had been admitted to ITU, with the remainder admitted to HDU.

Following discharge, N=6 (8.2%) were re-admitted within 30 days (median time to first re-admission 19.1 days). N=2 (3.5%) patients were diagnosed with pulmonary emboli following the index admission. 1 patient died within 30 days of discharge (unrelated to COVID infection).

Follow up calls occurred with N=57 patients, at median 9.6 weeks post discharge (range 6–12 weeks). Patient reported persistence of symptoms at time of review is summarised in table 1. Interval CXR was available in N=49 patients. Of these, N=34 (71.7%) were clear, N=10 (19.5%) showed linear atelectasis, and N=5 (8.7%) showed persistent consolidation (all improved compared to admission CXR).

Discussion These data describe the clinico-radiological course following admission with severe COVID-19 pneumonia. Limitations of this analysis include limitation to patients receiving HDU/ITU level care and the retrospective categorisation of

P176 EARLY RESULTS OF RADIOLOGICAL FOLLOW-UP OF NON-ITU INPATIENTS WITH COVID-19 PNEUMONIA IN A LARGE UK DISTRICT GENERAL HOSPITAL

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10.1136/thorax-2020-BTSabstracts.321

Introduction and Objectives Emerging data suggests COVID-19 pneumonia could lead to fibrotic changes post-infection.[1] In this study we seek to establish the radiological changes of non-ITU patients 3 months after hospital discharge based on the follow-up models recommended by the British Thoracic Society.[2]

Methods Patients admitted with swab-positive COVID-19 pneumonia were identified. Those who required intensive care and those deceased were excluded from analysis. Those who survived to hospital discharge were invited for a 3-month follow-up chest radiograph (CXR). Patients with normal CXRs were informed and discharged. Patients with persistent CXR changes were contacted and a decision made for further interval CXR or CT imaging.

Results 200 patients were admitted with swab-positive COVID-19 pneumonia without escalation to intensive care and discharged between mid-March and mid-May 2020. 25 were excluded from follow-up due to patient factors (e.g. extreme frailty). The patients' characteristics and outcomes are summarised in table 1. 87% of patients had their CXR return to normal after 3 months. The patients whose CXR returned to normal after 3 months are younger than those with persistent changes ($p<0.05$).

Conclusions Our results demonstrated reassuring findings that the majority of patients receiving ward-based care for COVID-19 pneumonia who survived to discharge have normal CXR findings by 3 months post-discharge. Younger patients are more likely to have CXR changes resolved completely by 3 months. Most patients with persistent CXR changes at 3 months are improving symptomatically and radiologically so up-front CT was not requested. More follow-up is required to characterise the longer term respiratory sequelae of COVID-19. Our follow-up is ongoing and more results will be

Abstract P176 Table 1 Characteristics and outcomes of non-ITU patients admitted with swab-positive COVID-19 pneumonia, at 3 months post-discharge

As of 08/08/2020	N	Male	Female	Mean Age
Total patients identified	200	125 (63%)	75	64
Patients invited for CXR	175	113	62	62
Invited patients who had CXR 3 months post-discharge to-date	113 (65%)	75	38	62
CXR normal therefore discharged	98 (87%)	64	34	61*
CXR abnormal ± patient symptomatic so interval CXR/CT needed	15 (13%)	10	5	76*
Patient with follow-up CT	2**			

*p<0.05
** One patient with persistent ground-glass changes but no fibrosis, one back to normal

available for presentation at the BTS Meeting if this abstract is accepted. We are also conducting follow up of patients surviving intensive care admissions with results submitted separately.

REFERENCES

1. Spagnolo P, *et al*. Pulmonary fibrosis secondary to COVID-19: a call to arms? *Lancet Respir Med* 2020
2. British Thoracic Society Guidance on Respiratory Follow Up of Patients with a Clinico-Radiological Diagnosis of COVID-19 Pneumonia. *V1.2 ed*, 2020.

P177 EXPERIENCES FROM POST COVID-19 CLINIC IN A TERTIARY CENTRE

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10.1136/thorax-2020-BTSabstracts.322

Introduction COVID-19 is a new disease. As the first wave hit the UK, clinicians had to learn how to manage the condition acutely. We progressed from a priori approach to assimilation of acquired experience and evidence. After the acute phase, the longer term sequelae were entirely unknown. We developed a service to follow up survivors. The service had to accommodate a large volume of patients and operational infection prevention restriction. Whilst primarily respiratory, the disease is multi-system. Patient assessment had to be comprehensive at the outset; 'Post-COVID syndrome' was an unknown entity.

Methods At 3 months post admission, patients were screened initially via telephone questionnaire. Those with ongoing issues were seen in a one stop multi-disciplinary clinic comprising: Respiratory, ID and Intensivist physicians, Physiotherapists, Psychologists with full lung function testing, a broad battery of blood tests, thoracic radiology and questionnaires on fatigue, mental health and activity.

Results Results from 101 patients seen in a 7 week period from June to August 2020 are presented here.

Of those seen in the clinic, 58 (57%) were male and 43 (43%) were female. The mean age was 60 and the mean BMI was 32. 32% of patients demonstrated moderately-severe to severe anxiety. 18% of patients were suffering moderately-severe to severe depression.

37% of follow up CXRs were still abnormal at 3 months. 48% of available CT scan demonstrated parenchymal or pulmonary vascular abnormality.

The vast majority of patients demonstrated significant fatigue and breathlessness. Almost all were sleeping poorly.

23% patients demonstrated evidence of PTSD using the Impact of events score. Based on the MDT assessments 45% patients were referred for additional follow up.

Conclusion We have demonstrated that a significant proportion of patients continue to have physical and psychological sequelae at 3 months post COVID-19 infection. In particular, almost half of patients with a follow up CT scan demonstrated radiological abnormality.

All patients benefited from a comprehensive psychosocial and clinical review with individualised, specialist advice on management. The MDT follow up approach has not only guided management of these patients but also allowed us to understand the multi-system complexity of the post-COVID condition.

P178 COVID-19 POST-DISCHARGE MORTALITY RATE IN A LONDON DISTRICT GENERAL HOSPITAL

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Introduction Due to the novelty of COVID-19, uncertainty about the factors contributing to mortality, unavailability of definitive treatment options, limited access to medical, social support and rehabilitation in the community during the covid-19 peak; compounded with anxiety and reluctance to seek medical help in timely manner, it was anticipated that vulnerable patients would be affected the worst. We report post-discharge mortality and the associated risk factors.

Method This is a retrospective study of all the patients admitted at a busy district general hospital during the peak period of the COVID-19 pandemic i.e. 1st March to 20 June 2020. We included all patients aged 18 and above in data analysis.

Results A total of 628 patients were admitted during the study period with 481 having positive swab PCR. Of these, 389 (62%) patients had two or more comorbidities, 311 (49.5%) hypertensive and 166 (26.4%) diabetic.

In-hospital mortality: 226/628 (35.9%) patient died in hospital, of which 194 (85.8%) had a positive Coronavirus nasopharyngeal swab. This was statistically significant with p-value of 0.001.

Post-discharge mortality of patients: 54/402 (13.4%) of those patients discharged home following hospitalisation died within 28 days of discharge. 42/54 (77.7%) were swab positive. Swab positive patients 42/54 (77.8%) had a higher risk of death. Two thirds of swab positive patient were older than 75 years and 81% had two or more pre-existing co-morbidities.

There was no difference in length of stay between the survivors and non-survivors.

Conclusion As expected, age, male gender, COVID-19 PCR-positivity, multiple comorbidities, high BMI and raised CRP were associated with higher in-hospital and post-discharge mortality. It is unsurprising that antibiotic treatment without bacterial infection was associated with higher but statistically insignificant mortality rate, while therapeutic anticoagulation and steroids were associated with better outcomes. There is an urgent need for further analysis of root cause to mitigate

the modifiable factors and devise a robust post-discharge management plan in collaboration with all stakeholders.

REFERENCE

1. Deaths involving COVID-19, England and Wales: deaths occurring in June 2020: https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsinvolvingcovid19englandandwales/deathsoccurringinjune2020

Cough and carbon

P179 PATIENT PERSPECTIVE OF DIAGNOSIS AND TREATMENT OF CHRONIC COUGH: A DESCRIPTIVE ANALYSIS OF UK ADULTS

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10.1136/thorax-2020-BTSabstracts.324

Introduction The patient perspective of chronic cough (CC) diagnosis and treatment path is not well-documented.
Aim To describe patient-reported diagnosis and treatment patterns among UK adults with CC.
Methods An ethics-approved CC survey was administered to 2018 National Health and Wellness Survey respondents who reported coughing daily for ≥8 weeks. CC survey respondents had active CC and were excluded if they smoked/vaped in the past year or were prescribed oral corticosteroids or ACE inhibitors.
Results There were 112 CC respondents (mean age 58.1 years; 65% female; mean CC duration 5.6 years). Of the 77% who sought evaluation for their CC from a healthcare provider (HCP), most were evaluated (93%) and treated (88%) in primary care while 48% were evaluated and 14% were treated by a specialist. The most common diagnostic tests recalled were chest imaging (60% of respondents) and breathing tests (58%). Three-fourths (77%) of the respondents had any recall of a doctor attributing their CC to one or more of the common phenotypes of CC. Where this was the case, asthma (34%), gastro-oesophageal reflux (27%) and upper airways disease (post-nasal drip 19%; nasal allergies 14%; allergic rhinitis 13%) were most common. Of the 61% given medical treatment for their CC, the most frequently prescribed were nasal steroids (32%), inhaled steroids (29%) and first-generation antihistamines (29%). These medications provided 'a great deal' of CC relief for 15% or fewer respondents, depending on Rx class. CC respondents often purchased OTC medication (49%) or tried home remedies (38%) to treat their CC. Although 61% of respondents believed their HCP was 'somewhat' or 'extremely knowledgeable' in evaluating and treating CC, 47% felt their HCP did not understand the impact of CC on their life, 57% felt they were not referred to enough or the right specialists and 81% felt not enough tests were ordered. Forty-seven percent (47%) of respondents stopped seeking medical care due to lack of success treating CC.
Conclusions Although UK adults suffering from CC are often evaluated in primary and secondary care, the majority remain unresolved and many felt more could be done to help them find relief.

P180 DESCRIPTIVE ANALYSES OF COUGH SEVERITY AND QUALITY OF LIFE AMONG UK ADULTS WITH CHRONIC COUGH: A GENERAL POPULATION SURVEY

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Introduction Chronic cough (CC) is infrequently studied outside of cough clinics.
Aim To describe the impact of CC on patient's lives.
Methods Among the 15,000 National Health and Wellness Survey (NHWS, 2018) general UK population respondents, those whom reported coughing daily for ≥8 weeks were offered an Ethics-approved survey asking about cough duration and severity and its impact. Respondents included those with active CC and excluded those who smoked/vaped in past year or used oral glucocorticoids or ACE inhibitors. The Hull Airway Reflux Questionnaire (HARQ) was completed; it is scored out of 70 with 13 being the upper limit of normal. From the NHWS, quality of life (SF-12v2; lower scores represent more impaired health status), mental health (GAD-7, PHQ-9) and Work Productivity and Activity Impairment were also reported.
Results Among adult active CC respondents (CCr) (n=112; mean age 58.1 years; 65% female, 39% past smokers), mean cough duration was 5.6 years. Three-quarters (77%) had their CC evaluated by an HCP. Over the prior 2 weeks, while 20% rated their overall cough severity as ≥7 (0–10 numeric rating scale), 52% rated their worst day as ≥7. Only 22% felt in control of their cough all/most of the time during the prior 2 weeks. Compared with the UK general population, the subset of CCr had higher mean impairment of both total work productivity (34% vs 23%) and daily activities (38% vs 26%). CCr mean SF-12 mental health component score was 2.19 pts lower and physical component score was 4.93 pts lower than the UK general population mean. CCr reported a mean HARQ of 28.3 out of 70. CCr reported severe or frequent problems (4–5 out of 5) of: strange taste in mouth (21%), clearing throat (25%), and coughing more when awake (31%). Most (63%) CCr reported that cough interfered with enjoyment of life. More CCr reported moderate-severe depression and severe anxiety than did the general UK population (21% vs 12%; 11% vs 7%).
Conclusions CC impedes work productivity, mental well-being and enjoyment of life. CC is an enduring condition with a wide-ranging impact on a person's life.

P181 HEALTHCARE UTILISATION IN CHRONIC COUGH

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10.1136/thorax-2020-BTSabstracts.326

Introduction Chronic cough is a common cause for medical consultations, and is associated with considerable physical and psychological morbidity. We investigated healthcare use and cost in chronic cough, and assessed its relationship with cough

severity, health status, objective cough frequency (CF) and anxiety and depression.

Methods Prospective study of consecutive patients with chronic cough from a specialist clinic who completed a cough severity visual analogue scale (VAS), cough-specific (Leicester Cough Questionnaire; LCQ) and general health status EuroQol EQ-5D-5L, Generalised Anxiety Disorder (GAD7), Patient Health Questionnaire (PHQ9) and 24-hour objective CF monitoring with Leicester Cough Monitor (LCM). Case notes were reviewed for cough specific healthcare use 12 months before and after the first cough clinic consultation. Resource use included general practitioner and hospital clinic visits, investigations and treatments. Unit costs for healthcare use were derived predominantly from National Health Service Reference Costs.

Results 100 participants with chronic cough were recruited (69% female, median duration 3 years, mean age 58 years). The diagnoses of cough were unexplained (57%) refractory (27%) and other (16%). Cough severity, health status, anxiety severity, depression severity and CF were: median (IQR) VAS 59.5 (30.0–79.0) mm, mean (SD) LCQ 11.9 (4.0), EQ-5D-5L 0.846 (0.178), GAD7 2.78 (4.85), PHQ9 3.30 (5.47) and geometric mean (SD) CF 15.3 (2.5) coughs·hr^{-1}, respectively. The mean total cost per individual for cough related healthcare utilisation was £1664.64. Diagnostic investigations were the largest contributor to cost (63%), followed by cough clinic consultations (25%). In multivariate analysis, anxiety (GAD7) and cough related health status (LCQ) were associated with increased cost (p=0.001 and 0.041 respectively).

Discussion Chronic cough is associated with significant healthcare costs and these are largely due to diagnostic investigations and clinic consultations. The strongest predictors of costs were health status (LCQ) and anxiety. Further studies should investigate the optimal management protocols for patients with chronic cough.

Funding for this study was provided by Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA.

P182 URINARY INCONTINENCE IN CHRONIC COUGH AND RESPONSES TO TREATMENTS

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Introduction and Objectives Chronic coughing is associated with a number of distressing complications including urinary incontinence. However the response of incontinence to treatments for chronic cough and/or management of the incontinence is poorly described. The objective of this study was to assess the prevalence of urinary incontinence in a tertiary cough clinic and to describe the effects of interventions.

Methods We reviewed the case notes of patients attending our clinic to identify those reporting urinary incontinence associated with coughing, documented at initial assessment in our standard clinic proforma. We then followed up a random selection of those reporting incontinence to evaluate the effects of interventions for cough and specific advice/onward referral to incontinence services delivered by our specialist nurse. Subjects used a 15-point global rating of change scale (GRCS) to rate changes in their urinary incontinence, with 7 graded descriptions of improvement (+1 to +7), 7 of worsening (-1 to -7) or 0 for no change.

Results Of 137 chronic cough patients [median age 62.0 yrs (IQR 50 -71), 100 (72.5%) female], 43 patients (31.4%) had urinary incontinence associated with coughing (one also reported faecal incontinence), 83 (60.6%) were continent and the information was missing for 11 (8%). Patients with urinary incontinence were much more likely to be female (41/43 subjects, p<0.001) but were a similar age to those without incontinence.

In 23 patients [median age 66.0 yrs (IQR 55.0–71.5); 21 (91%) female] followed up, the median GRCS score for urinary incontinence was +4 i.e. moderately better (IQR 0 to +6). Scores suggesting improved urinary continence were recorded by 15 (65.2%) patients, with 8 reporting no change and none reporting a worsening. Patients established on effective drug therapy (mainly low dose morphine sulphate) were more likely to report improved continence (median GRCS +5 versus 0, p=0.003), as were those seen by the specialist nurse (GRCS +6 versus +4, p=0.043) however speech and language therapy did not seem to influence continence (p=0.46).

Conclusions Different Interventions for chronic cough may have different impacts upon associated complications such as urinary incontinence. Furthermore specific intervention for urinary incontinence may be independently beneficial in this patient group.

P183 CHRONIC COUGH – EFFICACY OF ACID SUPPRESSION THERAPY IN ASYMPTOMATIC GASTROESOPHAGEAL REFLUX

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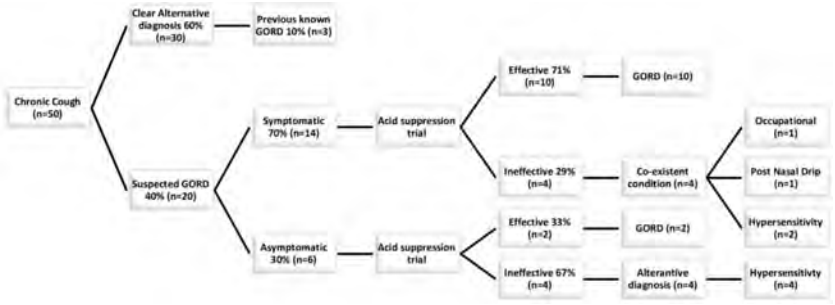
Background Gastroesophageal reflux disease (GORD) is a common contributor towards chronic cough and can often be asymptomatic. Current European Respiratory Society (ERS) guidelines advocate trialling acid suppression in symptomatic cases only controversially asymptomatic patients may also report therapeutic benefit.[1] Further studies are required to understand the efficacy of this intervention in both groups to reduce the economic cost of empirical anti-acid prescriptions and address the disparity in clinical practice.

Method We conducted a retrospective observational study of all referrals to respiratory outpatients with chronic cough over a 6 month period (January-June 2019). We evaluated the proportion of patients who had already been trialled on anti-acids in primary care. Subsequent analyses of clinic letters and investigations allowed us to assess the prevalence of GORD and associated benefit of acid suppression in symptomatic vs asymptomatic patients.

Results A total of 50 patients with chronic cough were reviewed. The mean age was 63 years with 60% of the cohort being female (n=30).

42% (n=21) of patients had been empirically trialled on anti-acids by the GP previously independent of symptoms but the dose or length of treatment was suboptimal. 60% (n= 30) of patients had a clear alternative diagnosis and were not offered an anti-acid trial in respiratory clinic. Out of these 10% (n=3) had GORD coexisting with an alternative cause of chronic cough. 40% (n=20) of patients suspected to have



Abstract P183 Figure 1 Efficacy of acid suppression in suspected gastroesophageal reflux

GORD underwent an anti-acid trial with efficacy of 71% (n=10) in symptomatic patients with co-existent disease seen in 29% (n=4) and 33% (n=2) in asymptomatic patients with an alternative diagnosis reached in 67% (n=4). [Figure.1]

Discussion Co-existence of cough and GORD is well established and may explain the inefficacy of treatment reported by patients on trial of anti-acids alone.[1] In asymptomatic patients who report benefit it is difficult to determine the contribution of GORD versus placebo effect. Further randomised control trials and a multidisciplinary approach is needed to better define this association and address disparity in clinical practice.

REFERENCE

1. Morice, A. H. *et al*, ERS Guidelines on the diagnosis and treatment of chronic cough in adults and children, *European Respiratory Journal*(2020;**55**:)

P184 EFFECT OF INHALATION PATTERNS ON THE DELIVERED DOSE OF SYMBICORT™ FROM A DRY POWDER INHALER (DPI) COMPARED TO A METERED DOSE INHALER (MDI) PLUS VALVED HOLDING CHAMBER (VHC)

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10.1136/thorax-2020-BTSabstracts.329

Rationale COPD is a chronic and progressive disease and requires self-administration of inhaled medications. As the disease progresses, reduced respiratory muscle strength may affect patients generating sufficient inspiratory effort to effectively use DPIs.

Methods Symbicort*(100 µg budesonide (BUD)+6 µg formoterol fumarate (FF)) inhaled via either DPI (Turbuhaler,n= 5) or MDI (Vannair,n= 5) with an AeroChamber Plus* Flow Vu* VHC (Trudell) was assessed. 10 males ranging in age from 57–83 inhaled from placebos of their medication. Inhalation profiles were recorded, and later recreated via breathing simulator, coupled to the mouthpiece of the inhaler via an adult oropharynx (OP) model. The simulator was located distal to a collection filter, at the exit of the OP, capturing medication likely to have deposited at the carinal region and potentially available for delivery to the lungs.

Results The mass (µg) of FF and BUD recovered from the model OP and filter (CARINA) from each simulation are summarized in table 1.

The mass of APIs retrieved from the CARINA for MDI +VHC was greater than the outcomes obtained by simulating the DPI profiles ($p \leq 0.03$).

Abstract P184 Table 1

Inhaler	OP		CARINA	
	BUD	FF	BUD	FF
DPI	20.3±7.9	1.0±0.4	21.1±8.1	1.0±0.4
MDI+VHC	18.3±11.7	0.8±0.6	28.7±10.0	1.8±0.6

Conclusions These data indicate the MDI+VHC can deliver more medication than the DPI evaluated to the carinal region. They also demonstrate a need for continued patient inhaler assessment to ensure they can generate the necessary inspiratory effort for sufficient drug delivery

P185 LIFE CYCLE ASSESSMENT AND CRADLE-TO-GRAVE CARBON FOOTPRINT OF A MULTIDOSE RESERVOIR DRY POWDER INHALER

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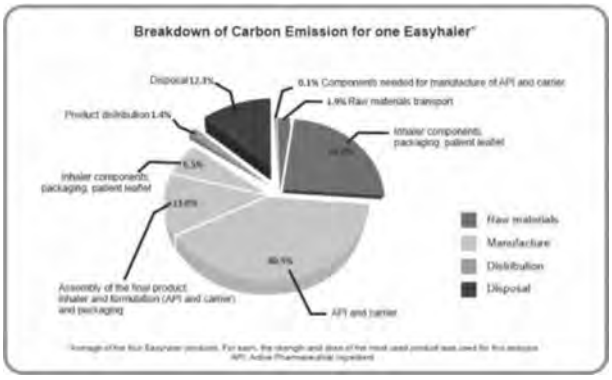
Dry powder inhalers (DPIs) have about 20-fold lower carbon footprint (CO_2FP) than metered dose inhalers (MDIs) with estimates of CO_2FP between 1.5 and 6 kg CO_2e for a 200-dose DPI. GSK's Carbon Trust-verified analysis including Relvar and Seretide Accuhaler is about 1 kg CO_2e/inhaler, and Product Carbon Footprint analysis of Spiriva Respimat 0.780 kg CO_2e. Still, limited data is available on CO_2FP and Life Cycle Assessment (LCA) of different types of DPIs.

We conducted a Cradle-to-Grave (CTG) CO_2FP analysis and LCA of four different Easyhaler® (EH) products available for the treatment of asthma and COPD (budesonide-formoterol; salmeterol-fluticasone; salbutamol, and formoterol EH). In-depth data collection from Orion in-house data, suppliers, and reference databases was conducted in 2019. Analyses were performed by ISO14001:2015 and 9001:2015 certified Carbon Footprint Ltd.

The total CTG life cycle emissions for one EH (average) was 0.588 kg CO_2e (range 0.514–0.664 kg). Emissions from manufacture accounted for 60% (range 54–65%). In comparison, emissions from distribution accounted for less than 2%, indicating that most potential for improvement lies in manufacture processes.



Abstract P185 Figure 1

Patients with asthma or COPD, and treating physicians alike, are increasingly aware of climate change and this affects even their treatment choices. When considering the climate impact of inhalation therapy, DPIs, like EH, have a minimal carbon footprint compared with MDI.

P186 CARBON FOOTPRINT ANALYSIS OF THE SALFORD LUNG STUDY (ASTHMA): A SUSQI ANALYSIS

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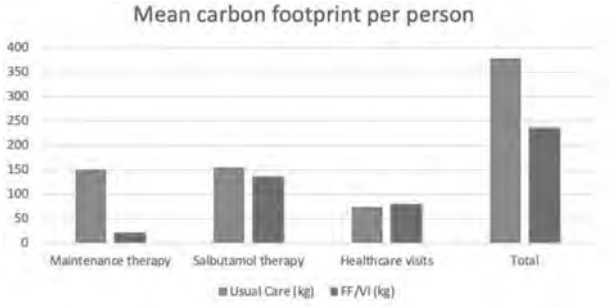
The UK is aiming for net zero carbon emissions by 2050 and the NHS makes up roughly 5% of the total carbon footprint. Inhaler therapies have high potential for carbon savings. Metered dose inhalers (MDI) have a very high carbon footprint as they contain hydrofluoroalkane propellants which are potent greenhouse gases. Dry powder inhalers (DPI), have a much smaller footprint and make up only 30% of inhaler usage in the UK (far lower than other European countries).

The Salford lung study (SLS) was a randomised control trial assessing a single combined DPI, Fluticasone Furoate/Vilanterol (FF/VI), against usual care in asthma management across a 12-month period.[1]Patient health outcomes, cost-effectiveness and employment outcomes have previously been reported. The Sustainable quality improvement (SusQI) framework assesses projects using a 'triple bottom line' of environmental, social and economic costs and is used to motivate healthcare workers to bring about positive change.[2] We used SusQI methodology and NHS Sustainable development data to calculate the carbon footprint of the two treatment arms.



Abstract P186 Figure 1 Chart showing the mean carbon footprint per person of the three measured outcomes and as a total

Additionally, the carbon footprint of healthcare visits and hospital stays were calculated.

We calculated a saving of 141 kg CO_2e per patient per year in the FF/VI arm. Prior to randomisation, 70% of patients were using MDI maintenance therapy. The majority of the greenhouse gas savings (129 kg CO_2e) derived from switching from MDI to DPI maintenance treatment. The carbon footprint of salbutamol therapy was slightly lower in the treatment arm; 156 kg in FF/VI group vs 137 kg CO_2e in the usual care arm. Usual care and FF/VI had little difference in carbon footprint of healthcare visits, 73 kg and 79 kg CO_2e respectively.

Patients randomised to FF/VI had a significant saving in their carbon footprint compared to standard care, alongside improvements in clinical outcomes. Future clinical trials should consider including not just patients' health outcomes, but also the triple bottom line of the environmental, social and financial costs.

REFERENCES

1. Woodcock, *et al*. The Salford Lung Study protocol: a pragmatic, randomised phase III real-world effectiveness trial in asthma. *BMC Pulmonary Medicine* 2015;**15**(1).
2. Mortimer, Wilkinson, *et al*. Sustainability in quality improvement: redefining value. *Future Healthcare Journal* 2018;**5**(2):88–93.

P187 EASE OF USE, EFFECTIVENESS AND ENVIRONMENTAL IMPACTS: EVALUATING INHALER PRESCRIPTIONS, PATIENT PREFERENCES AND OPPORTUNITIES FOR IMPROVEMENT

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Improving respiratory care is good for patients and good for the planet. Inhalers contribute 4% of the NHS's carbon footprint. The NHS committed to 51% carbon emissions reduction by 2025 (on 2007 baseline). The carbon footprint of dry powdered inhalers (DPIs) is 8gCO2eq/dose. Metered dose inhalers (MDIs) have 10 times this footprint (82–119gCO2e/dose).

Methods We designed scoring systems to assess DPI and MDI technique (image). We developed a survey to assess patients' inhaler prescriptions, technique and preferences. We piloted and amended the survey twice to improve coherence and clarity; then surveyed twenty respiratory ward inpatients over six weeks.

Results 20/20 patients were prescribed both MDI and DPI, but some did not have both inhalers at their bedside.

DPI 16/20 had a DPI at the bedside. 14/16 felt very confident or confident using the DPI, 2/16 somewhat or not confident. 13/16 remembered being shown how to use their DPI.

Checking DPI technique, out of 5 points: 8/16 scored 5, 3/16 scored 4, 3/16 scored 3, 2/16 scored 2.

MDI 17/20 had an MDI at the bedside. 13/17 felt very confident or confident using the MDI, 4/17 somewhat or not confident. 15/17 rememberd being shown how to use their MDI.

Checking MDI technique, out of 4 points: 5/17 scored 4, 4/17 scored 3, 8/17 scored 2. 9/17 patients lost a point due to not using a spacer. 9/17 patients said they use a spacer. 4/9 find cleaning a spacer inconvenient. 3/9 find carrying a spacer inconvenient.

Abstract P187 Figure 1 Scoring system used to assess response to the question 'Please demonstrate your inhaler technique'. One point is given per item correctly demonstrated

DPI – Out of FIVE	Demonstrated correctly	Not demonstrated correctly
1. Prime the inhaler		
2. Empty lungs		
3. Positioning (sat up straight, head up)		
4. Mouth seal and deep inhalation		
5. Hold breath 10 seconds (or as close as possible)		
MDI – Out of FOUR	**Demonstrated correctly**	**Not demonstrated correctly**
1. Attach spacer		
2. Empty lungs		
3. Positioning (sat up straight, head up)		
4. Mouth seal and deep inhale		

Recycling 11/17 said they know when their MDI needs replacing. 6/17 automatically receive an MDI on every prescription. 5/16 automatically receive a DPI on every prescription.

4/20 knew that they could return inhalers to pharmacies for recycling. 6/20 knew that inhalers should not be put in council recycling bins.

Preferences 16/20 would be willing to change inhaler for one that is easier to use. 20/20 would change for increased effectiveness. 16/20 would change for lower carbon footprint.

Discussion Potential improvements in respiratory disease management include switching from mixed DPI/MDI to DPI-only prescriptions, and demonstrating and checking inhaler technique.

The survey tool is available from sarah.walpole@doctors.org.uk

Infection, co-infection and chronic infection

P188 MODELLING TO MITIGATE: RISK FACTORS FOR HOSPITAL ACQUIRED PNEUMONIA

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10.1136/thorax-2020-BTSabstracts.333

Introduction Hospital acquired pneumonia (HAP) is a common nosocomial infection that is poorly researched outside of intensive care units.[1, 2]

Objectives This study aimed to improve understanding of the risk factors for acquisition and mortality from HAP by answering the following question:

What is currently known from the existing literature regarding the risk factors for acquisition of HAP and mortality from HAP?

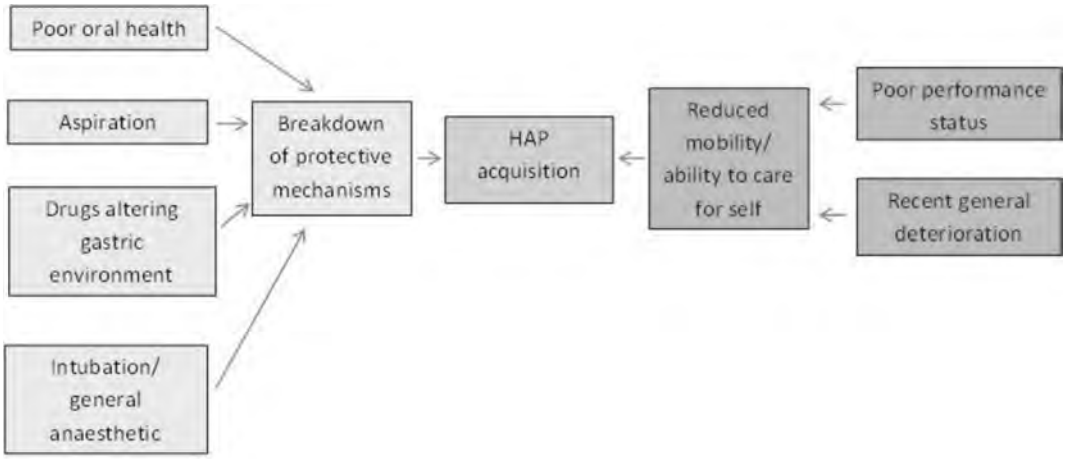
Methods A scoping review of the available literature was conducted in order to answer the above question. A literature search using Ovid Medline, Web of Science, Cochrane Collaboration and Pubmed databases was performed. Returned papers were screened for suitability before thematic analysis on the included 19 was conducted.

Results Factors that increase the risk of acquiring HAP form two meta-themes.

1. Anything that results in a breakdown of normal protective mechanisms (i.e. poor oral health, aspiration, drugs altering gastric environment and intubation).
2. Anything relating to deterioration in a patient's ability to care for themselves or to mobilise.

Synthesis of these meta-themes allowed the production of a model to describe how patients are put at an increased risk of acquiring HAP (figure 1).

The scoping review also identified that the literature is extremely fractured and contradictory regarding risk factors, their significance and how this is both identified and reported. There are large research gaps in potentially important issues surrounding mortality risk.



Abstract P188 Figure 1 Model of how patients are put at increased risk of acquiring HAP

This synthesis allowed the production of another model to describe how the literature surrounding risk factors for HAP acquisition is fractured.

Conclusion The model for HAP acquisition risk provides a simple demonstration of areas where interventions could help reduce rates.

Novel pilot studies into areas identified as poorly researched, especially mortality risk from HAP, are urgently needed. This will allow both the production of a similar model for mortality risk and mitigation of the issues identified regarding the fracturing of the literature.

REFERENCES

1. Nair G B, *et al*. Nosocomial Pneumonia. *Critical Care Clinics*. 2013; **29**(3): 521–546.
2. Burton L A, *et al*. Hospital-acquired pneumonia incidence and diagnosis in older patients. *Age Ageing*. 2016; **45**(1): 171–174.

P189 HOSPITAL ACQUIRED PNEUMONIA AND FRAILTY: THE NEW OLD AGE PROBLEM TO SOLVE

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10.1136/thorax-2020-BTSabstracts.334

Introduction Hospital acquired pneumonia (HAP) is a common but poorly researched nosocomial infection.[1] A review of the literature found scanty and contradictory evidence for risk factors for mortality from HAP.

Frailty is a condition that results from a decline in physiological reserve with age and has been deemed to be the biggest problem resulting from an ageing population.[2]

Objectives This novel study aimed to investigate if there is a relationship between frailty score and mortality risk from HAP.

It also aimed to study if frailty score affects how HAP presents.

Methods Data were collected from two medical wards at a district general hospital over a five month period. Comparisons of admission frailty scores between those dead and alive at 7 and 30 days after diagnosis of HAP were performed. All patients with HAP had their admission frailty scores, time from admission to diagnosis, observations and inflammatory markers recorded. Spearman's rank was used to assess for significant correlations.

Results The mean admission frailty score for those dead was higher than those alive at both 7 days (6.80, 6.41) and 30 days (7.00, 6.30).

Frailty score was not significantly correlated with any of the following measurements at time of HAP diagnosis: time from admission (rho=0.246, p=0.142), Early Warning Score (rho=-0.058, p=0.732), respiratory rate (rho=0.053, p=0.758), heart rate (rho=-0.276, p=0.098), temperature (-0.163, p=0.373), systolic blood pressure (rho=-0.051, p=0.763), diastolic blood pressure (rho=-0.157, p=0.353), white blood cell count (rho=0.205, p=0.252), C-reactive protein (rho=0.057, p=0.744).

