British Thoracic Society
Winter Meeting 2017

QEI Centre
Broad Sanctuary
Westminster
London SW1P 3EE

6 to 8 December 2017
Programme and Abstracts

thorax.bmj.com

BMJ
is attained treatment should be reviewed and the dose of corticosteroid should be prescribed. Once control of asthma treatment of patients with COPD, with a FEV1 <60%
Aerivio Spiromax is indicated for the symptomatic high dose inhaled corticosteroid and long-acting β2 agonist combination product or patients already controlled on a not adequately controlled on a lower strength corticosteroid. Treatment should not be used to treat acute asthma symptoms for which a fast and short-acting bronchodilator is required. Patients should not be initiated on Aerivio Spiromax during an exacerbation, or if they have significantly worsening or acutely deteriorating asthma. Some serious asthma-related adverse events and exacerbations may occur. Patients should continue treatment but seek medical advice if asthma symptoms remain uncontrolled or worsen after initiation of treatment. Patients who have an increased requirement for use of reliever medication, or decreased response to reliever medication should be reviewed. Patients who experience sudden and progressive deterioration in control of their asthma should undergo urgent medical assessment and treatment initiated immediately. Systolic effects may occur, particularly at high doses prescribed for long periods. It is important that the patient is reviewed regularly and dose of inhaled corticosteroid is reduced to lowest effective dose. Visual disturbance may be reported with systemic and topical corticosteroid use. Prolonged treatment with high doses of inhaled corticosteroids may result in adrenal suppression and acute adrenal crisis. Additional systemic corticosteroid cover should be considered during periods of stress or elective surgery. Patients transferring from oral corticosteroids may remain at risk of impaired adrenal reserve. Adrenal cortical function should be regularly monitored in such patients. COPD patients should be monitored for possible development of pneumonia as clinical features of such infections overlap with symptoms of COPD exacerbations. In COPD patients experiencing exacerbations, treatment with systemic corticosteroids is typically indicated. Patients should seek medical attention if symptoms deteriorate with Aerivio Spiromax treatment. Discontinuation of therapy in COPD patients may be associated with symptomatic decompensation and such patients should be monitored. To minimise risk of oropharyngeal candida infections patients should rinse mouth with water. As with other lactose containing medicinal products can have a potentially additive effect. By concomitant treatment with xanthine derivatives, in acute severe asthma this effect may be potentiated by concomitant treatment with xanthine derivatives. Paradoxical bronchospasm, anaphylactic reactions (including anaphylactic shock, Pneumonia (in COPD patients) Very Common: Headache, dizziness. Common: Cough, tremor, anxiety, nausea, oropharyngeal candida infections patients should rinse mouth with water. As with other lactose containing products, the small amounts of milk proteins present may therefore serum potassium levels should be monitored. Occurrence should be considered. An overdose of fluticasone propionate plasma levels. Concomitant treatment with ketocapsules or other potent CYP3A inhibitors such as miconazole, and rifampicin should also be avoided. Cautions recommended with moderate CYP3A inhibitors such as erythromycin and long term treatment should be avoided. Concomitant treatment with Aerivio and cobicistat-containing products should also be avoided. Pregnancy and lactation Not recommended. Effects on ability to drive and use machines: No or negligible influence on the ability to drive and use machines. Adverse reactions: Paradoxical bronchospasm, anaphylactic reactions including anaphylactic shock. Paradoxical bronchospasm, anaphylactic reactions (including anaphylactic shock Pneumonia (in COPD patients) Very Common: Headache, dizziness. Common: Cough, tremor, anxiety, nausea, oropharyngeal candida infections patients should rinse mouth with water. As with other lactose containing medicinal products can have a potentially additive effect.


Approval code: UK/ARO/16/0002(1) Teva UK Limited, Ridings Point, Whistler Drive, Castleford, West Yorkshire WF10 5HX Date of preparation: August 2017
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Approved by the Federation of the Royal Colleges of Physicians of the UK for 18 category 1 (external) credits (6 credits per day).
Code: 114519
Map to The Queen Elizabeth II Centre

PowerPoint preview facilities will be available throughout the three days of the Meeting on the ground floor of the Centre. All presenters and chairs should report to the Speakers’ section of the Registration Desks on arrival.
Full café facilities will be open in the Pickwick on the 1st floor from 8.00am to 4.00pm on Wednesday 6 and Thursday 7 December and from 8.00am to 2.30pm on Friday 8 December. A snack bar, serving hot and cold drinks, sandwiches and confectionery only, will be open at the same times in the Whittle & Fleming on the 3rd floor.
Full café facilities will be open in the Pickwick on the 1st floor from 8.00am to 4.00pm on Wednesday 6 and Thursday 7 December and from 8.00am to 2.30pm on Friday 8 December. A snack bar, serving hot and cold drinks, sandwiches and confectionery only, will be open at the same times in the Whittle & Fleming on the 3rd floor.
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**DAILY PROGRAMME**

<table>
<thead>
<tr>
<th>Time</th>
<th>Details</th>
<th>Location/Floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00am – 9.00am</td>
<td>COFFEE/TEA</td>
<td>Whittle &amp; Fleming/3rd</td>
</tr>
<tr>
<td>8.45am – 4.00pm</td>
<td>Poster viewing</td>
<td>P1-P11 Complications of TB and extra-pulmonary TB Whittle &amp; Fleming /3rd</td>
</tr>
<tr>
<td>Authors present</td>
<td>P12-P23 Asthma: airways and antibodies</td>
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</tr>
<tr>
<td>10.00am – 11.00am</td>
<td>P24-P33 Clinical update in COPD</td>
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<tr>
<td></td>
<td>P34-P44 Interventional procedures in respiratory disease</td>
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<tr>
<td></td>
<td>P45-P57 Cellular insights into lung injury repair</td>
<td></td>
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<tr>
<td></td>
<td>P58-P71 Respiratory medicine: common problems, new insights</td>
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<td></td>
<td>P72-P78 Pulmonary rehabilitation: walk this way</td>
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<tr>
<td></td>
<td>P79-P90 Update in paediatric lung disease</td>
<td></td>
</tr>
<tr>
<td>8.45am – 4.00pm</td>
<td>Moderated poster viewing</td>
<td>M1-M11 Innovation in service design Cambridge/5th</td>
</tr>
<tr>
<td>8.00am – 8.30am</td>
<td>BTS Journal Club</td>
<td>Lung cancer Albert/2nd</td>
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<tr>
<td>8.15am – 9.15am</td>
<td>Symposium</td>
<td>BTS/SIGN Asthma Guideline update Windsor/5th</td>
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<tr>
<td>8.30am – 10.00am</td>
<td>Symposium</td>
<td>CF: from evidence to effectiveness Churchill/Ground</td>
</tr>
<tr>
<td>8.30am – 10.30am</td>
<td>Symposium</td>
<td>Pulmonary vascular disease update Mountbatten/6th</td>
</tr>
<tr>
<td>8.30am – 10.30am</td>
<td>Joint BTS/BALR symposium (part I)</td>
<td>Alternative approaches to modelling human lung disease Westminster/4th</td>
</tr>
<tr>
<td>8.45am – 10.05am</td>
<td>Spoken session</td>
<td>S1-S5 COPD: doing what works St James/4th</td>
</tr>
<tr>
<td>8.45am – 10.05am</td>
<td>Spoken session</td>
<td>S6-S10 An update in pneumonia: from big data to cellular function Abbey/4th</td>
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<tr>
<td>9.30am – 10.50am</td>
<td>Spoken session</td>
<td>S11-S15 Lung cancer screening has arrived Windsor/5th</td>
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<td>10.00am – 11.00am</td>
<td>COFFEE/TEA</td>
<td>Whittle &amp; Fleming and Britten/3rd</td>
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<td>10.30am – 11.50am</td>
<td>Spoken session</td>
<td>S16-S20 Understanding and treating those irritating infections St James/4th</td>
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<td>10.30am – 12.05pm</td>
<td>Spoken session</td>
<td>S21-S26 Pleural effusions: diagnosis and prognosis Moore/4th</td>
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<td>10.30am – 11.50am</td>
<td>Spoken session</td>
<td>S27-S31 TB: from screening to compliance Abbey/4th</td>
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<tr>
<td>10.30am – 12.30pm</td>
<td>Symposium</td>
<td>Taking the ‘I’ out of IPF Churchill/Ground</td>
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<tr>
<td>10.45am – 12.45pm</td>
<td>Symposium</td>
<td>Update in asthma treatment Mountbatten/6th</td>
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<tr>
<td>11.00am – 12.00pm</td>
<td>SAG Open meeting</td>
<td>Pulmonary Vascular Disease Victoria/2nd</td>
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<tr>
<td>11.00am – 12.45pm</td>
<td>Symposium</td>
<td>Spotlight on our specialty: opportunities and threats to delivering better lung health in the future Windsor/5th</td>
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<tr>
<td>11.00am – 1.00pm</td>
<td>Joint BTS/BALR symposium (part 2)</td>
<td>Alternative approaches to modelling human lung disease Westminster/4th</td>
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</table>

Please see page Axii for a complete list of the days and times of BTS Specialist Advisory Group Open Meetings.

Coffee and tea is complimentary ONLY during the coffee/tea break times shown above. Outside these times, drinks may be purchased from the café in the Pickwick (1st floor), or the snack bar in the Whittle & Fleming (3rd floor).
**DAILY PROGRAMME (cont.)  WEDNESDAY 6 DECEMBER 2017**

<table>
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<tr>
<td>12.00pm – 2.00pm</td>
<td>LUNCH  Cash catering only</td>
<td>Pickwick /1st and Whittle &amp; Fleming/3rd</td>
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<td>12.15pm – 1.15pm</td>
<td>SAG Open meeting</td>
<td>Cystic Fibrosis</td>
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<td>12.30pm – 1.30pm</td>
<td>SAG Open meeting</td>
<td>Cough</td>
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<tr>
<td>12.45pm – 1.30pm</td>
<td>The Moran Campbell Lecture</td>
<td>Xtreme Everest: lessons from life at the limits?</td>
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<tr>
<td>12.45pm – 1.45pm</td>
<td>SAG Open meeting</td>
<td>Pulmonary Rehabilitation QI Advisory Group</td>
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<tr>
<td>12.45pm – 2.10pm</td>
<td>Poster discussion P1-P11</td>
<td>Complications of TB and extra-pulmonary TB</td>
</tr>
<tr>
<td>1.15pm – 2.45pm</td>
<td>Poster discussion P12-P23</td>
<td>Asthma: airways and antibodies</td>
</tr>
<tr>
<td>1.45pm – 3.15pm</td>
<td>Joint BTS/BPRS symposium</td>
<td>Sleep medicine and NIV: issues affecting children and adults</td>
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<td>2.00pm – 3.00pm</td>
<td>Open meeting</td>
<td>BTS/ARTP Strategy Board</td>
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<tr>
<td>2.00pm – 3.15pm</td>
<td>Poster discussion P24-P33</td>
<td>Clinical update in COPD</td>
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<tr>
<td>2.00pm – 3.20pm</td>
<td>Spoken session S32-S36</td>
<td>A troublesome cough: from diagnosis to treatment</td>
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<tr>
<td>2.00pm – 3.30pm</td>
<td>Symposium T1-T6</td>
<td>BTS/BALR/BLF Early Career Investigator Awards</td>
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<tr>
<td>2.00pm – 3.30pm</td>
<td>Moderated poster discussion M1-M11</td>
<td>Innovation in service design</td>
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<tr>
<td>2.00pm – 4.00pm</td>
<td>Symposium</td>
<td>Bronchiectasis: what to expect when you are expectorating</td>
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<tr>
<td>2.30pm – 4.00pm</td>
<td>Poster discussion P34-P44</td>
<td>Interventional procedures in respiratory disease</td>
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<tr>
<td>2.30pm – 4.05pm</td>
<td>Poster discussion P45-P57</td>
<td>Cellular insights into lung injury repair</td>
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<tr>
<td>2.30pm – 4.15pm</td>
<td>Poster discussion P58-P71</td>
<td>Respiratory medicine: common problems, new insights</td>
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<tr>
<td>3.00pm – 4.00pm</td>
<td>Poster discussion P72-P78</td>
<td>Pulmonary rehabilitation: walk this way</td>
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<tr>
<td>3.00pm – 4.00pm</td>
<td>SAG Open meeting</td>
<td>Asthma</td>
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<tr>
<td>3.00pm – 4.30pm</td>
<td>COFFEE/TEA</td>
<td>Whittle &amp; Fleming and Britten/3rd and Cambridge/5th (3.15pm – 3.30pm only)</td>
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<tr>
<td>3.30pm – 5.00pm</td>
<td>Poster discussion P79-P90</td>
<td>Update in paediatric lung disease</td>
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<tr>
<td>4.15pm – 4.40pm</td>
<td>Award Presentations</td>
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<tr>
<td>4.40pm – 5.30pm</td>
<td>The BTS President’s Address</td>
<td>A little flutter with the lung</td>
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<tr>
<td>5.30pm – 6.00pm</td>
<td>BTS AGM</td>
<td>BTS Annual General Meeting (BTS members only)</td>
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</table>

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### DAILY PROGRAMME

**THURSDAY 7 DECEMBER 2017**

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<thead>
<tr>
<th>Time</th>
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<th>Location/Floor</th>
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<tbody>
<tr>
<td>8.00am – 9.00am</td>
<td>COFFEE/TEA</td>
<td>Whittle &amp; Fleming/3rd</td>
</tr>
<tr>
<td>8.45am – 4.00pm</td>
<td>Poster viewing</td>
<td>P91-P101</td>
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<tr>
<td>8.45am – 4.00pm</td>
<td>Authors present</td>
<td>P102-P110</td>
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<tr>
<td>10.00am – 11.00am</td>
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<td>P111-P122</td>
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<td>10.00am – 11.00am</td>
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<td>P123-P133</td>
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<tr>
<td>10.00am – 11.00am</td>
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<td>P134-P146</td>
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<tr>
<td>10.00am – 11.00am</td>
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<td>P147-P160</td>
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<tr>
<td>10.00am – 11.00am</td>
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<td>P161-P170</td>
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<tr>
<td>10.00am – 11.00am</td>
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<td>P171-P184</td>
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<tr>
<td>8.45am – 4.00pm</td>
<td>Moderated poster viewing</td>
<td>M12-M23</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>BTS Journal Club</td>
<td>Tuberculosis</td>
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<tr>
<td>8.30am – 9.50am</td>
<td>Spoken session</td>
<td>S37-S41</td>
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<tr>
<td>8.30am – 10.00am</td>
<td>Joint BTS/BPRS symposium</td>
<td>Similar diseases?</td>
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<tr>
<td>8.30am – 10.05am</td>
<td>Spoken session</td>
<td>S42-S47</td>
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<tr>
<td>8.30am – 10.30am</td>
<td>Joint BTS/BTOG symposium</td>
<td>Molecular targeting of lung cancer: are we beginning to win the battle?</td>
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<td>8.45am – 10.05am</td>
<td>Spoken session</td>
<td>S48-S52</td>
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<tr>
<td>8.45am – 10.05am</td>
<td>Spoken session</td>
<td>S53-S57</td>
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<tr>
<td>8.45am – 10.15am</td>
<td>Symposium</td>
<td>Lung health under threat</td>
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<tr>
<td>10.00am – 11.00am</td>
<td>COFFEE/TEA</td>
<td>Paediatric asthma: big and real world data</td>
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<td>10.15am – 11.50am</td>
<td>Spoken session</td>
<td>Respiratory asthma: can integrated care improve respiratory health outcomes?</td>
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<tr>
<td>10.30am – 12.30pm</td>
<td>Symposium</td>
<td>Pulmonary rehabilitation – doing more and better</td>
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<tr>
<td>10.45am – 12.30pm</td>
<td>Symposium</td>
<td>Plenary scientific symposium</td>
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<tr>
<td>12.00pm – 2.00pm</td>
<td>LUNCH</td>
<td>Pickwick/1st and Whittle &amp; Fleming/3rd</td>
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<td>12.30pm – 1.30pm</td>
<td>SAG Open meeting</td>
<td>Nurse Advisory Group</td>
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<td>12.30pm – 1.30pm</td>
<td>SAG Open meeting</td>
<td>Occupational and Environmental Lung Disease</td>
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<td>12.30pm – 1.30pm</td>
<td>SAG Open meeting</td>
<td>Tuberculosis</td>
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</table>

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Please see page Axii for a complete list of the days and times of BTS Specialist Advisory Group Open Meetings.

Avii Thorax 2017;72(Suppl 3):A1–Alxxxiv
Please see page Axi for a complete list of the days and times of BTS Specialist Advisory Group Open Meetings.

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## DAILY PROGRAMME

**FRIDAY 8 DECEMBER 2017**

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<tr>
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<tr>
<td>8.00am – 9.00am</td>
<td>COFFEE/TEA</td>
<td>Whittle &amp; Fleming/3&lt;sup&gt;rd&lt;/sup&gt;</td>
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<tr>
<td>8.45am – 2.00pm</td>
<td>Poster viewing</td>
<td>P185-P194</td>
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<tr>
<td>Authors present</td>
<td>Biomarkers, imaging and outcomes in</td>
<td>Whittle &amp; Fleming/3&lt;sup&gt;rd&lt;/sup&gt;</td>
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<tr>
<td>10.00am – 11.00am</td>
<td>COPD</td>
<td>P195-P208</td>
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<tr>
<td>8.00am – 11.00am</td>
<td>Sleep and breathing</td>
<td>P209-P219</td>
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<tr>
<td>8.00am – 11.00am</td>
<td>Danger at work: occupational lung</td>
<td>P220-P230</td>
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<tr>
<td>8.00am – 11.00am</td>
<td>disease and asthma</td>
<td>P231-P243</td>
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<tr>
<td>8.00am – 11.00am</td>
<td>Closing the flood gates of the plera</td>
<td>P244-P255</td>
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<td>8.00am – 11.00am</td>
<td>Lung cancer: from virtual contact to</td>
<td>P256-P267</td>
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<tr>
<td>Authors present</td>
<td>invasive procedures</td>
<td>P268-P280</td>
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<tr>
<td>8.45am – 3.30pm</td>
<td>Moderated poster viewing</td>
<td>M24-M34</td>
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<td>8.00am – 8.30am</td>
<td>BTS Journal Club</td>
<td>S91-S96</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>Critical care medicine</td>
<td>P209-P219</td>
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<td>Idiopathic pulmonary fibrosis</td>
<td>S102-S107</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>treatment update</td>
<td>M24-M34</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>CF: disease trajectory and evolving</td>
<td>St James/4&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>8.00am – 8.30am</td>
<td>therapiess</td>
<td>S97-S101</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>Improvements in lung cancer</td>
<td>S106-S112</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>treatment</td>
<td>S107-S112</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>COPD: the cutting edge</td>
<td>Churchill/Ground</td>
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<td>8.00am – 8.30am</td>
<td>The impact of the obesity epidemic</td>
<td>Mountbatten/6&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>on the lung</td>
<td>S113-S117</td>
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<td>Pleural disease</td>
<td>Westminster/4&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>8.00am – 8.30am</td>
<td>Fruit flies to footballers</td>
<td>S114-S117</td>
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<td>Tobacco</td>
<td>Westminster/4&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>8.00am – 8.30am</td>
<td>SAG Open meeting</td>
<td>Rutherford/4&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>8.00am – 8.30am</td>
<td>Interstitial and Rare Lung Disease</td>
<td>Albert/2&lt;sup&gt;nd&lt;/sup&gt;</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>Advances in understanding chronic</td>
<td>St James/4&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>thrombo-embolic disease and pulmonary</td>
<td>S115-S117</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>hypertension</td>
<td>Westminster/4&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>Mechanistic insights into COPD</td>
<td>Westminster/4&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>Of mice and men</td>
<td>Abbey/4&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>Multi-system lung disease</td>
<td>Churchill/Ground</td>
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<tr>
<td>8.00am – 8.30am</td>
<td>Pulmonary infection</td>
<td>Victoria/2&lt;sup&gt;nd&lt;/sup&gt;</td>
</tr>
<tr>
<td>8.00am – 8.30am</td>
<td>Respiratory critical care: the hinterland</td>
<td>Mountbatten/6&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>8.00am – 8.30am</td>
<td>COPD</td>
<td>Rutherford/4&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Please see page Axii for a complete list of the days and times of BTS Specialist Advisory Group Open Meetings.

Coffee and tea is complimentary ONLY during the coffee/tea break times shown above. Outside these times, drinks may be purchased from the café in the Pickwick (1st floor), or the snack bar in the Whittle & Fleming (3rd floor).
<table>
<thead>
<tr>
<th>Time</th>
<th>Details</th>
<th>Location/Floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.00pm – 2.00pm</td>
<td>LUNCH Cash catering only</td>
<td>Pickwick/1st and Whittle &amp; Fleming/3rd</td>
</tr>
<tr>
<td>1.245pm – 1.45pm</td>
<td>SAG Open meeting</td>
<td>Sleep Apnoea</td>
</tr>
<tr>
<td>1.00pm – 1.45pm</td>
<td>The BTS Lecture</td>
<td>Social justice and the lungs</td>
</tr>
<tr>
<td>1.30pm – 2.45pm</td>
<td>Poster discussion P185-P194</td>
<td>Biomarkers, imaging and outcomes in COPD</td>
</tr>
<tr>
<td>1.30pm – 2.50pm</td>
<td>Spoken session S123-S127</td>
<td>Respiratory epidemiology</td>
</tr>
<tr>
<td>1.30pm – 2.50pm</td>
<td>Spoken session S128-S132</td>
<td>Managing pleural disease: from intervention to conservation</td>
</tr>
<tr>
<td>1.30pm – 3.15pm</td>
<td>Poster discussion P195-P208</td>
<td>External influences on asthma</td>
</tr>
<tr>
<td>2.00pm – 3.00pm</td>
<td>SAG Open meeting</td>
<td>Critical Care</td>
</tr>
<tr>
<td>2.00pm – 3.30pm</td>
<td>Symposium</td>
<td>Adapt and survive: mechanisms of chronic airway infection</td>
</tr>
<tr>
<td>2.00pm – 3.30pm</td>
<td>Symposium</td>
<td>Smoking and vaping</td>
</tr>
<tr>
<td>2.00pm – 3.25pm</td>
<td>Poster discussion P209-P219</td>
<td>Sleep and breathing</td>
</tr>
<tr>
<td>2.00pm – 3.25pm</td>
<td>Poster discussion P220-P230</td>
<td>Danger at work: occupational lung disease and asthma</td>
</tr>
<tr>
<td>2.00pm – 3.30pm</td>
<td>Moderated poster discussion M24-M34</td>
<td>Idiopathic pulmonary fibrosis treatment update</td>
</tr>
<tr>
<td>2.00pm – 3.35pm</td>
<td>Poster discussion P231-P243</td>
<td>Closing the flood gates of the pleura</td>
</tr>
<tr>
<td>3.00pm – 4.30pm</td>
<td>Poster discussion P244-P255</td>
<td>Clinical implications of CF</td>
</tr>
<tr>
<td>3.15pm – 4.45pm</td>
<td>Poster discussion P256-P267</td>
<td>Lung cancer: from virtual contact to invasive procedures</td>
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<tr>
<td>3.15pm – 4.50pm</td>
<td>Poster discussion P268-P280</td>
<td>Pharmacotherapies for COPD</td>
</tr>
<tr>
<td>3.30pm – 4.35pm</td>
<td>Spoken session S133-S136</td>
<td>Core outcomes for mechanical ventilation</td>
</tr>
<tr>
<td>3.00pm – 4.00pm</td>
<td>COFFEE/TEA</td>
<td>Britten/3rd</td>
</tr>
</tbody>
</table>

Please see page Axii for a complete list of the days and times of BTS Specialist Advisory Group Open Meetings.
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ADDITIONAL SESSIONS

The programme will also include open meetings of some of the BTS Specialist Advisory Groups (SAGs). Further details may be found online in the Virtual Conference Bag.

WEDNESDAY 6 DECEMBER

<table>
<thead>
<tr>
<th>Time</th>
<th>Details</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00am – 12.00pm</td>
<td>Pulmonary Vascular Disease</td>
<td>Victoria/2nd floor</td>
</tr>
<tr>
<td>12.15pm – 1.15pm</td>
<td>Cystic Fibrosis</td>
<td>Victoria/2nd floor</td>
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<tr>
<td>12.30pm – 1.30pm</td>
<td>Cough</td>
<td>Albert/2nd floor</td>
</tr>
<tr>
<td>12.45pm – 1.45pm</td>
<td>Pulmonary Rehabilitation QI Advisory Group</td>
<td>Rutherford/4th floor</td>
</tr>
<tr>
<td>2.00pm – 3.00pm</td>
<td>BTS/ARTP Strategy Board</td>
<td>Gielgud/2nd floor</td>
</tr>
<tr>
<td>3.00pm – 4.00pm</td>
<td>Asthma</td>
<td>Victoria/2nd floor</td>
</tr>
</tbody>
</table>

THURSDAY 7 DECEMBER

<table>
<thead>
<tr>
<th>Time</th>
<th>Details</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.30pm – 1.30pm</td>
<td>Tuberculosis</td>
<td>Rutherford/4th floor</td>
</tr>
<tr>
<td>12.30pm – 1.30pm</td>
<td>Nurse Advisory Group</td>
<td>Albert/2nd floor</td>
</tr>
<tr>
<td>12.30pm – 1.30pm</td>
<td>Occupational and Environmental Lung Disease</td>
<td>Victoria/2nd floor</td>
</tr>
<tr>
<td>2.00pm – 3.00pm</td>
<td>Pleural Disease</td>
<td>Victoria/2nd floor</td>
</tr>
<tr>
<td>3.15pm – 4.15pm</td>
<td>Lung Cancer and Mesothelioma</td>
<td>Victoria/2nd floor</td>
</tr>
<tr>
<td>4.00pm – 5.00pm</td>
<td>Specialty Trainees Advisory Group</td>
<td>Albert/2nd floor</td>
</tr>
</tbody>
</table>

FRIDAY 8 DECEMBER

<table>
<thead>
<tr>
<th>Time</th>
<th>Details</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00am – 11.00am</td>
<td>Tobacco</td>
<td>Rutherford/4th floor</td>
</tr>
<tr>
<td>10.30am – 11.30am</td>
<td>Interstitial and Rare Lung Disease</td>
<td>Albert/2nd floor</td>
</tr>
<tr>
<td>10.45am – 11.45am</td>
<td>Pulmonary Infection</td>
<td>Victoria/2nd floor</td>
</tr>
<tr>
<td>11.30am – 12.30pm</td>
<td>COPD</td>
<td>Rutherford/4th floor</td>
</tr>
<tr>
<td>12.45pm – 1.45pm</td>
<td>Sleep Apnoea</td>
<td>Victoria/2nd floor</td>
</tr>
<tr>
<td>2.00pm – 3.00pm</td>
<td>Critical Care</td>
<td>Victoria/2nd floor</td>
</tr>
</tbody>
</table>

BTS MEDAL AND AWARD PRESENTATIONS

Wednesday 6 December at 4.15pm in the Churchill, Ground floor

The presentations will be made for the annual BTS Medal, the BTS Award for Meritorious Service, the BTS/BALR/BLF Early Career Investigator Awards and the Medical Student Awards just before the BTS President’s Address. Please come along to this session to congratulate the winners.

THE BTS PRESIDENT’S RECEPTION

Thursday 7 December from 5.30pm to 7.00pm in the Britten, 3rd floor

All participants are warmly invited to join us for this social occasion.
For patients with pre-existing lung disease

COULD NTM BE CAUSING MORE DAMAGE?

Targeting Susceptible Patients
A nontuberculous mycobacterial (NTM) lung infection is a chronic condition that can get progressively worse and be debilitating in some patients. Patients with structural lung disease such as emphysema, asthma, bronchiectasis, cystic fibrosis, and COPD are at a greater risk of being infected. 1-6

More Prevalent Than Thought
A recent survey identified nearly 20,000 patients in Europe who have been diagnosed with an NTM lung infection. Due to the fact that this infection is under-reported, the number could be higher. 7,8

NTM May Be Masked
Symptoms, such as coughing and fatigue, are common of other respiratory comorbidities. These overlapping symptoms may mask an NTM lung infection, delaying diagnosis. Due to these factors, NTM lung infections can easily be overlooked, in some cases for months or even years. 2,5

References:

Graphic is for illustrative purposes only. Disease progression and actual lung damage vary among patients.

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FLOOR PLAN OF THE EXHIBITION STANDS

Exhibitors and stand numbers

Whittle & Fleming, 3rd floor

35 Adherium Europe Ltd
12 Airsonett UK Ltd
15 Aquilant Endoscopy Ltd
1 AstraZeneca
16 BD Medical
4 Boehringer Ingelheim Ltd
13 Boston Scientific Corporation
30 BTG
31 BTG-PneumRx Ltd
29 Circassia
3 & 32 Chiesi Limited
5-9 GlaxoSmithKline
17 & Napp Pharmaceuticals Limited
23–26
18 Novartis Pharmaceuticals UK Ltd
14 Olympus
19 PARI Medical Ltd
21, 22, 27 Pfizer UK
& 28
11 Pulmonx

33 & 34 Rocket Medical
36 Sanofi Genzyme
2 Teva Respiratory
20 Trudell Medical International
10 Vertex Pharmaceuticals UK Ltd

Britten, 3rd floor

43 Broncus Medical / Uptake Medical
44 Clement Clarke International
41 Gilead
48 Hitachi Medical Systems
40 Insmed
45 Mylan
37 PMD Solutions
49 Wisepress Medicl Bookshop

Charity and non-commercial stands

Britten, 3rd floor

69 Action for Pulmonary Fibrosis
60 Association for Respiratory Technology and Physiology (ARTP)
59 Association of Chartered Physiotherapists in Respiratory Care (ACPRC)
66 Association of Respiratory Nurse Specialists (ARNS)
55 BMJ Group
63 British Association for Lung Research (BALR)
67 British Lung Foundation
50 British Thoracic Society
62 European Respiratory Society
65 ILD Interdisciplinary Network
38 National COPD Audit Programme, led by the RCP
39 National Lung Cancer Audit, delivered by the RCP
68 PCD Family Support Group
64 PCRS-UK
51 Respiratory Futures
61 Royal College of Speech and Language Therapists
BECAUSE EVERYONE IS DIFFERENT...

flutiform® embraces differences. Some patients may have a fast inspiratory flow rate. Or some may have a slow one. But, that doesn’t matter to flutiform. flutiform achieves high total lung deposition of 36-44%.*

Give your asthma patients a treatment that gets the drug to where it’s needed. Give them flutiform.

*Based on in-vivo modelling at flow rates of 30/2/min and 60/1/min and, 2 inhalation profiles.

flutiform® (fluticasone propionate and formoterol fumarate) pressurised inhalation suspension. Prescribing Information. United Kingdom. Please read the Summary of Product Characteristics before prescribing. Presentation: Pressurised inhalation suspension, in a pressurised metered dose inhaler (pMDI), containing fluticasone propionate and formoterol fumarate dry powder at strengths of 50 µg/5 µg, 75 µg/5 µg or 250 µg/5 µg per actuation.

Indications: Regular treatment of asthma where the use of a combination product is appropriate, for patients not adequately controlled with inhaled corticosteroid and a long-acting β2-agonist (LABA), or for patients already adequately controlled on both an inhaled corticosteroid and a long-acting β2-agonist (LABA). flutiform 50 µg/5 µg and 125 µg/5 µg per actuation are indicated for use in adults and adolescents 12 years and above. flutiform 250 µg/5 µg per actuation is only indicated for use in adults.

Dosage and administration: for inhalation use. The patient should be shown how to use the inhaler correctly by a pharmacist or other healthcare professional. Patients should be given the strength of flutiform containing the appropriate fluticasone propionate dose for their disease severity (note that flutiform 50 µg/5 µg per actuation is not appropriate in patients with severe asthma). The appropriate strength should be taken as two inhalations, twice daily (morning and evening) and used every day, even when asymptomatic. flutiform® should not be used in children under 12 years. Prescriptions should be aware that a flutiform® and formoterol fumarate is as effective as some other inhaled steroids when administered at approximately half the total daily microgram dose. flutiform® once daily use can be increased if asthma remains poorly controlled by administering a higher strength inhaler. flutiform® is not recommended for use in patients with severe asthma.

Patients should be assessed regularly and once asthma is controlled, treatment can be reduced. Use cautiously in patients with severe asthma. The appropriate strength should be taken as two inhalations, twice daily (morning and evening) and used every day, even when asymptomatic. Labal® should not be used in children under 12 years. The patient should be shown how to use the inhaler correctly by a pharmacist or other healthcare professional. Patients should be given the strength of Labal® containing the appropriate fluticasone propionate dose for their disease severity. Use cautiously in patients with severe asthma. The appropriate strength should be taken as two inhalations, twice daily (morning and evening) and used every day, even when asymptomatic. flutiform® should not be used in children under 12 years. The patient should be shown how to use the inhaler correctly by a pharmacist or other healthcare professional.

Adverse events should be reported. Reporting forms and information can be found at http://www.mhra.gov.uk/
Wednesday 6 December 2017

8.00am – 9.00am
COFFEE/TEA will be served in the Whittle & Fleming, 3rd floor

8.45am – 4.00pm
Whittle & Fleming, 3rd floor
POSTER VIEWING
Authors present: 10.00am – 11.00am

P1–P11
Complications of TB and extra-pulmonary TB
Discussion of abstracts will take place from 12.45pm to 2.10pm in the Moore, 4th floor

P12–P23
Asthma: airways and antibodies
Discussion of abstracts will take place from 1.15pm to 2.45pm in the Abbey, 4th floor

P24–P33
Clinical update in COPD
Discussion of abstracts will take place from 2.00pm to 3.15pm in the Mountbatten, 5th floor

P34–P44
Interventional procedures in respiratory disease
Discussion of abstracts will take place from 2.30pm to 4.00pm in the Albert, 2nd floor

P45–P57
Cellular insights into lung injury repair
Discussion of abstracts will take place from 2.30pm to 4.05pm in the St James, 4th floor

P58–P71
Respiratory medicine: common problems, new insights
Discussion of abstracts will take place from 2.30pm to 4.15pm in the Moore, 4th floor

P72–P78
Pulmonary rehabilitation: walk this way
Discussion of abstracts will take place from 3.00pm to 4.00pm in the Abbey, 4th floor

P79–P90
Update in paediatric lung disease
Discussion of abstracts will take place from 3.30pm to 5.00pm in the Windsor, 5th floor

8.45am – 4.00pm
Cambridge, 5th floor
MODERATED POSTER VIEWING
M1–M11
Innovation in service design
Discussion of abstracts will take place from 2.00pm to 3.30pm in the Cambridge, 5th floor

8.00am – 8.30am
Albert, 2nd floor
BTS JOURNAL CLUB
LUNG CANCER
Dr Ian Woolhouse (Birmingham)

Learning objectives:
This Journal Club will introduce and summarise three to four key papers that have been published in the past 12 months on the subject of “Lung cancer”. Dr Ian Woolhouse (Associate Director of the National Lung Cancer Audit and Clinical Lead on the National Improving Lung Cancer Outcomes Project) will then lead a discussion on these papers, based on his internationally recognised experience in this field. The relevant references are available on the BTS website so that delegates may review the papers.

8.15am – 9.15am
Windsor, 5th floor
SYMPOSIUM
BTS/SIGN Asthma Guideline update
Chaired by: Dr James Paton (Glasgow) and Dr John White (York)
Information on the planned scope of the next edition of the BTS/SIGN Asthma Guideline will be presented.

8.30am – 10.00am
Churchill, Ground floor
SYMPOSIUM
CYSTIC FIBROSIS: FROM EVIDENCE TO EFFECTIVENESS
Chaired by: Dr Maya Desai (Birmingham) and Dr Helen Rodgers (Edinburgh)

8.30am
Newborn screening: lessons learnt
Professor Kevin Southern (Liverpool)
SCIENTIFIC PROGRAMME

9.00am  Progress in CFTR modulator therapies  
Professor Christiane De Boeck (Leuven)

9.30am  NICE Cystic Fibrosis Guidelines  
Professor Martin Walshaw (Liverpool)

Learning objectives:
1) To address key current issues for paediatricians and physicians treating patients with cystic fibrosis.
2) To review progress and problems arising from the newborn screening programme.
3) To provide an update on key clinical trials in CFTR modulator therapies.
4) To discuss the implementation of evidence from the new NICE CF guidelines.

8.30am – 10.30am  
Mountbatten, 6th floor
SYMPOSIUM  
PULMONARY VASCULAR DISEASE UPDATE
Chaired by: Dr Colin Church (Glasgow) and Dr Laura Price (London)

8.30am  Genetic counselling in pulmonary hypertension  
Professor Marc Humbert (Paris)

9.00am  Pulmonary emboli and pulmonary hypertension  
Dr Joanna Pepke-Zaba (Cambridge)

9.30am  Management of acute PE  
Dr Gregory Piazza (Boston)

10.00am  The BTS Outpatient PE Guidelines  
Dr Luke Howard (London)

Learning objectives:
1) To update the audience on the latest understanding of genetic abnormalities and detection in pulmonary hypertension.
2) To understand the role of screening and treatment for pulmonary embolus in pulmonary hypertension.
3) To highlight the evidence for the acute treatment of pulmonary embolus.
4) To discuss the current guidelines and evidence on management of PE.

Wednesday 6 December 2017

8.30am – 10.30am  
Westminster, 4th floor
JOINT BTS/BALR SYMPOSIUM  
ALTERNATIVE APPROACHES TO MODELLING HUMAN LUNG DISEASE  (part 1)
Chaired by: Professor Louise Donnelly (London) and Dr Chris Scotton (Exeter)

8.30am  Use of Drosophila melanogaster to examine function of candidate genes in asthma  
Professor Donna Davies (Southampton)

9.10am  Use of zebrafish to study respiratory inflammation  
Professor Maggie Dallman (London)

9.50am  ‘Lung’ on a chip  
Dr Dan Huh (Pennsylvania)

Learning objectives:
1) Professors Dallman and Davies will introduce the audience to alternative models to mammalian animal testing and how this research promotes the 3Rs concept.
2) Both sessions will highlight the latest models used in drug discovery, including Dr Huh whose work on creating a “lung on a chip” has garnered significant international interest and press coverage.

8.45am – 10.05am  
St James, 4th floor
SPOKEN SESSION: S1 – S5  
COPD: doing what works
Chaired by: Dr Nick Hopkinson (London) and Dr Elin Roddy (Newport)

8.50am  S1  
A 20 year experience of staged bilateral lung volume reduction for emphysema – the long term benefits of combined surgical and endobronchial techniques  
IF Oey, MC Steiner, MDL Morgan, DA Waller

9.05am  S2  
The impact of pulmonary rehabilitation (PR) completion and outcome on subsequent hospital admissions in patients with COPD. Results from the National COPD audit
**Wednesday 6 December 2017**

MC Steiner, J Holzhauer-Barrie, D Lowe, V McMillan, V van Loo, CM Roberts

**9.20am S3**
Clinical cultures and the sensation of breathlessness
J Macnaughton, R Oxley, A Rose

**9.35am S4**
A randomised controlled trial (RCT) of cognitive behavioural therapy (CBT) for patients with chronic obstructive pulmonary disease
K Heslop-Marshall, C Baker, D Carrick-Sen, J Newton, C Stenton, G Burns, A De Soyza

**9.50am S5**
Smoking cessation expenditure in secondary care within London – who are supporting sick smokers?
V Mak, S Hopkins, D Attar-Zadeh

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**8.45am – 10.05am**
**Abbey 4th floor**

**SPOKEN SESSION: S6 – S10**

An update in pneumonia: from big data to cellular function
Chaired by: Dr Davinder Dosanjh (Birmingham) and Dr Sarah Walmsley (Edinburgh)

**8.50am S6**
Establishing the true incidence of hospitalised community acquired pneumonia (CAP) in the UK: a hospital episode statistics (HES) analysis
J Campling, D Jones, G Ellsbury, C Czudek, H Madhava, M Slack

**9.05am S7**
High mortality from invasive pneumococcal pneumonia in the era of vaccine preventable disease
K Ferguson, M Wilczynska

**9.20am S8**
Risk stratification in community acquired pneumonia – CURB65, SIRS or qSOFA? A retrospective analysis
DPS Dosanjh, F Grudzinska, K Aldridge, S Hughes, D Thickett

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**9.30am – 10.50am**
**Windsor, 5th floor**

**SPOKEN SESSION: S11 – S15**

Lung cancer screening has arrived
Chaired by: Professor David Baldwin (Nottingham) and Dr Philip Barber (Manchester)

**9.35am S11**
Identification and attendance of a high-risk cohort in a lung cancer screening demonstration pilot
M Ruparel, SL Quaife, JL Dickson, A Bhowmik, MN Taylor, A Ahmed, PJ Shaw, S Burke, MJ Soo, A Devaraj, N Navani, SW Duffy, DR Baldwin, J Waller, SM Janes

**9.50am S12**
The Liverpool Healthy Lung Project (LHLP) – seeking out lung disease
MJ Ledson, S Grundy, R Arvanitis, M Timoney, E Gaynor, J Field

**10.05am S13**
Manchester lung screening, targeting high-risk individuals in deprived areas of the community
H Balata, P Crosbie, M Evison, L Yarnell, A Threlfall, P Barber, J Tonge, R Booton

**10.20am S14**
Lung cancer risk profiles and eligibility of attendees in a lung cancer screening demonstration pilot
M Ruparel, JL Dickson, SL Quaife, A Bhowmik, MN Taylor, A Ahmed, PJ Shaw, S Burke, MJ Soo, A Devaraj, N Navani, SW Duffy, DR Baldwin, J Waller, SM Janes
Improving the risk stratification for malignancy in small pulmonary nodules from an unselected patient population
A Talwar, JMY Willaime, N Rahman, M Gooding, T Kadir, F Gleeson

SCIENTIFIC PROGRAMME

10.35am S16
Circadian control of primary lung allograft dysfunction, mediated by the clock protein, REVERBα
PS Cunningham, HJ Durrington, RV Venkateswaran, M Cypel, S Keshavjee, JE Gibbs, AS Loudon, CW Chow, DW Ray, JF Blaikley

10.50am S17
Latent class modelling for pulmonary aspergillosis diagnosis in lung transplant recipients
A Shah, A Abdolrasouli, S Schelenz, C Thornton, MZ Ni, A Devaraj, N Devic, LWard, M Carby, A Reed, C Costelloe, D Armstrong-James

11.05am S18
Mechanisms regulating collagenolytic and elastolytic activity in M. avium infection
SJ McFetridge, R McMullan, GN Schroeder, CM O’Kane

11.20am S19
The role of lymph node-resident neutrophils in adaptive immunity
LSC Lok, B Stewart, ER Chilvers, MR Clatworthy

Wednesday 6 December 2017

11.35am S20
Impact of azithromycin on the post-lung transplant microbiota

10.30am – 12.05pm
Moore, 4th floor
SPOKEN SESSION: S21 – S26
Pleural effusions: diagnosis and prognosis
Chaired by: Professor Najib Rahman (Oxford) and Dr Elizabeth Sage (London)

10.35am S21
A prospective study using serum mesothelin to monitor malignant pleural mesothelioma
DT Arnold, D De Fonseka, L Stadon, A Morley, E Keenan, M Darby, L Armstrong, PVirgo, NA Maskell

10.50am S22
BAP1 expression and treatment outcomes in malignant pleural mesothelioma in a prospective UK based clinical trial
N Kumar, K Kolluri, DA Rifai, Y Ishii, E Borg, M Falzon, A Nicholson, SJanes

11.05am S23
Evaluation of phosphorylated protein kinase B (AKT) and mammalian target of rapamycin (mTOR) expression in malignant pleural mesothelioma (MPM) and their association with patient survival - a retrospective cohort study
S Tariq, A Campbell, L Cawkwell, MJ Lind

11.20am S24
A phase I feasibility study in establishing the role of ultrasound-guided pleural biopsies in pleural infection (the AUDIO study)
I Psallidas, N Kanellakis, R Bhatnagar, R Ravindran, A Yousuf, AJ Edery, RM Mercer, JP Corcoran, RJ Halifax, PS hetty, T Dong, HEG Pietrowska, C Clelland, NA Maskell, NM Rahman
Wednesday 6 December 2017

11.35am  S25
Eosinophilic pleural effusions – a large prospective study on aetiology and prognosis
S Walker, A Morley, L stadon, N Zahan-Evans, A Medford, N Maskell

11.50am  S26
Identification and prognostic importance of non-expansile lung following drainage of suspected malignant pleural effusion
GA Martin, AC Kidd, STsim, KG Blyth

10.30am – 11.50am
Abbey, 4th floor
SPOKEN SESSION: S27 – S31
TB: from screening to compliance
Chair: Professor Onn Min Kon (London) and Dr Jessica Potter (London)

10.35am  S27
Have recent changes to health policies increased diagnostic delay amongst migrant patients with active TB?
JL Potter, M Burman, C Tweed, D Vanghuela, VLC White, D Swinglehurst, CJ Griffiths, H Kunst

10.50am  S28
Changing diagnostic pattern of HIV and tuberculosis co-infection in England, Wales and Northern Ireland, 2000-2014
JR Winter, J Brown, HR Stagg, MK Lalor, V Delpech, M Lipman, I Abubakar

11.05am  S29
A randomized controlled trial comparing smartphone enabled remote video observation with direct observation of treatment for tuberculosis
A Story, RAldridge, C Smith, E Garber, J Hall, G Fernandez, L Possas, S Hemming, M Coxedge, FWurie, S Luchenski, I Abubakar, T McHugh, P White, JM Watson, M Lipman, R Garfein, A Hayward

11.20am  S30
Is the new national LTBI screening program reaching the target population? A population-based cohort study
LC Berrocal-Almanza, AM O’Connell, MC Muzyamba, A Mirza, M Lalor, A Lalvani, D Zenner

11.35am  S31
Prognostic value of interferon gamma release assays and tuberculin skin test in predicting the development of active tuberculosis: The UK PREDICT TB cohort study

10.30am – 12.30pm
Churchill, Ground floor
SYMPOSIUM
TAKING THE ‘I’ OUT OF IPF
Chair: Dr Amanda Goodwin (Nottingham) and Dr Nik Hirani (Edinburgh)

10.30am  Telomere-mediated pulmonary fibrosis
Professor Paul Wolters (San Francisco)

11.00am  Stretching the lungs in IPF: is breathing bad?
Professor Martin Kolb (Hamilton)

11.30am  IPF: idiopathic or infective?
Dr Philip Molyneaux (London)

12.00pm  Moving from magic bullet to disease signature: the future of molecular biomarkers in IPF
Dr William Fahy (GlaxoSmithKline)

Learning objectives:
As we increasingly understand the underlying mechanisms, it is said that ‘idiopathic’ Pulmonary Fibrosis should be rebranded. This session will cover the latest research linking premature cellular ageing and lung stretch to the development of fibrosis. The role of the lung microbiome in the pathogenesis and progression of disease will also be explored. Finally, the progress that has been made in the identification of diagnostic and prognostic biomarkers for IPF, together with a vision for how the field needs to evolve to impact disease management, will be presented.
Wednesday 6 December 2017

11.05am A review of ‘respiratory achievements’ in 2017 and making sense of the latest national NHS policy and service developments
   Professor Mike Morgan (Leicester)

11.35am What is ‘Getting It Right First Time’ (GIRFT) and what will it mean for professionals and patients?
   Dr Martin Allen (Stoke-on-Trent)

12.05pm Our people are our greatest asset – but how can we future proof our workforce?
   Dr Lisa Davies (Liverpool) and Dr Charlotte Addy (Belfast)

Keynote speakers will explore the opportunities and threats to the respiratory specialty, now and in the future. The session will provide insight on the latest national NHS policy and service developments, a spotlight on what the sector has achieved in 2017 and a look at current workforce issues and how we might overcome them.

11.00am – 1.00pm
Westminster, 4th floor
JOINT BTS/BALR SYMPOSIUM
ALTERNATIVE APPROACHES TO MODELLING HUMAN LUNG DISEASE (part 2)
Chaired by: Dr Amanda Tatler (Nottingham) and Dr Andrew Thorley (London)

11.00am Use of human lung organoids to study mechanisms of disease
   Dr Jason Rock (San Francisco)

11.40am Identifying targets in lung disease using non-mammalian systems
   Professor Stephen Renshaw (Sheffield)

12.20pm Tissue engineering living models of asthmatic airways
   Dr Felicity Rose (Nottingham)

Learning objectives:
1) Drs Rock and Rose will highlight the molecular mechanisms and cell biology underlying lung development and repair.
2) Professor Renshaw will discuss how innate immune mechanisms can be modelled in non-mammalian species.
Wednesday 6 December 2017

12.00pm – 2.00pm
LUNCH will be available to purchase in the café in the Pickwick, 1st floor, and the snack bar in the Whittle & Fleming, 3rd floor.