Conclusion The findings of this study suggest that an individual with a higher frailty score at admission is more likely to die should they acquire a HAP during their time in hospital.

Further research is urgently needed to further assess the predictive power of frailty score for mortality risk.

Knowledge that frailty score does not affect how patients present with HAP also aids healthcare professionals in caring for hospital inpatients.

REFERENCES

1. Burton L A, *et al*. Hospital-acquired pneumonia incidence and diagnosis in older patients. *Age Ageing*. 2016; **45**(1): 171–174.
2. Clegg A, *et al*. Frailty in elderly people. *Lancet*. 2013; **381**: 752–762.

P190 SYSTEMATIC SURVEY OF REPORTED OUTCOMES IN VENTILATOR ASSOCIATED PNEUMONIA RANDOMISED CONTROLLED TRIALS

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Introduction and Objectives Standardised core outcome sets facilitate the comparison of interventions across clinical trials. There is no core outcome set for randomised controlled trials (RCTs) of patients with ventilator-associated pneumonia (VAP). We performed a methodological systematic review of outcomes reported in randomised controlled trials of patients with VAP.

Methods PubMed and the Cochrane library were searched for randomised controlled trials including adult patients with VAP, indexed from January 2009 to December 2019. Trial outcomes (primary and secondary) were identified.

Results One hundred randomised controlled trials were identified, in which the trial interventions were antibiotics, 82/100 (82%), anti-inflammatories, 8/100 (8%), precision medicine, 6/100 (6%), bronchoscopy, 2/100 (2%), prone positioning, 1/100 (1%) and vitamins, 1/100 (1%). A total of 781 outcome measures were identified, including 131 outcome measures reported as primary outcomes.

Mortality was the most frequently reported outcome measure among 66/100 (66%) of randomised controlled trials. Approximately half the trials reported microbiological endpoints (54/100 (54%)), with 47 different variations on how microbiological outcomes were defined. Treatment success was also reported in half of the randomised controlled trials (51/100 (51%)). Treatment success was most often selected as the primary outcome (38/116 (33%)) but was not specifically defined in 31/100 (31%) of randomised controlled trials. The resolution of the signs (15/100 (15%) of RCTs) and symptoms (11/100 (11%) of RCTs) of VAP were most often included in definitions of treatment success.

Adverse events were reported in 46/100 (46%) of randomised controlled trials. Adverse events were undefined in 21/100 (21%) of trials and specifically defined in only 7/100 (7%) of randomised controlled trials. Serious adverse events were reported in 7/100 (7%) of randomised controlled trials but only defined in 4/100 (4%) of trials. Duration of ICU length of stay, mechanical ventilation and hospitalisation were reported in 44/100 (41%)) of randomised controlled trials. Only one outcome (1/781 (0.12%)) addressed quality adjusted life years.

Conclusion Numerous outcome measures have been reported in randomised controlled trials including patients with VAP. A range of different definitions are used for specific outcome

Abstract 190 Table 1 Categorisation of 781 outcomes reported in 100 randomised controlled trials including adults with VAP

CLINICAL OUTCOMES					
CATEGORY	No. of RCTS n (%)	Total No. of Outcomes n (%)	No. of Primary Outcomes n (%)	No. of Alternative Definitions for each Outcome	Examples
Mortality	66/100 (66)	108 (14)	19 (18)	10	All-cause, VAP related mortality, ICU mortality etc
Treatment Success	51/100 (55)	116 (15)	38 (33)	29	Clinical cure, resolution of signs, symptoms, etc
Secondary Infection	19/100 (19)	35 (4)	3 (9)	11	VAP recurrence, superinfection etc
Duration of mechanical Ventilation	39/100 (39)	45 (6)	1 (2)	5	Ventilator free days, duration of ventilation etc
Duration of ICU stay	30/100 (30)	36 (5)	1 (3)	5	ICU LOS, ICU free days etc
NON-CLINICAL OUTCOMES					
Microbiological Outcomes	54/100 (54)	120 (15)	11 (9)	43	Eradication, persistence, response etc
Pharmacokinetic/ Pharmacodynamic	22/100 (22)	64 (8)	19 (30)	19	Plasma concentration, AUC/MIC etc
Surrogate Clinical Outcomes	27/100 (27)	73 (9)	19 (26)	35	SOFA score, PaO2/ FIO2 etc
Adverse Events	46/100 (46)	64 (8)	3 (5)	21	Adverse event undefined, safety etc
Antibiotic Use; Duration, Appropriateness	21/100 (21)	37 (5)	8 (22)	11	No. of days of antibiotics, appropriate antibiotics in first 24 hours etc
Miscellaneous	37/100 (37)	83 (11)	12 (14)	39	Composite endpoints, clinical condition (e.g. septic shock), health economics (e.g. QALYs)

measures. Developing a core outcome set for clinical trials including patients with VAP is urgently required.

P191 THE IMPACT OF CHANGES IN SEPSIS CODING ON MORTALITY REPORTS

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Background Coding practices impact the recorded prevalence of disease. Sepsis, most commonly caused by pneumonia, remains a common cause of mortality worldwide. In April 2017, NHS Digital issued new guidance on coding of septicaemia. Following this, many hospitals reported an increase in mortality from sepsis. We hypothesised that this altered mortality was artefact due to changes in how primary admission diagnosis was recorded during processing of hospital data.
Methods Hospital Episode Statistics from the Admitted Patient Care dataset for NHS hospitals in England, from April 2016 to March 2018 were included (twelve months before and after change in coding practices). Adult patients with an International Classification of Diseases 10 (ICD-10) code associated with the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS) class 'Septicaemia (except in labour)' recorded for an inpatient episode were identified. Patient comorbidities were assessed using ICD-10 codes recorded within the admission episode.
Results 514,678 hospital episodes with a coded diagnosis of sepsis were studied. After the coding change, there was no increase in the number of episodes where sepsis was coded as a secondary diagnosis, but a significant increase in the number of episodes where sepsis was coded as the primary reason for admission, for all demographic factors studied (sex, ethnicity, social deprivation index). This was sustained for the whole study period. There were significant differences in the case-mix of patients with a primary diagnosis of septicaemia before and after the coding change, including the recorded prevalence of specific comorbidities such as asthma and lung cancer, and an increase in the proportion of patients with a primary diagnosis of sepsis who had any recorded respiratory disease. Reported differences in outcomes could be accounted for by this change in case-mix.
Conclusion Changes in coding practices can cause important differences in the types of patients where the diagnosis of interest is recorded, which in turn can influence reported outcomes. The impact of any coding change should be considered carefully when reviewing longitudinal trends in outcomes for any disease where coding practice or diagnostic definitions have changed, within local reporting measures and also in published literature.

P192 RISK FACTORS FOR PULMONARY STENOTROPHOMONAS MALTOPHILIA INFECTION

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10.1136/thorax-2020-BTSabstracts.337

Background *Stenotrophomonas maltophilia* is a multi-drug resistant, Gram-negative bacillus that can cause opportunistic respiratory infections and is recognized as a pathogen in cystic fibrosis (CF). Previous reports of the epidemiological trends and antimicrobial resistance of respiratory *S. maltophilia* infections are limited in size. The aims of this study were: 1) to determine the demographics, persistence, prevalence and co-trimoxazole susceptibility of respiratory *S. maltophilia* infection over a five-year period and 2) to identify specific risk factors for *S. maltophilia* infection in people with CF.
Methods All respiratory samples culture-positive for *S. maltophilia* at our institution between December 2014 and

December 2019 were identified. Clinical data were extracted from patients' electronic health records.

Results 740 *S. maltophilia* isolates from 238 patients were identified with median age 62 years (range 0–96). Respiratory *S. maltophilia* infection was most commonly associated with invasive ventilation (29.8%), CF (25.6%) and non-CF bronchiectasis (24.4%). There was no clear change in the rate of *S. maltophilia* infection during the study (mean 153 positive samples/year).10.7% of isolates were co-trimoxazole resistant, with resistance more common in CF than other diagnoses (29.5% vs 5.3%, $p<0.001$). There were higher rates of chronic infection, as per the adapted Leeds Criteria, in patients with CF compared to non-CF diagnoses (19.7% vs 9.9%, $p=0.069$). In the year prior to their 2018 annual review, *S. maltophilia*-positive CF patients received more intravenous (IV) antibiotic days than *S. maltophilia*-negative CF patients (median 32 vs 7, $p=0.026$). *S. maltophilia*-positive CF patients had a higher rate of chronic Methicillin-sensitive *Staphylococcus aureus* than *S. maltophilia*-negative CF patients (56.0% vs 30.6%, $p=0.032$).

Conclusions Rates of pulmonary *S. maltophilia* infection do not appear to be increasing over a five-year period at our institution. *S. maltophilia* infection is most commonly associated with invasive ventilation, CF and bronchiectasis. We found evidence of a heightened susceptibility of CF patients to develop chronic infection and carry co-trimoxazole resistant *S. maltophilia* isolates, compared to other patient groups. Risk factors for infection in CF patients included IV antibiotic use and chronic MSSA infection.

P193 IMPACT OF DELAYED RADIOGRAPHIC DETECTION OF IPSILATERAL EFFUSION ON PLEURAL INFECTION OUTCOMES

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10.1136/thorax-2020-BTSabstracts.338

Introduction and Objectives Pleural infection is a common clinical problem and despite improvements in diagnostic and therapeutic approaches is associated with significant morbidity and increased mortality. British Thoracic Society guidelines recommend chest tube drainage of complicated parapneumonic effusions and empyema.[1] This project aimed to identify barriers to prompt diagnosis and subsequent management of pleural infection across 3 sites in within a major UK health board.

Methods Data was collected between 12/01/2020 – 12/04/2020 in adults ≥16 treated for pleural infection requiring chest drain at the 3 sites. Patients with non-infective, transudative or malignant effusions were excluded.

Results 23 patients were included. Male to female ratio was 14:9 with an age range of 17–81 years. 13/23 (57%) were septic on admission (defined by SIRS criteria) and 9/23 (39%) required admission to critical care (either high dependency or intensive care). 14/23 (61%) patients had complex parapneumonic effusion and 9/23 (39%) patients had empyema based on standard criteria. 7/23 (30%) were initially misdiagnosed as community acquired pneumonia (CAP) without effusion at first senior review. 'Misdiagnosis' was defined as formal reporting of an ipsilateral effusion by radiology when effusion was not recorded in the chest radiograph (CXR) interpretation section of the case notes. Misdiagnosis was associated with significantly longer time from CXR to ultrasound-guided aspiration and chest drain insertion and a 7-day increase in length of stay (LOS, see figure 1). Once pleural effusion was correctly identified and aspirated, 18/23 (78%) patients underwent chest drain insertion within 24-hours.

Conclusions Accurate and early identification of pleural infection is associated with prompt drainage and shorter LOS, consistent with previous published literature[2]. Delayed diagnosis and intervention appeared associated with inaccurate interpretation of the admission CXR. A larger study is ongoing to expand on these findings and education sessions are planned in acute care settings, which may improve earlier diagnosis and shorten LOS.

REFERENCES

1. Davies HE, Davies RJO, Davies CWH. Management of pleural infection in adults: British Thoracic Society pleural disease guideline 2010. *Thorax* 2010;**65**(2):41–53.
2. Cham CW, Haq SM, Rahamim J. Empyema thoracis: a problem with late referral? *Thorax* 1993;**48**(3):925–7.

P194 COMPARING VITAMIN D LEVELS IN PATIENTS WITH COVID-19 AND TUBERCULOSIS INFECTION

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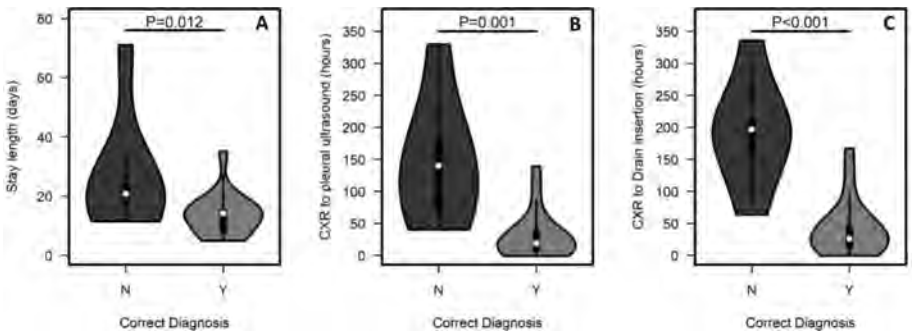
10.1136/thorax-2020-BTSabstracts.339



Abstract P193 Figure 1 Violin plots comparing correct diagnosis at first senior review with delayed diagnosis for LOS in days (A), time in hours from CXR to pleural ultrasound (B) and time in hours from CXR to chest drain insertion in hours (C). Comparisons made using Mann Whitney-U test. Y = Yes. N = No.

Introduction Vitamin D is important in innate and adaptive immunity. Deficiency is associated with susceptibility to tuberculosis(TB) and viral respiratory tract infections. Prevalence increases in patients of Black and Asian ethnicity, high BMI, smokers and the elderly. Vitamin D deficiency may have a role in acquisition and severity of COVID-19 infection.
Objective To investigate vitamin D status in patients admitted to hospital and critical care with COVID-19, and to compare vitamin D levels to patients with TB infection.
Methods Vitamin D levels were measured prospectively in adult patients admitted to three medical wards and HDU/ITU with suspected COVID-19 infection between 6/4/20 and 4/5/20. Data was supplemented by retrospectively screening admissions between 1/3/20 and 31/5/20 with PCR confirmed COVID-19 infection or highly suggestive chest radiology with a Vitamin D level within 3 months. Adult patients treated for latent and active TB between 1/1/18 to 30/6/20 had Vitamin D levels measured at treatment start. Patients were stratified as Vitamin D deficient(<25 nmol), insufficient(26–50 nmol) or sufficient(>50 nmol).
Results Vitamin D levels were available for 244/551(44%) patients admitted with confirmed COVID-19, including 62/113(55%) ITU/HDU admissions, and for 230/237(97%) TB patients. Overall, 195/244(76%) inpatients with COVID-19 had vitamin D <50 nmol (104/244(43%) deficient and 81/244(33%) insufficient, median 29 nmol), compared with 177/230(77%) patients with TB infection (79/230(34%) deficient and 98/230(43%) insufficient, median 34.2 nmol).

Demographics: COVID-19 inpatients were aged 22–97 (median 66 yrs); ethnicity White 120/244(49%), Black 68/244 (28%), Asian 14/244(6%); current smokers 8/244(3%), ex-smokers 50/244(20%), non-smokers 160/244(66%); BMI was recorded in 180/244(74%), 33.9% BMI >30 kg/m^2.

Vitamin D levels were not lower in COVID-19 patients requiring respiratory support or those that died- 76% of discharged patients were insufficient/deficient, compared to 69% requiring respiratory support and 70% that died. There was no significant difference in proportion of insufficient/deficient patients with ethnicity- White 89/120(74%), Black 52/68 (76%), Asian 11/14(78%).

Patients with active TB had lower vitamin D than patients with latent infection, but similar levels to patients with COVID-19(median 28.5 mol, 51% deficient, vs 40.8 nmol, 17% deficient vs 29 nmol, 43% deficient).
Conclusion Three-quarters of patients admitted with COVID-19 had low Vitamin D levels, proportionately similar to patients with TB infection. There was no correlation with disease severity.

P195 SECONDARY INFECTION RATES AND ANTIBIOTIC PRESCRIBING IN A COVID-19 HDU POPULATION

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Introduction Secondary infection in COVID-19 has been associated with adverse outcomes and high mortality. The prevalence of secondary infection in COVID-19 and optimal antimicrobial strategies remain unclear.
Methods Retrospective case-note review of patients with COVID-19 admitted to our institution's high dependency unit (HDU) from March to June 2020. Patients were PCR-positive for SARS-CoV-2 or had classical CT appearances and a compatible clinical presentation for COVID-19. Microbiological tests, antimicrobial prescriptions and clinical outcomes were recorded.
Results 84 patients were identified. Median age was 68.5 years and 29/84 (34.5%) were female. Respiratory support included HFNO (n=39), CPAP (n=56), non-invasive ventilation (n=3) and invasive ventilation (n=14). Overall mortality was 36/84 (42.9%).

6/84 patients (7.1%) had evidence of secondary infection (>10^5 CFUs on bronchoalveolar lavage (BAL); positive sputum culture or positive blood culture excluding skin contaminants).

28/84 (33.3%) had a respiratory sample sent: BAL n=10; sputum culture n=2; *Legionella* antigen n=15; throat swab multiplex PCR n=3; Biofire respiratory viral panel n=7. BAL was positive in 3/10 cases (*Enterococcus faecium; Serratia marcescens* and *Escherichia coli; Pseudomonas aeruginosa*). One sputum culture was positive for *M. abscessus*.

71/84 (84.5%) had blood cultures. 8 (11.2%) were positive, of which 6 were considered skin contaminants and not deemed true secondary infection (coagulase negative *Staphylococci* n=5; *Lysinibacillus* sp. n=1; *Proteus mirabilis* n=1; *Staphylococcus epidermidis* and *Serratia marcescens* n=1).

All 84 patients received antimicrobials. 32 (38.1%) received a macrolide, predominantly azithromycin. Macrolide usage was not associated with mortality or admission length, but was associated with increased intubation rate (28.1% vs 9.6%, p=0.027)

Initial antibiotic treatment was monotherapy in 45 (53.6%) cases and dual therapy in 39 (46.4%). Initial treatment with two antibiotics versus monotherapy was not associated with mortality but was associated with increased intubation rate (25.6% vs 8.9%, p=0.040) and increased mean admission length (16.5 vs 11.6 days, p=.036).
Discussion Robust evidence of secondary infection in patients with COVID-19 was uncommon in our cohort. Increased intubation rates in patients prescribed a macrolide and those initially prescribed dual antibiotic therapy is likely to reflect more severe disease. There is considerable potential for enhanced antimicrobial stewardship in further waves of COVID-19.

P196 INFLUENZA VACCINATION, AIRWAYS DISEASE AND THE RISK OF COVID-19 RELATED MORTALITY

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Introduction UK public health policy emphasises the need for increased influenza vaccination during the COVID-19 pandemic. However, there are claims on social media that influenza vaccination increases risk of adverse outcomes in SARS-CoV-2 infection that may compromise uptake, especially in high risk groups such as those with airways disease. There is also emerging evidence that inhaled corticosteroids (ICS) may modify this risk. We therefore sought to urgently assess the risk of morbidity and mortality in individuals admitted with COVID-19, and whether this influenced by influenza vaccination, airways disease and ICS use.

Method We examined data in patients admitted to a large acute hospital with microbiologically proven COVID-19 infection (positive PCR) between 23/01/2020 to 21/06/2020. Demographic and outcome data was extracted from discharge summaries, death certificates and electronic patient records. Multiple logistic regressions was performed using STATA version 12, and results for inpatient mortality expressed as odds ratios, and length of stay (morbidity) as coefficients with 95% CIs.

Abstract P196 Table 1 Demonstrating Vaccine, Airways Disease and ICS

				Adjusted values		
	Factor	**n (%)**	**n (%) inpatient mortality**	**OR/ Coeff**	**95% C.I**	**p value**
MORTALITY	**VACCINE***					
	No Vaccine	162 (35.9)	49 (11)			
	Vaccine	289 (64.1)	111 (25)	0.99	0.62, 1.58	0.98
	AIRWAY DISEASE**					
	No Airways Disease	410 (78.4)	148 (28)			
	Asthma	53 (10.1)	12 (2)	0.74	0.36, 1.51	0.41
	COPD	60 (11.5)	26 (5)	1.12	0.63, 1.99	0.68
	ICS Use•					
	Low Dose	21 (4.0)	6 (1)			
	Medium Dose	61 (11.6)	21 (4)	1.39	0.46, 4.20	0.56
	High Dose	10 (1.90)	3 (1)	1.06	0.19, 5.80	0.94
	Any ICS †	92 (17.5)	30 (6)	0.84	0.33, 2.11	0.71
			Mean			
LENGTH OF STAY	**VACCINE*^**					
	No Vaccine	162 (35.9)	10.8			
	Vaccine	289 (64.1)	13.1	0.29	-0.03, 0.63	0.07
	AIRWAY DISEASE**					
	No Airways Disease	410 (78.4)	12.8			
	Asthma	53 (10.1)	10.8	-0.02	-0.35, 0.30	0.88
	COPD	60 (11.5)	11.6	-0.25	-0.55, 0.04	0.09
	ICS Use •					
	Low Dose	21 (4.0)	10.7			
	Medium Dose	61 (11.6)	12.1	-0.15	-0.94, 0.63	0.69
	High Dose	10 (1.90)	13.3	0.38	-0.75, 1.51	0.50
	Any ICS†	92 (17.5)	12.5	0.38	-0.46, 1.22	0.37

*vs no vaccination, **vs no airways disease, •vs low ICS use †vs no ICS use

ICS dose (mcg/day BDP eq): Low dose ≤400, Medium dose >400-≤1000, High dose >1000

^Vaccination data available for 451 patients, type of vaccine known for 137

Results 525 patients were hospitalised with COVID-19 of whom 451 had a vaccination record available and 64% had been vaccinated. 22% had airways disease (10% asthma, 12% COPD) and 17.5% were on an inhaled corticosteroid. Increasing age (OR=1.04 [1.02, 1.05], p<0.001) and male gender (OR=2.26 [1.5, 3.4], p<0.001) were important predictors of inpatient mortality. Previous influenza vaccination (OR=0.99 [0.6, 1.6], p=0.98), the presence of airways disease (Asthma OR=0.74 [0.4, 1.5], p=0.41, COPD OR= 1.1 [0.6, 2.0], p=0.68), and ICS use (OR=0.84 [0.3, 2.1], p=0.71) did not increase risk of in-hospital mortality and were not associated with an increased length of stay, after adjusting for age and gender. Further sub-analysis including type of airways disease and dose of ICS did not change the risk.

Conclusions Advancing age and male gender increased the risk of in-hospital mortality from COVID-19. Furthermore previous influenza vaccination and the presence of airways disease and/or the use of ICS did not impact morbidity or mortality. Whilst this requires replication using national data sets, it is reassuring data from a single centre that supports the current public health message.

P197 BACTERIAL AND FUNGAL RESPIRATORY CO-INFECTION AMONG PATIENTS ADMITTED TO ICU WITH COVID-19: A RETROSPECTIVE COHORT STUDY IN A UK HOSPITAL

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10.1136/thorax-2020-BTSabstracts.342

Introduction and Objectives Bacterial and fungal co-infections contribute to mortality and morbidity to patients with Influenza. We aimed to evaluate respiratory tract flora, degree of co-infection and outcomes of patients admitted with COVID-19 to ICU in a UK hospital. Productive cough is rare in COVID-19 and therefore identification of co-pathogens requires invasive sampling which is non-practical outside of ICU.

Methods A retrospective cohort of patients admitted to ICU with confirmed SARS-CoV-2 infection was identified. Demographic data, co-morbidities, microbiology results from respiratory samples, clinical biomarkers and clinical outcomes were analysed. Respiratory samples were divided into early samples within 5 days of hospital admission that would represent community acquired organisms and late samples that would represent hospital acquired organisms.

Results 77 patients were admitted to ICU with COVID-19 from February to June 2020. Respiratory samples were collected by non-directed bronchoalveolar lavage(NBL)(171 samples) and BAL from 61 patients. 37/61(60.7%) patients isolated a pathogen. 39 patients had an early sample with 14/39(35.9%) isolating a pathogen. Table 1 lists organisms isolated from early and late samples. On antimicrobial susceptibility testing of early respiratory isolates 2/7 Staphylococcus aureus were methicillin resistant and 2/5 Haemophilus influenza isolates were co-amoxiclav resistant. 29/77(37.7%) patients died during their admission to hospital. There was no significant correlation between in hospital mortality and

Abstract P197 Table 1

Organism	Number of patients isolating organism in early samples (out of 39 Patients*,**)	Number of patients isolating organism in late samples (out of 39 Patients*,**)
Staphylococcus aureus	7 (17.9%)	5 (12.8%)
Staphylococcus lugdunensis		1 (2.6%)
Haemophilus influenzae	5 (12.8%)	2 (5.1%)
Streptococcus pneumoniae	1 (2.6%)	1 (2.6%)
Klebsiella sp	1 (2.6%)	9 (23.1%)
Serratia marcescens	2 (5.1%)	1 (2.6%)
Citrobacter sp	1 (2.6%)	2 (5.1%)
Enterobacter cloacae		3 (7.7%)
Proteus mirabilis		3 (7.7%)
E.coli		2 (5.1%)
Pseudomonas aeruginosa		2 (5.1%)
Hafnia alvei		1 (2.6%)
Enterococcus sp		4 (10.3%)
Aspergillus	3 (7.7%)	2 (5.1%)
No significant organisms	25 (64.1%)	16 (41.0%)

*17 patients provided both early and late samples. 22 patients only provided an early sample. 22 patients only provided a late sample.
** some patients isolated multiple pathogens and therefore column totals add up to greater than number of patients

isolation of a pathogen in early or any respiratory sample (Fisher's exact test p=0.512 and p=1.0 respectively).

Conclusions A higher proportion of bacterial co-pathogens were seen in our study population compared to previously reported non-UK data[1]. Identifying true co-infection is complicated by fever, chest x-rays infiltrates and high CRP being characteristic of severe COVID-19. Staphylococcus aureus was commonly isolated in both early and late respiratory samples and supports empiric antibiotic regimens with staphylococcal activity for secondary bacterial pneumonia in COVID-19 as currently recommended by NICE[2]. However the proportion of resistant organisms isolated needs to be studied in larger cohorts to ensure guideline recommended antibiotics are appropriate.

REFERENCES

1. Lansbury L, *et al*. Co-infections in people with COVID-19:a systematic review and meta-analysis. *J Infect*.2020;**81**(2):266–275.doi:10.1016/j.jinf.2020.05.046
2. NICE. COVID-19 rapid guideline:antibiotics for pneumonia in adults in hospital. Published:1 May 2020. www.nice.org.uk/guidance/ng173

Pleural disease: what are we doing and could we do it better?

P198 THORACIC SKELETAL MUSCLE LOSS IS PROGNOSTIC IN MALIGNANT PLEURAL MESOTHELIOMA

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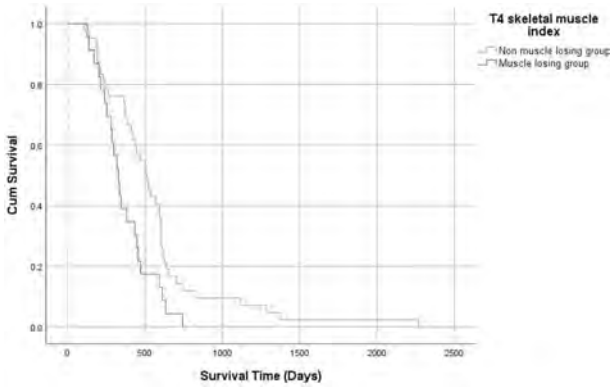
10.1136/thorax-2020-BTSabstracts.343

Introduction There are little data describing the prevalence of cancer cachexia or factors associated with this syndrome, including skeletal muscle loss, in patients with malignant pleural mesothelioma (MPM). We investigated the prognostic significance of thoracic muscle loss in patients with MPM who received chemotherapy.

Methods Baseline clinical information was collected regarding 113 patients in the Prediction of Resistance to Chemotherapy Using Somatic Copy Number Variation in Mesothelioma study (PRiSM) study. 107/113 patients had an identifiable fourth thoracic vertebrae (T4). Image analysis for body composition was based on a single image at T4 on pre-chemotherapy and response assessment contrast-enhanced Computer Tomography (CT) scans. Using established Hounsfield Unit thresholds, skeletal muscle groups were manually segmented using ImageJ software. Skeletal muscle mass area (cm^2) at T4 was normalised for height (cm^2/m^2) to calculate skeletal muscle index (SMI). Skeletal muscle loss was defined as response assessment skeletal muscle index/pre-chemotherapy skeletal muscle index ratio <1.0. Univariate analysis of prognostic variables was performed using a Cox proportional hazards regression model. Factors with p<0.10 in univariate analyses were included in a multivariate model. Overall survival (OS) was generated using the Kaplan-Meier method and compared using the log-rank test. Relationships between measures of systemic inflammation and T4SMI were examined using Pearson's or Spearman's correlation coefficients, where appropriate.

Results 65/113 eligible patients were included, based on available T4 imaging and height measurements. 23/65 (35%) patients lost skeletal muscle between pre-chemotherapy and response assessment CT scans. In a multivariate model, T4 skeletal muscle loss was a significant and independent predictor of shorter OS (HR 3.54 (CI 1.04–12.05), p=0.043). The median OS was 361 days (CI 271–384) in those losing skeletal muscle and 553 (CI 410–607) days in those not (p=0.007, figure 1). There were weakly negative correlations between response assessment SMI and response assessment white cell count (r_s=–0.287), response assessment neutrophils (r_s=–0.326) and response assessment neutrophil lymphocyte ratio (r_s=–0.297).



Abstract P198 Figure 1

Conclusion Thoracic skeletal muscle loss is prognostically significant in patients with MPM who received chemotherapy. Skeletal muscle loss appears to be linked with neutrophil-associated inflammation, but a larger study is needed.

P199 ASSESSMENT OF PNEUMOTHORAX TREATMENT RESPONSE ON CHEST RADIOGRAPH: A COMPARISON OF METHODS OF SIZE MEASUREMENT

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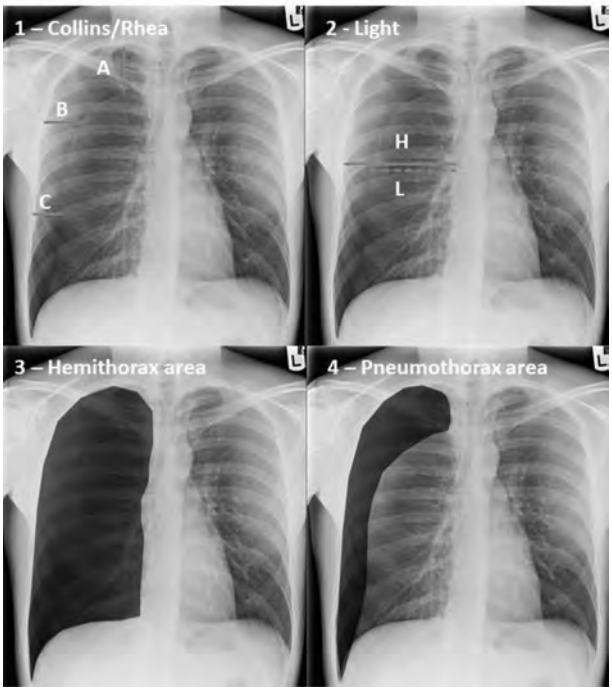
10.1136/thorax-2020-BTSabstracts.344

Background There is recent evidence that the size of pneumothorax on chest radiograph (CXR) in patients with Primary Spontaneous Pneumothorax (PSP) can predict failure of needle aspiration or persistent air leak. However, there are a number of differing methods of measuring pneumothorax size on CXR: Collins and Rhea methods use a combination of 3 intrapleural distances (in centimetres), whereas Light's index uses the cube of the ratio of lung/hemithorax measurement (figure 1). Developing a robust method of measuring pneumothorax size is useful for research and clinical care.

The aim of this study is to compare multiple measurement techniques to a novel digital measurement method, and to describe its utility in assessing treatment response.

Methods 56 CXRs from 28 patients recruited to the RAMPP pneumothorax trial,[1] in our centre, were reviewed, comparing three existing methods of size measurement with our method. This involves measuring the absolute percentage area of pneumothorax (in pixels) compared to the hemithorax size (as described previously[2]). The treatment response was assessed by absolute change in size (% of hemithorax) on CXR from pre- to post-procedure (1 hour after intervention).

Results There was good correlation between the calculated percentage area and Collins/Rhea methods (r^2 0.845). However, for large pneumothoraces, the Collins method overestimates the size: 5 of 56 CXR (8.9%) had a calculated size >100%.



Abstract P199 Figure 1 Pneumothorax size measurements on chest radiograph. Panel 1: Collins and Rhea; 2: Light's index; 3: hemithorax size; 4: pneumothorax size

14 (50%) patients were managed with a Pleural Vent (ambulatory device) and 14/28 (50%) by standard care. 10/14 (71.4%) in standard care group had initial management with needle aspiration (as per BTS guidelines); whilst 4 had chest drains inserted. The treatment response was lower in the needle aspiration group (22.6% improvement in pneumothorax size) and chest drain group (28.5%), than the Pleural vent group (44.2%).

Conclusion This new digital method of assessing pneumothorax has good correlation with published methods, but does not rely on measurement in centimetres, so is useful in multicentre research (when DICOM formats may not be available). On-going work will assess whether pneumothorax size can predict treatment outcomes and long-term recurrence rates.

REFERENCE

1. Hallifax RJ, Lancet 2020; 396: 39–49; 2. Rahman NM, *N Engl J Med* **2011**; 365:518–526

P200 OBJECTIVE THORACOSCOPIC CRITERIA IN DIFFERENTIATION BETWEEN BENIGN AND MALIGNANT PLEURAL EFFUSIONS

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10.1136/thorax-2020-BTSabstracts.345

Background Thoracoscopy is the 'gold standard' diagnostic modality for investigation of suspected pleural malignancy.[1] It is postulated that meticulous assessment of the pleural cavity may be adequate to diagnose malignancy through finding of nodules, pleural thickening and lymphangitis.[2] Given the increased uptake of local anaesthetic thoracoscopy (LAT) recently, we attempted to define precise, objective criteria to differentiate benign from malignant pleural diseases according to the pattern, anatomical site and exploring predilection of abnormalities to specific sites on the pleural surfaces.

Methods A structured review of recorded video footage from LAT procedures in 96 patients was conducted by 2 independent assessors. Abnormalities were scored according to the presence or absence of nodules, lymphangitis, inflammation on each of the parietal, visceral and diaphragmatic surfaces, respectively. The parietal pleura was divided into 6 levels (apical, middle, and inferior of the lateral surface and apical, middle, and inferior of the posterior surface). The anterior surface of the parietal pleura was excluded due to difficulty of assessment.

Results In the benign group, inflammation was the predominant finding in 65%(n=33; parietal), 44%(n=21; visceral) and 42%(n=15; diaphragmatic). Nodules were detected in 24% (n=12; parietal), 8% (n=4; visceral) and 8%(n=3; diaphragmatic). The most affected surfaces with inflammation were the middle lateral (60%) and the inferior lateral (57.8%) parts of the parietal pleura.

In the malignant group, nodules were the predominant finding in 73%(n=33; parietal), 32%(n=13; visceral) and 48%(n=17; diaphragmatic). Inflammation was detected in 44%(n=20; parietal), 25%(n=10; visceral) and 29%(n=10; diaphragmatic). The most affected surfaces with nodules were the middle lateral (67.4%) and the inferior lateral (66.7%) parts of the parietal pleura.

Conclusion This study suggests that macroscopic assessment at LAT can differentiate between benign and malignant pleural disease, with the predominance of inflammation and nodules, respectively. In addition, pleural abnormalities appear to have an anatomical predilection, emphasising the importance of inspection and sampling of these areas. The finding that nodules were seen in approximately 1 in 4 benign patients on the parietal pleura is of interest and warrants further exploration in a larger cohort.

REFERENCES

1. Rahman NM. *Thorax* 2010; **65**: ii54–ii60.
2. Boutin C. *Endoscopy* 1980; **12**(04): 155–160.

P201 THORACIC ULTRASOUND (TUS) COMPETENCE FOR ULTRASOUND GUIDED PLEURAL PROCEDURES: THE CREATION AND VALIDATION OF AN ASSESSMENT TOOL FOR USE IN THE CERTIFICATION OF BASIC THORACIC ULTRASOUND COMPETENCE

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10.1136/thorax-2020-BTSabstracts.346

Introduction Focused TUS guidance is considered essential when undertaking invasive pleural procedures as it has been proven to improve safety and reduce complications. There is a need for robust assessment methods to assess competence in TUS to facilitate safe pleural intervention.

We aimed to develop and validate a bespoke assessment tool corresponding to those skills associated with the most basic level of practice, recently defined as an emergency level operator in the BTS Training Standards for TUS.[1]

Method The assessment tool allowed comprehensive, multimodal assessment of competence by undertaking an ultrasound examination of a patient followed by identification of ultrasound images and clips.

Candidates were enrolled from two distinct groups – trainees with a workplace based assessment of competence in a pleural procedure but with no formal ultrasound training, and those who had undertaken some TUS training without yet having been entrusted to perform TUS unsupervised provided an acceptable surrogate for an emergency level operator.

Results Twenty-seven candidates were enrolled by two examiners based in Belfast and Oxford between February and November 2019. This included twelve candidates in the inexperienced and fifteen in the experienced group.

Mean score of the inexperienced group was 44.3 (95% CI 39.2–49.4) versus 74.9 (95% CI 72.8–77) in the experienced group. Mean difference was 30.7 (95% CI 24.7–36.7; $p<0.001$).

Standard setting using a borderline regression method for the first section of the assessment tool and a modified Angoff method for the second resulted in a pass mark of 61.

Discussion This assessment tool has the potential to discriminate appropriate TUS performance at the level of an emergency operator and requires further evaluation.

It is unlikely that this tool can define competence in isolation but could form part of a broader, multifaceted assessment including mentorship, a logbook and regular assessment of skill application by way of directly observed procedures (DOPs).

Further work may delineate the minimum number of TUS scans that correlates with successful exam performance for a majority of candidates, however this has not yet been identified as learning curves exhibit significant variation amongst individuals and the project was not adequately powered to address this.

P202 SOUTH WEST COHORT STUDY IN PLEURAL EMPYEMA (SWIPE)

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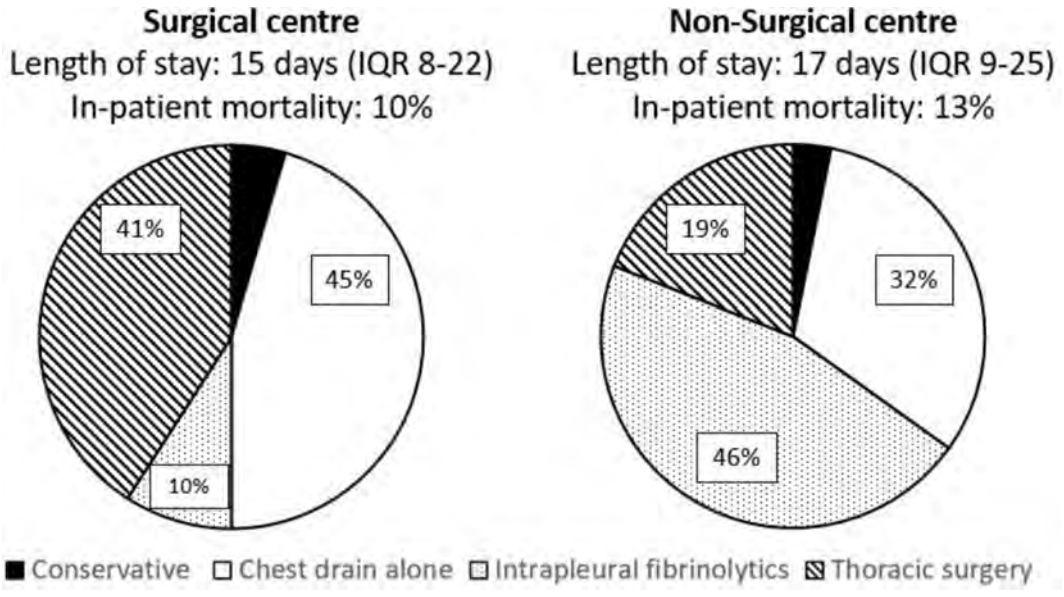
10.1136/thorax-2020-BTSabstracts.347



Abstract P202 Figure 1

Introduction The optimal management of pleural infection is uncertain. Randomised controlled trials have demonstrated the efficacy of intrapleural fibrinolytics, but uptake into local guidelines has been variable. Anecdotally, the access to surgery on-site affects referral rates and timing. We aimed to assess the epidemiology and variability of management of pleural infection in the South-West of England using a novel registrar research collaboration.

Methods Through the PRISM trainee network, respiratory and thoracic surgery registrars identified cases of pleural infection across the South West (9 sites) over a 6-month period. Inclusion criteria was based on previous epidemiological studies of pleural infection.

Results From January 1st to June 31st 2020, 104 admissions to the selected hospitals with pleural infection had demographic, biochemical and outcome data recorded. The median age was 62 (IQR 51–76) and was male predominant (n=65/104). 25% had a positive pleural fluid culture (n=26).

The median RAPID score of the group was 3 (33 low, 44 moderate, 27 high risk groups. None in the low risk group died and length of stay (median 17 days for entire cohort) was significantly longer with higher RAPID score (p-0.03). RAPID score was not associated with the need for surgery or fibrinolytics. Intrapleural fibrinolytics were used in 33% (n=34) at a median of 3 days after chest drain insertion. Forty patients were managed with thoracic surgery, 38/40 with Video-assisted thoracoscopic surgery (VATS) approach. Patients admitted to a surgical centre were more likely to have a surgical referral made and surgery performed sooner (3 days versus 8 days). There was no difference in hospital length of stay between patients managed with surgery or intrapleural fibrinolytics (p-0.56). Twelve patients died during their hospital admission (12%).

Conclusion Management of pleural infection varied across the region. Patients admitted to surgical centres were more likely to be referred for surgery and we observed less use of intrapleural fibrinolytics in these hospitals. Hospital length of stay and mortality did not differ significantly between surgical and non-surgical centres.

P203 PLEURAL BIOPSIES, CHANGING PRACTICE OVER TIME AND A COMPARISON OF TECHNIQUES

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10.1136/thorax-2020-BTSabstracts.348

Introduction Pleural fluid characteristics may be complimentary in diagnosing pleural disease but tissue histopathology remains the gold-standard for diagnosis, particularly in malignancy. We sought to understand how practice has changed over time with the incorporation of novel techniques in a high-volume centre.

Methods A retrospective study of all local anaesthetic thoracoscopies (LAT) and physician performed image guided pleural biopsies (IGPBx) with ultrasound at a single centre from 2014–2019.

Results 510 procedures were performed over this period; 67% were LATs (343/510) the remainder were IGPBx (167/510).

The proportion of IGPBx rose from 31% of procedures per year in 2014 (26) to 45% of procedures per year in 2018 (44). The number of talc poudrages performed decreased from 46% in 2015 (29) to 9% in 2018 (5).

IGPBx was used preferentially in cases of benign pleural disease with 61.2% (98) resulting in a benign diagnosis compared to 46.8% (153) in the LAT group (c^2 1df = 8.9, p=0.003).

A higher proportion of complications were seen in LATs overall (c^2 1df = 8.0, p=0.005) with complications seen in 15% of case (53). The majority were related to pain control (17), followed by vasovagal episodes (8). IGPBx were associated with complications in 6.6% of cases (11) and were largely related to bleeding (7).

The sensitivity of LAT biopsies for malignant pleural disease was 87%, compared to 78% for IGPBx. The negative predictive value of both were comparable at 90% for LAT and 87% for IGPBx (figure 1). The majority of false negative biopsies in both groups were seen in Mesothelioma; 11/18 (61.1%) in the LAT group and 9/14 (64.2%) in the IGPBx group.

Abstract P203 Table 1 Sensitivity/Specificity/PPV/NPV analysis LAT and IGPBx

LAT	+ve Malignant Pleural Disease	-ve Malignant Pleural Disease		IGPBX	+ve Malignant Pleural Disease	-ve Malignant Pleural Disease	
Biopsy +ve	123	1	PPV 0.99	Biopsy +ve	49	0	PPV 1.00
Biopsy -ve	18	160	NPV 0.90	Biopsy - ve	14	95	NPV 0.87
	Sens 0.87	Spec 0.99			Sens 0.78	Spec 1.00	

Discussion Physician performed IGPBx offers an alternative choice of procedure to LAT with comparable negative predictive values although direct comparison is limited due to the heterogenous patient groups they were performed in. IGPBx were associated with fewer complications and therefore may be suited to a frailer patient cohort. LAT biopsies have a higher diagnostic yield and therefore thoracoscopic biopsies remain the gold-standard for diagnosing malignant pleural disease.

P204 INCIDENCE AND OUTCOMES OF PNEUMOTHORAX SECONDARY TO CARDIAC DEVICE INSERTION

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10.1136/thorax-2020-BTSabstracts.349

Background Pneumothorax is an important early complication of cardiac pacemaker implantation however little is known about the modern incidence and outcomes.

Method Retrospective analysis of patients who developed a pneumothorax following cardiac device insertion between January 2015 and September 2019 was undertaken. Clinical and procedural characteristics were recorded alongside subsequent management and outcomes.

Results During the study period, 6643 cardiac devices were implanted at our large tertiary cardiothoracic centre.

Pneumothorax occurred in 43/6643 (0.65%) and were limited to the apex in 28/43 (65.1%). Those suffering pneumothorax had an average age of 74.2 years, 24/43 (56%) were male, 9/43 (20.9%) had previously known lung disease. Vascular access was obtained via subclavian vein 25/43, axillary 16/43, cephalic 1/43, revision 1/43. First operator was a consultant in 20/43 cases. Conservative management was adopted in 34/43 with only 8/34 requiring subsequent pleural intervention, giving a success rate of 76.5% for primary conservative management. Mean±SD length of stay was 3.9±6.7 for primary conservative management and 7.1±6.1 for primary chest drain insertion. Pneumothoraces which extended to the level of the hilum were more likely to be managed with a chest drain than those limited to the apices (9/15 vs. 8/28 respectively Chi2 $p<0.05$).

Discussion Pneumothorax incidence is rare but not negligible following cardiac pacemaker implantation but the majority of cases can be safely managed with conservative management. Drain insertion is associated with increased length of stay and further work is required to define whether more patients could benefit from conservative management.

P205 THORACOSCOPIC EVALUATION OF THE EFFECT OF TUMOUR BURDEN ON THE OUTCOME OF PLEURODESIS IN MALIGNANT PLEURAL EFFUSION

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10.1136/thorax-2020-BTSabstracts.350

Background It has been postulated that when the intrapleural tumour burden is high, the resultant obliteration of normal mesothelial cell surface of the pleura results in reduction in pleurodesis success rate.[1] This effect has been suggested in the context of worse pleurodesis outcomes in malignant pleural effusion (MPE) secondary to lung cancer or mesothelioma, with more favourable outcomes seen in breast and ovarian cancer.[2] This study therefore aimed to assess the hypothesis that tumour burden is associated with higher pleurodesis failure, and that tumour type can affect pleurodesis outcomes.

Methods A structured, retrospective review of recorded video footage of local anaesthetic thoracoscopy (LAT) procedures of 45 patients with proven MPE was conducted by 2 independent assessors blinded to the patient medical records. Abnormalities were assessed according to the presence or absence of; nodules, lymphangitis, inflammation, and adhesions on each of the parietal, visceral and diaphragmatic surfaces. A macroscopic score was developed by adding the number of abnormalities in each pleural surface to produce a total score for tumour burden. Two separate assessors correlated the findings with tumour type and pleurodesis outcome from the patient`s clinical records.

Results In both mesothelioma (n=21) and non-mesothelioma (n=24), there were no significant differences between the tumour burden score and the outcome of pleurodesis ($p=0.188$ and 0.173 respectively). The rate of pleurodesis success was higher in the non-mesothelioma group (n=16; 66.7%) compared to the mesothelioma group (n= 9; 42.9%) with no significant difference between both groups ($p=0.11$)

Conclusion In this study, we found no relationship between tumor burden and pleurodesis outcome. While the blinded and detailed analysis of LAT video footage is an important strength of this study, it has significant limitations, namely small numbers and retrospective methodology. Nonetheless it adds important insights that would go against our assumed understanding of this relationship between tumour burden and pleurodesis success. Further prospective evaluation in a larger cohort is underway. Consistent with the reported literature, we found that mesothelioma has a high failure rate of pleurodesis compared to non-mesothelioma patients.

REFERENCES

1. Rodriguez-Panadero F. *Respiration* 2012; **83**(2): 91–98;
2. Bielsa S. *Lung* 2011;**189**(2): 151–155.

P206 OUTCOMES OF RADIOLOGICALLY DIAGNOSED SOLITARY FIBROUS TUMOURS OF THE PLEURA

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10.1136/thorax-2020-BTSabstracts.351

Background Solitary fibrous tumours of the pleura (SFTP) are rare and account for around 5% of pleural based tumours with rates of malignancy of around 30%. Published data primarily includes histologically proven SFTP, but there is little evidence regarding the outcomes of radiologically diagnosed SFTP.

Methods A service evaluation of radiologically diagnosed SFTP was completed in 12 UK centres, searching the local radiology database reports for the terms 'Pleural fibroma' OR 'fibrous tumour of the pleura' OR 'SFTP' between 01/01/2005 and 31/12/2015. Scans were determined to demonstrate a 'typical' SFTP, 'unlikely' SFTP or SFTP that was 'within the differential diagnosis'. Data were collected to establish subsequent diagnoses and what follow up was undertaken.

Abstract P206 Table 1

	Radiological assessment of the lesion			
	Typical SFTP	SFTP in the differential diagnosis	SFTP unlikely	Unsure
Histology confirmed SFTP	20	36	3	2
No histology	19	43	7	
No follow up in centre	0	13	0	
Biopsy showed the lesion was not SFTP	2	25	8	
Resection showed the lesion was not SFTP	1	25	2	
Radiological investigation confirmed not a SFTP	1	29	4	
Outstanding data	1	3	2	

Results A total of 246 cases were included, table 1 exhibits the outcomes in each radiological group.

Of patients with typical appearances for SFTP, 20/44 were histologically confirmed to represent a fibroma, 19/44 underwent radiological follow up only and 4/44 were confirmed not to represent SFTP. Of the patients who underwent radiological follow-up; there were 9 deaths, none of which were known to be related to SFTP, the median longest diameter was 30 mm (IQR 25–40) and the median follow-up time was 62 months (IQR 17–106).

Of the 61 cases histologically confirmed SFTP, 17/61 were malignant, 37/61 benign and 7/61 unknown. A total of 26 patients died, 5 secondary to SFTP, 12 unrelated to SFTP and 9 of unknown cause.

Conclusion A large proportion of patients with radiologically typical SFTP features do not undergo biopsy or resection and did not have SFTP related adverse outcomes in this small series. Further analysis is needed to determine whether any radiological features can predict clinical outcomes.

P207 DAYCASE MEDICAL THORACOSCOPY AND PLEURODESIS: OUTCOMES AND COST EFFECTIVENESS

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10.1136/thorax-2020-BTSabstracts.352

Aim To assess the feasibility and safety of talc pleurodesis performed as part of daycase medical thoracoscopy.

Methods Conventionally, medical thoracoscopy with talc pleurodesis involves inpatient stay. In our institution this happens as a daycase procedure with patients admitted on the day of procedure. We use a Richard Wolf® 5 mm mini thoracoscope through a 5.5 mm port. At the end of the procedure eligible cases have talc poudrage, followed by insertion of indwelling pleural catheter (IPC) through the same port instead of a surgical drain. The IPC is then attached to an underwater seal and suction applied for 4 hours before the drain is capped off and the patient discharged. District nurses are asked to drain the IPC daily for the first 5 days. Once the drain output is <150 ml, the frequency is progressively reduced to once a week. The drain is removed after two consecutive dry taps (<50 ml) one week apart. Patients were reviewed at 2 weeks in the ambulatory care unit for results and suture removal.

Results Between April 2019 and June 2020, 42 patients underwent thoracoscopy of which 40 patients underwent day case thoracoscopy with pleurodesis. However, 2/40 patients required a short duration unplanned admission. All patients were followed up for 70 days. One patient in conventional thoracoscopy group required surgical intervention for pleural infection. There were 4 deaths in the day case cohort compared to 9 deaths in the conventional thoracoscopy cohort within 70 days. Median time to removal of IPC was 14 days and IPC was successfully removed in 35 patients by the end of 70 days. Three patients had continuing drainage at day 70, one patient died with drain in situ and another chose to leave the drain in situ despite cessation of drainage. Overall rate of successful cessation of drainage was 90% (36/40). An initial estimated cost-analysis showed the procedure to be largely cost neutral for the local healthcare economy.

Conclusion This study suggests that thoracoscopy and talc poudrage can be performed safely as a day case procedure. Further data is needed for longterm outcomes and cost effectiveness.

P208 USING A REGIONAL NETWORK TO IDENTIFY TRENDS IN PRACTICE OF AND TRAINING IN PLEURAL PROCEDURES

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10.1136/thorax-2020-BTSabstracts.353

Introduction There has been variation in practice of pleural procedures between hospitals, despite clear guidance from the BTS and other bodies.[1] It causes significant anxiety out of hours for General Medical (GIM) registrars (SpRs), whose experience with these procedures has reduced since the advent of mandatory thoracic ultrasound.

Aims We assessed practice in eight hospitals across a training deanery to identify trends that may enable a more standardised approach to training and practise of pleural procedures both in and out of hours.

Methods We used the PRISM network to disseminate a questionnaire to all Respiratory and GIM registrars and consultants. Domains included number of procedures performed, self-rated confidence undertaking them out of hours and the availability of standard operating procedures (SOPs), safety checklists and procedure rooms.

Results 137 responses were received from eight hospitals. 90.4% of respondents said that out-of-hours procedures were the responsibility of the GIM SpR. 39 GIM SpR respondents had a mean confidence of 2.4 (95% CI 2.09, 2.78) (Likert 1 not confident-5 very confident in performing said procedure in an emergency, compared to 3.9 (95% CI 3.26, 4.55) amongst respiratory respondents. 70.7% of GIM SpRs desired further training. 53.3% of respondents knew of a pleural safety checklist and only 20.7% knew of it being used

Abstract P207 Table 1

Procedure	Cases (N)	Deaths within 70 days	Mean length of hospital stay (Days)	Complications	Repeat procedure	Cost savings to Hospital	Estimated Community costs (nurse visits etc.)	Net Savings
Conventional Thoracoscopy (April-Nov 2017)	40	9	4.92	1	4	-	-	-
Daycase Thoracoscopy (Apr 2019-july 2020)	40	4	0.1	0	0	£1650 (£330 × 5 days)	£1473	£177

regularly. 53.0% did not know where to find the SOP for pleural procedures. Respiratory consultants felt that trainees require more experience to achieve competency than their GIM counterparts. 18.0% of respiratory trainees had regular access to a procedure room and only 15.8% had dedicated time in their schedule for procedures.

Discussion As expected, there was a wide variation in practice and experience across multiple trusts and specialties. While it remains on the GIM curriculum, it is important to ensure that non-respiratory trainees have their confidence and experience increased. Further work will look to address this by piloting a formalised training programme with certification across multiple sites via the PRISM network, and looking to increase access to SOPs.

REFERENCE

1. Havelock T, Teoh R, Laws D, *et al*. Pleural procedures and thoracic ultrasound: British Thoracic Society pleural disease guideline 2010. *Thorax* 2010;**65**:i61–i76

P209 ESTABLISHING A PLEURAL CLINIC AND LOCAL ANAESTHETIC THORACOSCOPY SERVICE IN A SMALL SECONDARY REFERRAL HOSPITAL: A REVIEW OF OVER 1000 PLEURAL CLINIC ATTENDANCES IN SINGLETON HOSPITAL

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10.1136/thorax-2020-BTSabstracts.354

Introduction and Objectives A pleural service was established in 2015 in this small secondary referral hospital to provide rapid access to diagnostics and treatment for patients with pleural disease. A local anaesthetic thoracoscopy service, which receives referrals from sites throughout the region, was established in 2017. We aimed to review the efficacy of this service.

Methods We conducted a retrospective analysis of 1139 pleural clinic attendances since 2015. Data regarding source of referral, timeframe to assessment, procedure performed and final diagnosis was collected using the Welsh Clinical Portal system.

Results A total of 490 new patients were seen across 1139 patient clinic attendances. 139 (28%) of these patients were referred from their GP, with the remaining from secondary care (72%). The average time from referral to clinic appointment for urgent suspected cancer (USC) referrals was 8.2 days. Of the 490 patients seen, 358 (73%) were seen by a consultant. In total 50 patients received a diagnostic only pleural aspiration, 353 received a therapeutic and diagnostic pleural aspiration and 37 received an indwelling pleural catheter. 51 patients underwent local anaesthetic thoracoscopy and average time from referral to thoracoscopy was 7 days. The cause of the pleural effusion was malignant in 193 patients (39%), with 297 (61%) due to non-malignant causes.

Conclusions Ambulatory pleural services can significantly reduce hospital admission for patients with a pleural effusion, for which the average hospital stay is 4 days[1]. Across the 490 patients seen, our pleural clinic is estimated to have reduced hospital bed days by 1960 days, which would have cost more than £800,000[2]. This streamlined service enables early access to respiratory consultant led pleural diagnostics and treatment. Physician led medical thoracoscopy enhances this small secondary referral hospital's service, allowing patients throughout the region to rapidly access definitive diagnostics.

REFERENCES

1. Aujayeb A, *et al*. A Review of a Pleural Service. *J R Coll Physicians Edinb* 2016; **46**: 26–31
2. Welsh Government: Together for Health. A Delivery Plan for the Critically Il. 2016. Accessed at http://www.wales.nhs.uk/documents/delivery-plan-for-the-critically-ill.

P210 PATIENT PERSPECTIVES ON PATHWAYS IN MALIGNANT PLEURAL DISEASE: A QUALITATIVE STUDY

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10.1136/thorax-2020-BTSabstracts.355

Introduction and Objectives Malignant pleural effusions (MPE) are associated with disabling dyspnoea, considerable distress and poor survival. Current MPE pathways often involve repeated procedures, equivocal results and diagnostic delay.[1]

This study explores patients' experiences with probable MPE who are undergoing investigation through the Oxford Pleural Unit and perspectives of a new Covid driven pathway.

Methods Semi-structured, qualitative interviews were held from December 2019 to March 2020 with a purposive sample of 10 patients with probable MPE. Interviews were carried out by an independent researcher. The interviews explored patients' experiences with the MPE pathway and their perspective on a novel pathway which incorporates early specialist review, pleural biopsy and indwelling pleural catheter (IPC) insertion.

Results At the time of the interview, 9/10 patients had not received a definitive diagnosis, and had waited an average of 6 weeks since first being referred to the service. Six had negative cytology and were awaiting further investigation, and 3 were awaiting biopsy results.

Despite this, 6 patients were satisfied with the speed of the service, expressing sentiments such as 'I don't mind waiting'. Three expressed frustration at the delays: 'don't like the uncertainty', 'frustrated that treatment hasn't started' and 'anxious that tumour is spreading'. Conversely, 1 felt 'things were progressing too fast' because she didn't have time to process the information.

Most patients noticed significant improvement in their dyspnoea after pleural drainage, with only one patient not reporting any benefit.

Patients were positive towards the novel pathway. They felt this would reduce travel time, speed up their diagnosis and reduce uncertainty. However, most were reluctant about the idea of a 'semi-permanent IPC' and would prefer a chest drain if needed.

Conclusions Participant responses revealed similar themes on the investigation of possible MPE, with 30% expressing frustration with delays in the current pathway. Combining specialist review, imaging and pleural biopsy could have a role in improving existing pathways to facilitate better patient experience. Objective and prospective measurement of breathlessness, patient uncertainty and satisfaction is now required to assess the quality of the current pathway and novel interventions.

REFERENCE

1. Rachelle Asciak and Najib M Rahman Malignant pleural effusions: from diagnostics to therapeutics. *Clinics in chest medicine* 2018;**39**(1).

P211 TIME TO DIAGNOSIS AND TREATMENT FOR PATIENTS WITH AN UNDIAGNOSED PLEURAL EFFUSION- RAPID PLEURAL CLINIC- WYTHENSHAWE HOSPITAL

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10.1136/thorax-2020-BTSabstracts.356

Introduction and Objectives The pleural service runs in parallel to the RAPID lung cancer diagnostic service at Wythenshawe Hospital. This is a tertiary referral service within Manchester Foundation Trust.

Our current practice is to offer an urgent outpatient appointment with diagnostic aspiration at time of assessment and proceed to a tissue diagnosis if required.

Our aims were to assess time to diagnosis and treatment for patients presenting with an undiagnosed pleural effusion, to determine the percentage of patients who were diagnosed on cytology and molecular studies, and to assess for those who had a biopsy which form of biopsy achieved a diagnosis and the associated complication rate.

Method This retrospective study reviewed all patients referred to the service from January 2018 to June 2019, with a pleural effusion of unknown aetiology to look at time to diagnosis and treatment, based on the initial investigation. Outcomes of procedures, need for further investigation and fluid management and complication rates were also analysed.

Results 85 patients were seen during this study period. 77 (91%) had a diagnostic aspiration and 8 (9%) went directly to Medical Thoracoscopy (MT). 34 (44%) patients undergoing diagnostic aspiration required further investigation. 19 (25%) in the form of MT, 5 (6%) image guided pleural biopsy and 10 (13%) video assisted thoracoscopy (VATs). In 56% cases, pleural aspiration was sufficient for diagnosis without need for further investigation. Further fluid management was required in 19% (n=15) of those who had a diagnostic aspiration alone, 10% (n=3) of those who underwent MT and 20% (n=1) of those undergoing image guided pleural biopsy. The mean time to treatment across all patients was 18.9 days and 33 days in those who require systemic anticancer therapy. 2 (2%) of patients breached the 62-day time- to-treatment pathway due to patient choice to delay chemotherapy.

Discussion Our service is operating within the 62-day target (98%) with two breeches due to delay in chemotherapy which was patient choice. We will continue to offer diagnostic pleural aspirations as part of our workup. Direct to MT will continue to be considered in cases where mesothelioma is suspected.

The lung cancer diagnostic journey

P212 PREHAB4CANCER: AN INNOVATIVE REGIONAL LUNG CANCER PREHABILITATION SERVICE

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10.1136/thorax-2020-BTSabstracts.357

Introduction and Objectives Surgical resection for lung cancer is physically and emotionally demanding for patients, with risks of complications and morbidity. Prehabilitation aims to maximise patients' fitness, nutrition and wellbeing before treatment to improve outcomes. The existing literature on lung cancer prehabilitation points to improved functional capacity, post-operative length of stay & frequency of complications. As such, it is recommended in current guidelines.[1]

Methods Prehab4Cancer, a Greater Manchester (GM) Cancer funded project, is the first regional system in the UK to introduce large-scale prehab as a standard of care for cancer patients.[2] Surgical lung cancer patients are rapidly assessed at one of 17 clinics. Tailored prehab interventions span exercise (re-HIIT: high intensity interval training and muscle strengthening), nutrition, and psychological support. It is delivered by 'GM Active', a collective of 12 community organisations utilising cancer rehabilitation-qualified exercise specialists. A 12-week post-op rehabilitation programme follows. Measures of fitness are recorded at baseline, pre-operatively, post-operatively, and after rehabilitation.

Results Since April 2019, 380 lung cancer patients have been referred from 11 hospitals, with 75% participating. Average age was 70y; 53% were female. Median duration of prehab was 39 days, with mean 2.2 sessions/week. Physiological assessments such as incremental shuttle walk test (ISWT) improved from median 350 m at baseline to 380 m. Health-related quality of life measures also demonstrated improvement (see table 1).

Conclusions Prehab4cancer has successfully implemented a regional cancer prehab programme that demonstrates feasibility and excellent uptake and improved patient experience. Collaboration has been key, between GM-wide healthcare professionals working together with the GM Cancer alliance, people

Abstract P212 Table 1 Physiological and functional assessments made during prehabilitation (baseline to pre-operative). Values presented as median (IQR) unless stated otherwise.

	Baseline	Pre-operative
Physiological assessments		
Weight (kg)	72.1 (60.0-83.9)	70.8 (60.6–82.0)
BMI (kg/m^2)	26.2 (22.8–29.3)	25.5 (22.8–28.7)
Sit to Stand (reps/min)	19 (12–22)	22 (17–27)
Hand grip (kg)	22.7 (18.7–31.1)	23.2 (18.8–31.0)
6MWT (m)	310 (232–360)	365 (319–430)
ISWT (m)	350 (260–440)	380 (290–490)
Survey assessments		
WHODAS	5 (2–10)	3 (1–7)
Self-efficacy scale	66 (49–77)	74 (63–81)
EQ-5D (mean)		
Mobility	1.71	1.43
Self-care	1.15	1.11
Usual Activities	1.59	1.33
Pain/Discomfort	1.85	1.62
Anxiety/depression	1.78	1.71

Summary of survey assessments
WHODAS: lower scores indicate patient is better able to perform in their daily living tasks
Self-efficacy scale: higher scores indicate patient has more confidence in their ability to exercise
EQ-5D: lower scores indicate better health-related quality of life
Abbreviations: BMI: body mass index; 6MWT: 6-minute walk test; ISWT: incremental shuttle walk test; WHODAS: WHO disability assessment schedule

affected by cancer and GM Active. Validated measures of fitness and quality of life show promising trends toward improvement among surgical lung cancer patients.

REFERENCES

1. Batchelor TJP, *et al.* Guidelines for enhanced recovery after lung surgery: Recommendations of the Enhanced Recovery after Surgery (ERAS®) Society and the European Society of Thoracic Surgeons (ESTS). *Eur J Cardio-thoracic Surg* 2019;**55**:91–115.
2. Moore J, Merchant Z, Rowlinson K, *et al*. Implementing a system-wide cancer prehabilitation programme: The journey of Greater Manchester's 'Prehab4cancer'. *Eur J Surg Oncol* Published Online First: 2020.

P213 THE EFFICACY OF THE SOUTHWEST CHEST X-RAY REPORTING TOOL (SW CXR RT) IN IDENTIFYING PATIENTS WITH A NEW DIAGNOSIS OF LUNG CANCER, SUBSEQUENTLY MANAGED VIA THE NATIONAL OPTIMAL LUNG CANCER PATHWAY (NOLCP)

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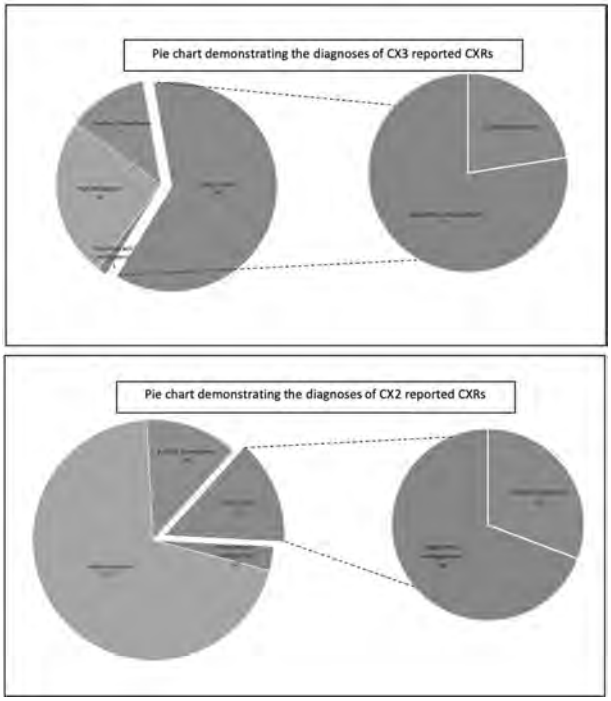
10.1136/thorax-2020-BTSabstracts.358

Introduction and Objectives The Southwest Lung Cancer Alliance introduced the Southwest CXR Reporting Tool (SW CXR RT) to help identify patients requiring reflex CT scans to streamline the first part of the NOLCP. The SW CXR RT identifies 3 categories: CX1 (normal), CX2 (abnormal pathology of uncertain significance), CX3 (highly suggestive of lung cancer). CX3 reported XR have a reflex CT; for CX2 the CT decision is at the discretion of the general practitioner (GP). We audited the efficacy of using the SW CXR RT in identifying patients with a new diagnosis of lung cancer, subsequently managed via the NOLCP.

Methods Results were collated over a 10-month period (1st March – 31st December 2019). The CTs of patients with CX2 and CX3 reported chest x-rays were reviewed.



Abstract P213 Figure 1

Results The 65 reflex CTs for CX3 identified the following diagnoses: 41 (63%) malignant condition, 16 (25%) non-malignant, and 8 (12%) undergoing further surveillance. Of malignant diagnoses, 40 (98%) were lung cancer and 1 (2%) was non-thoracic malignancy. 9 (23%) lung cancer diagnoses received radical treatment and 31 (78%) supportive management. The average time from CX3 CXR to CT was 5.8 days. The average time from CT to report was 2.3 days. The average time from CX3 CXR to CT report was 8.1 days.

The 367 separately-requested CTs for CX2 identified the following diagnoses: 64 (17%) malignant condition, 257 (70%) non-malignant, and 46 (13%) undergoing further surveillance. Of malignant diagnoses, 52 (81%) were lung cancer and 12 (19%) were non-thoracic malignancy. 16 (31%) lung cancer diagnoses received radical treatment and 36 (69%) supportive management. The average time from CX2 CXR to CT was 9.8 days. The average time from CT to report was 2.6 days. The average time from CX2 CXR to CT report was 12.4 days.

In total, 92/432 (21%) CTs were lung cancer diagnoses; 25/92 (27%) were treated radically.