12.15pm – 1.15pm
Victoria, 2nd floor
BTS SPECIALIST ADVISORY GROUP OPEN MEETING
CYSTIC FIBROSIS

12.30pm – 1.30pm
Albert, 2nd floor
BTS SPECIALIST ADVISORY GROUP OPEN MEETING
COUGH

12.45pm – 1.30pm
Churchill, Ground floor
THE MORAN CAMPBELL LECTURE
Xtreme Everest: lessons from life at the limits?
Professor Mike Grocott (Southampton)
Introduced by: Professor Edwin Chilvers (Cambridge)

12.45pm – 1.45pm
Rutherford, 4th floor
BTS SPECIALIST ADVISORY GROUP OPEN MEETING
Pulmonary Rehabilitation and Quality Improvement Advisory Group

12.45pm – 2.10pm
Moore, 4th floor
POSTER DISCUSSION: P1 – P11
Complications of TB and extra-pulmonary TB
Chaired by: Dr Martin Dedicoat (Birmingham) and Dr Marc Lipman (London)

P1
Access to bedaquiline and delamanid in England for treatment of drug resistant mycobacterial disease – results of a TB SAG survey
GC Hagan, M Dedicoat, G Bothamley

P2
Using an app to detect early ethambutol toxicity
E Batalla-Duran, R Unsworth

P3
The challenge of estimating TB mortality accurately: reconciling deaths reported in the TB notification system and the vital registration system in England and Wales, 2005-2015
MK Lalor, T Mohiyuddin, T Uddin, HL Thomas, M Lipman, CNJ Campbell

P4
Isolated mediastinal lymph node tuberculosis (IMLNTB) is characterised by elevation in systemic and bronchial IL-12 pathway mediators compared to pulmonary TB
H Jarvis, RS Thwaites, T Tunstall, JN Nanan, M Tolosa-Wright, I Marwah, AK Reuschl, TT Hansel, A Lalvani, OM Kon

P5
Pleural tuberculosis in London: a persistent diagnostic challenge
L Peters, GK Russell, Lj Martin, LY Han, M O’Donoghue, OM Kon, CL Ross

P6
Ocular tuberculosis: a survey of UK clinical practice
R Hussain, R Petrushkin, C Barracough, H Kunst, C Pravesio, VLC White, JL Potter

P7
Tuberculosis in differential diagnosis of intrathoracic lymphadenopathy in an endemic country – is EBUS-TBNA a useful tool?
LM Santos, M Jacomelli, VR Figueiredo

P8
Epidemiology of tuberculosis in Norfolk
A Bhamani, D Terrington, R Phillips

P9
Impact of the 2016 tuberculosis guideline on a single paediatric TB centre in the UK
L Turnbull, R Anderson, C Bell, F Child

P10
The role of FDG-PET CT imaging in ocular tuberculosis
CS Sethi, M Bhalla, MR Stanford, L Martin, G Russell, OM Kon

P11
How expert is the Xpert MTB/Rif for drug susceptible tuberculosis?
JB Mullerpattan, RB Banka, A Khillari, S Ganatra, ZF Udwadia, C Rodrigues
SCIENTIFIC PROGRAMME

1.15pm – 2.45pm
Abbey, 4th floor

POSTER DISCUSSION: P12 – P23

Asthma: airways and antibodies

Chaired by: Dr Binita Kane (Manchester) and Dr Dominick Shaw (Nottingham)

P12 Suppression of fractional exhaled nitric oxide with directly observed inhaled corticosteroid therapy: is it a useful test in routine clinical practice?
S Faruqi, J Thompson, K Watkins, H Cummings, N Jackson, A Prakash, MG Crooks

P13 Bronchial thermoplasty maintains a long-term reduction in peripheral blood eosinophils in severe asthma
K Hince, Lj Holmes, G McCumesky, D Ryan, RM Niven

P14 Therapeutic benefit of mepolizumab in the National Institute of Health and Care Excellence (NICE) sub-population – a post-hoc meta-analysis of phase Ib/III trials
H Marwaha, CEA Hartmann, RA Mehta, NB Gunsoy, FC Albers

P15 Cost effectiveness of mepolizumab for severe eosinophilic asthma from the UK perspective
S Doyle, K Westerhout, S Cockle, N Gunsoy, B Verheggen

P16 Implications of NICE guidance in England and Wales on eligibility for treatment with mepolizumab and omalizumab – an IDEAL study analysis
CEA Hartmann, H Starkie Camejo, NB Gunsoy, RA Mehta, FC Albers

P17 Monitoring inhaled corticosteroid adherence of patients on omalizumab in a real world cohort
LJ Holmes, R Daly, K Hince, C Ustabashi, DJ Allen

P18 Early experience initiating mepolizumab from NICE to the real world
LJ Holmes, L Elsey, R Niven

Wednesday 6 December 2017

1.45pm – 3.15pm
Windsor, 5th floor

JOINT BTS/BPRS SYMPOSIUM

SLEEP MEDICINE AND NON-INVASIVE VENTILATION: ISSUES AFFECTING CHILDREN AND ADULTS

Chaired by: Professor Anita Simonds (London) and Dr Don Urquhart (Edinburgh)

1.45pm Neuromuscular disease: challenges related to transition
Professor Anita Simonds (London)

2.15pm Sleep-disordered breathing, inflammation and effects on the cardiovascular system in childhood
Dr Athanasios Kaditis (Athens)

2.45pm Ethics of NIV/tracheostomy in fatal disease
Professor John Massie (Melbourne)
Wednesday 6 December 2017

Learning objectives:
At the end of this symposium, attendees will have:
1) Gained a state-of-the-art understanding of the systemic effects of sleep-disordered breathing and the long-term consequences of untreated disease.
2) Been introduced to the importance of decision-making and communication in providing optimal care in challenging scenarios:
   – prolonging life in the absence of curative therapies
   – children growing into young adults with severe neuro-muscular disease

2.00pm – 3.00pm
Gielgud, 2nd floor
OPEN MEETING
BTS/ARTP Strategy Board

2.00pm – 3.15pm
Mountbatten, 6th floor
POSTER DISCUSSION: P24 – P33
Clinical update in COPD
Chaired by: Dr Mona Bafadhel (Oxford) and Dr Diana Crossley (Birmingham)

P24 Mapping of end of life recognition and palliative care provision in COPD
   HM Ward, A Wood, C Morrissey, F Hakkak

P25 Living with COPD: a public awareness and screening campaign
   MG Crooks, J Thompson, S Platten, C Evans, S Faruqi

P26 How does the Salford Lung Study in COPD (SLS COPD) patient population fit into the GOLD 2017 classification grid?
   J Vestbo, I Boucot, L Frith, N Diar Bakerly, S Collier, DA Leather, JM Gibson, A Woodcock

P27 Deprivation in the COPD Salford Lung Study (SLS) is associated with higher healthcare costs but does not moderate the main outcomes
   R Jones, A Nicholls, D Browning, N Diar Bakerly, A Woodcock, J Vestbo, D Leather

P28 The use of a novel case-finding algorithm in the identification of chronic obstructive pulmonary disease (COPD) patients in primary care – early results of the ASSIST Study
   C Healy, A Hicks, K Gillett, E Ray, H Kruk, M North, C Newell, DM Thomas, T Wilkinson

P29 Clinical characteristics and management of patients with an inaccurate diagnosis of chronic obstructive pulmonary disease (COPD) in primary care; results from the Welsh national COPD primary care audit
   M Fisk, V McMillan, J Brown, J Holzhauer-Barrie, MS Khan, N Baxter, CM Roberts

P30 A service evaluation to assess the accuracy of the Gold Standard Framework Proactive Indicator Guidance (GSF PIG) in predicting 12 month mortality in patients with a diagnosis with chronic obstructive pulmonary disease
   S Pilsworth, J Crane, D Wat, S Sibley, M Shaw

P31 COPD diagnosis in primary care: a UK observational database study comparing patients with and without confirmed airflow obstruction
   LK Josephs, DC Culliford, Mj Johnson, DM Thomas

P32 Quantifying levels of physical activity in patients with COPD: a US cross-sectional survey
   B Ding, D Judge, M Small, N Bent-Ennakhil, S Siddiqui

P33 What matters to people with COPD?
   Outputs from Working Together for Change
   F Early, M Lettis, JP Fuld

SCIENTIFIC PROGRAMME
SCIENTIFIC PROGRAMME

2.00pm – 3.20pm
Rutherford, 4th floor

SPOKEN SESSION: S32 – S36
A troublesome cough: from diagnosis to treatment
Chaired by: Professor Jaclyn Smith (Manchester) and Dr Lorcan McGarvey (Belfast)

2.05pm  S32
Cough suppression test: a novel objective test for chronic cough
PSP Cho, H Fletcher, RD Turner, SS Birring

2.20pm  S33
The utility of FeNO in the differential diagnosis of chronic cough: the response to anti-inflammatory therapy with prednisolone and montelukast
M Haji Sadeghi, C Wright, S Hart, M Crooks, A Morice

2.35pm  S34
The effects of a novel formulation of inhaled cromolyn sodium (PA101) in idiopathic pulmonary fibrosis and chronic cough: a randomized, controlled, phase 2 trial
SS Birring, MS Wijsenbeek, S Agrawal, JWK van den Berg, H Stone, TM Maher, A Tutuncu, AH Morice

2.50pm  S35
Randomised control trial quantifying the efficacy of low dose morphine in a responder group of patients with refractory chronic cough
BA Al-Shekly, J Mitchell, B Issa, H Badri, I Satia, T Collier, S Sen, J Webber Ford, D Corfield, JA Smith

3.05pm  S36
Cough suppression therapy in secondary care
SJ Mohammed, J Steer, J Ellis, L Kellett, SM Parker

Wednesday 6 December 2017

2.00pm – 3.30pm
Westminster, 4th floor

PRIZE SYMPOSIUM: T1 – T6
BTS/BALR/BLF EARLY CAREER INVESTIGATOR AWARDS
Chaired by: Professor Edwin Chilvers (Cambridge)
Judged by: Professor Peter Bradding (Leicester), Professor Louise Donnelly (London) and Professor Gisli Jenkins (Nottingham)

T1  Bacteria can trigger airway sensory nerves via the activation of TLR2
MA Wortley, ED Dubuis, SJ Bonvini, MA Birrell, MG Belvisi

T2  Oestrogen: an endogenous agonist for TRPM3 triggered sensory nerve activation in the airway?
SJ Bonvini, MA Wortley, JJ Adcock, E Dubuis, JA Bolaji, S D’Sa, J Ma, MA Birrell, MG Belvisi

T3  Increased respiratory neural drive and work of breathing in exercise-induced laryngeal obstruction
ES Walsted, A Faisal, CJ Jolley, LL Swanton, MJ Pavitt, YM Luo, V Backer, MI Polkey, JH Hull

T4  Diabetes and pseudomonas, a terrible combination? Examining the UK Cystic Fibrosis Registry for a sex difference in outcomes (2008-2013)
SS Hippolyte, NJ Simmonds, D Bilton, U Griesenbach, R Keogh

T5  Complement protein C5a induces prolonged neutrophil dysfunction in a clinically relevant model of human bacteraemia
AJT Wood, A Vassallo, K Okkenhaug, JS Scott, J Simpson, C Summers, ER Chilvers, A Conway-Morris

T6  Understanding the cellular dysfunction caused by pathogenic surfactant protein C mutant I73T
JA Dickens, MO Ellis, SJ Marciniak
Wednesday 6 December 2017
2.00pm – 3.30pm
Cambridge, 5th floor
POSTER DISCUSSION: M1 – M11
Innovation in service design
Chaired by: Dr Jonathan Bennett (Leicester) and Professor Monica Spiteri (Stoke-on-Trent)

M1 Assertive outreach for persistent frequent attenders with COPD in the community; reducing attendance by meeting their unmet psychological needs
CSJ Chan, L Graham, D Roots, M Hodson, S Sunak

M2 Adult integrated respiratory care; staffing, populations served and pathways of care in the UK in 2017
KL Redden-Rowley, LJ Restrick, L Preston

M3 Effect of a ‘Defer Dispensing Inhaled Therapy’ Programme in an acute hospital trust
J Clark, D Eaton, J Congleton

M4 Meeting the psychological needs of COPD patients and enhancing self-efficacy: integrating clinical psychology in a community respiratory service
CSJ Chan, L Graham, D Roots, M Hodson, S Sunak

M5 Virtual clinics for chronic lung disease – comparison and learning from patient groups in primary care and integrated respiratory care services
J Cornwallis, S Purlackee, A Ahmed, R Hassan, G Ng-Man-Kwong

M6 Breathlessness rapid evaluation, assessment, treatment and health education (BREATHE); a novel approach to breathlessness in Stockport
V Gupta, K McEwan, P Ansbro, RR Viswesvaraiah, K Fern, H Oxenfirth, N Okolie, J Thompson, N Davies, K Lewis-Jones, F Poisson, S Gaduzo

M7 Impact and evaluation of electronic clinician-to-clinician advice service (E-consultation)
S Sufyan, E Fears, MN Khan, G Smith, GL Esterbrook, SL Meghjee, M Thirumaran, J McCreanor, P Blaxill, AOC Johnson, A Dwarakanath

2.00pm – 4.00pm
Churchill, Ground floor
SYMPOSIUM
BRONCHIECTASIS: WHAT TO EXPECT WHEN YOU ARE EXPECTORATING
Chaired by: Professor Stuart Elborn (Belfast) and Professor Tom Wilkinson (Southampton)

M8 Can reliable delivering of the 48-hour antimicrobial review result in a reduction in the number of days a patient stays on intravenous antibiotics on a respiratory unit? Results from a trainee led quality improvement project (QIP)
A Asour, S Abburu, J Sood, N Jaafar, D Hobday, S Khan, M Madhani, N Ahmad, A Choudhury

M9 Quality improvement project: can we improve recording of target oxygen saturations and prescribing on a respiratory ward in accordance to new British Thoracic Society (BTS) oxygen guidelines?
RT Rahman, G Young, N Shah, B Reyad, A Choudhury

M10 Demonstrating the potential role of community pharmacists in improving care of COPD patients
D Attar-Zadeh, A Guirguis, CE Heading, S Shah, U Shah, S Bancroft

M11 The use of asthma care bundle proformas can improve quality of care in acute asthma admissions
M Pace-Bardon, D Bilocca, K Jackson, P Bradding, RH Green

Learning objectives:
In this session, participants will understand the epidemiology, characteristics and clinical presentation of patients
SCIENTIFIC PROGRAMME

Wednesday 6 December 2017

2.30pm – 4.00pm
Albert, 2nd floor
POSTER DISCUSSION: P34 – P44
Interventional procedures in respiratory disease
Chaired by: Dr Samuel Kemp (London) and Dr Neal Navani (London)

P34 Prospective validation of a risk stratification model following negative EBUS-TBNA in isolated mediastinal and/or hilar lymphadenopathy
ZL Borrill, JL Hoyle, L Brown, R Booton, P Crosbie, M Evison

P35 A single centre prospective analysis of the effect of needle gauge on EBUS-TBNA sensitivity and safety
FR Millar, J Gates, A Kumar, MK Menon, RB Banka

P36 EBUS-TBNA diagnostic yield can be maintained when performed by a trainer supervising a second operator trainee
A Gupta, D Nicoara, A Sajeed, RK Panchal, M Tufail, J Bennett

P37 The clinical utility of rapid on-site evaluation (ROSE) in the diagnosis of non-malignant granulomatous mediastinal lymphadenopathy following endobronchial ultrasound (EBUS)
J Capps, K Heyes, S Bailey, T Gorsuch, M Woodhead, D Shelton, D Rana, N Narine, H Al-Najjar

P38 EBUS-TBNA in lung cancer – can we simplify diagnosis and staging in a single procedure?
LM Santos, D Jaramillo, M Jacomelli, VR Figueiredo

2.30pm – 4.05pm
St James, 4th floor
POSTER DISCUSSION: P45 – P57
Cellular insights into lung injury repair
Chaired by: Professor Maria Belvisi (London) and Dr Paul Mercer (London)

P45 Mechanisms of regeneration: retinoic acid acts via the endothelium to drive human lung repair
J Alçada, DS Shao, MJD Griffiths, CH Dean, M Hind

P46 Cigarette smoke- and hypoxia-induced imbalanced vasoactive gene expression in human pulmonary artery endothelial and smooth muscle cells
A Alqarni, O Brand, A Pasini, M Alshehri, L Pang
Wednesday 6 December 2017

P47  Hypercapnia impairs the ability of mesenchymal stem cells to promote distal lung epithelial wound repair in ARDS
NF Fergie, DF McAuley, CM O’Kane, AD Krasnodembskaya

P48  The effects of TGF-β and IL-33 on the pro-fibrotic activity of primary human lung fibroblasts during the development of IPF
KE Stephenson, CL Overed-Sayer, AE John, ES Cohen, RG Jenkins

P49  The effects of oral cotrimoxazole upon neutrophil and monocyte activation in patients with pulmonary fibrosis and healthy controls; does this relate to its action in idiopathic pulmonary fibrosis?
VA Varney, B Smith, G Quirke, H Parnell, S Ratnatheepan, AS Bansal, A Nicholas

P50  Localisation of the glycolytic isozyme, pyruvate kinase M2 in the lung of idiopathic pulmonary fibrosis
ST Tan, EJF Forty, PFD Durrenberger, RJM McAnulty, RCC Chambers, PFM Mercer

P51  Lung epithelial cell inhibition of cytokine production by peripheral blood mononuclear cells and lung lymphocytes
S Layzell, A Southern, ID Pavord, TJ Powell

P52  Exploring the interaction between HIV-1 gp120, bronchial airway epithelial cells and macrophages
BT Talbot, CAS Stokes, PJC Collini, AMC Condliffe

P53  Phosphoinositide-3 kinase and MEK inhibition prevents uptake of bacteria by airway epithelial cells
EC Duffett, PS Fenwick, PJ Barnes, LE Donnelly

P54  Eosinophil migration is enhanced towards IL-5 and eotaxin in COPD
RR Lababidi, JL Cane, M Bafadhel

P55  Exploring rhinovirus-induced ER stress in bronchial airway epithelial cells
KL Bradley, CA Stokes, LC Parker, AM Condliffe

SCIENTIFIC PROGRAMME

P56  Human rhinovirus impairs phagocytosis of Haemophilus influenzae in alveolar macrophages in chronic obstructive pulmonary disease
LJ Finney, K Belchamber, S Kemp, G Donaldson, P Mallia, SL Johnston, JA Wedzicha

P57  Soluble receptor for advanced glycation end-products (sRAGE) in patients with COPD: the ERICA Study

2.30pm – 4.15pm
Moore, 4th floor
POSTER DISCUSSION: P58 – P71
Respiratory medicine: common problems, new insights
Chair by: Dr Abigail Moore (London) and Dr Paul Walker (Liverpool)

P58  A qualitative and quantitative assessment of patients’ attitudes to pulmonary targeted antibiotics in bronchiectasis
J Davison, D McEvoy, G Davies, R Lee, T Rapley, A De Soyza

P59  Home bronchiectasis service: a safe and clinically effective model for managing infective exacerbations of bronchiectasis in the community
K Cobb, E Jennison, J Graves, J Richards

P60  Outcomes of pregnancy in women with bronchiectasis
SEG Taylor, WG Flight

P61  Self-management for non-cystic fibrosis bronchiectasis: Cochrane Systematic Review
C Kelly, S Spencer, S Grundy, D Lynes, DJW Evans, S Guder, SJ Milan

P62  Oxygen desaturation index for diagnosing obstructive sleep apnoea in patients with morbid obesity
A Fawzi, H Basheer, M Patel, S Sharma
Establishing the cost of hospitalised community acquired pneumonia (CAP): a hospital episode statistics (HES) analysis
D Jones, J Campling, G Ellsbury, C Czudek, H Madhava, M Slack

Predicting the impact of tobacco price increase policies on COPD burden in Italy
VJ Jani, LP Potts, GP Pesce, AM Marcon, SA Accordini, DJ Jarvis, CM Minelli

Quality of inpatient care for COPD exacerbations and its impact on clinical outcomes
BC Cushen, AA Alsaid, EC Cleere, PM MacHale, LT Tompkins, IS Sulaiman, GG Greene, EM MacHale, RWC Costello

Exacerbation telemonitoring for COPD patient under long term oxygen therapy. Step 1: breathing rate measurement validation
J Soler, XL Le, DPQ Nguyen, L Grassion, R Antoine, A Guerder, J Gonzalez-Bermejo

Implementing BTS asthma discharge bundle improves discharge planning in children
NT Patel, V Moreton, L Nair, I Eckersall, JC Furness

Asthma symptom improvements with benralizumab are associated with improvements in activity functions and quality of life for patients with severe, uncontrolled asthma: results of pooled phase III benralizumab studies
G Gopalan, X Xu, S O’Quinn, I Hirsch

Functionality, reliability, and performance of an accessorized pre-filled syringe with home-administered subcutaneous benralizumab for adult patients with severe asthma
AH Mansur, GT Ferguson, JS Jacobs, J Hebert, C Clawson, W Tao, Y Wu, M Goldman

Relation between bronchial asthma and parasitic (nematodes) infection in Egyptian children
YM Bakr, MM Shahin, MH Zidan, AA Alfatah, JS Gharraf

Mepolizumab in adolescents with severe eosinophilic asthma not eligible for omalizumab: one centre’s experience
EW Weir, JYP Paton

Is the use of a novel high frequency airway oscillating device feasible for the management of chronic obstructive pulmonary disease?
E Daynes, TC Harvey-Dunstan, NJ Greening, SJ Singh

Systematic review of the use of physical activity devices as an adjunct to pulmonary rehabilitation in patients with chronic obstructive pulmonary disease
BL Turner, M Kwok, AM Wilson

Why do patients with COPD decline post exacerbation pulmonary rehabilitation?
ES Mullen, S Ward, L Clinch, C Chebbout, K Barley, C Mitchell-Issitt, N Gardiner, S Singh

Self-reported staff knowledge, confidence and skills to deliver patient education in pulmonary rehabilitation
CLA Bourne, NY Gardiner, MW Orme, SJ Singh

“Just do it!” Patient satisfaction after a course of pulmonary rehabilitation and advice to other potential participants
S Lohar, O Revitt, C Bourne, SJ Singh

Shuttle walk tests: are they just an outcome measure?
P Kanabar, J Ruksenaite, L Houchen-Wolloff, S Singh

Cardiovascular and musculoskeletal phenotypes and the clinical outcomes in COPD: a systematic review and meta-analysis
JM Fermont, KL Masconi, AM Wood, H Müllerova, IB Wilkinson
Wednesday 6 December 2017

3.00pm – 4.00pm
Victoria, 2nd floor
BTS SPECIALIST ADVISORY GROUP
OPEN MEETING
ASTHMA

3.00pm – 4.30pm
Coffee/Tea will be served in the Whittle & Fleming and Britten, 3rd floor, and the Cambridge, 5th floor (3.15pm – 3.30pm only)

3.30pm – 5.00pm
Windsor, 4th floor
POSTER DISCUSSION: P79 – P90
Update in paediatric lung disease
Chaired by: Dr Prasad Nagakumar (Birmingham) and Dr Katy Pike (London)

P79 Children with complex congenital heart disease: who needs a pre-flight hypoxic challenge test?
N Naqvi, VL Doughty, L Starling, R Franklin, S Ward, PEF Daubeney, IM Balfour-Lynn

P80 Assessment of association between duration of oxygen therapy in children with chronic lung disease of prematurity (CLDP) and management of PDA
AZ Zafar, SA Alifieraki, JB Bhatt

P81 What is the ideal target preterm population that might benefit from the expensive palivizumab prophylaxis?
L Tsilika, D Batra, AP Prayle, M Hurley, JM Bhatt

P82 Comparison of RSV hospitalisation in pre-term infants with chronic lung disease who do not qualify for palivizumab prophylaxis with those who qualify in Nottingham, UK
L Tsilika, D Batra, AP Prayle, M Hurley, JM Bhatt

P83 Respiratory morbidity and assessment of respiratory risk factors in school aged children with severe neurological impairment
L Thomson, L Gardner, K Sharp, P Davies

P84 Longer term tolerability of nebulised hypertonic saline in children with respiratory disease
GM Housley, N Sanghani, A Bush

P85 Preschool wheeze: a role for antibiotics?
RJ Langley, RA Lewsey, P Davies

4.15pm – 4.40pm
Churchill, Ground floor
AWARD PRESENTATIONS
Presentation of the BTS Medal, BTS Award for Meritorious Service, BTS/BALR/BLF Early Career Investigator of the Year Award and the BTS Medical Student Awards

4.40pm – 5.30pm
Churchill, Ground floor
THE BTS PRESIDENT’S ADDRESS
“A little flutter with the lung”
Professor Mark Woodhead (Manchester)
Introduced by: Professor Edwin Chilvers (Cambridge)

5.30pm – 6.00pm
Churchill, Ground floor
BTS ANNUAL GENERAL MEETING
(BTS members only)
**SCIENTIFIC PROGRAMME**

**Thursday 7 December 2017**

8.00am – 9.00am
**COFFEE/TEA will be served in the Whittle & Fleming, 3rd floor**

8.45am – 4.00pm
**Whittle & Fleming, 3rd floor**
**POSTER VIEWING**

_Authors present: 10.00am – 11.00am_

**P91–P101**
**Multi-morbidity in COPD**
Discussion of abstracts will take place from 1.45pm to 3.10pm in the Windsor, 5th floor

**P102–P110**
**Triggers and treatment of cough**
Discussion of abstracts will take place from 2.00pm to 3.10pm in the Albert, 2nd floor

**P111–P122**
**Infected lung: from bench to bedside**
Discussion of abstracts will take place from 2.00pm to 3.30pm in the Moore, 4th floor

**P123–P133**
**Ventilatory strategies for patients with respiratory failure**
Discussion of abstracts will take place from 3.30pm to 5.00pm in the Windsor, 5th floor

**P134–P146**
**Characterisation of lung disease with imaging and physiology**
Discussion of abstracts will take place from 3.30pm to 5.00pm in the Rutherford, 4th floor

**P147–P160**
**A clinical update in interstitial lung disease**
Discussion of abstracts will take place from 3.30pm to 5.15pm in the Westminster, 4th floor

**P161–P170**
**Early detection and screening in TB**
Discussion of abstracts will take place from 3.45pm to 5.00pm in the Abbey, 4th floor

**P171–P184**
**Pulmonary vascular disease: monitoring and managing**
Discussion of abstracts will take place from 3.45pm to 5.30pm in the Mountbatten, 6th floor

**Thursday 7 December 2017**

8.45am – 4.00pm
**Cambridge, 5th floor**
**MODERATED POSTER VIEWING**

**M12–M23**
**Patient, physician and carer perspectives**
Discussion of abstracts will take place from 2.00pm to 3.30pm in the Cambridge, 5th floor

8.00am – 8.30am
**Albert, 2nd floor**
**BTS JOURNAL CLUB**
**TUBERCULOSIS**
Dr Veronica White (London)

_Learning objectives:_

_This Journal Club will introduce and summarise three to four key papers that have been published in the past 12 months on the subject of “Tuberculosis”. Dr Veronica White (Clinical Lead for the TB service at Barts Health NHS Trust, which has one of the largest TB services in Western Europe) will then lead a discussion on these papers, based on her internationally recognised experience in this field. The relevant references will be available on the BTS website at the beginning of November so that delegates may review the papers in advance._

8.30am – 9.50am
**St James, 4th floor**
**SPOKEN SESSION: S37 – S41**
**Hot topics in home-based mechanical ventilation**

_Chaired by: Dr Alanna Hare (London) and Dr Justin Pepperrell (Taunton)_

8.35am **S37**
Home mechanical ventilation (HMV) and home oxygen therapy (HOT) following an acute exacerbation of COPD in patients with persistent hypercapnia: results of the per protocol analysis from the HOT-HMV UK Trial

PB Murphy, G Arbane, R Phillips, N Hart
Thursday 7 December 2017

8.50am  S38
Home mechanical ventilation (HMV) and home oxygen therapy (HOT) following an acute exacerbation of COPD in patients with persistent hypercapnia: predicting 1 year admission-free survival in the HOT-HMV UK trial
PB Murphy, G Arbane, A Bisquera, N Hart

9.05am  S39
An outreach service for domiciliary non-invasive ventilation (NIV) improves access for patients
SK Mansell, S Cutts, R Kanakaraj, R Jose, A Mackay, I Moonsie, S Mandal

9.20am  S40
Survival in domiciliary NIV. An observational cohort study over a 9-year period
T Ingle, A Creamer, A Patel, K Lee

9.35am  S41
Tracheostomy ventilation in motor neurone disease: a multi-centre review
JM Palmer, AD Armstrong, B Kathiresan, MJ Latham, R Moses

8.30am – 10.00am
Mountbatten, 6th floor
JOINT BTS/BPRS SYMPOSIUM
SIMILAR DISEASES? DIFFERENCES IN MANAGING ADULTS AND CHILDREN
Chaired by: Dr Rebecca Thursfield (Liverpool) and Dr Lena Thia (Wales)

8.30am  Interstitial lung disease
Dr Elisabetta Renzoni (London)

9.00am  Difficult asthma
Professor Ruth Green (Leicester)

9.30am  Bronchiectasis
Dr Anthony De Soyza (Newcastle upon Tyne)

Learning objectives:
1) To explore differences (and similarities) in treating diseases that occur across all ages.
2) To provoke discussions so both paediatricians and adult specialists can learn from each other’s experiences.
3) To aid our understanding, which should promote better transition arrangements when children move to adult services.

8.30am – 10.05am
Abbey, 4th floor
SPOKEN SESSION: S42 – S47
New insights in bronchiectasis
Chaired by: Dr Karen Heslop-Marshall (Newcastle) and Dr Michael Loebinger (London)

8.35am  S42
Sex differences in reported quality of life in bronchiectasis: an analysis of the EMBARC registry
SM Finch, A Shoemark, M Crichton, M Loebinger, E Polverino, S Aliberti, P Goeminne, M Vendrell, A De Soyza, K Dimakou, JD Chalmers

8.50am  S43
In-hospital mortality and length of stay following cardiovascular events and interventions in people with bronchiectasis: a population based study
M Plowright, JP Hutchinson, JK Quint, RB Hubbard, V Navaratnam

9.05am  S44
RCT evaluation of the bronchiectasis empowerment tool self-management intervention using self-reported questionnaires and focus groups
C Brockwell, AM Wilson, A Clark, G Barton, MC Pasteur, R Fleetcroft, JH Hill, A Stöckl

9.20am  S45
Validation of the incremental shuttle walk test as a clinical endpoint in bronchiectasis
MK Cartlidge, AT Hill

9.35am  S46
Is Pseudomonas infection a necessary precursor to NTM infection in non-CF bronchiectasis?
M Elsayed, E Doherty, C Marchand, A Malin

9.50am  S47
Hypertonic saline inhaled therapy – results of drug reaction assessments
G Rinaldi, G Housley, A Shah, B Dennis, M Loebinger
SCIENTIFIC PROGRAMME

8.30am – 10.30am
Churchill, Ground floor
JOINT BTS/BTOG SYMPOSIUM
MOLECULAR TARGETING OF LUNG CANCER – ARE WE BEGINNING TO WIN THE BATTLE?
Chaired by: Professor David Baldwin (Nottingham) and Dr Malcolm Lawson (Chelmsford)

8.30am  Linking lung cancer biology to novel therapeutics
Professor Sam Janes (London)

9.00am  Unlocking the evolutionary secrets of lung cancer – what can it teach us about treatment?
Dr Mariam Jamal-Hanjani (London)

9.30am  How and when to test for susceptibility to immunotherapy
Professor John Gosney (Liverpool)

10.00am  Immunotherapy for lung cancer – real hope or expensive hype?
Professor Frances Shepherd (Toronto)

Learning objectives:
1) To understand how a better understanding of lung cancer biology can help in the development of novel therapeutics.
2) To understand which patients we should be testing for susceptibility to immunotherapy.
3) To discover whether immunotherapy really will make a difference in NSCLC.

8.45am – 10.05am
Westminster, 4th floor
SPOKEN SESSION: S48 – S52
Diagnosing and treating pulmonary vascular disease
Chaired by: Dr Laura Price (London) and Dr Karen Sheares (Cambridge)

8.50am  S48
Septal angle on MRI predicts combined pre and post capillary pulmonary hypertension
CS Johns, JM Wild, S Rajaram, E Tubman, D Capener, C Elliot, R Condliffe, A Charalampopoulos, DG Kiely, AJ Swift

Thursday 7 December 2017

9.05am  S49
Elicitation of disutility values associated with the mode of administration of drugs acting on the prostacyclin pathway in pulmonary arterial hypertension (PAH)
EW Davies, S Llewellyn, A Beaudet, CE Kosmas, H Doll

9.20am  S50
CAMPHOR Score: sustained improvement in patient reported outcomes following pulmonary endarterectomy in chronic thromboembolic pulmonary hypertension
M Newnham, K Bunclark, N Abraham, L Amaral Almeida, J Cannon, S Clare, N Doughty, J Dunning, C Ng, A Ponnabaranam, S Scholtes, K Sheares, N Speed, D Taboada, M Toshner, S Tsui, D Jenkins, J Pepke-Zaba

9.35am  S51
Patient pathway mapping of UK referrals to the National Pulmonary Endarterectomy MDT (June 2015 – May 2016)
K Bunclark, N Abraham, L Amaral Almeida, J Cannon, S Clare, N Doughty, J Dunning, C Ng, M Newnham, A Ponnabaranam, A Ruggiero, N Screaton, K Sheares, N Speed, D Taboada, M Toshner, S Tsui, D Jenkins, J Pepke-Zaba

9.50am  S52
Computed tomography in the diagnosis of left heart disease in patients with suspected pulmonary hypertension
B Currie, C Johns, M Chin, CA Elliot, RA Condliffe, A Charalampopoulos, S Rajaram, JM Wild, DG Kiely, AJ Swift

8.45am – 10.05am
Moore, 4th floor
SPOKEN SESSION: S53 – S57
From diagnosis to treatment in interstitial lung disease
Chaired by: Dr Shaney Barrett (Bristol) and Dr Muhunthan Thillai (Cambridge)

8.50am  S53
Marked small airway dysfunction and consequent air-trapping characterise chronic hypersensitivity pneumonitis (CHP) but not idiopathic pulmonary fibrosis (IPF)
**Thursday 7 December 2017**

M Bonini, O Usmani, A Pacini, I Menichini, SW Ward, S Walsh, C Daccord, C Minelli, M Brunori, AU Wells, F Chua

**9.05am S54**
Automating the analysis of thoracic CT scans in cystic lung disease
V Maharajan, S Karia, ER Maher, SN Taraskin, SR Johnson, SJ Marziani

**9.20am S55**
Derivation and validation of a simple longitudinal score which strongly predicts mortality in interstitial lung disease (ILD) associated pulmonary hypertension (ILD-PH)
SRB Bax, C Breedy, K Dimopoulos, A Kempny, A Devaraj, S Walsh, J Joseph, A Nair, G Kier, M Kokosi, C Harries, V Kouranos, C McCabe, W Li, M Wilde, AU Wells, LC Price, SJ Wort

**9.35am S56**
The impact of azithromycin in idiopathic pulmonary fibrosis
O Alzaher, C Macaluso, J Maritano, R Chaube, F Chua, M Kokosi, V Kouranos, AU Wells, TM Maher, PM George, ER Renzoni, PL Molyneaux

**9.50am S57**
Predictors of uptake of ambulatory oxygen on completion of the AmbOx trial, a study to assess effects of ambulatory oxygen on quality of life in patients with fibrotic interstitial lung disease

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**SCIENTIFIC PROGRAMME**

**8.45am – 10.15am**
Windsor, 5th floor
**SYMPOSIUM**

**LUNG HEALTH UNDER THREAT**
Chaired by: Dr Chris Barber (Sheffield) and Dr Alex Wilkinson (Stevenage)

**8.45am**
The present and future impacts of climate change on lung health
Dr Isabella Annesi-Maesano (Paris)

**9.15am**
Air pollution – the lungs and beyond
Professor Frank Kelly (London)

**9.45am**
What controlled human diesel exhaust exposures tell us about air pollution: why this still matters
Dr Christopher Carlsten (Vancouver)

*Learning objectives:*
The lungs are at risk from environmental changes – this session will provide information about the impact of climate change on the lungs as well as impacts of pollution and particularly diesel traffic.

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**10.00am – 11.00am**
**COFFEE/TEA will be served in the Whittle & Fleming and Britten, 3rd floor**

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**10.15am – 11.50am**
St James, 4th floor
**SPOKEN SESSION: S58 – S63**

**Paediatric asthma: big and real world data**
Chaired by: Professor Sejal Saglani (London) and Professor Michael Shields (Belfast)

**10.20am S58**
FEV1 and FeNO as predictors of asthma outcomes in children? An individual patient data analysis using data from six FeNO trials

**10.35am S59**
Predicting asthma in later childhood: a general and high-risk population approach
**Thursday 7 December 2017**

for all. What, if anything, can we learn from other UK nations and how can we make best use of existing NHS initiatives such as RightCare? This panel event aims to engage delegates working across the respiratory community.

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**10.30am – 12.00pm**

**Mountbatten, 6th floor**

**SYMPOSIUM**

**PULMONARY REHABILITATION – DOING MORE AND BETTER**

*Chaired by: Dr Charlotte Bolton (Nottingham) and Professor Ioannis Vogiatzis (Newcastle upon Tyne)*

- **10.30am** Non-COPD rehabilitation (asthma and ILD)
  - Dr Rachael Evans (Leicester)

- **11.00am** Promoting physical activity
  - Professor Michael Polkey (London)

- **11.30am** Is home-based rehabilitation an option?
  - Professor Anne Holland (Melbourne)

**Learning objectives:**

Pulmonary rehabilitation is one of the highest value interventions for COPD. How can it be delivered more effectively and efficiently and how well does it apply to non-COPD respiratory disease?

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**10.45am – 12.30pm**

**Churchill, Ground floor**

**SYMPOSIUM**

**PLENARY SCIENTIFIC**

*Chaired by: Professor Louise Donnelly (London) and Professor Gisli Jenkins (Nottingham)*

- **10.45am** Imaging and pulmonary hypertension: ready for prime time?
  - Professor David Kiely (Sheffield)

- **11.10am** The role of neutrophils in acute pulmonary inflammation
  - Dr Charlotte Summers (Cambridge)

- **11.35am** The opposing roles of leukotriene A4 hydrolase in regulating pulmonary inflammation
  - Dr Robert Snelgrove (London)

- **12.00pm** High-risk COPD
  - Dr John Hurst (London)
Thursday 7 December 2017

Learning objectives:

A highlight of the Winter Scientific Meeting programme, as four of the UK’s top respiratory researchers share highlights of their work and its relevance to patients.

12.00pm – 2.00pm
LUNCH will be available to purchase in the Cafe in the Pickwick, 1st floor, and the Snack Bar in the Whittle & Fleming, 3rd floor

12.30pm – 1.30pm
Albert, 2nd floor
BTS SPECIALIST ADVISORY GROUP
OPEN MEETING
Nurse Advisory Group

12.30pm – 1.30pm
Victoria, 2nd floor
BTS SPECIALIST ADVISORY GROUP
OPEN MEETING
Occupational and Environmental Lung Disease

12.30pm – 1.30pm
Rutherford, 4th floor
BTS SPECIALIST ADVISORY GROUP
OPEN MEETING
Tuberculosis

12.30pm – 1.45pm
Gielgud, 2nd floor
OPEN SESSION
The Respiratory Research Road Map and training the next generation
Chaired by: Professor Ian Hall (Nottingham)

12.30pm
Update on the BTS-UKRRC Research Road Map project
Professor Ian Hall (Nottingham)

Academic training in Respiratory Medicine:

12.45pm
The do’s and don’ts of research training in respiratory medicine
Professor Edwin Chilvers (Cambridge)

1.00pm
The trainee’s view
Dr Shahideh Safavi (Nottingham)

1.15pm
NIHR review of training
Dr Peter Thompson (Leeds)

1.30pm
General discussion

This session, organised jointly by the BTS and the UK Respiratory Research Collaborative (UKRRC), will provide an update on the Research Road Map project, and talks designed to help trainees and supervisors plan research training in respiratory medicine.

12.45pm – 1.30pm
Churchill, Ground floor
THE MORRISTON DAVIES LECTURE
Making research more reproducible and useful
Professor John Ioannidis (Stanford)
Introduced by: Professor Adam Hill (Edinburgh)

1.45pm – 3.05pm
St James, 4th floor
SPOKEN SESSION: S64 – S68
Asthma: infection and inflammation
Chaired by: Dr Hitasha Rupani (Southampton) and Professor Stephen Scott (Chester)

1.50pm S64*
Clinical and transcriptomic profiles of severe asthmatics with high or low expression of the glucocorticoid receptor and importin-7
RM Mullegama, SP Pavlidis, KFC Chung, IMA Adcock, PKB Bhavsar

2.05pm S65
Quantification of ‘whole lung’ pulmonary eosinophilic inflammation using radiolabelled autologous human eosinophils
N Farahi, S Loutsios, N Tregay, AKA Wright, LSC Lok, D Gillett, I Cullum, RP Simmonds, C Summers, A Wong, CK Solanki, J Buscombe, PH Pang, A Thavakumar, AM Peters, CE Brightling, AM Condliffe, ER Chilvers

2.20pm S66
Long-term azithromycin therapy improves clinical outcomes in an infective phenotype of severe asthma
K Ibrahim, AH Mansur

2.35pm S67
Persistent frequent exacerbators: a subtype of severe asthma
SCIENTIFIC PROGRAMME
AD Gani, IM Adcock, U Hoda, S Pavlidis, F Chung

2.50pm  S68
Phase 1 trial of an intranasal respiratory syncytial virus (RSV) subunit candidate vaccine: safety results from the MUC-SynGEM study
IV Vlachantoni, SA Ascough, RG Grimaldi, KL Leenhouts, CC Chiu, PO Openshaw

*S64 BTS Medical Student Awards Winner

1.45pm – 3.05pm
Rutherford, 4th floor
SPOKEN SESSION: S69 – S73
New approaches to characterising paediatric respiratory diseases
Chair: Dr Paul Aurora (London) and Professor Jane Lucas (Southampton)

1.50pm  S69
Genetic and structural characterization of outer dynein arm variants causing primary ciliary dyskinesia
F Daudvohra, MR Fassad, M Dixon, T Burgoyne, AV Rogers, MR Loebinger, C Hogg, HM Mitchison, A Shoemark

2.05pm  S70
Change in lung clearance index and exhaled nitric oxide as markers of systemic corticosteroid response in children with severe asthma
S Irving, Y Bingham, C Bossley, L Fleming, S Saglani, A Bush

2.20pm  S71
Are ethnic differences in lung function explained by differences in respiratory muscle strength in children?
NTS Gharbawi, G Duncan, EA Gaillard, M Viskaduraki, CS Beardsmore

2.35pm  S72
Clinical and pathological characteristics of severely asthmatic children with persistent airflow limitation
AN Nayeem, SS Saglani, AB Bush, LPS Silveira, CB Bossley, LF Fleming

Thursday 7 December 2017

2.50pm  S73
Cough frequency and diurnal patterns in children with asthma
D Elghamoudi, K McGuinness, J Smith, C Murray

1.45pm – 3.10pm
Windsor, 5th floor
POSTER DISCUSSION: P91 – P101
Multi-morbidity in COPD
Chair: Dr Charlotte Bolton (Nottingham) and Dr Neil Greening (Leicester)

P91  High prevalence of vitamin D deficiency amongst patients with COPD in the North East. Highlighting a deficiency and need for improved assessment
H Tedd, K Conroy, A Mitchell, Y Shanshal, H Curtis

P92  Efficacy of beta blockers prescribed among COPD patients with concomitant heart failure
S Ashraf, A Ashraf

P93  ‘COPD: CT thorax – friend or foe’: clinical utility of CT thorax in diagnosing comorbidities
AV Vohra, PD Dalal, SK Kaul

P94  Cardiorespiratory physiology in patients with COPD according to blood eosinophilia: data from the ERICA cohort

P95  Chronic obstructive pulmonary disease in symptomatic aortic stenosis: a main underlying diagnostic confounder and prognostic factor
M Rigolli, A Rossi, PL Temporelli, G Benfari, G Cioffi, S Nistri, N Galibazza, F Guidetti, M Bafadhel, P Faggiano

P96  Death related to cardiovascular disease in chronic obstructive pulmonary disease
JM Fermont, AM Wood, H Mullerova, IB Wilkinson
Thursday 7 December 2017

P97  A cross-sectional analysis of domain specific cognitive impairment in chronic obstructive pulmonary disease
    JW Mitchell, C Morris, HC Moorey, G Tadros, A Turner

P98  Grey matter atrophy, retinal vessel dilatation and reduction in aortic distensibility in COPD: the relationship between multi-organ vascular measures
    JW Dodd, CA Spilling, M-PK Bajaj, DR Burrage, S Ruickbie, GJ McKay, C Bucciarelli-Ducci, EH Baker, TR Barrick, PW Jones

P99  Clinical characteristics and management of dual asthma and chronic obstructive pulmonary disease (COPD) diagnosis in primary care; results from the Welsh national COPD primary care audit
    M Fisk, V McMillan, J Brown, J Holzhauer-Barrie, MS Khan, N Baxter, CM Roberts

P100 Risk of stroke associated with acute exacerbations of chronic obstructive pulmonary disease (COPD): a self-controlled case series
    OL Connell, KJ Rothnie, JK Quint

P101 Reasons for accident and emergency department attendance by people with heart failure or chronic obstructive pulmonary disease: recipients’ and providers’ perspectives. An exploratory study
    JS Lee, E Barley, H Lempp, V Srivastava

1.45pm – 3.15pm
Abbey, 4th floor
SYMPOSIUM
BTS Clinical Audit and Quality Improvement
Chairled by: Dr Jonathan Bennett (Leicester)

1.45pm  Introduction: BTS QI and changes to the audit programme
        Dr Jonathan Bennett (Leicester)

Reports from recent national audits:

1.55pm  BTS National Adult Asthma Audit 2016
        Professor Stephen Scott (Chester)

2.15pm  BTS National Paediatric Pneumonia Audit 2016/17
        Dr Julian Legg (Southampton)

2.35pm  BTS National Bronchoscopy Audit 2017
        Dr Jonathan Bennett (Leicester)

2.55pm  Quality improvement following the National BTS Smoking Cessation Audit
        Dr Alexander Hicks (Southampton) and Dr Zaheer Mangera (London)

1.45pm – 3.20pm
Westminster, 4th floor
SPOKEN SESSION: S74 – S79
Mechanistic insights into interstitial lung disease
Chairled by: Dr Chris Scotton (Exeter) and Dr Hannah Woodcock (London)

1.50pm  S74 Endoplasmic stress is associated with fibrosis in interstitial lung disease
        H Parfrey, E Moseley, B Beardsley, J Knight, SJ Marciniak, D Rassl

2.05pm  S75 Cyclical stretch induces Gαq/11 mediated TGFβ activation in lung fibroblasts
        AT Goodwin, AL Tatler, S Offermanns, G Jenkins

2.20pm  S76 Role of galectin-3 in the development of idiopathic pulmonary fibrosis
        N Parmar, A Tatler, P Ford, G Jenkins

2.35pm  S77 Transcriptomic studies reveal monocyte-related genes as major contributor to disease activity in pulmonary sarcoidosis
        Y Kendrick, A Crawshaw, H Lockstone, E Giannoulatou, K Argoud, S Taylor, LP Ho

2.50pm  S78 Increased CD16briCD62LdimCD11b+ subset of neutrophils in bronchoalveolar lavage from patients with interstitial lung disease
        DLW Chong, J Sahota, HL Booth, JC Porter

Scientific Programme

Thorax 2017;72(Suppl 3):Aii–Axxxiv
3.05pm  S79
Localised hypoxia enhances neutrophil extravasation and activation in interstitial lung disease
AA Khawaja, J Sahota, C Pericleous, VM Ripoll, DLW Chong, G Azzopardi, LW Thomas, HL Booth, AM Groves, M Ashcroft, I Giles, JC Porter

1.45pm – 3.45pm
Churchill, Ground floor
SYMPOSIUM
WEDDED TO TB: SOMETHING OLD, SOMETHING NEW, SOMETHING RECONSTITUTED, SOMETHING TURNING BLUE
Chaired by: Professor Onn Min Kon (London) and Dr Anna Rich (Nottingham)

1.45pm Advances in the genetics of TB: what the practicing physician needs to know
Dr Eliza Alexander (PHE)

2.15pm Who will develop active TB? The role of biomarkers
Professor Hazel Dockrell (London)

2.45pm Worsening symptoms during TB treatment: paradoxical responses and IRIS or relapse?
Dr Marc Lipman (London)

3.15pm Genomic analysis of globally diverse M. tuberculosis
Dr Keira Cohen (Baltimore)

Learning objectives
1) To help physicians understand the molecular biology of TB and its role in assessing drug resistance and outbreak management.
2) To provide an update on mechanisms how latent TB progresses to active disease and how biomarkers might impact on clinical practice in the near future.
3) To update physicians on the most recent research and analysis of why paradoxical responses occur and logic behind measures to address to them.
4) To provide an overview of the genetic evolution of multi-drug resistant TB strains to determine whether molecular diagnostic techniques could enable future targeted treatment of patients prior to development of MDR-TB.

Thursday 7 December 2017

2.00pm – 3.00pm
Victoria, 2nd floor
BTS SPECIALIST ADVISORY GROUP
OPEN MEETING
Pleural Disease

2.00pm – 3.00pm
Gielgud, 2nd floor
OPEN MEETING
BLF research highlights – mesothelioma update
Chaired by: Professor Andrew Peacock (Glasgow)

2.00pm Immunotherapy for mesothelioma
Dr John Maher (London)

2.20pm MesobanK update
Dr Robert Rintoul (Cambridge)

2.40pm The Mesothelioma Stratified Therapy (MisT) Trial
Dr Harriet Walter (Leicester)

2.00pm – 3.10pm
Albert, 2nd floor
POSTER DISCUSSION: P102 – P110
Triggers and treatment of cough
Chaired by: Professor Surinder Birring (London) and Dr James Hull (London)

P102 The sensations provoking cough: quantitative study
YK Huong, D Yuille, A Caress, J Smith, J Yorke

P103 The urge to cough in COPD
A Solomon, PSP Cho, H Fletcher, IS Patel, CJ Jolley, RD Turner, SS Birring

P104 Sensations associated with experimentally evoked cough: influence of low dose morphine sulphate in opioid responders
J Mitchell, B Al-Shekly, B Issa, T Collier, S Sen, J Webber Ford, D Corfield, JA Smith

P105 Does FeNO predict clinical characteristics in chronic cough?
M Haji Sadeghi, C Wright, S Hart, M Crooks, A Morice
Thursday 7 December 2017

P106  The use of gabapentin and pregabalin for the management of chronic cough in a tertiary cough clinic
B Al-Sheklly, H Badri, I Satia, AWoodcock, JA Smith

P107  Time to re-group: a novel approach to the delivery of speech and language therapy for chronic refractory cough
J Selby, E Bailey, F Gillies, JH Hull

P108  Chronic productive cough (CPC) clinic – standardising care for children with non-CF bronchiectasis
VVasi, J McVeigh, H Steen

P109  Utility of a multidimensional upper airway visual analogue scale to characterise laryngeal dysfunction
J Selby, F Gillies, E Bailey, JH Hull

P110  Feasibility of continuous laryngoscopy during provocation in the assessment of inducible laryngeal obstruction
J Selby, P Cullivan, J Feary, G Scadding, B Fitzgerald, JH Hull

2.00pm – 3.30pm
Moore, 4th floor

POSTER DISCUSSION: P111 – P122

Infected lung: from bench to bedside
Chaired by: Professor Adam Hill (Edinburgh) and Professor Miriam Moffatt (London)

P111  Exhaled breath biomarkers in pulmonary aspergillosis
ST Talbot, I White, A Hobson, MWilkinson, A Simpson, L Novak-Frazer,
G Gionan-Tavernier, DW Denning, SJ Fowler

P112  Incidence and clinical outcomes of pulmonary infection with Achromobacter spp.
ZA Syed, W Flight

P113  Antimicrobial peptides in inflammatory phenotypes of COPD
JL Cane, SJ Thulborn, SC Piper, DK Finch, M Bafadhel

P114  Glucocorticoid receptor α and β expression in bronchial epithelial cells infected with NTHi
LJ Parker, JL Cane, SJ Thulborn, MBafadhel

P115  Cigarettes smoke extract induces inflammatory gene expression in human bronchial epithelial cells
M Alshehri, O Brand, A Alqarni, A Pasini, LPang

P116  NEATstik® – a novel point of care test for the measurement of active neutrophil elastase in patients with respiratory disease
DF McCafferty, KL Moffitt, W Tong, TEG Ferguson, C Robb, SL Martin, BWalker

P117  Neutrophil chemotaxis in the SZ form of alpha-1 antitrypsin deficiency
SVVayalapra, AJAM McGuinness, RAS Stockley, AM Turner

P118  Procalcitonin can reduce antibiotic usage in patients with suspected respiratory infections in an acute respiratory service
HElfaki, HParsons, K Cawthron, A Holborn, OPirzada

P119  Picking up a bug by picking your nose. Hand to nose transmission of Streptococcus pneumoniae in healthy participants – pilot study
VConnor, EGerman, RRobinson,
CHales, CLowe, SZaisi, HAdler,
LLazarova, HHill, ADWright,
ENikolou, SPojar, EMitsi, HBurhan,
J Rylance, DM Ferreira

P120  Which scoring system is better at predicting likely mortality and intensive care unit (ICU) admission in community acquired pneumonia related sepsis?
FGroustis-Allwright, GCheallapah,
SNiroshan, SAbburu, AAsour,
ACHoudhury

P121  The respiratory infections team – a novel paradigm in the management of community-acquired pneumonia
GCresswell, TBewick
## Thursday 7 December 2017

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<thead>
<tr>
<th>M13</th>
<th>The role of clinical psychology and the number of hospital bed days required by severe asthma patients</th>
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<td>H Hope, R Niven</td>
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<th>M14</th>
<th>Understanding and improving participants’ experience of health research; patient evaluation of research participation in a dedicated respiratory biomedical research unit (BRU) clinical research facility (CRF)</th>
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<td>R Dobra, E Guilmant, T Higgins, S Fleming</td>
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<th>M15</th>
<th>Patient satisfaction in a tertiary cough service</th>
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<td>J Haines, H Badri, B Al-Shekly, JA Smith</td>
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<th>M16</th>
<th>Their point of view: patient experience of a DGH pleural service</th>
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<td>K Conroy, T Fretwell, H Tedd, J Killen</td>
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<th>M17</th>
<th>Patient and carer knowledge of personalised asthma action plans (PAAP)</th>
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<td>D Luciano, S Hails, P De Zwart, R Levey, S Moss</td>
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<th>M18</th>
<th>Exploring the experiences of young people transitioning from paediatric to adult asthma services: a qualitative study</th>
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<td>SJ Rylance, M Stewart, H James, G Jones</td>
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<th>M19</th>
<th>Differences in patient and physician viewpoints of the management of idiopathic pulmonary fibrosis (IPF)</th>
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<td>TM Maher, JJ Swigris, M Kreuter, M Wijsenbeek, J Axmann, L Ireland, SD Nathan</td>
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<th>M20</th>
<th>Think well, feel well. Enabling participants to develop helpful coping strategies in the management of severe asthma challenges</th>
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<td>H Hope, G McCumesky, R Niven</td>
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<tr>
<th>M21</th>
<th>Patient stories: the use of novel anti-fibrotics, pirfenidone and nintedanib, in the management of idiopathic pulmonary fibrosis, IPF</th>
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<td>S Enston-Newall</td>
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<th>M22</th>
<th>Does telephoning patients before the difficult-to-treat asthma clinic improve attendance?</th>
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<td>S Oliveira, R Robinson, S Mault, B McDonough, H James, H Joplin, G Jones, J Blakey, H Burhan</td>
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### Scientific Programme

**P122** The effect of alcohol on severe respiratory diseases: a series of systematic reviews and meta-analyses

E Simou, J Britton, J Leonardi-Bee

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**2.00pm – 3.30pm**

**Mountbatten, 6th floor**

**SYMPOSIUM**

**HIGHLIGHTS FROM THORAX**

*Chaired by: Professors Nicholas Hart, Gisli Jenkins and Alan Smyth (Joint Editors-in-Chief, Thorax)*

**2.00pm**

Pseudomonas aeruginosa LasB protease impairs innate immunity in mice and humans by targeting a lung epithelial cystic fibrosis transmembrane regulator–IL-6–antimicrobial–repair pathway

Dr Jean-Michel Sallenave (Paris)

**2.20pm**

Role of atmospheric pollution on the natural history of idiopathic pulmonary fibrosis

Dr Lucile Sese (Paris)

**2.40pm**

Polysomnographic phenotypes in obstructive sleep apnoea and their cardiovascular implications

Dr Henry Yaggi (Yale)

**3.00pm**

Aspirin reduces lipopolysaccharide induced pulmonary inflammation in human models of ARDS

Dr Cecilia O’Kane (Belfast)

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**2.00pm – 3.30pm**

**Cambridge, 5th floor**

**POSTER DISCUSSION: M12 – M23**

**Patient, physician and carer perspectives**

*Chaired by: Mrs Alice Joy (Derby) and Mrs Jane Scullion (Leicester)*

**M12** A UK survey on the experiences and views of respiratory nurses (RNs) on their role in delivering cognitive behavioural therapy (CBT) for patients with chronic obstructive pulmonary disease (COPD)

K Marshall, K Knighting, M Pilkington, C Kelly
Thursday 7 December 2017

**M23** Integrated respiratory care training from the trainee’s perspective: mind the gap
AJ Jayadev, ZP Pond, LP Preston, HW Ward

**3.00pm – 4.00pm**
COFFEE/TEA will be served in the Whittle & Fleming and Britten, 3rd floor

**3.15pm – 4.15pm**
Victoria, 2nd floor
**BTS SPECIALIST ADVISORY GROUP**
**OPEN MEETING**
**Lung Cancer and Mesothelioma**

**3.15pm – 4.15pm**
Gielgud, 2nd floor
**OPEN MEETING**
**COPD audits: past, present and future**

Presentation and panel discussion on the National COPD Audit Programme, and its audits. The audit programme team will be in attendance, as well as the following speakers:

Professor Mike Roberts (Clinical Lead for the National COPD Audit Programme)

Dr Noel Baxter (Clinical Lead for the Primary Care Workstream)

Dr Robert Stone (Clinical Lead for the Secondary Care Workstream)

Professor Michael Steiner (Clinical Lead for the Pulmonary Rehabilitation Workstream)

**3.30pm – 4.50pm**
St James, 4th floor
**SPOKEN SESSION: S80 – S84**
**Changes in pulmonary rehabilitation: new diseases, new approaches**

_Chaired by: Dr Rachael Evans (Leicester) and Professor Anne Holland (Melbourne)_

**3.35pm S80**
A feasibility study of a multi-centre randomised controlled trial of asthma-tailored pulmonary rehabilitation (AT-PR) versus usual care (UC) in individuals with severe asthma
SM Majd, RG Green, PB Bradding, SS Singh, RE Evans

**3.50pm S81**
Functional capacity, peripheral muscle strength, and quality of life following interval versus continuous rehabilitative exercise training in cystic fibrosis
G Kaltsakas, N Anastasopoulos, N Chynkiamis, P Zeliou, V Karapatoucha, K Kotsifas, F Diamantara, I Iglezos, NG Koukouris, I Vogiatzis

**4.05pm S82**
Daily stepping does not recover as an inpatient: standardising the measurement of physical activity during hospitalisation for respiratory disease
MW Orme, TC Harvey-Dunstan, I Boral, EJL Chaplin, S Fayyaz Hussain, MC Steiner, SJ Singh, NJ Greening

**4.20pm S83**
Neural respiratory drive, respiratory mechanics and breathlessness in highly active older adults
AS Shaar, B Best, M Choudhury, Z Berger, SDR Harridge, NR Lazarus, CJ Jolley