Conclusion The discretion for CT imaging in CX2 is with GPs. Further work is needed to streamline CT imaging to ensure prompt time to diagnosis and treatment in CX2 patients with lung cancer given a greater proportion were radically treatable versus CX3.

P214 A NORMAL CT CHEST NEGATES THE NEED FOR BRONCHOSCOPY FOR THE DETECTION OF COVERT MALIGNANCY IN PATIENTS PRESENTING WITH HAEMOPTYSIS THROUGH THE TWO-WEEK-WAIT PATHWAY; A RETROSPECTIVE STUDY FROM A DISTRICT GENERAL HOSPITAL

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10.1136/thorax-2020-BTSabstracts.359

Introduction Unexplained persistent haemoptysis is a red flag symptom and a common indication to refer via the two-week wait (2WW) lung cancer pathway. For patients having a normal chest radiograph who are not anticoagulated our current standard of practice is to investigate with computed tomography (CT), fibre-optic bronchoscopy (FOB) and blood panel.

Given the perceived poor yield in bronchoscopic evaluation for malignancy,[1] we tested the hypothesis that in haemoptysis patients a normal CT chest is enough to exclude lung cancer.

Methods We performed a retrospective study reviewing the medical records of all patients referred via the 2WW service with haemoptysis in one year (2018). 743 patients were screened and 128 cases were included, reviewing demographics, investigations and final diagnosis.

Results Of the 128 patients 53% (n=68) were male, 47% (n=60) female. The mean age was 66.8 years. 65% were current or ex-smokers. 98.4% of patients underwent CT chest imaging (n=126), of which 32.5% (n=41) were reported as normal and 67.4% (n=85) as showing pathology, malignant or otherwise. 50.7% (n=65) of patients underwent FOB.

The most common diagnoses were benign haemoptysis with or without anticoagulation in 43% (n=55), malignancy in 20.3% (n=26) and infection in 18.8% (n=24).

68.3% (n=28) of patients with a normal CT chest underwent FOB, 85.7% of which were normal. There were no additional malignancies picked up on FOB in the context of a normal CT chest. The only other pathology was that of infection in 2 cases which could have avoided bronchoscopic diagnosis.

Conclusion FOB did not detect covert malignancy if the CT chest was normal in patients presenting with persistent haemoptysis. Our findings suggest that it is unnecessary to routinely investigate our population with bronchoscopy for malignancy if CT chest is normal. Changing our practice will reduce invasive investigation, avoiding inherent risks and streamline services through cost effectiveness and time management.

REFERENCE

1. Werpachowska, *et al*. Diagnostic yield of flexible bronchoscopy: A retrospective study over six months. *European Respiratory Journal* 2014 **44**: P2756

P215 TIME FOR CHANGE? ULTRASOUND GUIDED BIOPSY BY THE RESPIRATORY PHYSICIAN – OUTCOME FROM A SPECIALIST PLEURAL CLINIC

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10.1136/thorax-2020-BTSabstracts.360

Introduction Lung cancer management is time sensitive and delays often lead to poor outcomes.[1] To reduce diagnostic delay, we started a respiratory physician led ultrasound guided biopsy service in the pleural clinic. Patients with N3 disease (axillary and cervical lymph nodes), chest wall masses, cutaneous lesions and suspected pleural malignancy were referred to the pleural clinic for an Ultrasound (USG) guided biopsy. The patients were screened from the daily diagnostic (mini) MDT. Data was reviewed to assess if this intervention aided early diagnosis and reduced the need for invasive diagnostic procedures.

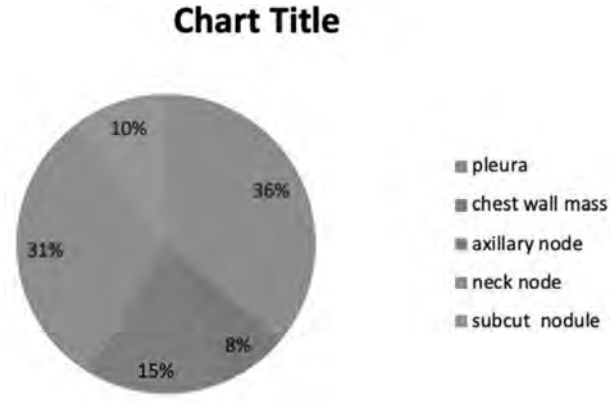
Methods Retrospective data analysis was done over a 2-year period from June 2018 to June 2020 using electronic records, imaging and histology results. Temno tru-cut biopsy needle sizes 16G/18G were used.

Results 39 USG biopsies were done. Male to female ratio was 26:13, average age 62.5 years and 41% patients had PS 0–1. Histology was confirmed in 35 (33 malignant, 1 patient had TB, 1 was benign following 2nd procedure) giving us a diagnostic accuracy of 92% with samples sufficient for extended immunohistochemistry. In 9 out of the 14 USG biopsy of pleura we avoided an invasive thoracoscopy or VATS.

5 (13%) patients needed a second procedure (2 was due to insufficient tissue for extended analysis). 1 had CT guided lung biopsy, 1 VATS biopsy, 1 thoracoscopy, 1 liver biopsy and 1 punch skin biopsy.

3 pneumothoraces were recorded as a complication, 2 after pleural biopsy with no further intervention and 1 following a pectoral node biopsy that required a therapeutic aspiration.

Median time from referral to procedure was 3 days (range 0 -14) and 64% had procedure done with in 5 days of referral.



Abstract P215 Figure 1

Conclusion We conclude that USG guided biopsy is a safe intervention and reduces diagnostic delay in patients with suspected malignancy. Historically it is performed by radiologists. A standardised training pathway should be established for respiratory physicians to make this a routine procedure in pleural clinics across the UK.

REFERENCE

1. https://www.nice.org.uk/Media/Default/About/what-we-do/Into-practice/measuring-uptake/lung-cancer-impact-report/nice-impact-lung-cancer.pdf

P216 DOES SIZE MATTER? THE EFFECT OF PLEURAL FLUID VOLUME ON THE SENSITIVITY AND EFFICACY OF PLEURAL FLUID CYTOLOGICAL ANALYSIS FOR ACCURATELY DIAGNOSING CANCER AND INFLUENCING MANAGEMENT

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10.1136/thorax-2020-BTSabstracts.361

Introduction and Aims The optimum volume of pleural fluid submitted for cytological analysis to detect and categorise suspected malignant pleural effusions has not been identified. A handful of studies have investigated the minimum fluid volume size to maintain sensitivity in identifying the presence of malignant cells and concluded 50–75mls pleural fluid is required.

To date no study has formally assessed if varying sample sizes has any bearing on providing additional clinically relevant information beyond simply identifying malignant cells.

We aimed to test the hypothesis that larger pleural samples sent for analysis increases the cellular material available for immunohistochemistry (to accurately diagnose the tumour type) and presence or absence of therapeutic tumour markers. Thereby avoiding repeated invasive diagnostic tests and delays to diagnosis and treatment options.

Methods We undertook an observational single centre retrospective analysis of pleural fluid samples sent in patients with a suspected malignant pleural effusion. Samples were grouped according to volume sent. We evaluated the sensitivity rates for identifying malignant cells between volumes as has been investigated previously.

Additionally, in cases where malignant cells were identified we assessed the proportion between groups where immunocytochemistry and tumour marker analysis could be performed.

Abstract P216 Table 1

Pleural Volume	No.	Malignant Cells present (%)	Immuno Positive (%)	Insufficient Cells for Immuno (%)	Tumour Marker Testing performed	Tumour Marker Positive (%)	Insufficient Cells for TM Testing
0–24 mls	36	11 (30%)	6 (54%)	5 (45%)	2	1 (50%)	1 (50%)
25–49	24	11 (45%)	9 (72%)	0 (0%)	5	3 (60%)	2 (40%)
50–74	6	2 (33%)	1 (50%)	1 (50%)	0	n/a	n/a
75–99	10	4 (40%)	4 (100%)	0 (0%)	2	2 (100%)	0 (0%)

Results See table 1.

Our results reveal comparable sensitivity in identifying malignant cells between groups. The proportion of samples where successful immunocytochemistry and tumour marker analysis could be performed tended to be higher in larger volumes with fewer instances where tests could not be performed due to insufficient cellular material.

Conclusion and Future Considerations Our results need to be interpreted with caution as our case number was small. However, there were trends towards greater yields of more clinically useful data in larger volumes. Ours was an exploratory pilot study to assess whether our hypothesis warrants more formal investigation.

A larger, prospective study where for each suspected malignant effusion different volumes of pleural fluid are submitted. Each sample volume would be analysed separately by a blinded pathologist. The proportions of positive yields could be compared with the lower volume acting as a control to establish if larger pleural volumes yield greater and more comprehensive cytological diagnoses.

P217 PNEUMOTHORAX INCIDENCE IN CT GUIDED BIOPSY FOR THE INVESTIGATION OF LUNG CANCER

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Introduction CT guided biopsy is an established diagnostic test for lung cancer. The British Thoracic Society suggests pneumothorax rates between 0–61%; 3.3%–15% require chest drains, with no relation between FEV1 and incidence of pneumothorax. Care should be exercised with an Fev1 of less than 1L or less than 35% predicted.[1] A recent review of 23,104 patients suggested an 25.9% pneumothorax rate; 6.9% required a drain and a pneumothorax was associated with larger calibre needle, multiple punctures and no pleural apposition of the mass being biopsied.[2] We reviewed our local practice to better inform any risk to patients.

Methods The notes of patients who udnerwent a CT guided biopsy between April 2011 to December 2019 were analysed. Radiological and spirometric findings as well as procedural aspects were analysed. Any resultant pneumothorax was measured and any interventions documented. Descriptive statistics were applied.

Results 789 biopsies were performed, on 418 male (53.3%) and 271 (46.7%) female patients. The mean age was 73.3 years (IQR 68–80, range 35–96). The mean number of pleural passes was 1.7 (range 1–3). 134 resulting pneumothoraces were identified (16.9%). 116 of those patients had a biopsy using an 18 French Gauge needle. British Thoracic Guidance was applied and 21 pneumothoraces were large by definition. 5 of those were symptomatic and required a chest drain. 16 pneumothoraces were small and required intervention, 15 with chest drains and 1 with a pleural vent. Of those patients, none of the masses had pleural contact and 90% of patients had radiological emphysema detected. The mean FeV1 was 1.89 litres (range 1.27–2.71) and no bullae or fissures were crossed.

Conclusion This is one of the largest retrospective reviews. Our rates are much lower than quoted and might be attributable to using a smaller calibre biopsy needle. There was no relationship between Fev1 and pneumothorax incidence, or the need for intervention. Main risk factors are radiological detection of emphysema and masses not having pleural contact. We thus provide a safe service.

REFERENCES

1. Manhire A, Charig M, Clelland C (*et al*) Guidelines for radiologically guided lung biopsy. british thoracic society guidelines. *Thorax* 2003; **58**: 920 – 936
2. Huo YR, Chan MV, Habib AR, *et al*. Pneumothorax rates in CT-Guided lung biopsies: a comprehensive systematic review and meta-analysis of risk factors. *Br J Radiol*. 2020;**93**(1108):20190866. doi:10.1259/bjr.20190866

P218 EFFECTIVENESS OF A PHYSICIAN-LED BIOPSY SERVICE FOR THE RAPID DIAGNOSIS OF LUNG AND PLEURAL CANCER

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10.1136/thorax-2020-BTSabstracts.363

Background The National Optimal Lung Cancer Pathway dictates that the patients must be referred for treatment by 'Day 28' of their pathway and receive treatment by 'Day 49. Inevitably, this poses great strains on Radiology services where conventionally a significant number of biopsies would take place. In our hospital, a previous baseline audit revealed significant delays and long waiting lists for CT-guided and other image-guided modalities, causing a domino-effect delay in the patients' diagnosis and treatment.

Aim To improve the waiting times by introducing a rapid access Physician-led biopsy pathway for all the new referrals, fully utilising all our interventional services including bronchoscopy, EBUS, medical thoracoscopy and ultrasound-guided biopsies. We set a target of 75% for the percentage of diagnoses achieved by a Physician-led procedure at the end of the 3-month intervention.

Methods All 2WW referrals were screened by a Physician and their CT scans were reviewed. Depending on site of malignancy and accessibility of lesions, all cases got streamlined directly for either a Physician-led procedure or conventional CT-guided biopsy or surgery if appropriate.

Process measure The waiting times for CT-guided biopsy.

Overall measure Percentage of biopsies performed by a Physician.

Results Total 70 cases streamlined within 3-month period. 47 patients were diagnosed with cancer (67%). Out of 47 patients 42 patients required a biopsy technique, 5 cases directly referred to surgery. Of those 42, 38 (90%) were diagnosed via a technique performed by a Physician, with only 4 (10%) CT-guided biopsies needed to be performed in 3 months (chart 1). Out of 47 diagnosed cancer 41 (87%) had lung cancer and 4 (9%) had mesothelioma. As a result, currently there is no waiting time at all for a CT-guided biopsy in our hospital.

Conclusion Physician-led biopsy service significantly reduce the waiting time for CT-guided biopsies and time to diagnosis and treatment.

P219 POTENTIAL UTILITY OF ULTRASOUND GUIDED SUPRACLAVICULAR LYMPH NODE BIOPSY IN THE DIAGNOSIS OF LUNG CANCER – REMODELLING THE PATHWAY

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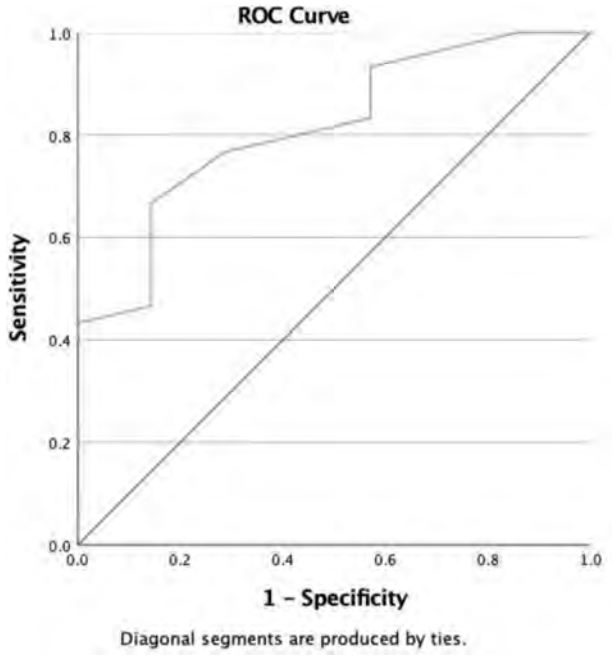
10.1136/thorax-2020-BTSabstracts.364

Introduction Ultrasound guided sampling (USGS) of supraclavicular lymph nodes (SCLN) with fine needle aspiration (FNA) or core biopsy is a well established, minimally invasive method for obtaining cytological diagnosis in metastatic lung cancer. It is recommended in the National Lung Cancer Optimal Pathway 'Direct to Biopsy' option for cases where further staging is not required to guide treatment. Re-modelling of the pathway to incorporate 'direct to biopsy' (same day Radiology or Respiratory service) may help improve timeliness of investigations whilst minimising hospital visits and reducing invasive procedures particularly given COVID-19 precautions.

Method We performed a retrospective analysis of patients with SCLN amenable to FNA or biopsy detected on 2 week wait (2WW) CT, timeliness of subsequent SCLN sampling and diagnostic yield. Data was extracted from InfoFlex from January 2017 to December 2019. Inclusion criteria was at least N2 mediastinal lymphadenopathy >0.5 cm at initial staging with adequate lower neck CT coverage, and where the node was amenable to biopsy (determined by a radiologist). Review of patient records identified those who underwent USGS, whether this was diagnostic and which other procedures were performed. Statistical analysis was performed using IBM SPSS.



Abstract P219 Figure 1

Results From 186 patients with suspected N2 or N3 lymphadenopathy at initial staging, 49 (26%) had SCLN amenable to sampling, of whom 37 (75.5%) had sampling performed. Diagnostic yield was 81.2%. Average timeline from 2WW CT to USGS was variable (M = 18 days, 95% CI[14.5, 21.5]) but shorter, on average, compared to other diagnostic procedures (M=22.81 days, 95% CI[13.02, 35.6]). SCLNs with positive biopsy are larger than those without, with AUC of 0.814 (see figure 1). SCLN size of ≥0.65 cm was highly associated with a diagnostic result.

Conclusion 2WW CT with lower neck coverage provided an early opportunity to identify any amenable SCLN especially in the presence of enlarged mediastinal nodes, for ultrasound guided sampling even when SCLN measured <1 cm, and may apply in up to 25% of patients, A prospective study of ultrasound assessment of all patients with N2 mediastinal lymphadenopathy is now required to assess its clinical utility and effect on an accelerated diagnostic pathway.

P220 IS THERE A NEED FOR STAGING EBUS?

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10.1136/thorax-2020-BTSabstracts.365

Introduction Nodal sampling via (EBUS) is well established in the lung cancer pathway. A ***staging EBUS involves*** targeted mediastinal and hilar lymph nodal sampling via a systematic approach of any lymph node greater than 5 mm in maximum dimension and of smaller nodes which might be FDG-avid on PET-CT.

There is a growing movement nationally that all patients with N1 or central disease on CT or PET-CT should undergo a staging EBUS before resection due to a concern about upstaging in this patient group but this has resource implications.

Methods We performed a retrospective review of all patients between January 2014 and December 2018 who had undergone surgical resection. We analysed their TNM stage based on CT/PET-CT and reviewed if their nodal stage had changed following surgery and if staging EBUS would have changed the pre-operative stage and management.

Results 189 patients had surgical resection. 48 had central disease or N1 disease on PET/CT pre-operative staging.

5 of those had an EBUS based on clinical concerns and there was no upstaging either at EBUS or at resection.

No multi-station N2 or N3 disease was detected in the resection group.

4 patients in this group were found to have single station N2 disease at resection.

2 patients had positive station 8/9 nodes that would not have been detected at EBUS

2 patients had positive station 7 nodes at resection.

One patient was alive 3 years later with no disease evident (patient was given adjuvant chemo)- pre-op stage was T3N1M0, post-op stage was T2bN2M0.

The 2nd patient was alive 1 year later with no disease evident (also given adjuvant chemo)- pre-op stage T2N1M0- post T2bN2M0.

Conclusion Our local single trust experience suggests that routine use of staging EBUS would have added no extra benefit to our patients over standard practice of clinicoradiological correlation by an MDT team and focused use of staging investigations.

Staging EBUS in all these patients would have meant 43 extra EBUS over 5 years with the potential pick-up of 2 single station N2 disease but leading to NO alteration of management in any patients.

This approach would have significant cost and resource implications as EBUS costs approximately £1200- £2000. Therefore, the cost to health economy would been approximately £50K-£80K over 5 years in single centre.

P221 CAUSES AND OUTCOMES OF EXUDATIVE PLEURAL EFFUSIONS IN CONGESTIVE CARDIAC FAILURE (CCF)

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10.1136/thorax-2020-BTSabstracts.366

Background Up to 20% of pleural effusions in CCF patients could be exudative. Differentiating a transudate from exudate is crucial, in order to rule out malignancy. Diuretics increase fluid protein and can misclassify effusions as exudative.

Aim We aimed to study causes and outcomes of exudates secondary to CCF.

Methods Retrospective analysis of consecutive patients with suspected CCF (n=204), presenting to pleural clinic at our institution from 24/10/17 – 24/12/18. Electronic patient records from pleural clinics and in-patient episodes were reviewed, up to 12 months after initial presentation.

Results 68/204 patients with suspected CCF had pleural effusion aspirated; 41 (20%) were frank exudates(pleural fluid protein > 35 g/dl). 6 aspirates (9%) were marked as traumatic. 50 patients (74%) had unilateral right sided effusion. Histopathology analysis revealed only 24% to be lymphocyte rich.

51 patients (75%) had evidence of cardiac dysfunction on echocardiogram within the last 6 months. 46 patients (68%) were on a minimum dose of 40 mg frusemide at the time of pleural aspiration – no correlation was observed between diuretics dose and fluid protein (CORRELL -0.08).

24/41 exudates (59%) had alternate pathology accounting for high fluid protein including 5 malignant, 8 parapneumonic, 2 recent MI, 4 recent cardiac surgery and 5 with combination of above. 5/17 remaining patients needed a pleural biopsy on clinical grounds which showed fibrinous pleuritis in all five cases. Rest of the patients were observed for a period of 12 months and none turned malignant.

Conclusion Most exudative pleural effusions in CCF can be explained by alternative diagnoses, diuretic therapy or traumatic tap. Pleural biopsy in such cases should only be resorted to if suspicion of malignancy is high as most effusions resolve with medical therapy on subsequent follow up.

P222 ELECTRONAVIGATIONAL BRONCHOSCOPY IN A DISTRICT GENERAL HOSPITAL UNDER CONSCIOUS SEDATION

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10.1136/thorax-2020-BTSabstracts.367

Introduction and Objectives Electronavigational bronchoscopy (ENB) facilitates the biopsy of small peripheral lesions in the lungs, otherwise inaccessible to conventional sampling techniques. It is most commonly performed under general anaesthetic in tertiary institutions. We sought to evaluate the ability to perform ENB under conscious sedation in a district general hospital.

Methods Prospective data was gathered on the first 21 patients undergoing ENB between May 2019 and June 2020 using the Medtronic SuperDimension Navigation system. Neither cone beam CT nor fluoroscopy were used during the procedure. A lead operator performed all procedures assisted by another experienced consultant bronchoscopist. Patients were followed up for a minimum of three months, except for one who declined further review. A false negative was defined by either a subsequent biopsy proven cancer, or when treatment for cancer was given based on clinical and radiological suspicion despite a negative ENB biopsy.

Results 21 patients with suspected lung cancer underwent 22 day-case ENB procedures under conscious sedation with no significant complications (Table). In our case series ENB had a diagnostic yield of 76.2% (52.8% – 91.8%); sensitivity of 68.8% (95% CI 41.3% – 89.0%); a specificity of 100.0% (47.8% – 100.0%); a positive predictive value of 100.0%; and a negative predictive value of 50.0% (32.6% – 67.4%). These results are similar to the largest published trial of ENB (81.4% done under GA; 94.9% with adjuvant cone beam CT or fluoroscopy) which had diagnostic yield, sensitivity, and negative predictive value and of 72.9%, 68.8%, and 56.3% respectively.

Eight patients (38.1%) had undergone a prior non-diagnostic biopsy, and all had a subsequent diagnostic ENB. In cases where a positive diagnosis was obtained the size of the target

Abstract P222 Table 1 Demographics, procedure and lesion characteristics of patients undergoing electronavigational bronchoscopy under conscious sedation

Demographics	
Age, mean (range)	70 (53–89)
Gender (m/f)	8/13
Previous lobectomy n (%)	3 (14.2)
Procedure	
Fentanyl, mean (range) micrograms	61 (50 -100)
Midazolam, mean (range) milligrams	2.2 (0.5 – 4)
Lesion characteristics	
Location (n)	Right upper lobe 9
	Right lower lobe 4
	Left upper lobe 7
	Left lower lobe 1
Size mean (range) mm	24 (9–66)
Bronchus sign positive n (%)	18 (85.7%)
Distance from pleural mean (range) mm	28 (0–75)

lesion (27 mm) was comparable with that of the case series as a whole (24 mm).

Conclusion ENB can be performed successfully in a district general hospital using conscious sedation and without reliance on cone beam CT or fluoroscopy, with diagnostic rates comparable with larger institutions under general anaesthesia.

P223 EBUS SAMPLING OF CENTRALLY LOCATED PRIMARY LUNG TUMOURS PROVIDES SUITABLE MATERIAL FOR DIAGNOSTIC AND MOLECULAR TESTING

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10.1136/thorax-2020-BTSabstracts.368

Background EBUS has revolutionised lung cancer diagnostics. As with mediastinal nodal disease, centrally located lung tumours can be sampled using curvilinear EBUS. We evaluated our local five year experience.

Method We retrospectively evaluated patients who underwent EBUS targeting the primary tumour. Sampling was performed using either a 22 gauge FNA or core biopsy needle (Echo-Tip®, Cook). Samples were placed directly into formalin and processed as cell blocks.

Results Between January 2015 and July 2020, 87/1352 EBUS procedures performed sampled primary lesions in 84 patients. The median[interquartile] age was 68[60–73]years and 45/84 (54%) were male. The commonest site was the right upper lobe (n=28/84; 33%), with a median lesion size of 30[24–35] mm. FNA needles were used in 79/84(94%) while in five cases core needles were used.

Total representative sampling was 80/87(92%), with a false negative rate of 11%. In three patients who underwent repeat EBUS, one was representative but further tissue was required for molecular testing and the remaining two were diagnostic, but underwent sampling for recurrence >12 months after index presentation. Of those negative and non-representative samples – final diagnoses were defined by a clinco-radiological diagnosis in four cases, resections and CT guided biopsies in two cases each, and one patient underwent a repeat EBUS under general anaesthesia.

Of diagnostic samples, lung cancer was diagnosed in 66/84 (76%) cases, of which NSCLC-squamous was the commonest (n=27/66; 41%). In patients undergoing molecular/therapeutic target testing: EFGR was successful in 28/28 (100%), ALK-FISH in 25/26 (96%) patient tested and PDL-1 was tested in 39 patients. One repeat EBUS was required for molecular tissue.

Complications included minor bleeding in 4/87(5%), with only one requiring cold saline instillation, desaturation in 1/87 (1%), and tachycardia in 1/87(1%). Only one procedure was abandoned, due to patient tachyarrhythmia. Delayed complications occurred in one patient who was hospitalized ≤seven days with a pneumonia.

Conclusion EBUS sampling of centrally located lung tumour provides a similar diagnostic yield to lymph node sampling, provides suitable material for molecular/therapeutic target testing and has a low complication rate.

P224 NEEDLE PASS TIME AS A METRIC TO MONITOR PROGRESSION OF EBUS TRAINEES

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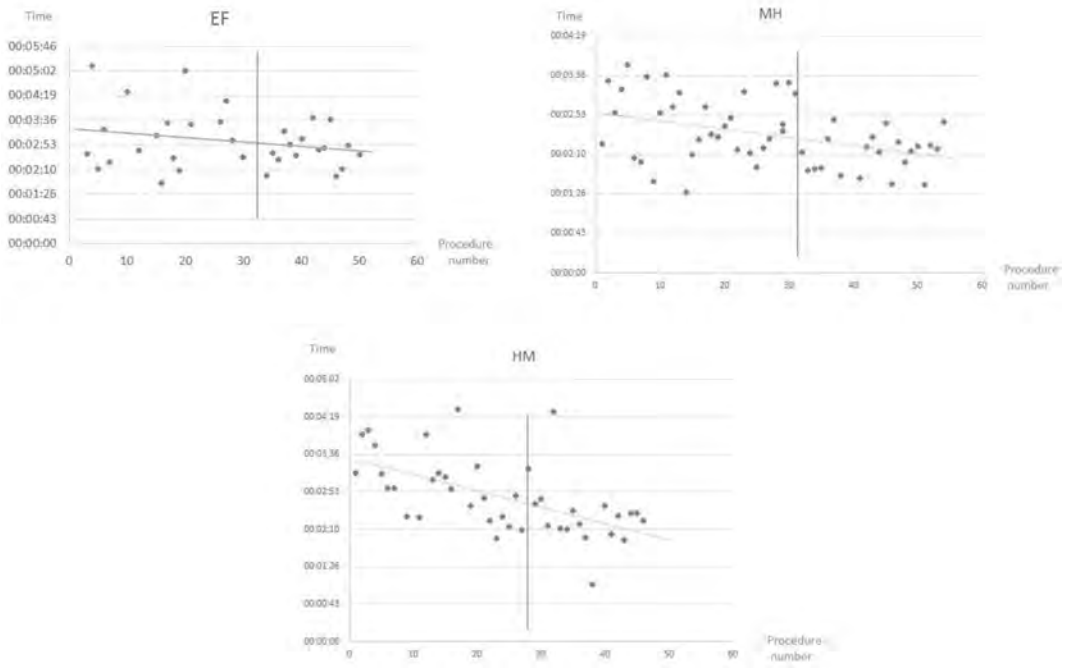
10.1136/thorax-2020-BTSabstracts.369

Background and Objectives Ways to assess and track progress of new EBUS operators and trainees is desirable to ensure training goals and procedural competence are achieved and maintained. While important, relying on the diagnostic yield or on question-based assessments alone is not sufficient.



Abstract P224 Figure 1

Methods This study examined the longitudinal change in times taken between needle passes (needle pass time; NPT) during EBUS lymph node sampling as a metric to monitor progress. The EBUS database of a tertiary hospital that employs 1–2 lung cancer fellow per year was accessed to extract data on the first 50 EBUS procedures for three trainees were collected. The NPT was derived using PACS images that are stored to document every needle pass during an EBUS procedure and an average NPT per procedure was calculated.

Results Between the three trainees 157 procedures were carried out within the study period with 302 LN stations sampled. Station 7 was the most commonly sampled (36.9%). The mean NPT (n=204 stations) was 2:49±0:49 mins. The mean lymph node short axis diameter (n=210) was 15.5±8.7 mm. There was a negative correlation between node size and time per pass (r -0.146, p=0.045).

The change in average NPT and time between passes during the study period for the trainees is plotted in figure 1 showing a consistent decrease in average times between passes during the first 50 procedures. A point of 'convergence' around the 30th procedure with less variation between procedures was noted (red vertical lines) for the three trainees. On multivariate regression, NPT was significantly associated with procedure order and type of station sampled but not lymph node diameter.

Conclusion NPT and time between stations are easy metrics that can potentially help ensure EBUS trainees are advancing in a given training programme.

P225 THE FUTILTY OF BRONCHOSCOPY IN PATIENTS WITH NON-MASSIVE HAEMOPTYSIS WITH NORMAL OR BENIGN CT SCANS

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10.1136/thorax-2020-BTSabstracts.370

Introduction Haemoptysis is a red flag for malignancy. NICE suggests 2 week-wait referral if present in those aged >40. The evidence is limited on the best investigative pathway. Archived 2013 BTS guidance suggests 'consider bronchoscopy after a normal CT if patient is high risk for lung carcinoma or if haemoptysis persists' based on Grade D evidence. The default approach is to order both CT and fibre-optic bronchoscopy (FOB), regardless of risk factors or duration of symptoms. However the pick-up rate is very low (table 1).

Methods We reviewed electronic notes, imaging and FOB reports of all patients that underwent FOB in our trust over the last 7 years (n=4376). Inclusion criteria were presenting with haemoptysis and a normal CT chest or with benign changes only.

Results 275 cases were reviewed. We did not identify a malignant cause of haemoptysis for any patient or change management in 274 patients. One patient had a polypoid vocal cord lesion(eventual outcome after referral to ENT: benign). 192 FOBs were normal (42 chronic bronchitis and 25 easy contact bleeding amongst others).

Conclusions This project is the largest in literature and adds to the existing evidence that FOB has a negligible value in investigating haemoptysis with normal or benign CT. In the UK, one FOB costs £569 and significant cost benefits would accrue from applying the above. We urge the BTS to update their guidance.[1]

REFERENCE

1. Du Rand IA, Blaikley J, Booton R, *et al*. British Thoracic Society guideline for diagnostic flexible bronchoscopy in adults: accredited by NICE Thorax 2013;**68**:i1-i44.

Time for sleep

P226 REDUCTION OF APPOINTMENTS AFTER INTRODUCTION OF SLEEP SYMPTOM QUESTIONNAIRE INTO A SLEEP APNOEA PATHWAY

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10.1136/thorax-2020-BTSabstracts.371

Introduction Prior to October 2018 our sleep service was offering oximetry sleep study and consultant appointment for all sleep referrals. GP referrals have increased by up to 13%. As a result of a quality improvement project we changed our pathway to incorporate a sleep symptom questionnaire at the time of study, then consultant reporting and restricting clinic appointments to those with definite sleep apnoea. Repeat studies were arranged for equivocal cases depending on the symptom questionnaire.

Method 376 patients (GP referral=279) attended for home sleep study over a 6 month period were included in the analysis. Studies were either screening overnight pulse oximetry (n =310) or multi-channel respiratory tracings (n=36). An

Abstract P225 Table 1

	Naidich *et al*, 1990	Set *et al*, 1993	Hirshberg *et al*, 1997	Tak *et al*, 1999	Revel *et al*, 2002	Tsoumakido *et al*, 2006	Khalil *et al*, 2007	Thirurman *et al*, 2009	Sharma *et al*, 2012	Lee *et al*, 2012	Ahmed *et al*, 2014	Davoodi *et al*, 2015	Quinn *et al*, 2019	Chowdhury *et al*, 2020	TOTAL
CT – Normal/ Benign changes	30	43	18	35	48	36	27	206	99	228	50	16	115	22	**973**
Bronchoscopy – No malignancy	30	43	15	35	48	36	27	205	99	227	50	16	113	22	**966**
Bronchoscopy – Malignancy found	0	0	**3**	0	0	0	0	**1**	0	**1**	0	0	**2**	0	**7**

Abstract P226 Table 1 Summary data for patient groups attending for sleep study. Mean and *(range)*

	Male (%)	BMI (kg/m^2)	Age (yrs)	Neck (')	ODI (4%/hr)	Mean SpO_2 (%)	ESS
Total (n=376)	62	34.8 *(18–69)*	50.3 *(18–90)*	16.6 *(12–23)*	16.9 *(0.1–115.7)*	94.1 *(71.0–98.1)*	9.5 *(0–24)*
Clinic + CPAP (n=185)	67	37.7 *(18–69)*	51.8 *(19–80)*	17.3 *(12–23)*	30.3 *(3.5–115.7)*	92.8 *(71.0–96.7)*	10.7 *(1–24)*
Clinic No CPAP (n=31)	58	35.0 *(22–64)*	51 *(24–76)*	16.3 *(14–20)*	7.1 *(0.7–13.8)*	94.4 *(86.9–97.2)*	8.9 *(0–20)*
No Clinic No CPAP (n=160)	59	31.6 *(19–53)*	48.5 *(18–90)*	16.0 *(12–21)*	3.7 *(0.1–13.3)*	95.5 *(91.7–98.8)*	8.2 *(0–20)*

additional sleep symptom questionnaire was completed prior to performing the studies. After consultant review of the study and questionnaire, patients were either offered treatment, further investigation or discharged with advice.

Results 49% of patients who attended for sleep studies required doctor follow up and CPAP treatment. 43% of patients attending for sleep studies did not require clinic appointment or CPAP. 8% of the individuals attended clinic but did not have CPAP after consultation – the majority of this group were advised lifestyle changes and/or use of MAD (CPAP not required/lifestyle advice n = 14, MAD= 10, CPAP offered but declined = 3, neurology referral =2, CBT = 2).

Conclusion and Discussion Around half of patients referred to the sleep clinic have normal overnight oximetry readings and do not require clinic consultation if a symptom questionnaire is also completed. Implementation of a sleep symptom questionnaire into the sleep apnoea pathway helps preserve appointment capacity. Individuals with mild sleep apnoea may still require clinic appointment to discuss symptoms and treatments.

P227 NON-INVASIVE VENTILATION: IMPROVEMENTS IN PATIENT SELECTION, TIME TO TREATMENT, AND ESCALATION PLANNING

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10.1136/thorax-2020-BTSabstracts.372

Introduction Better patient selection for non-invasive ventilation (NIV), and time to NIV initiation, are national improvement objectives.[1]Treatment escalation planning (TEP) was also identified locally as a priority.

Intervention Multiple quality improvement programmes were implemented in 2019 across two hospital sites within one NHS trust, including a move to 24-hour critical care outreach nursing; introduction of a TEP document to the clerking booklet; a redesigned user-friendly NIV proforma; a standardised respiratory discharge summary template; and presentation at local governance meetings.

Measurement The BTS NIV audit toolkit was used to assess NIV care pre-intervention in February - March 2019, and post-intervention in February - March 2020, with inclusion criteria and methodology as specified elsewhere.[2]

Results Results are reported for 2020 compared to 2019. Fewer patients received NIV (21 vs 32), with proportionally more cases of COPD (16/21 [76%] vs 21/32 [66%]), and fewer cases of pneumonia (2/21 [10%]) vs 5/32 [16%]). More patients had NIV started within 1 hour of the last pre-NIV blood gas (15/17 [88%] vs 11/19 [58%]). More patients had a documented TEP (20/21 [95%]) vs 27/32 [84%]), and more of these were recorded pre-NIV (12/20 [60%] vs 14/27 [52%]). There was a statistically significant higher rate of patients involved in TEP decision making (17/20 [94%] vs 14/27 [52%], p=0.003), and more patients for whom NIV was the ceiling of care (18/20 [90%] vs 12/27 [54%], p=0.002).

Discussion Introducing a TEP document to the clerking proforma, with a specific question regarding suitability for NIV, improved early patient-centred decision making about treatment escalation. Though numbers were small and not statistically significant, there was an overall reduction in NIV use, particularly for non-COPD patients, suggesting better patient selection, as well as improved time to NIV initiation.

REFERENCE

1. British Thoracic Society. Adult NIV Audit Report (2019).
2. British Thoracic Society. National Audit Protocol and Instructions (2019).

P228 HOSPITAL AT HOME FOR HYPOXAEMIC PATIENTS: EXTENDING THE REMIT OF COMMUNITY RESPIRATORY CARE

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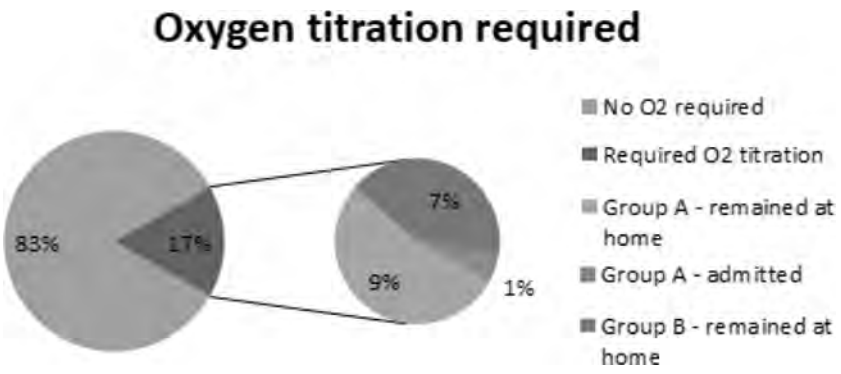
10.1136/thorax-2020-BTSabstracts.373

Background The Knowsley Community Respiratory Service (KCRS) provides 24 hours per day, 7 days per week hospital at home support for patients with COPD. Current UK guidance[1] recommends that patients with an arterial PaO2 of < 7kPa be managed in the hospital setting. Despite the current recommendation, many patients declined hospitalization during an exacerbation. We wished to explore the safety of patients being managed at home despite lower arterial oxygen levels.

Aims To evaluate the outcome of patients with COPD exacerbations being managed at home with an arterial PaO2 of < 7.3Kpa. Group A: Pa02 6.7–6.99kpa, Group B: Pa02:7.0 – 7.3kpa.

Methods Retrospective data were evaluated over a period of 10 months for 103 patients. Smokers (37), Male:42% Female:58%, Mean age: 73, Mean predicted FEV1%: 42.8%. Group A & B Mean NEWS2:3

Results 79 avoided admission (77%) & 24 admitted (23%). Number of patients kept at home but admitted within 30 days is 6 (7.6%). Group A (37) were safely managed at home, Group B (42). More intervention required such as repeat ABG for patients managed at home in group A.



Abstract P228 Figure 1 Percentage of patients requiring oxygen titration, and subsequent outcomes

Overall 17 patients received 02 titration to prevent a hospital admission (Group A: 10, Group B:7).

Conclusion The community respiratory team supports patients to be managed at home safely with a lower Pa02 to avoid unnecessary hospital admission and provide early supported discharge.

REFERENCE

1. Chronic obstructive pulmonary disease in over 16s: diagnosis and management. NICE guideline December 2018.

P229 DOES ESTABLISHING AN EARLY DIAGNOSIS OF EDAC AND INITIATING CPAP, AFTER PERFORMING SLEEP STUDIES HAVE A ROLE IN IMPROVING QOL AND LOWER THE OVERALL COST BURDEN OF THE DISEASE?

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10.1136/thorax-2020-BTSabstracts.374

Background Excessive dynamic airway collapse (EDAC), is a known cause for dyspnoea, cough, exercise intolerance, and recurrent hospital admissions. It refers to the collapse of the airway lumen greater than 75% while still maintaining the cartilaginous structural integrity of the trachea. The diagnosis remains mostly incidental due to lack of awareness while performing a bronchoscopy.

Aim To determine effects of EDAC and its links to sleep disordered breathing and effect of therapy and cost efficacy with CPAP.

Methods Retrospective analysis of patients referred to sleep services at Royal Stoke University hospital who were diagnosed with EDAC and who underwent sleep studies to formally assess sleep disordered breathing

Results 15 patients with a mean age at diagnosis of EDAC was 67.9 years with a male to female ratio of 1:2, mean BMI 34 (SD 7.37) and 47% were non-smokers. Initial presenting symptoms were cough (53.33%), Cough with breathlessness (26.66%), and breathlessness alone (20%). EDAC was suspected in 13% while in the remaining 87% the large airway collapse was a chance finding on CT. Surprisingly all patients had confirmed obstructive sleep apnoea with a mean (SD) AHI 33.2 (SD 22.80). All these patients were initiated on Auto CPAP, with a mean duration of 28.73 months and an average per day use of 6.83 hours. An improvement in AHI was found to average of 4.4% (86.76%) and a marked improvement in sleep disordered breathing 73.33%. Hospital admissions were looked at a six-month interval before and after initiation of CPAP. A marked decline in total number of hospital admissions was observed i.e. 90% reduction with 69.63% reduction in total duration of hospital stay.

Conclusions EDAC should be considered as a cause/contributing factor to unexplained respiratory symptoms. Where EDAC is shown on CT, sleep studies may be indicated prior to the introduction of what appears to be the cost effective treatment of CPAP.

P230 ADHERENCE FOLLOWING NON-INVASIVE VENTILATION INITIATION IN AN OUTPATIENT SETTING IN MOTOR NEURONE DISEASE

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10.1136/thorax-2020-BTSabstracts.375

Background Motor neurone disease (MND) is a relentlessly progressive, incurable neurodegenerative disorder that causes muscle weakness, disability, and mortality. Non-invasive ventilation (NIV) can improve quality of life and survival. Scarce data exists on the preferred location of the initial titration. Therefore, we sought to investigate the adherence to NIV in an outpatient setting.

Methods Outpatient NIV initiation data were collected October 2018-March 2020 from MND patients at our tertiary NIV centre.

Results 119 patients (67 males) were referred for respiratory assessment. The duration between onset of symptoms and referral was 21(13–32) months and between diagnosis and referral was 5(2–14) months. Ten patients (8%) died or were intubated prior to attending clinic. The wait from referral to first appointment was 15(10–28) days. Seventy patients (59%) were initiated on NIV at the first outpatient appointment and they had: age 68(60–73)years, FVC 1.67±0.73L, $FEV_1$1.37 ±0.63L, sniff nasal inspiratory pressure -26(-17–32)cmH_2O, peak cough flow 183±99L/min, and $PaCO_2$5.7(5.3–6.3)kPa. Adherence to NIV at first follow-up appointment (6 weeks) or death was 1.3(0.0–6.3)h. Bulbar-onset patients had lower adherence (0.5(0.0–2.0)h/night) compared with limb-onset patients (3.3(0.0–8.0)h/night; p=0.04). Patients with poor adherence (<4h/night) had reduced spirometry compared to those with good adherence (FEV_1: 1.11±0.55L vs. 1.62 ±0.61L, p=0.002; FVC: 1.42±0.68L vs. 1.94±0.69, p=0.006). Time from symptom-onset to referral was shorter in patients who have died (8(7–14)months) compared to those

still alive (26(17–42)months, p<0.0001). Spirometry at time of NIV initiation was reduced in patients who died compared to those still alive (FEV_1: 1.15±0.54L vs. 1.56±0.65L, p=0.01; FVC: 1.45±0.66L vs. 1.89±0.74L, p=0.02).

Conclusion To streamline the management of MND-related respiratory failure, we have successfully established a rapid access neuromuscular NIV outpatient service. Over 50% of patients referred were initiated on NIV at the first appointment. Adherence to NIV was better in limb-onset patients and also in patients with better preserved spirometry. Patients who died during the follow-up period were more likely to have a shorter duration from onset of symptoms to referral for ventilation.

P231 PATIENT EXPERIENCE OF POSTAL CPAP IN COVID ERA: A UNIQUE MODE OF CPAP TRIALS

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Background The COVID19 pandemic stopped most face to face (F2F) interventions like CPAP & NIV as they were deemed aerosol generating (AGP) and only telephone consultations continued. Prior to this we were performing 30 CPAP trials/week. We realised that without an alternative our patients will have to wait a long time for treatment.

Methods We sent CPAP machines by post with MirageFX nasal mask, a sizing gauge for full face mask along with a link to a Youtube video that we created simulating F2F trial. Patients received a phone call prior to sending the kit explaining what to expect & address any concerns. A pre-setup Airsense 10 machine with our standard CPAP booklet was sent and remote monitoring was enabled for a 4 week virtual review. We assessed patients' experience with this system and whether this could become the new normal. A survey questionnaire was sent to all patients. Most responses were on a 5 point Likert scale, 0 being very poor & 5 excellent.

Results We sent 171 CPAPs(ESS 12±5,ODI 32±22) between 27th April & 17th July 2020. 85(50%) responded to the survey. 95% felt able to set up the device successfully. 80% felt better or much better. Overall satisfaction score was 9/10 on a 10 point scale. 75% accessed the video. Table 1 shows the results.

Abstract P231 Table 1

Questions	Mean response score out of 5 ± SD	
Did you find the phone call from a clinician helpful?	3.6 ± 1.6	
How easy did you find the YouTube video to access?	4.4 ± 0.8	
How easy did you find the YouTube video to follow?	4.4 ± 0.8	
How satisfied were you with how we answered your query?	4.3 ± 0.9	
Reasons to contact service n= 38 (45%)	Mask issues	50%
	Machine set up	15%
	Other	23%
	Machine usage	12%
Age groups of patients	25 -34 Yrs	2%
	35 – 44 Yrs	27%
	45 – 54 Yrs	29%
	55 – 64 Yrs	29%
	65 + Yrs	12%

Conclusion 95% patients could setup their devices through remote instructions without any F2F interaction. Initial phone call from the clinical team helped to address queries reducing future interactions. This new way of CPAP trial shows excellent patient satisfaction & less than half needed additional support. Most patients felt symptomatically better, suggesting good response to CPAP. Moving routine trials from F2F to postal had a significant impact in reducing waiting list, room utilizations, AGPs, PPE & man power usage. This reduced hospital visits during pandemic & allowed us to focus on more vulnerable patients. Currently we are sending 30 postal CPAPs/wk. If we have a second spike all F2F interactions might stop again hence we propose this as the standard practice limiting F2F CPAPs only in situations when this is not possible.

P232 EFFICACY OF POST-ACUTE DOMICILIARY NON-INVASIVE VENTILATION (NIV) SET-UPS

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Introduction Post-acute Domiciliary NIV (i.e. following a hospital admission requiring acute NIV) has been shown to reduce hospital admissions and Length of Stay (LOS) for persistently hypercapnic COPD patients (Murphy *et al. JAMA* 2017; **317**(21):2177–2186. doi:10.1001/jama.2017.4451) but the data on the impact of post-acute domiciliary NIV on the full spectrum of conditions in real life practice is scant. We set out to assess its effect on our patient community in the number of admissions and LOS by comparing the periods two years prior and two years after set-up of domiciliary NIV for each patient.

Methods As part of an audit, we identified the patients who had domiciliary NIV set up between April 2012 and April 2014. Electronic and paper patient records were then used to assess the number of admissions and LOS of this group of patients for the 2 years before and 2 years after domiciliary NIV was set up and analysed using Wilcoxon signed-rank test.

Results There were 88 intended new Post-acute Domiciliary NIV set-ups; 4 were excluded as NIV was not initiated (as intended during the post-acute phase) on discharge. The total number of admissions for this cohort of patients fell from 164 for the two years preceding set up, to 79 in the two years after set up. This correlated to a total of 1794 days of inpatient treatment pre domiciliary set up, reducing to 600 inpatient days for the two years post domiciliary NIV (p=0.00000174), a reduction of 66.5%. In addition to this the mean length of stay per admission fell from 10.9 days pre domiciliary NIV, to 7.6 days post domiciliary NIV, a reduction of 30.6%. Of the original 84 patients 62 survived 2 years; out of the 22 patients who died within the 2 years, 4 were readmitted, in a total of 7 admissions and total length of stay 99 days.

Conclusion Our results show a statistically significant reduction in both the number of admissions and the length of stay per

admission in the cohort of patients after initiation of Post-acute Domiciliary NIV.

P233 OUTCOMES OF DIAGNOSTIC AND THERAPEUTIC CPAP TRIALS IN THE MANAGEMENT OF PATIENTS WITH SUSPECTED OBSTRUCTIVE SLEEP APNOEA

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Introduction and Objectives Oximetry is a widely used, but insensitive, screening test for obstructive sleep apnoea (OSA). Patients with non-diagnostic oximetry may be referred for a trial of continuous positive airway pressure (CPAP) based on symptoms of OSA due to lack of availability of polysomnography. We assessed the efficacy of CPAP in these patients compared to those with confirmed OSA.

Methods We retrospectively reviewed 54 patients referred for a CPAP trial between January and June 2018. 34 patients were selected with a 4% oxygen desaturation index (ODI) <5/hour (low ODI group) and compared to 20 patients with a 4% ODI >15/hour (high ODI group). Baseline demographics and follow up data on CPAP adherence and symptoms was collected.

Results Patients with a lower ODI were younger (44.0±11.6 vs 55.5±14.2 years, p<0.05) and had a lower BMI (29.2±4.4 vs 38.5±9.4, p<0.05) than those with a higher ODI. Prevalence of snoring was higher in the low ODI group (97.1% vs 80%, p<0.05). Excessive daytime somnolence (97.1% vs 90%, p=0.27), partner-reported apnoeas (67.6% vs 90%, p=0.06) and Epworth scores (13.3±4.7 vs 12.7±5.8, p=0.64) were similar.

At initial follow up (median 87 days in low ODI group vs 56 days in high ODI group), 58.9% patients in the low ODI group continued to use CPAP vs 95% in the high ODI group, p=0.09 (figure 1). The low ODI patients used CPAP less than the high ODI patients (average usage 3.43±2.0 vs 6.32±2.08 hours/night, p<0.05). Fewer patients reported symptomatic improvement in the low ODI group (50% vs 75%, p=0.07) and their Epworth scores tended to be higher (11.2±4.8 vs 7.4±6.6, p=0.06). At final follow up (median 383 days in the low ODI vs 286 days in the high ODI group), 32.3% of the low ODI patients were still using CPAP vs 75% of the high ODI patients (p<0.05).

Conclusions Although some patients with unconfirmed OSA benefit from CPAP, they are less likely to use it than those with confirmed OSA. Performing a polysomnogram following non-diagnostic oximetry may prevent unnecessary CPAP trials.

P234 IMPLEMENTATION OF AN AMBULATORY PATHWAY FOR THE INITIATION OF HOME NON-INVASIVE VENTILATION: A PILOT PROJECT

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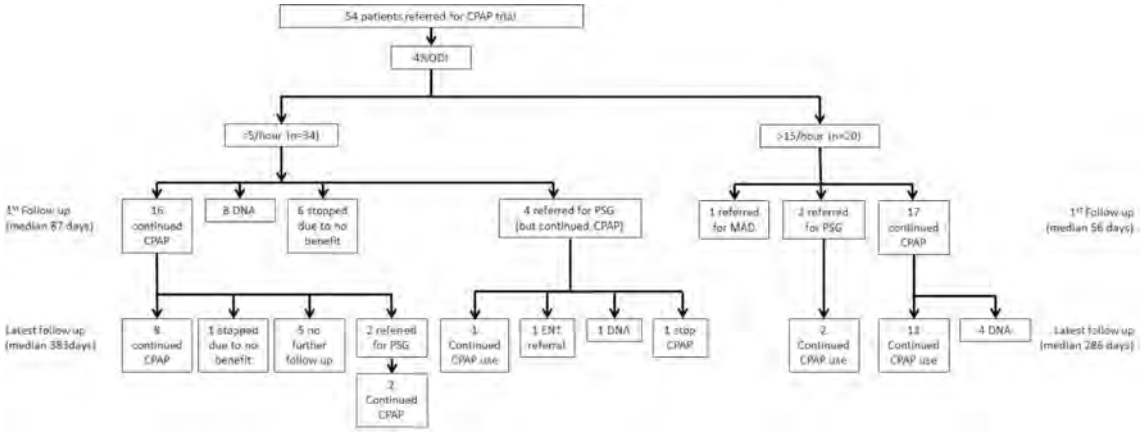
Introduction There remains a paucity of data comparing ambulatory initiation of home non-invasive ventilation (NIV) with a model requiring inpatient admission.[1] In our institution, a Quality Improvement (QI) project was performed where an ambulatory model for NIV initiation was developed and evaluated.

Methods Ambulatory pathways were formulated for NIV initiation in the outpatient setting, alongside outreach and initiation of NIV for inpatients referred within regional hospitals. The primary outcome measure was 'compliance with NIV' defined as NIV use ≥4 hours/night for ≥75% of nights.[2]

Results Between 6.1.20 and 1.7.20, 76 referrals for home NIV were assessed within the ambulatory model. Of these, NIV was not indicated in 3 cases and contraindicated in 1 case, while 2 trialled NIV and declined it, leaving 70 patients who commenced home NIV (n=36 following COVID-19 ward 'closure'). Neuromuscular disease was the principal diagnosis in 41% (29/70) with MND comprising 20/29 neuromuscular cases; see table 1. Ventilator interaction data was available for 68 patients where mean NIV use was 5.21 (SD 3.98) hours/night. Of those established by ambulatory pathway, 62% (42/68) were deemed 'compliant' with NIV in comparison to previous data reporting compliance in 62% (56/90) of subjects established through inpatient admission[2]. It was calculated that delivery of the ambulatory pathway resulted in a cost saving of £197,967



Abstract P233 Figure 1 Clinical outcomes of 54 patients referred for CPAP trial
CPAP (continuous positive airway pressure), DNA (did not attend), MAD (mandibular advancement device), PSG (polysomnography).

Abstract P234 Table 1 Characteristics and outcomes in ambulatory home NIV pathway

Characteristic		Frequency	Paired samples test
Age, years (mean, SD)		62 (16)	n/a
Gender, male (number,%)		31 (44)	n/a
Diagnosis (number,%)	Neuromuscular disease	29 (41)	n/a
	OHS ± OSA	24 (34)	n/a
	COPD	20 (29)	n/a
	CWD	6 (9)	n/a
	CSA	3 (4)	n/a
Ambulatory setup method (number,%)		63 (90)	n/a
Offsite setup method (number,%)		7 (10)	n/a
Change in pCO_2, kPa (median, IQR)		-2.24 (2.93)	p = 0.007
Change in mean overnight SpO_2,% (median, IQR)		+2.00 (3.03)	p = 0.004
Mean NIV use when used, hours/night (mean, SD)		5.21 (3.98)	n/a
NIV compliance (number,%)		42/68 (62)	n/a

Legend: OHS = obesity hypoventilation syndrome; OSA = obstructive sleep apnoea; COPD = chronic obstructive pulmonary disease; CWD = chest wall disease; CSA = central sleep apnoea; n/a = not applicable.

for this period, achieved principally by admission avoidance based on previous length of stay data and Level 2 bed costings.

Conclusions An ambulatory model for initiation of home NIV appears to be as effective in achieving compliance as inpatient admission, while carrying health economic benefits. Ambulatory treatment pathways enabled us to deliver service continuity during the COVID-19 pandemic.

REFERENCES

1. Mandal S, Arbane G, Murphy P. *et al*. Medium-term cost-effectiveness of an automated non-invasive ventilation outpatient set-up versus a standard fixed level non-invasive ventilation inpatient set-up in obese patients with chronic respiratory failure: a protocol description. *BMJ Open*. 2015; **5**; e007082.
2. Ward K, Chakrabarti B, Ashcroft H. *et al*. Compliance with non-invasive ventilation (NIV) at 90 days may be associated with use of NIV in the first 2 weeks: investigation of telemonitoring data. *AJRCCM*. 2018; **197**; A1463.

P235 HIGH FLOW NASAL THERAPY FOR ACUTE TYPE 2 RESPIRATORY FAILURE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background Acute type 2 respiratory failure (AT2RF) is the failure of ventilatory mechanism which results in hypercapnia (>6kPa). Current treatment is non-invasive ventilation(NIV) which has a high failure rate. High flow nasal therapy (HFNT) showed a variety of benefits for AT2RF patients such as, CO2 clearance, ability of communication and comfort. This systematic review aims to determine whether the use of HFNT for patients with AT2RF improves 1)arterial CO2 (PaCO2) and 2)clinical and patient-centred outcomes and 3)to assess any potential harms.

Method We searched relevant electronic databases from 1999 to *August* 2019. We included randomised trials and cohort studies comparing HFNT with low-flow oxygen (LFO) or NIV. Two authors independently assessed studies for eligibility, data extraction and trial quality.

Results From 539 publications reviewed, three studies (n=340 participants) met the inclusion criteria: two RCTs and one cohort. There was no significant difference between HFNT vs NIV and HFNT vs simple nasal prong (SNP) in PaCO2 at different time points (see table 1). Respiratory parameters including, PaO2 and pH showed no significant difference between HFNT and NIV. For patient comfort no significant differences were reported by two studies except, patients found SNP to be quieter than HFNT Pilcher *et al*. (MD 1.30, 95% CI 0.44, 2.16). For dyspnoea score no significant difference were reported between HFNT and NIV. Intubation rate showed no difference between HFNT and NIV, Doshi *et al*. at 72 hours (OR 0.48 95% CI 0.18, 1.27), Lee *et al*. at 30 days (OR 0.89 95% CI 0.34, 2.30). mortality rate of 30-day showed no

Abstract P235 Table 1 PaCO2

Study	Time-points	HFNT[2] n/N[5]	HFNT[2] Mean (SD[6])	n/N[5]		Mean (SD[6])		Mean difference
				NIV[3]	SNP[4]	NIV[3]	SNP[4]	
Doshi 2018 (RCT[1]) HFNT[2] vs NIV	Baseline	203/104	7.10 (21)	203/99	-	7.80 (25.0)	-	-0.70 [-7.07, 5.67]
	60 min	178/92	6.90 (20)	178/86	-	7.35 (21.5)	-	-0.45 [-6.88, 5.98]
	240 min	146/74	6.20 (13)	146/72	-	7 (18)	-	-0.80 [-5.90, 4.30]
Lee 2018 (Cohort) HFNT[2] vs NIV[3]	Baseline	88/44	7.50 (10)	88/44	-	7 (9)	-	0.50 [-3.48, 4.48]
	6 hours	88/44	6.20 (15)	88/44	-	6.90 (17)	-	-0.70 [-7.40, 6.00]
	24 hours	88/44	6.30 (16.0)	88/44	-	6.6 (14)	-	-0.30 [-6.58, 5.98]
Pilcher 2017 (RCT[1]) HFNT[2] vs SNP[4]	Baseline	12/12	6.50 (10)	-	12/12	-	6.50 (10)	0.00 [-8.00, 8.00]
	5 min	12/12	6.40 (10)	-	12/12	-	6.50 (10)	-0.10 [-8.10, 7.90]
	10 min	12/12	6.30 (10)	-	12/12	-	6.50 (10)	-0.20 [-8.20, 7.80]
	15 min	12/12	6.30 (10)	-	12/12	-	6.50 (10)	-0.20 [-8.20, 7.80]
	20 min	12/12	6.35 (10)	-	12/12	-	6.40 (10)	-0.05 [-8.05, 7.95]
	25 min	12/12	6.40 (10)	-	12/12	-	6.40 (10)	0.00 [-8.00, 8.00]
	30 min	12/12	6.30 (10)	-	12/12	-	6.50 (10)	-0.20 [-8.20, 7.80]

[1] RCT: Randomized controlled trial
[2] HFNT: High flow nasal therapy
[3] NIV: Non-invasive ventilation
[4] SNP: Simple nasal prong
[5] n/N: Number of patients
[6]SD: Standard deviation

difference between HFNT and NIV, Lee *et al*. (OR 0.85 95% CI 0.28, 2.59). No difference in hospital stay between patients in HFNT and NIV groups.

Conclusion Our systematic review has identified a small number of trials related to AT2RF patients with variability of outcomes measured. The benefits of HFNT for AT2RF patients are supported by low to very low quality of evidence. Thus use of HFNT for AT2RF cannot be recommended. Current evidence does suggest similar improvements in PaCO2, pH, intubation and mortality rate with HFNT when compared to NIV suggesting potential benefit. However, there is an urgent need for high quality randomised controlled trials.

P236 ABSTRACT WITHDRAWN

P237 DYNAMIC CHEST RADIOGRAPHY: A NOVEL TOOL FOR THE ASSESSMENT OF DIAPHRAGM PALSY

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Introduction Although traditional assessment of diaphragm palsy requires ultrasound or fluoroscopy, ultrasound is dependent on operator experience and may suffer from poor reproducibility, and fluoroscopy may confer a higher radiation dose, requires radiologist oversight, and is not available in all centres.[1 2] We have therefore explored the utility of dynamic chest radiography (DCR) using a novel dynamic X-ray imaging tool to assess diaphragm palsy, and present our experience.

Methods DCR is a low-dose, large field-of-view X-ray imaging system (Konica Minolta, Inc., Japan) that takes sequential PA images of the thorax at 15fps to provide a moving image. It is performed in the same position as an erect PA CXR, carries an effective dose of <0.125 mSv for a 10s exposure, and can be done rapidly without specialist input. Automated computer identification of the diaphragm allows calculation of diaphragm position and velocity. DCR is also of sufficient quality to interpret as a standard PA CXR.

We undertook DCR in 8 cases of suspected diaphragm palsy (mean age 60 years, 3 female), where images were acquired over 10–19 seconds. Three sharps sniffs were followed by a forced maximal deep inspiration.

Results See table 1. Paradoxical diaphragm motion was demonstrated in cases 1 to 6. In cases 7 and 8, abnormal but non-paradoxical motion was demonstrated, in both cases confirmed by fluoroscopy. DCR was well tolerated by all subjects.

Conclusions DCR is a useful tool to quantify diaphragm kinetics. Its low radiation dose and rapid image acquisition make it an attractive alternative to traditional imaging modalities when assessing diaphragm paralysis.

Abstract P237 Table 1 Details of abnormal diaphragm motion, excursion and peak velocity

Case	Paradoxical motion		Inspiratory apex-diaphragm excursion (mm)		Peak inspiratory diaphragm velocity (mm/s)	
	R	L	R	L	R	L
1	N	Y	29	-11	49	-25
2	Y	N	-36	36	-76	77
3	Y	N	-15	19	-53	54
4	Y	N	-6	32	-22	62
5	Y	N	-10	32	-11	64
6	Y	N	-20	25	-31	47
7	Elevated, very poor movement	N	15	48	21	49
8	Elevated, very poor movement	N	5	48	5	28

REFERENCES

1. Nason LK, Walker CM, McNeeley MF, *et al*. *Imaging of the diaphragm: anatomy and function*. *Radiographics*. 2012;**32** (2): E51–70
2. Boussuges A, Gole Y, Blanc P. *Diaphragmatic motion studied by m-mode ultrasonography: methods, reproducibility, and normal values*. *Chest*. 2009;**135** (2): 391–400.

Respiratory physiology: planes, training and mobility

P238 MINIMAL CLINICALLY IMPORTANT DIFFERENCE FOR PEDOMETER STEP COUNT IN COPD: A PROSPECTIVE ANALYSIS

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Background Infection control precautions arising from the COVID-19 pandemic has led to challenges undertaking face-to-face exercise testing required for pulmonary rehabilitation (PR) exercise prescription and evaluation.[1] Self-management programmes, incorporating physical activity, have been advocated as an alternative to PR when face-to-face assessment is not possible.[1] Daily step count is the most commonly used physical activity outcome and does not require face-to-face assessment. We aimed to estimate the minimal clinically important difference (MCID) for daily pedometer step count in COPD, using response to PR as a model of improvement and longitudinal decline following PR as a model of deterioration.

Methods This was a secondary analysis of a trial that investigated the effectiveness of pedometer-directed step count targets in COPD as an adjunct to PR, with the study arms combined as the intervention did not result in significant between-group differences.[2] We measured spirometry, Medical Research Council score, incremental shuttle walk test, Chronic Respiratory Questionnaire and pedometer step count (Yamax Digiwalker CW700) pre-, post- and six months following PR. Post-PR and six months post-PR, participants completed a Global Rating of Change Questionnaire: *'How do you feel your physical activity levels have changed following rehabilitation?'* and rated the response on a five-point Likert scale (*'1: I feel much more active'* to *'5: I feel much less active')*. The MCID for improvement was defined as the median for *'2: I feel a little more active'* at the post-PR assessment. The MCID for deterioration was the median for *'4: I feel a little less active'* at the six-month assessment (compared to post-PR).

Results 152 participants enrolled in PR; 80% and 70% attended the post-PR and six month assessments respectively. Baseline characteristics and change with PR and over time are

Abstract P238 Table 1 Baseline characteristics, response to PR and change over time

Variable	Baseline (n=152)	Δ pre- to post-PR (n=121)	p-value	Δ post-PR to six months (n=106)	p-value
Sex (male) (n (%))	110 (72)	-	-	-	-
Age (years)	68 (9)	-	-	-	-
FEV_1 (% predicted)	50.5 (21.2)	-	-	-	-
FEV_1/FVC	0.50 (0.15)	-	-	-	-
BMI (kg/m^2)	28.1 (5.8)	-	-	-	-
MRC Dyspnoea score	3 (1)	-1 (-1 to 0)	<0.001	0 (0 to 0)	<0.01
ISW distance (meters)	259 (145)	63 (51 to 75)	<0.001	32 (19 to 46)	<0.001
CRQ Dyspnoea	13.4 (5.7)	4.6 (3.6 to 5.7)	<0.001	1.5 (0.5 to 2.6)	<0.01
CRQ Fatigue	13.9 (5.9)	3.3 (2.6 to 4.1)	<0.001	1.8 (1.1 to 2.5)	<0.001
CRQ Emotion	31.4 (9.4)	4.2 (3.01 to 5.3)	<0.001	2.4 (1.2 to 3.6)	<0.001
CRQ Mastery	18.2 (5.8)	2.6 (1.8 to 3.4)	<0.001	1 (0.1 to 1.9)	0.03
CRQ Total score	76.8 (22.8)	14.7 (11.8 to 17.6)	<0.001	6.7 (3.9 to 9.6)	<0.001
Daily pedometer step count	2418 (1440, 4261)	420 (-259, 1582)	0.03	-262 (-1764, 511)	0.04

Baseline data are presented as number (percentage), mean (SD) or median (25th, 75th centile). Data for change pre- to post-PR and change post-PR to six months are presented as mean (95% confidence interval) change or median (25th, 75th centile) change.
Abbreviations: BMI: Body mass index; CRQ: Chronic Respiratory Questionnaire; FEV_1: Forced expiratory volume in 1 second; FVC: Forced vital capacity; ISW: Incremental shuttle walk test; MRC: Medical Respiratory Council Dyspnoea Scale; PR: Pulmonary rehabilitation.

in table 1. There were significant improvements in daily pedometer step count following PR and reductions at six months. The median (25th, 75th centile) MCID estimate for improvement and deterioration in daily pedometer step count was 427 (-443, 1286) and -456 (-2271, 650) steps respectively.

Conclusion The MCID estimates for improvement with PR and deterioration over time after PR are 427 and -456 steps respectively.

P239 THE IMPACT OF COVID-19 SHIELDING ON LEVELS OF PHYSICAL ACTIVITY AND HEALTH-RELATED QUALITY OF LIFE IN COPD PATIENTS FOLLOWING PULMONARY REHABILITATION

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Introduction To prevent infection during the peak of the COVID-19 pandemic, COPD patients were instructed to 'shield', resulting in restrictions to usual daily activities, potentially negating health benefits attained during pulmonary rehabilitation (PR). The aim of this study was to determine the impact of a shielding period on physical activity levels and health-related quality of life (HRQoL) in COPD patients who completed a course of supervised PR before shielding in March 2020.

Methods COPD patients who completed an 8-week PR course between January and March 2020 were enrolled into this single centre, observational cohort study. Physical activity was measured using accelerometry (Actigraph wGT3X) and the Clinical Visit of Proactive Physical Activity in COPD (C-PPAC) instrument (that captures the domains of amount and difficulty of physical activity; Gimeno-Santos *et al*. ERJ 2015) in the week preceding PR, the week following completion of PR and for a week 3 months following completion of PR during the shielding period (April to July 2020). Additionally, assessment of HRQoL (COPD Assessment Test [CAT] and Clinical COPD Questionnaire [CCQ]) and psychological well-being (Hospital Anxiety and Depression Scale [HADS]) was undertaken.

Results In ten COPD patients (FEV_1: 55±23% predicted), a significant and clinically meaningful decrease in daily steps was shown from post-PR to shielding (4129±2245 versus 2508±1186 steps/day; p=0.030), as well as pre-PR to shielding (3681±2025 versus 2508±1186 steps/day; p=0.015). Likewise, there was a significant and clinically meaningful worsening in the C-PPAC score from post-PR to shielding (68 ±13 versus 59±13 points; p=0.060), but not pre-PR to shielding (61±11 versus 59±13 points; p=1.000). There were no statistically or clinically meaningful changes in HADS and CAT scores. However, the worsening in CCQ scores from post-PR to shielding did exceed clinically meaningful margins (±0.4 points) for both functional (+0.5 points) and mental domains (+0.7 points).