**4.35pm S84**
Do patients gain as much knowledge around their condition from a web-based pulmonary rehabilitation programme?
E Chaplin, S Hewitt, S Singh

*S83 – BTS Medical Student Awards Highly Commended*

**3.30pm – 5.00pm**
Windsor, 5th floor
**POSTER DISCUSSION: P123 – P133**
**Ventilatory strategies for patients with respiratory failure**

_Chaired by: Professor Mark Griffiths (London) and Dr Charlotte Summers (Cambridge)_

**P123**
Review of patient characteristics and their association with survival in patients with COPD on home non-invasive ventilation for hypercapnic respiratory failure: 5 year retrospective study

**SCIENTIFIC PROGRAMME**

SM Majd, RG Green, PB Bradding, SS Singh, RE Evans

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E Chaplin, S Hewitt, S Singh

*S83 – BTS Medical Student Awards Highly Commended*
SCIENTIFIC PROGRAMME

JE Bleksley, NR Ward, R Pritchard, J Davidson, PD Hughes, J Palmer, B Kathiresan

P124 Early experience with 2-way remote monitoring for the initiation of volume-assured home non-invasive ventilation
G McDowell, D MacFarlane, R Tourish, C Canavan, A Brown, H Ambler, C Carlin

P125 The effect of preventative hydrocolloid nasal dressings in acute non invasive ventilation (NIV)-related nasal bridge pressure ulceration
A Bishop, A Oakes, A Watson, B Chakraborty, G Stygall, P Antoine-Pitterson, E Justice, B Rooke, K Stygall, R Mukherjee

P126 Weaning outcomes of mechanically ventilated spinal cord injured persons with acute tetraplegia admitted to a regional UK centre over a 10 year period
B Chakrabarti, A Forrest, M Bevan, A Ward, K Chaudhary, B Soni, F Selmi, R Parker, PK Plant, A Manuel, N Duffy, S Lari, RM Angus

P127 What is the optimal mode of non-intravenous bronchodilators in adult, mechanically ventilated patients on the intensive care unit? A systematic review of the literature
J Finnerty, JJ Kent, K Bramley

P128 Automated video monitoring of patients’ spontaneous breathing during high frequency jet ventilation
MB Kontorovich, KS Purto, VS Kublanov

P129 Implementing target range oxygen in critical care (TROCC): a baseline survey and pilot study
BR O’Driscoll, T Fudge, J Cardell, H Millar, PM Dark

P130 Automated video monitoring of spontaneous breathing recovery during the high frequency jet ventilation
MB Kontorovich, KS Purto, VS Kublanov

P131 Weaning outcomes from tracheostomy ventilation in an acute respiratory care unit (ARCU): a three-year experience

Thursday 7 December 2017

S Sufyan, MN Khan, M Thirumaran, SP Meghjee, AOC Johnson, A Dwarakanath

P132 The role of ventilation in pneumonic exacerbations of COPD
TM Hartley, ND Lane, J Steer, C Echevarria, SC Bourke

P133 Acute hypercapnic respiratory failure; application of a novel human factors approach to improve recognition and management
HJ Pick, P Cull, E Mullaney, S Smith, N Taylor, G Lowrey

3.30pm – 5.00pm
Rutherford, 4th floor

POSTER DISCUSSION: P134 – P146
Characterisation of lung disease with imaging and physiology
Chaired by: Professor Brendan Cooper (Birmingham) and Dr Annabel Nickol (Oxford)

P134 An evaluation of a new lung function test: TLNO in healthy subjects
A Ijaz, J Hull

P135 The prevalence of undiagnosed COPD in patients with an abdominal aortic aneurysm and its impact on cardiopulmonary exercise tests
L Archer, E Parkes, J Shakespeare, DP Parr

P136 Non-invasive assessment of diaphragm contractility using surface mechanomyography in healthy subjects
M Lozano-García, L Sarlabous, J Moxham, GF Rafferty, R Jané, CJ Jolley

P137 19F-MRI of inhaled perfluoropropane gas: a novel approach to ventilation imaging
B Pippard, M Neal, P Dutta, AJ Simpson, P Thelwall

P138 Kinetics of intrathoracic pressure change following administration of CPAP
MCP Apps, E Walsted, M Pavitt, L Swanton, A Lewis, S Buttery, J Garner, N Hopkinson, M Polkey, J Hull
A randomised comparative study of cough peak expiratory flow (CPEF) using full face mask vs mouthpiece interfaces in healthy subjects
A Mearns, F Subhan, L Roberts

Hypoxic challenge testing in motor neuron disease
IJ Cliff, N Mustfa, H Stone

Pulmonary function test physiology and progression in diffuse idiopathic pulmonary neuroendocrine cell hyperplasia (DIPNECH)
JB Barlow, DR Ryan, WM Mansoor, MH Howell, NC Clayton, RN Niven

Hypoxic challenge test (HCT) for in-flight oxygen assessments can be avoided in patients with lung disease and low resting PaO2
R Peat, F Frost, K Waldron, J Furlong, D Russell, D Wat

Using big data to investigate physiology: retention of CO2 does not impact the oxygen-haemoglobin dissociation curve of critically ill adults
N Rosculet, R Samata, A Dixit, S Harris, NS MacCallum, DA Brearley, PJ Watkinson, A Jones, S Ashworth, R Beale, SJ Brett, JD Young, M Singer, C Summers, A Ercole

The prevalence of dysfunctional breathing and its association with personality type in a university population
A Thain, L Silva Vidotto, A Harvey, M Jones

Medical co-morbidities in patients referred for specialist assessment of inducible laryngeal obstruction and dysfunctional breathing
J Haines, R Daly, SJ Fowler

Can masks protect you from air pollution?
NM Liu, T Wan, EC Russell-Jones, J Grigg

The changing shape of patients with idiopathic pulmonary fibrosis
RL Wollerton, CJ Scotton, MA Gibbons

Idiopathic pulmonary fibrosis: “lost in the system” in the North West of England?
TL Lodhi, CL Leonard, RA Abdulqawi, HM Morris, NC Chaudhuri

Description of a national pulmonary fibrosis cohort in Sweden
K Bartley, A Levine, L Arnheim-Dahlstrom, G Ferrara, K Kirchgaessler, R Linder, C Janson, CM Sköld

Neck as mediastinal extension: diagnosis of sarcoidosis by core biopsy of cervical lymph nodes
A Fahim, MM Qasim, D Rosewarne

The role of bronchoalveolar lavage and its quality in the diagnosis of interstitial lung disease
A Ebraheem, L Macfarlane, R Booton, N Chaudhuri

The association between adult height, socioeconomic status and idiopathic pulmonary fibrosis: a population based case-control study
T Glover, JP Hutchinson, T McKeever, RB Hubbard, V Navaratnam

Clinical frailty score but not age is associated with early treatment discontinuation with antifibrotic medication in idiopathic pulmonary fibrosis
S Davies, A Holt, J Sutcliffe, S Agnew, D Menzies, LG Spencer

Gender and height drive variation between forced vital capacity reference equations: implications for IPF treatment
F Frost, R Peat, S Town, C Brockelsby, L Johns, E Hilal
P155 Use of mycophenolate mofetil and azathioprine in patients with chronic hypersensitivity pneumonitis
CA Fiddler, N Simler, M Thillai, H Parfrey

P156 Maintaining patients with idiopathic pulmonary fibrosis (IPF) on antifibrotic therapy; the nurses’ challenge
GA Burge, H Alldrick, E Briggs, K Neighbour, PS Burge, GI Walters

P157 Can baseline physiological tests help predict the outcome of hypoxic challenge testing (HCT) in interstitial lung disease (ILD)?
SLB Barratt, JS Shaw, RJ Jones, HA Adamali, IC Cliff, NC Clayton, NM Mustafa, HS Stone, NC Chaudhuri

P158 Pulmonary vascular disease markers predict death in interstitial lung disease patients proven not to have pulmonary hypertension at right heart catheter
SRB Bax, C Breedy, K Dimopoulos, A Kempny, A Devaraj, S Walsh, J Joseph, S Nair, M Kokosi, G Kier, C Harries, V Kouranos, C McCabe, W Li, M Wilde, AU Wells, LC Price, SJ Wort

P159 Preliminary experience of a tailored ILD pulmonary rehabilitation programme and inspiratory muscle training delivered in a hospice and home setting
M AlQuaimi, L McNeillie, C Donaldson, J Harper, J Hartley, S Cassidy, AM Bourke, JS Simpson, C Ward, I Forrest

P160 Mortality from idiopathic pulmonary fibrosis in England and Wales by birth cohort
C Reynolds, C Barber, P Cullinan

3.45pm – 5.00pm
Abbey, 4th floor
POSTER DISCUSSION: P161 – P170
Early detection and screening in TB
Chaired by: Professor Graham Bothamley (London) and Dr Rosemary Trafford (Southport)

P161 Tuberculosis contact screening: will the 2016 guidelines lead to missed diagnoses?
J Prynn, ECJ Bailey, M Darmalingam

P162 Analysis of and lessons from the multiple screening episodes in United Kingdom’s tuberculosis pre-entry screening programme: October 2005 to December 2016
MC Muzyamba, R Harris, D Zenner

P163 An audit into the completeness of latent tuberculosis screening in the gastrointestinal department, prior to patients starting anti-TNF-α therapy
SM Meghji

P164 QFT-Plus: do the peptides in the TB2 tube induce a T suppressor response in some subjects?
M Sieren, B Thippeswamy, C Mandiveyi, N Marshall, G Bothamley

P165 Latent tuberculosis infections (LTBI) national screening programme
YO Abunga, M Day, N Wright, SO Brij

P166 Diagnosing pulmonary tuberculosis: how useful is the chest X ray report?
KJ Myall, W Owen, RA Breen, F Perrin

P167 The usefulness of tablet counting to identify potential TB treatment non-compliance
H Patel, Y Abunga, SO Brij

P168 Should we continue screening household contacts of all index cases with TB irrespective of infectivity? An analysis of contact screening yields stratified according to index site of disease and smear status
R Enuechie, M Kanu, A Amoah, J Marshall, M Ogundengbe, F Ogunrin, LV Baker

P169 Latent tuberculosis infection screening of adult close contacts in London: a cost-utility analysis
M Hayama, N Green, SL Seneviratne, M O’Donoghue, N Drey, OM Kon

P170 New entrant latent tuberculosis screening in the UK: should the search be widened?
MS Rana, S Sandhu, M Silka, SM Menzies
### Thursday 7 December 2017

**3.45pm – 5.20pm**  
Moore, 4th floor  
**SPOKEN SESSION: S85 – S90**  
**Mechanisms of asthma**  
*Chaired by: Dr David Cousins (Leicester) and Professor Clare Lloyd (London)*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>3.50pm</td>
<td>S85</td>
<td>Corticosteroid-resistant neutrophilic airway inflammation and hyper-responsiveness caused by IL-13</td>
<td>ER Davies, JFC Kelly, JA Whitsett, ST Holgate, DE Davies, HM Haitchi</td>
</tr>
<tr>
<td>4.05pm</td>
<td>S86</td>
<td>Extracellular matrix deposited by asthmatic human airway smooth muscle cells enhances basal activation of TGFβ</td>
<td>JT Cairns, R Krishnan, AE John, CE Brightling, DE Shaw, G Jenkins, AL Tatler</td>
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<tr>
<td>4.20pm</td>
<td>S87</td>
<td>Regulation of type 2 cytokine release by epithelial cells: characterisation of soluble factor pathways and characterisation of potential mediators</td>
<td>A Southern, S Layzell, JL Cane, TJ Powell, ID Pavord</td>
</tr>
<tr>
<td>4.35pm</td>
<td>S88</td>
<td>MicroRNAs regulate genome-wide translation in severe asthma bronchial epithelial cells as revealed by Frac-seq</td>
<td>RT Martinez-Nunez, H Rupani, M Niranjan, PH Howarth, T Sanchez-Elsner</td>
</tr>
<tr>
<td>4.50pm</td>
<td>S89</td>
<td>Soluble ADAM33 augments the pulmonary immune response promoting allergic airway sensitivity</td>
<td>JFC Kelly, ER Davies, ST Holgate, X Xu, JA Whitsett, DE Davies, HM Haitchi</td>
</tr>
<tr>
<td>5.05pm</td>
<td>S90</td>
<td>The effect of long acting beta-agonists on glucocorticoid receptor and importin-7 nuclear translocation in airway smooth muscle cells</td>
<td>SS Dhesi, KF Chung, C Michaeloudes, PK Bhavsar</td>
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### SCIENTIFIC PROGRAMME

**3.45pm – 5.30pm**  
Mountbatten, 6th floor  
**POSTER DISCUSSION: P171 – P184**  
**Pulmonary vascular disease: monitoring and managing**  
*Chaired by: Professor Claire Shovlin (London) and Dr Elaine Soon (Cambridge)*

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<thead>
<tr>
<th>Session</th>
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<tr>
<td>P172</td>
<td>Pre-operative insights from cardiopulmonary exercise testing in patients with pulmonary arteriovenous malformations</td>
<td>S Thurairatnam, V Santhirapala, T Hall, HC Tighe, J Perks, JE Jackson, LS Howard, CL Shovlin</td>
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<tr>
<td>P173</td>
<td>Prognostic factors for survival in idiopathic pulmonary arterial hypertension</td>
<td>CR Popplewell, A Greenhalgh, PA Corris</td>
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<tr>
<td>P174</td>
<td>A multicenter, retrospective study into early mortality in acute pulmonary embolism</td>
<td>NM Batt, A Radford, K Milinis, K Saraya</td>
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<td>P175</td>
<td>Burden of cerebral infarcts identified by screening cerebral MRI scans in patients with pulmonary arteriovenous malformations</td>
<td>G Fatania, M Patel, JE Jackson, CL Shovlin</td>
</tr>
<tr>
<td>P176</td>
<td>Investigating environmental factors associated with cerebral abscesses in patients with pulmonary arteriovenous malformations via an international online questionnaire</td>
<td>EJ Boother, SC von Widekind, CL Shovlin</td>
</tr>
<tr>
<td>P177</td>
<td>Computed tomography diagnostic model for diagnosis of pulmonary hypertension</td>
<td>AJ Swift, M Chin, B Currie, CA Elliot, A Charalampopoulos, S Rajaram, JM Wild, C Johns, DG Kiely</td>
</tr>
</tbody>
</table>
SCIENTIFIC PROGRAMME

P178  5 year follow up of patients investigated for suspected PE. What further tests for suspected VTE are performed and are they positive?
J Henderson, S Hainey, M Avery, NCD Morley, KC Muir, EJ van Beek, JT Murchison

P179  Utilisation of respiratory and haematology multi-disciplinary team (MDT) meeting for effective follow-up and management of pulmonary embolism (PE) in a district general hospital
H McAuley, SO Brij, LD Calvert

P180  Managing pregnancy in pulmonary hypertension using a multi-professional approach: a 16-year experience in a specialist referral centre
L ten Klooster, V Wilson, K Selby, R Newton, S Gandhi, T Bonnet, J Fletcher, I Armstrong, L Martin, N Hamilton, G Mills, R Thompson, A Charalampopoulos, I Sabroe, C Elliot, R Condiffe, D Kiely

P181  Pulmonary arteriovenous malformations, hereditary haemorrhagic telangiectasia and iron treatments
CL Shovlin, EJ Boother, CH Fung, KB Bamford, DM Layton, JE Jackson, S Brownlow

P182  The appropriateness of the usage of CT pulmonary angiography for the diagnosis of pulmonary embolism; evaluation of the current practice at East Kent Hospitals University NHS Foundation Trust and review of similar studies
A Vrettos, M Prasinou, R Basit, D Malamis

P183  Impact of patient choice on survival in patients with chronic thromboembolic pulmonary hypertension offered pulmonary endarterectomy

Thursday 7 December 2017

P184  Age should not be a barrier to pulmonary endarterectomy in carefully selected patients
M Newnham, J Hernandez-Sanchez, J Dunning, C Ng, S Tsui, K Bunc Clark, K Sheares, D Taboada, M Toshner, J Pepke-Zaba, D Jenkins, J Cannon

4.00pm – 5.00pm
Albert, 2nd floor
BTS SPECIALIST ADVISORY GROUP OPEN MEETING
Specialty Trainees Advisory Group

4.00pm – 5.30pm
Churchill, Ground floor
SYMPOSIUM
IMMUNODEFICIENCY AND THE LUNG IN THE 21ST CENTURY
Chaired by: Professor Ling Pei Ho (Oxford) and Dr John Hurst (London)

4.00pm  Managing the pulmonary complications of stem cell transplantation
Dr Clare Sander (Cambridge)

4.30pm  HIV and the lung in the post-HAART era
Professor Margaret Johnson (London)

5.00pm  Respiratory immunology in the modern era: at the cutting edge of next generation sequencing
Professor Alison Condliffe (Sheffield)

Learning objectives:
1) To understand how the aetiology, natural history and management of primary and secondary immunodeficiency have changed in recent years.
2) To delineate the early and late complications of stem cell transplant and how they are investigated and managed.
3) To illustrate how the natural history of HIV infection has been changed by highly active anti-retroviral therapy and how this impacts on the pulmonary complications of this condition.
4) To showcase how recent scientific discoveries in the field of immunodeficiency may offer new insights into the pathogenesis of infection and its treatment in the broader setting.

5.30pm – 7.00pm
Britten, 3rd floor
THE BTS PRESIDENT’S RECEPTION
All welcome!
Friday 8 December 2017

8.00am – 9.00am
COFFEE/TEA will be served in the Whittle & Fleming, 3rd floor

8.45am – 2.00pm
Whittle & Fleming, 3rd floor
POSTER VIEWING

Authors present: 10.00am – 11.00am

P185–P194
Biomarkers, imaging and outcomes in COPD
Discussion of abstracts will take place from 1.30pm to 2.45pm in the Moore, 4th floor

P195–P208
External influences on asthma
Discussion of abstracts will take place from 1.30pm to 3.15pm in the St James, 4th floor

P209–P219
Sleep and breathing
Discussion of abstracts will take place from 2.00pm to 3.25pm in the Rutherford, 4th floor

P220–P230
Danger at work: occupational lung disease and asthma
Discussion of abstracts will take place from 2.00pm to 3.25pm in the Albert 2nd floor

P231–P243
Closing the flood gates of the pleura
Discussion of abstracts will take place from 2.00pm to 3.35pm in the Westminster, 4th floor

P244–P255
Clinical implications of cystic fibrosis
Discussion of abstracts will take place from 3.00pm to 4.30pm in the Moore, 4th floor

P256–P267
Lung cancer: from virtual contact to invasive procedures
Discussion of abstracts will take place from 3.15pm to 4.45pm in the Abbey, 4th floor

P268–P280
Pharmacotherapies for COPD
Discussion of abstracts will take place from 3.15pm to 4.50pm in the Windsor, 5th floor

SCIENTIFIC PROGRAMME

8.45am – 3.30pm
Cambridge, 5th floor
MODERATED POSTER VIEWING

M24–M34
Idiopathic pulmonary fibrosis treatment update
Discussion of abstracts will take place from 2.00pm to 3.30pm in the Cambridge, 5th floor

8.00am – 8.30am
Albert, 2nd floor
BTS JOURNAL CLUB
CRITICAL CARE MEDICINE
Professor Danny McAuley (Belfast)

Learning objectives:
This Journal Club will introduce and summarise three to four key papers that have been published in the past 12 months on the subject of “Critical care medicine”. Professor Danny McAuley (Co-Director of Research for the Intensive Care Society) will then lead a discussion on these papers, based on his internationally recognised experience in this field. The relevant references will be available on the BTS website at the beginning of November so that delegates may review the papers in advance.

8.30am – 10.05am
St James, 4th floor
SPOKEN SESSION: S91 – S96
Cystic fibrosis: disease trajectory and evolving therapies

Chaired by: Dr Frank Edenborough (Sheffield) and Dr Helen Rodgers (Edinburgh)

8.35am S91
Early growth trajectories in cystic fibrosis
A Macdougall, O Archangelidi, P Cullinan, S Carr, D Bilton, D Jarvis, S Stanojevic

8.50am S92
Genomic investigation unmasks evidence of transmission across Mycobacterium abscessus cystic fibrosis patients
SCIENTIFIC PROGRAMME

9.05am  S93
Effect of lumacaftor/ivacaftor on total, bronchiectasis, and air trapping computed tomography (CT) scores in children homozygous for F508del-CFTR: exploratory imaging substudy
ASB Brody, SN Nagle, CH Hug, GM Marigowda, DW Waltz, JG Goldin, FR Ratjen, LW Wang

9.20am  S94
Development of assays to assess safety and efficacy of lentiviral gene therapy for cystic fibrosis
AD Saleh, NK Clarke, C Meng, MR Jacobson, JC Davies, SR Durham, EFW Alton, U Griesenbach

9.35am  S95
Clinical outcomes of aspergillus disease phenotypes in adult cystic fibrosis patients
LJ Collier, RJ Bright-Thomas, C Baxter, M Richardson, AM Jones

9.50am  S96
An open-label extension (EXT) study of lumacaftor/ivacaftor (LUM/IVA) therapy in patients aged 6 to 11 years with cystic fibrosis (CF) homozygous for F508del-CFTR
MC Chilvers, ST Tian, GM Marigowda, MB Bsharat, CH Hug, MS Solomon, PB Black, MR Rosenfeld, GS Sawicki, JH Hoppe

8.30am – 9.50am
Abbey, 4th floor
SPOKEN SESSION: S97 – S101
Improvements in lung cancer treatment
Chair by: Dr Lianne Castle (Oxford) and Professor Sam Janes (London)

8.35am  S97
Management of early stage lung cancer in the elderly: an observational study
MPT Kennedy, K Franks, A Brunelli, MEJ Callister

8.50am  S98
Treatment patterns and survival outcomes of stage Ila (N2) non-small cell lung cancer in England

Friday 8 December 2017

9.05am  S99
P Beckett, R Dickinson, R Hubbard, A Khakwani, D West

9.20am  S100
Utility of endobronchial ultrasound-guided transbronchial needle aspiration for PD-L1 testing in patients with NSCLC
F Perrotta, B Adizie, U Maqsood, M Elshafi, S Jafri, I Woolhouse, M Munavvar, M Evison, R Booton, DR Baldwin, SM Janes, A Bianco, N Navani

9.35am  S101
A comparison of the imaging features of early stage primary lung cancer in patients treated with surgery, SABR and microwave ablation
A Talwar, N Jenko, M Sarim, M Enescu, P Whybra, JMY Willaime, LC Pickup, W Hickes, M Gooding, D Boukerroui, NM Rahman, T Kadir, FV Gleeson

8.30am – 10.00am
Churchill, Ground floor
SYMPOSIUM
COPD: THE CUTTING EDGE
Chair by: Dr Stephen Bourke (North Shields) and Dr Rama Vancheeswaran (London)

8.30am
Understanding host-pathogen interactions to improve outcomes in COPD
Professor Tom Wilkinson (Southampton)

9.00am
Surgery for and in COPD
Mr Simon Jordan (London)

9.30am
Refining inhaled therapies for COPD
Professor Wisia Wedzicha (London)

Learning objectives:
COPD is a diverse condition. Attendees will hear about advances across a range of topics including the role of pathogen host interactions, advances in surgical approaches and who should (or should not) be getting which inhaler.
Friday 8 December 2017

8.30am – 10.30am
Mountbatten, 6th floor
SYMPOSIUM
THE IMPACT OF THE OBESITY EPIDEMIC ON THE LUNG
Chair by: Dr Ari Manuel (Liverpool) and Dr Sophie West (Newcastle upon Tyne)

8.30am  Mechanisms of obesity induced asthma
          Professor Dale Umetsu (San Francisco)
9.00am   Achieving sustained weight loss in people with obesity
          Professor Rachel Batterham (London)
9.30am   The role of obesity in difficult asthma and airway dysfunction
          Professor Chris Brightling (Leicester)
10.00am  Obesity hypoventilation syndrome
          Professor Jean Louis Pepin (Grenoble)

Learning objectives:
1) To understand the impact of obesity on airway function and how it affects asthma.
2) To explore aspects of obesity and difficult asthma.
3) To recognise when obesity causes ventilatory failure and how best to manage this in different healthcare settings.
4) To empower all those working with obese patients with the latest effective strategies in obesity management – drugs, surgery, effective diets etc.

8.30am – 10.30am
Windsor, 5th floor
SYMPOSIUM
PLEURAL DISEASE
Chair by: Professor Nick Maskell (Bristol) and Professor Najib Rahman (Oxford)

8.30am  Basic science of mesothelioma
          Dr Elizabeth Sage (London)
9.00am  Clinical trials in mesothelioma
          Dr Robert Rintoul (Cambridge)
9.30am  Pneumothorax
          Professor Stefan Marciniak (Cambridge)
10.00am Update on the management of pneumothorax
          Dr Robert Hallifax (Oxford)

Learning objectives:
1) To update the audience on the latest data on the molecular basis and understanding of mesothelioma occurrence and progression.
2) To review recent and ongoing randomised trials in mesothelioma, and review data on use of surgery in mesothelioma.
3) To understand the genetic basis of familial associations in pneumothorax.
4) To appraise the current understanding of acute treatment of pneumothorax, including the use of ambulatory treatment.

8.45am – 10.20am
Moore, 4th floor
SPOKEN SESSION: S102 – S107
Fruit flies to footballers
Chair by: Dr Joanna Szram (London) and Dr Ruth Wiggans (Southport)

8.50am  S102
Identification of allergens present in Drosophila melanogaster using a serum immunoblotting method
M Brian, D Jarvis, P Burney, P Cullinan, M Jones

9.05am  S103
Occupational allergy to fruit flies (Drosophila melanogaster) in laboratory workers
M Jones, S Blair, S MacNeill, J Welch, A Hole, P Baxter, P Cullinan

9.20am  S104
Investigating the diagnostic performance of specific immunological tests in occupational asthma
D Fernandes, J Cannon, B Fitzgerald, J Welch, M Jones, P Cullinan, J Szram

9.35am  S105
Respiratory symptoms, lung function and sensitisation across different exposure groups of British woodworkers
REWiggans, J Sumner, E Robinson, CM Barber
**SCIENTIFIC PROGRAMME**

**9.50am S106**
Distribution of occupational and non-occupational causes in hypersensitivity pneumonitis diagnosed by an interstitial lung disease expert panel
J Mokhlis, AS Robertson, VC Moore, PS Burge, GI Walters

**10.05am S107**
Should respiratory health be assessed as part of a pre-season medical evaluation in professional footballers?
AR Jackson, JG Hopker, JW Dickinson, JH Hull

**10.00am – 11.00am**
Rutherford, 4th floor
BTS SPECIALIST ADVISORY GROUP OPEN MEETING
Tobacco

**10.00am – 11.00am**
COFFEE/TEA will be served in the Whittle & Fleming and Britten, 3rd floor

**10.30am – 11.30am**
Albert, 2nd floor
BTS SPECIALIST ADVISORY GROUP OPEN MEETING
Interstitial and Rare Lung Disease

**10.30am – 11.50am**
St James, 4th floor
SPOKEN SESSION: S108 – S112
Advances in understanding chronic thrombo-embolic disease and pulmonary hypertension
*Chair by: Professor David Kiely (Sheffield) and Dr Mark Toshner (Cambridge)*

**10.35am S108**
Genome-wide association study in chronic thromboembolic pulmonary hypertension reveals new insights into aetiology

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**Friday 8 December 2017**

**10.50am S109**
ADAMTS13 protein levels are decreased in chronic thromboembolic pulmonary hypertension and implicated in its pathobiology
M Newnham, K South, M Bleda, J Cannon, J Pepke-Zaba, NW Morrell

**11.05am S110**
HIF2a deletion in the pulmonary endothelium prevents hypoxia-induced pulmonary hypertension
AS Cowburn, A Crosby, D Macias-Gutierrez, M Southwood, C Branco, N Morrell, ER Chilvers, RS Johnson

**11.20am S111**
Altered neutrophil phenotypes in pulmonary arterial hypertension
O Dirir, KM Lodge, A Creaser-Myers, S Walker, DG Kiely, AM Condliffe, A Lawrie, AAR Thompson

**11.35am S112**
Conditioned media from human pulmonary arterial endothelial cells treated with hepcidin or haemoglobin cause proliferation and migration of human pulmonary artery smooth muscle cells
T Shackshaft, SJ Wort, GJ Quinlan, LR Ramakrishnan
Friday 8 December 2017

10.30am – 11.50am
Westminster, 4th floor

SPOKEN SESSION: S113 – S117
Mechanistic insights into COPD
Chaired by: Professor Louise Donnelly (London) and Dr Elizabeth Sapey (Birmingham)

10.35am S113
Defining the molecular signature of the pulmonary endothelium in chronic obstructive pulmonary disease (COPD)
CE Green, R Bicknell, AM Turner

10.50am S114
Hypoxia drives neutrophil-mediated endothelial damage in COPD
KM Lodge, K Hoenderdos, AJ Robbins, ER Chilvers, W Li, AM Condliffe

11.05am S115
Mechanisms to reverse impaired macrophage efferocytosis in COPD
EM Ryan, R Budd, MA Bewley, P Coelho, W Rumsey, Y Sanchez, G Choudhury, PA Reid, DH Dockrell, SR Walmsley, MKB Whyte

11.20am S116
Cell-dissociated Haemophilus influenzae and bacteria-associated inflammatory mediators in the airways of patients with chronic obstructive pulmonary disease
SJ Thulborn, A Ceroni, K Haldar, V Mistry, J Cane, CE Brightling, MR Barer, M Bafadhel

11.35am S117
The effect of cigarette and electronic cigarette vapour on bacteria in chronic lung infection
DF Gilpin, KA McGown, K Gallagher, J Bengoechea, JS Elborn, MM Tunney

10.30am – 11.50am
Abbey, 4th floor

SPOKEN SESSION: S118 – S122
Of mice and men
Chaired by: Professor Donna Davies (Southampton) and Dr Amanda Tatler (Nottingham)

10.35am S118
Elk1 gene deletion leads to spontaneous early fibrotic changes in the ageing lung

10.50am S119
Mapping mouse models of severe asthma onto human disease
K Kazi, IM Adcock, S Pavlidis

11.05am S120
Gene therapy for pulmonary alveolar proteinosis
N Atsumi, A Pilou, I Pringle, RC Ashworth, C Meng, M Chan, DR Gill, S Hyde, C Morgan, EWF Alton, U Griesenbach

11.20am S121
Cell tracking in lung cancer
SP Patrick, K Kolluri, AV Davies, EK Sage, M Lythgoe, A Edwards, TL Kalber, SM Janes

11.35am S122
A role for the bone morphogenetic protein type 2 receptor (BMPR2) in differentiation of the common myeloid progenitor lineage in mice and humans
A Crosby, C Hadinnapola, UK PAH Cohort Study Consortium, E Groves, S Moore, BD Dunmore, M Southwood, I P Horan, M Bleda, M Haimel, S Gräf, MR Toshner, NW Morrell

10.30am – 12.00pm
Churchill, Ground floor

SYMPOSIUM
MULTI-SYSTEM LUNG DISEASE
Chaired by: Professor Ann Millar (Bristol) and Dr Muhunthan Thillai (Cambridge)

10.30am Systemic sclerosis and the lung
Professor Chris Denton (London)

11.00am Vasculitis of the lung
Professor Ulrich Specks (Minnesota)

11.30am Cystic lung disease – what, when and why?
Professor Simon Johnson (Nottingham)

Learning objectives:
Multisystem diseases can be challenging to diagnose and manage and often have severe respiratory complications. The speakers will describe the common manifestations of...
**SCIENTIFIC PROGRAMME**

Systemic sclerosis, vasculitis and cystic lung diseases, outline how to assess the patient with multisystem disease, and update the audience on the management of these complex patients.

### 10.45am – 11.45am

**Victoria, 2nd floor**

**BTS SPECIALIST ADVISORY GROUP OPEN MEETING**

**Pulmonary Infection**

### 10.45am – 12.45pm

**Mountbatten, 6th floor**

**SYMPOSIUM**

**RESPIRATORY CRITICAL CARE: THE HINTERLAND**

*Chaired by: Dr Michael Davies (Cambridge) and Professor Nicholas Hart (London)*

#### 10.45am

**BREATHE: the role of NIV in weaning from invasive ventilation. Results of a national multi-centre study**

*Professor Gavin Perkins (Warwick)*

#### 11.15am

**Non-coding RNA controlling ICU acquired weakness**

*Dr Paul Kemp (London)*

#### 11.45am

**Post-ICU rehabilitation: the RECOVER trial**

*Professor Tim Walsh (Edinburgh)*

#### 12.15pm

**NCEPOD: NIV in the UK, here we go again**

*Dr Mark Juniper (Swindon)*

**Learning objectives:**

This session focuses on the interface between invasive and non-invasive mechanical ventilation (NIV) which in the UK often determines the placement of patients in ICU or HDU. Specifically the following questions will be addressed:

1) Can NIV be used to accelerate weaning from invasive mechanical ventilation?

2) What is the latest evidence underlying the muscle wasting that ties survivors of critical illness to invasive mechanical ventilation?

3) What is the role for physical rehabilitation after critical illness?

4) How is NIV being provided to patients with acute respiratory failure in our hospitals?

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**Friday 8 December 2017**

### 11.30am – 12.30pm

**Rutherford, 4th floor**

**BTS SPECIALIST ADVISORY GROUP OPEN MEETING**

**COPD**

#### 12.00pm – 2.00pm

**LUNCH will be available to purchase in the Cafe in the Pickwick, 1st floor, and the Snack Bar in the Whittle & Fleming, 3rd floor**

### 12.45pm – 1.45pm

**Rutherford, 4th floor**

**BTS SPECIALIST ADVISORY GROUP OPEN MEETING**

**Sleep Apnoea**

#### 1.00pm – 1.45pm

**Churchill, Ground floor**

**THE BTS LECTURE**

**Social justice and the lungs**

*Professor Sir Michael Marmot (London)*

*Introduced by: Professor Mark Woodhead (Manchester)*

#### 1.30pm – 2.45pm

**Moore, 4th floor**

**POSTER DISCUSSION: P185 – P194**

**Biomarkers, imaging and outcomes in COPD**

*Chaired by: Dr John Hurst (London) and Dr Alice Turner (Birmingham)*

**P185** Urine biomarker profiles associated with COPD exacerbations

*A Yousuf, G Parekh, L Watson, L George, A Singapuri, V Mistry, P Davis, C Brightling*

**P186** Demonstrating higher diffusion coefficients in patients with eosinophilic vs. non-eosinophilic exacerbations of COPD

*R Barker, C Jones, J Fenton-Woods, L Smith, M Johnson, R Barker*

**P187** Seasonality of eosinophilic and non-eosinophilic exacerbations of COPD

*R Barker, R Shrimanker, R Russell, J Fenton-Woods, C Jones, L Smith, M Johnson, I Pavord*

**P188** A feasibility study of salivary pepsin measurement to assess airways reflux in exacerbating COPD patients
Friday 8 December 2017

TJB Brown, P Dettmar, AH Morice, SP Hart, MG Crooks

**P189** Reducing readmission in high risk COPD patients
K Sunderland, K Pears, D Anderson

**P190** Specialist emergency care and COPD outcomes
ND Lane, K Brewin, TM Hartley, K Gray, M Burgess, J Steer, SC Bourke

**P191** Gender differences in COPD exacerbations: analysis from the CPRD database
D Stolz, K Kostikas, E Loefroth, R Fogel, A Clemens, FS Gutzwiller, V Conti, H Cao

**P192** Functional respiratory imaging (FRI) and lung function assessment of glycopyrronium/formoterol fumarate dihydrate fixed-dose combination delivered using innovative co-suspension delivery technology (GFF MDI) in COPD
W De Backer, J De Backer, W Vos, I Verlinden, S Dwivedi, S Siddiqui, M Jenkins, C Reisner, U Martin

**P193** The degree of lung destruction with emphysema on quantitative lung CT scans versus subjective and objective impairment in patients with advanced emphysema referred for volume reduction therapies
DTB Betney, NJ Jarad

**P194** Lobar perfusion uptake significantly differs from lobar lung destruction in patients with advanced emphysema referred for volume reduction therapies
DTB Betney, NJ Jarad

1.30pm – 2.50pm
Windsor, 5th floor
SPOKEN SESSION: S123 – S127
Respiratory epidemiology
Chair by: Dr Vidya Navaratnam (Nottingham) and Dr Jennifer Quint (London)

**1.35pm S123** Exacerbation risk and characterisation of the UK’s asthma population, from infancy to old age
CI Bloom, F Nissen, I Douglas, L Smeeth, P Cullinan, JK Quint

1.30pm – 2.50pm
Abbey, 4th floor
SPOKEN SESSION: S128 – S132
Managing pleural disease: from intervention to conservation
Chair by: Dr Amelia Clive (Bristol) and Professor Nick Maskell (Bristol)

**1.35pm S128** Exploring the behaviour of mesothelioma in a post hoc analysis from the TIME 1 trial
<table>
<thead>
<tr>
<th>Time</th>
<th>Poster Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.05pm</td>
<td>S130</td>
<td>Preliminary data supporting a ‘Direct to LAT’ strategy in selected patients with suspected malignant pleural effusion</td>
<td>S Tsim, S Paterson, J Holme, M Evison, KG Blyth</td>
</tr>
<tr>
<td>2.20pm</td>
<td>S131</td>
<td>Ambulatory management of secondary spontaneous pneumothorax</td>
<td>RV Reddy, F Khan, M Naeem, N Siddique, I Masih, Y Vali</td>
</tr>
<tr>
<td>2.35pm</td>
<td>S132</td>
<td>Conservative management in traumatic pneumothoraces: an observational study</td>
<td>S Walker, S Barratt, J Thompson, N Maskell</td>
</tr>
</tbody>
</table>

**External influences on asthma**

**Chaired by: Dr Christopher Barber (Sheffield) and Dr Andrew Menzies-Gow (London)**

<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Title</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>P195</td>
<td>“Syndrome Z” in the asthma population</td>
<td>S Davies, N Cachada, S Wharton, AM Turner, A Mansur</td>
</tr>
<tr>
<td>P196</td>
<td>A new questionnaire to measure quality of life in severe asthma (SAQ): preliminary validation</td>
<td>R Jones, M Masoli, M Hyland, J Lanario</td>
</tr>
<tr>
<td>P197</td>
<td>The Improving Asthma Care Together (ImpACT) project</td>
<td>D Subramanian, S Greenwood, E Dryden, H Paine, S Ali, C Bennet, H Lagnado, L Sutton</td>
</tr>
<tr>
<td>P198</td>
<td>FeNO and blood eosinophils as biomarkers in predicting asthma exacerba-</td>
<td>S Rastogi, S Bosnic-Antievich, I Pavord, N Roche, D Halpin, L Bjerner, OS Usmani, G Brusselle, S Wan Yau Ming, S Halim, G Gopalan, D Price</td>
</tr>
<tr>
<td>P199</td>
<td>Adverse events profile of oral corticosteroids among asthma patients in the UK</td>
<td>M Bloechliger, D Reinau, J Spoendlin, SC Chang, K Kuhlbusch, LG Heaney, SS Jick, CR Meier</td>
</tr>
<tr>
<td>P200</td>
<td>The clinical, utility and economic benefits of securing minimal important difference in asthma control test using a novel tool: the ABOVE ASTHMA</td>
<td>A Manfrin, M Tinelli</td>
</tr>
<tr>
<td>P201</td>
<td>Park run dyspnoea — isn't it all exercise-induced asthma?</td>
<td>OJ Price, L Darville, H Allen, JH Hull</td>
</tr>
<tr>
<td>P202</td>
<td>Obstructive sleep apnoea (OSA) and non-eosinophilic asthma: an important phenotype in the severe asthma population</td>
<td>S Davies, N Cachada, AM Turner, S Wharton, A Mansur</td>
</tr>
<tr>
<td>P203</td>
<td>A comparison of adverse events associated with licensed and unlicensed spacer use with non-extrafine beclometasone dipropionate treatment in a real-life patient population with asthma in the United Kingdom</td>
<td>S Wan Yau Ming, J Haughney, D Ryan, S Patel, M Ochel, S Thornhill, D Price</td>
</tr>
<tr>
<td>P204</td>
<td>Prevalence of anxiety and depression in patients with severe asthma</td>
<td>J Finnerty, G Paszek, N Sehgal</td>
</tr>
<tr>
<td>P205</td>
<td>Burden of anxiety and depression in the difficult asthma clinic and relationship to outcome</td>
<td>JSS Cannie, I Bryce, G MacDonald, D Cowan, M Brewis</td>
</tr>
<tr>
<td>P206</td>
<td>A study to investigate the mechanisms underlying circadian rhythm in asthma</td>
<td>HJ Durrington, K Krakowiak, D Singh, D Ray</td>
</tr>
</tbody>
</table>

**Poster Discussion: P195 – P208**

**1.30pm – 3.15pm**

St James, 4th floor

**Thursday 8 December 2017**
Friday 8 December 2017

**P207** Ambient air pollution and admissions to hospital with exacerbations of asthma
F Thompson, A Hujan, M Richardson, G Woltmann, S Siddiqui, S Gonem

**P208** Effects of personal air pollution exposure on asthma symptoms, lung function and airway inflammation
L Chambers, J Finch, K Edwards, A Jeanjean, R Leigh, S Gonem

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**2.00pm – 3.30pm**

**Mountbatten, 6th floor**

**SYMPOSIUM**

**SMOKING AND VAPING**

Chaired by: Dr Nick Hopkinson (London) and Dr Louise Restrick (London)

- **2.00pm** Who vapes, where and why adults and children and both sides of the pond?
  - Dr Sanjay Agrawal (Leicester)
- **2.30pm** Relative risks – what do we know about the harms of vaping?
  - Dr Robert Tarran (North Carolina)
- **3.00pm** Smoking cessation – making it work in the NHS
  - Dr Rachael Murray (Nottingham)

**Learning objectives:**

- Smoking cessation is the most effective treatment for lung disease. Find out how to make it work in the NHS and what the current state of knowledge is around e-cigarettes and vaping.

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**2.00pm – 3.00pm**

**Rutherford, 4th floor**

**POSTER DISCUSSION: P209 – P219**

**Sleep and breathing**

Chaired by: Dr Joerg Steier (London) and Dr Christopher Turnbull (Oxford)

- **P207** Ambient air pollution and admissions to hospital with exacerbations of asthma
  - F Thompson, A Hujan, M Richardson, G Woltmann, S Siddiqui, S Gonem

- **P208** Effects of personal air pollution exposure on asthma symptoms, lung function and airway inflammation
  - L Chambers, J Finch, K Edwards, A Jeanjean, R Leigh, S Gonem

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**2.00pm – 3.30pm**

**Churchill, Ground floor**

**SYMPOSIUM**

**ADAPT AND SURVIVE: MECHANISMS OF CHRONIC AIRWAY INFECTION**

Chaired by: Professor Andres Floto (Cambridge) and Dr Elizabeth Sapey (Birmingham)

- **2.00pm** The evolutionary biology of chronic lung infections
  - Professor Michael Brockhurst (Sheffield)
- **2.30pm** The microbiome and chronic infection
  - Professor Michael Tunney (Belfast)
- **3.00pm** Macrophages and the control of chronic infection
  - Professor Louise Donnelly (London)

**Learning objectives:**

- In this session, participants will understand how pathogens adapt to the airway to establish and maintain chronic infection, understand the role of the microbiome in different airway diseases and how polymicrobial infections are established. The session will cover how defects in the innate immune response may predispose to chronic infection or allow it to be maintained, and novel treatment approaches will be considered, in particular those that target bacterial virulence, modify the microbiota or modify the host inflammatory response to find alternatives to antibiotics for chronic airway infection.

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**2.00pm – 3.25pm**

**Rutherford, 4th floor**

**POSTER DISCUSSION: P209 – P219**

**Sleep and breathing**

Chaired by: Dr Joerg Steier (London) and Dr Christopher Turnbull (Oxford)

- **P207** Ambient air pollution and admissions to hospital with exacerbations of asthma
  - F Thompson, A Hujan, M Richardson, G Woltmann, S Siddiqui, S Gonem

- **P208** Effects of personal air pollution exposure on asthma symptoms, lung function and airway inflammation
  - L Chambers, J Finch, K Edwards, A Jeanjean, R Leigh, S Gonem

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**P209** Characteristics of East London children with severe obesity requiring non-invasive ventilation for sleep disordered breathing
SMN Brown, J Rae, A Franklin, E Mapazire, J Bettencourt

**P210** Peri-operative treatment of sleep-disordered breathing and outcomes in bariatric patients
JH Meurgey, R Brown, A Woloszyl, J Steier

**P211** Feasibility and early benefits achieved by adopting telephone consultation and 2-way remote monitoring for initiation of CPAP therapy
R Tourish, G McDowell, D MacFarlane, C Canavan, A Brown, H Ambler, C Carlin
SCIENTIFIC PROGRAMME

P212 Repeatability of self-reported sleepiness in the context of fitness-to-drive
A Ayeni, G Beghal, J Steier

P213 Implementation of a novel obstructive sleep apnoea pathway
L Picton-Turbervill, J Butcher, S Neville, C Heaps, H Julian, S Gunatilake

P214 Remote monitoring in the early stages of continuous positive airway pressure (CPAP) initiation in obstructive sleep apnoea (OSA) allows early detection of poor compliance and mask problems
S Wordingham-Baker, J O’Reilly, N Duffy, P Plant, B Chakrabarti, S Craig, A Manuel

P215 Continuous positive airway pressure (CPAP) versus auto-CPAP (APAP) for the initial treatment of obstructive sleep apnoea syndrome: clinical efficacy and cost
M Mason, I Valero-Sanchez, J Archer, IE Smith

P216 Accuracy of sleep position detection by sleep positional trainers
S Campbell, C Carlin

P217 Evaluation of upper airway (UA) anthropometry using magnetic resonance imaging (MRI) and lateral cephalometry in patients of obstructive sleep apnea (OSA) in North Indian population
D Chaudhry, B Prajapat, S Singh, S Rohilla

P218 The effects of supplemental oxygen on blood pressure in obstructive sleep apnoea during CPAP withdrawal
CD Turnbull, N Petousi, D Sen, JR Stradling, M Kohler

P219 The use of oral modafinil in chronic obstructive pulmonary disease patients with chronic hypercapnic respiratory failure
VA Varney, G Quirke, C Kearon, S Adeyemo, H Parnell

Friday 8 December 2017

2.00pm – 3.25pm
Albert, 2nd floor
POSTER DISCUSSION: P220 – P230
Danger at work: occupational lung disease and asthma
Chaired by: Dr Joanna Feary (London) and Dr Jennifer Hoyle (Manchester)

P220 Profiling of occupations and exposures of patients diagnosed with occupational respiratory diseases at a UK regional referral unit
SS Sadhra, OP Kurmi, GI Walters

P221 Silicosis and mycobacterium disease: is it a problem in the UK?
C Hayton, J Hoyle

P222 Follow up of patients diagnosed with occupational asthma or rhinitis at Royal Brompton Hospital
J Feary, J Cannon, S Schofield, P Cullinan

P223 Update of the British Occupational Health Foundation (BOHRF) evidence-based guidelines on the prevention and management of occupational asthma
S De Matteis, J Feary, J Macfarlane, D Romano-Woodward, J Szram, GWalters, R Wiggins, P Cullinan

P224 How do the timings of reactions during specific inhalation challenge relate to real world exposures in occupational asthma?
VC Moore, PS Burge, AS Robertson, GI Walters

P225 Personal perception and impact of work aggravated asthma
LM Bradshaw, J Sumner, J Delic, D Fishwick

P226 What is the likelihood of a diagnosis of occupational lung disease when referred to a specialist tertiary clinic?
JL Hoyle, K Ballance

P227 A novel CT scoring system differentiates admissions secondary to eosinophilic from non-eosinophilic asthma
G Hynes, M Tsakok, R Shrimanker, M Bradicich, V St Noble, F Gleeson, I Pavord
Friday 8 December 2017

P228  Fatty acid supplementation and asthma: a systematic review
WF Kwok, AW Wilson

P229  A systematic review of the impact of rhinitis and its treatment in severe asthma
JA Aamir, SF Fowler, MK Khan

P230  Does the global asthma visual analogue scale relate to the asthma control questionnaire?
S Jabbal, B Lipworth

2.00pm – 3.30pm
Cambridge, 5th floor
MODERATED POSTER DISCUSSION: M24 – M34

Idiopathic pulmonary fibrosis treatment update
Chaired by: Dr Simon Hart (Hull) and Dr Felix Woodhead (Leicester)

M24  Do antifibrotics impact on lung transplantation outcomes in idiopathic pulmonary fibrosis?
YK Huong, V Dhunnoo, C Leonard, R Venkateswaran, N Chaudhuri

M25  Weight loss has a significant impact on anti-fibrotic drug tolerance in patients with idiopathic pulmonary fibrosis
RDC Moon, E Barker, S Agnew, J Surcliffe, A Kwok, LG Spencer

M26  Geographic variation in anti-fibrotic prescriptions for idiopathic pulmonary fibrosis persists and is not fully-explained by indices of multiple deprivation
AD Redfern, FA Woodhead

M27  Effect of pirfenidone on breathlessness as measured by the UCSD-SOBQ score in patients with idiopathic pulmonary fibrosis (IPF) with moderate lung function impairment
MK Glassberg, M Wijsenbeek, F Gilberg, U Petzinger, KU Kirchgaessler, C Albera

M28  Deferring treatment with pirfenidone results in loss of lung function that is not recovered by later treatment initiation

M29  FVC decline over 1 year predicts mortality but not subsequent FVC decline in patients with IPF
L Richeldi, M Kolb, A Azuma, W Stansen, M Quaresma, S Stowasser, B Crestani

M30  Effect of dose reductions and/or interruptions on the efficacy of nintedanib in patients with idiopathic pulmonary fibrosis (IPF): subgroup analysis of the INPULSIS trials
TM Maher; Y Inoue, AH Case, W Sakamoto, S Stowasser, WA Wuys

M31  Safety of combined pirfenidone and nintedanib in patients with idiopathic pulmonary fibrosis

M32  Effect of pirfenidone on all-cause mortality (ACM) and forced vital capacity (FVC) in idiopathic pulmonary fibrosis (IPF) patients with low FVC and/or low DLCO: analysis of pooled data from ASCEND and CAPACITY
SD Nathan, U Costabel, C Albera, KU Kirchgaessler, W Chou, PW Noble

M33  Long-term efficacy of nintedanib is maintained in patients with idiopathic pulmonary fibrosis (IPF) irrespective of dose: subgroup analysis of INPULSIS-ON
B Crestani, M Kolb, B Wallaert, M Quaresma, W Stansen, L Richeldi

M34  Cardiovascular safety of nintedanib in subgroups by cardiovascular risk at baseline in the TOMORROW and INPULSIS trials
I Noth, M Wijsenbeek, M Kolb, F Bonella, L Moros, D Wachtlin, TJ Corte
SCIENTIFIC PROGRAMME

2.00pm – 3.35pm
Westminster, 4th floor
POSTER DISCUSSION: P231 – P243
Closing the flood gates of the pleura
Chaired by: Dr Matthew Evison (Manchester) and Mrs Jennifer Latham (Inverness)

P231  The use of indwelling pleural catheters in patients with malignant pleural effusion and unexpandable lung
P Halford, R Bhatnagar, NA Maskell

P232  Factors predicting outcomes of talc pleurodesis in those with malignant pleural effusions at a Belfast teaching hospital
E Keelan, R Whitaker, N Magee

P233  Thoracic ultrasonography as a predictor of pleurodesis success in malignant pleural effusion
JP Corcoran, RJ Hallifax, A Yousuf, RM Mercer, R Asciak, M Hassan, I Psallidas, NM Rahman

P234  Patient and fluid characteristics associated with non-draining malignant pleural effusion
EK Mishra, A Clive, HE Davies, AJ Nunn, RF Miller, I Psallidas, NA Maskell, NM Rahman

P235  Assessment of diaphragm motion in patients with unilateral or asymmetrical pleural effusions
MG Aldik, A Sibly, L Telisinghe, C Daneshvar

P236  A systematic review of interventions to improve health related quality of life in malignant pleural effusion
P Sivakumar, A Saigal, L Ahmed

P237  Pleural abnormalities predating the development of mesothelioma
M Hassan, R Asciak, RJ Hallifax, R Mercer, NM Rahman

P238  Training opportunities in thoracic ultrasound for respiratory registrars – are current guidelines user friendly?