Conclusions In COPD, the shielding period had a negative impact on physical activity levels, evidenced by reduced daily steps compared to not only post-PR, but also pre-PR. This decline below baseline values could have led to further physical deconditioning, potentially reversing some of the benefits gained during PR and worsening long term disease-related outcomes.

P240 PARASTERNAL ELECTROMYOGRAPHY AS A MEASURE OF RESPIRATORY MUSCLE FUNCTION IN PATIENTS RECOVERING FROM SEVERE COVID-19 PNEUMONIA

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Introduction Conventional lung function testing involves forced expiratory manoeuvres which risk aerosolisation of respiratory droplets and nosocomial transmission of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2/COVID-19). Between-patient decontamination procedures render routine testing impractical. Parasternal electromyography (EMG_{para}) is an effort-independent method of assessing inspiratory muscle activity that tracks clinical trajectory in COPD, cystic fibrosis and pulmonary fibrosis. We evaluated EMG_{para} as a method of monitoring respiratory muscle function during recovery from COVID-19 pneumonia in Post-COVID clinic.

Methods Prospective single-centre observational cohort study (05/Q0703/82). All patients hospitalised with severe COVID-19 pneumonia (oxygen requirement ≥40% or critical care admission) were invited to clinic 6–8 weeks post-discharge. EMG_{para} was recorded in consecutive patients attending 12 clinic sessions using transcutaneous second intercostal space

electromyography. Measurements were made over 2 minutes of tidal breathing followed by maximal inspiratory manoeuvres (inspiration to total lung capacity and maximal sniff manoeuvres) and the values for root mean square (RMS) EMG_{para} per breath, $EMG_{para\%max}$ (RMS EMG_{para} as a proportion of volitional maximum), Neural Respiratory Drive Index (NRDI) and sex-specific standardised residuals (*z*-scores) recorded. After each measurement, equipment was decontaminated using alcohol-based wipes and surface electrodes were disposed of. Symptom questionnaires and radiographic assessment of lung oedema (RALE) scores were recorded.

Results Between 4th June and 2nd July 2020, EMG_{para} was measured in 25 patients. All approached patients consented to participate, no adverse events occurred. Mean±SD age 57.1 ±15.6 years, 64% male, BMI 29.4±5.6 kg/m^2, 29% current/ex-smokers. mMRC was at pre-COVID baseline in 56%, 32% reported persistent burdensome breathlessness. Respiratory rate 15±3 breaths/minute, oxygen saturation 98±2.0%, heart rate 87±12 bpm. EMG_{para} measures are presented in table 1. Z-scores of all EMG_{para} indices were raised. NRDI was associated with admission, worst inpatient and follow-up RALE scores (R=0.41 (p=0.04), R=0.40 (p=0.046) and R=0.49 (p=0.01), respectively), not mMRC (R=0.24, p=0.24).

Abstract P240 Table 1 Measures of parasternal electromyography

	Measured value	*Z*-score
EMG_{para} (**μV**)	5.80 (3.91–12.26)	1.27 (0.73–2.10)
$EMG_{para\%max}$ (%)	15.45 (11.41–23.27)	2.93 (1.91–4.34)
NRDI (%.bpm)	224 (164–306)	2.68 (1.79–3.90)

Data are presented as median (interquartile range). Abbreviations: z-score = standardised residual, EMG_{para} = mean root mean square parasternal electromyography per breath, **μV = microvolts,** $EMG_{para\%max}$ = **EMG_{para} as a proportion of volitional maximum,** NRDI = **Neural Respiratory Drive Index.**

Conclusions Inspiratory muscle activation was high, which may reflect underlying interstitial pathology, critical illness myopathy, deconditioning or anxiety relating to clinic attendance. Parasternal electromyography is a well-tolerated technique that avoids aerosolisation of respiratory droplets and utilises equipment that is easily decontaminated between patients. This makes it a practical and informative measure of lung function during the COVID-19 pandemic.

P241 A PILOT RCT ASSESSING THE INCLUSION OF PHYSICAL ACTIVITY COUNSELLING TO STANDARD CARE PULMONARY REHABILITATION IN PATIENTS WITH COPD

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10.1136/thorax-2020-BTSabstracts.385

Introduction Pedometer-based physical activity (PA) counselling is effective in inducing meaningful improvements in daily PA as a standalone intervention and alongside pulmonary rehabilitation (PR) in patients with COPD. However, findings surrounding its effectiveness in patients with profoundly low activity levels remain inconsistent.

Objective To determine patient acceptability and compliance to PA counselling alongside PR and its effects on daily PA levels.

Methods In this pilot RCT, patients were assigned 1:1 to receive standard care (PR alone, twice weekly for 8 weeks) or PR alongside PA counselling (PR+PA) comprising motivational interviews, pedometer step goals (reviewed twice weekly) and patient feedback. Patients with HADS ≥8 participated in Cognitive Behavioural Therapy sessions. A study specific questionnaire and adherence to components of the intervention assessed patient acceptability and compliance to PA counselling.

Results A total of 37 patients (mean±SD: FEV_1: 49±18%, baseline steps/day: 3249±1898) completed the study in the PR+PA (n=19) and PR alone (n=18) arms. Overall the PA counselling intervention was well received by patients (72% indicating they liked taking part) and patient compliance to components of the intervention was high (PA diary: 91±18% and acceptability to step goal targets: 68±12%). Pedometer (Fitbug) derived steps/day increased throughout the 8-week intervention (mean [95% CI] difference: 1370 [681, 2057] steps; p=0.001). Patients in both arms improved the 6MWD (PR alone mean [95% CI] difference: 39 [20, 65] m; PR+PA mean [95% CI] difference: 47 [23, 70] m, p=0.594) and CAT scores (PR alone mean [95% CI] difference: -2.0 [-3.5, -0.4] points; PR+PA mean [95% CI] difference: -3.6 [-5.2, -1.9] points, p=0.143). However, there were significant differences in favour of the PR+PA compared to PR alone arms at 8 weeks in the magnitude of improvement in accelerometer (Actigraph-wGT3X) derived measures for daily steps (mean [95% CI] difference: 845 [296, 1396] steps, p=0.004), and movement intensity (mean [95% CI] difference: 95 [30, 156] VMU, p=0.005).

Conclusions PA counselling alongside PR was well received by patients and compliance to various components of the intervention was high. PA counselling using pedometers is effective in enhancing daily PA in COPD patients with low PA levels at the onset of PR.

P242 CAN EXISTING ROUTINE CLINICAL DATA BE USED TO PREDICT HYPOXAEMIA FOR MND PATIENTS UNDERTAKING COMMERCIAL FLIGHT?

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Introduction Pre-COVID-19, the total number of passengers traveling by commercial airlines rose to 4.3 billion, with Europe amounting to a 7.2% increase. The risks of respiratory compromised patients developing hypoxaemia during flight is well documented. Assessment of these patients is time consuming and often requires specialised equipment. Furthermore, the majority of evidence is based on research into patients with Chronic Obstructive Pulmonary Disease (COPD). The aim of this study is to investigate potential predictive biomarkers relating to the development of hypoxaemia during flight in patients with Motor Neurone Disease (MND).

Methods 118 MND patients referred into a fitness to fly service (n=118) completed baseline lung function and a Hypoxic Challenge Test (HCT) as part of a risk stratification for

Abstract P242 Table 1 Descriptive statistics for physiological parameters by condition, including indications of statistical significance

	MND		
Variable	Pass	Fail	p value
Age	61.5 (12.67)	66 (14.18)	0.076
FEV_1	2.12 (0.80)	1.25 (0.71)	0.001
FEV_1 %	70 (24.43)	45 (21.04)	0.001
FVC	2.61 (1.02)	1.74 (0.88)	0.003
FVC %	68 (24.09)	49 (19.68)	0.004
PaO_2 21%	10.30 (1.14)	9.045 (1.18)	0.001
PaO_2 15%	7.60 (1.147)	6.39 (0.25)	0.001
$PaCO_2$ 21%	5.28 (0.75)	6.24 (0.86)	0.001
BE 21%	2.35 (2.37)	5.70 (3.34)	0.001

planned air travel (77 male). Data from patients requiring in-flight oxygen was compared to patients who did not, in accordance with the British Thoracic Society recommendations 2011: Managing passengers with stable respiratory disease planning air travel. Statistical analysis was performed using one-way ANOVA, Kruskal-Wallis, and Chi-Squared tests, as appropriate.

Results There was no significant difference between the pass (n=94) and fail (n=24) groups for age, gender, smoking history or BMI. There was a significant difference for all spirometry data (FEV_1, FVC and FEV_1/FVC ratio – absolute, percent predicted and standardised residuals). Moreover, the resting blood gases ($FiO_2$21%) data showed significant difference for all parameters with the exception of pH (<0.001). The Regression analysis showed limited predictive value of spirometry and/or resting blood gas data with the exception of $PaCO_2$ and base excess (BE).

Conclusions The predictive value of spirometic paraments and resting blood gases are limited in assessing hypoxaemia during commercial flight in MND patients, with the exception of parameters relating to respiratory failure. Despite the significant difference between the two groups, routine physiological data was limited in the predictive regression equations. We recommend that the safest approach in managing this group of patients is to perform an HCT in all patients intending to use air travel until more evidence-based data is available.

P243 CAN HISTORICAL ASSUMPTIONS BE USED TO ASSESS FITNESS TO FLY FOR MND AND ILD PATIENTS? AN EVALUATION OF PHYSIOLOGICAL PARAMETERS TO RISK STRATIFY PATIENTS PLANNING AIR TRAVEL

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Introduction The risk associated with commercial flight for respiratory compromised patients is well known. Many of the assumptions are based on studies that have included patients with Chronic Obstructive Pulmonary Disease (COPD) and have often been extended to other respiratory and non-respiratory disorders. This study aimed to examine differences in physiological parameters and Hypoxic Challenge Test (HCT) outcome in patients with Motor Neurone Disease (MND), Interstitial Lung Disease (ILD) and COPD.

Methods Respiratory patients who were referred into a fitness to fly service (n=225) with COPD (n=51), MND (n=118) and ILD (n=56) completed baseline lung function and a HCT as part of a risk stratification for planned air travel. Statistical analysis was performed using one-way ANOVA, Kruskal-Wallis, and Chi-Squared tests, as appropriate.

Results Demographic data relating to age, smoking history and BMI were significantly different between the patient groups. Spirometric data showed significant differences in Forced Expiratory Volume in one second (FEV_1) absolute, percent predicted and standardised residuals, however there was no significant difference in Forced Vital Capacity (FVC) absolute or percent predicted. Resting capillary blood gases (CBGs) ($FiO_2$21%) showed significant differences between patient groups in all parameters with the exception of pH. Responses to the hypoxic mix during the HCT ($FiO_2$15%) showed differences in all CBG values with the exception of pH. This was also mirrored in the corrective values ($FiO_2$28%). The difference between the PaO2 at rest (21%) and during the HCT (15%) is higher in the MND and ILD groups (2.66and 2.74 kPa respectively) versus the COPD group (2.2kPa). The HCT fail rate was greatest for the COPD group (table 1).

Conclusions In this retrospective, exploratory examination, the physiological data supports significant differences between the disorders for the majority of data. The assumptions and algorithms based on the study of COPD patients cannot be assumed for MND or ILD, and these groups need to be

Abstract P243 Table 1 Descriptive statistics for physiological parameters by condition, including indications of statistical significance

	MND		ILD		COPD		
Variable	Mean	SD	Mean	SD	Mean	SD	p value
Age	63	12.99	69.5	7.05	66	9.24	0.001
FEV_1 (L)	1.94	0.85	1.91	0.65	1.13	0.61	0.001
FEV_1 %	65.93	25.72	76.1	19.19	44.76	25.55	0.001
FVC (L)	2.46	1.05	2.54	0.84	2.62	0.95	0.676
FVC %	64.59	24.35	70.8	18.11	74.24	23.13	0.059
PaO_2 21%	10.12	0.12	9.46	1.05	8.68	1.01	0.001
PaO_2 15%	7.46	1.01	6.72	0.75	6.48	0.92	0.001
PaO_2 28%	11.7	2.56	11	2.56	8.94	2.25	0.002
% HCT Fail	20.34		51.79		62.75		0.001

specifically studied to better understand their response to the commercial cabin environment.

P244 AN ALGORITHM FOR AUTOMATICALLY IDENTIFYING TRENDS IN MAXIMUM AND MINIMUM FEV1

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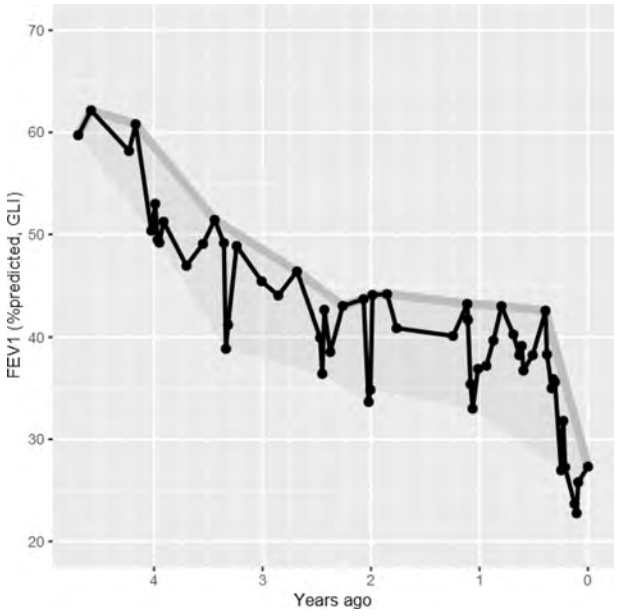
Background FEV_1 is a critical metric in bronchiectasis, however pulmonary exacerbations make it highly variable over time, notably in Cystic Fibrosis (CF). Trends in FEV_1 are usually calculated by linear interpolation through all readings. FEV_1 is a forced maximal procedure, which gives trends in the maximum FEV_1 achievable over time a distinct meaning from an average which includes low values associated with pulmonary exacerbations. Deteriorating patients frequently dismiss low readings as unrepresentative, however the trend in the maximum value achievable over time is harder to dismiss. However, automatic calculation of a trend in maximum FEV_1 is surprisingly challenging (e.g. rolling maxima are slow to respond to changes).
Aim Proof of concept study to develop a practical algorithm to automatically identify and visualise trends in maximum & minimum FEV1.
Methods/Results An R function using the R package concaveman (https://R-project.org) employing the Concave Hull algorithm (Park J *et al*, J Info Sci Eng (2013) 29(2) 379–392) was written, wrapping an 'envelope' around the plot of% predicted FEV_1versus date, from which maximum and minimum trendlines were extracted. Linear interpolation of the maximum FEV_1 trace allows calculation of the rate of change in maximum FEV_1 (likewise for minimum FEV_1).

An 'R Shiny' script allows the visualisation to be accessed from any web browser on the Trust network, using live data for any patient. Clinically credible trends were identified for all patients attending our Regional Adult CF Specialist Centre with more than 2 years of data available.



Abstract P244 Figure 1

The figure 1 shows a sample visualisation of FEV1 vs time in a deteriorating patient generated by the script (black points/line = raw readings; thick grey line = maximum FEV1 trendline ; grey area = envelope included by maximum and minimum trendlines)
Conclusion Data collection is ongoing to evaluate patient experience of this visualisation as a tool in consultations however initial response seems to be favourable when it has been used to discuss clinical trajectory or response to therapies with patients and colleagues. We also plan to explore the significance of the envelope area.

P245 ACUTE THORACOABDOMINAL AND CENTRAL HAEMODYNAMIC RESPONSES TO INSPIRATORY MUSCLE LOADING IN HEALTHY YOUNG ADULTS

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Introduction Inspiratory muscle training (IMT) has been shown to improve inspiratory muscle strength and exercise tolerance in healthy and diseased populations, however the acute physiological effects of short bouts of tapered flow resistive loading (TFRL) remain unclear. We investigated the acute responses of TFRL at low, moderate, and high IMT intensities and aimed to determine an optimal training load.
Methods Twelve healthy adults (26±3 years) performed 3 loaded trials (at 30, 50 and 70% maximal inspiratory pressure; PI_{max}) applied in a balanced ordered sequence and lasting 3 minutes each. Thoracoabdominal volumes (captured by Optoelectronic Plethysmography), cardiac output (recorded by Cardio-impedance), gas exchange, and dyspnoea scores were assessed throughout.
Results Inspiratory loading induced significant increases in thoracoabdominal tidal volumes compared to QB (0.69±0.06 L): by 2.71±0.30 L at 30% PI_{max} (p=0.003); 3.01±0.27 L at 50% PI_{max} (p=0.002); and 3.02±0.27 L at 70% PI_{max} (p=0.002). Increased end-inspiratory rib cage volume and decreased end-expiratory abdominal volume contributed to the expansion of thoracoabdominal tidal volumes. A significant difference in thoracoabdominal tidal volumes was observed between 30 and 50% PI_{max} (p=0.033) and between 30 and 70% PI_{max} (p=0.049). Cardiac output was significantly increased from rest (6.11±0.28 L/min) to 7.74±0.31 L/min at 30% PI_{max} (p=0.004), 8.38±0.66 L/min at 50% PI_{max} (p=0.003), and 8.36±0.57 L/min at 70% PI_{max} (p=0.003). With increasing inspiratory intensity, BORG ratings for dyspnoea progressively increased from 2.36±0.20 at 30% PI_{max}, to 3.45±0.21 at 50% PI_{max} (p=0.003), and to 4.91±0.25 at 70% PI_{max} (p=0.003). A significant difference in dyspnoea ratings was also observed between 50 and 70% PI_{max} (p=0.002). End-tidal carbon dioxide pressure ($P_{ET}CO_2$) progressively decreased from QB during 30% PI_{max} (26.23 ±0.59 mmHg; p=0.005), 50% PI_{max} (25.87±1.02 mmHg; p=0.005) and 70% PI_{max} (24.30±0.82 mmHg; p=0.005). Significant differences in $P_{ET}CO_2$ were found between 30% and 70% PI_{max} (p=0.017) and 50% and 70% PI_{max} (p=0.037).
Discussion Thoracoabdominal tidal volumes and cardiac output responses were nearly identical between 50% and 70% PI_{max}, however adverse physiological responses, such as

hyperventilation (decreased $P_{ET}CO_2$) and dyspnoea scores were significantly greater at 70% PI_{max}. This study suggests that 50% PI_{max} is the optimal intensity for IMT via TFRL in healthy subjects.

P246 IS ROUTINE CLINICAL DATA USEFUL IN PREDICTING HYPOXAEMIA IN ILD PATIENTS UNDERTAKING COMMERCIAL FLIGHT?

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Introduction The British Thoracic Society guidelines on air travel in patients with respiratory disease advocate an individual risk assessment, with the respiratory physician being the central referral point. A hypoxic challenge test (HCT) can identify patients that would benefit from in-flight oxygen, but evidence as to which patients should be referred for this test is lacking.

Methods We aimed to identify parameters that might predict the outcome of an HCT in patients with interstitial lung disease (ILD) the majority of whom had idiopathic pulmonary fibrosis (IPF). 56 consecutive HCTs were reviewed. Data from patients requiring in-flight oxygen according to the HCT was compared to data from patients who did not. Routine clinical data for spirometry, static lung volumes, transfer factor and six-minute walking test (6MWT) was also obtained. Statistical analysis was performed using one-way ANOVA, Kruskal-Wallis, and Chi-Squared tests, as appropriate.

Results Demographic data relating to age, gender, smoking history and BMI were comparable. Spirometric data showed differences in per cent predicted for Forced Expiratory Volume in one second (FEV_1) and Forced Vital Capacity (FVC). There was no difference in any of the parameters relating to static lung volumes, transfer factor or 6MWT. Furthermore, there was no difference between the group for resting blood gases (21%). The Regression analysis showed limited predictive value for spirometry.

Conclusions The data showed that the physiological parameters have limited predictive ability in identifying patients who are at risk of developing hypoxaemia during commercial flights. We have excluded patients on high flow rate oxygen at sea level from our study due commercial airlines limiting flow rate to 4 l/min at altitude. We recommend that the safest approach is to refer all patients with ILD for HCT assessment until more evidence-based data is available, which is the current practice at this regional centre.

Abstract P246 Table 1 Descriptive statistics for physiological parameters by condition, including indications of statistical significance

	ILD		
Variable	Pass	Fail	P Value
Age	72 (6.95)	68 (6.82)	0.063
FEV_1 %	84 (19.26)	67.56 (15.20)	0.001
FVC %	2.74 (0.95)	2.32 (0.67)	0.002
TLco	3.66 (3.88)	3.86 (0.78)	0.966
TLC	4.14 (1.19)	3.41 (1.23)	0.345
PaO_2 21%	9.64 (1.05)	9.28 (1.04)	0.203
PaO_2 15%	7.34 (0.66)	6.41 (0.36)	0.001
6MWT % Dist.	74.38 (25.61)	61.59 (24.67)	0.196
6MWT Destat.	-6.5 (4.14)	-9.0 (3.78)	0.743

P247 THE ROLE OF IMPULSE OSCILLOMETRY IN THE MANAGEMENT OF ASTHMA WHEN FORCED EXPIRATORY MANOEUVRES ARE CONTRAINDICATED

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Introduction The impulse oscillometry system (IOS) provides an alternative method of lung function testing for patients in whom forced expiratory maneuvers are contraindicated, such as those with inherited vascular connective tissue disorders. Here we examine the role of IOS in the diagnosis and monitoring of asthma in such patients through a clinical case series and literature review.

Materials and Methods The clinical case series comprised of data from 12 patients with inherited connective tissue disorders representing 32 clinical encounters. Of these, 11 encounters were for asthma diagnosis and 21 were for asthma monitoring. Symptoms, exhaled nitric oxide (FeNO) and IOS were assessed at each encounter.

Results In the clinical case series, 5 of 6 patients with likely asthma had abnormal IOS parameters compared with 0 of 5 of those with unlikely asthma. In the monitoring group, 11 encounters resulted in treatment escalation (demonstrating suboptimal control), and 8 resulted in no change to treatment (good control). 6 of 11 of those with suboptimal control had abnormalities in $\geq$3 IOS parameters, with R5 and R5-20 most frequently affected. Only 1 of 8 of those with good control had abnormalities in $\geq$3 IOS parameters.

Conclusions IOS provides a useful alternative to conventional lung function testing for the diagnosis and monitoring of

Abstract P247 Table 1 Abnormalities seen in symptoms, FeNO and IOS parameters in those with suboptimal and stable asthma control

		Suboptimal control (n=11)	Stable asthma (n=8)
Number of abnormal IOS parameters	0	1	1
	1	2	3
	2	2	3
	3	5	1
	4	1	0
	5	0	0
Specific abnormal IOS parameters	R5	4	1
	Z5	7	3
	R5-20	7	2
	R20	3	3
	X5	4	0
Abnormal FeNO	Y	6	0
	N	3	4
	N/A	2	4
Symptoms of asthma	Y	8	1
	N	3	7

asthma when forced expiratory maneuvers are contraindicated. Larger studies are required to establish severity and treatment escalation thresholds and provide clearer comparisons with spirometry values.

P248 ASSESSMENT OF REPEATABILITY OF STRUCTURED LIGHT PLETHYSMOGRAPHY (SLP) TECHNIQUE COMPARED TO SPIROMETRY

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10.1136/thorax-2020-BTSabstracts.392

Introduction Structured Light Plethysmography (SLP) is a novel non-invasive, contactless technique utilising only a grid of white light and cameras to track, measure, capture Thoraco-Abdominal (TA) displacement and record quiet tidal breathing. Repeatability is used to assess the measurements from two devices for the same test subject when recorded simultaneously. Spirometry is considered to be the gold standard for measuring lung function but requires the application of forceful manoeuvres which might not be attainable by patients, and so SLP could provide an opportunity to evaluate these patients if successfully benchmarked to spirometry data.

Aim To assess the correlation between SLP recordings with simultaneous spirometry measurement of quiet tidal breathing.

Methods Quiet breathing in 14 healthy volunteers was simultaneously recorded via SLP (Thora3Di, Pneumacare Ltd) and by spirometry (Power lab 4/20, AD Instruments Ltd). Statistical analysis using Wilcoxon paired signed-rank test to assess correlation and agreement of these techniques was assessed under three different breathing conditions: Normal, Deep & Shallow. Respiratory rate (RR), inspired, expired and total breathing times were analysed (Ti, Te, Ttot) and duty cycle (Ti/Ttot) was calculated under the three different breathing conditions. There was a good correlation between the techniques under normal and deep breathing conditions. Ethical Approval for the study was approved by Science, Technology, Engineering and Mathematics Ethical Review Committee at the University of Birmingham.

Results There were only significant differences in shallow breathing measurements (Ti $P=0.0015$, Ti/Ttot $P=0.0400$) (see figure 1 A-E).

Conclusions SLP shows good correlation with spirometry for all timing indices both under normal quiet breathing as well as deep breathing but showed a significant difference in shallow breathing indicating that it is a reliable technique during normal and deep breathing. However, during shallow breathing probably due to fast breathing the movement detection was disturbed as a result of the high frequency (50–60 bpm) or could be attributed to the effects of the mouthpiece and nose clip.

P249 CHANGES IN ΔPCO2(V-A) OR PCO2 GAP IN RESPONSE TO ACUTE CHANGES IN VENTILATION

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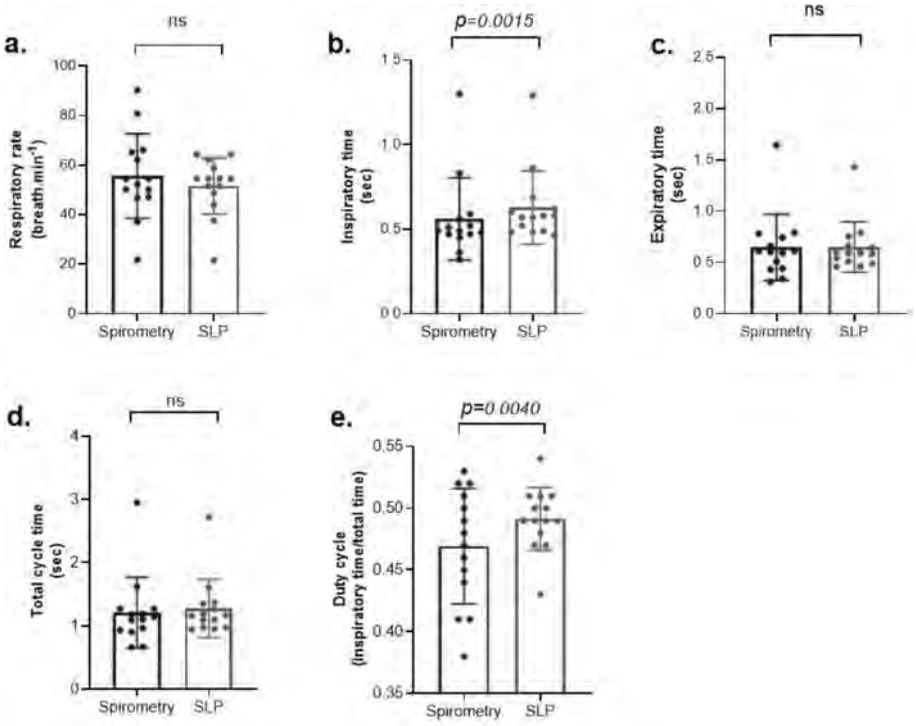
10.1136/thorax-2020-BTSabstracts.393



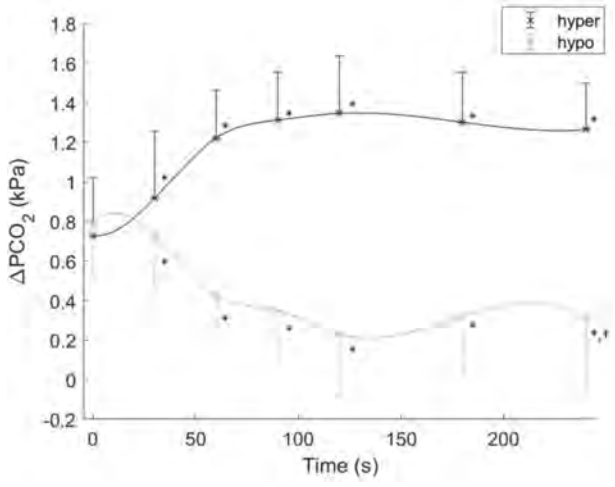
Abstract P248 Figure 1 A-E Tidal Measurements during Shallow breathing:
A Wilcoxon ranked sign test of the tidal breathing parameters (a. Respiratory rate (RR), b. Inspiratory time (TI), C. Expiratory time (Te), d. Total time (Ttot), and e. inspiratory to total time ratio (Ti/Ttot) between Spirometry and SLP recordings after participant's shallow breathing. Median IQR presented with $p<0.05$ and considered significant

Background Early diagnosis of shock is a pre-determining factor for a good prognosis in intensive care. An elevated central venous to arterial PCO_2 difference (ΔPCO_2) over 0.8 kPa (6 mmHg) is indicative of low blood flow states. Disturbances around the time of blood sampling could result in inaccurate calculations of ΔPCO_2, thereby misrepresenting the patient status. This study aimed to determine the influences of acute changes in ventilation on the ΔPCO_2.

Methods Eight pigs without cardiovascular or respiratory disease were studied. Arterial and central venous catheters were inserted following anaesthetization. Baseline ventilator settings were titrated to achieve an $EtCO_2$ of 5 ± 0.5 kPa (V_T = 8 ml/kg, Freq = 14±2 breaths per minute). Blood was sampled simultaneously from both catheters at baseline and 30, 60, 90, 120, 180 and 240 seconds after a change in ventilation. Pigs were subjected to both hyperventilation and hypoventilation, wherein the respiratory frequency was doubled or halved from baseline. ΔPCO_2 changes from baseline were analysed using Repeated Measures ANOVA with post-hoc analysis using Bonferroni's correction.

Results Response of ΔPCO_2 to acute changes in ventilation are illustrated in figure 1. ΔPCO_2 at baseline was 0.76 ± 0.29 kPa (5.7 ± 2.2 mmHg). Following hyperventilation there was a rapid increase in the ΔPCO_2, plateauing at 1.31 ± 0.24 kPa (9.75 ± 1.80 mmHg). There was a corresponding decrease in the ΔPCO_2 following hypoventilation, reaching a maximum at 0.23 ± 0.31 (1.73 ± 2.33 mmHg). These changes were statistically significant from baseline 30 seconds after the change in ventilation.

Conclusion Disturbances around the time of blood sampling can rapidly affect the PCO_2, represented here by the changes in ventilation. This leads to inaccurate calculations of the ΔPCO_2 resulting in misinterpretation of patient status, possibly affecting patient management decisions. We, therefore, advocate mindfulness when interpreting blood gases and caution with the use of these parameters while assessing patient status, especially if there is doubt as to the presence of a transient change in the patient's ventilation status.



Abstract P249 Figure 1 Change in APCO, in response to acute changes in ventilation
Changes in APCO, (kPa) in response to hyperventilation (black) and hypoventilation (grey), presented as mean (SD; one sided). N=8.
*statistically significant when compared to baseline using a Repeated Measures ANOVA and a post-hoc analysis with Bonferroni's correction (P<0.05)
†analysis done with n=7 due to an erroneous blood sample.

P250 A SIX YEAR FOLLOW UP STUDY OF PATIENTS UNDERGOING CARDIOPULMONARY EXERCISE TESTING (CPET) FOR INVESTIGATION OF UNEXPLAINED BREATHLESSNESS

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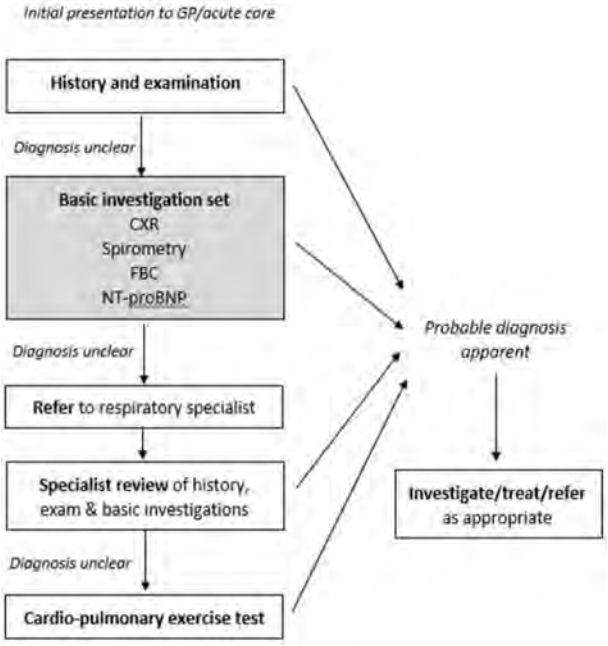
10.1136/thorax-2020-BTSabstracts.394

Introduction and Objectives Cardiopulmonary exercise testing (CPET) is a powerful diagnostic tool for investigating unexplained breathlessness. As well as diagnosing pathology, excluding harmful causes can reassure patients and help clinicians avoid over-investigation. Since 2013, Nevill Hall Hospital has offered CPET as the first line test for unexplained breathlessness if a diagnosis remains unclear after history, examination and basic clinic testing (figure 1). We have followed the cohort of 46 patients tested in 2013 to assess the impact of a 'negative' CPET on future secondary care use and the frequency of missed pathology.

Methods We retrospectively reviewed the electronic case records of all 46 patients to 31st December 2019. We collected CPET outcomes, duration of follow up, number of subsequent referrals back to secondary care for breathlessness and the number and results of subsequent specialist investigations. We examined all secondary care correspondence for subsequent diagnoses of cardiovascular or pulmonary disease, even if breathlessness was not the presenting complaint.

Results 90% (41/46) of CPETs showed no evidence of harmful pathology. Of these, just over half (24/41) showed positive evidence of dysfunctional breathing and a quarter (12/41) of



Abstract P250 Figure 1 Investigating unexplained breathlessness pathway (Nevill Hall Hospital) (>6 weeks of symptom and >5 weeks since acute chest infection)

deconditioning; 90% (37/41) were discharged within one appointment. One-third (13/41) were later either referred back to secondary care (8/41), frequented acute medical services (3/41) or accessed further specialist testing through secondary care (9/41) for the same complaint of breathlessness. Only one re-referral led to a new diagnosis (of COPD, six years after CPET) and of 29 additional investigations for the nine patients who underwent repeat testing, no additional diagnoses were found.

4% (2/41) were later diagnosed with a pathology potentially 'missed' by their CPET. One patient had a paroxysmal arrhythmia, not present at time of CPET. The second presented four months after CPET with myocardial infarction; their dysfunctional breathing pattern was so pronounced at CPET that they couldn't reach adequate levels of exercise to reveal ischaemia.

Conclusions This study provides support for use of CPET to reliably exclude harmful pathology and reassure both patients and clinicians early within a secondary care pathway for unexplained breathlessness. The diagnostic limitations of a submaximal test must be appreciated.

COVID-19: contact, admission, recruitment and outcome

P251 THE INDUCTION OF EARLY, DYNAMIC AIRWAY MUCOSAL AND SYSTEMIC IMMUNE RESPONSES FOLLOWING RECENT SARS-COV-2 HOUSEHOLD EXPOSURE

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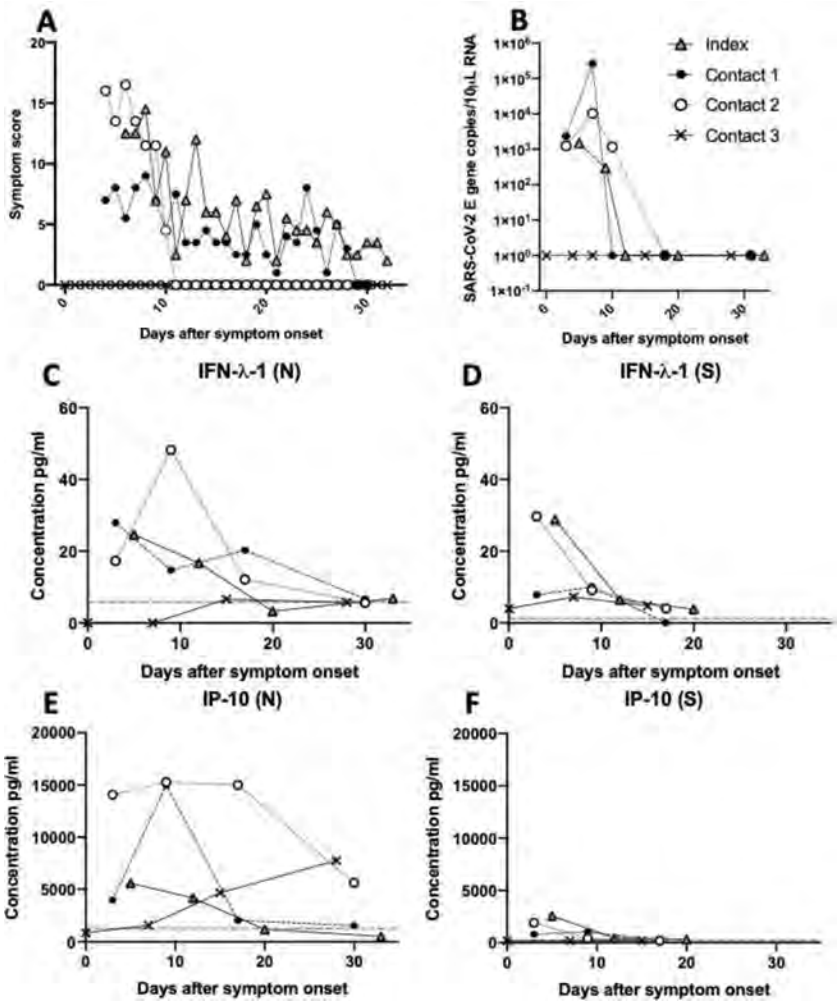
10.1136/thorax-2020-BTSabstracts.395

Objectives The wide spectrum of clinical outcomes to SARS-CoV-2 exposure suggests that early immune responses play a pivotal role.[1] We aim to describe early, longitudinal, local (nasal mucosal lining fluid) and systemic (peripheral blood) cytokine and cellular immune responses to SARS-CoV-2 in a



Abstract P251 Figure 1 Symptom score, virology, serology and nasal & serum cytokine data in the index case and their two PCR-positive household contacts since day of symptom onset at 4 timepoints across 28 days of follow up. **A.** Symptom score was calculated by allocating values for each self-reported symptom, weighted by self-reported severity, from a daily tracker; **B.** virology was measured by oropharyngeal swab RT-PCR. Samples below the detectable level were assigned value of 1; **C-F**. concentrations of 2 of the cytokines (IFNA1 and IP-10) measured in nasal lining fluid (**C & E**) and serum (**D & F**), measured by Meso Scale Discoveries U-plex assay. Grey dashed line indicates mean of healthy control values (**C&E**: n=4; **D&F**: n=5). Serum values for the fourth timepoint were not reported due to delayed sample processing.

symptomatic index case and their household contacts with detailed clinical and virological phenotyping. We hypothesise that immune responses at symptom onset would correlate with outcomes.

Methods Participants from the London area are referred to INSTINCT study by general practitioners as suspected, or Public Health England as laboratory-confirmed, cases (ethical review details: IRAS 282820, approved 24.04.2020). Households are visited the day after identification and again on days 7, 15 and 28. Clinical and exposure questionnaires, samples of environment (surface swabs and air); oropharynx (swabs); nasal mucosa (synthetic absorptive matrix) and blood, and daily symptom diaries are collected. Samples are analysed by PCR, serology, 20-plex cytokine assay and flow cytometry in institutional laboratories.

Results The index case was the first SARS-CoV-2 PCR-positive recruit of INSTINCT, confirmed on oropharyngeal swab 5 days after symptom onset. Contacts 1 and 2, the spouse and daughter, became symptomatic 2 days after the index case and were confirmed PCR-positive 3 days after symptom onset. The three PCR-positive individuals seroconverted during follow-up. Contact 3, the son, remained asymptomatic, PCR- and serology-negative throughout (figure 1a-b). None required hospitalisation. Swabs of the kettle and fridge handles were positive for virus, while other household surfaces and air samples were negative. Induction, peak and decline of interferon-λ-1 and IP-10 levels were captured in nasal mucosa, with lower serum levels (figures 1c-f).

Conclusion These data demonstrate the ability of the INSTINCT household contact study to capture early immune responses in mild SARS-CoV-2 infection, not captured by COVID-19 hospital cohort studies. Early nasal mucosal cytokine responses to SARS-CoV-2 infection are not reflected in serum. The correlations observed provide cogent hypotheses that will be tested in the larger INSTINCT cohort, with implications for COVID-19 risk stratification, therapeutics, prophylaxis and vaccinology.

REFERENCE

1. Vabret N, Britton GJ, Gruber C, *et al*. Immunology of COVID-19: Current State of the Science. *Immunity*. 2020;**52**(6):910–41.

P252 ROLE OF CHEST X-RAY IN DIAGNOSIS AND PREDICTING OUTCOME OF COVID19 INFECTION IN A DISTRICT GENERAL HOSPITAL SETTING

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10.1136/thorax-2020-BTSabstracts.396

Introduction We set out to look at the role of chest x-ray (CXR) in diagnosing novel coronavirus (Covid19) infection and to explore if it can predict clinical outcomes. We compared the chest imaging and swab results in Covid19 patients. Demographics, symptoms and CXR findings were explored as predictors of clinical outcome in COVID19 patients.

Methods All adult patients who had CXR and Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) available between March and June 2020 were included. Data was collected retrospectively from electronic case notes. CXR reported as typical or atypical COVID features[1] was considered as positive. For predictors of outcomes, regression analysis was conducted.

Results 876 patients had both CXR and RT-PCR swabs. Their mean age was 64.6 years and age range was 17 to 105 years. 324 (37%) were positive and 552 (63%) negative on RT-PCR. CXR showed typical COVID19 changes in 217 (24.8%) and atypical COVID19 changes in 148 (16.9%) patients. The sensitivity and specificity of CXR in the overall study group was 59.9% and 69% with positive predictive value (PPV) and negative predictive value (NPV) of 53.2% and 74.6% respectively. 692 patients were admitted and the sensitivity and specificity of CXR in this group was 66.9% and 65.5% with PPV and NPV of 53% and 77.4% respectively. 148 patients (16.8%) received ventilator support (27 received invasive and 121 had non-invasive ventilator support) and the sensitivity and specificity of CXR in this sub-group was 78% and 42.4% with PPV and NPV of 62.7% and 60.9%. There were 129 deaths and on multivariate regression analysis, age (> 60 years) and positive CXR remained significant risk factors for the clinical outcome (Table). In contrast to the current literature, our sample did not show gender as a risk factor to predict the outcome.

Conclusions CXR has a reasonable specificity and sensitivity for diagnosing COVID19 and it increases with the severity especially in patients needing ventilator support. CXR can be used in predicting worse clinical outcome in COVID19 pneumonia.

REFERENCE

1. BSTI COVID-19 guidance for the reporting radiologists, https://www.bsti.org.uk/covid-19-resources/

P253 ACUTE PULMONARY EMBOLI AND COVID-19

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10.1136/thorax-2020-BTSabstracts.397

Abstract P252 Table 1 Regression analysis of age, gender, presenting symptoms and CXR for clinical outcomes (death or discharged)

			Univariate			Multivariate		
	Death	Discharge	Odds ratio	95% CI	P value	Odds ratio	95% CI	P value
Age (>60 years)	113/129 (87.6%)	409/736 (55.6%)	5.145	3.097 – 8.547	<0.001	5.150	3.024 – 8.772	<0.001
Sex (Male)	72/129 (55.8%)	202/736 (27.4%)	1.314	0.903– 1.911	0.153	1.212	0.812– 1.810	0.346
Fever	52/129 (40.3%)	139/736 (18.9%)	0.842	0.576 – 1.229	0.373	0.900	0.584 – 1.385	0.631
SoB	78/129 (60.5%)	195/736 (26.5%)	1.363	0.931 – 1.997	0.112	1.235	0.803 – 1.899	0.337
Cough	52/129 (40.3%)	146/736 (19.8%)	0.773	0.529 – 1.131	0.186	0.816	0.527 – 1.264	0.363
CXR	87/129 (67.4%)	146/736 (19.8%)	3.396	2.289 – 5.039	<0.001	3.455	2.245 – 5.316	<0.001

Introduction An increased risk of pulmonary emboli (PE) has been reported in COVID-19 disease, possibly as a result of a hypercoagulable state. Superadded PE's may exacerbate respiratory failure and lead to increased morbidity and mortality. The objective of this study was to review the detection rates for PE in patients with COVID-19 undergoing CTPA scanning. Secondary objectives were to explore correlations between PE diagnosis, serum markers and radiological COVID-19 severity.

Methods A total of 325 patients had a CTPA performed between 30/03/2020–15/05/2020. Data was retrospectively collected on patient demographics, COVID-19 status, radiological severity (British Society of Thoracic Imaging classification), PE location and biochemical markers (D-Dimer, Troponin-I, CRP, Ferritin).

Results 122/325 patients were diagnosed with COVID-19 either radiologically (n=20, 16%) or by RT-PCR (n=102, 84%). The PE detection rate on imaging was significantly higher in those with COVID-19 than those without (32/122 [26%] and 27/203 [13%] respectively [p=0.005]). 617 patients were hospitalised with COVID-19 during this period (total PE incidence 5.2% [32/617]).

Radiological severity of COVID-19 lung disease was not associated with PE detection (p=0.94).

Initial quantitative D-Dimer's were significantly higher in COVID-19 patients with PE than those without (median 4390 [range 761–20,000] and 930 [range 110–20,000] respectively [p<0.001]). Higher D-Dimer levels were associated with increased PE detection rates on CT imaging (**Abstract P253 figure 1**).

COVID-19 associated PE's were more likely to be unilateral (16/32 compared to 5/27 in COVID-19 negative group [p=0.025]) and trended towards more distal vessels (p=0.09). Accounting for age, an additional PE diagnosis did not significantly affect in-hospital COVID-19 mortality (OR 1.54 [CI 0.52–3.94], [p=0.38]).

Conclusion Our results demonstrate increased detection of PE in COVID-19. Emboli are more likely to be unilateral, and more distally located. We postulate this may be due to higher rates of in-situ thrombosis rather than distant embolisation of clots. The radiological severity of COVID-19 lung disease does not appear to be strongly linked to PE detection rates which may suggest the hypercoagulable state in COVID-19 is independent from the inflammatory lung process. Patients with COVID-19 and co-existent PE's have significantly higher D-Dimer's, and further evaluation is needed into their use as a screening tool.

P254 AZITHROMYCIN MAY PLAY A ROLE IN THE MANAGEMENT OF HOSPITALISED PATIENTS WITH SUSPECTED OR PCR-PROVEN COVID-19

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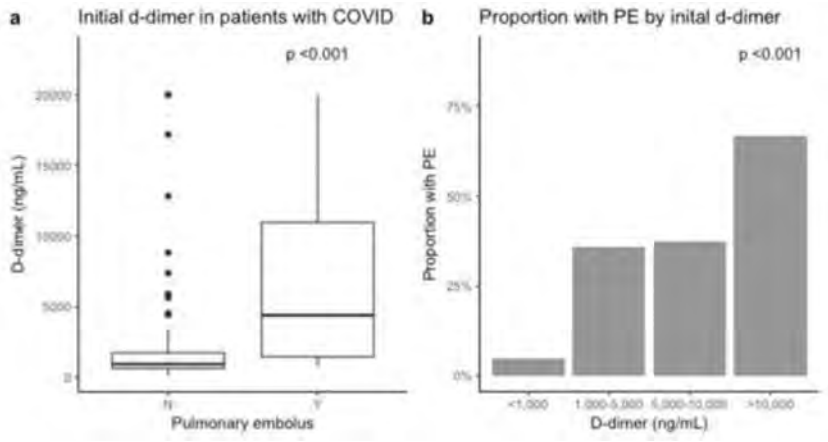
10.1136/thorax-2020-BTSabstracts.398

Background Coronavirus infection (COVID-19) typically presents with mild symptoms; however, 15% of patients develop significant illness with up to 5% overall mortality. Hence, there is an urgent and unmet need for identifying definitive pharmacological interventions. Repurposing of Azithromycin presents encouraging early findings given its anti-inflammatory properties and proven antiviral efficacy during the Ebola and Zika virus outbreaks. To date, studies are limited to using Azithromycin and Hydroxychloroquine in conjunction. Here, we present our findings on the isolated use of Azithromycin in the management of COVID-19.

Methods We performed retrospective analysis of patients admitted between 1st March and 20th June 2020 to one of the most pressurised Greater London District General Hospitals during the early stages of the pandemic. Pearson's Chi-squared test was utilised to compare mortality outcomes between two patient groups; those receiving Azithromycin (500 mg once daily, prescribed for five days) and those of a non-Azithromycin control group, comprising those with contraindication or allergy. Independent T-test analysed length of stay.

Results Overall, 628 patients were analysed (mean age 71.6; 41.9% female); 448 (71.3%) were COVID-19 PCR swab positive, and an additional 70 (11.1%) had negative PCR but positive radiology. 394 (62.7%) received Azithromycin, whilst 234 (37.3%) constituted the non-Azithromycin control group. We observed notably improved mortality rates in Azithromycin patients (41.1%; 162/394) compared to control patients (50.4%; 118/234; p=0.14). Interestingly, length of stay was



Abstract P253 Figure 1 (a): Initial D-Dimer levels in COVID-19 patients without (L) and with (R) PE diagnosis on CTPA. (b): Proportion of CTPA's diagnosing a PE at specified D-Dimer ranges

similar between Azithromycin administration (11.92±10.85) and control groups (10.82±12.30).

Conclusion To our knowledge, this is the first large-scale analysis of Azithromycin as a stand-alone pharmacological treatment of COVID-19. The combination of Hydroxychloroquine and Azithromcyin has been widely discussed, however mortality data is adversely skewed by significant antagonistic cardiac side-effects which hinders interpretation of their individual therapeutic efficacy. Our preliminary results suggest, whilst just shy of statistical significance, a short course of Azithromycin in COVID-19 patients may reduce mortality, without negatively impacting length of stay. This highlights the need for prospective validation of this data with randomised control trials; preceding this, we advocate the use of Azithromycin in clinically selected patient populations until other licensed therapies become available.

P255 FRAILTY AND SURVIVAL IN COVID-19 IN LEVEL 1 PATIENTS: THE NORTHUMBRIA EXPERIENCE

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10.1136/thorax-2020-BTSabstracts.399

Introduction There is a research gap with regards to supporting the use of CFS in the acute management Covid -19 patients. The COPE study assessed the effect of frailty on outcomes in people of all ages with COVID-19 and showed that frailty increases risk of mortality, after acounting for age and comorbidities.[1]

Method We performed a retrospective analysis of all patients with Covid-19 patients who did not require respiratory support (CPAP/BIPAP), so called 'level 1' patients. Basic demographics, co-morbidities, outcomes and Clinical Frailty Scores (CFS) were collected. All electronic notes reviewed by a COTE consultant to independently verify the CFS. Descriptive statistical methodology was applied.

Results 402 patients were identified. Median age was 78.5 (range 19–100) (IQR 16). The prevalance of frailty, defined as CFS 5–8 was 48% (n=193). Overall mortality was 27%, and mortality rate in that group was 42% (n=81). CFS had a linear relationship with CFS (figure 1).

Conclusions Our mortality rates are in line with other studies and our data supports the use of CFS in the decision making process and assessment of Covid-19 patients. Our data is limited by non-inclusion of the level 2/3 patients (this has been submitted to BTS by another author) and correction of other variables.

Abstract P255 Figure 1

REFERENCE

1. https://doi.org/10.1016/S2468-2667(20)30146-8

P256 PROGNOSTICATION IN COVID-19: A PROSPECTIVELY DERIVED AND EXTERNALLY VALIDATED RISK PREDICTION SCORE FOR IN-HOSPITAL DEATH

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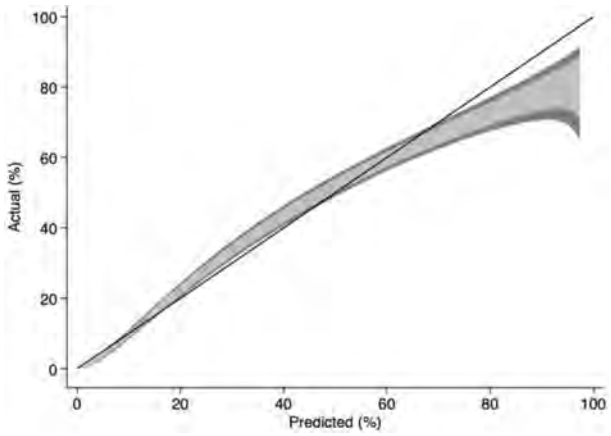
10.1136/thorax-2020-BTSabstracts.400

Introduction and Objectives The disease spectrum of COVID-19 ranges from mild viral illness to devastating lung injury that heralds the acute respiratory distress syndrome. Different risk factors of adverse outcomes have been identified but prospectively stratified and externally validated studies of prognosis are lacking. We set out to identify independent predictors of mortality and to develop and validate a clinically applicable risk prediction model of COVID-19.

Methods 983 consecutive patients with COVID-19 were prospectively recruited over an 11-week period for an outcome of in-hospital death. Multiple imputation was used to address randomly missing data. 12 independent mortality predictors were identified by multivariate regression and internally validated by bootstrapping. A prognostic score was constructed and validated in an external cohort (N=277) and assessed for predictive accuracy including goodness-of-fit by the Hosmer-Lemeshow test.

Results The median age of the derivation cohort was 70 (IQR: 53-83). Among non-survivors (29.9%; 294/983), the highest odds ratios for death (with 95% confidence intervals) were age >70 (7.65; 4.89–11.98; $P<0.001$), BMI >30 (2.39; 1.88–3.03; $P<0.001$), baseline hypoxia (2.24; 1.78–2.79; $P<0.001$), chronic kidney disease stage 5 (2.00; 1.18–3.41; $P<0.05$) and tachypnoea (1.79; 1.43–2.24; $P<0.001$). White ethnicity accounted for 85% of all non-survivors ($P<0.01$ vs. non-White ethnicities). Care home residency was associated with an increased risk of COVID-19 death on univariate analysis (OR 3.14; 95% CI: 2.28–



Abstract P256 Figure 1

4.32). A linear relationship between increasing COVID-19 severity and in-hospital mortality was derived from the development dataset. Evaluation of a risk score (ranging 1–19 points) disclosed good discriminatory ability (area under the receiver operating characteristic 0.855), sensitivity (59.7%), specificity (87.6%), positive predictive (70.2%) and negative predictive value (81.6%). Subsequent validation of the score in an age and mortality-matched independent cohort showed robust performance parameters: accuracy/AUC 0.797, calibration slope (R^2) of 0.882 (see calibration belt figure 1).

Conclusions Integration of key variables including age, indices of acute respiratory illness and comorbidities into a clinical risk score allows in-hospital death due to COVID-19 to be reliably predicted. The ability to risk stratify may help frontline clinicians in decision processes in respect of escalation and de-escalation strategies during resurgent COVID-19.

P257 USE OF VISUAL BASIC IN MICROSOFT WORD TO FACILITATE DATA COLLECTION FOR COVID-19 STUDIES

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10.1136/thorax-2020-BTSabstracts.401

Introduction There is a national target to recruit 100,000 patients with COVID-19 to the PRIEST study. Use of a research proforma to collect the required data risked Emergency Department (ED) physicians collecting this dataset at the expense of their more usual clinical history. Use of paper admission forms which could not be taken from COVID-19 'dirty' to 'clean' areas either resulted in work duplication to transcribe information written in the 'dirty' zone or potential recall error/omission when staff completed paperwork later in the 'clean' zone.

Methods The solution (in a hospital which still uses paper notes) was an electronic admissions document, completed in the dirty zone and printed out in the clean zone. The use of Visual Basic (VB) allowed insertion of scripts to automate data extraction for research and quality improvement use. Microsoft Word was preferred because of staff familiarity, combined with better data governance than cloud solutions such as Google Forms and better legibility/formatting than research data collection tools such as REDCap.

Results VB enhanced Word documents offer similar benefits for management of patients in COVID-19 treatment areas and for subsequent follow up. The electronic forms were received well by staff, as they allowed for clerking and PRIEST to happen simultaneously. Clinical staff remarked that the form also acted as a prompt when clerking, which reduced the time taken to carry out subsequent patient encounters. Research teams found the form much easier to process, as it negated the need to quarantine notes prior to assessment and allowed for data to be extracted immediately into an Excel spreadsheet.

Conclusion The use of VB not only increased staff safety, but it also allowed researchers to contemporaneously process data. Whilst a mixed paper and electronic notes system is less than perfect, the adjunct of the virtual form was well received during the COVID-19 pandemic. Future expansion of VB use as an adjunct to medical clerking will be considered and has already been piloted in the collection of data for COVID-19 patients admitted to our hospital.

P258 ASTERIX: ADAPTIVE STRATIFICATION OF COVID19 TO FACILITATE ENDOTYPE-DIRECTED INTERVENTION STUDIES

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10.1136/thorax-2020-BTSabstracts.402

Introduction and Objectives Severe coronavirus 19 disease (COVID 19) has rapidly emerged as a global health threat and, despite considerable advances, outcomes remain poor in many patients. Published data infers considerable heterogeneity, with 80% suffering minimal symptoms but a minority developing life-threatening disease. COVID 19 trials to-date have been necessarily broad but the emergence of established therapies (e.g. Dexamethasone) and distinct phenotypes (e.g. immune activated, prothrombotic) suggests that early stratification to licensed or trial agents might result in improved outcomes. The ASTERIX study aims to define disease endotypes, based on baseline biological signatures associated with COVID-19 pneumonia, development of respiratory failure and death, which could be targeted in future trials.

Methods >6,000 samples of blood, urine and respiratory secretions were collected and banked during the first wave of the COVID 19 pandemic in Glasgow. The cohort is organised into Tiers 0, 1 & 2 with each tier having an increasing number of samples available for downstream translational research. All tiers have the same associated comprehensive clinical data including comorbidity, ethnicity, blood results, imaging, prescription data and outcomes, including critical care support and survival.

Results Tier 0 contains 1,512 cases, Tier 1 (defined by having at least one surplus sample banked for downstream assays) contains ~1000 cases. Tier 2 (defined as having matched samples of serum, plasma and a buffy coat) contains 421 cases. Sample collation and data analysis is ongoing but preliminary review indicates a mortality rate of 29%, which is consistent with that reported in UK-wide COVID 19 series. The project team have made extensive links with collaborators and a scientific review board has been convened. The following projects are at various stages of approval and delivery: (1) Host Epigenomics (2) Host Proteomics (3) Host Metabolomics (4) miRNA Outcome Signatures (5) Host Respiratory Microbiome (6) COVID 19 Coagulopathy.

Conclusions Data and banked samples will be used to develop endotypes (biological signatures derived from statistical models) associated with progression to key clinical outcomes. This information will be used to identify high-risk cohorts that could be targeted in future studies testing suitable interventions, as directed by the content of each signature.

Improving diagnostics and patient responses

L1 BLOOD IMMUNE CELLS CLOCK MECHANISM IS ALTERED IN ASTHMA, WITH A TIME-OF-DAY DEPENDENT RESPONSE TO STEROIDS IN VITRO

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10.1136/thorax-2020-BTSabstracts.403

Asthma is a rhythmic disease, with symptoms, airway physiology and inflammation showing strong time-of-day differences. Biological rhythms in our bodies (circadian rhythms) occur through the action of clock genes, present in most cell types, including immune cell. Chronotherapy is administering a treatment at the most efficacious time of day. Previous studies suggest that 4:00pm is the most efficacious time of day for steroid administration in asthma.[1]

Objectives

1. To determine if peripheral clocks in blood immune cells (PBMCs) differ in asthma compared to healthy.
2. To determine if (PBMCs respond differently to steroids (dexamethasone, DEX), by time of day in asthma compared to healthy.

10 adults with mild/moderate asthma on regular ICS and 10 healthy individuals were studied overnight. Whole blood samples were collected at 9:00am, 4:00pm, 9:00pm and 4:00amand qPCRused to quantify clock gene expression (*PER2)*. PBMCs extracted at 4:00pm and 4:00am, plated and cultured for 4 hours with either DEX alone, Lipopolysaccharide (LPS) or LPS with DEX. Supernatant was collected and analysed for cytokines using a Luminex 34-plex panel.

Expression of *PER2* was significantly different between asthma and healthy ($p<0.05$), with increased PER2 expression at 9:00pm, 2.7-fold in healthy and 11.3-fold in asthma ($p<0.01$), (figure 1a).

IL-6 expression increased following treatment with LPS by 356-fold at 4:00pm and 757-fold at 4:00am. Following combined LPS and DEX treatment mean differences in IL-6 expression were54-fold and 256-fold recorded at 4:00pm and 4:00am respectively, (figure 1b).

This is the first time that clock gene expression has been measured in whole blood in asthma. Differences in expression of *PER2* between asthma and health, suggest alteration in the clock mechanism in immune cells in asthma.

Preliminary luminex data of *IL-6* expression, presents an exciting possibility of a time-of-day dependent response to steroids *in vitro*. Further cytokine analysis will provide an insight on a mechanism behind changes in steroid efficacy and reveal possible pathways and chronotherapy targets which could be used in the clinic.

REFERENCE

1. Pincus DJ, *et al*. Chronotherapy of asthma with inhaled steroids: The effect of dosage timing on drug efficacy. *Journal of Allergy and Clinical Immunology* 1995. **95**(6): p. 1172–1178.

L2 ACCELERATING COVID-19 DIFFERENTIAL DIAGNOSIS WITH EXPLAINABLE ULTRASOUND IMAGE ANALYSIS: AN AI TOOL

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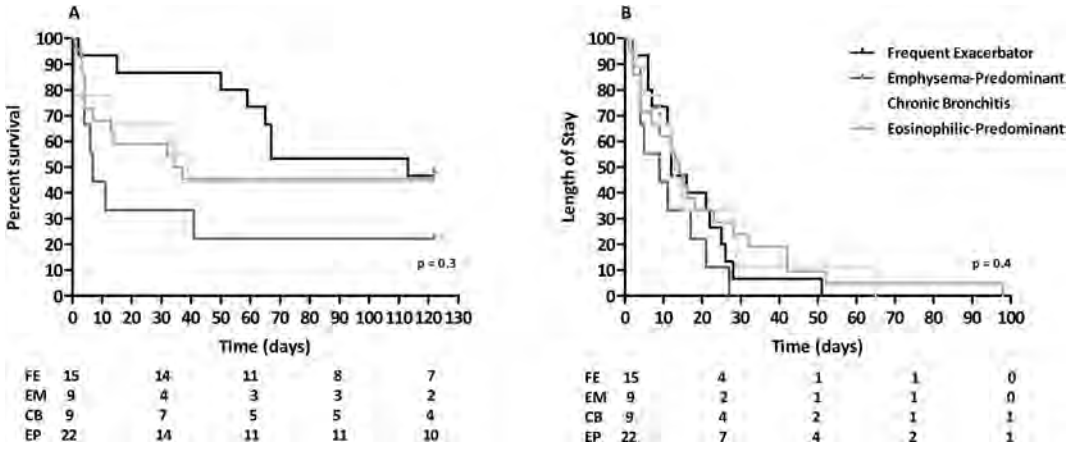
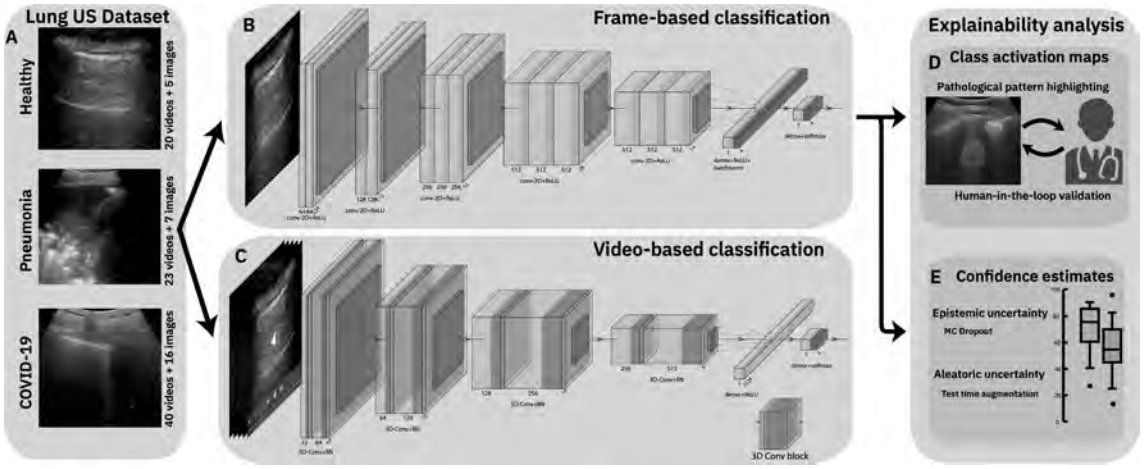
10.1136/thorax-2020-BTSabstracts.404

Introduction Care during the COVID-19 pandemic hinges upon the existence of fast, safe, and highly sensitive diagnostic tools. Ultrasound has practical advantages over other radio-logical modalities and can serve as a globally-available first-line examination technique. However, the specific LUS patterns such as B-lines or subpleural irregularities can be hard to discern, calling into play AI-based image analysis as a support tool for physicians.

Methods A LUS dataset of patients with COVID-19, bacterial pneumonias, non-COVID-19 viral pneumonia and healthy volunteers was constructed to assess the value of deep learning methods for the differential diagnosis of COVID-19. We



Abstract L1 Figure 1 (A) Gene expression of core clock gene PER2. Values expressed as fold change (RQ), normalised to RN18s at 9:00am time point. Measurements taken from whole blood samples from healthy subjects (n=10) and asthma patients (n=10), collected at time 4 points. Lines represent means for each time point. (B) Expression of IL-6 in PBMCs from asthma patients (n=5) cultured with DEX and LPS. Values expressed as fold change, normalised to control well. Lines represent mean values and SD.
t-test ** = p<0.01, t-test. + = p<0.05, 2-way ANOVA



Abstract L2 Figure 1

hypothesized that a frame-based convolutional neural network would correctly classify COVID-19 LUS with a high sensitivity and specificity.

Results 202 LUS videos were analysed. The frame-based convolutional neural network correctly classified COVID-19 with a sensitivity of 0.90 ± 0.08 and a specificity of 0.96 ± 0.04 (frame-based sensitivity 0.88 ± 0.07, specificity 0.94±0.05). We further employed class activation maps for the spatio-temporal localization of pulmonary biomarkers, which we subsequently validated for human-in-the-loop scenarios in a blindfolded study with medical experts. Aiming for scalability and robustness, we also performed ablation studies comparing mobile friendly, frame- and video-based architectures and show reliability of the best model by aleatoric and epistemic uncertainty estimates. We validated our model on an independent test dataset of 39 videos with COVID-19 severity scores and report promising performance (sensitivity 0.806, specificity 0.962). Figure 1 shows the flowchart.

Conclusion Our work shows the potential of interpretable AI to serve as a decision support system for diagnosis and thereby provide an accessible and efficient screening method. Further clinical validation of the proposed method is underway. Data and code are publicly available at https://github.com/jannisborn/covid19_pocus_ultrasound

L3 STRUCTURAL AND FUNCTIONAL PROTON MRI ASSESSMENT OF CYSTIC FIBROSIS LUNG DISEASE IN PEOPLE WITH F508-DEL MUTATION

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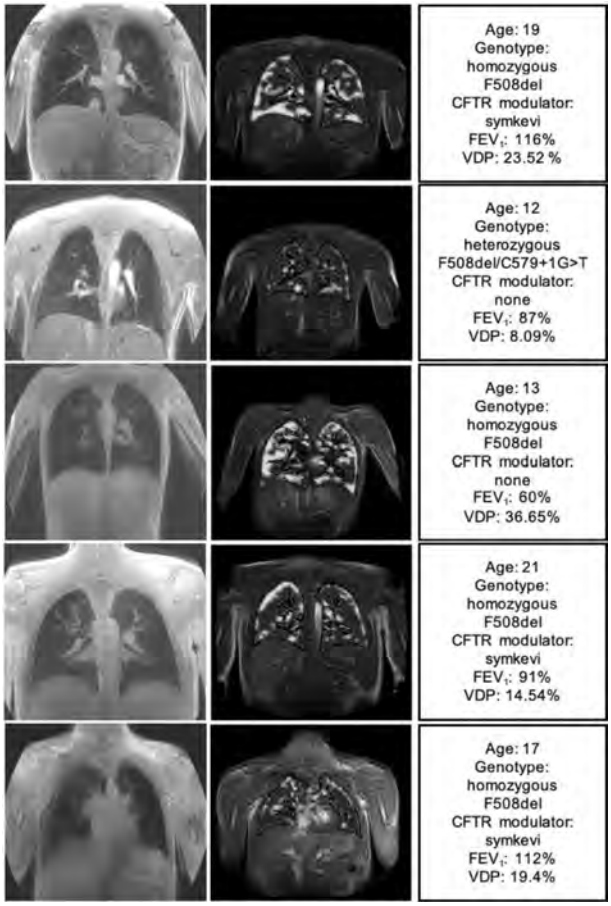
10.1136/thorax-2020-BTSabstracts.405

Introduction Newer proton MRI methods may be complementary to conventional respiratory diagnostics like computed tomography (CT) and spirometry. Non-contrast Ultrashort Echo Time (UTE) MRI acquires high resolution structural images, comparable to CT, and gradient-echo combined with phase-resolved functional lung (PREFUL) processing methods can produce spatial assessments of lung function. The need for such MRI methods is exemplified by cystic fibrosis (CF), where rapid development of novel therapeutics demands an equivalent change in our ability to monitor lung disease.