Friday 8 December 2017

3.00pm – 4.30pm
Moore, 4th floor
POSTER DISCUSSION: P244 – P255
Clinical implications of cystic fibrosis
Chaired by: Dr Caroline Elston (London) and Dr Rachel Kaminski (Bristol)

P244  Extended CFTR screening for patients with a clinical diagnosis of CF but only one gene on initial screening
F Frost, P Griffiths, MJ Ledson, MJ Walshaw, D Nazareth

P249  Is a pleural on-call service beneficial?
R Asciak, R Hallifax, R Mercer, J Corcoran, J Wrightson, M Hassan, C Bradley, I Psallidas, NM Rahman

P240  Outcomes of those diagnosed with chronic fibrinous pleuritis after medical thoracoscopy: a local review
B Teng, D Cooper, A Aujayeb

P241  Diagnostic timeline of patients with suspected malignant (unilateral) effusion in a large tertiary centre
L Crowley, A Rajgor, AKA Abi Musa Asa’ari, N Yoganayagam, T Palit, A Ali, N Rowe, S Bikmalla, M Iqbal, B Ganaie, M Haris, T Cusay, S Khan, N Maddekar

P242  The prognosis of patients diagnosed with pulmonary adenocarcinoma at local anaesthetic thoracoscopy (LAT): the role of primary T stage
F Khan, RK Panchal, C Richards, S Ahmed, J Bennett, M Tufail

P243  Survival prediction in malignant pleural mesothelioma: fundamental limitations of routinely available clinic predictors
AC Kidd, M McGettrick, S Tsim, DL Halligan, M Bylesjo, KG Blyth

3.00pm – 4.30pm
Moore, 4th floor
POSTER DISCUSSION: P244 – P255
Clinical implications of cystic fibrosis
Chaired by: Dr Caroline Elston (London) and Dr Rachel Kaminski (Bristol)

P244  Extended CFTR screening for patients with a clinical diagnosis of CF but only one gene on initial screening
F Frost, P Griffiths, MJ Ledson, MJ Walshaw, D Nazareth
Friday 8 December 2017

P245  Influenza B outbreak at a large adult CF centre: clinical consequences and potential contributing factors
       JB Dennis, W Welfare, A Turner, PJ Barry, RJ Bright-Thomas

P246  The impact the introduction of a universal payment by results annual tariff CF centres upon the North South divide in England
       SO Nyangoma, P Cullinan, SB Carr

P247  Lumacaftor/ivacaftor is associated with high discontinuation rates in patients with baseline severe lung function but also benefits in those who tolerate therapy
       JM Wareham, KA Webb, AM Jones, AL Brennan, RJ Bright-Thomas, AR Horsley, PJ Barry

P248  CFRD is not an independent risk factor for Stenotrophomonas maltophilia acquisition – 5 year analysis of UK CF Registry data
       F Frost, D Nazareth, MJ Walshaw, MJ Ledson

P249  It is possible to detect active neutrophil elastase in exhaled breath condensate of patients with cystic fibrosis
       C Edmondson, R Murphy, K Moffitt, D Ribeiro, EWFW Alton, JC Davies

P250  A national study of non-invasive ventilation and clinical outcomes in cystic fibrosis
       O Archangelidi, NJ Simmonds, SB Carr, P Cullinan

P251  Environmental fungal sampling in a cystic fibrosis centre
       LJ Collier, RJ Bright-Thomas, M Richardson, AM Jones

P252  Clinical profile of infants with cystic fibrosis screen positive, inconclusive diagnosis (CFSPID) in the West Midlands
       SH Ali, J Clarke, S Rao, M Desai, P Nagakumar

P253  Investigating the complexity of the relationship between gastro-oesophageal reflux and CF lung disease

P254  Feasibility of ultrashort echo time (UTE) MRI to evaluate the effect of lumacaftor/ivacaftor therapy in children with cystic fibrosis (CF) homozygous for F508del
       S Nagle, AS Brody, JWoods, KM Johnson, LWang, G Marigowda, D Waltz, J Goldin, F Ratjen, C Hug

P255  Rate of lung function decline in patients with cystic fibrosis (CF) having a residual function gene mutation
       G Sawicki, MW Konstan, E McKone, RB Moss, LBubarsky, ESuthoff, S Millar, DJ Pasta, NM Mayer-Hamblett, CH Goss, WMorgan

3.15pm – 4.45pm
Abbey, 4th floor

POSTER DISCUSSION: P256 – P267
Lung cancer: from virtual contact to invasive procedures
Chairied by: Dr Lianne Castle (Oxford) and Dr Robert Rintoul (Cambridge)

P256  Targeted stem cells expressing TRAIL as a therapy for lung cancer TACTICAL: a phase I/II trial
       AV Davies, EK Sage, K Kolluri, B Weil, R Vitorino Tendeiro Pereira Rego, A Edwards, OBain, GSantilli, D Fullen, K Champion, ADay, GWheeler, BPopova, A Thrasher, M Forster, MWLowdell, SMJanes

P257  Acceptability of a ‘virtual’ lung nodule clinic to patients
       P Davie, EA Mackay, P Brindas, A Aziz Al Rahim, VM Tippett

P258  Can we safely discharge resected early-stage NSCLC from the clinic sooner than 5 years?
       HJP Lurcott, SCO Taggart

P259  Pursuit of tissue: are we doing patients a disservice?
       RM Williams, HE Davies
SCIENTIFIC PROGRAMME

P260 Survival improves in stage IV lung cancer patients
B Matata, M Shaw, J Maguire, M Ledson

P261 Impact of physician-led ultrasound-guided tissue sampling in suspected lung cancer
R Patel, R Reddy, M Naeem, A Singh, Y Vali

P262 Pulmonary benign metastasing leiomyoma: a single-institution case series
K Chandarana, V Rizzo, EJ Caruana, AG Dawson, S Rathinam, A Nakas

P263 Daily “virtual” cancer clinic – the end of the one stop clinic?
DA Tarpey, K Hughes, AG Wight

P264 Telephone consultations for patients with newly diagnosed low risk lung nodules
MPT Kennedy, KA Rodger, JM Robson, E Paramasivam, MEJ Callister

P265 Survey of North West England CT follow-up of patients post radical treatment for lung cancer
P Griffiths, DG Fullerton, DC Lees

P266 Early lung cancer team intervention in emergency admissions
J Dunbar, M Walshaw, M Ledson, A McIver, J Hughes, N Maddock, C Smyth

P267 Optimising tissue sampling for the molecular diagnosis of lung adenocarcinoma
C Brockelsby, P Griffiths, M Walshaw, M Ledson

3.15pm – 4.50pm
Windsor, 5th floor
POSTER DISCUSSION: P268 – P280

Pharmacotherapies for COPD
Chairied by: Professor Paul Jones (London) and Professor David Singh (Manchester)

P269 Describing adherence data in a clinical effectiveness trial: the Salford Lung Study in COPD (SLS COPD)
S Collier, D Browning, JP New, JM Gibson, L Stephens, N Diar Bakerly, J Fletcher, J Crawford

P270 Identification of responder groups to fluticasone furoate/vilanterol (FF/VI) in the Salford Lung Study in COPD (SLS COPD) using a cluster analysis model
A Nicholls, N Diar Bakerly, S Collier, H Dickinson, D Leather, I Boucot

P271 Effect of extrafine single inhaler triple therapy on lung function and use of rescue medication: results from the TRINITY study
M Scuri, J Vestbo, A Papi, M Corradi, I Montagna, C Franciso, G Cohuet, S Vezzoli, A Muraro, S Petruzzelli, D Singh

P272 Improvements in exacerbation rates with single inhaler triple therapy versus dual ICS/LABA therapy in patients with advanced chronic obstructive pulmonary disease (COPD): subgroup analyses of the Phase III FULFIL study
E Hilton, N Brealey, R Birk, C-Q Zhu, GJ Criner, MT Dransfield, D Halpin, DA Lomas, DA Lipson

P273 Association of incident pneumonia and exacerbations with extrafine triple therapy in one single inhaler in COPD patients: a post-hoc analysis from TRILOGY and TRINITY studies

P274 Comparison of the initiation of COPD treatment with licensed FDC ICS/LABA treatments in terms of disease control and cost effectiveness
SW Wan Yau Ming, J Haughney, D Ryan, I Small, F Lavorini, K Gruffydd-Jones, A Papi, D Singh, D Halpin, J Hurst, S Patel, M Ochel, D Price
Friday 8 December 2017

P275  Comparing clinically relevant improvement with umeclidinium/vilanterol and tiotropium/olodaterol in symptomatic COPD: a randomised non-inferiority crossover trial
C Compton, G Feldman, AR Sousa, D Lipson, I Naya, L Tombs, S Patel, B Alcázar Navarrete

P276  Cardiovascular safety of extrafine single inhaler triple combination of beclometasone dipropionate, formoterol fumarate, and glycopyrronium bromide in COPD: results of safety analysis from the TRILOGY and TRINITY studies

P277  Bisoprolol blunts domiciliary FEV1 in COPD patients taking concomitant dual or triple inhaler therapy
S Jabbal, B Lipworth

P278  Assessing different valved holding chambers (VHC) with facemask for delivered mass to carina with inhaled corticosteroid by pressurized metered-dose inhaler (pMDI)
J Suggett, M Nagel, A Bracey

P279  Priming of a non-conducting valved holding chamber (VHC) may result in inconsistent medication delivery
A Bracey, J Suggett, M Nagel

P280  How do we choose inhalers? Patient and physician perspectives on environmental, financial and ease-of-use factors
K Liew, A Wilkinson

SCIENTIFIC PROGRAMME

3.30pm – 4.35pm
St James, 4th floor
SPOKEN SESSION: S133 – S136
Core outcomes for mechanical ventilation
Chaired by: Dr Patrick Murphy (London) and Dr Charlotte Summers (Cambridge)

3.35pm S133
A core outcome set for mechanical ventilation trials: The COVenT Study
SM Ringrow, DF McAuley, M Clarke, JC Marshall, B Connolly, L Rose, B Blackwood

3.50pm S134
Effect of continuous positive airway pressure on neural respiratory drive and functional capacity in excessive dynamic airway collapse patients
G Kaltsakas, M Patout, G Arbane, L Ahmed, D D’Cruz, M Polkey, J Hull, N Hart, PB Murphy

4.05pm S135
Timing of acidaemia onset in exacerbations of COPD requiring assisted ventilation and in-hospital mortality
TM Hartley, ND Lane, J Steer, C Echevarria, SC Bourke

4.20pm S136
Lung protective mechanical ventilation for acute respiratory failure is not being implemented in UK clinical practice
R Samanta, A Dixit, S Harris, NS MacCallum, DA Brearley, PJ Watkinson, A Jones, S Ashworth, R Beale, SJ Brett, JD Young, M Singer, C Summers, A Ercole

3.00pm – 4.00pm
COFFEE/TEA will be served in the Britten, 3rd floor
†Relvar 184/22 is not indicated in COPD. There is no additional benefit compared to 92/22 and there is a potential increased risk of adverse reactions.

Relvar Ellipta was developed in collaboration with

*Patients could receive a LAMA throughout the treatment period in addition to their randomised treatment.

**Critical errors defined as errors that are likely to result in no, or minimal, medication being delivered to the lung.

For more information on Relvar please visit www.relvar.co.uk

Prescribing information, references and safety information can be found on the reverse.

1Relvar 184/22 is not indicated in COPD. There is no additional benefit compared to 92/22 and there is a potential increased risk of adverse reactions.

2Relvar Ellipta was developed in collaboration with INNOVIVA.

3Patients could receive a LAMA throughout the treatment period in addition to their randomised treatment.

4Critical errors defined as errors that are likely to result in no, or minimal, medication being delivered to the lung.
Ellipta Prescribing information

Incruse Ellipta 55mcg (umeclidinium) inhalation powder. Each single inhalation provides a delivered dose (the dose leaving the mouthpiece of the inhaler) of 55 micrograms umeclidinium (equivalent to 65 micrograms of umeclidinium bromide). Indications: Incruse is indicated as a maintenance inhaler) of 55 micrograms umeclidinium (equivalent to 65 micrograms of umeclidinium bromide). Indications: Incruse Ellipta should be used in patients with asthma. Treatment with Incruse Ellipta should be discontinued in the event of paradoxical bronchospasm and alternative therapy initiated if necessary. Cardiovascular effects may be seen after the administration of muscarinic receptor antagonists, therefore Incruse Ellipta should be used with caution in patients with severe cardiovascular disorders, particularly cardiac arrhythmias. Incruse Ellipta should be used with caution in patients with urinary retention or narrow angle glaucoma. No dosage adjustment is required in renal or mild to moderate hepatic impairment. Acute symptoms: Incruse Ellipta is not indicated for acute episodes of bronchospasm. Warn patients to seek medical advice if short-acting inhaled bronchodilator use increases, a re-evaluation of the patient and of the COPD treatment regimen should be undertaken. Interactions with other medicinal products: Co-administration with other long-acting muscarinic antagonists or medicinal products containing this active substance has not been studied and therefore, is not recommended. Fertility, pregnancy, and breastfeeding: No available human in vivo data. Balance risks against benefits. Side effects: Common (≥1/10 to <1/10): Nasopharyngitis, upper respiratory tract infection, urinary tract infection, sinusitis, headache, tachycardia, cough. Other important side effects include: Uncommon (≥1/1,000 to <1/100): Atrial fibrillation, rhythm idioventricular, supraventricular tachycardia, supraventricular extrasystoles. Hypersensitivity reactions including rash, urticaria, pruritus. Not Known (cannot be estimated from available data): Glaucoma and vision blurred. Legal category: POM. Presentation and Basic NHS cost: Incruse Ellipta. 1 inhaler x 30 doses. Incruse Ellipta 55mcg - £27.50. Marketing authorisation (MA) nos. 55mcg 1x30 doses [EU/1/14/922/002]; MA holder: Glaxo Group Ltd, 980 Great West Road, Brentford, Middlesex TW8 9GS, UK. Last date of revision: April 2017. UK/INC/0001/17(1). Incruse and Ellipta are trademarks of the GlaxoSmithKline Group of Companies. All rights reserved.

Relvar Ellipta Prescribing information

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

Relvar Ellipta (fluticasone furoate/vilanterol [as trifenate]) inhalation powder. Each single inhalation of fluticasone furoate (FF) 100 micrograms (mcg) and vilanterol (VI) 25 mcg provides a delivered dose of 92 mcg FF and 22 mcg VI. Each single inhalation of FF 200 mcg and VI 25 mcg provides a delivered dose of 184 mcg of FF and 22 mcg of VI. Indications: Asthma: Regular treatment of asthma in patients ≥12 years not adequately controlled on inhaled corticosteroids (ICS) and “as needed” short-acting inhaled β₂-agonist (LABA) and ICS combination is appropriate. COPD: Symptomatic treatment of adults with COPD with a FEV₁ <70% predicted normal (post-bronchodilator) and an exacerbation of COPD: Symptomatic treatment of adults with COPD with a FEV₁ <70% predicted normal (post-bronchodilator) and an exacerbation is appropriate. Relvar should not be used in conjunction with other sympathomimetic medicinal products may potentiate the adverse reactions of FF/VI. Relvar should not be used in conjunction with other long-acting β₂-agonists or medicinal products containing long-acting β₂-agonists. Pregnancy and breast-feeding: Experience limited. Balance risks against benefits. Side effects: Common (≥1/10): headache, nasopharyngitis. Common (≥1/100 to <1/10): candidiasis of the mouth and throat, dysphonia, pneumonia, bronchitis, upper respiratory tract infection, influenza, oropharyngeal pain, sinusitis, pharyngitis, rhinitis, cough, abdominal pain, arthralgia, back pain, fractures, pyrexia, muscle spasms. Other important side effects include: Uncommon (≥1/1,000 to <1/100): blurred vision. Rare (≥1/10,000 to <1/1,000) paradoxical bronchospasm and hypersensitivity reactions including anaphylaxis, angioedema, rash, urticaria. See SmPC for other adverse reactions. Legal category: POM. Presentation and Basic NHS cost: Relvar Ellipta. 1 inhaler x 30 doses. Relvar Ellipta 92/22 - £22.00. Relvar Ellipta 184/22 - £29.50. Marketing authorisation (MA) nos. 92/22 mcg 1x30 doses [EU/1/13/886/002]; 184/22 mcg 1x30 doses [EU/1/13/886/005]. MA holder: Glaxo Group Ltd, 980 Great West Road, Brentford, Middlesex TW8 9GS, UK. Last date of revision: September 2017. UK/FFT/0227/15(3). Trademarks are owned by or licensed to the GSK group of companies. © 2017 GSK group of companies or its licensor Relvar Ellipta was developed in collaboration with Innoviva Inc.
SPEAKERS’ BIOGRAPHICAL DETAILS

Dr Sanjay Agrawal is a Consultant in Respiratory and Intensive Care Medicine at the University Hospitals of Leicester NHS Trust (UH). He Chairs the British Thoracic Society (BTS) Tobacco Specialist Advisory Group and is a member of the Royal College of Physicians Tobacco Advisory Group. During this time, with many others, he has developed the BTS National Tobacco Audit in Secondary Care and the BTS Tobacco Quality Improvement tool.

Dr Isabella Annesi-Maesano is Research Director at the French NIH (INSERM) and Professor of Environmental Epidemiology. She is the Head of the Department of Epidemiology of Allergic and Respiratory Diseases (EPAR) (www.epar.fr) at IPLESP INSERM and UPMC in Paris. Her research includes the explanation of the development of allergic and respiratory diseases and their co-morbidities through an exposomic approach in the frame of the FP7-ENV Health and Environment-wide Associations based on Large Population Surveys (HEALS) project (www.health-eu.eu) of which she is PI. Other thematics of hers include the impact of air pollution and climate change.

Professor David Baldwin is a Consultant Respiratory Physician at Nottingham University Hospitals and Honorary Professor at the University of Nottingham. He is Chair of the Clinical Expert Group for Lung Cancer, NHS England and Chair of the Screening Prevention and Early Diagnosis Group for the National Cancer Research Institute (NCRI). His National duties include work with the NCRI Lung Group. He has held the post of Honorary Secretary of the British Thoracic Society (BTS). He has played a leading role on the NICE Lung Cancer Guidelines CG121 (2011), the BTS Guidelines on the Radical Management of Lung Cancer (2010) and the BTS Guidelines on the Management of Pulmonary Nodules (2015). His research interests include CT screening and lung cancer epidemiology, with a focus on research that translates to changes in services. He was Lead Respiratory Physician on the UK CT Lung Cancer Screening Trial (UKLS). He has held grants from a variety of sources. He has published over 160 papers. Clinically, Professor Baldwin specializes in lung cancer and interventional respiratory procedures. He is Lead Clinician for the East Midlands Lung Cancer Expert Advisory Group and Associate Editor for Thorax. He enjoys time with his family and is a keen windsurfer.

Dr Chris Barber is a Respiratory Consultant whose work is split between clinical sessions in Sheffield and research at the Centre for Workplace Health in Buxton. He is a member of the Group of Occupational Respiratory Disease Specialists (GORDS), current Chair of the BTS Occupational and Environmental Lung Disease Specialist Advisory Group, and a Principal Medical Adviser to the Health and Safety Executive. Dr Barber has a clinical and research interest in a wide range of occupational and environmental lung diseases.

Professor Rachel Batterham established and leads the University College London Hospital Bariatric Centre for Weight Management and Metabolic Surgery and the University College London Centre for Obesity Research. She holds a prestigious National Institute of Health (NIHR) Research Professorship and is recognised internationally for her research focused on body weight regulation. Her work has played a key role in identifying gut hormones as tractable therapeutic targets for obesity. She has made significant clinical contributions to defining the management of obese patients through her membership of the NICE Obesity Guideline Development Group and Royal College of Physicians Advisory Group on Health and Weight.

Professor Maria Belvisi is an internationally recognised expert in the respiratory field. Her research is focused on the cellular and molecular mechanisms of asthma, COPD and chronic cough, and developing therapies for these diseases. She is Professor of Respiratory Pharmacology at the NHLI, Imperial College London but was also recently appointed as the Vice President and Head of RIA IMED Biotech Unit focusing on the development of respiratory therapeutics for chronic lung diseases. Professor Belvisi has >200 publications in peer review journals and has served on the editorial board of several high impact respiratory journals including AJRCCM and ERJ. She has also received several prizes and awards, including the Women in Inflammation Science (2009) awarded by the World Inflammation Society and the AstraZeneca Women in Pharmacology Prize (2011). She was elected Fellow of the British Pharmacological Society in 2005 and Fellowship of the European Respiratory Society in 2013.

Dr Charlotte Bolton is Clinical Associate Professor in Respiratory Medicine at the University of Nottingham. The focus of her clinical and translational research has been on the extrapulmonary manifestations of chronic respiratory disease, predominantly COPD and also pulmonary rehabilitation. In addition, she is interested in the long term respiratory sequelae of being born preterm.
SPEAKERS’ BIOGRAPHICAL DETAILS

She is joint lead of the East Midlands Respiratory Programme. She chaired the British Thoracic Society (BTS) Pulmonary Rehabilitation Guidelines and co-chaired the BTS Pulmonary Rehabilitation Quality Standards. She is a member of the BTS Pulmonary Rehabilitation Quality Improvement Advisory Group.

Dr Stephen Bourke is a Consultant Respiratory Physician at Northumbria Healthcare NHS FT and Senior Lecturer, Newcastle University. He is Chair of the BTS COPD Specialist Advisory Group and leads a research group focused on clinical risk stratification in COPD and NIV. This includes the development of the DECAF prognostic score, an RCT of hospital at home selected by DECAF and a multicentre NIV outcomes study. He has also led practice changing research on NIV in motor neurone disease.

Professor Peter Bradding is Professor of Respiratory Medicine at the University of Leicester and Consultant Respiratory Physician at Glenfield Hospital, Leicester. His clinical research interests include asthma, and in particular the role of cytokines, mast cells and ion channels in asthma pathogenesis. He is the Bronchoscopy Theme Lead for the MRC-funded Refractory Asthma Stratification Programme, and the Discovery Theme Lead for the respiratory component of NIHR Leicester Biomedical Research Centre.

Professor Christopher Brightling is a National Institute for Health Research Senior Investigator, Director of the Leicester NIHR Biomedical Research Unit and Honorary Consultant Respiratory Physician at the Institute for Lung Health, Leicester, UK. He is Coordinator for the European Union Consortium AirPROM, MRC/ABPI COPD (COPDMAP) Consortium and the MRC Molecular Pathology Node EMBER. He is founding Director of the ERS Clinical Research Collaborations.

As a well-respected expert in the immunopathogenesis of airway diseases, particularly asthma, chronic cough and COPD, his current projects include understanding the interactions between mast cells and airway smooth muscle cells in the development of the asthmatic phenotype, and migration and remodeling of airway smooth muscle in asthma and COPD.

Professor Brightling has published over 300 peer-reviewed articles and has an h-index of 76 (Google scholar). He has been an invited speaker at over 20 international meetings within the last five years. Professor Brightling is Associate Editor of the prestigious CHEST and Clinical Science journals and has contributed to updates for the American College of Chest Physicians’ Cough Guidelines, the British Thoracic Society Difficult Asthma Guidelines and the American Thoracic Society/European Respiratory Society Severe Asthma Task Force.

Professor Mike Brockhurst is an evolutionary biologist using experimental evolution and observational clinical studies to understand the impact of evolutionary dynamics on infections, particularly in cystic fibrosis. His recent research has focused on horizontal gene transfer and the role for mobile genetic elements in bacterial adaptive evolution. He gained his DPhil from University of Oxford in 2003, joined the faculty at University of Liverpool in 2006, and was appointed the 50th Anniversary Chair in Evolutionary Biology at University of York in 2012. In January 2017 he moved to University of Sheffield as Professor of Microbial Evolution.

Professor Chris Carlsten, MD MPH is a Professor of Medicine, Canada Research Chair in Occupational and Environmental Lung Disease and holds the AstraZeneca Chair in Occupational and Environmental Lung Disease at the University of British Columbia. He is the Director of the Air Pollution Exposure Laboratory and also holds adjunct positions at the Peter Wall Institute for Advanced Studies, the UBC School of Population and Public Health and the Centre for Heart Lung Innovation (formerly James Hogg Research Centre).

Professor Carlsten attended undergraduate and medical school at Stanford University before training in internal, occupational, pulmonary and critical care medicine at the University of Washington.

The Carlsten laboratory leverages the power of controlled human exposure methodology to focus on the respiratory and immunological health effects of inhaled environmental and occupational threats, using diesel exhaust, western red cedar, and phthalates as model inhalants.

As Director of the Occupational Lung Disease Clinic at The Lung Centre (Vancouver General Hospital), Professor Carlsten welcomes patients with concerns regarding occupational or environmental exposures contributing to respiratory disease including asthma, COPD, interstitial lung disease, cancer, and pleural disease.

For more information, please see: https://pollutionlab.com https://twitter.com/PollutionLab
**SPEAKERS’ BIOGRAPHICAL DETAILS**

**Professor James D Chalmers** is GSK/British Lung Foundation Chair of Respiratory Research at the University of Dundee and an Honorary Consultant Respiratory Physician. His clinical and research interests are in neutrophilic lung disease and airway infection, particularly in relation to bronchiectasis and COPD. He is Chair of the European Bronchiectasis Registry (EMBARC) and chaired the recent European Bronchiectasis Guidelines. He is Chair of the BTS Respiratory Infection Specialist Advisory Group and is the incoming Deputy Chief Editor of the *European Respiratory Journal*. In 2017 he won the Patrick Neil Medal from the Royal Society of Edinburgh and the Romain Pauwels Award from the European Respiratory Society for his contribution to bronchiectasis research.

**Professor Edwin R Chilvers** is Professor of Respiratory Medicine at the University of Cambridge and President of the British Thoracic Society. His research interests include the molecular basis of neutrophil priming, activation and apoptosis, in particular the role of the phosphoinositide 3-kinase (PI3K) and hypoxia inducible factor (HIF) in signalling these events. Past posts include registrar training at the Hammersmith Hospital, an MRC Research Training Fellowship at the University of Leicester and NHLI Imperial College London, and a Wellcome Trust Senior Research Fellowship at the University of Edinburgh. He has held an Honorary NHS Consultant position since 1992, currently at Addenbrooke’s Hospital, and remains clinically active with a particular interest in ARDS and interstitial lung disease.

Professor Chilvers is Director of Graduate Education within the School of Clinical Medicine, Chair of the Faculty Board of the School of Veterinary Medicine, and past Chair of the UK’s Association of Clinical Professors in Medicine. He was awarded a ScD from Cambridge in 2016 and elected a Fellow of the Academy of Medical Sciences in 2007.

**Dr Colin Church** is a Consultant in Pulmonary Vascular and Respiratory Medicine. He trained in Glasgow, Cambridge, Papworth and Sydney. He has completed a PhD in understanding the basic mechanisms of inflammatory signaling in pulmonary vascular remodeling. He has a keen interest in both clinical and basic science research and is a principal investigator on a number of important clinical trials including looking at novel anti-inflammatory strategies to treat pulmonary hypertension. His basic science research focuses on the interplay of inflammation and hypoxia on the pulmonary vascular cells, in particular the pulmonary artery fibroblast. He is one of three consultants in the Scottish Pulmonary Vascular Unit, which is the national referral centre for the Scottish population. This unit investigates and manages all patients in Scotland with pulmonary hypertension. He is also one of the principal clinicians involved in management of venous thromboembolic disease in the Queen Elizabeth University Hospital and sits on the Glasgow Thrombosis Committee.

**Dr Keira A Cohen**, MD is an Instructor of Medicine at Johns Hopkins School of Medicine. She received her medical degree at the University of Pennsylvania School of Medicine and subsequent training in internal medicine and pulmonary and critical care medicine at Brigham and Women’s Hospital, Harvard Medical School. In collaboration with the KwaZulu-Natal Research Institute for TB and HIV (K-RITH) in Durban, South Africa, and the Broad Institute of MIT and Harvard, her research to date has focused on the genomic and evolutionary biology of *M. tuberculosis* and its relationship with pathogenesis and drug resistance. She is currently working to establish the Johns Hopkins Non-tuberculous Mycobacteria and Bronchiectasis Clinic.

**Professor Alison Condliffe** is Professor of Respiratory Medicine at the University of Sheffield. Her research interests include host-pathogen interactions, neutrophil-mediate tissue injury, and the impact of hypoxia on innate immune cell function, with a particular focus on the PI3-kinase signalling pathway. She serves on a number of peer-review and scientific committees. After graduating from Cambridge and London, she undertook a PhD in Edinburgh and a Wellcome Intermediate Fellowship at the Babraham Institute in Cambridge, with a subsequent Lectureship in the Department of Medicine at the University of Cambridge. She is an Honorary Consultant in Respiratory Medicine and her clinical interests include the respiratory complications of immune deficiency, respiratory infections, and non-CF bronchiectasis.

**Professor Adnan Custovic** is Clinical Professor of Paediatric Allergy at Imperial College London. In 2015 he was awarded the European Respiratory Society Gold Medal for research in asthma. In 2013 he received the BSACI William Frankland Medal for outstanding contributions to clinical allergy, and the CIIP
SPEAKERS’ BIOGRAPHICAL DETAILS

President’s Award for distinguished achievements in childhood asthma. He has delivered numerous prestigious keynote/named lectures, including Ann Woolcock Lecture (2016), Nemacolin Asthma Conference Keynote Lecture (2014), Cas Motala Memorial Lecture (South African Allergy Society, 2013), James Hutchison’s Memorial Lecture (Hong Kong Paediatric Society, 2012), and the RSM Priscilla Piper Lecture (2011). He is Associate Editor of Blue Journal, and serves on 13 journal editorial boards.

Professor Maggie Dallman is Associate Provost (Academic Partnerships) and Professor of Immunology at Imperial College London. She has over thirty five years of experience in experimental research in university and industrial environments. Her interests have focussed on understanding dysregulated and inappropriate immune responses with the goal of developing novel biomarkers and therapeutic interventions. Her most recent work involves developing zebrafish models of inflammation at mucosal surfaces. In her Associate Provost role, Professor Dallman is the academic lead on the College’s Outreach and Engagement Strategy and International Relations. She is currently a Trustee and Director of the Francis Crick Institute and sits on BBSRC Council.

Professor Donna Davies is Professor of Respiratory Cell and Molecular Biology in the Faculty of Medicine at the University of Southampton and is Associate Lead for the Respiratory Theme of the Southampton NIHR Biomedical Research Centre. Her translational research programme is focused on understanding mechanisms of lung disease with particular emphasis on epithelial barrier immunity, epithelial-mesenchymal signaling and matrix biology. She is co-founder of the University spin-out company, Synairgen, a drug development company focused on advancing novel biomarkers and therapeutic interventions. Her most recent work involves developing zebrafish models of inflammation at mucosal surfaces. In her Associate Provost role, Professor Dallman is the academic lead on the College’s Outreach and Engagement Strategy and International Relations. She is currently a Trustee and Director of the Francis Crick Institute and sits on BBSRC Council.

Professor Christopher Denton is Professor of Experimental Rheumatology at UCL and Consultant Rheumatologist at the Royal Free Hospital in London. He has published extensively on laboratory and clinical aspects of connective tissue disease. He leads a large clinical and translational research programme in scleroderma at the Royal Free Hospital and co-ordinates multidisciplinary care for more than 1700 patients. He currently chairs the UK Scleroderma Study Group (UKSSG).

Dr Maya Desai has been a Consultant in Respiratory Paediatrics at Birmingham Children’s Hospital since 2003. Her paediatric training started in Newcastle. She moved via London and Melbourne to Birmingham to undertake CF research, completing this and her paediatric respiratory training in the West Midlands. As well as being the CF Centre Director, she is involved in a busy clinical respiratory unit and is active in clinical research. Specific interests include newborn screening, microbiology and transition to adult care. Dr Desai is a member of the BTS CF Specialist Advisory Group.

Dr Tony De Soyza is a clinical academic working at Freeman Hospital where he runs a 500+ patient clinic in bronchiectasis that transitions paediatric bronchiectasis cases over into adult services. He is the lead applicant for the MRC funded BronchUK Network (www.bronch.ac.uk) which aims to develop excellence in patient care through an observational cohort of 1500 adults and underpin research through a biobank. He has an active research programme, from bench research through to bedside and patient interface. His PhD student has recently completed an adult patient bronchiectasis information and experience website www.bronchiectasis.me. Dr De Soyza is hugely grateful to his research team and patients who collectively have meant that over 740 consented participants in Newcastle have added to our knowledge on bronchiectasis. His interests include Pseudomonas infections, patient education and developing stratified medicines for bronchiectasis.

Professor Hazel Dockrell BA(Mod), PhD, obtained her first degree in Microbiology from Trinity College, Dublin, received her PhD from University of London (1978) and after a period as a Research Associate at the Middlesex Hospital Medical School (1978-85), she joined the London School of Hygiene and Tropical Medicine, initially to work on leprosy, and then on tuberculosis and BCG vaccination. She has contributed to the understanding of the immune responses to tuberculosis and the BCG vaccine, and to the development of TB biomarkers for use in vaccine trials. Professor Dockrell has played a major role in the establishment of international collaborative efforts to develop TB vaccines and to identify correlates of protection for TB. A particular interest has been how...
environment, co-infection, and co-morbidity with diabetes impact on immune signatures induced by BCG and *Mycobacterium tuberculosis*. She is also Special Advisor on Overseas Programmes in Africa at LSHTM.

**Professor Louise Donnelly** is a Professor of Respiratory Cell Biology in the Section of Airway Disease at the National Heart and Lung Institute, Imperial College London. Her research interests are primarily focused on the cellular profile of inflammatory lung diseases including asthma and COPD. In particular, her work investigates how inflammatory cells are altered in the disease state and how these changes can be exploited in the development of novel therapeutic strategies. To this end, Professor Donnelly’s group have established a number of human primary cell systems to investigate mechanisms of aberrant inflammation.

**Professor Stuart Elborn** is Professor of Respiratory Medicine at Imperial College London, and Director of the Adult CF Centre, Royal Brompton Hospital and Professor of Respiratory Medicine at Queen’s University Belfast. His clinical and research interests are in cystic fibrosis and bronchiectasis. His research group is focused on identifying new targets and diagnostics in suppurative lung disease, developing better therapies for treating the underlying defects in cystic fibrosis and bronchiectasis.

**Dr Rachael Evans** is an Associate Professor (Clinical) at the University of Leicester and Honorary Consultant Respiratory Physician at Glenfield Hospital, Leicester, UK. Her sub-specialty clinical interests include the diagnosis and management of chronic breathlessness, and the management of advanced COPD. After a post-doctoral fellowship in Toronto, Canada, she returned to Leicester as an NIHR Clinical Lecturer completing research around exercise and chronic respiratory disease. As Principle Investigator, she recently completed an NIHR funded project to develop exercise rehabilitation for patients with severe asthma. She currently holds an NIHR Clinician Scientist Fellowship to understand the prognosis and diagnosis of people presenting to primary care with chronic breathlessness.

**Dr Billy Fahy** qualified in Medicine from the University of Oxford and University College London and is an accredited specialist in pharmaceutical medicine. He has worked in drug discovery and development for over a decade, gaining a broad experience in translational medicine and early drug development across respiratory and classical autoimmune disease, with a special interest in interstitial lung disease. He is currently the Early Development Leader for the Interstitial Lung Disease Portfolio at GlaxoSmithKline, where he leads the translational and clinical research strategy to support the discovery and development of novel therapies for the treatment of idiopathic pulmonary fibrosis.

**Professor Andres Floto** is a Wellcome Trust Senior Investigator and Professor of Respiratory Biology in the Molecular Immunity Unit of the University of Cambridge (based at the MRC Laboratory of Molecular Biology), and Research Director of the Cambridge Centre for Lung Infection at Papworth Hospital, Cambridge.

His basic research is focused on understanding how immune cells interact with bacteria, how intracellular killing and inflammation are regulated during infection, how combining whole genome sequencing with directed evolution can be used both to understand pathogenesis and to develop novel antibiotics and host-directed therapies.

Clinically, he specialises in the treatment of patients with cystic fibrosis (CF), non-CF bronchiectasis, and infections with non-tuberculous Mycobacteria (NTM). He Co-chairs the British Thoracic Society NTM Guidelines Committee, the joint US CF Foundation-European CF Society (ECFS) NTM Guidelines Group, and the ECFS working group on NTM.

**Dr Amanda Goodwin** attained her medical degree from the University of Liverpool in 2010. She progressed through the NIHR Clinical Academic Training Programme and is now a respiratory SpR in the East Midlands. She is currently undertaking research investigating the role of G protein signalling in pulmonary fibrosis at the University of Nottingham, funded by an MRC Clinical Research Training Fellowship.

**Professor John Gosney** is Consultant Thoracic Pathologist at the Royal Liverpool University Hospital and Professor of Thoracic Pathology at the University of Liverpool. He has internationally acknowledged expertise in the pathology of tumours of the lung and in the genomic and proteomic pathology of lung cancer and its application to management.

**Professor Ruth Green** is a Consultant Physician at Glenfield Hospital, Leicester and Honorary Professor
SPEAKERS’ BIOGRAPHICAL DETAILS

of Respiratory Medicine at the University of Leicester. She has clinical and research interests in severe asthma, particularly the importance of characterising clinico-pathological phenotypes to guide asthma management.

Dr Rob Hallifax is a Clinical Research Fellow working in the Oxford Pleural Unit. He studied medicine as a graduate-entry student at the University of Oxford, having completed a MSc in Natural Sciences at University of Cambridge. Dr Hallifax is currently undertaking a DPhil through an MRC funded fellowship entitled “Understanding pneumothorax: epidemiology, physiology and outcomes”.

He is the trial coordinator for the RAMPP (Randomised Ambulatory Management of Primary Pneumothorax) trial, a multi-centre study recruiting at 24 sites around the UK.

Professor Nicholas Hart was appointed as the Director of the Lane Fox Respiratory Service in 2012, which is an internationally recognised weaning, rehabilitation and home mechanical ventilation service. It is the largest weaning and rehabilitation service in the UK. Professor Hart’s research activity is focused on increasing health-related quality of life and reducing hospital admission in patients with chronic respiratory disease and post critical illness. Professor Hart established the Lane Fox Clinical Respiratory Physiology Research Centre in 2007 and he has developed a programme of translational physiological research focused on:

- Mechanism of skeletal muscle wasting in nonneuromuscular conditions
- Advanced physiological monitoring in acute illness to prevent inpatient deterioration and readmission
- Rehabilitation strategies to improve outcome in patients with chronic respiratory disease and post critical illness
- Clinical trials to improve outcome in chronic respiratory failure

Professor Hart is Professor in Respiratory and Critical Care Medicine, Kings College London, Director of Research Delivery, Guys and St Thomas’ NHS Foundation Trust, London, and Joint Editor-in-Chief of Thorax and the International Journal of Respiratory, Sleep and Critical Care Medicine.

Dr Charles Haworth is Director of the Cambridge Centre for Lung Infection at Papworth Hospital. He trained at the Manchester Adult Cystic Fibrosis Centre, the Royal Brompton Hospital and at Hammersmith Hospital, before moving to Cambridge in 2003. He co-authored the US CF Foundation and European CF Society NTM guidelines published in Thorax in December 2015 and is Co-chair of the BTS NTM Guidelines Committee. Dr Haworth is also a member of the BTS Bronchiectasis and ERS Bronchiectasis Guidelines Committees. He collaborates with Professor Andres Floto at the University of Cambridge on NTM related studies and is a member of the European Union funded iABC and CFMATTERS consortia. Dr Haworth is co-chief investigator of three current international novel therapy clinical trials in people with bronchiectasis. He is also the site principal investigator for the European Cystic Fibrosis Society Clinical Trials Network and is a member of the CF Foundation Data Safety Monitoring Board.

Professor Liam Heaney is Professor of Respiratory Medicine at Queens University Belfast, Northern Ireland, and trained in Northern Ireland and at the Royal Brompton Hospital in London. He is Director of the Northern Ireland Regional Difficult Asthma Service which over the past 10 years has developed a programme of optimal clinical assessment in this population, including multi-disciplinary systematic assessment and identification and management of poor adherence. He has chaired the British Thoracic Society Asthma Specialist Advisory Group, the Evidence Review Group for Difficult Asthma for the British Thoracic Society/Scottish Intercollegiate Guidelines on Asthma Management and has been a member of the National Steering Committee for the UK Asthma Guidelines. He coordinates the UK Severe Asthma Registry and NICE UK Thermoplasty Registry. He is Academic Lead of the Medical Research Council UK Refractory Stratification Programme (http://www.rasp.org.uk) and has published extensively on the clinical assessment and management of difficult to control asthma in adults.

Dr Nik Hirani qualified from Nottingham University and following clinician scientist training fellowships, is currently a Senior Lecturer and PI in the MRC Centre for Inflammation Research in Edinburgh and Honorary Consultant at the Royal Infirmary Edinburgh. He is Clinical Director for Respiratory Medicine in Lothian and leads the Edinburgh Lung Fibrosis Service. His research interests include macrophage biology in lung fibrosis, the natural
history of interstitial lung diseases and he is CI or Co-I for several clinical trials in lung fibrosis. Dr Hirani is past chair of the British Thoracic Society ILD Guideline Committee, the National Institute for Clinical Excellence Working Group for Idiopathic Pulmonary Fibrosis and is a member of several academic and industry advisory boards.

**Professor Ling-Pei Ho** leads the Translational Lung Immunology Programme based at the MRC Human Immunology Unit at the University of Oxford. Her research programme centres on how immunological responses impact on mechanisms of lung injury and repair with a focus on myeloid cells and lung fibrosis. Her group’s diseases of interest are idiopathic pulmonary fibrosis and fibrotic sarcoidosis, and their studies target the interface between cellular immunology, disease mechanisms and early clinical trials. She leads the Oxford Sarcoidosis Service and works very closely with her colleagues at the Oxford Interstitial Lung Disease Service.

**Professor Anne Holland** is Professor of Physiotherapy at La Trobe University and Alfred Health in Melbourne, Australia. Her research programme investigates new models of rehabilitation for people with chronic respiratory disease, including low cost home-based pulmonary rehabilitation and tele-rehabilitation. Professor Holland has published over 180 peer reviewed journal articles and her publications have been cited more than 4600 times, including in eleven international treatment guidelines for respiratory physiotherapy, pulmonary rehabilitation and chronic lung disease.

**Dr Nicholas Hopkinson** MA PhD FRCP is a Reader in Respiratory Medicine and Honorary Consultant Physician at the National Heart and Lung Institute of Imperial College and the Royal Brompton Hospital where he runs the Advanced COPD Service.

His research focuses on addressing exercise and activity limitation in COPD in areas including pulmonary physiology and lung volume reduction, skeletal muscle impairment and pulmonary rehabilitation. His research has been funded by the MRC, the NIHR, the Wellcome Trust, the British Lung Foundation and the Moulton Foundation.

He is also active in tobacco control advocacy and is a Trustee of Action on Smoking and Health and a medical advisor to the British Lung Foundation.

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**Dr Dan Huh** is an Assistant Professor and Wilf Family Term Endowed Chair in the Department of Bioengineering at the University of Pennsylvania. He is a pioneer of “organ-on-a-chip” technology, and his research group at Penn focuses on developing microengineered models of human organs in health and disease for a wide variety of biomedical applications. Dr Huh has won several honours and awards including the CRI Technology Impact Award, the John J Ryan Medal from the Royal College of Surgeons in Ireland, Design of the Year Award from London Design Museum, NIH Director’s New Innovator Award, Analytical Chemistry Young Innovator Award, TEDx Fellow, NC3Rs Annual Award, Lifetime Membership from the MOMA, SLAS Innovation Award from the Society for Lab Automation and Screening, and Scientific Breakthrough of the Year from the American Thoracic Society.

**Professor Marc Humbert**, MD, PhD, is the Director of the National Reference Centre for Pulmonary Hypertension, Department of Respiratory and Intensive Care Medicine, Hospital Bicêtre, Assistance Publique Hôpitaux de Paris, France. He is the Chief Editor of the *European Respiratory Journal*. He has received several distinctions including the Cournand Lecture Award from the ERS (2006), the Descartes-Huygens Award from the Royal Netherlands Academy of Arts and Sciences (2009) and the Rare Disease Award, Fondation des Maladies Rares (2016).

**Dr John Hurst** graduated from the University of Edinburgh Medical School and was appointed Senior Lecturer, then Reader in Respiratory Medicine at University College London in October 2007. He has a particular research interest in mechanisms of exacerbation susceptibility and cardiovascular risk in COPD. He was awarded the 2012 European Respiratory Society COPD Research prize. His clinical work at Royal Free London NHS Foundation Trust focuses on the specialist COPD and alpha-1 antitrypsin services, and he has an active role in undergraduate and postgraduate medical education. A previous Associate Editor at *Thorax*, during 2012 he was appointed to the Editorial Board of the *American Journal of Respiratory and Critical Care Medicine*.

**Dr Mariam Jamal-Hanjani** completed her undergraduate studies in physics and medicine, before training as a medical oncologist. In 2012 she was awarded a CRUK Clinical Research Fellowship for her PhD at the UCL Cancer Institute and is currently an
NIHR Clinical Lecturer working in the field of lung cancer intratumour heterogeneity.

**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 integrin adhesion molecules and cancer cell survival. 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 recently won his Wellcome Senior Fellowship renewal to study the genetic and cellular changes in lung cancer pathogenesis. The ambition is that from this knowledge he can develop therapies detecting and targeting early lung cancers and thereby dramatically improve outcomes.

Professor Janes 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 Respiratory Research Department at UCL, Director of the Lung Cancer Board for London Cancer, Lead for Pulmonary at the International Society of Cellular Therapies and Vice-Chair of the National ‘Clinical Expert Group’ on Lung Cancer.

**Professor Simon Johnson** is Professor and Head of Respiratory Medicine at the University of Nottingham and Director of the National Centre for Lymphangioliomyomatosis (LAM). His research group work on proteolysis and mechanisms of lung destruction in chronic lung disease and have a programme of basic, translational and clinical studies in LAM.

**Dr Mark Juniper** has been a Consultant in Respiratory and Intensive Care Medicine in Swindon since 2000. He has been Clinical Co-ordinator at the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) for the last five years and co-wrote the proposal for a study on non-invasive ventilation with Dr Mike Davies, the lead for the BTS NIV audit.

**Dr Athanasios Kaditis** MD, is Associate Professor of Paediatrics and Paediatric Pulmonology, University of Athens School of Medicine and Aghia Sophia Children’s Hospital, Athens, Greece. He graduated from the University of Athens School of Medicine; was a Resident in Paediatrics at the Mayo Clinic, Rochester, Minnesota, USA; and a Fellow in Paediatric Pulmonology at the Children’s Hospital of Pittsburgh, Pittsburgh, Pennsylvania, USA. He has 88 PubMed publications.

**Dr Binita Kane** is a Consultant and Honorary Senior Lecturer in Respiratory Medicine at the University Hospital of South Manchester. She is currently the Strategic Lead and Co-chairs the Board for the North West Severe Asthma Operational Delivery Network. She is also Lead for Respiratory Integration across Manchester. This includes the Royal College of Physicians Future Hospital Pilot, which is transforming care for those with long-term conditions through a system-wide approach. Her interests include healthcare leadership, quality improvement and co-production.

**Professor Frank J Kelly** PhD, FKC, FRSB holds the Chair in Environmental Health at King’s College London where he leads research activity spanning all aspects of air pollution research from toxicology to science policy. Professor Kelly provides policy support to the WHO on air pollution issues and is Chairman of COMEAP, the UK’s Department of Health’s Expert Committee on the Medical Effects of Air Pollutants.

**Dr Paul Kemp** is a Reader in the Molecular Biology of Muscle in the National Heart and Lung Institute at Imperial College London. His research interests are in the control of skeletal muscle mass in acute and chronic disease. In particular he is interested in the interplay between disease severity and muscle loss and the variation in muscle loss between individuals with similar disease burdens. His work focuses on the importance of microRNAs in the control of muscle cell phenotype.

**Professor David G Kiely** is a Respiratory Physician and Professor of Pulmonary Vascular Medicine in Sheffield. He is a board member of the International Workshop on Pulmonary Functional Imaging and a previous chair of the UK and Ireland Pulmonary Hypertension Physicians Committee. Professor Kiely’s interests include pulmonary vascular disease and respiratory complications of multisystem diseases. He participates in a number of research studies funded by the NIHR, MRC and BHF, and his research is primarily...
focussed on the assessment and classification of pulmonary hypertension.

**Dr Martin Kolb** is a German-Canadian Respirologist who obtained his MD and “Venia Legendi” (PhD equivalent) for Experimental Medicine at the Julius-Maximilian University Medical School in Würzburg, Germany. He is licensed to practice in Germany and Canada, and is the Moran Campbell Professor and Chair of Respiratory Medicine at McMaster University, Director of the Division of Respirology and Research Director of the Firestone Institute for Respiratory Health in Hamilton, Ontario.

Dr Kolb treats patients with ILD in his specialty clinic, as well as practises in general respirology and internal medicine at St Joseph’s Healthcare Hamilton. His research focuses on mechanisms of lung injury, repair and fibrosis, particularly in IPF. He conducts pre-clinical studies of disease mechanisms and efficacy of novel drugs. Dr Kolb leads activities in biomarker development for lung fibrosis and serves as principal investigator and a steering committee member in ILD clinical trials. He has published over 130 peer-reviewed articles and received awards from the Parker B Francis Families Foundation and the New Investigator Award from the Canadian Institute for Health Research. Further, he was Associate Editor for *Thorax* and Deputy Editor for *Respirology* until recently and was just appointed as Editor-in-Chief elect for the *European Respiratory Journal*.

**Professor Onn Min Kon** is a respiratory physician and Head of Service for Tuberculosis at Imperial College London Healthcare NHS Trust. He is also Professor of Clinical Respiratory Medicine at the National Heart and Lung Institute, Imperial College London. He is Chair of the UK National MDRTB Clinical Advice Service and the British Thoracic Society Joint Tuberculosis Committee. He is a member of the National TB Programme.

After he completed his medical degree in London, he trained in respiratory and general internal medicine in North West London with placements at the Royal Brompton Hospital and St Mary’s Hospital. He was a Clinical Research Fellow at the National Heart and Lung Institute, Imperial College London.

He has published over 100 peer reviewed papers including publications in *Nature Medicine*, the *New England Journal of Medicine* and *The Lancet*. He has also authored several book chapters, editorials and reviews.

His research interests include the clinical and immune diagnosis of tuberculosis and the delivery of care and management of the disease. He also participates in research evaluating the effects of infection on airways disease. Professor Kon organises the annual London Advanced TB course.

**Dr Malcolm Lawson** is the Lead for Lung Cancer at Broomfield Hospital in Chelmsford Essex, and a Consultant Respiratory Physician. He is also the current Chair of the Essex Lung Cancer Network. He graduated from Newcastle University and then worked in London and the East of England. He completed a PhD at Cambridge in the molecular mechanisms of chemoresistance in small cell lung cancer and worked in the Thoracic Oncology Unit at Papworth. He has previously been a member of the BTS Lung Cancer and Mesothelioma Specialist Advisory Group.

**Dr Marc Lipman** is a Senior Lecturer and Consultant in Respiratory and HIV Medicine at the Royal Free London NHS Foundation Trust and University College London. His research focusses on mycobacterial disease, respiratory infection and HIV, with a particular interest in translational and health services research. He has served on a number of national and international committees, including UK NICE TB Guideline Group and British HIV Association HIV/TB co-infection Working Party.

**Dr Ari Manuel** is a Consultant Respiratory Physician at Aintree University Hospital, Liverpool. He has a particular interest in sleep and ventilation. He completed his PhD in Oxford and has a continued research interest in obesity hypoventilation syndrome.

**Professor Stefan Marciniak** is Professor of Respiratory Science at the University of Cambridge where his laboratory studies the role of abnormal protein folding in lung disease. He is an Honorary Consultant Respiratory Physician at Addenbrooke’s Hospital with a clinical focus on pleural medicine including familial pneumothorax. http://www.med.cam.ac.uk/marciniak/

**Professor Nick Maskell** is Professor of Respiratory Medicine, University of Bristol and Honorary Consultant, North Bristol NHS Trust, Bristol, England. He undertook his DM thesis on pleural diseases in Oxford prior to taking up a consultant post at North Bristol NHS Trust in 2003. His research interests include clinical trials in pleural disease, mesothelioma and patient safety during pleural procedures.
Professor Maskell leads the pleural service at North Bristol NHS Trust and the Bristol Pleural Clinical Trials Unit at the University of Bristol. He is the Chief Investigator for a number of mesothelioma and pleural RCT research studies. He chaired the last BTS Pleural Disease Guideline Group, and is Co-chair of the 2017 BTS Mesothelioma Guideline Group.

Professor Danny McAuley is a Consultant and Professor in Intensive Care Medicine at the Regional Intensive Care Unit at the Royal Victoria Hospital and Queen's University of Belfast. He graduated from Queen's University of Belfast in 1992. He undertook his training in Belfast, Birmingham, London and San Francisco. He is Co-Director of Research for the UK Intensive Care Society.

Professor Ann Millar is Emeritus Professor of Respiratory Medicine at the University of Bristol, having trained in London and Liverpool. She has clinical interests in diffuse parenchymal lung disease, acute lung injury and the immunocompromised lung. Professor Millar's research interests are in the mechanisms regulating the outcome of acute and chronic lung injury. She is a past-President of the BTS.

Dr Hannah Mitchison is a GOSHCC Reader in Molecular and Medical Genetics based in the UCL Great Ormond Street Institute of Child Health Experimental and Personalised Medicine Section. Dr Mitchison co-directs the Ciliopathy Disorders Laboratory. A Ciliopathy Alliance founder and science advisor to the PCD Family Support Group UK, her genetic research in rare diseases and PCD has led to over 20 gene discoveries.

Dr Philip Molyneaux qualified from Guy’s, King’s and St Thomas’ School of Medicine in 2004, completing an intercalated BSc in Molecular Genetics. He attained an NIHR Academic Clinical Fellowship in Respiratory Medicine at Imperial College studying the respiratory microbiome in COPD. He subsequently completed a PhD examining the host response and microbiome in IPF as part of the PROFILE study with Dr Toby Maher. Having completed his clinical training in respiratory and critical care medicine, he has taken up a Senior Clinical Lecturer and Consultant position in Interstitial Lung Disease at Imperial College and the Royal Brompton Hospital.

Dr Rachael Murray is an Associate Professor of Health Policy at the UK Centre for Tobacco and Alcohol Studies/University of Nottingham and completed a Cancer Research UK funded PhD focusing on effective ways to support smokers to quit in 2009.

Her research mainly focuses on the delivery of smoking cessation support within healthcare systems, particularly the secondary care setting. She is currently running a trial investigating ways of supporting newly abstinent smokers after discharge from hospital, and is seeking funding for provision of personalized smoking cessation intervention within a lung cancer screening trial.

Dr Rob Niven is a Senior Lecturer and Consultant Respiratory Physician at the University of Manchester and University Hospital of South Manchester. As a clinician he runs a supra-regional service for severe asthma. He has assessed over 2,000 severe asthma patients, with around 50% of these referrals being for patients on maintenance oral steroids.

He is a core member of the UK National Severe Asthma Network, with nearly 1,000 patients entered onto a national database from multiple centres, with Manchester a core contributor. As a researcher, Dr Niven has published over 100 peer reviewed papers and authored five book chapters.

Areas of interest have included occupational lung disease, environmental epidemiology and more recently clinical practice in severe asthma. He has innovated research into clinical practice in the fields of hypertonic saline for bronchiectasis as a therapy, awareness and diagnosis of dysfunctional breathing patterns, the role of antifungal therapy in severe asthma with fungal sensitisation and has been PI and CI on trials of bronchial thermoplasty and new biologics.

In addition Dr Niven is a keen educator and leads the final year exams for the South Manchester site as well as being active in all aspects of education at undergraduate level.

Dr Jean-Louis Pépin MD, PhD, received his MD from Montpellier University, France (1987), where he was a Resident in Respiratory Medicine and obtained a Certificate of Specialist in Sleep Medicine (1987-1989). He then obtained a Master’s degree in Animal Biophysiology (option Neuroscience) from Claude Bernard University of Lyon (1990). He obtained his PhD in Biology (cardiovascular adaptations induced by chronic hypoxia) from Joseph Fourier University of
Grenoble, France and was a Visiting Professor at the Laboratory of Pulmonary Physiology of Harvard University in Boston, USA (1999). He achieved European Certification in Sleep Medicine in 2013.

Dr Pépin has pursued his education, training and research focusing on clinical and translational research on the cardiovascular consequences associated with chronic and intermittent hypoxia, sleep apnoea, chronic obstructive pulmonary disease, chronic respiratory failure, and non-invasive ventilation.

Dr Pépin is currently Professor of Clinical Physiology at Joseph Fourier University in Grenoble and Medical Director of the regional home care system for chronic respiratory failure; Director of the HP2 Laboratory (Inserm U1042; Hypoxia pathophysiology; cardiovascular consequences of intermittent hypoxia), a member of the Faculty of Medicine, Joseph Fourier University where he holds a five-year Inserm Interface full time research contract. He is Head of the Clinic of Physiology, Sleep and Exercise Department, Scientific Director of Clinical Research Administration and presides the Research Division at Grenoble University Hospital. He runs the French Registry of Sleep Apnoea (> 100,000 individuals) and is involved in the European Sleep Apnoea Database (ESADA). He is involved in several European and American Thoracic Society task forces. He was recently the joint Editor with Ferran Barbe of the European Respiratory Society monography dedicated to sleep apnoea.

Dr Pépin is the co-author of >320 scientific publications (H-index=48). He is the former President of the French Sleep Research and Medicine Society, a member of the European Respiratory Society and American Thoracic Society; and Associate Editor of Thorax (Impact Factor > 8.0) for the sleep medicine field.

Dr Joanna Pepke-Zaba PhD, FRCP is the Lead Physician and Director of the National Pulmonary Vascular Diseases Unit at Papworth Hospital, Cambridge, UK. Her main research has concentrated on the translational programmes in the field of pulmonary hypertension with specific interest into chronic thromboembolic pulmonary hypertension and idiopathic pulmonary arterial hypertension. She has published over 120 papers in the field of PH and serves on various educational, scientific international committees and is an active member/fellow of the BTS, ERS, ECS, ATS, ISHLT societies. Dr Pepke-Zaba is Founding Member of International CTEPH Association.

She has been Honorary Senior Visiting Fellow of the University of Cambridge, School of Clinical Medicine since 2011.

Professor Gavin Perkins is Professor of Critical Care Medicine at the University of Warwick and Heart of England NHS Foundation Trust. He is a National Institute for Health Research Senior Investigator and a Director of Research for the Intensive Care Foundation. His research interests include ARDS, weaning from ventilation and research in emergency settings.

Dr Gregory Piazza is Assistant Professor of Medicine, Harvard Medical School and faculty in the Cardiovascular Division at Brigham and Women’s Hospital. In addition to his training in cardiology, he completed a National Heart Lung and Blood Institute-sponsored fellowship in vascular medicine. Dr Piazza’s research interests include the epidemiology, treatment, and prevention of venous thromboembolism as well as stroke prevention in atrial fibrillation.

Professor Michael Polkey is a chest physician with 25 years of experience. He trained at the University of Bristol and, after qualification, at several hospitals in London. He obtained his own thesis on the study of the respiratory muscles from Kings College London 1998.

In 2000 he was appointed as a Consultant Physician to the Royal Brompton Hospital in London where he serves on the Sleep and Ventilation Service. Aside from COPD and sleep, he is particularly interested in weaning from invasive mechanical ventilation, rehabilitation and cachexia in lung disease and respiratory aspects of neurological disease. Professor Polkey is also a visiting consultant for NHS Highland which he manages both remotely and by personal visits eight times annually. Since 2007 he is also Professor of Respiratory Medicine at Imperial College and more recently Deputy Director of the Royal Brompton Hospital NIHR Respiratory Biomedical Research Unit. He has experience in acquiring and directing multicentre research grants and in PhD supervision and examination.

Dr Laura Price is a Consultant in Pulmonary Hypertension (PH) at the Royal Brompton Hospital. She trained at Bristol University then in respiratory/ general medicine in London. She undertook a PhD in PH pathophysiology at Imperial College London and South Paris University. Her research interests include
acute management and respiratory disease-associated PH.

**Dr Jennifer Quint** is a Clinical Senior Lecturer in Respiratory Epidemiology at the National Heart and Lung Institute, Imperial College and Honorary Consultant Physician in Respiratory Medicine at the Royal Brompton Hospital, London.

Dr Quint’s research interests centre on the use of electronic health records to study respiratory and cardiovascular diseases, including bronchiectasis, asthma and chronic obstructive pulmonary disease (COPD). In addition, she is involved in clinical work and is active on a number of international committees. She is currently secretary of the Epidemiology Group for the European Respiratory Society and the Information Governance Trustee for the BTS.

**Professor Najib M Rahman** is Associate Professor of Respiratory Medicine, Lead for Pleural Diseases and Director Oxford Respiratory Trials Unit, University of Oxford and Oxford Centre for Respiratory Medicine, Churchill Hospital, Oxford. He runs the Oxford Pleural Unit and directs the Oxford Respiratory Trials Unit. He conducts clinical research in pleural disease at the Oxford Centre for Respiratory Medicine. Professor Rahman is currently involved in randomized and observational studies in pleural infection, pneumothorax and malignant pleural effusion intervention. He is trained in thoracoscopy, thoracic ultrasound and clinical trials methodology. He has published in the fields of pleural disease and thoracic ultrasound.

**Professor Stephen Renshaw** is the Sir Arthur Hall Professor of Medicine at the University of Sheffield, combining clinical work in respiratory medicine with research into the molecular controls of inflammation resolution. He has a specialist interest in rare and complex interstitial lung diseases, and delivers acute respiratory care at Sheffield Teaching Hospitals NHS Trust. His key research achievement is the development of innovative transgenic zebrafish models to aid understanding of innate immunity.

**Dr Elisabetta Renzoni** trained in respiratory medicine at the University of Siena, Italy. In 1999, she was awarded a European Respiratory Society Research Fellowship to work at the Royal Brompton ILD Unit on a study investigating genetic predisposition to lung fibrosis. She subsequently continued her research in the Unit as an Imperial College Research Fellow, and in 2006 was appointed Consultant Physician at the Royal Brompton Hospital, and Honorary Senior Lecturer, Imperial College. In 2008, she was awarded with a PhD from Imperial College London for a study on fibroblast gene expression in pulmonary fibrosis.

Her specialist clinical interests are: connective tissue disease-associated lung involvement; idiopathic interstitial pneumonias; sarcoidosis/hypersensitivity pneumonitis; and pulmonary vasculitis.

**Dr Renzoni’s** research interests include translation and clinical research in pulmonary fibrosis. From a clinical research perspective, Dr Renzoni leads a multicenter randomized controlled clinical trial to study the effects of supplemental oxygen on quality of life in fibrotic lung diseases (NCT02286063), funded by the NIHR Research for Patient Benefit funding stream. The trial completed recruitment in October 2016, and preliminary findings were presented at the recent ATS and ERS meetings. Further novel data will be presented at the BTS 2017 Winter Meeting. The results of this study should form the basis for the development of ILD specific guidelines for the use of ambulatory oxygen, currently lacking.

Dr Renzoni regularly acts as an expert reviewer for research grant proposals and for international respiratory/rheumatology journals. She is frequently invited to speak/chair scientific sessions at national and international meetings. She is an Associate Editor for *Respirology*. She is a member of the British Thoracic Society, the American Thoracic Society, the European Respiratory Society, and the Asian Pacific Society of Respirology. Since November 2015 she is a Fellow of the Higher Education Academy.

Dr Renzoni works closely with rheumatologists and scientists at the Royal Free Hospital Rheumatology Department, and has instituted collaborations with Aintree University, Bristol University, Siena University, Padova University, Parma University, as well as Heidelberg University, Germany and Catholic University of Leuven, Belgium.

**Dr Louise Restrick** is an Integrated Consultant Respiratory Physician at the Whittington Hospital, London. She co-led the London Respiratory Network, was a member of the London Senate ‘Helping Smokers Quit’ team and co-leads a team where identifying and treating tobacco dependence is regarded as a core component of care.
Dr Anna Rich is a Respiratory Consultant in Nottingham. Having trained in Cambridge she has worked in Nottingham for almost 20 years including time on the infectious diseases ward. Her interest in TB stems from living and working in Africa, and it combines her love of respiratory and infectious diseases perfectly! She has been TB Lead at Nottingham University Hospitals since 2013, and is also a member of the East Midlands TB Control Board. The TB service in Nottingham cares for 75-100 patients with TB a year, and is a recognised centre for treating MDR TB.

Dr Robert Rintoul is Reader in Thoracic Oncology at the University of Cambridge and an Honorary Consultant Respiratory Physician at Papworth Hospital, Cambridge. Currently he is Lead Clinician for Cancer at Papworth Hospital and Director of the Papworth Hospital Clinical Trials Unit collaboration. The focus of his work is around clinical trials and translational research in malignant mesothelioma and early detection of lung cancer. He is Chief Investigator for several clinical trials and for MesobanK UK, the national bioresource for mesothelioma tissue. Dr Rintoul is the Specialty Research Lead for Lung Cancer for the East of England Clinical Research Network and a member of the BTS Science and Research Committee and NHS England Lung Cancer Clinical Expert Group. He is the co-lead for the Aerodigestive Programme of the Cancer Research UK Cambridge Centre.

Dr Jason Rock is an Associate Professor of Medicine at the Center for Regenerative Medicine at Boston University. His group studies cell lineage relationships in lung development, homeostasis, disease and regeneration using a variety of in vivo and in vitro techniques. They hope to leverage this knowledge to identify new therapies to prevent or reverse pathologies associated with end stage lung disease.

Dr Helen Rodgers is the Director of the Adult CF service in Edinburgh. She trained in CF in Nottingham and Edinburgh, and completed an MD in clinical CF research when working as a CF Trust Clinical Fellow in Nottingham. She has an interest in clinical research and is a Principal Investigator for several CF studies. She is currently the Chair of the BTS CF Specialist Advisory Group.

Dr Felicity Rose is Head of the Division of Regenerative Medicine and Cellular Therapies, School of Pharmacy at Nottingham. Her research focuses on the ability to control stem and differentiated mammalian cell behaviour during the tissue regeneration process to develop in vivo-like in vitro models to study disease biology and for drug screening applications, with the ultimate goal of developing tissue grafts for transplantation.

Dr Beth Sage is a Respiratory Consultant at University College London Hospital with an interest in lung cancer and mesothelioma. She won an MRC Clinical Training Fellowship to undertake a PhD with Professor Janes to develop a genetically modified cellular therapy for the treatment of malignant mesothelioma and was subsequently awarded an NIHR Academic Clinical Lecturer post to undertake her postdoctoral training. Dr Sage is a co-investigator on the TACTICAL trial – a first-in-man trial to assess a gene and cell therapy in patients with metastatic lung cancer – and her research interest is in novel therapies for thoracic malignancies.

Dr Clare Sander has been a Consultant Respiratory Physician at Addenbrooke’s Hospital, Cambridge since 2010. She completed postgraduate training in NW Thames with a PhD in TB immunology from Oxford. She specialises in respiratory infection with a particular interest in respiratory complications from primary and secondary immunodeficiency, including haematology oncology patients. She developed her interest in this patient group during SpR training and has continued to work closely with haematologists at Addenbrooke’s. Dr Sander has undertaken service development projects aimed at improving the diagnostic accuracy of invasive fungal disease and is working on improving early detection of pulmonary GVHD in allogeneic bone marrow transplant patients.

Dr Elizabeth Sapey is a Reader at the University of Birmingham and a Consultant in Respiratory Medicine at the University Hospital Birmingham NHS Foundation Trust (UHBFT).

She is the COPD Research Lead for UHBFT and has an active research programme in COPD, funded by the Medical Research Council, Alpha 1 Foundation, British Lung Foundation and National Institute for Health Research. Dr Sapey’s research interests include developing techniques to better diagnose early COPD and to understand the inflammatory basis of COPD, focusing on innate immunity and in particular neutrophil functions. She also has a research interest in the innate immune system in ageing subjects, especially those with frailty and sarcopenia.
Dr Sapey is the Managing Director of the Birmingham NIHR/Wellcome Clinical Research Facility (Adults), which supports a wide range of experimental research studies across Birmingham Health Partners, a research partnership between University Hospital Birmingham NHS Foundation Trust, Birmingham Children’s Hospital, Birmingham Women’s Hospital and the University of Birmingham.

Professor Stephen Scott is a Clinical Respiratory Physician at the Countess of Chester Hospital. He obtained his PhD in the relationship between obesity, weight loss and asthma. Current roles include: Chair of the BTS Asthma Specialist Advisory Group, National BTS Asthma Audit Clinical Lead and he has been involved in the guideline development of both BTS/SIGN and NICE. Professor Scott is also a member of the North West Severe Asthma Network. He was appointed a Visiting Professor at the University of Chester in 2015.

Dr Chris Scotton is a Senior Lecturer in Lung Pathobiology and Head of the Respiratory Medicine Group at the University of Exeter Medical School, and also holds an honorary appointment at UCL. His current research focuses on interstitial lung disease and bronchiectasis. Through close links with the clinic and external collaborators, Dr Scotton is investigating novel therapeutic opportunities and biomarkers. He also sits on the Scientific Committee for the British Lung Foundation and is an active member of the British Association for Lung Research, having served on that committee since 2010.

Dr Frances A Shepherd received her medical degree from the University of Toronto, Ontario, Canada and is currently a Senior Staff Physician at Princess Margaret Hospital in Toronto, where she holds the Scott Taylor Chair in Lung Cancer Research. She is a Full Professor of Medicine at the University of Toronto and served as the University Division Director for Medical Oncology from 1997 to 2003.

Dr Shepherd has been recognised for her many contributions in the field of lung cancer research, most notably her long-standing international leadership in the development of innovative therapies for this indication. In 2001, she was named the Scott Taylor Chair in Lung Cancer Research, becoming the first holder of this esteemed research position with a primary goal of investigating new treatments for lung cancer.

Dr Shepherd served as Chair of the Lung Cancer Committee of the National Cancer Institute of Canada Clinical Trials Group for 19 years and was President of the International Association for the Study of Lung Cancer (IASLC) from 2003 to 2005. She has been a member of the Board of Directors of the American Society of Clinical Oncology (ASCO); she is a current Board member of the European Organisation for Research and Treatment of Cancer (EORTC), and chairs the EORTC Protocol Review Committee. Dr Shepherd has served as Chair of ASCO Membership and Publications Committees. She was the recipient of the Jacqueline Seroussi Memorial Foundation for Cancer Research Award in 2004; the National Cancer Institute of Canada O Harold Warwick Award for Research Excellence in 2006; the IASLC Research Award in 2007; the Ontario Premier’s Summit Award for Research in 2009; and a Boehringer Ingelheim Innovation Award in 2010. In recognition of her contributions to cancer research and treatment, she received the Order of Ontario in 2007. In 2012, she won the British Thoracic Oncology Group International Award for Contributions to Lung Cancer Research, the Royal College of Physicians and Surgeons of Canada Whiteman Award and Visiting Professor and a Queen Elizabeth II Diamond Jubilee medal. In 2015, she was made an Officer of the Order of Canada.

Dr Shepherd has designed and led more than 100 clinical trials over the past three decades and her studies have changed treatment and outcomes for patients with lung cancer at a global level. She sits on numerous national and international lung cancer advisory boards, and chairs and/or sits on several data and safety monitoring boards for international lung cancer trials. She has mentored more than 30 post-doctoral research fellows from around the world, many of whom now hold senior academic positions in their home countries. She has authored or co-authored more than 450 peer-reviewed publications and 35 book chapters.

Professor Anita Simonds is a Consultant in Respiratory and Sleep Medicine at the Royal Brompton and Harefield NHS Foundation Trust. She has a clinical and research interest in sleep disordered breathing and ventilatory support, and manages 2000 adults and children on long term ventilation, and 8000 on CPAP. She is Chief Editor of European Respiratory Journal Open Research, and the ERS Handbook of Non-Invasive Ventilation.
**Dr Rob Snelgrove** is a Senior Research Fellow within the National Heart and Lung Institute at Imperial College London, with a broad interest in neutrophil and protease biology. Having graduated with a BSc in Biochemistry and an MRes in Biochemical Research, Dr Snelgrove undertook a PhD with Professor Tracy Hussell at Imperial College London. He was then awarded a Sir Henry Wellcome Postdoctoral Fellowship, which was spent within the laboratory of Professor J Edwin Blalock at the University of Alabama at Birmingham. Dr Snelgrove was subsequently awarded a Career Development Award by the Wellcome Trust at Imperial College London.

**Professor Kevin Southern** joined the University of Liverpool and Alder Hey Children’s Hospital on the 1st January 2000 and is Director of the Cheshire, Merseyside and North Wales Network of Paediatric Cystic Fibrosis Care. He is Chair of the UK Newborn Screening Board for Cystic Fibrosis. In 2007, along with other clinicians, he helped establish the National Newborn Screening Programme for Cystic Fibrosis. Professor Southern is also Leader of the European CF Society Neonatal Screening Working Group. He is the Chief Investigator on the National CF START study, a trial funded by the HTA to evaluate the safest and most effective antibiotic treatment strategy for infants with CF.

**Dr Robert Tarran**, PhD received his BSc (Hons) from the University of Leeds, UK and his PhD in Physiology from Newcastle University. Prior to joining the faculty at UNC-Chapel Hill, he completed post-doctoral research in ion channel physiology at the University of North Carolina at Chapel Hill and the University of California at Berkley.

Dr Tarran’s research interests have centered on the role of ion channels in chronic lung diseases such as CF, COPD and asthma. During his career, Dr Tarran has significantly contributed to the establishment of confocal microscopy measurements of airway surface liquid height as a method for studying airway epithelial function. He is also the founder of Spyryx Biosciences, which is based on his discovery of the SPLUNC1/ENaC regulatory pathway in the respiratory tract. Dr Tarran is currently an Associate Professor in the Department of Cell Biology and Physiology at UNC-Chapel Hill, a member of the Lineberger Cancer Center, and a member of the Cystic Fibrosis and Pulmonary Diseases Research and Treatment Center. Additionally, he is the Director of UNC’s NIH/FDA-funded Tobacco Center of Regulatory Science.

Dr Tarran has served on advisory and steering committees for the US Food and Drug Administration and for the Cystic Fibrosis Foundation.

**Dr Amanda Tatler** is a Senior Research Fellow at the University of Nottingham, UK. Her fellowship is funded by Asthma UK and the Medical Research Foundation. Her research is focused upon understanding the mechanisms driving tissue remodelling in respiratory diseases, particularly asthma and pulmonary fibrosis. She has undertaken periods of post-doctoral training at the University of California San Francisco and Harvard Medical School. Her current work aims to develop a “breathing” precision cut lung slice model to investigate the effects of breathing on lung tissue. Furthermore, Dr Tatler is interested in the transcription factor Elk1 and its role in promoting fibrogenesis in multiple organs.

**Dr Muhunthan Thillai** is a Chest Physician and Clinical Lead of the Cambridge Interstitial Lung Disease Group at Papworth Hospital. He trained at St Mary's Medical School in London and was later a Wellcome Trust Fellow at Imperial College London where he was awarded a PhD in immunology and proteomics. He has a specific interest in sarcoidosis and has written a number of research papers and book chapters as well as given presentations at international scientific meetings on the disease.

**Dr Andrew Thorley** is a Lecturer in Lung Cell Biology at the National Heart and Lung Institute, Imperial College London, with a research focus on medical applications of nanotechnology and pulmonary innate immunity. Dr Thorley’s current research focuses on design and synthesis of novel multi-modal polymer-based nanotherapeutics for the treatment of lung cancer. In addition, he has a continuing interest in the Toll-like receptor mediated inflammatory responses of alveolar macrophages and epithelium, and how these two cell types communicate to mount a co-ordinated innate immune response to infection.

**Dr Rebecca Thursfield** is a Consultant in Paediatric Respiratory Medicine at Alder Hey Children’s NHS Trust where she leads the respiratory physiology service. She specialises in cystic fibrosis, respiratory complications of immuno-deficiencies and congenital abnormalities. She also has a particular interest in clinical research.
**SPEAKERS’ BIOGRAPHICAL DETAILS**

**Professor Michael Tunney** is a Chair in Clinical Pharmacy and Director of Research at the School of Pharmacy, Queen’s University Belfast. He has an international track record in lung microbiome research, with his translational research programme focusing primarily on the improved detection and treatment of lung infection in patients with respiratory diseases such as cystic fibrosis (CF), non-CF bronchiectasis and COPD. He has published over 100 research papers in peer-reviewed journals and serves on a number of scientific advisory boards as well as editorial boards.

**Dr Dale Umetsu**, MD, PhD, is currently Principal Medical Director in the Respiratory and Allergic Diseases Group and the Global Development Lead for Xolair programmes at Genentech. Until 2014, he was the Prince Turki al Saud Professor of Paediatrics at Harvard Medical School and Boston Children’s Hospital; prior to that he was Professor of Paediatrics at Stanford University. His research interests have included the clinical and immunobiologic aspects of asthma and allergic diseases including food allergy, and adaptive and innate lymphoid cells in asthma and allergic diseases. Dr Umetsu also holds a faculty position at the University of California, San Francisco as Clinical Professor of Paediatrics.

**Dr Don Urquhart** is Consultant in Paediatric Respiratory and Sleep Medicine, Royal Hospital for Sick Children, Edinburgh. He completed paediatric respiratory medicine training at Great Ormond Street and Royal Brompton Hospitals followed by a paediatric sleep fellowship in Brisbane. He co-chairs the British Paediatric Sleep Association and his current research interests are exercise physiology in cystic fibrosis, as well as sleep-disordered breathing in children with epilepsy.

**Dr Rama Vancheeswaran** is a Consultant Respiratory and General Physician at the Royal Free NHS Foundation Trust (Barnet site). She completed her clinical training in 2006 with an MSc and PhD in the immunopathogenesis of scleroderma fibrosing alveolitis at the Royal Free and Brompton. As a consultant, she has expertise in both COPD/airways and interstitial lung disease (ILD). Dr Vancheeswaran leads the COPD service at the Barnet site and works as an Integrated Consultant with the community, which she helped set up and developed over 10 years. She leads the ILD service across the Trust. She also has interests in academic research, NHS improvement, patient education and teaching. She is part of the BTS COPD Specialist Advisory Group and is a BLF patient ambassador.

**Professor Ioannis Vogiatzis** is a Professor of Rehabilitation Sciences at Northumbria University in Newcastle, and holds an honorary Professorship contract with Northumbria Healthcare NHS Foundation Trust. He currently chairs the Rehabilitation and Chronic Care Group of the European Respiratory Society (ERS). Professor Vogiatzis has authored 70 highly ranked manuscripts in the area of pulmonary rehabilitation and cardiopulmonary exercise testing in COPD and has co-chaired the ATS/ERS Policy Statement on enhancing implementation, use and delivery of pulmonary rehabilitation. He is currently co-chairing an ERS Task Force on standardization of cardiopulmonary exercise testing in chronic lung diseases.

**Professor Timothy Walsh** is an academic critical care clinician with an interest in health services research, specifically pragmatic clinical trials, epidemiology, and quality improvement research. In recent years his focus has increasingly been on large multicentre studies within Scotland, UK-wide, and internationally. Through collaboration with clinical scientists in Edinburgh, he has had a key role in recent successful translational research projects bridging the gap between the laboratory and patient.

Professor Walsh’s particular clinical interests are in blood transfusion related research, sedation technology, and recovery from critical illness, but he is involved in a wide range of key UK portfolio studies relating to critical illness either as co-investigator, recruiting centre, or through steering committee and data monitoring committee roles. His methodological interests focus on outcome measurement for critical care trials, especially the use of mixed methods (combined quantitative and qualitative) approaches. He has a particular interest in complex intervention trial methodology.

Professor Walsh has held several strategic roles with the National Institute of Healthcare Research (Chair of UK Critical Care Specialty Group), Chief Scientists Office (Critical Care Specialty Group Lead and member of the Research Strategy Oversight Group), Blood Transfusion Services (Research Lead, Clinical Effectiveness Group, Scottish National Blood Transfusion Service) and through national professional societies (Chairman, Scottish Critical Care Trials...
Group; member of UK Intensive Care Society Research Committee). He is currently R&D Director of NHS Lothian.

Professor Martin Walshaw is a Consultant Chest Physician at the Liverpool Heart and Chest Hospital and Director of the Specialist Regional Adult CF Clinic there, which he founded in 1993 and which now caters for over 330 adults from Merseyside, North Wales, Cheshire, and the Isle of Man. He is past Chair of the British Thoracic Society Cystic Fibrosis Specialist Advisory Group, Chair of the UK CF Peer Review Oversight Board, and Chaired the NICE committee writing guidelines for CF Care in the UK. Professor Walshaw is heavily involved in medical education and is a Senior PACES Examiner and Secretary of the Respiratory Specialist Certificate Examination Board for the RCP. He has published over 100 peer reviewed papers and his major research interests include cross infection in CF and developments in CFRD. He was appointed Honorary Professor of Medicine at Liverpool University in 2014 in recognition of his achievements.

Professor Wisia Wedzicha is Professor of Respiratory Medicine and Head of the Airways Division at the National Heart and Lung Institute, Imperial College London, UK. She qualified from Somerville College, Oxford University and St Bartholomew’s Hospital Medical College, University of London. She was elected as Fellow of the Academy of Medical Sciences (FMedSci) in 2013 and is a National Institute of Health Research (NIHR) Senior Investigator. She received the Helmholtz International Fellow Award in 2014 and delivered the Samuel Gee Lecture at the Royal College of Physicians in 2016. Professor Wedzicha has a major interest in the causes, mechanisms, impact and prevention of chronic obstructive pulmonary disease (COPD) exacerbations, and in the role of bacterial and viral infection in COPD exacerbations. She directs an active research group specialising in COPD exacerbations, and has published extensively on this topic.

Professor Wedzicha chaired the English Department of Health Home Oxygen Clinical User Group, and was a member of the Guideline Development Group for the revision of the National Institute for Healthcare and Clinical Excellence COPD Guidelines. She was a member of the Programme Board for the COPD National Clinical Strategy.

Professor Wedzicha was Editor-in-Chief of Thorax from 2002 to 2010, and is a member of the BioMed Central advisory board. She is currently Editor in Chief for the American Journal of Respiratory and Critical Care Medicine. In addition, she is on the editorial boards of a number of international journals. She was the Lancet Ombudsman until 2014, Publications Director for the European Respiratory Society (ERS) and has also previously been ERS Guidelines Director.

Dr Sophie West is a Consultant Physician and Lead of the Newcastle Regional Sleep Service and Chair of the British Thoracic Society Sleep Specialist Advisory Group. She has research interests in type 2 diabetes and OSA, and is currently Chief Investigator of the multicentre ROSA randomised controlled trial to establish whether CPAP can improve vision in patients with diabetic macular oedema.

Dr Veronica White is the Clinical Director of Respiratory Medicine at St Bartholomew’s Hospital, Barts Health NHS Trust. She trained in North East Thames in Respiratory and General Medicine and sub-specialised in tuberculosis (TB); she studied for an MSc in Medical Anthropology at UCL in 1999 and MD thesis at QMUL (2005), entitled ‘Barriers to the effective management of tuberculosis in the Bangladeshi community of East London, UK’, and she has published widely in her field. Dr White has a specialist interest in MDR TB and non-pulmonary TB. She is currently an Associate Editor of the International Journal of Tuberculosis and Lung Disease.

Dr Alex Wilkinson studied medicine at Cambridge and Oxford Universities before starting training in respiratory medicine back in the East of England. He had a year working in a rural hospital in Tanzania and a few years working part time while looking after his children, before settling into a consultant position at East and North Herts NHS Trust. Dr Wilkinson’s special interests include infection, smoking cessation and sustainable respiratory care. He is a co-author of the BTS Position Statement on the Environment and Lung Health and now serves as BTS Lead on Sustainable Respiratory Care.

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 Respiratory Theme Lead for the NIHR Wessex CLAHRC. Professor Wilkinson’s 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. He leads a long term collaborative programme of vaccine development with industry, is co-chair of the British Thoracic Society Home Oxygen Guidelines Standards of Care Committee, Associate Editor for the journal Thorax and co-founder of the health technology company myMHealth. He has published over 60 peer reviewed papers and reviews on the topics of COPD, exacerbations and airway immunology. In 2012 he was awarded The Maurizio Vignola Prize for Innovation in Respiratory Medicine by the European Respiratory Society.

Professor Mark Woodhead is a Consultant in General and Respiratory Medicine at Manchester Royal Infirmary and Honorary Clinical Professor of Respiratory Medicine at the University of Manchester. In 2018 he will be President of the British Thoracic Society. He is a member of the National TB Delivery Board and was Chair of the NICE Pneumonia Guideline Development Group. He remains closely involved in patient care while continuing his long research interest in lung infections.

Dr Ian Woolhouse graduated from the University of Newcastle upon Tyne in 1988. He completed his specialist training in Birmingham and was awarded MD from the University of Birmingham in 2004. Dr Woolhouse is currently a Consultant Physician in Respiratory Medicine and Associate Medical Director at University Hospitals Birmingham NHS Foundation Trust, and Honorary Senior Lecturer at the University of Birmingham. He took up the role of Associate Director to the National Lung Cancer Audit from 2009 to 2017. Dr Woolhouse has a major interest in using healthcare data to drive improvement and in 2010 led a national two year Improving Lung Cancer Outcomes Project. He is Chair of the BTS Lung Cancer and Mesothelioma Specialist Advisory Group and co-authored the BTS Lung Nodule and Mesothelioma Guidelines.
Airsonett AB

Airsonett AB is a Swedish born company. Airsonett® offers Temperature controlled Laminar Airflow (TLA) technology, protecting patients from the exposure to allergens, spores, bacteria, viruses and other airborne particulates. Positioned at the bedside, it draws air through a filter, capturing them and thus providing patients filtered air to breathe whilst sleeping. Airsonett® is for adults and children with severe allergic asthma with poor disease control despite optimal drug therapy at Step 4 (BTS/SIGN) or above. The device (CE marked; Class 1) is non-invasive and non-pharmacological. It has no side effects and is suitable for adults and children.

Email: Krupa.patel@airsonett.eu
Website: www.airsonett.com
Facebook: facebook.com/airsonettinternational

Action for Pulmonary Fibrosis

Action for Pulmonary Fibrosis (APF) was set up in 2013 by a group of patients, family members, carers and medical specialists to provide support for patients diagnosed with the devastating terminal lung disease, idiopathic pulmonary fibrosis (IPF). Our vision is a world in which everyone living with IPF has a better future. We work hard to raise awareness of the condition, help to set up and maintain support groups, provide accurate information for patients, fund training for healthcare professionals, campaign to improve patient care and raise funds for research. Please visit our website for more information.

Tel: 01543 442 152
Email: info@actionpulmonaryfibrosis.org
Website: www.actionpulmonaryfibrosis.org
Twitter: @ActionPFcharity
Facebook: facebook.com/actionpulmonaryfibrosis

Association of Chartered Physiotherapists in Respiratory Care (ACPRC)

ACPRC is a national body of physiotherapists interested in all aspects of respiratory care, with 1000 members. The ACPRC aims to promote health and best practice in respiratory physiotherapy for the benefit of all.

Email: secretary@acprc.org.uk
Website: www.acprc.org.uk
Twitter: @AACPRC_UK
You can also find us on Facebook

AstraZeneca

AstraZeneca is a global, science-led biopharmaceutical company that focuses on the discovery, development and commercialisation of prescription medicines, primarily for the treatment of diseases in three main therapy areas – oncology, cardiovascular and metabolic diseases, and respiratory. The company also is selectively active in the areas of autoimmunity, neuroscience and infection. AstraZeneca operates in over 100 countries and its innovative medicines are used by millions of patients worldwide.

Website: www.astrazeneca.co.uk
EXHIBITORS' INFORMATION

BD Medical Stand number 16
BD is a global medical technology company that is advancing the world of health by improving medical discovery, diagnostics and the delivery of care. BD leads in patient and health care worker safety and the technologies that enable medical research and clinical laboratories. The company provides innovative solutions that help advance medical research and genomics, enhance the diagnosis of infectious disease and cancer, improve medication management, promote infection prevention, equip surgical and interventional procedures and support the management of diabetes.
Tel: 0800 917 8776
Email: bduk_customerservice@europe.bd.com
Website: www.bd.com

BMJ Stand number 55
BMJ is a healthcare knowledge provider and a leader in respiratory content. Together with our partner the British Thoracic Society, we publish Thorax (ranked 3rd in the field of respiratory) and it's Open Access sister title, British Open Respiratory Research. Visit our stand today to learn more about how to submit your research and access content.
Tel: 0207 111 1105
Email: thorax@bmj.com
Website: www.thorax.bmj.com

Boehringer Ingelheim Stand number 4
The Boehringer Ingelheim group is one of the world’s 20 leading pharmaceutical companies. Headquartered in Ingelheim, Germany, Boehringer Ingelheim operates globally with 142 affiliates and a total of more than 47,400 employees. The focus of the family-owned company, founded in 1885, is researching, developing, manufacturing and marketing new medications of high therapeutic value for human and veterinary medicine.
Tel: 01344 424 600
Website: www.boehringer-ingelheim.co.uk

Boston Scientific Stand number 13
Boston Scientific (NYSE: BSX) is a worldwide developer, manufacturer and marketer of medical devices with approximately 27,000 employees and revenue of $8.4 billion in 2016. Boston Scientific transforms lives through innovative medical solutions that improve the health of patients around the world. As a global medical technology leader for more than 35 years, we advance science for life by providing a broad range of high performance solutions that address unmet patient needs and reduce the cost of healthcare.

British Association for Lung Research (BALR) Stand number 63
The BALR provides a focus for exchange of ideas between all respiratory researchers, basic scientist and clinician alike. Fostering collaboration and furthering fundamental pulmonary research since 1982, thus fulfilling the initial focus of the society to promote respiratory research throughout the UK. The BALR has an annual summer meeting and a joint BTS/BALR symposium at the BTS Winter Meeting each year. The BALR provides membership benefits including travel awards to national and international conferences and offers support for seminar and workshop provision.
More information is available on the website.
Email: admin@balr.co.uk
Website: www.balr.co.uk

British Lung Foundation Stand number 67
The British Lung Foundation is the only UK charity fighting to help the 1 in 5 people in the UK affected by lung disease, by researching new treatments, campaigning for better awareness and services, and providing support and advice for patients, carers and family members. For further information, please visit our website. For help and support, call the BLF Helpline. To donate £5 to help the BLF fight lung disease, please text LUNGS to 70500.
Helpline: 03000 030 555
Website: www.blf.org.uk
Twitter: www.twitter.com/lunguk
Facebook: www.facebook.com/britishlungfoundation

Broncus Medical/UpTake Medical Stand number 43
Broncus Medical Inc, San Jose, have developed pattern recognition software for navigational bronchoscopy and are dedicated to be providing physicians with the tools for total lung access solutions of diagnosis and treatment of patients with lung disease.
UpTake Medical Technology Inc is a commercial-stage medical device company based in Seattle, WA, USA. UpTake Medical is dedicated to improving the lives of patients suffering from pulmonary disease with vapor ablation. Bronchoscopic Thermal Vapor Ablation® (InterVapor® or BTVA®) is a non-surgical and non-implant therapy developed for lung disease including emphysema and lung cancer. Vapor ablation
is simply the application of heated pure water (steam) to tissue.

**Emails:**  
- sdey@uptakemedical.com (Broncus/UpTake contact and UpTake sales)  
- sales@broncus.com (Broncus Medical sales)

**Websites:**  
- www.broncus.com  
- www.uptakemedical.com

**BTG**  
**Stand number 30**

BTG is a global specialist healthcare company bringing to market innovative products in specialist areas of medicine to better serve doctors and their patients. We have a portfolio of interventional medicine products to advance the treatment of cancer, severe emphysema, severe blood clots and varicose veins, and specialty pharmaceuticals that help patients overexposed to certain medications or toxins. Inspired by patient and physician needs, BTG is investing to expand its portfolio to address some of today’s most complex healthcare challenges.

The EKOS™ system uses targeted ultrasonic waves in combination with clot-dissolving drugs to quickly and safely dissolve blood clots and restore healthy heart function and blood flow in patients with pulmonary embolism, deep vein thrombosis, and peripheral arterial occlusions.

To learn more about BTG and EKOS™, please visit our websites.

**Websites:**  
- www.btgplc.com  
- www.btg-im.com/en-GB/EKOS

**BTG-PneumRx Ltd**  
**Stand number 31**

PneumRx, a BTG International group company, is a medical device company focused on the development and commercialisation of minimally invasive solutions for unmet clinical needs in pulmonary medicine. The flagship product is the PneumRx Coil® System, a unique implantable device designed to improve lung function, exercise capacity and quality of life for patients with severe emphysema.

In Europe the PneumRx Coil® System has received CE Mark certification. The PneumRx Coil® System is limited by US law to investigational use only in the USA.

**Website:**  
- www.pneumrx.com/en

**Chiesi Limited**  
**Stand numbers 3 & 32**

Chiesi Limited is part of the Chiesi group, an international family-owned company with more than 80 years of experience focusing on research, development, production and marketing of innovative prescription medicines in the field of respiratory, neonatology, transplant medicine and rare diseases.

Chiesi is committed to improving patient outcomes and quality of life.

**Tel:** 0161 488 5555  
**Website:**  
www.chiesi.uk.com

**Circassia**  
**Stand number 29**

Circassia is a specialty pharmaceutical company focused on respiratory disease. Our growing commercial organisation promotes NIOX®, our innovative, market leading diagnostic and monitoring tool to aid in asthma management, directly to healthcare providers. We also have a broad-based pipeline including a range of respiratory medicines in development.

**Tel:** 01865 405 560  
**Email:** info@circassia.com  
**Website:** www.circassia.com

**Clement Clarke International**  
**Stand number 44**

Respiratory specialists Clement Clarke International, have a series of innovative devices to showcase at the BTS meeting.

Among these devices are DispozABLE Spacer; the paper cup spacer for emergency SABA delivery and some new training tools, aimed at standardising pMDI technique training, based on the existing Flo-Tone device, now with improved features.

Included in these new training tools are Flo-Check; a simple device to facilitate multi-patient use of pMDI placebos and a positive whistle mask for Able Spacer to enable young children a better experience with their spacer – it also works with Rafi-Tone App. making the whole experience fun!

**Tel:** 01279 414 969  
**Email:** resp@clement-clarke.com  
**Website:** www.clement-clarke.com

**European Respiratory Society (ERS)**  
**Stand number 62**

ERS is an international organisation that brings together physicians, healthcare professionals, scientists and other experts working in respiratory medicine. We are one of the leading medical organisations in the respiratory field, with a growing membership representing over 140 countries.

Our mission is to promote lung health in order to alleviate suffering from disease and drive standards for respiratory medicine globally. Science, education and advocacy are at the core of everything we do.

ERS is involved in promoting scientific research and providing access to high-quality educational resources.
EXHIBITORS’ INFORMATION

It also plays a key role in advocacy – raising awareness of lung disease amongst the public and politicians.
Tel: +41 21 213 01 01
Website: www.ersnet.org

Gilead Sciences Stand number 41
Gilead Sciences is a biopharmaceutical company that discovers, develops and commercializes innovative therapeutics in areas of unmet medical need. The company’s mission is to advance the care of patients suffering from life-threatening diseases worldwide. Gilead’s portfolio of products and pipeline of investigational drugs includes treatments for HIV/AIDS, liver diseases, cancer, inflammatory and respiratory diseases, and cardiovascular conditions.
Tel: 0203 681 4500
08000 113 700 (medical information)
Email: ukmedinfo@gilead.com
Website: www.gilead.com

GlaxoSmithKline Stand numbers 5-9
GSK is a science-led global healthcare company with a mission to help people do more, feel better and live longer. For more than 45 years, GSK has been a leader in respiratory, helping patients with respiratory disease better manage their condition. Working in collaboration with the scientific community, we remain at the cutting-edge of scientific research into innovative medicines with the aim of helping to treat patients’ symptoms and reduce the risk of their disease.
For further information please visit our website.
Website: www.gsk.com

Hitachi Medical Systems Stand number 48
Hitachi Medical Systems launch the latest EBUS technology.
Discover New Facets of Vision, featuring the new Ultrasound Bronchoscope EB19-J10U combined with HITACHI’s advanced ultrasound unit NOBLUS and PENTAX Medical’s DEFINA video processor: an innovative solution for unmatched diagnostic value in EUS and EBUS.
Tel: 0844 800 4294
Email: b.dowell@hitachi-medical-systems.com
Website: www.hitachi-medical-systems.com

ILD Interdisciplinary Network Stand number 65
The ILD Interdisciplinary Network developed over a period of several years as an informal group of ILD specialist nurses to provide peer support, ad hoc ILD educational study days and shadowing opportunities for newly appointed nurses working in ILD care. The purpose of the group is to provide a supportive network, promote ILD specialty practice through education and professional development and to influence the policy of ILD care.
Tel: 01543 442 147
Email: events@ILD-INN.org.uk
Website: www.ild-inn.org.uk

Insmed Stand number 40
Insmed is a global, biopharmaceutical company whose mission is to transform the lives of patients with serious, rare diseases
Email: medicalinformation@insmed.com
Website: www.insmed.com

Mylan Stand number 45
Mylan is a global pharmaceutical company committed to setting new standards in healthcare. Working together around the world to provide 7 billion people access to high quality medicine, we innovate to satisfy unmet needs; make reliability and service excellence a habit; do what’s right, not what’s easy; and impact the future through passionate global leadership. We offer a growing portfolio of more than 7,500 marketed products around the world, including antiretroviral therapies on which approximately 50% of people being treated for HIV/AIDS in the developing world depend. We market our products in more than 165 countries and territories. We are one of the world’s largest producers of active pharmaceutical ingredients. Every member of our more than 35,000-strong workforce is dedicated to creating better health for a better world, one person at a time. Learn more at Mylan.com.
Tel: 01707 853 000
Email: Muhammad.imran@mylan.co.uk
Website: www.mylan.co.uk

Napp Pharmaceuticals Limited Stand numbers 17 & 23–26
Napp Pharmaceuticals Limited is a UK healthcare company with a strong track record in bringing high-quality, innovative medicines to UK health professionals and their patients. We are a committed long-term NHS provider in respiratory medicine, supporting the delivery of real-world evidence and education. We aim to provide high-quality asthma medicines that meet genuine needs, make a positive difference to patients’ lives and offer value to the NHS.
Tel: 01223 397 520
Email: emily.harrison@napp.co.uk
Website: www.napp.co.uk
National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme, led by the Royal College of Physicians (RCP)

Stand number 38

Through an extensive partnership approach, the National COPD Audit Programme brings together primary care, secondary care, and pulmonary rehabilitation audits in order to comprehensively map the patient's journey through COPD services. This National Audit Programme aims to drive improvements in the quality of care and services provided for COPD patients in England and Wales. It is led by the RCP, working closely with a range of key stakeholders, including the British Thoracic Society (BTS), the Primary Care Respiratory Society UK (PCRS-UK), the British Lung Foundation (BLF) and the Royal College of General Practitioners (RCGP). The programme is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit Programme (NCA).

For further information contact: Viktoria McMillan, Programme Manager, or Juliana Holzhauer-Barrie, Project Manager.

Tel: 0203 075 1502
Email: copd@rcplondon.ac.uk
Website: www.rcplondon.ac.uk/COPD
Twitter: @NatCOPDAudit #COPDaudit #COPDauditQI

National Lung Cancer Audit, delivered by the Royal College of Physicians (RCP)

Stand number 39

The most comprehensive audit of lung cancer in the world, the National Lung Cancer Audit (NLCA) is commissioned by the Healthcare Quality Improvement Partnership. The NLCA uses combined registry data from the National Cancer Registration and Analysis Service, which are then analysed by the University of Nottingham. The audit now highlights an additional ~6000 lung cancer cases per year, improving outcomes for more patients. Publications include an Annual report for England and Wales, the Lung Cancer Clinical Outcomes Publication and Mesothelioma report for England, as well as a Patient information booklet for England and Wales. The NLCA runs quality improvement initiatives including an annual spotlight audit, which this year examined patients who did not undergo surgery.

Tel: 0203 075 1739
Email: NLCA@rcplondon.ac.uk
Website: www.rcplondon.ac.uk/nlca

EXHIBITORS’ INFORMATION

Olympus

Stand number 14

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Stand number 19

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Stand numbers 21, 22, 27 & 28

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Tel: 01304 616 161
Websites: www.pfizer.co.uk, www.novartis.co.uk, www.bms.co.uk

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Tel: 07585 955 507 (Nicholas Helme, UK Business Development Manager)
07803 727 474 (Zakk Zdravev, EMEA Business Development Manager)
Emails: nicholas.helme@pmd-solutions.com, zakk.zdravev@pmd-solutions.com

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Email: chair@pcdsupport.org.uk
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+41 (0)79 102 3194 (Eric Faust)
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Stand number 61

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Stand number 36

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Stand number 20

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BACTERIA CAN TRIGGER AIRWAY SENSORY NERVES VIA THE ACTIVATION OF TLR2

MA Wortley, ED Dubuis, SJ Bonvini, MA Birell, MG Belvisi. Imperial College, London, UK
10.1136/thoraxjnl-2017-210983.1

Introduction Excessive coughing is a key symptom of lower respiratory tract infections (LRTI's) especially when associated with exacerbations of respiratory diseases like asthma and COPD. As airway sensory nerve activation is required to trigger the cough response, we hypothesised that respiratory related bacteria could fire these nerves.

Methods In vivo tissue and neuron assay systems were employed, in conjunction with in vivo electrophysiology and a guinea pig cough model to investigate this hypothesis.

Results We show that a bacterial mimetic, LPS can activate guinea pig sensory nerve fibres in vivo. Furthermore, LPS, as well as heat-killed bacteria (Haemophilus Influenzae and Streptococcus Pneumoniae), activated isolated sensory nerve tissue (vagus) from guinea pigs (LPS 0.1±0.04 mV; HI 0.14±0.02 mV; SP 0.16±0.05 mV, n=3) with similar Results in tissue obtained from human donor lungs and c57bl/6 mice. An investigation into the Toll-like receptor (TLR) involved revealed that it was TLR2, and not TLR4, with a TLR2 agonist (lipopolysaccharide, LPS) causing activation of isolated vagus (0.14±0.02 MTV), whereas a TLR4 agonist (ultra-pure LPS) did not (0.00±0.00 mV). Furthermore LPS activated wild-type mouse vagus nerve (0.12±0.01 mV) whereas it had little effect in TLR2-/- mouse vagus nerve (0.02±0.00 mV). Indeed, using single cell RT-PCR, we found guinea pig airway-terminating neurons expressed TLR2 (3/69), but not TLR4 receptors (0/69). Further investigation showed that the TLR2 response at least partially required TRPA1 ion channels, whereas it had little effect in TLR2-/- mouse vagus nerve (0.02±0.00 mV).

Conclusion We have shown that bacteria can activate the sensory nerves associated with the cough response. We propose that this could be an endogenous defensive mechanism designed to expel bacterial infection, and/or could be a method harnessed by some infective agents to spread from carrier to new host. Furthermore, increased understanding of the mechanisms involved may lead to an insight into ways to modulate the excessive coughing, which plagues respiratory patients during exacerbation episodes.

REFERENCES

OESTROGEN: AN ENDOGENOUS AGONIST FOR TRPM3 TRIGGERED SENSORY NERVE ACTIVATION IN THE AIRWAY?

SJ Bonvini, MA Wortley, JJ Adcock, E Dubuis, JA Bolaji, S D’Sa, J Ma, MA Birell, MG Belvisi. Imperial College, London, UK
10.1136/thoraxjnl-2017-210983.2

Introduction In chronic lung diseases, activation of airway sensory nerves initiates respiratory reflexes including cough for which there is currently no safe and effective treatment. Ion channels on sensory afferents can activate these reflexes and as such are attractive therapeutic targets. Using synthetic ligands we have shown that activation of TRPM3 can trigger human and guinea pig airway sensory nerves. As TRPM3 is thought as a “steroid receptor” and women are consistently over represented in chronic cough clinics, we hypothesised that oestrogen could be an endogenous agonist of TRPM3 mediated activation of airway sensory nerves.

Methods Ex vivo tissue and neuron assay systems were employed, in conjunction with in vivo electrophysiology and a guinea pig cough model to investigate this hypothesis.

Results In vivo, β-oestradiol caused firing of both C and A fibres and also elicited a cough response in conscious unrestrained guinea pigs. Ex vivo, β-Oestradiol caused a concentration dependant depolarisation of isolated guinea pig vagal nerves which was inhibited by the non-selective ER receptor antagonist ICI182780 (92.7%±4.5%) and by the TRPM3 antagonist Isosakuranetin (86.5%±6.8%). The ER receptor antagonist had no effect on the TRPM3 agonist (CIM0216) mediated depolarisation. Translational responses were obtained in human vagal tissue. Single cell PCR indicated that the TRPM3 ion channel and two oestrogen receptors GPER and ERα were expressed in airway specific nodose and jugular ganglia, and were co-expressed with TRPM3.

Conclusion These data show that the oestrogen can activate airway sensory nerves, and suggests that ER receptors may be activated upstream of TRPM3 activation. Further investigation is required, however this data may help to explain the higher number of females attending chronic cough clinics and suggests TRPM3 could be a novel therapeutic target for chronic cough.

REFERENCES
Results The EILO and control groups had a similar peak power output and minute ventilation (VE) (power: 227±35 vs. 237±35 watts; VE: 103±20 vs. 98±23 L/min; p>0.05). At submaximal work rates (140–240 W) subjects with EILO demonstrated increased work of breathing (p<0.05) and respiratory neural drive (p<0.05), developing in close temporal association with onset of endoscopic evidence of laryngeal closure (p<0.05). Unexpectedly, there were no differences in dyspnoea intensity whilst a ventilatory increase, driven by augmented tidal volume (p<0.05), was seen in subjects with EILO, before the onset of laryngeal closure.

Conclusions Using novel methodology, we found respiratory work and respiratory neural drive increases in close association with paradoxical laryngeal closure; highlighting the importance of the upper airway contribution to respiratory loading.

Abstract T3 Figure 1

Introduction FEV₁ and BMI are well-validated predictors of disease severity and outcome in cystic fibrosis (CF), however, the impact of sex remains debated. The UK-CF Registry features demographic and clinical information on >99% of the UK-CF population (~10 000 individuals). Data were used to
investigate whether there was a sex difference in change in FEV1 and BMI between 2008–2013, and if this difference could be explained by chronic Pseudomonas aeruginosa (cPsA) infection or CF-related diabetes (CFRD).

Methods Longitudinal analyses (2008–2013) compared male/female age at cPsA acquisition as well as FEV1 and BMI differences between individuals with cPsA infection. Regression analysis examined for a difference in change in BMI and FEV1 between the sexes depending on CFRD and cPsA status, adjusting for age, genotype and ethnicity. A survival analysis completed the sex comparison.

Results Females were significantly younger than males at the time of new cPsA infection (20.9 vs 22.4 years; p<0.001) with a lower mean BMI with new cPsA (21.3 vs 22.2 years; p<0.001) but no difference in FEV1 at time of new cPsA. Females had greater decline in FEV1 than males (8.2% vs 7.0% over 5 years; p<0.001), this was even greater in individuals with cPsA (10.2% vs 8.2% in males;p=0.002). Females had less of an increase in BMI than males (0.2 vs 0.6 in males;p<0.001), this difference was only seen in individuals with cPsA. Sex differences in change in BMI were also seen in the CFRD population. Overall, median survival for females was significantly less than males (39.5 vs 44.2 years, p<0.001) but no difference in FEV1 at time of new cPsA. Females with CFRD had the worst survival overall. Males without cPsA had the greatest median survival while males with cPsA had similar survival to females irrespective of their cPsA status.

Conclusions Females had earlier cPsA infection and lower BMI. cPsA was associated with greater decline in FEV1 and BMI in females than males, with worse survival in females with cPsA that was not seen in males with cPsA. CFRD was associated with less BMI increase in females, with females with CFRD having worse survival overall. These data suggest a measurable sex difference in clinically relevant CF outcomes in the UK population.

Abstract T4 Figure 1  Kaplan-Meier survival estimates (males and females).

T5 COMPLEMENT PROTEIN C5A INDUCES PROLONGED NEUTROPHIL DYSFUNCTION IN A CLINICALLY RELEVANT MODEL OF HUMAN BACTERAEMIA

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Introduction Critically ill patients are highly susceptible to nosocomial infections including ventilator-associated pneumonia. Susceptibility to nosocomial infection is heavily influenced by immune-cell failure; however the mechanisms underpinning this process remain incompletely understood.1 Previously, we have demonstrated that the complement split product C5a impairs the phagocytosis of zymosan by healthy donor and patient neutrophils.2 In this study, we investigated the underlying mechanism, duration and preventability of C5a-induced neutrophil dysfunction in a clinically relevant in vitro model.

Methods In a new assay, which permits rapid interrogation of neutrophil functions in whole blood, healthy human or murine blood samples were exposed to C5a or vehicle control, prior to addition of pH-sensitive Staphylococcus aureus bioparticles. Phagocytosis was quantified by flow cytometry with an Attune Next Acoustic Focusing Cytometer (Life Technologies, Paisley, UK). Selective small molecule inhibitors, alternative pro-inflammatory agents, and neutrophils from knock-out mice were used to address our experimental questions.

Results C5a rapidly reduced neutrophil phagocytosis of Staphylococcus aureus in human whole blood by 39.5% (p<0.0001). Moreover, this phagocytic impairment increased over time post-exposure. In contrast to C5a, LPS and platelet activating factor (PAF) increased phagocytosis (p<0.01 and p<0.05 respectively). Prior phagocytosis protected neutrophils from subsequent C5a-induced phagocytic impairment, but this was not recapitulated by exposing neutrophils to soluble priming agents. C5a-induced phagocytic impairment was PI3-kinase dependent in isolated neutrophils, but not in human and murine whole blood.

Conclusions This is the first study to demonstrate the selective ability of C5a to impair neutrophil phagocytosis of a clinically relevant pathogen in a whole blood model which mimics bacteremia. It also provides intriguing insights into the potential mechanisms by which this may occur, including the temporal dependence of C5a and bacterial exposure. Finally, the ability of PI3-kinase inhibition to ameliorate neutrophil dysfunction may vary depending on whether inhibitors are administered topically or systemically.