Abstract L3 Figure 1 UTE (left) and PREFUL (right) images from five people with CF. PREFUL MRI shows areas of normal ventilation (green) and ventilation defect (purple).

Aim To evaluate lung structure and function using UTE and PREFUL MRI methods in people with CF with at least one F508-del mutation pre-Trikafta therapy.

Methods 5 people with CF (12–21 years; n=4 homozygous F508-del; n=3 on Symkevi) underwent a single MRI scanning session performed on a 3T Philips Ingenia scanner. UTE-MRI was collected during a 10-second breath-hold (n=2) or free breathing with a respiratory-gated acquisition (n=3). PREFUL-MRI was performed using a continuous single coronal slice Fast Field Echo acquisition during 2 minutes of free breathing (n=5).

PREFUL analysis was performed using a semiautomated k-means segmentation algorithm in MATLAB. [1] A region of interest (ROI) at the diaphragm was defined, images with extremes of signal intensity were removed and those remaining sorted into a sinusoidal pattern of signal intensity within the ROI. Thoracic masking and a pulmonary vessel filter were applied followed by k-means clustering analysis to demonstrate normal ventilation and ventilation defect. Ventilation defect percentage (VDP) was calculated by dividing the ventilation defect volume by the lung mask volume.

Results MRI scanning was well-tolerated and both UTE and PREFUL acquisitions were completed in all participants. VDP values ranged from 8.09–36.65%, with the individual with the lowest FEV_1 having the highest VDP (figure 1).

Discussion Our findings demonstrate the feasibility of combined structural and functional lung MRI assessment in people with CF. These non-contrast approaches do not require additional specialised equipment, such as hyperpolarised gas, and could be obtained using standard clinical MRI scanners. In the future, functional lung MRI may facilitate longitudinal assessment of response to disease modifying therapies, such as CFTR modulators.

REFERENCE

1. Couch, *et al*. *Academic Radiology* 2020. doi:10.1016/j.acra.2020.05.008.

L4 A REVIEW OF RADIOLOGY REPORTING TO DATE IN THE YORKSHIRE LUNG SCREENING TRIAL

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10.1136/thorax-2020-BTSabstracts.406

Introduction and Objectives Radiology reporting of low-dose CT (LDCT) scans is a key component of any lung cancer screening (LCS) programme. We reviewed data relating to reporting in the Yorkshire Lung Screening Trial (YLST), an ongoing LCS trial.

Methods In YLST, baseline LDCT scans are reported by one of eight thoracic radiologists and assigned an overall category: negative; indeterminate (pulmonary nodule requiring surveillance); or, positive for lung cancer. In addition, scans can be flagged as having a clinically significant incidental finding. Reporting radiologists for YLST do not have access to previous imaging at the time of initial read.

We collated data from all baseline YLST scans to date. The number of scans assigned to each category, including incidental findings, was assessed both overall and by reporting radiologist. We reviewed the conclusions from screening review meetings (SRMs) where all indeterminate, positive, or incidental findings are re-evaluated (alongside any previous imaging) by a radiologist and a respiratory physician.

Abstract L4 Table 1

		Initial radiologist categorisation			
Final screening categorisation (after SRM)		**Negative**	**Indeterminate**	**Positive**	**Total**
	Negative	4030 (99%)	448 (40%)	55 (18%)	4533 (82%)
	Indeterminate	58 (1%)	657 (59%)	143 (46%)	858 (16%)
	Positive	5 (0%)	13 (1%)	111 (36%)	129 (2%)
	Total	4093 (100%)	1118 (100%)	309 (100%)	5520 (100%)

Results In total 5520 baseline LDCT scans were reported from November 2018 until October 2020, a mean of 690 per radiologist (range 607–744). Overall, 4093 (74%) scans were reported as negative (range between radiologists 64–80%), 1118 (20%) indeterminate (range between radiologists 9–30%), and 309 (6%) positive (range between radiologists 3–12%).

The categorisation of scans before and after review in SRM is outlined in table 1.

Of 1427 scans initially reported as either indeterminate or positive, the SRM conclusion was negative for 503 (35%), with 192 (38%) downgraded on the basis of previous imaging.

Overall 1087 (20%) scans were reported with an incidental finding (range between radiologists 10–34%). Following review in SRM, 782 (72%) of the incidental findings did not lead to any additional action. This decision was based on review of old imaging in 254 cases (32%).

Conclusions The categorisation of scans as negative was reasonably consistent between radiologists with greater variation in the frequency of reporting incidental findings. Review in a SRM often resulted in re-classification of scans, with some (but not all) of this reduction related to availability of previous imaging.

This work was funded by Yorkshire Cancer Research (L403/L403B).

L5 PREVALENCE OF PULMONARY CYSTS IN PATIENTS WITH RENAL CELL CARCINOMA AS A DIAGNOSTIC INDICATOR OF BIRT–HOGG–DUBÉ SYNDROME

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10.1136/thorax-2020-BTSabstracts.407

Introduction and Objectives Birt–Hogg–Dubé (BHD) syndrome is an autosomal dominant condition characterised by skin fibrofolliculoma, lung cysts, spontaneous pneumothorax and increased risk of renal cell carcinoma (RCC). The thoracic

radiological features of BHD vary from solitary to multiple lung cysts with a lower zone and peripheral predominance. The purpose of our study was to evaluate the presence of pulmonary cysts on computed tomography (CT) in patients who underwent nephrectomy for RCC and integrate these findings with the established European BHD Consortium criteria to identify those patients with a potential diagnosis of BHD.

Methods We retrospectively reviewed chest CT imaging and hospital records from the last 6 years of patients who had been diagnosed with RCC and treated with nephrectomy. We investigated if the patients fulfilled the BHD consortium criteria (1 major criteria: genetically confirmed Folliculin germline mutation, or two minor criteria: presence of multiple/lower zone predominant lung cysts on CT, and either age <50 years-old at diagnosis of RCC, multiple/bilateral RCC, or particular RCC histology).

Results In our cohort of 1288 patients with RCC, 120 (9.3%, age at time of diagnosis 61±11 years, M:F 88:32) were found to have at least one pulmonary cyst. Of these, 48 (3.7%) had multiple/lower zone predominant cysts. Twenty-seven patients (2.1%) fulfilled the BHD consortium criteria: three cases had genetically confirmed BHD, while 24 patients (1.9%) met at least two minor criteria. Genetic evaluation in patients with suspicious imaging appearance of BHD is in progress. Twenty-eight patients had died at the time of data collection, and of these 15 had cysts in a lower zone distribution.

Conclusion Although BHD remains a rare condition, understanding the association of varying radiological and clinical features can provide an opportunity for improving its detection. Our findings suggest the potential need for a dedicated pathway for RCC patients with incidental lung cysts, where they may benefit from referral for genetic workup and/or multidisciplinary teammeeting review. The implications of a diagnosis of BHD are numerous, including genetic counselling for the patient and their family, regular imaging follow-up and potential lifestyle modifications due to the increased risk of pneumothorax.

L6 ENVIRONMENTAL CORRELATES OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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10.1136/thorax-2020-BTSabstracts.408

Introduction and Objectives Physical activity predicts important health outcomes in chronic obstructive pulmonary disease (COPD), and is recognised as a therapeutic treatment that is recommended in current disease management guidelines. Environmental factors have the potential to influence physical activity, however, there are limited data in this clinical population. Therefore, the objective of the present study is to investigate both atmospheric and physical environmental correlates of physical activity and sedentary behaviour in individuals with COPD.

Methods Socio-demographic and behavioural data were collected from a prospective cohort of 418 individuals with COPD (65% female; 58 ± 8 years). Physical activity behaviour was captured using the International Physical Activity Questionnaire, while sitting time was used as a measure of sedentary behaviour. Environmental data was drawn from a national environmental data repository and individually matched to each participant's postal code. Environmental variables included social and material deprivation, urban form index, surrounding greenness, and air quality (concentrations of air pollution for fine particles; nitrogen dioxide; ozone; and sulphur dioxide). Logistic and multivariate linear regression models were used to investigate the strongest environmental predictors of physical activity and sedentary behaviour, respectively.

Results In the models, a statistically significant correlation was shown between physical activity level and ozone pollution (p = 0.023; Adjusted OR = 0.85; 95%CI = 0.74–0.98). Indicating, that a higher level of physical activity was associated with a lower level of ozone pollution in the environment. Urban form index was significantly associated with sitting time per day (beta = 0.113; t-value = 1.71; p = 0.011). Suggesting, that those living in less urban environments spend less time sedentary. 'Self-rated health' of the participants was positively correlated with physical activity level (p = 0.006; Adjusted OR = 2.22; 95%CI = 1.25–3.94), and inversely correlated with sitting time per day (beta = -0.159; t-value = -2.42; p = 0.016).

Conclusions Physical activity is a complex behaviour influenced by a combination of individual, sociocultural, and environmental factors. Clinicians may wish to consider the individual's environment in the discussion and prescription of physical activity/exercise; particularly when hospital based, face-to-face, pulmonary rehabilitation is not possible.

COVID-19: impact on respiratory health

L7 IMPACT OF NATIONAL LOCKDOWN FOR SARS-COV-2 PANDEMIC ON INCIDENT TUBERCULOSIS AND TRANSMISSION

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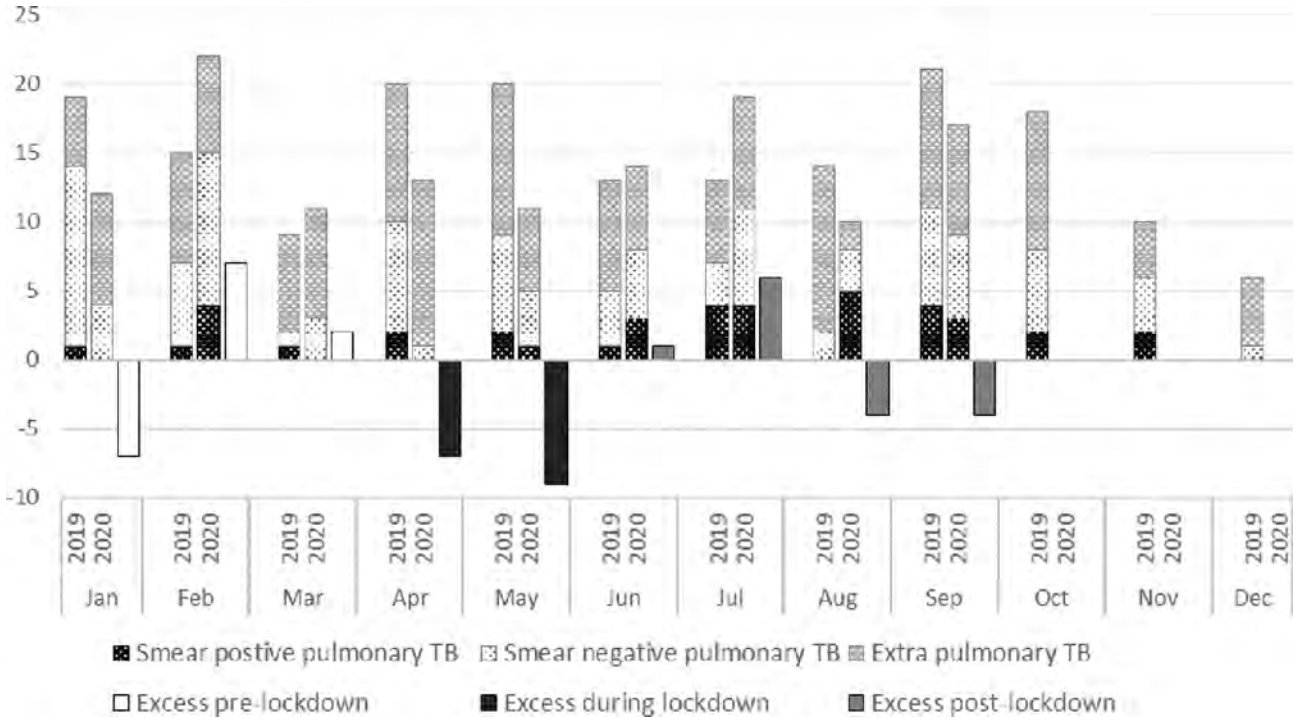
10.1136/thorax-2020-BTSabstracts.409

Introduction The nationwide lockdown for COVID-19 and ongoing mitigation measures are having a significant impact on healthcare delivery for other disease including tuberculosis (TB). Leicester has faced a particularly prolonged period of disruption after imposition of local lockdown measures within 7 weeks of the national lockdown.

Objectives To evaluate the impact of the national lockdown and post-lockdown periods on tuberculosis presentation and transmission in Leicester, UK.

Methods We performed retrospective analysis of all notified tuberculosis cases and their contacts comparing the pre-lockdown period (January 2019 – March 2020) with lockdown and post-lockdown periods (April –Sept 2020). AFB smear status, Xpert DNA load, culture status, time to culture positivity, CXR severity scores, hospital admission rate and proportion of screened contacts identified with latent tuberculosis infection (LTBI) were reviewed. Data was extracted from hospital systems. Statistical analyses used SPSS (v.26).

Results 307 index cases (146 pulmonary) and 460 family contacts of pulmonary TB were included for analysis. Overall, TB incidence in 2020 has been lower than 2019 (144 vs. 129 cases from Jan – Sept). There has been a marked fall in cases during the lockdown with no comparable rebound increase



Abstract L7 Figure 1 Monthly incidence of tuberculosis. The third bar shows the monthly excess incidence (the number of incidents over and under compared to 2019)

post-lockdown (figure 1). Comparing the pre-lockdown period with the period since lockdown, there has been a non-significant increase in duration of symptoms before diagnosis (15.7 vs. 17.7 weeks, p=0.81) and fall in hospital admission rate (47.6% vs. 33.3%, p=0.117). For pulmonary TB, there has been a significantly higher proportion with smear positive disease (24.2% vs. 42.1%, p=0.040) and a higher proportion with microbiological confirmation of disease (by culture: 73.7% vs. 81.1%; by Xpert: 77.5% vs. 91.4%). However, the time to culture positivity and CXR disease burden are comparable before and after the lockdown. There has been a mean reduction of 0.5 persons per index case requiring contact screening (4.4 vs. 3.9) and no change in the proportion identified with LTBI (29%).

Conclusions The impact of lockdown measures on TB remains unclear. Early data here suggests presentation of more infectious cases. However, fewer active TB have been diagnosed since the lockdown, raising the possibility of an increasing undiagnosed burden of TB in the community.

L8 ASTHMA DEATHS IN SCOTLAND DURING THE FIRST PEAK OF COVID-19: DID REDUCED HOSPITAL ADMISSION RESULT IN EXCESS ASTHMA MORTALITY?

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10.1136/thorax-2020-BTSabstracts.410

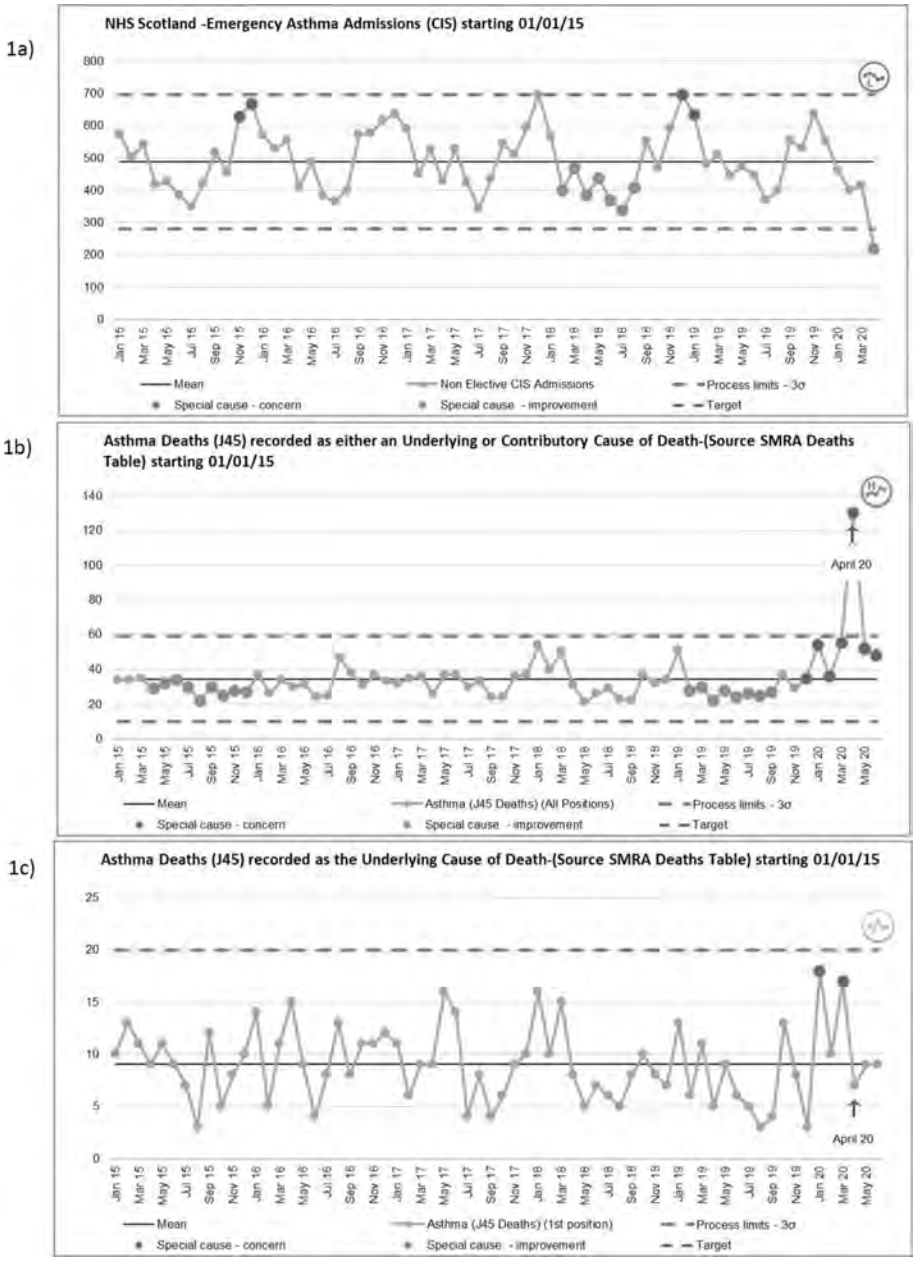
Introduction During the first wave of the COVID-19 pandemic in the UK there was a reduction in A&E attendances and hospital admissions. Monthly excess deaths peaked in April 2020; driven by COVID-19.[1] We investigated whether hospital admissions due to asthma were reduced in April 2020 compared to the previous five years and if this was accompanied by an increase in asthma deaths.

Methods Five-year data were obtained from Public Health Scotland from the time period January 2015 to June 2020. Hospital admission data was sourced from Public Health Scotland's Scottish Morbidity Records, death certificate data from National Records of Scotland and A&E attendance data from Public Health Scotland. Data were analysed using statistical process control charts.

Results A&E presentations in April 2020 reduced to 44% of April 2019. Hospital admissions for all conditions reduced, as did asthma admissions (figure 1a) [218 in April 2020 versus previous 5 year mean of 418]. 7958 deaths occurred in April 2020; an excess of 2731 from previous 5-year mean. In 130 deaths asthma was recorded on the death certificate as either the underlying or the contributory cause, giving rise to around 100 apparent excess deaths versus the previous 5-year mean of 27.5 (figure 1b). Asthma was recorded as the underlying cause of death in 7 cases, comparable with the previous 5 year mean of 9.2 deaths (figure 1c).

The age distribution of those with asthma on the death certificate was: 97 ≥65, 27 aged 45–65, 6 aged 18–44 and 0 <18 years. Of the 123 patients with asthma recorded as a contributory cause, 81 had COVID-19 recorded as the underlying cause of death. All 7 patients with asthma recorded as underlying cause of death were elderly and the location of death was: 3 at home, 2 in residential care, 1 in hospital and 1 in a hospice.

Conclusions Reduced acute healthcare utilisation by people with asthma during the first peak of COVID-19 did not appear to result in increased mortality where asthma was the primary underlying cause of death.



Abstract L8 Figure 1 Statistical Process charts of: 1a) Emergency Asthma Admissions from January 2015 to April 2020. 1b) Deaths with Asthma Recorded as underlying or Contrubutory Cause of Death on Death Certificate January 2015 to June 2020. 1c) Deaths with Asthma Recorded as underlying or contributory Cause of Death on Death Certificate January 15 to June 2020

REFERENCE

1. Scottish Government. COVID-19 in Scotland 2020 [04 November 2020]. Available from: https://data.gov.scot/coronavirus-covid-19/index.html.

L9 COVID-19 AND RESPIRATORY DEPARTMENTS IN ENGLAND: A NATIONAL SURVEY

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10.1136/thorax-2020-BTSabstracts.411

Introduction We developed a national survey to capture how respiratory departments in England adapted during the first wave of the COVID-19 pandemic and to develop lessons which can be applied to subsequent planning.

Methods A link to the online survey, hosted on a secure platform in an NHS England and Improvement account, was sent by email to all NHS trusts in England with known respiratory departments. The survey was open for 43 days during August and September 2020. The survey included sections on COVID patient numbers, bed capacity, workforce, delivery of respiratory support, equipment, diagnostic and interventional services, and follow-up for patients discharged.

Results 58 (43.9%) responses were received. *Workforce* – 42 sites (72.4%) changed their respiratory consultant rota, for example, by changing to 12 hours shifts and overnight resident on calls. 24 sites (41.4%) stated that respiratory consultants had been removed from the general medical rota. *Respiratory Support* - CPAP was used in a variety of clinical environments including closed bays (in 36 sites) and closed

wards (19 sites), and was primarily used as a bridge to ventilation (46 sites), to prevent intubation (48 sites) and as a ceiling of care (47 sites). *Equipment* – 28 (48.3%) of units reported a shortage of at least one respiratory medical consumable (most commonly non-vented NIV masks (16 units) and CPAP machines (12 units)). *Diagnostic and interventional services* - Bronchoscopy and EBUS services were suspended in 16 (27.6%) and 10 (17.2%) sites respectively and continued for cancer patients only in 24 (41.4%) and 27 (46.6%) sites respectively. *Follow up* - 12 units (20.7%) did not offer follow up to patients with COVID related pneumonia at 6 weeks.

Conclusion This national survey shows the significant changes made, and challenges faced, by respiratory departments during the first wave of the COVID-19 pandemic. We identified some areas where there were deviations from best practice and some positive changes that should be continued. The lessons drawn from the survey results can assist in future COVID-19 planning.

L10 RAPID DESIGN AND IMPLEMENTATION OF A PERSONALISED HOLISTIC POST-COVID RECOVERY AND REHAB APP

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10.1136/thorax-2020-BTSabstracts.412

Background Many patients with SARS-CoV-2 infection are reporting long lasting symptoms, requiring holistic multi-disciplinary rehabilitation; however, there are severe capacity restraints in rehabilitation services. We report on the development and initial experience of a digitally-enabled remote, supported rehabilitation programme: '*Covid Recovery*' from UCLP/Living With.

Methods *Covid Recovery* includes: (i) a clinical pathway; (ii) an app delivering physiotherapy, dietetic and psychology education and treatments for common symptoms (breathlessness, fatigue, anxiety) plus validated Patient-Reported Outcome Measures (PROMS); and (iii) a digital dashboard for clinicians to monitor patient activity and progress. A two-way messaging function allows personalisation of advice.

Results In the first 3 months, 66 patients with diverse demographics have been registered on the App: mean (range) age 54 years (23–78 years); 33 female; 19 Black/Asian ethnicity, 38 White/Caucasian ethnicity, remainder not stated/other. Amongst patients registered on the App for at least one week, patients undertake a mean average 7.0 actions per week covering 'recording weight', 'completing a PROM – FACIT-F, Covid Recovery, GAD-7, MRC Breathlessness, D-12', 'tracking exercise', and finishing a ''fatigue diary'. Overall on average each patient has read 11 articles, and 1 in 2 patients are creating and tracking a goal. Weekly review takes 2 – 3 minutes per patient.

Example Case: A 47-year-old male joined the App following primary care managed Covid-19 but with residual symptoms at 12 weeks. In 77 days of using the App, he logged 97 activities including 15 messages on the two-way platform. Clinician support focused on managing breathlessness and fatigue symptoms whilst returning to exercise. Significant improvement was identified across the outcome measures for both physical and mental health in conjunction with an increase in exercise activity and intensity (see figure 1).

Discussion Patients recovering from Covid-19 report multiple and variable symptoms. *Covid Recovery* provides specialist services in a personalised manner, supporting patients through their rehabilitation and recovery journey, enabling them to feel seen, heard and believed.

L11 SARS-COV-2: SURVIVAL AND LENGTH OF STAY IN COPD PHENOTYPES

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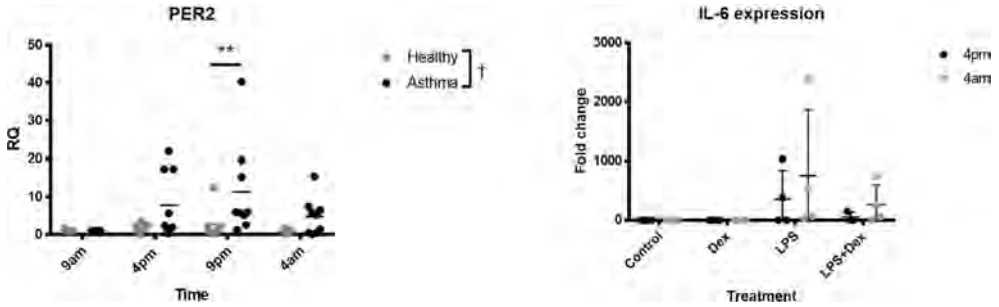
10.1136/thorax-2020-BTSabstracts.413

Introduction and objectives Individuals with Chronic Obstructive Pulmonary Disease (COPD) have increased risk of severe pneumonia and poor outcomes when they develop severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Hoffmann 2020). We hypothesised that there would be a difference in survival and length of stay between COPD

Abstract L10 Figure 1 Example patient FACIT-Fatigue outcomes



Abstract L11 Figure 1 Kaplan-Meier curve of survival and length of stay for COPD phenotypes
Panel A. Survival
A log rank test was run to determine if there were differences in the survival distribution for the different COPD phenotypes: Frequent Exacerbator, Emphysema, Chronic Bronchitis and Eosinophilic. The survival distributions for the four phenotypes were not statistically significantly different, X2 (2) = 3.9, p=0.3. There was a statistically significant difference in median survival between emphysema-predominant (113 days) vs Frequent Exacerbator (7 days) Odds Ratio 16.1 (95% CI 15.to 16.5); X2 (1) = 4.8, p=0.03. There was no statistically significant difference between Emphysema-Predominant and the other COPD phenotypes.
Panel B. length of Stay
A log rank test was run to determine if there were differences in the length of stay distribution for the different COPD phenotypes: Frequent Exacerbator, Emphysema, Chronic Bronchitis and Eosinophilic. The survival distributions for the four phenotypes were not statistically significantly different, X2 (2) = 3.0, p=0.4.
Abbreviations: FE - Frequent Exacerbator; EM - Emphysema-Predominant;CB - Chronic Bronchitis; EP-Eosinophilic-Predominant

phenotypes with SARS-CoV-2 infections requiring hospital admission.

Methods Observational retrospective analysis of individuals admitted to a teaching hospital was performed on during the first peak of the SARS-CoV-2 pandemic (1st March to 30th June 2020). Individuals with COPD were identified and grouped into phenotypes; frequent exacerbators (≥2 severe exacerbations in the last 12 months), emphysema-predominant, chronic bronchitis (cough and sputum production) and eosinophilic-predominant (plasma eosinophil count ≥ 300 cells/μL). Overall survival and length of stay for all phenotypes was compared using Kaplan-Meier methodology.

Results 508 individuals were admitted to hospital with SARS-CoV-2 infection during this time period. 55 (11%) of these individuals had a diagnosis of COPD. Survival was significantly lower in all individuals with SARS-CoV-2 infection (34%) compared to individuals with SARS-CoV-2 infection and co-existing COPD (58%) (p = 0.0003). There was no difference between baseline characteristics (age, gender and smoking status) between all COPD phenotypes. There was no significant difference in survival between all 4 phenotypes; median survival for frequent exacerbators, emphysema-predominant, chronic bronchitis and eosinophilia-predominant (113 vs 7 vs 39 vs 36 respectively), X2 (2) = 3.9, p = 0.3; figure 1A. There was no difference in length of stay between all commers 13 days and individuals with COPD 12.5 days (p = 1.0). There was no significant difference in length of stay between all 4 phenotypes; median length of stay for frequent exacerbators, emphysema-predominant, chronic bronchitis and eosinophilia-predominant (12 vs 9 vs 13 vs 14 respectively), X2 (2) = 3.0, p = 0.4; figure 1B.

Conclusions These data do not support the hypothesis that COPD phenotype would result in a difference in a difference in survival and length of stay. Further study should investigate factors which predict survival of SARS-CoV-2 infection in individuals with co-existent COPD in a larger population.

L12 TO WHAT EXTENT ARE SOCIAL DETERMINANTS OF HEALTH, INCLUDING HOUSEHOLD OVERCROWDING, AIR POLLUTION AND HOUSING QUALITY DEPRIVATION, MODULATORS OF PRESENTATION, ITU ADMISSION AND OUTCOMES AMONG PATIENTS WITH SARS-COV-2 INFECTION IN AN URBAN CATCHMENT AREA IN BIRMINGHAM, UNITED KINGDOM?

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Background Internationally, researchers have called for evidence to support tackling health inequalities during the COVID19 pandemic. UK Office for National Statistics data suggests that patients in regions of most deprived overall Index of Multiple Deprivation Score (IMDS) are twice as likely to die of COVID19 than other causes. The Intensive Care National Audit and Research Centre (ICNARC) report that Black, Asian and Minority Ethnic (BAME) patients account for 34% of critically ill COVID19 patients nationally despite constituting 14% of the population. This paper is the first to explore the roles of social determinants of health, including specific IMDS sub-indices with indicators for household overcrowding deprivation (Barriers to Housing and Services subindex (BHS)), indoor housing quality deprivation and outdoor air pollution deprivation (Living Environment subindex (LE)) as modulators of presentation, Intensive Care Unit (ITU) admission and outcomes among COVID19 patients of all ethnicities.

Methods An in-depth retrospective cohort study of 408 hospitalised COVID19 patients admitted to Queen Elizabeth Hospital, Birmingham was conducted. Quantitative data analyses including two-step cluster analyses were applied.

Results Patients admitted from highest LE deprivation sub-indices were at increased risk of presenting with multi-lobar

pneumonia and, in turn, ITU admission. Patients admitted from highest BHS deprivation sub-indices were at increased risk of ITU admission. BAME patients were more likely, than white patients, to present with multi-lobar pneumonia, be admitted to ITU and be admitted from highest BHS and LE deprivation indices. Comorbidities and frailty significantly increased the risk of death among COVID19 patients irrespective of deprivation.

Conclusions Air pollution and housing quality deprivation are potential modulators of presentation with multi-lobar pneumonia. Household overcrowding deprivation and presentation with multi-lobar pneumonia are potential modulators of ITU admission. Patents of BAME ethnicity are more likely to be admitted from regions of highest air pollution, housing quality and household overcrowding deprivation; this is likely to contribute an explanation towards the higher ITU admissions reported among COVID19 BAME patients. Consideration of Charlson Comorbidity and Clinical Frailty Scores on admission supports clinicians in stratifying high risk patients. These findings have urgent implications for supporting front line clinical decisions, disseminating practical advice around applying social distancing messages at the household level and informing wider pandemic strategy.

This study has been cited by several national and international public bodies including Public Health England and UK Parliament as evidence to support the COVID19 strategic response.

Declarations of interest

S22 RATE OF SEVERE COPD EXACERBATIONS WITH BUDESONIDE/GLYCOPYRRONIUM/FORMOTEROL FUMARATE DIHYDRATE METERED DOSE INHALER (BGF MDI) VERSUS DUAL THERAPIES: A POST-HOC SUBGROUP ANALYSIS OF THE ETHOS TRIAL

This study was funded by AstraZeneca.

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S63 IVACAFTOR IN 4- TO <6-MONTH-OLD INFANTS WITH CYSTIC FIBROSIS AND A GATING MUTATION: RESULTS OF A 2-PART, SINGLE-ARM, PHASE 3 STUDY

This study was supported by Vertex Pharmaceuticals Incorporated. Medical writing assistance was provided by Liz Phipps, PhD, of Articulate Science, and editorial assistance was provided by Beatrice Vetter-Ceriotti, PhD, of Complete HealthVizion, funded by the study sponsor.

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S64 REAL-WORLD OUTCOMES IN CHILDREN AGED 2-5 YEARS WITH CYSTIC FIBROSIS TREATED WITH IVACAFTOR

This study was supported by Vertex Pharmaceuticals Incorporated. Medical writing assistance was provided by JoAnna Anderson, PhD, of Articulate Science, and editorial assistance was provided by Beatrice Vetter-Ceriotti, PhD, of Complete HealthVizion, funded by the study sponsor.

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S65 IMPACT OF ELEXACAFTOR/TEZACAFTOR/IVACAFTOR TRIPLE COMBINATION THERAPY ON HEALTH-RELATED QUALITY OF LIFE IN PEOPLE WITH CYSTIC FIBROSIS HETEROZYGOUS FOR F508DEL AND A MINIMAL FUNCTION MUTATION (F/MF): RESULTS FROM A PHASE 3 CLINICAL STUDY

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S66 IMPACT OF ELEXACAFTOR/TEZACAFTOR/IVACAFTOR TRIPLE COMBINATION THERAPY ON HEALTH-RELATED QUALITY OF LIFE IN PEOPLE WITH CYSTIC FIBROSIS HOMOZYGOUS FOR F508DEL (F/F): RESULTS FROM A PHASE 3 CLINICAL STUDY

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S93 REPAIR: LONG-TERM EFFECTS OF MACITENTAN ON THE RIGHT VENTRICLE (RV) IN PULMONARY ARTERIAL HYPERTENSION (PAH)

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S94 LONG-TERM OUTCOMES WITH INITIAL TRIPLE ORAL THERAPY IN PULMONARY ARTERIAL HYPERTENSION (PAH): INSIGHTS FROM TRITON

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Topic Leaders, who organised the symposia, were:

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