REFERENCES
Introduction and Objectives Our understanding of the pathogenesis of interstitial pulmonary disease is limited largely to its late, fibrotic stages. Inherited forms offer the potential to understand earlier pathogenic events. Autosomal dominant mutations in surfactant protein C (SFTPC) cause some cases of familial pulmonary fibrosis; the most common mutation is I73T, which is said to be mistrafficked within the type 2 pneumocyte. We hypothesise that mistrafficking of SFTPC I73T is causal in triggering type 2 pneumocyte dysfunction in familial pulmonary fibrosis. This work aims to understand the mechanism of SFTPC I73T mistrafficking such that type 2 pneumocyte dysfunction in familial, and sporadic disease can be better understood.

Methods We overexpressed GFP tagged wild-type (WT) and I73T SFTPC in HeLa cells to study their localisation and trafficking. Subcellular localisation and co-localisation with organelle markers was assessed using confocal microscopy and immunofluorescence. Western blotting was used to assess expression of SFTPC isoforms and GFP traps to study SFTPC interactors, including ubiquitin. Mass spectrometry was used to assess the interactome of WT and I73T SFTPC.

Results In HeLa cells overexpressing GFP-SFTPC, we observed mistrafficking of SFTPC I73T; WT SFTPC is trafficked to the multivesicular body (MVB), while I73T mistrafficks to the cell surface and into tubular structures (figure 1A) which co-localise with a marker of recycling endosomes Rab8 (figure 1B). Correct trafficking of WT SFTPC to the MVB depends on ubiquitination of lysine-6 (K6). We see an absence of ubiquitination in the I73T mutant and a subcellular distribution similar to that seen in a SFTPC mutant (K6R) which cannot be ubiquitinated. Mass spectrometry revealed differential binding between WT and I73T SFTPC of a number of cell surface proteins.

Conclusion We have shown that pathogenic SFTPC mutant I73T mistrafficks not only to the cell surface, but also into recycling endosomes. We propose that this occurs as a result of failure of ubiquitination and internalisation into the MVB. Trafficking defects appear to impact upon binding of WT vs I73T to cell surface markers, the functional significance of which is the focus of our ongoing work.

Abstract T6 Figure 1 SFTPC I73T localises to the cell surface and recycling endosomes. (A) Subceller localisation of GFP-SFTPC WT and I73T expressed in HeLa cells. (B) GFP-SFTPC co-localises with mstrawberry Rab8, a marker of recycling endosomes.
COPD: doing what works

**S1 A 20 YEAR EXPERIENCE OF STAGED BILATERAL LUNG VOLUME REDUCTION FOR EMPHYSEMA – THE LONG TERM BENEFITS OF COMBINED SURGICAL AND ENDOBRONCHIAL TECHNIQUES**

1Yf Oey, 1MC Steiner, 1MDL Morgan, 1DA Walker, 1University Hospitals Leicester, Leicester, UK; 2Barts Health NHS Trust, London, UK

10.1136/thoraxjnl-2017-210983.7

We made a decision early in our lung volume reduction (LVR) experience to offer a staged bilateral approach with the timing of each additional intervention determined by patient choice and have latterly incorporated the use of endobronchial valves into this protocol. We have analysed the long-term effect on patient outcome of this novel approach. Over a 20 year period 329 LVR procedures were performed on 256 patients (157 male, 99 female, median age 61 [23–79] years) by a single surgeon in one institution. Baseline lung function showed predicted values (mean +/-SE): FEV1 28 (11)%; RV 253 (53)%; DLCO 39 (39)%. 64 patients have received a second LVR and 13 a third LVR procedure (fig). Median time between first and second stage was 3.8 (0.1–12.5) years. The time interval between 2nd and 3rd stage was 2.7 (0.2–5.2) years. Median time interval between 1st and 3rd stage was 5.8 (1.9–10) years. Overall 30 day mortality was 3% (20% after open, 3% after VATS and 3% after EBV). Median overall survival was 5.6 (95% CI 4.7–6.9) years. In the subgroup of patients who underwent staged procedures there was a significant improvement in mean predicted FEV1 from 28% at initial baseline to 34% at 6 years. There was a sustained reduction in static lung volumes up to 8 years: predicted TLC remained reduced from 143% to 123% and predicted RV from 259% to 189%. The physiological improvements after first and second stage were similar. There were also sustained improvements over initial baseline in health status as assessed by Euroquol for 5 years [50 (+/-26) to 62 (+/-23), p<0.001] en in SF36: perception of the physical role was significantly improved for up to 7 years, social functioning for 8 years. Energy levels remained significantly higher for 9 years with 20% of patients scoring better than preoperatively. A staged unilateral video assisted surgical and endobronchial approach to lung volume reduction dictated by the patient is justified by a sustained benefit for up to 9 years in physiology and health status in patients with severe emphysema who had already received maximal medical therapy.

**Abstract S1 Figure 1** All LVR procedures.

S2 THE IMPACT OF PULMONARY REHABILITATION (PR) COMPLETION AND OUTCOME ON SUBSEQUENT HOSPITAL ADMISSIONS IN PATIENTS WITH COPD. RESULTS FROM THE NATIONAL COPD AUDIT

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10.1136/thoraxjnl-2017-210983.8

**Introduction** Clinical trials suggest attendance at PR reduces subsequent hospitalisation rates. However, whether this benefit occurs in routine clinical practice is uncertain. We analysed admission rates and days spent in hospital 90 and 180 days after assessment for PR in the 2015 national PR audit cohort.

**Methods** PR services across England and Wales provided data for all consenting patients assessed for PR between Jan and April 2015. Cumulative rates of admission to hospital and numbers of days spent in hospital at each timepoint (and between the 90 and 180 day timepoints) were extracted from Hospital Episode Statistics (HES) and compared between patients who did and did not complete PR and between those reaching and not reaching accepted thresholds for clinically important improvements (MCIDs) in exercise and health status measures.

**Results** Data for 7135 patients included in the audit in England were extracted. Overall admission rates (proportion with at least one admission) were 18.6% and 29.6% at 90 and 180 days respectively. At each timepoint, completion of PR (defined by there being a discharge assessment) was associated with a reduced risk of admission to hospital (compared with non-completion) (90 days: 13.1 vs 26.4%; 180 days: 23.7 vs 37.9%; 91–180 days: 15.0 vs 21.7%; all p<0.001) and reduced days spent in hospital (90 days: Mean 3.1 vs 7.1 days; 180 days: mean 4.8 vs 9.4 days; 91–180 days: 4.91 vs 7.6 days; all p<0.001). Reaching the MCID for exercise measures after completion of PR was associated with reduced risk of admission at 180 days (and 91–180 days) (p<0.05) but not reduced days spent in hospital. Changes in health status measures were not associated with admission rates or days spent in hospital.

**Conclusion** Successful completion of PR is associated with reduced risk of hospitalisation and reduced days in hospital up to 180 days after assessment. Although some of this effect may be due to case-mix variation, actions to enhance uptake and completion rates for PR may be effective measures to reduce health care resource utilisation for patients with COPD.

S3 CLINICAL CULTURES AND THE SENSATION OF BREATHLESSNESS

J Macnaughton, R Oxley, A Rose. Durham University, Durham, UK

10.1136/thoraxjnl-2017-210983.9

**Introduction and Objectives** Our Wellcome Trust funded project, the Life of Breath, takes as its starting point the problem of symptom discordance between clinically measured lung function and patient experience. Clinicians have long recognised the influence of thoughts and emotions on symptoms of breathlessness. Recent work in neuroscience, exemplified in the ‘multidimensional model’ of breathlessness proposed by
A RANDOMISED CONTROLLED TRIAL (RCT) OF COGNITIVE BEHAVIOURAL THERAPY (CBT) FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Background Anxiety and depression are common co-morbidities in COPD. We conducted a RCT comparing CBT delivered by respiratory nurses (RNs) and self-help leaflets in 279 patients with COPD and anxiety. The CBT intervention delivered by RNs achieved clinical and statistical improvements in anxiety, depression and improving quality of life. RNs with dual physical and psychological skills are rare. However there is an appetite for RNs to be trained to identify and treat psychological difficulties experienced by respiratory patients using CBT.

Aims To evaluate the effectiveness of The Lung Manual Intervention used in The Newcastle COPD CBT Care study on patient outcomes when delivered by nurses who completed 3 day foundation training compared to advanced post-graduate education in CBT.

Methods Following an educational course, four respiratory nurses delivered The Lung Manual Intervention. Four nurses were randomly allocated patients and delivered CBT. Nurses with Diploma training delivered CBT to 83 patients; foundation level delivered 32. CBT sessions were audio-recorded to explore delivery of the intervention in practice. The recordings were then assessed fidelity of intervention delivery by an independent CBT therapist. Unpaired t-tests were used to compare mean anxiety scores and at baseline and three months.

Results The nurses competency was rated highly by an independent CBT therapist. The mean number of CBT sessions was 4 and this was similar for all nurses. Table 1 summarises the outcome from nurses delivering The Lung Manual CBT intervention.

Conclusion Brief education in CBT was effective in improving patient symptoms of anxiety at three months. RNs with dual skills in physical and psychological well being may be an appropriate model to provide holistic care for patients with COPD.

REFERENCES

Abstract S4 Table 1 Summary of outcome from RNs delivering the lung manual intervention based on level of training

<table>
<thead>
<tr>
<th>Level of training</th>
<th>Number of patients</th>
<th>HADS-Anxiety at baseline (SD)</th>
<th>HADS-Anxiety at three months (SD)</th>
<th>Difference at three months</th>
<th>p-value (95% CI)</th>
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<td>Diploma level</td>
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<td>12.3</td>
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<td>Foundation level</td>
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<td>&lt;0.001 2.05-4.76</td>
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</tbody>
</table>

S5 SMOKING CESSSION EXPENDITURE IN SECONDARY CARE WITHIN LONDON – WHO ARE SUPPORTING SICK SMOKERS?

Introduction In 2010, 17% of hospital inpatients in England were current smokers, equating to 1.1 million individuals. In November 2013, NICE published guidance on stopping smoking in secondary care, recommending the routine and systematic delivery of stopping smoking support to all smokers in acute, maternity and mental health settings. Patients who smoke should be offered stop smoking medications, nicotine patches, and counselling as soon as they are admitted, encouraging them to quit. We undertook an audit of secondary care trusts in London to see how much stop smoking medications were being provided.

Methods The London Procurement Partnership has access to drug expenditure data for all Trusts and CCGs within the London area. We calculated the total expenditure for all nicotine replacement products including varenicline and bupropion between April 2016 April 2017 in each trust.

REFERENCE
2. London Procurement Partnership, London, UK

10.1136/thoraxjnl-2017-210983.11
Results
There was a 90-fold variation in expenditure on stop smoking products across London secondary care trusts (graph 1). Some of the highest expenditure was in trusts dealing with mental health. Comparing similar sized organisations to correct for bed numbers; within major teaching hospital groups, there was a 3-fold variation (£96 k vs £29 k). There was a 10-fold difference in smaller acute Trusts (£32 k vs £3 k) and specialist trusts (£14 k vs £1.4 k).

Discussion
It is important to stress that expenditure does not equate to prescribing or use of these products. Also, this expenditure does not include any products bought in a hospital shop or provided by any on site external stop smoking services. Being unwell and admitted to hospital offers a unique opportunity for sick smokers to stop smoking. Heightened health concerns and being in an environment where smoking is not permitted enhances the motivation to quit. However, it appears that not all secondary care Trusts in London are providing the tools to help sick smokers quit. This may also reflect the lack of skilled advisors to provide support within these trusts. Hopefully, the variation in expenditure will narrow with the introduction of a national CQUIN for offering stop smoking products in secondary care coming into force for 2017–2019.

REFERENCE

An update in pneumonia: from big data to cellular function

ESTABLISHING THE TRUE INCIDENCE OF HOSPITALISED COMMUNITY ACQUIRED PNEUMONIA (CAP) IN THE UK: A HOSPITAL EPISODE STATISTICS (HES) ANALYSIS

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10.1136/thoraxjnl-2017-210983.12

Introduction
In November 2015, the Joint Committee on Vaccination and Immunisation (JCVI) recommended against including PCV13 for age based and risk based populations.1 A principal driver of this recommendation was the incidence of hospitalised pneumococcal pneumonia, reported by Rodrigo et al.2 Using the Results from the study by Rodrigo et al a simple calculation can be performed to approximate the incidence of vaccine preventable pneumococcal CAP from all cause hospitalised CAP (ACH-CAP). The national Hospital Episodes Statistics (HES) database3 reports a significantly higher incidence of ACH-CAP which could impact the potential benefit provided by PCV13.

AIM To compare the incidence of ACH-CAP reported in the study by Rodrigo et al.2 with the incidence of ACH-CAP coded in HES in the corresponding population, over a similar period of time.

Materials and Methods
The study by Rodrigo et al ran from September 2008 for 5 years. Inpatients≥16 years old, with symptoms suggestive of lower respiratory tract, new CXR infiltrates consistent with pneumonia, and treated for CAP, were included.2 Our HES analysis included patients≥18 years old with (ICD-10) codes J12–J184 (April 2008 – March 2013) admitted to the hospitals in Rodrigo’s study (Nottingham University Hospitals NHS Trust – City Campus and Queen’s Medical Centre Campus).

Results
Rodrigo and colleagues identified 2702 adults while our analysis of HES identified 11 059 across both sites.

Conclusion
The study by Rodrigo et al was not specifically designed to capture total incidence of ACH-CAP; instead its objective was to report on pneumococcal serotype evolution.2 Miscoding and misdiagnosis of pneumonia in HES is well-recognised5 but doesn’t appear to explain the four-fold difference in these numbers. Further investigation to validate HES data against hospital records could be performed. Accurate incidence data would impact cost-effectiveness analyses and facilitate a more informed decision next time the data is reviewed.

Please refer to page A257 for declarations of interest in relation to abstract S6.

REFERENCES
1. https://app.box.com/s/iddfb4pwpktujusii2tc/1/2199012147/228460519671/1
HIGH MORTALITY FROM INVASIVE PNEUMOCOCCAL PNEUMONIA IN THE ERA OF VACCINE PREVENTABLE DISEASE

K Ferguson, M Wilczynska. Haemymes Hospital, Renfrew, UK

Introduction and Objectives Bacteraemia secondary to pneumococcal pneumonia is the most common presentation of invasive pneumococcal disease (IPD) and is associated with high mortality rates. We conducted this study to evaluate differences in the process of care and outcome in patients with community-acquired invasive pneumococcal pneumonia (CAIPP) depending on age, co-morbidities and vaccination status.

Methods This was a retrospective study that analysed the data for patients with CAIPP who were hospitalised in 2016 at NHS Lanarkshire hospitals.

Results Forty-five of 60 patients with pneumococcal bacteraemia had IPD secondary to community-acquired pneumonia. The mean age of the patients was 61 years (17–101). The CURB 65 score was 0–1 in 55% patients, 1 in 2% and 3–5 in 33%. Overall 30 days mortality was 22%. The odds ratio of death within 30 days from CAIPP was 15.9 (95% CI: 1.8–140, p=0.012) among those who had any co-morbidity involving major organ (cardiac, respiratory, renal or liver failure). Thirty days mortality showed the strongest positive association with age (r=0.46, p=0.001) therefore patients were divided into two groups according to their age (Table 1). There was no difference between groups in time to reach diagnosis or initiate treatment. Within 4 hours of admission, a chest x-ray was obtained in 88% in Group 1 vs. 89% in Group 2 (p=NS), and the first dose of antibiotics was administered within 4 hours in 90% in Group 1 vs. 94% in Group 2 (p=NS). 79% patients in Group 2 had at least one major co-morbidity vs. 46% in Group 1 (p=0.012). Group 2 had significantly higher 30 days mortality than group 1, 47% vs 17.9% (p<0.001). In the Group 2, among deceased 44% (4 of 9) have not received pneumococcal vaccination. Only 4 of 26 patients in Group 1 were vaccinated against Streptococcus pneumonia.

Conclusions Clinical significance of IPP is underestimated in older people. Despite satisfactory initial assessment and prompt treatment mortality remains very high. That could be associated with the presence of co-morbidities and insufficient level of pneumococcal vaccination.

REFERENCE

Abstract S7 Table 1 Demographics and clinical data for group 1 and group 2.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 1 (≤65 years old)</th>
<th>Group 2 (&gt;65 years old)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age years</td>
<td>47.9</td>
<td>81</td>
</tr>
<tr>
<td>Females (%)</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>CRP mg/dL (mean)</td>
<td>254</td>
<td>214</td>
</tr>
<tr>
<td>WBC x10^9/L (mean)</td>
<td>17.9</td>
<td>13.8</td>
</tr>
<tr>
<td>Chest x-ray:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-lobar consolidation (%)</td>
<td>26</td>
<td>31</td>
</tr>
<tr>
<td>-multilobar consolidation (%)</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>-consolidation and pleural effusion (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalisation (days)*</td>
<td>8.6</td>
<td>9.6</td>
</tr>
<tr>
<td>30 days mortality (n)</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>30 days readmission (n)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Door to antibiotics time (min)</td>
<td>103.5</td>
<td>99</td>
</tr>
<tr>
<td>Door to chest x-ray time (min)</td>
<td>146</td>
<td>101</td>
</tr>
<tr>
<td>Antibiotics duration (days)*</td>
<td>12.7</td>
<td>9.3</td>
</tr>
<tr>
<td>Antibiotics in the community before admission (%)</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Antibiotics according to local guidelines (%)</td>
<td>53</td>
<td>36</td>
</tr>
</tbody>
</table>

*p<0.05

RISK STRATIFICATION IN COMMUNITY ACQUIRED PNEUMONIA – CURB65, SIRS OR QSOFA? A RETROSPECTIVE ANALYSIS

DPS Dosanjh, F Gudzinska, K Aldridge, S Hughes, D Thickett. Institute of Inflammation and Ageing, University of Birmingham, Birmingham, UK; University Hospitals NHS Foundation Trust, Birmingham, UK

Introduction and Objectives The British Thoracic Society and National Institute for Health and Care Excellence recommend the CURB65 for severity assessment in community acquired pneumonia (CAP). The Third International Consensus Definitions for Sepsis and Septic Shock however, state that the qSOFA (quick Sequential Organ Failure Assessment) should be used to identify those with infection who are likely to have poor outcomes. This superseded the SIRS (Systemic Inflammatory Response Syndrome) criteria. There is therefore no clear international consensus regarding how severity of CAP should be assessed outside the critical care setting. We retrospectively evaluated the ability of the CURB65, SIRS and qSOFA scores to predict 30 day mortality in patients with CAP.

Methods Adults admitted to the Queen Elizabeth Hospital Birmingham, with CAP between 10/2014 and 01/2016 were included. Radiology, admission clerking and electronic patient records were reviewed to confirm pneumonia and calculate the scores. Cases were excluded if there was no radiological confirmation, or if they had hospital-acquired pneumonia.

Results 1545 patients were included in the final analysis (mean age 72, 30 day mortality 19.0%, 49.1% female). All scoring systems enabled stratification according to increasing risk of 30 day mortality. CURB65: 0%–3.5%, 1%–11.5%; 2%–18.5%; 3%–27.1%; 4%–42.1% (p<0.001). SIRS: 0%–10.4%; 1%–13.5%; 2%–18.1%; 3%–22.5%; 4%–32.5% (p<0.001). qSOFA: 0%–1.19%; 1%–17.9%; 2%–30.1%; 3%–47.2% (p<0.001). Receiver operator characteristic curves calculated to determine the accuracy with which the scores were able to predict 30 day mortality, revealed areas under the curve of 0.69, 0.60 and 0.63 for CURB65, SIRS and qSOFA respectively. Using the established cut-offs of CURB65 ≥2, SIRS ≥2 and qSOFA ≥2, sensitivities, specificities, negative and positive predictive values for prediction of 30 day mortality were calculated (Table 1). Of those that died within 30 days, qSOFA ≥2 correctly identified
40.5% as high risk, compared to 79.5% and 84.9% using the SIRS criteria and CURB65 respectively.

**Conclusions** All three scoring systems can stratify according to risk of 30 day mortality, though none of them are particularly accurate. qSOFA has poor sensitivity, and may underestimate severity and risk of 30 day mortality in CAP. New assessment tools to accurately identify CAP patients at increased risk of poor outcomes are urgently required.

### Abstract S8 Table 1 Predictive characteristics of three severity scoring systems for community acquired pneumonia. Ability of the scoring systems to predict 30 day mortality was assessed using cut-offs of ≥2 for all three scores

<table>
<thead>
<tr>
<th>Score</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>PPV (%)</th>
<th>NPV (%)</th>
<th>Negative LR</th>
<th>Positive LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURB65</td>
<td>84.9</td>
<td>40</td>
<td>91.5</td>
<td>25.9</td>
<td>0.38</td>
<td>1.42</td>
</tr>
<tr>
<td>SIRS</td>
<td>79.5</td>
<td>32.5</td>
<td>87.3</td>
<td>21.4</td>
<td>0.63</td>
<td>1.18</td>
</tr>
<tr>
<td>qSOFA</td>
<td>40.5</td>
<td>79.5</td>
<td>84.3</td>
<td>32.9</td>
<td>0.75</td>
<td>1.98</td>
</tr>
</tbody>
</table>

NPV – negative predictive value, PPV – positive predictive value, LR – Likelihood ratio

**S9 INVASION VERSUS OVERGROWTH: UNDERSTANDING WHY RESPIRATORY PATHOGENS COLONISE THE MOUTH PRIOR TO DEVELOPMENT OF PNEUMONIA**

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10.1136/thoraxjnl-2017-210983.15

**Introduction** The presence of respiratory pathogens on oral surfaces is a risk factor for pneumonia. Understanding why non-oral respiratory pathogens appear is crucial in planning interventions to manipulate the oral microbiota to prevent pneumonia. We sought to understand whether respiratory pathogens were associated with reduction in oral bacterial diversity (invasion hypothesis) or no change in diversity (overgrowth hypothesis).

**Methods** We analysed extracted DNA from 167 throat samples from 53 hospitalised older patients with hip fracture using next generation sequencing (Lib-L chemistry, mothur). Occurrence of respiratory tract infection (RTI, clinician-initiated antibiotic for chest infection) within 3 months of discharge was noted via case notes and telephone call to General Practitioner. We used linear mixed effect modelling in R (nlme package) to investigate the association between relative abundances of respiratory pathogens and oropharyngeal species diversity. These results support the overgrowth, rather than the invasion, hypothesis, and larger studies to explore frequency of oral clearance in conjunction with the oral microbiota are warranted. In addition, the lack of change over time in relative abundances of respiratory pathogens suggests that the exposure to the hospital environment is not a major driver in the appearance of these organisms.

### S10 SUPPRESSION OF MACROPHAGE INFLAMMATORY RESPONSES TO STREPTOCoccus PNEUMONiae BY REGULATORY T CELLS


10.1136/thoraxjnl-2017-210983.16

**Background** The highly inflammatory immune response to *Streptococcus pneumoniae* infection can result in complications such as sepsis and Acute Respiratory Distress Syndrome. Macrophages are an important source of the inflammatory cytokines that activate epithelial and endothelial cells, resulting in a loss of barrier integrity. Regulatory T cells (Tregs) are a population of anti-inflammatory cells that modulate macrophage activity and are protective against invasive pneumococcal disease in mice.1,2

**Aims** To characterise the *in vitro* effects of Tregs on the macrophage inflammatory response to *S. pneumoniae* and to observe Treg recruitment to the site of intradermal injection of UV-killed *S. pneumoniae* in a human model.

**Results** Preliminary data suggest that co-culture of human monocyte-derived macrophages (MDMs) with CD4+CD25+CD127- Tregs reduced MDM TNFα production by at least 45% (One-way ANOVA p<0.01) and IL-6 production by at least 52% (One-way ANOVA p<0.01) 72 hours after initial infection with *S. pneumoniae* TIGR4 strain (MOI of 2, ratio of 1 Treg to 3 MDMs). Separation of Tregs from the MDMs during co-culture using transwell inserts prevented the suppressive effects of the Tregs. Using a novel human model of *S. pneumoniae* challenge involving intradermal injection of UV-killed *S. pneumoniae* into the forearm of healthy volunteers, we demonstrated that Tregs accumulated at the site of injection within 48 hours, increasing from undetectable Treg population at 4 hours to constituting approximately 33% of CD4 cells by 48 hours.

**Conclusion** Preliminary data suggest that Tregs modulate the MDM inflammatory response to *S. pneumoniae* in a contact-dependent manner, and track to the site of intradermal injection of the UV-killed bacteria in healthy volunteers.

### REFERENCES


Lung cancer screening has arrived

**S11** IDENTIFICATION AND ATTENDANCE OF A HIGH-RISK COHORT IN A LUNG CANCER SCREENING DEMONSTRATION PILOT

1M Ruparel, 1SL Quaife, 1JL Dickson, 2A Bhowmik, 3MN Taylor, 3A Ahmed, 3PJ Shaw, 3S Burke, 4M Soo, 4A Devaraj, 4N Navani, 5SW Duffy, 6DR Baldwin, 1J Waller, 1SM Janes.

1University College London, London, UK; 2Homerton University Hospital, London, UK; 3University College London Hospital, London, UK; 4Royal Brompton Hospital, London, UK; 5Wolfson Institute of Preventive Medicine, Barts and The London School of Medicine and Dentistry, London, UK; 6David Evans Research Centre, Nottingham University Hospitals, Nottingham, UK

10.1136/thoraxjnl-2017-210983.17

Introduction

Lung Cancer screening by Low-Dose CT (LDCT) has been shown to reduce mortality, though exactly how best to implement this is unclear. Uptake to screening trials has generally been low, particularly in those at highest risk of lung cancer. The Lung Screen Uptake Trial is a UK based dual centre LDCT randomised controlled screening trial of a modified invitation strategy versus a standard approach in a population with high levels of socioeconomic deprivation.

Methods

Patients were identified as ‘high-risk’ primarily by age and smoking history on a predesigned EMIS-Web search and subsequently invited on behalf of their general practitioner (GP) to a ‘lung health check’ appointment. Those attending were offered enrolment into the study and a LDCT if they met the required threshold of lung cancer risk. This abstract focuses on the mode of recruitment via general practice.

Results

Potentially eligible participants were recruited from 16 GP surgeries serving a population of 1 55 034. Of these, 8.7% were in the required age range of 60–75% and 98.9% of those had smoking status recorded. A mean of 32.2% (SD 3.8) of those aged 60–75 had been recorded as a current smoker in the preceding 15 years. A total of 1997 patients, who had been recorded as current smokers within the past 5 years were invited. Uptake to the study was 50.3% (n=1005) of all those invited. 765 underwent a LDCT examination (figure 1). In 10.3% of patients the smoking history was confirmed to be too light for CT screening, despite GP records suggesting otherwise.

Conclusions

Smoking status was found to be very well recorded in primary care records, providing a feasible method for initial selection of those eligible for screening. However we also showed the importance of confirmation of smoking history, something that might be done prior to invitation in screening programmes. This study observed a high rate of attendance when compared to previous LDCT screening trials. The explanation for this observed difference is likely to be multifactorial, though one key factor, unique to this study, is that the invitation to participate came from patients’ own GP.

**Abstract S11 Figure 1** Flow chart illustrating the numbers of individuals invited, recruited to the study and undergoing LDCT screening.
through www.MyLungRisk.org and those >5% threshold are offered a low dose CT scan.

**Results** The 87 healthy lung events attracted 1943 interactions and 813 completed spirometry of which 146 (18%) were abnormal, triggering a primary care consultation. 2911 (40%) of 7274 eligible individuals attended the lung health check, where 1107 (38%) were offered a CT scan: of 1064 performed, 414 (39%) were abnormal (102 [9.6%] lung nodules and 17 [1.6%] lung cancer [65% resected]). 726 (44%) of the 1658 (57%) without previously diagnosed COPD had abnormal spirometry. Based on the first year LHLP evaluation we have extended the eligible age range to 75 years, altered patient letters, and introduced a phone contact.

**Conclusions** This innovative project has improved access to respiratory healthcare in a deprived area of Liverpool, identified new COPD patients, and should improve outcomes for lung cancer in this disadvantaged population.

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**S13**

**MANCHESTER LUNG SCREENING, TARGETING HIGH-RISK INDIVIDUALS IN DEPRIVED AREAS OF THE COMMUNITY**

1H Balata, 1P Crosbie, 1M Evison, 2L Yarnell, 3A Threlfall, 4P Barber, 5J Tonge, 6R Booton.

1University Hospital of South Manchester, Manchester, UK; 2University of Manchester, Manchester, UK; 3Macmillan Cancer Improvement Partnership, South Manchester Clinical Commissioning Group, Manchester, UK.

10.1136/thoraxjnl-2017-210983.19

**Background** Lung cancer (LC) is the commonest cause of cancer-related death in the world. Screening with low-dose computer tomography (LDCT) had been shown to reduce LC specific and all-cause mortality. Benefit is greatest in those at highest risk, such as current smokers from areas of high socio-economic deprivation, yet participation in these ‘hard-to-reach’ populations remains a challenge. The aim of this NHS implementation project was to assess LC screening within the community in deprived areas.

**Methods** Patients aged 60 to 75, at higher risk of lung cancer by virtue of their recorded smoking history, were invited to a ‘lung health check appointment’ on behalf of their GP. Attendees at one of two secondary care sites, underwent a nurse consultation that included a lung cancer risk assessment. Participants were eligible for LDCT if they met any of the following three criteria: NLST-like criteria* (≥30 pack-year smoking history and given up ≤5 years ago); PLCOm2012 score ≥1.51%; or LLP score ≥2.5%. This abstract focuses on the performance of the different eligibility criteria.

**Results** At the time of analysis, 1997 individuals had been invited to screening and 936 attended and were enrolled into the study. 834 participants were eligible for LDCT by fulfilling any of the 3 criteria above, and 718 went on to have LDCT. The mean age of participants was 66.0 (SD 4.16), 54.4% were male and the mean smoking pack-year history was 39.7 (SD 24.9). After a median of 9.7 months follow up, 46 lung cancers were detected in 42 individuals, a prevalence of 3.0%, of which 80.4% were early stage (I+II). A treatment with curative intent was offered to 89.1% of screen detected cancers.

**Conclusion** Taking lung cancer screening into the community can identify and affect those at most risk, the so-called ‘hard-to-reach’ populations. This Results in a significant stage shift in screen detected lung cancers in deprived populations.

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**S14**

**LUNG CANCER RISK PROFILES AND ELIGIBILITY OF ATTENDEES IN A LUNG CANCER SCREENING DEMONSTRATION PILOT**

1M Ruparel, 2JL Dickinson, 3S Quaife, 2A Bhowmik, 2MN Taylor, 2A Ahmed, 3PJ Shaw, 2S Burke, 2M Sos, 2A Devaara, 2N Navani, 2SW Duffy, 2DR Baldwin, 2J Walker, 2SM Janes, 2University College London, London, UK; 6Homerton University Hospital, London, UK; 1University College London Hospital, London, UK; 6Royal Brompton Hospital, London, UK; 5Wolfson Institute of Preventive Medicine, Barts and The London School of Medicine and Dentistry, London, UK; 4David Evans Research Centre, Nottingham University Hospitals, London, UK.

10.1136/thoraxjnl-2017-210983.20

**Introduction** Lung cancer screening by Low-Dose CT (LDCT) has been shown to reduce mortality, and the harm-benefit balance of screening is optimised by screening those at higher risk. The Lung Screen Uptake Trial is a UK based randomised controlled trial of standard versus enhanced invitation methods for LDCT screening in more deprived communities.

**Methods** Patients aged 60 to 75, at higher risk of lung cancer by virtue of their recorded smoking history, were invited to a ‘lung health check appointment’ on behalf of their GP. Attendees at one of two secondary care sites, underwent a nurse consultation that included a lung cancer risk assessment. Participants were eligible for LDCT if they met any of the following three criteria: NLST-like criteria* (≥30 pack-year smoking history and given up ≤5 years ago); PLCOm2012 score ≥1.51%; or LLP score ≥2.5%. This abstract focuses on the performance of the different eligibility criteria.

**Results** At the time of analysis, 1997 individuals had been invited to screening and 936 attended and were enrolled into the study. 834 participants were eligible for LDCT by fulfilling any of the 3 criteria above, and 718 went on to have LDCT. The mean age of participants was 66.0 (SD 4.16), 54.4% were male and the mean smoking pack-year history was 39.7 (SD 24.9). After a median of 9.7 months follow up, 17 lung cancers were confirmed. Ten suspicious pulmonary
nodules are undergoing diagnostic work up under the lung cancer multidisciplinary team (MDT) and 80 indeterminate nodules are under CT surveillance. The distribution of these cancers and nodules by eligibility criteria is shown in Table 1.

<table>
<thead>
<tr>
<th>Eligibility Criteria</th>
<th>PLCOm2012 Positive</th>
<th>LLP Positive</th>
<th>NLST-like* Positive</th>
<th>Total in Cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Had CT</td>
<td>576</td>
<td>661</td>
<td>493</td>
<td>718</td>
</tr>
<tr>
<td>Indeterminate nodules</td>
<td>64</td>
<td>74</td>
<td>58</td>
<td>80</td>
</tr>
<tr>
<td>Suspicious nodule referred to MDT</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Confirmed cancers</td>
<td>17</td>
<td>16</td>
<td>13</td>
<td>17</td>
</tr>
</tbody>
</table>

Conclusions Using the NLST-like* criteria to determine eligibility would mean the fewest number screened, with 4 fewer cancers detected. The PLCOm2012 score was the most reliable way to detect cancers and resulted in less individuals screened than with use of the LLP score. Further follow up and review of the data is required to fully establish the most effective tool for determining eligibility into LDCT screening though the PLCOm2012 score shows the most promise with the available data.

Introduction Distinguishing between benign and malignant small pulmonary nodules (PNs) detected on CT scanning is a significant challenge. Such nodules are commonly detected in clinical practice as incidental findings or in patients with a history of prior malignancy. CT texture analysis (CTTA) has been proposed as a potential imaging biomarker in tumour characterisation. Image texture refers to the statistical analysis of spatial intensity variations of the pixels within an image to produce a CT texture score. This score is then mapped onto a probability of malignancy from 0–1.

Aims and Objectives

- To create a registry of patients with small solid PNs from an unselected population of patients.
- Patient demographic data were combined with information acquired from CT derived parameters such as shape, size, and texture analysis (CTTA) to develop and validate a generalised linear model to determine the probability of malignancy of PNs.
- A parallel prospective intervention cohort study was also conducted to assess whether CTTA repeatability was comparable to automatic volumetric measurements when a patient is scanned twice on the same day.

Methods Between January 2012 to September 2014, 1008 patients presenting with small solid PNs were identified. The gold standard diagnosis of the nodules was established by histology or nodule stability at 2 years of CT follow-up.

Results The prevalence of malignant PNs was 31.6% (319/1008). Significant independent predictors of malignancy included prior history of malignancy within 5 years (OR=117.4, 95% confidence interval (CI): 67.1 to 272.8, p<0.001); larger nodule diameter (OR=9.7, CI: 4.1 to 17.6, p<0.001); nodule count (OR=1.6, CI: 1.3 to 1.8, p<0.001) and nodule spiculation (OR=118.4, CI: 61.9 to 772.3, p<0.001). The models’ performance using the area under the ROC curve (AUC) was 0.969. When CTTA was used alone the AUC was 0.800 (figure 1). CTTA displayed ULR and LLR

Abstract S15 Figure 1 (A) Patient demographics and nodule characteristics, (B) Performance of clinical models (AUC is area under the ROC curve), and (C) Bland-altman plot to show variability in texture feature scores and volumetry for 40 Pulmonary nodules.
below ±17.8%, comparable to volume using Bland-Altman and also had high repeatability (CCC (0.84≤CCC≤0.99)).

Conclusion This study has highlighted the potential clinical utility of CTTA in the risk stratification of PNs. It has also shown that CTTA is a highly repeatable imaging biomarker of malignancy, akin to volume measurements but with the advantage of not requiring imaging follow-up.

Understanding and treating those irritating infections

LATENT CLASS MODELLING FOR PULMONARY ASPERGILLOSIS DIAGNOSIS IN LUNG TRANSPLANT RECIPIENTS

Circadian control of primary lung allograft dysfunction, mediated by the clock protein, REVERBα

Introduction

The circadian clock regulates murine immune responses by time of day, partly through the clock protein REVERBα, resulting in altered mortality after infection. The mechanisms regulating time of day differences are poorly understood in humans, where performing circadian studies presents a number of challenges. Lung transplantation, which is performed at any time of day to minimise organ ischaemic complications, had a previous lung transplant, or if the donor or recipient organ clock by 4–12 hours depending on time of day and time of day differences are poorly understood in humans, where performing circadian studies presents a number of challenges. Lung transplantation, which is performed at any time of day to minimise organ ischaemic time, is an ideal model to study circadian effects on human immune responses.

Methods

Primary graft dysfunction (PGD) incidence after lung transplantation was examined for an eight year retrospective (2004–2012) cohort (n=563) in one centre. Patients were excluded, a priori, if they had significant intra-operative complications, had a previous lung transplant, or if the donor lung had undergone ex-vivo perfusion. Circadian factors were also studied using PER2::Luc and REVERBα−/− mice and by pharmacological targeting of the circadian clock in primary alveolar macrophages from lung transplant recipients.

Results

The incidence of PGD grades 2/3 at 24 hours was temporarily elevated when organs were reperfused between 4 and 8 am (p<0.02) compared to other time points. Similar observations were made when the cohort was examined by operation start time (p<0.01). Sub-cohort analysis, defined using ISHLT relative contraindications, revealed that PGD incidence oscillated in a circadian manner (r2=0.87, p=0.046). Investigations in PER2::Luc mice, which allows real time tracking of circadian oscillations, revealed that temperature and serum fluctuations, mimicking organ preservation, shifts the donor organ clock by 4–12 hours depending on time of retrieval. This could create circadian desynchrony between the transplanted organ and recipient. In macrophages, genome-wide gene expression analysis of the role of REVERBα identified gene ontology terms linked to the regulation of lymphocyte function and activation, suggesting a functional link from the macrophage to the adaptive immune response. Furthermore, key PGD biomarkers are elevated (p<0.05) in macrophages from REVERBα−/− mice and are repressed (p<0.05) by REVERB ligands (GSK2945 and GSK2667) in macrophages from lung transplant recipients.

Conclusion

This study suggests that the circadian clock could temporally affect outcomes after lung transplantation due to recipient-donor circadian desynchrony. Ligands targeting the clock protein REVERBα repress key PGD biomarkers showing that this is a tractable therapeutic pathway.
Conclusions This study demonstrates a latent class modelling approach for IA diagnosis in LTR with a combination of culture, composite biomarker testing, and radiology required for optimal IA diagnosis.

**S18** MECHANISMS REGULATING COLLAGENOLYTIC AND ELASTOLYTIC ACTIVITY IN M. AVIUM INFECTION

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10.1136/thoraxjnl-2017-210983.24

**Background** The incidence of pulmonary non-tuberculous mycobacterial (NTM) infection is increasing. In the UK mycobacterium avium complex (MAC), is the commonest NTM infection outside of CF lung disease. Patients with pulmonary MAC infection develop cavitating lung disease or nodular bronchiectasis, but the mechanisms of tissue destruction are not well-characterised, unlike M. tuberculosis infection. We have previously shown that clinical isolates of M. avium surprisingly do not drive secretion of MMP-9 by infected macrophages. Instead, M. avium drives functionally unopposed MMP-1, previously thought to be an M. tuberculosis-specific response, and MMP-7. We investigated the mechanisms regulating MAC-induced MMP-1 and –7 secretion.

**Methods** Monocytes were isolated from healthy human volunteer blood by density centrifugation and adherence, before incubation in GM-CSF for 7 days to generate monocyte-derived macrophages (MDMs). MDMs were stimulated with four different clinical isolates of M. avium at MOI 100 for up to 72 hours. Whole cell lysates, and cytoplasmic and nuclear extracts were collected 15 mins –4 hours after infection, and analysed by western blot for protein phosphorylation or TransAm assay for NF-kB activation. Supernatants collected at 72 hours were analysed by ELISA for MMP-1 and 7.

**Results** Infection with M. avium caused activation of all 3 MAPK (p38, JNK, ERK) pathways as early as 15 min post exposure with maximal phosphorylation at 30 min. M. avium infection drove maximal nuclear translocation of NF-kB and degradation of cytosolic IkBα at 30 min, returning to baseline by 4 hours. M. avium-induced MMP-1 secretion from MDMs is ERK and JNK, but not p38- dependant (figure 1). Treatment with caffeic acid phenethyl ester (CAPE), an NF-kB inhibitor, reduced M. avium-induced MMP-1 secretion by 30%. Both MMP-1 and –7 upregulation were suppressed by P3 kinase inhibitor LY294002. M. avium-induced MMP-7 upregulation was not inhibited by indomethacin.

**Conclusions** MMP-1 and –7 may drive the destructive pulmonary pathophysiology that characterises MAC infection. However, regulation of the host macrophage response to M. avium is divergent to that M. tuberculosis, with p38- independent MMP-1 secretion. This divergence in intracellular signalling may necessitate deviation in potential adjunctive patient therapies for M. tuberculosis and M. avium.

**S19** THE ROLE OF LYMPH NODE-RESIDENT NEUTROPHILS IN ADAPTIVE IMMUNITY

LSC Lok, B Stewart, ER Chilvers, MR Clatworthy. Department of Medicine, University of Cambridge, Cambridge, UK

10.1136/thoraxjnl-2017-210983.25

**Introduction** Neutrophils play a key role in the early response to a diverse range of infectious and inflammatory stimuli. However, persistent neutrophilic inflammation can result in collateral tissue damage, as evident in a number of chronic respiratory diseases. In addition to their role in innate immunity, neutrophils can also shape the adaptive immune response, in part through antigen presentation. While there is accumulating evidence that neutrophils can migrate to draining lymph...
nodes following infectious challenges, the role of tissue-resident neutrophils in physiological settings is less clear. We hypothesise that neutrophils are present within lymph nodes and can influence adaptive immunity under physiological conditions.

Methods Lymph nodes from unchallenged C57BL/6 and LysM-GFP mice were harvested; single cell suspensions were generated for flow cytometric analysis, and frozen sections stained for confocal microscopy. Two-photon intravital imaging of popliteal lymph nodes was performed to examine neutrophil dynamic behaviour in vivo. Human lymph nodes were harvested from organ donors and analysed by flow cytometry and mass cytometry.

Results Neutrophils were present in lymph nodes in mice without prior inflammatory or infectious challenge. Whilst some neutrophils were within blood vessels (11% in inguinal lymph node, 10% in popliteal lymph node, 12% in mesenteric lymph node) or lymphatic vessels (15% in inguinal lymph node, 21% in popliteal lymph node, 18% in mesenteric lymph node), the majority were located in lymph node tissues. Lymph node neutrophils showed higher surface expression of major histocompatibility complex II (MHCII) compared to blood, bone marrow and splenic neutrophils (figure 1A). In vivo, neutrophils were capable of immune complex uptake, and their dynamic behaviour differed according to their location within the lymph node. Neutrophils were also present in human lymph nodes, and expressed surface MHCII (figure 1B). Immune cell profiles of matched lymph nodes and spleen were compared using mass cytometry. Isolated human blood neutrophils upregulated surface MHCII upon ex vivo immune complex stimulation.

Conclusion We have demonstrated the presence of tissue-resident neutrophils within murine and human lymph nodes, and their capacity to express MHCII, potentially influencing the adaptive immune response via antigen presentation.

Introduction and Objectives Chronic Lung Allograft Dysfunction (CLAD) is a major limiting factor to survival post-lung transplant (LTx), restricting 5 year survival to approximately 55%. The mechanism by which CLAD and its sub-types occur are not fully understood and changes in the microbiota may play a role in the development of this condition. Moreover, azithromycin prolongs CLAD-free post-transplantation. This study aims to determine the effect of azithromycin over time on the airway microbiota post-LTx and how the microbiota changes with the development of CLAD.

Methods As part of a double-blind RCT in UZ Gasthuisberg, Leuven, Belgium, patients undergoing LTX were previously randomised to receive either azithromycin (n=43; 250 mg three times per week) or placebo (n=40) treatment following discharge post-transplant. Regular routine bronchoscopy was carried out on all patients and bronchoalveolar lavage (BAL) samples from discharge, 12, 24 months and at diagnosis of suspected rejection were processed for microbiota analysis using 16S Illumina sequencing and 16S quantitative PCR.

Results To date, 42 azithromycin treated (n=17 patients) and 52 (n=22 patients) placebo samples have been analysed. Microbiota diversity was significantly higher (p=0.0467) in the azithromycin group compared to placebo. Furthermore, a trend for reduced dominance by Pseudomonas, with re-emergence of taxa considered to constitute a ‘healthy’ microbiota (e.g., Prevotella, Veillonella, Streptococcus) was observed. There were no significant differences in 16S copies per mL BAL between the two groups. Eight samples (n=5 azithromycin, n=3 placebo) at suspected rejection have also been analysed. The azithromycin group exhibited low relative abundances of Pseudomonas (mean 7.7%), while the placebo group showed dominance by this taxa (mean 84.87%).

Conclusions Restoration of a diverse microbiota, while preventing dominance by Pseudomonas, may be a factor contributing towards the prophylactic effects of azithromycin observed in LTx patients. Further analysis of microbiota data alongside clinical data e.g., development of CLAD, CLAD-free survival time, etc. is ongoing.

REFERENCE

Background Radiological monitoring of malignant pleural mesothelioma (MPM) using modified RECIST criteria is limited by low sensitivity and inter-observer variability. Serial serum mesothelin measurement has shown utility in the assessment of treatment response during chemotherapy but has never been assessed in the longer term follow up of patients.

Methods This is a single centre study of consecutive patients diagnosed with MPM who received chemotherapy or best supportive care (BSC). Serum mesothelin measurements with paired 6 monthly CT scans were performed following the completion of chemotherapy, or from baseline in the BSC group. Changes in mesothelin were correlated with radiological progression and overall survival.

Results Forty-one patients with MPM were recruited and followed up for a minimum of 12 months (range 12–21 months). The majority of patients (n=23) received chemotherapy with pemetrexed and cisplatin. Across the cohort a 10% rise in serum mesothelin could predict radiological progression with a sensitivity of 96% (IQR; 79–100) and specificity of 74% (IQR; 50–91) (figure 1). Sensitivity fell to 80% in sarcomatoid only disease. Patients with a rising mesothelin at 6 months had significantly worse overall survival (175 days) compared to stable/falling levels (448 days) (p=0.003).

Conclusions This is the first study to assess serum mesothelin’s ability to detect progression of MPM following chemotherapy or during BSC. A 10% rise in serum mesothelin level showed excellent sensitivity at predicting progressive disease. Mesothelin measurement has several advantages over serial CT imaging including reducing hospital visits and cost.

Abstract S21 Figure 1
Abstract 22 Table 1  Clinical characteristics and clinical outcomes

<table>
<thead>
<tr>
<th></th>
<th>Nuclear BAP1 IHC positive (n=11)</th>
<th>Nuclear BAP1 IHC negative (n=66)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (M=male)</td>
<td>M: 100%</td>
<td>M: 91%</td>
<td>0.30</td>
</tr>
<tr>
<td>Median age at diagnosis (years)</td>
<td>69.5</td>
<td>66.0</td>
<td>0.94</td>
</tr>
<tr>
<td>Histology</td>
<td></td>
<td></td>
<td>0.57</td>
</tr>
<tr>
<td>Epithelioid</td>
<td>82%</td>
<td>89%</td>
<td></td>
</tr>
<tr>
<td>Biphasic</td>
<td>18%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Sarcomatoid</td>
<td>0%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Median overall survival from diagnosis (months)</td>
<td>All</td>
<td>Active symptom control (ASC)</td>
<td>ASC+vinorelbine</td>
</tr>
<tr>
<td></td>
<td>21.0</td>
<td>24.3</td>
<td>12.8</td>
</tr>
</tbody>
</table>

Results Our data included 44 epithelioid, 24 biphasic and 14 sarcomatoid tissue samples. Of the MPM tissues samples, 63.41% demonstrated positive expression for phosphorylated mTOR protein while 61.73% showed positive phosphorylated AKT expression. We did not observe a significant difference in expression of phosphorylated AKT/mTOR between the histological subtypes of MPM (p>0.05). Positive expression of phosphorylated AKT/mTOR proteins was not associated with survival in Kaplan Meier survival curve analysis (p>0.05). When histological subtypes were taken into account, multivariate Cox regression analysis demonstrated that neither phosphorylated mTOR nor phosphorylated AKT expression were independent prognostic factors for survival (p>0.05).

Conclusion Our data suggest that phosphorylated AKT/mTOR are expressed in a significant proportion of MPM samples. However, no statistically significant association was found between phosphorylated AKT/mTOR expression and patient prognosis.

REFERENCE


Abstract 23 Figure 1 (A)  Survival by phos AKT expression and (B) Survival by phos mTOR expression.
Background Pleural infection is a common complication of pneumonia associated with high mortality and poor clinical outcome. Treatment of pleural infection relies on the use of broad-spectrum antibiotics, since reliable pathogen identification occurs infrequently. We performed a feasibility interventional clinical trial assessing the safety and significance of ultrasound (US)-guided pleural biopsy culture to increase the microbiological yield.

Methods 20 patients with clinically established pleural infection were recruited. Participants underwent a detailed US scan and US-guided pleural biopsies before chest drain insertion, alongside standard clinical management. Pleural biopsies and routine clinical samples (pleural fluid and blood) were submitted for microbiological analysis. In an exploratory sub-study, the 16S rRNA technique was applied on pleural biopsy samples, to investigate its utility on increasing speed and accuracy versus standard microbiological diagnosis. This trials is registered with ClinicalTrials.gov, number NCT02608814.

Findings US-guided were safe with no adverse events observed in this study. Pleural biopsies increased microbiological yield by 30% in addition to pleural fluid and blood samples (combined diagnostic sensitivity 55%). US characteristics at baseline were not statistically associated with survival, fluid volume drainage, radiological improvement or need for surgery. The 16S rRNA technique was successfully applied to pleural biopsy samples, demonstrating high sensitivity (93%) and specificity (89.5%).

Conclusion Our findings demonstrate safety of conducting US guided biopsies in patients with pleural infection and a substantial increase in microbiological diagnosis. qPCR primer assessment of pleural fluid and biopsy appears to have excellent sensitivity and specificity.

Funding Oxfordshire Health Services Research Committee

Abstract S25 Figure 1 (A)% increase on positive culture samples in patients with pleural infection, (B) Results of pleural biopsy culture, and (C) Gram stain of acute inflammatory exudate in a pleural biopsy showing small colonies of Gram positive cocci.

Abstract S25 Figure 1 Kaplan-meier survival curves for Eosinophilic vs Non-Eosinophilic effusions.
marker of benign disease, however, subsequent studies found malignancy to be the commonest aetiology, with other causes, including infection, blood/air and drug reactions less frequent. Our aim is to use prospective data to examine the relative incidence and aetiology of EPE, and its prognostic significance.

**Methods** We recruited 803 consecutive patients presenting to a pleural service, between 03/2008 and 03/2015, with undiagnosed pleural effusions. Pleural biochemistry, cytology, thoracic USS, chest radiograph and CT scans were performed. Biopsies and thoracoscopy were performed as clinically indicated. Patients were followed-up for minimum duration of 12 months with final diagnosis decided by independent review by 2 respiratory consultants. Survival data was calculated from study entry to death and censored on 07/2017.

**Results** Of the 803 patients, 398/803 (49.6%) had a malignant pleural effusion (MPE). 57 (7.1%) had eosinophil count (EC) ≥10%. With this threshold, MPE was the commonest cause, at 24/57 (42%), followed by infection 9 (16%) and inflammatory pleuritis (IP) 5 (9%). With higher thresholds of EC, the relative frequency of malignancy decreased. At ≥30% EC, malignancy accounted for 4/20 cases, infection 4/20, drug/toxin 3/20, unknown 3/20, benign asbestos pleural effusion 2/20, pulmonary embolism 2/20, IP 1/20 and heart failure 1/20. Mortality rates were lower in EPE relative to non-EPE, with 6 months and 1 year mortality rates for EPE 19%–33% respectively, with non-EPE 36%–50%. The higher the EC, the lower mortality, with hazard ratios compared to non-EPE at 0.6, 0.5, 0.3, 0.2 for ≥10%, ≥20%, ≥30%, ≥40% and ≥50% EC respectively (p<0.01).

**Conclusion** Higher eosinophil counts are associated with decreased mortality and lower rates of malignant vs benign effusions. The threshold ≥10% is not helpful in differentiating MPE from benign disease. We suggest a higher threshold of ≥30% would hold greater clinical significance and therefore be a more useful definition for clinicians.

**REFERENCE**

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**Abstract S26**

**Identification and Prognostic Importance of Non-Expansile Lung Following Drainage of Suspected Malignant Pleural Effusion**

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**Introduction** Malignant Pleural Effusion (MPE) is common and often results in disabling breathlessness. Non-expansile lung (NEL) frequently complicates pleural drainage, resulting in talc pleurodesis failure. Reliable detection of NEL would allow better clinical decision-making and more rational design of

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**Figure 1**

Semi-objective definitions of non-expansile lung (NEL) including worked examples and screenshots from Vue PACS v13 (Carestream Health Inc., Rochester, NY).

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*Thorax 2017;72(Suppl 3):A1–278*
MPE trials. We developed 2 semi-objective definitions of NEL, which we hypothesised might prove more accurate and more consistent than the currently used subjective British Thoracic Society (BTS) method.

**Materials and Methods** A retrospective cohort study was performed, involving 93 consecutive patients who underwent local anaesthetic thoracoscopy at our centre (July 2010–January 2015). NEL was defined prospectively at 3 month follow-up in all. Post-drainage chest radiographs were retrospectively classified as ‘NEL’ or ‘expansile’ by 2 independent assessors using the subjective BTS method and the 2 semi-objective methods (Re-expansion Proportion (REP) and Lateral Apposition Ratio (LAR), shown in figure 1). Sensitivity, Specificity and Inter-observer Agreement (Cohen’s Kappa, k) for NEL by each method were compared. Overall Survival (OS) based on expansion status by each method was compared using Kaplan-Meier methodology (MPE cases only).

**Results** 65/93 patients had MPE. Sensitivity (0.81 (95%CI 0.71–0.89)) and specificity (0.87 (95%CI 0.81–1.00)) by the BTS method were highest. REP (sensitivity 0.61 (95%CI 0.49–0.72), specificity 0.94 (95%CI 0.73–1.00)) and LAR (sensitivity 0.56 (95%CI 0.44–0.67), specificity 0.94 (95%CI 0.73–1.00)) were less accurate. Inter-rater agreement (k) for BTS, REP, LAR were 0.68, 0.46 and 0.53, respectively. In MPE patients, NEL was consistently associated with a 2-4-fold lower median OS by all methods.

**Discussion** The subjective BTS method appeared more accurate in predicting NEL than REP or LAR in this retrospective study, however all methods were subject to significant inter-observer variation. NEL is strongly associated with mortality. Our data highlight the clinical importance of NEL and its potential impact on MPE trial design, but do not strongly support any of these reported end-points as reliable clinical decision-making tools, trial end-points, or entry/stratification criteria. Further prospective research is needed to standardise the definition of NEL for these purposes, ideally prior to pleural drainage, and link this to patient-centred end-points.

**TB: from screening to compliance**

**S27 HAVE RECENT CHANGES TO HEALTH POLICIES INCREASED DIAGNOSTIC DELAY AMONGST MIGRANT PATIENTS WITH ACTIVE TB?**

**Background** In April 2014 the UK government launched the ‘Migrant and Visitor Cost Recovery Programme’ (MVCRP): a series of policy changes to recoup costs from ‘chargeable’ (largely non-UK born) patients. In England approximately 75% of tuberculosis (TB) cases occur in those born abroad. Delays in treatment increase the risk of morbidity and mortality and threaten public health. We considered whether time between symptom onset and starting treatment for TB has increased since the introduction of the MVCRP.

**Methods** Adult TB cases notified on the London TB Register across Barts Health NHS Trust between 2011 and 2016 were identified. Incomplete data sets were excluded. We examined time to treatment between UK born and Non-UK born patients before and after the policy change using a student paired t-test. To further evaluate non-UK born patients, we labelled a delayed diagnosis as ≥ median time to treatment for all patients (79 days). We used a chi-squared test to look for an association before developing a logistic regression model adjusting for age, sex, occupation, time in the UK and social risk factors. Other potential confounders were not included in the final model if they had no effect on the original association. Analyses were performed using Stata15.

**Results** 2237 cases were identified (for summary statistics see Table 1). Pre-MVCRP there was no difference in the mean time to treatment between the UK born and non-UK born (p=0.559) but post MVCRP there was a non-significant increase for the non-UK born (p=0.076). Amongst non-UK born patients only, time to treatment increased following introduction of MVCRP (p=0.0008) and they were more likely to have a delayed diagnosis (p<0.001). A logistic regression model adjusting for confounders found that the non-UK born were 37% more likely to have a delay in diagnosis post introduction of the MVCRP (aOR 1.37, 95% CI 1.13–1.66, p=0.001).

**Conclusion** Our findings suggest an association between the introduction of the MVCRP and risk of a delayed TB diagnosis amongst migrants. We cannot exclude the possibility of unknown confounders. However, further investigation into the effect of policies restricting access to healthcare for migrants is urgently needed.

**Abstract 27 Table 1**

<table>
<thead>
<tr>
<th></th>
<th>Pre-MVCRP</th>
<th>Post-MVCRP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UK born</td>
<td>Non-UK born</td>
</tr>
<tr>
<td>Total cases</td>
<td>178</td>
<td>1037</td>
</tr>
<tr>
<td>Mean age</td>
<td>36.4</td>
<td>36.8</td>
</tr>
<tr>
<td>Mean time to diagnosis</td>
<td>133.2</td>
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</table>

**S28 CHANGING DIAGNOSTIC PATTERN OF HIV AND TUBERCULOSIS CO-INFECTION IN ENGLAND, WALES AND NORTHERN IRELAND, 2000–2014**

**Background** HIV coinfection of tuberculosis (TB) patients is associated with TB disease progression, treatment complications, and higher mortality. Over the last decade, national guidelines have encouraged earlier diagnosis of HIV infection and greater use of anti-retroviral therapy (ART). We investigated the relationship between HIV and TB diagnoses at a national level.

**Methods** TB patients aged ≥15 years notified to Public Health England from 2000–2014 were linked to national HIV surveillance data. Amongst co-infected patients, we examined the order of TB and HIV diagnoses. Diagnoses were classified as ‘simultaneous’ if TB and HIV were diagnosed within 91 days of each other.
Abstract S28 Figure 1  First diagnosis for TB-HIV co-infected patients, 2000–2014.

Results 106,829 TB cases aged ≥15 years were notified to PHE between 2000 and 2014, of which 5792 (5.4%) were co-infected with HIV. The absolute number of HIV-TB diagnoses rose between 2000–2004, and then decreased from 543 (8.0%) in 2004 to 205 (3.2%) in 2014. Overall, 2,787/5,792 (49%) were diagnosed with TB and HIV simultaneously, whilst 549 (9%) were diagnosed with TB before and 2456 (42%) after HIV diagnosis. The relationship between TB and HIV diagnosis changed over time (figure 1). The absolute number of TB cases in people with known HIV rose from 75/224 (33%) in 2000 to 210/454 (46%) in 2007, then fell to 117/205 (57%) by 2014, but increased as a proportion of all HIV-TB cases from 2000 to 2014. There were corresponding declines in the proportion diagnosed simultaneously with TB and HIV from 298/543 (55%) in 2004 to 79/205 (39%) in 2014 and those first diagnosed with TB (51/224 (23%)) in 2000 to 9/205 (4%) in 2014.

Conclusions Within an overall decline in HIV-TB co-infection there has been a change in the pattern of co-infection. A greater proportion of cases now occur in people with known HIV infection, and fewer HIV infections are diagnosed after TB diagnosis. This may be explained by more HIV testing, including in TB clinics, resulting in earlier HIV diagnosis. However, as the number of people with HIV in the UK increases, sustained success requires better management of latent TB infection to prevent the occurrence of TB disease in people diagnosed with HIV.

Background Directly observed treatment (DOT) has been the standard of care for tuberculosis since the early 1990s. In England DOT is targeted at those considered to be at high risk of poor adherence and clinically complex patients. We report the first randomised controlled trial of smartphone-enabled video observation of treatment (VOT) for active tuberculosis compared to DOT.

Methods Tuberculosis patients eligible for selective DOT in England were randomised to an offer of asynchronous VOT (daily remote observation using a smartphone app) or DOT (3 or 5 times weekly observation in community or clinic settings).

Results 58% of 226 randomised patients had a history of homelessness, drug use, imprisonment, alcohol or mental health problems. Of the 112 patients randomised to an offer of VOT, 70% had over 80% of scheduled observations completed over two months (the primary outcome measure) compared to 31% of 114 patients randomised to an offer of DOT (p<0.001). The effect was, in part, due to 51% of those randomised to DOT having less than one week of observation (compared to 10% of those randomised to VOT), and so not starting treatment with their allocated regimen. VOT patients sustained high observation levels throughout treatment, whereas this declined rapidly in DOT patients. We estimate that observation of a six month course of treatment with daily VOT cost £1645 per patient compared to £5700 for five times per week DOT.

Conclusions VOT is a more effective and cheaper approach to observation of tuberculosis treatment than clinic or community based DOT.
160,780 immigrants from the 72 high-burden countries registered between 2011 and 2014, of whom 1,299,424 (80.8%) arrived before 2011. These delayed registrants thus miss the window of opportunity for LTBI screening because the program targets arrivals within last five years. We estimated and compared TB incidence and LTBI service utilisation in the cohort of early vs delayed registrants. The program may be compromised by low and delayed primary-care registration, could be enhanced by promoting GP registration and community-based screening to reach unregistered migrants.

REFERENCES

**S31** PROGNOSTIC VALUE OF INTERFERON GAMMA RELEASE ASSAYS AND TUBERCULIN SKIN TEST IN PREDICTING THE DEVELOPMENT OF ACTIVE TUBERCULOSIS: THE UK PREDICT TB COHORT STUDY


10.1136/thoraxjnl-2017-210983.37

Background Tackling tuberculosis (TB) requires testing and treatment of high-risk groups for latent tuberculosis infection. We estimated the predictive values of the tuberculin skin test (TST) and interferon gamma release assays (IGRAs) for development of active TB in migrants and contacts of active TB patients in the UK.

Methods Participants were prospectively recruited in clinics and the community and followed for a median of 2.9 years. We administered IGRAs (QuantiFERON Gold In-Tube [QFT-GIT] and T-SPOT.TB) and TST (with 3 thresholds: 5 mm [TST5], 10 mm [TST10] and TST15 [5 mm in BCG-naïve, 15 mm in vaccinated]). Potential incident TB cases were identified by telephone interview and national TB databases and confirmed by medical review.

Results Ninety-seven (1.0%) of 9,610 participants developed active TB (77 of 6386 who had Results for T-SPOT.TB, QFT-GIT and TST). All tests had very low incidence in test negatives (1.2–1.6 per 1000 per year). Incidence rates in test positives were highest for TSpot.TB (13.2 95% CI: (9.9–17.4)), TST5 (11.1 (8.3, 14.6)) and QFT-GIT (10.1 (7.4, 13.4)); positive test Results for these tests were significantly more predictive of progression than TST10 and TST5. TSpot.TB was also higher than QFT-GIT. TST5 predicted more at high risk (55%) than TST10 (45%), TSpot.TB (33%), TST15 (38%) and QFT.GIT (31%).

Conclusions IGRA-based or TST15 strategies are most suited for population screening in low-risk populations. Although TST5 and TST10 detect more TB cases this is at the cost of more individuals being classified at high risk with lower positive predictive values.

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**S32** COUGH SUPPRESSION TEST: A NOVEL OBJECTIVE TEST FOR CHRONIC COUGH

Cho, PSP; Fletcher, H; Turner, RD; Birring, SS. Division of Asthma, Allergy and Lung Biology, King’s College London, London, UK; King’s College Hospital NHS Foundation Trust, London, UK.

Introduction A recent functional MRI study has shown that patients with chronic refractory cough (CRC) have reduced activity in the areas of the brain associated with cough suppression. Cough challenge tests focus only on provoking cough and have limited clinical application due to the wide overlap between healthy subjects and patients with cough. We investigated whether patients with CRC could suppress cough in a cough challenge test.

Methods We recruited 13 chronic refractory cough patients and 11 healthy controls. Participants underwent an incremental capsaicin challenge test (0.49 to 1000 micromol.L\(^{-1}\)) and were instructed “please do not cough during the test”. The concentrations of capsaicin during the cough suppression (CS) protocol required to elicit 1 or more cough (CS1), 2 or more coughs (CS2), and 5 or more coughs (CS5) were documented. Patients with CRC also completed cough-severity and urge-to-cough visual analogue scales (VAS; 0–100 mm), and quality of life, Leicester Cough Questionnaire (LCQ; range 3–21).

Results Patients with CRC and controls had a mean (SD) age 57 (8) and 51 (7) years and 11 (85%) and 7 (64%) were female, respectively. CRC patients self-reported symptom and health status were; mean (SD) cough severity VAS 58 (31), urge-to-cough VAS 63 (30), and LCQ score 12.1 (4.4). Patients with CRC were less able to suppress cough compared to healthy controls; geometric mean (SD) CS1: 2.30 (3.56) vs 62.46 (5.62), CS2: 2.55 (3.71) vs 70.86 (5.91) and CS5: 3.37 (4.84) vs 321.70 (3.23) micromol.L\(^{-1}\) respectively, all p<0.0001. The mean difference (95% CI) in CS5 between CRC and controls was 6.6 (4.9, 8.3) doubling doses. CS5 was better than CS1 and CS2 at discriminating CRC patients from controls (figure 1). There was no significant association between CS5 and cough severity VAS (correlation coefficient,
Conclusion Voluntary suppression of capsaicin-evoked cough is significantly diminished in chronic refractory cough. Our findings suggest future research should focus on cough inhibitory as well as activation pathways. CS5 has potential to be used as a diagnostic test and to evaluate anti-tussive therapy; this should be investigated further.

THE UTILITY OF FENO IN THE DIFFERENTIAL DIAGNOSIS OF CHRONIC COUGH: THE RESPONSE TO ANT-INFLAMMATORY THERAPY WITH PREDNISOLONE AND MONTELUKAST

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Objectives In this study we explored the effectiveness of treatment with montelukast 10 mg as compared with prednisolone in chronic cough patients with an associated elevated FeNO (The fraction of exhaled nitric oxide in breath) – a marker of eosinophilic inflammation.

Methods 50 non-asthmatic patients with chronic cough were recruited sequentially from a specialist cough clinic. 30 patients with high FeNO (≥30 ppb) were randomised to either two weeks prednisolone 20 mg or two weeks montelukast 10 mg followed by montelukast 10 mg for the subsequent two weeks in both arms. A control group of 20 patients with low FeNO (≤20 ppb) were enrolled who received four weeks montelukast. 24 hours cough counting at baseline after 2 and 4 weeks treatment was the primary endpoint. Subjective measures of cough, the Leicester Cough Questionnaire (LCQ), and Hull Airways Reflux Questionnaire (HARQ) were also administered.

Results At baseline the average FeNO value in both high FeNO treatment groups was similar (around 60±30 ppb). At the end of the study there was a significant fall in FeNO of approximately 30% in both high FeNO treatment groups (p < 0.005). In the low FeNO group there was no significant change during the study (12±5 ppb). Therapy reduced the number of coughs in 24 hours by approximately 50% in both low and high FeNO groups (p<0.005). HARQ and LCQ scores also improved significantly (p<0.005) in all treatment groups.

Conclusions The hypothesis that FeNO could be used as a marker of eosinophilic inflammation in chronic cough was supported by our observation at baseline in the high FeNO group of eosinophilia in both blood and sputum. However, baseline FeNO did not predict overall treatment response. Perhaps the most surprising aspect of our study is the dramatic response in the low FeNO group to montelukast. The fact...
that montelukast appears to be equally effective in the low FeNO group suggest the either the current markers of cosinophilic lung disease are insufficiently sensitive to pick up low levels of leukotriene activation in the low FeNO group, or that montelukast has its antitussive activity by an alternative mechanism.

**Abstract S34 Figure 1** Changes in daytime cough frequency in IPF cohort.
scales (VAS)) and the cough quality of life questionnaire (CQLQ). For analysis we ran generalised estimating equations to compare morphine and placebo, adjusting for baseline measures and assessing any influence of treatment, sequence or period.

Results Low dose morphine reduced objective cough frequency compared to placebo by 71.8% over 24 hours. Morphine significantly reduced cough frequency overnight as well as during the daytime (p<0.05) and responses were independent of baseline cough frequency. All patient reported outcomes were consistent with this effect (p<0.05). The treatment effect was not significantly influenced by period or sequence. Overall morphine was well tolerated. There was one serious adverse event, unrelated to the study treatment.

Conclusions This is the first study to demonstrate a substantial objective reduction in cough frequency with low dose morphine in a clinically responsive group. Importantly this was accompanied by improvements in patient reported outcomes despite the short treatment duration used. The data suggests this population would be suitable for further investigation of the mode of action of opioids in chronic cough.

REFERENCE

Abstract S35 Figure 1 Median values for efficacy markers at baseline, on morphine and placebo *mean values.

<table>
<thead>
<tr>
<th>Efficacy Marker</th>
<th>Baseline (off morphine)</th>
<th>Morphine</th>
<th>Placebo</th>
<th>P-value (morphine v placebo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime cough frequency (c/hr)</td>
<td>22.97</td>
<td>6.26</td>
<td>29.94</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Night time cough frequency (c/hr)</td>
<td>4.84</td>
<td>0.71</td>
<td>4.37</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>24 hour recording (c/hr)</td>
<td>37.94</td>
<td>5.25</td>
<td>17.00</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>VAS Daytime (mm)*</td>
<td>47.68</td>
<td>16.32</td>
<td>43.52</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>VAS night time (mm)</td>
<td>25.00</td>
<td>3.00</td>
<td>19.00</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>CQLQ*</td>
<td>57.05</td>
<td>52.05</td>
<td>53.95</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

**Spoken sessions**

Hot topics in home-based mechanical ventilation

**S36 COUGH SUPPRESSION THERAPY IN SECONDARY CARE**

S J Mohammed, J Steer, J Ellis, L Kellett, SM Parker. North Tyneside General Hospital, North Shields, UK

Introduction Non pharmacological cough suppression therapy (CST) delivered by speech and language therapists is one of the few effective treatments available for patients suffering from a chronic refractory cough (CRC) although its use is not currently widespread. CST is a relatively new and developing area, our understanding of its mechanisms and the optimal treatment strategies are limited. We currently have no way of predicting response to therapy.

Method Retrospective review of records from patients undergoing CST in the period 2014–2017. Objective measures included quality of life (QOL) measured using the Leicester cough questionnaire (LCQ) and Laryngeal symptoms (Newcastle Laryngeal Hypersensitivity Questionnaire, LHQ).

Results 198 predominantly female (73.2%) patients with chronic refractory cough underwent CST. Baseline/follow up LCQ and LHQ scores were available on 183/122 patients and 144/90 patients respectively. Most had a cough of >1 year duration (85.9%), impaired QOL (Baseline LCQ mean=11.6 (SD 3.52) and significant laryngeal symptoms (Baseline LHQ: mean 14.7 SD 3.08). The median number of CST sessions was 3. CST improved both QOL (Mean change in LCQ=4.97 SD 3.81) and laryngeal symptoms (Mean change in LHQ=3.13 SD 2.81). Most patients had a response greater than the minimally clinically important difference (MCID) for both LCQ (84.4%) and LHQ (64.4%) but a significant subgroup showed no improvement in objective markers or were worse after CST (15.6% LCQ, 34.4% LHQ). Sex, age, previous smoking status, duration of cough and baseline LHQ and LCQ did not predict non response to treatment.

Conclusions This is the largest series of patients undergoing CST published so far. Most patients show meaningful improvements in both symptoms and quality of life. Use of CST is not currently widespread and it is important that we improve access to this therapy. There is a significant subgroup of treatment non responders. Identifying those most likely to benefit will help us to personalise therapy for this challenging group of patients.

**S37 HOME MECHANICAL VENTILATION (HMV) AND HOME OXYGEN THERAPY (HOT) FOLLOWING AN ACUTE EXACERBATION OF COPD IN PATIENTS WITH PERSISTENT HYPERCAPNIA: RESULTS OF THE PER PROTOCOL ANALYSIS FROM THE HOT-HMV UK TRIAL**

P B Murphy, G Arbene, R Phillips, N Hart. Guy’s and St Thomas’ NHS Foundation Trust, London, UK; King’s College London, London, UK

Introduction Intention-to-treat analysis from the HOT-HMV UK trial showed an improvement in admission-free survival with the addition of home mechanical ventilation (HMV) to home oxygen therapy (HOT) in patients with persistent hypercapnia following an acute exacerbation of COPD.
Abstract S37 Figure 1  Kaplan-Meier plot showing survival from randomisation to end of trial follow up by treatment arm. Adjusted for number of COPD admissions in previous year, prior use of long term oxygen therapy (LTOT), age and BMI.

Abstract S38 Table 1  Comparison of baseline variables between patients with favourable (no readmission and alive at 12 months) to those with poor (readmission or death within 12 months) outcome.

<table>
<thead>
<tr>
<th></th>
<th>No admission/death (n=20)</th>
<th>Admission/death (n=37)</th>
<th>p-value</th>
<th>No admission/death (n=17)</th>
<th>Admission/death (n=42)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean (sd))</td>
<td>66.95 (9.67)</td>
<td>65.84 (10.50)</td>
<td>0.696</td>
<td>66.53 (9.42)</td>
<td>67.31 (8.97)</td>
<td>0.767</td>
</tr>
<tr>
<td>FEV1 (mean (sd))</td>
<td>0.66 (0.24)</td>
<td>0.54 (0.20)</td>
<td>0.042</td>
<td>0.63 (0.30)</td>
<td>0.52 (0.19)</td>
<td>0.123</td>
</tr>
<tr>
<td>ABG on air PCO2 (mean (sd))</td>
<td>7.72 (0.96)</td>
<td>7.94 (0.81)</td>
<td>0.358</td>
<td>7.88 (0.99)</td>
<td>7.88 (0.89)</td>
<td>0.992</td>
</tr>
<tr>
<td>Weight (mean (sd))</td>
<td>6.49 (1.12)</td>
<td>6.40 (1.21)</td>
<td>0.788</td>
<td>6.31 (1.15)</td>
<td>6.41 (1.13)</td>
<td>0.764</td>
</tr>
<tr>
<td>BMI (mean (sd))</td>
<td>22.33 (4.52)</td>
<td>22.27 (4.88)</td>
<td>0.974</td>
<td>25.09 (5.10)</td>
<td>21.79 (5.76)</td>
<td>0.044</td>
</tr>
<tr>
<td>FFf (mean (sd))</td>
<td>32.09 (6.53)</td>
<td>30.05 (5.90)</td>
<td>0.266</td>
<td>31.20 (6.06)</td>
<td>29.95 (5.56)</td>
<td>0.482</td>
</tr>
<tr>
<td>SRI.SS (mean (sd))</td>
<td>47.02 (15.16)</td>
<td>45.16 (15.07)</td>
<td>0.665</td>
<td>44.46 (17.08)</td>
<td>47.86 (15.09)</td>
<td>0.464</td>
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<tr>
<td>SGRQ.SS (mean (sd))</td>
<td>68.84 (17.56)</td>
<td>73.55 (12.69)</td>
<td>0.259</td>
<td>71.09 (15.65)</td>
<td>68.22 (12.39)</td>
<td>0.467</td>
</tr>
<tr>
<td>SGRQ.SX (mean (sd))</td>
<td>69.42 (18.45)</td>
<td>69.00 (16.87)</td>
<td>0.933</td>
<td>74.94 (15.45)</td>
<td>71.89 (18.61)</td>
<td>0.531</td>
</tr>
<tr>
<td>SGRQ.AC (mean (sd))</td>
<td>85.20 (12.77)</td>
<td>92.02 (7.48)</td>
<td>0.015</td>
<td>88.14 (13.38)</td>
<td>84.96 (14.03)</td>
<td>0.438</td>
</tr>
<tr>
<td>SGRQ.IM (mean (sd))</td>
<td>59.28 (23.14)</td>
<td>64.41 (18.93)</td>
<td>0.381</td>
<td>58.04 (20.49)</td>
<td>57.67 (16.62)</td>
<td>0.943</td>
</tr>
<tr>
<td>MRC (mean (sd))</td>
<td>4.05 (1.18)</td>
<td>4.78 (0.48)</td>
<td>0.002</td>
<td>4.19 (0.98)</td>
<td>4.51 (0.78)</td>
<td>0.194</td>
</tr>
</tbody>
</table>

Abstract S38  Home mechanical ventilation (HMV) and home oxygen therapy (HOT) following an acute exacerbation of COPD in patients with persistent hypercapnia: predicting 1 year admission-free survival in the HOT-HMV UK trial

Introduction  Data from the HOT-HMV UK trial showed an improvement in admission-free survival with the addition of home mechanical non-invasive ventilation (HMV) to home oxygen therapy (HOT) in patients with persistent hypercapnia following an acute exacerbation of COPD [JAMA;317:2177]. A post-hoc analysis was conducted to investigate (1) which baseline patient characteristics predict 12 month outcome and (2) the difference of these characteristics between treatment groups.

Conclusion  Patients with persistent hypercapnia following an acute exacerbation of COPD who were adherent to HOT-HMV had a reduced risk of readmission or death and in addition, unlike the intention to treat analysis, had an improvement in gas exchange and a reduction in all-cause mortality at 12 months. Addition of HMV to HOT should be considered for patients with persistent hypercapnia following a life-threatening exacerbation of COPD.

S38 HOME MECHANICAL VENTILATION (HMV) AND HOME OXYGEN THERAPY (HOT) FOLLOWING AN ACUTE EXACERBATION OF COPD IN PATIENTS WITH PERSISTENT HYPERCAPNIA: PREDICTING 1 YEAR ADMISSION-FREE SURVIVAL IN THE HOT-HMV UK TRAIL

1PB Murphy, 2G Arbene, 3A Bisquera, 4N Hart. 2Guy’s and St Thomas’ NHS Foundation Trust, London, UK; 3King’s College London, London, UK
10.1136/thoraxjnl-2017-210983.44

Method  Patients were randomised to HOT or HOT-HMV if they had persistent hypercapnia (PaCO2 >7 kPa) 2 weeks following resolution of respiratory acidosis (pH >7.30) secondary to an acute exacerbation of COPD. NIV was titrated to nocturnal hypventilation and patients were followed up for 1 year. Patients allocated to the HOT arm that breached safety criteria had HMV added to HOT. Patients were included in the analysis in the HOT-HMV group if they had mean adherence of >4 hours/night. Patients allocated to HOT were included up until trial withdrawal or treatment switching.

Results  57 patients were randomised to HOT-HMV of whom 15 were non-adherent and 11 had missing usage data and were treated as non-adherent. 59 patients were allocated to HOT of whom 5 patients were excluded due to treatment switching. Median time to readmission or death was 1.1 months in the HOT group and 3.7 months in the HOT-HMV group (adjusted hazard ratio (HR) 0.41, 95% CI 0.23, 0.74, p=0.01). All-cause mortality was reduced in the HOT-HMV group (figure 1; adjusted HR 0.36, 95% CI 0.13, 0.97, p=0.04). There was a significant treatment effect on PaCO2 at 6 weeks (ΔPaCO2=0.9 kPa, p<0.01) which was observed at 12 months (ΔPaCO2=0.7 kPa, p=0.04) with no significant effect on health related quality of life at 6 weeks (SRI p=0.28, SGRQ p=0.98) or 12 months (SRI p=0.71, SGRQ p=0.31).

Conclusion  Patients with persistent hypercapnia following an acute exacerbation of COPD who were adherent to HOT-HMV had a reduced risk of readmission or death and in addition, unlike the intention to treat analysis, had an improvement in gas exchange and a reduction in all-cause mortality at 12 months. Addition of HMV to HOT should be considered for patients with persistent hypercapnia following a life-threatening exacerbation of COPD.
AN OUTREACH SERVICE FOR DOMICILIARY NON-INVASIVE VENTILATION (NIV) IMPROVES ACCESS FOR PATIENTS

S39

Introduction and Objectives Hypercapnic ventilatory failure is common and patients often present to hospital with compensation. As well as requiring acute non-invasive ventilation (NIV), patients may require domiciliary NIV (D-NIV). Traditionally, inpatients requiring D-NIV awaited transfer to a hospital with a D-NIV service. Long wait times for transfer could result in; repeated decompensations, D-NIV services appearing inaccessible and alternative sub-optimal treatment options being considered. Increasing healthcare pressures mean newer models of care need to be considered to avoid delayed treatment. In May 2014 our D-NIV service implemented an outreach function. Inpatients referred for D-NIV were either visited at their base hospital, or attended as a day-case at our centre. Patients were assessed and, if appropriate, commenced on D-NIV. This study assessed the impact of our outreach service on accessibility to D-NIV services, hospital length of stay (LoS) and 90 day readmission rates (90R).

Methods Patients were randomised to HOT or HOT-HMV if they had persistent hypercapnia (PaCO₂ >7 kPa) 2 weeks following resolution of respiratory acidosis (pH >7.30) secondary to an acute exacerbation of COPD. Non-invasive ventilation was titrated to treat nocturnal hypoventilation and patients were followed up for 1 year after discharge. Between group comparison of readmission and death were assessed in terms of baseline demographics, anthropometrics, lung function, gas exchange, quality of life and dyspnoea level.

Results 116 patients were enrolled and randomised to HOT (n=59) or HOT-HMV (n=57) with (mean ±sd or median [IQR]) age 67±10 years, BMI 22 [18–26] kg/m², FEV₁ 0.6±0.2 L, PaCO₂ 59±7 mmHg, SRI-SS 46±15, SGRQ-SS 74 [63–80], MRC dyspnoea score 5 [4–5]. Patients allocated HOT were less likely to be admitted with increasing BMI (25±5 vs 22±6 kg/m²; p=0.044). Patients allocated to HOT-HMV were less likely to be admitted if they had higher FEV₁ (0.66±0.24 vs 0.54±0.20 L; p=0.042), lower levels of dyspnoea (MRC dyspnoea score 4±1.0 vs 5±0.5; p=0.002) or higher levels of specific measures of quality of life (SGRQ-AC 85±13 vs 92±7; p=0.015) (Table 1). Baseline severity of respiratory failure did not predict 12 month outcome in either group.

Conclusion Factors influencing outcome in patients with COPD and persistent hypercapnia receiving HOT-HMV treatment were airways obstruction and level of dyspnoea. However, in the patients receiving HOT alone, BMI was the only factor. There was no between group difference in with the exception of a sub-scale of the SGRQ. Interestingly, the severity of respiratory failure at baseline does not influence risk of readmission or death within 12 months as the patients all demonstrated severe chronic respiratory failure.
Introduction Long-term domiciliary NIV is increasingly used for patients with chronic respiratory failure, typically due to neuro-muscular disease, sleep-disordered breathing/obesity hypoventilation, obstructive lung disease (COPD) and restrictive lung disease. The benefit of domiciliary NIV in patients with neuro-muscular disease is well established, and recent evidence of the prognostic benefit in COPD may lead to increased use of home NIV in this group. Here, we intended to analyse and compare the indications for NIV, patient demographics, mode of NIV initiation (elective or emergency admission) and mortality in a cohort of patients newly-started on NIV over a 9 year period.

Methods A retrospective observational cohort study was performed using data collected between 2007 and 2015 in a single-centre teaching hospital. Patients newly started on domiciliary NIV were screened using electronic patient records and departmental NIV databases. Patients commenced on NIV for chronic respiratory failure were included, whilst cases under 18 years of age and in whom NIV was supplied for other indications (e.g., sputum clearance) were excluded. SPSS was used for analysis.

Results 311 cases were included, of which there was a slight majority of males (56.3%). 50.2% of patients were diagnosed with a neuro-muscular disorder (mean age of 61.6 years); 35.7% of as sleep-disordered breathing/obesity hypoventilation (mean age 56.4 years); 12.2% as COPD (mean age 62.7 years) and 1.9% of cases were established as restrictive lung disease (mean age 54 years). We found that 76.3% of COPD patients were set up acutely, whereas 73.7% of patients with neuromuscular disorders were established electively on NIV. In total, 58.1% of cases were elective starters; 49.4% patients commenced electively died within 12 months. Regression analysis indicated a significant effect of year on mortality (p=0.002). Chi-square testing showed no association between initiation mode and gender (p=0.405).

Conclusions We demonstrate that domiciliary NIV use is particular high amongst neuro-muscular patients. Survival of patients on domiciliary NIV has improved in this single centre, and is associated with year of initiation, but mortality at 12 months is unchanged.

Introduction and Objectives Little data exists regarding use of tracheostomy ventilation (TV) in patients with motor neurone disease (PwMND). NICE 2016 does not provide guidance for use of TV. Some centres offer TV as a treatment option. Data suggest TV in PwMND can prolong life and is more readily accepted by young males. It is hypothesised that starting TV in PwMND is intrusive to quality of life and leads to unconscionably, long hospital stays.

Methods 4 HMV centres obtained data by retrospective case-note review of patients set-up on TV as a consequence of MND between January 1998 and December 2016.

Results 38 patients (26 male) were included. Average age at tracheostomy was 59.3 (range 26–78). 79% (n=30) of patients had emergency tracheostomy v 21% elective. 76% (n=23) of emergencies were related to acute illness requiring intubation. 75% (n=6) of those who elected for TV wanted to live as long as possible or were struggling with continuous use of non-invasive interfaces, all of these lived with a partner or parent. 41% were managed on respiratory wards for the majority of the inpatient stay. After commencing TV, mean length of stay was 7 weeks for those admitted electively v 18 weeks as an emergency. 2 patients died in hospital. 71% were discharged to their own home. Majority of home care was undertaken by skilled carers (22 hrs/day) rather than Registered Professional (1.8 hrs/day). 3 patients were weaned, 1 successfully. Mean length of life post TV was 3.7 years (range 0–15 years), with longer life expectancy in the elective group (5.1 years). A total of 52% patients died during the time-frame. 45% of deaths were unexpected the rest expected or planned withdrawal.

Conclusion TV in PwMND could be associated with increased length of life. In keeping with published data there appears to be a high incidence of unexpected death. PwMND and TV tend to be discharged to their own home with skilled carers. Length of hospital stay for planned admission is not long as is anecdotally suggested. Further work, including detailed nationwide audit, national ventilation registry and national guidance may be helpful.

New insights in bronchiectasis

Introduction Bronchiectasis is a chronic disease with a major impact on Quality of Life (QoL). As part of the EMBARC European Bronchiectasis Registry patients complete a Quality of Life-Bronchiectasis (QoL-B) questionnaire annually. The QoL-B has been validated and is widely used to give a comprehensive picture of the QoL across different aspects of patient’s lives. Bronchiectasis is more common in females but sex differences in disease impact have not been explored.

Methods The EMBARC registry is a prospective observational study of adult patients with clinically significant bronchiectasis from 27 European countries. Baseline QoL-B questionnaires were analysed cross-sectionally using multiple linear regression to identify independent determinants of QoL across the 8 domains.
Results 8389 patients were included, 58% were female, median age 68 years. Men and women appear to have a similar level of disease severity with no significant differences in the Respiratory Symptoms, Role Functioning and Health Perception domains of the QoL-B. There was however a significant difference in all other aspects of the QoL scores. Men had higher scores for Physical functioning, with β coefficient 4.9 (95% CI 3.3–6.5, p<0.0001) (indicating an average of 4.9 points higher for men when adjusted for confounding variables). Men also had higher scores for Emotional Functioning (β coefficient 3.6 (95% CI 2.2–5.1), p<0.0001), Social Functioning (β coefficient 2.4 (95% CI 0.7–4.1), p=0.007) and Vitality (β coefficient 2.5 (95% CI 1.2–3.9), p<0.0001). Across all domains, the elements with a large effect were Breathlessness, Comorbidities (with Depression and Anxiety commonly having a large impact), Pseudomonas aeruginosa infection and frequent exacerbations. Female patients nevertheless had greater disease impact even after adjusting for these variables.

Conclusions From this large dataset we show that despite similar levels of disease severity, women living with bronchiectasis are significantly more affected in physical, emotional and social functioning aspects of their lives than their male counterparts. This has implications for tailoring care and suggests a need for more holistic care for patients with bronchiectasis.

Abstract S43 Table 1 In-hospital mortality and mean length of hospital stay following AMI, CABG and PCI

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Number of people with bronchiectasis (n=101,597)</th>
<th>Number of people without bronchiectasis (n=77,666,681)</th>
<th>In-hospital mortality in people with bronchiectasis (%)</th>
<th>In-hospital mortality in people without bronchiectasis (%)</th>
<th>Adjusted Odds Ratio (95% CI)*</th>
<th>Mean LOHS (days) in people with bronchiectasis (SD)**</th>
<th>Mean LOHS (days) in people without bronchiectasis (SD)***</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI</td>
<td>2195 (2.16)</td>
<td>2,423,961 (3.12)</td>
<td>12.5%</td>
<td>10.1%</td>
<td>0.97 (0.86–1.10)</td>
<td>7.7 (8.3)</td>
<td>6.3 (7.9)</td>
</tr>
<tr>
<td>CABG</td>
<td>366 (0.36)</td>
<td>7,327,373 (0.94)</td>
<td>3.6%</td>
<td>3.1%</td>
<td>0.90 (0.51–1.57)</td>
<td>11.4 (8.7)</td>
<td>9.8 (8.5)</td>
</tr>
<tr>
<td>PCI</td>
<td>827 (0.81)</td>
<td>1,791,318 (2.31)</td>
<td>2.9%</td>
<td>1.4%</td>
<td>1.40 (0.93–2.10)</td>
<td>6.0 (8.1)</td>
<td>3.2 (4.2)</td>
</tr>
</tbody>
</table>

*Odds ratio adjusted for age and sex

**Confidence Interval

†Length of Hospital Stay

§Standard Deviation

Background The incidence and prevalence of bronchiectasis is increasing. Epidemiological studies have reported that people with bronchiectasis are at increased risk of cardiovascular comorbidities. However, there are limited data on outcomes after acute myocardial infarction (AMI), coronary artery bypass graft (CABG) or percutaneous angioplasty (PCI) amongst people with bronchiectasis. The aims of our study were to determine in-hospital mortality and mean length of hospital stay (LOHS) following AMI, CABG and PCI in people with and without bronchiectasis.

Methods We used data from the Nationwide Inpatient Sample, an anonymised stratified yearly sample of discharge records from community hospitals in the USA developed for the Healthcare Cost and Utilisation Project. People with a record of bronchiectasis from 2000 to 2011 were identified using the International Classification of Diseases (ICD-9-CM) codes. ICD-9-CM and procedure codes were also used to identify people with AMI, CABG and PCI. Multivariable logistic regression was used to estimate odds ratios for in-hospital mortality following AMI, CABG and PCI in people with and without bronchiectasis, adjusting for age and sex. We also compared mean LOHS following AMI, CABG and PCI between individuals with bronchiectasis and the general population.

Results We identified 1,015,97 people with a record of bronchiectasis. The mean age of the cohort was 57.2 years (Standard Deviation 20.8) and 60.8% were female. 2195 (2.2%) individuals with bronchiectasis had an AMI, 366 (0.4%) had undergone a CABG and 827 (0.8%) underwent a PCI. In-hospital mortality amongst people with bronchiectasis following AMI, CABG and PCI was 12.5%, 3.6% and 2.9% respectively. After adjusting for age and sex, we found no difference in in-hospital mortality following AMI, CABG or PCI in people with bronchiectasis compared to the general population (Table 1). Individuals with bronchiectasis had a longer mean LOHS following AMI, CABG and PCI (Table 1).

Conclusions Our findings suggest no difference in risk of death following AMI, CABG and PCI in people with bronchiectasis, which should be taken into account when counselling patients. However, individuals with bronchiectasis had a longer mean LOHS, which may impact healthcare resources and patient care pathways.
Evidenced self-management to guide patients in preserving their quality of life (QoL) and moderate healthcare demands, is lacking in bronchiectasis though advocated in the guidelines. An expert patient plan has shown promise.

**Aim**

To measure the impact on self-efficacy (confidence in dealing with disease), of the Bronchiectasis Empowerment Tool (BET) as part of a quality of life and economic evaluation.

**Method**

220 people from 6 UK hospitals were randomised (computerised) to standard treatment (including BTS physiotherapy leaflet and British Lung Foundation leaflet about bronchiectasis) alone or with the addition of BET. Participants had radiological diagnosis and at least one exacerbation within 12 months of enrolment. Individuals with cystic fibrosis, traction bronchiectasis and severe uncontrolled co-morbid disease were excluded. BET, (48 pages) comprising an action-plan based on the 2010 BTS Guidelines (1) and four educational sections: sputum, health changes, medications and health interactions (with notepads), was introduced using four brief telephone calls (totalling 24 min per person). All outcomes were self-reported: The primary outcome using the Self-Efficacy Measure for Chronic Disease (SEMCD) questionnaire at 12 months. QoL measures included St George’s Respiratory Questionnaire, Lung Information Needs Questionnaire (LINQ) and non-validated questionnaires. Euroqol 5 Dimension (EQ5D) and healthcare utilisation questionnaires were used for economic evaluation. Participants received questionnaires quarterly for one year. Focus groups assessed acceptability.

**Results**

127 participants responded at 12 months. BET did not influence SEMCD (mean difference (0.14 (95% confidence interval 95% CI 0.37 TO 0.64), p=0.59). NHS cost weren’t significantly different between groups (mean difference £335.94, 95% CI £444.97 to £1156.85) nor were Quality adjusted life years derived from EQ5D data (mean difference 0.006, 95% CI –0.042 to 0.053) or QoL. Focus group participants, diverse in severity, symptoms and isolation deemed the telephone element of BET acceptable.

**Conclusion**

BET did not improve self-efficacy, QoL or diminish healthcare costs. Supporting literacy needs with increased contact (perhaps telephone) or novel methods of evaluation may reduce attrition in future self-management research using self-reported outcomes.

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**Introduction**

There is a need for objective clinical endpoints in bronchiectasis to evaluate response to new and existing therapies. Current clinical endpoints in use present their own challenges; 24 hour sputum volume is unreliable, microbial clearance is often only assessed qualitatively and there remains controversy over changes in microbial load. Quality of life questionnaires (St George’s Respiratory Questionnaire (SGRQ), Leicester Cough Questionnaire, Bronchiectasis Health Questionnaire and Quality of Life-bronchiectasis are subjective outcome measures. The mean exacerbations and time to first exacerbation have been used in phase 3 trials but there remains debate regarding the definition of an exacerbation. The incremental shuttle walk test (ISWT) is a measure of functional exercise capacity and more objective than the 6 min walk test; an endpoint associated with survival in COPD.

**Aim**

To evaluate the ISWT as an objective clinical endpoint in bronchiectasis by assessing its reliability, validity and responsiveness.

**Methods**

To assess reliability 30 patients were invited 6 months apart whilst clinically well to perform the ISWT. To assess validity the ISWT scores were correlated with total SGRQ and activity scores in 94 patients (stable and exacerbation). To assess responsiveness 30 patients performed the ISWT pre-and post 14 days of intravenous antibiotic therapy for an exacerbation, 94 patients performed pre and post 14 days of oral antibiotics for exacerbation and sub-analysis from a previous study evaluated ISWT in 30 patients pre and post 12 months of nebulised gentamicin therapy.

**Results**

There was no significant difference in median (IQR) distance walked at baseline (390 m (225 m – 462.5 m)) and after 6 months (400 m (260 m – 480 m)). There was a negative correlation between ISWT and total SGRQ (r=−0.60) and the activity component (r=−0.64) p<0.001. There was a median increase of 18.5% in distance walked with nebulised gentamicin, 16.3% with oral antibiotic therapy and 11.9% with IV antibiotic therapy.

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**Abstract S45 Figure 1**

Graph to show the changes (%) in ISWT distance walked from baseline with different antibiotic therapies.
with intravenous antibiotic therapy. 81% of patients had a more than 10% increase in distance walked with nebulised gentamicin, 61% with oral therapy and 50% with intravenous therapy (figure 1).

Conclusions The ISWT is an objective, quick and inexpensive clinical endpoint that is reliable, valid and responsive for use in assessing patients with bronchiectasis.

**Background**
Non-tuberculous mycobacterial (NTM) infection is more prevalent in those with bronchiectasis than the general population. In addition, *Pseudomonas* is frequently isolated in more severe bronchiectatic disease. We interrogated our non-CF bronchiectasis database to identify association.

**Method**
A retrospective analysis of 232 patients with non-CF bronchiectasis distinguished those both with and without NTM infection. Analysis included demographic, clinical, microbiologic, lung function and radiological data over a 10 year period.

**Results**
NTM were cultured in 29 patients (12.5%), *M gordonae* being the most frequent (n=11, 37.9%) followed by *M avium-intracellulare* (n=9, 31.0%). *Pseudomonas* infection, current or previous, was identified in 146 (62.9%). Of those with NTM infection, a history of *Pseudomonas* infection was very strongly associated (96.6%) with only a single case of NTM isolated without *Pseudomonas* (3.4%; p=0.001) (figure 1). Also, concurrent proton pump inhibitor use in the NTM group showed a strong association (55.2% vs. 29.06%; p=0.03).

**Conclusion**
A 10 year analysis of our non-CF bronchiectasis cohort indicates a very strong association between prior *Pseudomonas* infection and subsequent NTM isolation, with an NTM negative predictive value 98.8% in the absence of *Pseudomonas*. Whilst association is not causation, we postulate that *Pseudomonas* may lead to specific mucosal microbiome and structural changes. Moreover, this may be a necessary antecedent prior to observing the very high NTM prevalence rates found in this condition.
Patients with left heart disease commonly develop pulmonary hypertension (PH), and some subsequently develop pre-capillary vascular remodelling. This combined pre and post capillary pulmonary hypertension (Cpc-PH) is defined as mean pulmonary artery pressure (mPAP) ≥25 mmHg, pulmonary arterial wedge pressure (PAWP) >15 mmHg and diastolic pulmonary gradient (DPG) of ≥7. Patients with Cpc-PH have a worse outcome and targeted pulmonary vascular therapies may be useful. The aim of this study was to assess MRI measured septal angle in the assessment of Cpc-PH.

Methods Consecutive, incident suspected PH patients who underwent MRI at a pulmonary hypertension referral centre from April 2012 to October 2015 were assessed. Patients with PAWP >15 mmHg, with right heart catheter and MRI on the same day were included. The diagnostic accuracy of septal angle to identify Cpc-PH was assessed.

Results 2437 patients underwent MRI, 1272 were incident and 227 patients had PAWP >15 mmHg. 163 had MRI and right heart catheter and MRI on the same day were included. The diagnostic accuracy of septal angle to identify Cpc-PH was assessed.

Results A total of 150 participants (63% female; mean age 37 years) completed interviews. Utilities are presented as values between 1 and 0, where 1 is equal being in a state of ‘full health’ and 0 is equal to being dead. The mean (SD) utility for the oral health state was 0.84 (0.16), while the other health states were all significantly lower at 0.73 (0.27) for inhaled (p=0.001), 0.58 (0.31) for subcutaneous (p<0.001), and 0.54 (0.32) for intravenous (p<0.001). Utility differences compared to the oral health state showed that there are disutilities (negative differences) associated with the inhaled, subcutaneous, and intravenous modes of treatment administration. Disutilities were –0.11 for intravenous, –0.26 for subcutaneous, and –0.30 for intravenous administration.

Conclusion The Results demonstrate quantifiable QoL differences between modes of administration of drugs acting on the prostacyclin pathway, so as to allow appropriate reflection of the unique QoL burden within an economic evaluation of drugs for PAH treatment.
PEA improved by 6,7 and 9 points for activity, QoL and symptoms respectively. The median difference for individuals having consecutive paired pre- and post-PEA scores also improved (median ±IQR: activity 4±7; QoL 4±8; symptoms 7±8). Patients were dichotomised into those with significant residual pulmonary hypertension (previously reported risk threshold of ≥30 mmHg , n=302) and those without (n=569). The improvement in CAMPHOR score was greater and more sustained in those without residual pulmonary hypertension (figure 1).

Conclusion PROs relating to activity, QoL and symptoms improve after PEA in CTEPH when evaluated by CAMPHOR score. The improvement is sustained up to 5 years in those without residual pulmonary hypertension. Ongoing work will examine the utility of PROs in addition to traditional clinical outcome measures.

Acknowledgements National Pulmonary Hypertension Centres UK and Ireland for referring patients considered for PEA.
Spoken sessions

COMPUTED TOMOGRAPHY IN THE DIAGNOSIS OF LEFT MARKED SMALL AIRWAY DYSFUNCTION AND VASCULAR DISEASE Unit, Sheffield, UK

Identification of patients with left heart disease

Background

10.1136/thoraxjnl-2017-210983.58

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Background Identification of patients with left heart disease (LHD) as the cause of pulmonary hypertension is challenging, developing a tool that can identify these patients would reduce unnecessary referral for investigation at specialist centres and may reduce the burden of invasive investigations. The aim was to investigate the capability of computed tomography (CT)-derived metrics for the diagnosis LHD in a cohort of patients with suspected pulmonary hypertension.

Methods Patients with suspected pulmonary hypertension who underwent CT and RHC were identified. Derivation and validation cohorts were randomly constructed to derive and test a binary logistic regression model. All image analysis took place under curve (AUC) 0.87, p=0.87, p<0.001. Derived regression models did not add diagnostic value AUC in validation cohort 0.87, p<0.001. A limit for enlarged left atrial area was set at 27.5 cm². This had sensitivity 65% and specificity 90% in predicting Group 2 PH using PAWP ≥18 mmHg as a threshold.

Conclusions Ct derived left atrial area is a specific predictor of LHD in suspected pulmonary hypertension. Composite models did not increase diagnostic value. Left atrial area on CT may be a useful tool for diagnosing PH-LHD and may reduce unnecessary referrals to specialist PH centres and reduce the number of invasive investigations.

Abstract S52 Figure 1

From diagnosis to treatment in interstitial lung disease

MARKED SMALL AIRWAY DYSFUNCTION AND CONSEQUENT AIR-TRAPPING CHARACTERISE CHRONIC HYPERSENSITIVITY PNEUMONITIS (CHP) BUT NOT IDIOPATHIC PULMONARY FIBROSIS (IPF)

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Introduction CHP, the major differential diagnosis for IPF, has varied radiological features that can confound CT agreement in up to a third of cases of fibrotic interstitial lung disease presenting to multidisciplinary panels. Given that the pathological basis of CHP incorporates diffuse bronchiolitic abnormalities, we hypothesised that differences in small airway dysfunction and resultant air-trapping might help refine a multi-domain approach to distinguishing CHP from IPF.

Methods Analysis of lung function records of individuals with multidisciplinary diagnoses of CHP and IPF (n=118 in each group) with matched disease severity (% predicted FVC: 69.3 ±21.9 vs. 73.8±16.2 respectively, p=n/s and% predicted validation cohort (n=211). Left atrial area was found to be most significant individual predictor of elevated PAWP, area under curve (AUC) 0.86, p<0.001, the accuracy was higher for identification of PAWP ≥18, AUC 0.87, p=0.87, p<0.001. Derived regression models did not add diagnostic value AUC in validation cohort 0.87, p<0.001. A limit for enlarged left atrial area was set at 27.5 cm². This had sensitivity 65% and specificity 90% in predicting Group 2 PH using PAWP ≥18 mmHg as a threshold.

Conclusions Ct derived left atrial area is a specific predictor of LHD in suspected pulmonary hypertension. Composite models did not increase diagnostic value. Left atrial area on CT may be a useful tool for diagnosing PH-LHD and may reduce unnecessary referrals to specialist PH centres and reduce the number of invasive investigations.
AUTOMATING THE ANALYSIS OF THORACIC CT SCANS


TLco: $39.2 \pm 14.8$ vs $39.9 \pm 13.1$ respectively, $p=ns$) at the Royal Brompton Hospital was undertaken. Indices relating to airflow, dynamic and static lung volumes were compared. Data were analysed using parametric tests following testing for normal distribution and expressed as mean $\pm SD$. A $p$-value $<0.05$ was considered statistically significant.

**Results**

Compared to patients with IPF, the CHP cohort was characterised by considerably worse small airway impairment as denoted by significantly lower%-predicted values of mid-expiratory flow (MEF25/75), p<0.0001), forced expiratory volume at 3 s (FEV3; p<0.05), volumic inspiratory and expiratory airway conductance (Gaw) as well as resistance (Raw) (p<0.0001). In contrast, indicators of greater air-trapping including residual volume/RV and the RV/TLC ratio were increased in CHP (p<0.0001 and p<0.0001 respectively) while contraction of total lung capacity occurred to a lesser extent in this group (p=0.01). The gas transfer coefficient/Kco was lower in CHP than in IPF (p=0.01).

**Conclusion**

Although both diseases result in restrictive pulmonary physiology, patients with CHP have demonstrably worse small airway function than those with IPF, as evaluated by a range of flow and volume determinants. Consequent upon these changes, a higher degree of air-trapping is evident in the CHP cohort. The radiologic correlates of such observations, namely bronchocentric fibrosis and lobular air-trapping, are widely recognised in CHP. In future, integration of a more disease-specific physiologic profile with detailed assessment of disease behaviour, volumetric radiology and dynamic small airway tests may enhance the accuracy of diagnosing CHP.

**Abstract S54**

Automated detection of lung cysts. 3D rendering of the thoracic CT scan of an individual with BHD following automated detection of cysts but prior to deletion of airways. Note irregular cysts with a preponderance below level of the carina.

**S55**

DERIVATION AND VALIDATION OF A SIMPLE LONGITUDINAL SCORE WHICH STRONGLY PREDICTS MORTALITY IN INTERSTITIAL LUNG DISEASE (ILD) ASSOCIATED PULMONARY HYPERTENSION (ILD-PH)

Introduction

Pulmonary hypertension commonly occurs in ILD, and is a malignant prognostic factor. Predicting mortality in this group remains problematic. We hypothesised that a combination of baseline demographics and longitudinal change in PFT’s and the biomarker brain-natriuretic peptide (BNP) would predict mortality in ILD-PH.

Methods

Demographics, ILD subtype, PFTs, echocardiogram, and CTs were reviewed in consecutive patients undergoing...
right heart catheterisation (RHC) for suspected ILD-PH. Predictors of prognosis were evaluated in their ability to predict mortality using Cox proportional hazard analysis. A prognostic model was developed and tested in a derivation cohort and tested in a separate validation cohort.

Results 180 patients with confirmed PH formed the derivation cohort (mean pulmonary arterial pressure (mPAP) at RHC 37 ± 9 mmHg; 50% male). At baseline, the strongest predictor of mortality was the underlying ILD diagnosis, with idiopathic pulmonary fibrosis or chronic hypersensitivity pneumonitis strongly associated with mortality (hazard ratio (HR): 3.58, p<0.001). A relative decline in forced vital capacity (FVC) of 10% at 12–24 months after RHC predicted mortality (HR: 3.20, p=0.001), and an increase in BNP at 12–24 months was also associated with mortality (HR: 2.27, p=0.005). A prognostic model combining baseline and longitudinal change risk stratified patients into very-high risk, high-risk and moderate risk groups. In the derivation cohort, the high-risk group had a HR of 2.20 (p=0.01), and the very high-risk group a HR of 4.41 (p<0.001). 50 patients with confirmed PH made up the validation cohort (mPAP 37 ± 9 mmHg; 46% male). The high-risk group had a HR of 3.60 (p=0.01) and the very high-risk group a HR of 8.17 (p<0.001).

Conclusion A simple prognostic score using longitudinal change in FVC and BNP powerfully predicts mortality in ILD-PH, and could be used to prognosticate and help prioritise precious organ allocation in this challenging population.

Introduction There is growing evidence of the role of infection in the pathogenesis of Idiopathic pulmonary fibrosis (IPF). Azithromycin, a macrolide antibiotic, has antibacterial and anti-inflammatory activity and has shown to be beneficial in animal models of lung fibrosis. This study aimed to assess the effects of prophylactic Azithromycin on hospital admissions, rescue antibiotic use and lung function in IPF.

Method A retrospective analysis identified all IPF patients receiving a prophylactic prescription of 250 mg Azithromycin three times a week (Monday, Wednesday and Friday) between 2012 and 2017. An IPF diagnosis was made, according to international guidelines, following multi-disciplinary team discussion. The use of immunosuppressive therapy, immunodeficiency or the use of other prophylactic antibiotics resulted in study exclusion.

Results One hundred and fifteen patients with IPF receiving prophylactic Azithromycin were identified. Thirteen already established on therapy and 5 who received other prophylactic antibiotics were excluded. The remaining 97 IPF subjects had a mean age of 66.05±11.25 years, were predominantly male (65%) with moderately severe disease (DLco 34%±9.5% predicted; FVC 70%±18% predicted). The majority (92%) of IPF patients tolerated Azithromycin, only 8 (8.25%) discontinued therapy due to side effects (tinnitus (n=1) and gastrointestinal intolerance (n=7)). One discontinued following lung transplant and 4 had therapy discontinued at the discretion of the prescribing clinician who felt there had been no subjective improvement. In the Pre-treatment twelve month period a total of 29 hospital admissions (0.30±0.6 per patient years) and 146 courses of antibiotics (1.50±1.70 per patient years) were recorded. In the same cohort a year after commencing prophylactic Azithromycin, there were 7 hospital admissions (0.08±0.3 per patient years) and 31 therapeutic antibiotic courses prescribed (0.36±0.8 per patient years) (p=0.0086, p<0.0001 respectively) (figure 1). Lung function rate of change over the 12 months preceding and following initiation of antibiotics was examined and there was no significant change in rate of decline in either FVC or DLco.

Conclusions The present study has shown the beneficial effect of prophylactic Azithromycin in IPF patients, decreasing both hospital admissions and antibiotic usage, however, further

Introduction

The impact of Azithromycin in idiopathic pulmonary fibrosis

O Alzaher, C Macaluso, J Martano, R Chaube, F Chua, M Kokosi, V Kouranos, AU Wells, TM Maher, PM George, ER Renzoni, PL Molyneaux. Royal Brompton Hospital, London, UK

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Conclusions

The present study has shown the beneficial effect of prophylactic Azithromycin in IPF patients, decreasing both hospital admissions and antibiotic usage, however, further
randomised placebo controlled studies are needed to support and confirm our findings.

REFERENCE

Background There are no ILD specific guidelines on the use of ambulatory oxygen. The AmbOx trial is a multicenter, randomised, cross-over controlled trial (NCT02286063), to assess quality of life during two weeks on ambulatory oxygen compared to two weeks off oxygen, in patients with fibrotic ILD.

Methods Individuals with fibrotic ILD whose oxygen saturation was normal at rest, but dropped to ≤88% on a 6MWT, with stable symptoms during a two week run-in period, were recruited and randomised. Primary outcome: health status assessed by King’s Brief ILD questionnaire (KBILD). A simple question on whether breathlessness had changed (better, same, worse) over the previous two weeks was a key secondary outcome. Patients’ experiences with portable oxygen were explored through interviews in a subgroup. At the end of the four week trial period, patients were asked if they wished to continue with the ambulatory oxygen.

Results Out of 84 randomised patients, 76 completed the trial. Mean age 64.5±1.1 years, 58 males, 53 ever smokers, FVC 73.3±19.1%, DLCO 38.7±12.8%. 43 patients had possible/definite IPF. Ambulatory oxygen, compared to no oxygen, was associated with improvements in total KBILD score (p<0.0001). At the end of the two weeks on oxygen, the majority of patients reported improved breathlessness (better:52/76 – same:23/76 – worse:1/76), compared to the two weeks on no oxygen (better 1/76 – same:57/76 – worse:18/76). On trial completion, 51/76 (67%) of patients chose to continue on ambulatory oxygen. On multivariate analysis, factors independently predictive of the patient’s decision to continue, included younger age (64.8 vs 72.8 years, p=0.002), more severe disease (CPI 53.5 vs 49.1, p=0.003) and patient’s global assessment of improvement in breathlessness (OR 3.2, p=0.018). Despite symptomatic improvements in the majority, ambulatory oxygen was also associated with a number of patient-reported challenges, explored in the patient interviews.

Paediatric asthma: big and real world data

Introduction Some guidelines advocate using FEV$_1$ and/or fractional exhaled nitric oxide (FeNO) in the management of childhood asthma, but evidence supporting these recommendations is generally unsupportive. Our hypothesis was that reduced FEV$_1$ and/or elevated FeNO measurements were associated with increased risk of future asthma attacks and loss of asthma control.

Methods Data were obtained from six trials where FeNO was used to guide asthma treatment. Baseline% FEV$_1$ and FeNO were linked to exacerbation and loss of control between baseline and three months. Change in% FEV$_1$ and change in FeNO between baseline and 3 months were also linked to exacerbation and loss of control between three and six months after baseline. A one-stage individual patient data meta-analysis was conducted using a random effect for study. Baseline confounders included in the model were age, sex, LABA, LTRA, ICS dose, trial arm, control and FeNO or FEV$_1$ as appropriate.

Results Data were available in 1049 children (58% male, mean age 12.7 years) from six trials. Each unit reduction in baseline% FEV$_1$ was associated with increased risk for future exacerbation (OR 1.02 [1.00, 1.03] n=935, p=0.034) and with increased risk for loss of control (1.01 [1.00, 1.02], n=940, p=0.026) after three months. Similar associations were present between change in% FEV$_1$, and outcomes after six months. Baseline FeNO was not related to asthma outcomes but each 10% increase in FeNO between baseline and three months was associated with increased risk for loss of control between three and six months after baseline. Baseline FeNO was not related to asthma outcomes but each 10% increase in FeNO between baseline and three months was associated with increased risk for future exacerbation (OR 1.02 [1.00, 1.03]) and rising% FeNO between baseline and three months were independently associated with loss of control at six months.

Conclusions Baseline% FEV$_1$ is rather weakly associated with future asthma outcomes, and change in% FEV$_1$ between visits does not strengthen this association. In contrast, baseline FeNO is not related to future outcomes but% change in FeNO has some precision for future asthma control. The utility of% FEV$_1$ and FeNO in childhood asthma management needs to be rigorously evaluated in a clinical trial.
Introduction Young children commonly wheeze but only some have asthma later in life. Asthma prediction tools have poor predictive performance and few have been validated. We aimed to develop a robust tool for the prediction of asthma at age 10–14 years using readily available information.

Methods We studied 5 UK birth cohorts (the STELAR consortium) and considered two groups: 1. all children recruited at birth and 2. high-risk children on the basis of reported wheezing at 2/3 or 5 years. Two comparable cohorts (Ashford and ALSPAC) were used to select predictors (training sample) and the SEATON, MAAS and Isle of Wight studies to assess predictive performance (validation sample). We included 16,187 and 285 children from groups 1 and 2 respectively in the training sample and validated the developed predictive tool in 5,320 and 285 children from the validation sample.

We considered 40 potential predictors collected at recruitment and at 1, 2/3 and 5 years of age: demographic and perinatal information, eczema, hay-fever, respiratory symptoms, environmental and family-related factors. We defined asthma at 10–14 years by the presence of both current wheeze and asthma treatment. We compared 5 statistical methods to select variables and estimate coefficients: stepwise regression, classical (LASSO and Elastic-Net, EN), empirical Bayes (EB) and Bayesian (BM) regularisation. Methods Predictive performance was assessed using calibration and discrimination measures including area under the ROC curve (AUC).

Results Asthma prevalence at age 10–14 ranged from 7%–18% in group 1 and from 32%–52% in group 2. Frequency of early wheezing, eczema, and paternal asthma were important predictors in all models and both groups. Other selected predictors included birth order, maternal asthma and domestic pets. Specificity and negative predictive value (NPV) were higher in the general population, while sensitivity and positive predictive value (PPV) were higher in high-risk group. BM (AUC 0.77, specificity 0.84 and NPV 0.93) and EN (AUC 0.74, sensitivity 0.71 and PPV 0.65) provided the highest accuracy and discriminative ability predictive ability in the 2 groups, respectively.

Conclusion The use of sophisticated statistical methods in a large, multicentre population demonstrated promising results in developing an asthma predictive tool.

Abstract S60 Figure 1 Number of unique patients with asthma related ED attendance per month during the 24 months pre-omalizumab (ED pre-activity) and the first 24 months on omalizumab treatment (ED post-activity) in children aged 6–16 years in England 2011–2013.
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A SYSTEMATIC REVIEW AND META-ANALYSIS FOR THE ASSOCIATION OF PARACETAMOL AND CHILDHOOD ASTHMA: BREATHING NEW LIFE INTO AN OLD MYTH?

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Introduction and Objectives Paracetamol is globally the most frequently prescribed drug amongst infants being employed in a variety of different contexts – from acute febrile illnesses to postoperative analgesia. Prior epidemiological evidence had long inferred a correlation between paracetamol to the ontogeny and exacerbation of asthmatic symptoms, leading to some clinicians advocating for a total prohibition. In view of the evidence being primarily from cohort studies, uncertainty persisted about the strength of the evidence as concerns were raised about the validity of observational cohort studies to ascertain causation, particularly in the absence of a placebo or a control group.

Methods A systematic review of the medical literature search was performed from bibliographic databases that included: Pubmed/Medline, EMBASE, CINAHL, CENTRAL, and Google Scholar; from 1975 until June 2017, using a prospective and explicit search criteria. The Mantel Haenszel (MH) method using a random effects model calculated the weighted odd ratio (OR).

Results 256 studies were identified from abstracts and titles with 9 studies being included in this review: 7 were prospective cohorts studies and two RCTs. The study ascertained that paracetamol was not associated with increased risk of asthma symptoms: MH-OR 0.083 (95% CI 0.051–0.1332). However, the substantially high degree of heterogeneity ($I^2=99\%$) illustrated the limitations of combining the weighted MH-OR from cohort studies. Four prospective cohort studies reported a statically significant association between paracetamol and asthma symptoms, whereas a well conducted, rigorous, double blinded RCT found no significant difference. The potential mechanisms by which paracetamol induced bronchospasm has not been fully elucidated; however the depletion of glutathione in lung parenchyma, increased intra and extra-mitochondrial oxidative stress, and reactive oxygen species are all thought to have a contributory role.

Conclusions Whilst prior cohort studies had previously inferred causation between paracetamol and the exacerbations of asthma symptoms, a well conducted and rigorous RCT demonstrated no significant association. Notwithstanding the limitations of meta-analysis, we recommend that paracetamol remains safe, with usage being contextualised to follow current best practice paradigms. Reflectively, the review raises the caveat of the unquestioned advocacy of paracetamol or any drug as a cultural axiom.

IDENTIFYING THE CHILD (5–12 YEARS) WITH ASTHMA AT INCREASED RISK OF ATTACKS: THE AT-RISK CHILD WITH ASTHMA (ARC) SYSTEMATIC REVIEW

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Introduction and Objectives Asthma is the commonest long-term condition in children with attacks impacting on both
Spoken sessions

DO THE ROYAL COLLEGE OF PHYSICIANS’ THREE QUESTIONS’ PREDICT SYMPTOM CONTROL IN PEDIATRIC ASTHMA?

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Introduction and Objectives The UK Quality Outcomes Framework (QOF) rewards primary-care practices for completing the Royal College of Physicians “Three Questions” (RCP3Q) score for all patients listed on their asthma register. Almost no validation data currently exists, however, to support its use in children. This study aimed to investigate the performance of the RCP3Q to predict asthma control in children, by comparing it with the validated Asthma Control Test (ACT) or Childhood Asthma Control Test (C-ACT).

Methods This was a prospective, observational study involving 8 primary-care practices. Children aged 5–16 on the QOF asthma register and/or receiving asthma medication were invited to self-complete the ACT (age 12–16, n=96) or C-ACT (age 5–11, n=223) questionnaire immediately prior to a primary-care asthma review, where responses to the RCP3Q were collected. RCP3Q scores were compared with ACT or C-ACT data to assess performance of the RCP3Q in predicting asthma control. The RCP3Q scoring system is summarised in figure 1.

Results Questionnaire and RCP3Q data was completed for 319 participants. RCP3Q scores correlated moderately with C-ACT and ACT data (Spearman’s rho −0.49 and −0.52 respectively, p<0.001). A RCP3Q score of ≥2 predicted uncontrolled asthma (C-ACT or ACT ≤19) with a sensitivity of 57% and specificity of 81%. A lower threshold RCP3Q score of ≥1 gave a specificity of 55%, resulting in a high false positive rate. A RCP3Q score of 0 predicted well-controlled asthma (C-ACT or ACT ≥20) with a sensitivity of 55% and specificity of 81%. Using thresholds of RCP3Q≥2 for uncontrolled asthma and RCP3Q=0 for good control resulted in 25% participants unclassified (RCP3Q=1) and 18% of participants scoring 0, 2 or 3 incorrectly classified. Binary logistic regression showed that individual positive answers to RCP questions 1 and 2, but not 3, significantly increased the likelihood of uncontrolled asthma.

Conclusions Our data in ≥300 participants does not support use of the RCP3Q to classify asthma control in children. Our findings support current BTS/SIGN guidelines, which recommend use of validated asthma control questionnaires, such as C-ACT, when conducting a paediatric asthma review.

Asthma: infection and inflammation

CLINICAL AND TRANSCRIPTOMIC PROFILES OF SEVERE ASTHMATICS WITH HIGH OR LOW EXPRESSION OF THE GLUCOCORTICOID RECEPTOR AND IMPORTIN-7

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Introduction and Objectives The majority of asthmatics can be well-controlled using inhaled corticosteroids (ICS) and long-acting β2-agonists (LABAs). However, approximately 5% have a severe, refractory form of the disease and are often difficult to treat. Corticosteroid (CS) Insensitivity is the defining feature of these asthmatics known as “severe” asthmatics. The
molecular mechanisms underlying CS insensitivity are not fully known. Here, we hypothesise that reduction in the expression of the Glucocorticoid receptor (GR) and Importin 7 are related to CS insensitivity. This aims project were to compare the gene expression of GR and Importin 7 between severe asthmatics and mild/moderate asthmatics or healthy controls of the U-BIOPRED cohort. We then investigated whether changes in their expression, correlated with changes in clinical features and expression of other genes.

Methods The U-BIOPRED database contains data on mRNA expression, lung function, medication usage, blood, urine and sputum samples for their subjects (n=661). Using an unbiased approach to analyse the data we will initially used Gene Set Variation Analysis (GSVA) to look for differences in expression of GR and Importin 7 between the severe asthma, mild/moderate asthma and healthy volunteer cohorts. We then characterised the asthmatics into subjects with high (top 25%), compared to healthy controls) or low (bottom 25%) expression of GR or Importin 7 and then compared clinical characteristics and gene expression profiles between the high and low expressing GR or Importin-7 groups.

Results Severe and non-severe asthmatics had reduced GR expression in endobronchial biopsy and brushings samples compared to healthy controls. There were no significant differences in lung function, blood analytes or exacerbation rates between high or low GR expression groups. Severe non-smoking asthmatics had reduced Importin 7 expression in sputum compared to mild/moderate asthmatics and healthy controls. Low Importin 7 group had lower means in FEV1%, FEV1/FVC, higher means in blood and sputum neutrophils%, IL-6 and hCRP.

Conclusions Reduced Importin-7 expression in sputum samples of asthmatics correlated with reduced lung function scores, increased neutrophilic inflammation and more oral CS use.

Findings Pulmonary eosinophil clearance was increased in patients with focal eosinophilia (0-0033 ml/min/ml; 95% CI –0.005–0.011; p=0.02) compared to asthmatics (0-0007 ml/min/ml; 95% CI 0-0003–0.0010; p=0.14) and controls (0-0003 ml/min/ml; 95% CI –7.5 × 10−2–0.0008). Absolute lung eosinophil migration was elevated in patients with focal inflammation (5932 eosinophils/min/ml; 95% CI –14351–26215, p=0.01) and asthma (364 eosinophils/min/ml; 95% CI 38–689; p=0.03) versus healthy volunteers (38 eosinophils/min/ml; 95% CI –11–87). Stratification of asthmatics based on BMI revealed increased pulmonary eosinophil clearance in obese (0-001 ml/min/ml; 95% CI 0-0007–0.001; p=0.02) versus non-obese asthmatics (0-0003 ml/min/ml; 95% CI –0.0002–0.0009).

Interpretation Eosinophil radiolabelling can quantify pulmonary eosinophilic inflammation, with the potential for patient endotyping and testing eosinophil-targeted treatments.

Funding Medical Research Council, Wellcome Trust, Asthma UK, Cambridge NIHR Biomedical Research Centre.
response, whilst 11 patients (23.9%) discontinued due to lack of benefit (n=8) or side effects (n=3).

Conclusion Long-term azithromycin therapy improved clinical outcomes in this sub-population of severe asthma of infective phenotype with acceptable safety profile. Further research is warranted to confirm these findings.

REFERENCE

Abstract S66 Figure 1

Introduction and Objective Frequent exacerbations (≥2 exacerbations in the past year) is a prognostic factor in severe asthmatics and is associated with increased morbidity and mortality. Using clinical and transcriptomic data, we sought to characterise a clinical subtype of asthma associated with persistent frequent exacerbations (PFE) which is defined by frequent exacerbations for minimum 2 consecutive years.

Methods Baseline and longitudinal clinical and transcriptomic data from 311 severe asthmatics from the U-BIOPRED study was analysed to find distinct clinical characteristics of the PFE group. The longitudinal data was collected 12–18 months after the baseline visit. We also sought to annotate the PFE group with gene set variation analysis (GSVA) using gene signatures associated with active viral infection and immune response.

Results Out of 311 patients, 193 were frequent exacerbators (FE) at baseline. 109 (56.5%) of FE subjects at baseline remained FE at the longitudinal follow-up and were designated PFE. This group of patients had earlier-onset of asthma (25 [28] yrs vs 28 [33] yrs, median [interquartile range]), higher BMI (30.3±6.8 vs 28.4±5.3 kg/m², mean ±SD) and higher eczema diagnosis (37.61% vs 28.22%) compared with infrequent and non-persistent exacerbators. However, they had lower atopy positive blood tests (57.80 vs 68.32%). These patients also had poor lung function and lower airway conductance with a lower mean Sgaw (0.72±0.6 vs 0.99±0.8, mean ±SD). The number of subjects taking oral corticosteroids (60.2 vs 37.6%) and xanthines (34.3 vs 12.6%) was greater in the PFE group. PFE patients were more poorly controlled (ACQ; 2.7±1.2 vs 2.0±1.1, mean ±SD) and had a worse quality of life (AQLQ; 4.2±1.1 vs 4.6±1.3, mean ±SD) with higher anxiety and depression (HADS; 14.0 ±7.9 vs 12.1±8.2, mean ±SD). GSVA analysis identified gene signatures associated with an active viral response to be differentially enriched amongst the PFE in nasal brushing samples.

Conclusion This study identified a group of asthmatics, defined by PFE who have poorly managed and difficult-to-treat asthma. It also identified a potential role of the minimally invasive nasal brushing sample to identify PFE and thus allow for early intervention and improvement in the morbidity and mortality in this group of patients.
PHASE 1 TRIAL OF AN INTRANASAL RESPIRATORY SYNCYTIAL VIRUS (RSV) SUBUNIT CANDIDATE VACCINE: SAFETY RESULTS FROM THE MUC-SYNGEM STUDY

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Background RSV is a ubiquitous pathogen causing severe disease in children and the elderly. There is as yet no licensed vaccine. SynGEM, a novel intranasal subunit vaccine based on the RSV F glycoprotein linked to an immunostimulatory bacterium-like-particle carrier, was previously shown in animal models to elicit durable immune responses both locally (nasal secretory IgA) and systemically (serum neutralising antibodies). Induction of mucosal as well as systemic antibodies may enhance protection and reduce transmission. This was the first-in-human phase 1 study of SynGEM in healthy volunteers.

Methods MUC-SynGEM-001 was a randomised, placebo-controlled, phase 1 trial that enrolled healthy adults aged 18–49 years to evaluate the safety and tolerability of SynGEM. Forty-eight participants were randomly assigned to either the low-dose (140 μg F-protein-FP/2 mg BLPs) or high-dose group (350 μg F-protein-FP/5 mg BLPs) and received the vaccine or placebo in a 3:1 ratio. Primary safety outcomes included local or systemic, solicited or unsolicited adverse events (AE) within 28 days and incidence of vaccine-related serious adverse events (SAE) within 57 and 180 days post-vaccination. Antibodies were measured at baseline, day 29 and day 57.

Results Overall incidence of solicited local (83.3% vs 83.3% vs 83.3%) and systemic (88.9% vs 72.2% vs 75.0%) AEs was similar between low-dose, high-dose and placebo groups. Most were of mild severity and only one was severe in a subject subsequently diagnosed with PCR-confirmed influenza A at the time of vaccination. The most common local side effects included nasal discomfort, rhinorrhea and loss of smell whereas fatigue, headache and myalgia were the most frequent systemic effects. Unsolicited AEs were primarily respiratory and reported by 33.3%, 55.6% and 33.3% of participants in the three respective groups. One SAE possibly related to the vaccine was recorded: a high-dose group participant reported persistent pulsatile tinnitus arising after the prime vaccination. Assessment of immunogenicity revealed significant dose-dependent increases in serum and nasal antibodies.

Conclusion SynGEM was generally well tolerated and the data showed that both local and systemic antibodies could be induced by intranasal delivery. However, one SAE was noted and further investigation as to whether intranasal subunit vaccination could be causal is required.
New approaches to characterising paediatric respiratory diseases

**GENETIC AND STRUCTURAL CHARACTERISATION OF OUTER DYNEIN ARM VARIANTS CAUSING PRIMARY CILIARY DYSKINESIA**

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**Introduction** Primary ciliary dyskinesia (PCD) is a heterogeneous, recessive disease, characterised by dysfunction of motile cilia that arises from structural defects. Symptoms include chronic pulmonary disease, rhinosinusitis, otitis media, laterality defects, congenital heart disease and subfertility. The most commonly affected cilia structure is the outer dynein arm (ODA), a complex structure composed of a docking complex and multiple heavy, light and intermediate dynein chains. An understanding of the relationship between the genetic and structural phenotype of ODA variants will allow patient stratification and improve diagnosis through verification of new candidate genes.

**Methods** 195 PCD patients were genotyped using next generation sequencing. Candidate variants were confirmed by Sanger sequencing and familial segregation analysis. For selected ODA mutations, electron tomography, an extension to transmission electron microscopy, was used to produce high-resolution 3D models of ciliary axonemal microtubular doublets and ODA volume ratios. The data were analysed to determine the impact of eight different gene mutations causing different structural defects of the ODAs.

**Results** 39% of patients had bi-allelic mutations identified which are associated with ODA structure. These include variants in known PCD genes: DNAH5 (n=39), DNAH11 (n=18), DNAI1 (n=8), DNAI2 (n=5), ARMC4 (n=3), CCDC114 (n=2), DNAL1 (n=1) and mutations in the novel candidate DNAH9. Variants in DNAH9 have been suggested as a cause of PCD previously but disregarded due to lack of phenotypic evidence. 3D models of the ODA complex identified genotype specific changes in the ODA complex in PCD. The ODA structure in PCD was different in the proximal region, in proximity to the microvilli, when compared to the distal region, towards the tip of the axoneme. A significant deficiency in the ODA volume was detected at the distal part of the axoneme in the patient with DNAH9 defects, whereas the proximal portion was unaffected, reflecting the protein position of DNAH9.

**Conclusion** 3D electron tomography can be used to detect subtle changes in the ultrastructure of the ODA in PCD patients with differences detected in the impact of mutations in proximal versus distal regions of the cilia.

**S70 CHANGE IN LUNG CLEARANCE INDEX AND EXHALED NITRIC OXIDE AS MARKERS OF SYSTEMIC CORTICOSTEROID RESPONSE IN CHILDREN WITH SEVERE ASTHMA**

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10.1136/thoraxjnl-2017-210983.76

**Introduction** Children with severe therapy resistant asthma (STRA) have heterogeneous disease with variable response to steroids. Currently, spirometry (forced expiratory volume in 1 s (FEV1)) is most widely used to assess treatment response. We hypothesised lung clearance index (LCI) would more sensitively assess steroid response than FEV1 alone, using our multi-domain approach [JACI 2016;138:413–420] with the addition of LCI to measure response of distal airway disease.

**Methods** 39 children with STRA were recruited during a clinically-indicated admission for bronchoscopy and intramuscular triamcinolone injection. Prior to triamcinolone, they performed LCI, spirometry, FeNO, and filled in the asthma control test (ACT). They were followed up at 4 weeks and these tests repeated. ACT was considered abnormal if <20, LCI if ≥7.1, FEV1 percent predicted below 80%, and FeNO if ≥24 parts per billion. Any domain which was abnormal at visit 2 was a non-response.
Results 26/39 (67%) patients had at least a partial response, see Table. There was strongest concordance of Results between FeNO and LCI (70%). 11/39 (28%) of patients had a response in at least two domains, 4/39 (10%) at least three, and 1 patient responded in all four domains.

Conclusions In this cohort, LCI, FeNO and FEV₁ were equally likely to be abnormal at baseline. FeNO and LCI were most likely to respond, (36% and 33% respectively), whereas FEV₁ was less responsive to systemic steroids. Using this multi-domain approach 67% improved over 4 weeks following treatment with systemic corticosteroid. The clinical significance of an LCI response remains to be determined. We speculate that this group may reflect a distal airway disease phenotype who may benefit from fine particle inhaled corticosteroids.

This finding was unchanged after adjustment for age, height and weight (Table).

Conclusions Differences in spirometry were in accordance with previous reports. We did not find any significant differences in respiratory muscle strength between the two ethnic groups. The greater FVC in white children might have been attributable to increased inspiratory muscle strength, leading to a greater volume at the start of the manoeuvre, but this was not the case. An increase in expiratory muscle strength would be less likely to increase FVC, since the end of expiration occurs when there is airway closure. Elastic recoil might be an alternative explanation for ethnic differences in lung function.

Abstract S70 Table 1  Patients with abnormal results in each of the 4 domains tested pre- and four weeks post-triamcinolone injection

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Visit 1</th>
<th>Visit 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abnormal</td>
<td>Abnormal</td>
</tr>
<tr>
<td>FEV₁</td>
<td>23 (59%)</td>
<td>19 (49%)</td>
</tr>
<tr>
<td>LCI</td>
<td>20 (51%)</td>
<td>7 (18%)</td>
</tr>
<tr>
<td>ACT</td>
<td>37 (95%)</td>
<td>26 (67%)</td>
</tr>
<tr>
<td>FeNO</td>
<td>24 (62%)</td>
<td>10 (26%)</td>
</tr>
<tr>
<td>MIP (unadjusted) (kPa)</td>
<td>7.31 (1.92)</td>
<td>7.05 (1.91)</td>
</tr>
<tr>
<td>MEP (unadjusted) (kPa)</td>
<td>7.45 (1.92)</td>
<td>6.27 (1.56)</td>
</tr>
<tr>
<td>MEP (adjusted) kPa</td>
<td>7.45 (1.92)</td>
<td>6.27 (1.56)</td>
</tr>
</tbody>
</table>

Values are all Mean (SD)

S71 ARE ETHNIC DIFFERENCES IN LUNG FUNCTION EXPLAINED BY DIFFERENCES IN RESPIRATORY MUSCLE STRENGTH IN CHILDREN?

NTS Gharbawi, G Duncan, EA Gaillard, M Viskaduraki, CS Beardsmore. University of Leicester, Leicester, UK

10.1136/thoraxjnl-2017-210983.77

Background South Asian (SA) children have a reduction in forced vital capacity (FVC) of 9%–13% compare to white children. Ethnic differences in Maximal Inspiratory Pressure (MIP) and Maximal Expiratory Pressure (MEP) could potentially explain this. One study in adults measured MIP (but not MEP) in four ethnic groups (not including South Asians) but failed to find any differences (Sachs, Enright et al. 2009).

Aim To investigate differences in spirometry and respiratory muscle strength between white and south Asian children.

Methods Children were recruited from primary schools. We measured height, weight, and spirometry. FEV₁ and FVC were expressed as Z-scores, based on predicted values for white children (Quanjer et al. 2012). For respiratory muscle strength measurements, the child breathed through a pneumotachograph attached to a shutter. To measure MIP, after several quiet breaths, the child exhaled maximally and the shutter was activated. The child made an inspiratory effort and peak pressure was recorded. The test was repeated several times. Measurements of MEP were similar, except that the child inhaled maximally and then made a forceful expiratory effort.

Results We studied 263 healthy children aged 5–11 year. We obtained valid spirometry on 229 (64 white, 165 SA); valid MIP on 203 (55 white, 148 SA); and valid MEP on 231 (64 white, 167 SA). FEV₁ and FVC were smaller in SA children than their white peers. There were no significant differences between unadjusted MIP and MEP in white and SA children.

Conclusions FEV₁ and FVC were smaller in SA children (Quanjer et al. 2012). For respiratory muscle strength between unadjusted MIP and MEP in white and SA children. There were no significant differences in respiratory muscle strength between the two ethnic groups. The greater FVC in white children might have been attributable to increased inspiratory muscle strength, leading to a greater volume at the start of the manoeuvre, but this was not the case. An increase in expiratory muscle strength would be less likely to increase FVC, since the end of expiration occurs when there is airway closure. Elastic recoil might be an alternative explanation for ethnic differences in lung function.

Abstract S71 Table 1

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>South Asian</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV₁ Z-score</td>
<td>0.13</td>
<td>−0.58</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>(1.02)</td>
<td>(0.96)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FVC Z-score</td>
<td>0.34</td>
<td>−0.69</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>(1.00)</td>
<td>(0.95)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIP (unadjusted) (kPa)</td>
<td>7.31 (1.56)</td>
<td>7.10 (2.03)</td>
<td>0.54</td>
</tr>
<tr>
<td>(2.15)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIP (adjusted) (kPa)</td>
<td>7.45 (1.92)</td>
<td>7.05 (1.91)</td>
<td>0.19</td>
</tr>
<tr>
<td>(1.92)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEP (unadjusted)</td>
<td>6.27 (1.56)</td>
<td>6.48 (1.73)</td>
<td>0.38</td>
</tr>
<tr>
<td>(1.56)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEP (adjusted) kPa</td>
<td>6.33 (1.57)</td>
<td>6.46 (1.56)</td>
<td>0.59</td>
</tr>
</tbody>
</table>

Values are all Mean (SD)

S72 CLINICAL AND PATHOLOGICAL CHARACTERISTICS OF SEVERELY ASTHMATIC CHILDREN WITH PERSISTENT AIRFLOW LIMITATION

A Nayeem, S Saglani, A Bush, LP Silveira, C Bossley, L Fleming. Imperial College London, London, UK

10.1136/thoraxjnl-2017-210983.78

Introduction Severe therapy resistant asthma (STRA) in children is heterogeneous: many have normal lung function, however there is a group with persistent airflow limitation (PAL). Little is known about PAL in children and previous studies are limited by the definitions used. We hypothesised that when PAL is classified according to stringent criteria (post bronchodilator FEV₁ z score < −1.96 after a one-month systemic steroid trial (ERM 2011, Ch 5; 51–59) this group would have distinct clinical, inflammatory and pathological characteristics compared to children without PAL.

Methods Retrospective analysis of 103 STRA children. Patients were classified as STRA if they had ongoing poor control despite high dose inhaled corticosteroids plus at least one add on therapy having been assessed as part of a systematic protocol when modifiable factors such as poor adherence were identified and corrected. All children underwent bronchoscopy, bronchoalveolar lavage (BAL) and endobronchial biopsy and treatment with systemic corticosteroid. The clinical significance of an LCI response remains to be determined. We speculate that this group may reflect a distal airway disease phenotype who may benefit from fine particle inhaled corticosteroids.
**Results**

26/103 (25.2%) STRA children were classified with PAL. There were no differences in the demographic characteristics between the groups. Fewer children with PAL had a previous Paediatric Intensive Care Unit admission (21.7% versus 47.1%); there were no other differences in asthma control. Children with PAL had a higher number of submucosal eosinophils (p=0.021) in endobronchial biopsies before triamcinolone, but there were no differences in airway luminal inflammation in BAL. However, there was a trend lower sputum eosinophils post, but not pre, triamcinolone in children with PAL (0.65% (0–17) versus 2.5% (0–42.8), p=0.054). There were no differences in blood eosinophils or FENO levels. All children classified as PAL post triamcinolone continued to have reduced FEV1 (post bronchodilator z score < −1.96) in the following 12 months.

**Conclusion**

PAL is relatively common in paediatric STRA even when a very stringent definition is used. Mucosal eosinophilic inflammation is associated with PAL and may represent a therapeutic target. Further work is needed to elucidate underlying mechanisms.

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**Background**

Asthma is one of the commonest childhood diseases. Although cough is considered a key symptom of asthma, little is known about the cough patterns in asthmatic children. Previously, cough patterns in asthma have only been studied subjectively, in terms of frequency and diurnal variation, and it has been reported that asthmatics cough more at night, specifically from midnight until early morning. However, there is little objective data to confirm this. Using an objective cough monitoring system we investigated cough frequency and diurnal patterns of cough over 24 hours in asthmatic children.

**Methods**

Children (age 2–17 years) with a diagnosis of Asthma were asked to wear the VitaloJAK cough monitor for a maximum of 24 hours on two occasions – when symptoms were stable and during an exacerbation. All 24 hour recordings were processed through compression software and coughs counted by listening to the resulting files; the 24 hour cough number were reported.

**Results**

26 stable asthmatic children (17 male; median age 11.9 years) completed 24 hour recordings when stable; 12 repeated recordings during an exacerbation. During the stable period median total cough counts during awake-hours, sleep-hours and 24 hour periods were 69.5 (range 3–395), 0 (range 0–151) and 71 (range 4–432) respectively. Coughs occurred mostly during the awake time (86%), peaking at 08:00 and 19:00 hours, and rarely occurred during the night when subjects were sleeping (14%). During exacerbations the median total cough counts during awake-hours, sleep-hours and 24 hours were 183 (range 0–632), 18.5 (range 0–128) and 262 (range 10–645), which were significantly higher than during stable recordings (p<0.05). The incidences of day-time cough were similar to that of stable asthmatic recordings (80%) and the incidences of night-time cough remained low (10%). However, during an exacerbation, the peak time of coughing was at 11:00 and 17:00–19:00 hours. The distribution of cough for 12 asthmatic children when stable and during exacerbations is shown in figure 1.

**Conclusions**

Objective monitoring shows that cough frequency in children is greater during the day and was reduced during...
sleep in both stable and exacerbating asthma. Cough frequency increases during the morning and late afternoon.

Mechanistic insights into interstitial lung disease

ENDOPLASMIC STRESS IS ASSOCIATED WITH FIBROSIS IN INTERSTITIAL LUNG DISEASE

Interstitial lung diseases (ILD) are a heterogeneous group characterised by variable amounts of inflammation and fibrosis. However, the development of pulmonary fibrosis is associated with a poorer prognosis. Although distinct histological features differentiate between the ILDs, it is unknown if there are shared pathogenic mechanisms involved in the development of fibrosis. Endoplasmic reticulum (ER) stress has been implicated in the pathogenesis of familial and sporadic idiopathic pulmonary fibrosis (IPF). In response to ER stress, cells trigger the unfolded protein response (UPR) and upregulate chaperones, such as BiP, and the phosphatase GADD34, which can regulate epithelial to mesenchyme transition, cell proliferation, apoptosis and cell survival.

Aims We hypothesise that ER stress may be involved in the pathogenesis of fibrosis in all interstitial lung diseases.

Methods Paraffin embedded sections, obtained from video-assisted thoracoscopic diagnostic lung biopsies, from 8 patients with familial pulmonary fibrosis, 11 sporadic idiopathic pulmonary fibrosis (IPF). In response to ER stress, cells trigger the unfolded protein response (UPR) and upregulate chaperones, such as BiP, and the phosphatase GADD34, which can regulate epithelial to mesenchyme transition, cell proliferation, apoptosis and cell survival.

Results The relationship between BiP and GADD34 expression in IPF (r^2=0.49 p<0.0001) and HP (r^2=0.59 p<0.0001). There was no association with inflammation.

Conclusion These data show that ER stress and the UPR are associated with fibrotic ILDs. Hence targeting ER stress may be a novel therapeutic option for pulmonary fibrosis. Work is on going to identify a peripheral biomarker signature for ER stress.
ROLE OF GALECTIN-3 IN THE DEVELOPMENT OF IDIOPATHIC PULMONARY FIBROSIS

N Parmar, A Tatler, P Ford, G Jenkins. University of Nottingham, Nottingham, UK; Galecto Biotech, Sweden

Introduction

Idiopathic pulmonary fibrosis (IPF) is a chronic and progressive lung disease with a poor prognosis. Activation of the profibrotic cytokine transforming growth factor β (TGFβ) is crucial in IPF development. It has been shown that the β-galactoside binding lectin galectin-3 can promote fibrosis through altering cellular responses to TGFβ. However, the precise mechanism of this is currently unknown.

Methods

Immunohistochemistry (IHC) staining for galectin-3 in lung sections from patients with IPF and mice treated with 28 day of saline or bleomycin. Transformed mink lung epithelial cells (TMLCs) which stably express firefly luciferase at the plasminogen activator inhibitor-1 promotor region were used as a measure of TGFβ activity. TMLCs were treated with increasing concentrations of recombinant human galectin-3 (rhGal-3) and luciferase activity was measured. Human lung fibroblasts (HLFs) isolated from control patients (non-IPF) and patients with IPF, and immortalised human bronchial epithelial cells (IHBECs) were treated with 50 μM TGFβ receptor type 1 inhibitor (Alk5 inhibitor), or 1 μM galectin-3 inhibitor TD139 (currently in clinical trials for IPF treatment) and 10 μg/ml rhGal-3. Mouse embryonic fibroblasts expressing the integrin αvβ6 (MEF66), HLFs, and IHBECs were treated with 1 μM TD139 and 2 ng/ml TGFβ. Protein expression of phosphorylated Smad2 (pSmad2) and total Smad2 were assessed by western blot. qPCR was used to measure galectin-3 at the mRNA level in HLFs treated with 2 ng/ml TGFβ.

Results

IHC showed that galectin-3 is increased in patients with IPF and in the bleomycin mouse model; where expression is increased in airway epithelial cells, fibroblasts, and macrophages. Treatment with rhGal-3 increased TGFβ activity in TMLCs, and significantly increased levels of pSmad2 in HLFs but not IHBECs which was inhibited by the Alk5 inhibitor and TD139. Treatment with the galectin-3 inhibitor TD139 significantly inhibited TGFβ dependent Smad2 phosphorylation in MEF66 and HLFs but not in IHBECs. TGFβ stimulation significantly increased galectin-3 expression at the mRNA level in IPF HLFs but not control HLFs.

Conclusion

Galectin-3 is involved in TGFβ signalling where it can promote TGFβ activation and activity in fibroblasts. Results indicate the presence of a TGFβ-galectin-3 positive feedback loop (figure 1). Thus galectin-3 can potentially be a therapeutic target for IPF treatment.

REFERENCES


TRANSCRIPTOMIC STUDIES REVEAL MONOCYTE-RELATED GENES AS MAJOR CONTRIBUTOR TO DISEASE ACTIVITY IN PULMONARY SARCOIDOSIS

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Despite major advances in characterising the disease pathogenesis of sarcoidosis, it is still unclear which immune pathway is
the main contributor to disease activity. The most effective treatment, corticosteroids, has a high adverse effect burden so there is a need to define more specific therapeutic agents with less side effects. In addition, for some patients with progressive active disease, corticosteroids are often unhelpful; therefore better understanding of the mechanisms of disease is needed for development new drugs. This study examines the potential immune processes involved in disease activity in sarcoidosis using gene expression profiling of peripheral blood mononuclear cells (PBMCs) (n=29) and bronchoalveolar lavage cells (BALCs) (n=12). Patients with well-defined pulmonary sarcoidosis and secure tissue-supported diagnosis were recruited from the Oxford Sarcoidosis Service during a defined 2 year period. Patients were not on treatment at the point of sampling. A CTAS1 -validated chest radiograph-blood disease activity score comprising lymphocyte, ACE and IgG levels (SCAS, scores from 0 to 12 reflecting low to high activity) was used to measure activity at the point of sampling. Gene expression profiles were derived from PBMC and BALCs using the Illumina HT-12 v4 expression chip. All RNA had a RIN >8. We found a significant positive correlation between the ‘immune response’ gene set and SCAS for BALCs, by GSEA and Metacore functional analyses. Within this gene set, a transcriptional signature related to monocyte activity and function was shown to be the most significant gene network with an unexpected downregulation of TGFb receptor signalling pathway in low activity BALCs. In PBMCs and BALCs, the two IFN-g-inducible, monocyte-produced genes CXCL-9 and CXCL-10 were the soluble factors that most correlated with increasing activity (r \geq 0.3) by Spearman Correlation. In an independent cohort, SCAS levels were examined against CD14hi classical monocyte levels (n=40, same inclusion criteria). This showed a marked correlation between monocyte frequency and level of activity as measured by SCAS (r=0.67; p<0.001; Spearman Rank correlation). These Results implicate monocytes as a major contributor to disease activity in sarcoidosis and propose monocyte pathways as potential specific targets for new therapeutics in sarcoidosis.

**REFERENCE**


**S78 INCREASED CD16BRICD62LDMCD11B+SUBSET OF NEUTROPHILS IN BRONCHOALVEOLAR LAVAGE FROM PATIENTS WITH INTERSTITIAL LUNG DISEASE**

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**Introduction**

The Interstitial Lung Diseases (ILD) are a heterogeneous group of inflammatory and fibrotic diseases of the interstitium, with worst cases resulting in pulmonary fibrosis (PF). Increased neutrophils are found within the lung or bronchoalveolar lavage (BAL) in ILD and predict a poor prognosis. Neutrophil adhesion molecules, e.g., CD18/b2 integrins (LFA-1; CD11a, Mac-1; CD11b and CR3; CD11c) and L-Selectin (CD62L) regulate cellular recruitment and fibrosis in animal models of bleomycin-induced PF. Expression of the Fc receptor (CD16) is upregulated during neutrophil activation, whilst ICAM-1 (CD54) is a marker for neutrophil reverse-transmigration back across the endothelium.

**Study Aim**

Investigate adhesion molecule expression profile of neutrophils in ILD patients compared to controls.

**Methods**

BAL samples were collected from ILD and non-ILD patients undergoing bronchoscopy with informed consent. Adhesion molecule expression was studied via flow cytometry by staining cells with CD16, CD62L, CD11b, CD11c, CD11a, CD18 and CD54 antibodies.

**Results**

Flow cytometric analysis of BAL showed significantly more neutrophils in ILD lavage express CD11b and CD18 compared to non-ILD controls (p=0.0016 and p=0.0211 respectively). No significant differences were found in CD11c or CD11a expression. Further analysis revealed ILD lavage contained a higher percentage of CD16+CD62Ldim neutrophil subset expressing CD11b than non-ILD lavage controls (p<0.0001); a subset previously associated with a suppressive phenotype.1 In addition, ICAM-1 expression was significantly down-regulated in ILD lavage neutrophils (p=0.0397) and this was also reflected in the CD16+CD62Ldim neutrophil population (p=0.0445).

**Conclusions**

From our preliminary study, we have observed an increased percentage of CD16+CD62LdimCD11b+ subset of neutrophils in ILD lavage compared to controls. ILD lavage neutrophils express significantly less ICAM-1. This suggests that more neutrophils are entering and being retained within the lung in ILD. Further experiments will dissect whether ILD neutrophils have altered functions (such as NETosis, ROS production, adhesion or migration) to contribute to disease progression.

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**S79 LOCALISED HYPOXIA ENHANCES NEUTROPHIL EXTRAVASATION AND ACTIVATION IN INTERSTITIAL LUNG DISEASE**

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**Background**

Neutrophilic inflammation is common in various diseases and may contribute to the pathophysiology of interstitial lung disease (ILD), however the underlying mechanism are not fully understood. Localised tissue hypoxia is often accompanied with inflammation, which may alter cellular responses to drive immunopathology.

**Hypothesis**

We propose that hypoxia modulates neutrophil functions including integrin activation, neutrophil extravasation and neutrophil extracellular trap (NET) release that may contribute to pulmonary damage in ILD

**Methods**

Pulmonary hypoxia was assessed using both fluorom�sonia (FMISO)-PET scanning of ILD patients and immunohistochemical HIF-1a staining in ILD and control lung sections. To examine the effects of hypoxia, isolated neutrophils were cultured under hypoxia (1% oxygen) or normoxia (21% oxygen) prior to experimentation. Neutrophil integrin expression was evaluated using flow cytometry. Neutrophil...
adhesion and trans-endothelial migration were measured using fluorescence-based assays. Reactive oxygen species (ROS) production was measured using an enzymatic assay to assess hydrogen peroxide (H₂O₂) generation. NETosis was measured using a novel capture ELISA. Bronchoalveolar lavage (BAL) were obtained from ILD or control patients and assessed for NETs.

**Results** FMISO-PET scans indicated localised hypoxia in fibrotic regions in ILD patients. Hypoxia was also determined in lung sections, which demonstrated positive HIF-1α in ILD but not control lungs. ILD-BAL had significantly greater levels of NETs. Hypoxia increased neutrophil β₂ integrin expression, however increased surface expression of the α₅ and αX subunits (p=0.0001 and 0.0179 respectively). Unstimulated, PMA- and LPS-stimulated neutrophil adhesion to both resting and activated endothelial monolayers were enhanced under hypoxia. Neutrophil trans-endothelial migration, across both resting and activated endothelial cells, was also greater in hypoxia (p<0.05). Interestingly, whilst ROS generation was not affected by hypoxia, both spontaneous and PMA-induced NETosis were increased under hypoxic conditions (p<0.05 and 0.001 respectively).

**Conclusions** We have demonstrated that localised hypoxia is a feature of the ILD lung. Moreover, elevated NETs were found in ILD-BAL, suggesting a role for aberrant neutrophil activation in ILD pathology. Hypoxia increased neutrophil β₂ integrin expression, adhesion to endothelial monolayers, trans-endothelial migration and NETosis. Further work is underway to investigate the signalling pathways underlying neutrophil activation in ILD.

**Changes in pulmonary rehabilitation: new diseases, new approaches**

### A FEASIBILITY STUDY OF A MULTI-CENTRE RANDOMISED CONTROLLED TRIAL OF ASTHMA-TAILORED PULMONARY REHABILITATION (AT-PR) VERSUS USUAL CARE (UC) IN INDIVIDUALS WITH SEVERE ASTHMA

**Introduction** There is limited evidence regarding the acceptability and efficacy of pulmonary rehabilitation (PR) for patients with severe asthma. We investigated the feasibility of performing a randomised controlled trial of asthma-tailored pulmonary rehabilitation (AT-PR) versus usual care (UC).

**Method** Patients with severe asthma were recruited and randomised 2:1 to AT-PR or UC. The primary outcome was recruitment, retention and adverse event rates. Secondary outcome measures were assessed before and after a 12 week intervention period and included the incremental shuttle walk test (ISWT), cycle-ergometer (ICE), quadriceps muscle strength, the asthma control questionnaire (ACQ), chronic respiratory questionnaire (CRQ), asthma quality of life questionnaire (AQLQ), hospital anxiety and depression scale (HADS) and measures of airway inflammation (sputum eosinophil count and fractional exhaled nitric oxide (FeNO)). Analysis of covariance adjusting for baseline differences was used to compare the effect of AT-PR compared to UC. By recruiting 60 patients, a recruitment rate of 30% was estimated with a 95% CI of ±7%.

**Results** 61 out of 235 eligible patients were recruited (26%): 38 females, mean (SD) age 54 (13) yr, BMI 32 (7) kg/m², FEV₁ 1.95 (0.74) L, PEFR/FVC 69 (11)% and 51 were randomised to AT-PR (n=34) or UC (n=17). The retention rates for AT-PR and UC were 62% and 53%, respectively. There were 7 serious adverse events but none related to the AT-PR sessions. The Results for the secondary outcome measures are shown in Table 1.

**Conclusion** AT-PR may be effective for patients with severe asthma but any future trial design would need to be modified to improve retention rate. In this small study, changes in airway inflammation were similar between AT-PR and usual care.
The effects of pulmonary rehabilitation in cystic fibrosis are well documented, but the effectiveness of interval exercise training remains unexplored. The aim of this study was to investigate whether interval exercise (IE) could be as beneficial as continuous exercise (CLE) in terms of improvement in functional capacity, peripheral muscle strength, and quality of life. We studied 24 Caucasian, ambulatory, adult, cystic fibrosis patients. Patients underwent a structured, outpatient, hospital-based pulmonary rehabilitation program for 12 weeks. Patients were randomised either to 30 min high-intensity IE (100% WRmax for 30 s alternated with 40% WRmax for 30 s; n=12) or 30 min moderate intensity CLE (70% WRmax; n=12). Interventions were balanced to provide the same overall training workload. Assessment was performed at baseline and following completion of the rehabilitation program. Functional capacity was assessed by the 6MWT, peripheral muscle strength was measured by the quadriceps isometric force and the Cystic Fibrosis Questionnaire-Revised (CFQ-R) was used to assess patient reported outcomes. The 6MWT was significantly improved equally in the IE Group (by 45 m; pre: 538±70, post: 583±83 m; p<0.001) and in CLE Group (by 48 m; pre: 516±57, post: 564±55 m; p=0.001). Improvement in quadriceps muscle strength was significantly greater in the IE group (pre: 37.9±13.1, post: 45.2±14.2 Kg; p=0.024) compared to CLE (pre: 40.0±12.2, post: 45.4±9.3 Kg; p=0.002) and lower intensity of dyspnoea (3.8±0.7 vs. 5.9±0.8; p<0.001).

In conclusion, within the pulmonary rehabilitation setting, IE is equally effective to CLE in improving functional capacity and aspects of quality of life, but is superior to CLE in improving peripheral muscle strength. Furthermore, it can be applied to CF patients with lower dyspnoea sensations and lower arterial desaturation, thus qualifying as a safer alternative training strategy.
Introduction and Objectives Ageing is typically associated with progressive deleterious changes in respiratory mechanics which increase the work of breathing and limit ventilatory reserve. The impact on exercise capacity and exertional breathlessness in healthy ageing remains incompletely understood, in part due to a failure of previous research to control for negative effects of physical inactivity. This study aimed to compare neural respiratory drive (NRD), respiratory mechanics and breathlessness between highly active older adults (AOA) and recreationally active younger adults (YA). We hypothesised that NRD, quantified as diaphragm electromyogram activity (EMGdi) as a percentage of volitional maximum (EMGdi%max), would be higher in AOA than in YA and that this would be associated with increased breathlessness intensity during exercise.

Methods 12 YA (mean (+/-SD) age 26.4+/-4.7 years) and 12 AOA (cyclists, 59.0+/-10.1 years), all male, underwent incremental cycle ergometry to their symptom-limited maximum. EMGdi was recorded continuously using an oesophageal multi-pair electrode catheter and quantified as EMGdi%max. Breathlessness intensity was quantified each minute and at end-exercise using the modified Borg scale.

Results Absolute FEV1, FVC, FEV1/FVC and IC tended to lower values in AOA than in YA (Table 1), without significant differences in baseline EMGdi%max (AOA 10.6+/-5.8%max; YA 7.6+/-3.7%max, p=0.15). End-exercise EMGdi%max was significantly higher in AOA than in YA (AOA 61.8+/-13.7%max; YA: 51.9+/-9.1%max p=0.049), with a trend towards higher end-exercise tidal volume (Vt) relative to IC (AOA: Vt%IC=83.1+/-16.7%; YA: Vt%IC=73.2+/-17.1%, p=0.17). There were no significant end-exercise differences in VT (AOA 2.9+/-0.8 L; YA 2.8+/-0.6 L, p=0.83), minute ventilation (VVe) (AOA 116.7+/-35.8 L/min; YA: 110.4+/-29.3 L/min, p=0.64) or mBorg breathlessness intensity (median (IQR) AOA 5 (3.23–7.75); YA 5 (5–9), p=0.5).

Conclusions Highly active older adults achieved a similar end-exercise Ve to the younger adults despite age-related respiratory constraints. This required higher levels of NRD, which contrary to our hypothesis, was not perceived as increased breathlessness intensity. The contribution of ageing and/or regular physical activity to this apparent blunted perception of breathlessness requires further study.
Results Fifty two patients completed the BCKQ questionnaire: 36 conventional PR programme [20 male, MRC 3 (IQR 2–4), age 67 (±8.5) years, BMI 30 (±6.6) kg/m², FEV₁ (% predicted) 53 (±21), pre ISWT 280 m (±163), pre HADS anxiety 6.6 (±4.8), pre PRAISE 45 (±8.4)] and 16 online [14 male, MRC 3 (IQR 2–4), age 67 (±7.4) years, BMI 25 (±5.0) kg/m², FEV₁ (% predicted) 47 (±27), pre ISWT 365 m (±201), pre HADS anxiety 7.5 (±5.1), pre PRAISE 49 (±7.9)]. There were no significant differences in baseline characteristics. A statistically significant difference was seen in knowledge within each group following either the conventional PR programme (change=5 points, p≤0.001) or the web programme (change=11 points, p≤0.001). The change in scores between the groups was also significantly different (p≤0.001) in favour of the web-based programme (Table 1).

Discussion Patients are able to gain improvements in knowledge around their condition using a website programme as an alternative to the traditional spoken sessions in a PR programme.

REFERENCE

Abstract S84 Table 1 Between group changes of the Bristol COPD knowledge questionnaire following either conventional PR or a web-based programme

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<th>WEB</th>
<th>PR</th>
<th>Difference Between groups (p value)</th>
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<td>Pre BCKQ</td>
<td>35±10</td>
<td>38±10</td>
<td>0.3</td>
</tr>
<tr>
<td>Post BCKQ</td>
<td>46±6</td>
<td>43±7</td>
<td>0.2</td>
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<tr>
<td>Change in BCKQ</td>
<td>11±8</td>
<td>5±7</td>
<td>0.009*</td>
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*p≤0.01

Mechanisms of asthma

CORTICOSTEROID-RESISTANT NEUTROPHILIC AIRWAY INFLAMMATION AND HYPERRESPONSIVENESS CAUSED BY IL-13

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Rationale Severe corticosteroid refractory asthma is a significant unmet medical need. It accounts for 10% of the asthma population and 50% of the health economic burden. Recent understanding of asthma heterogeneity has evolved beyond classical characteristics, allowing definition of distinct disease phenotypes such as those defined by levels of Type 2 inflammation (Type-2 high ‘eosinophilic’ disease and Type-2 low ‘neutrophilic’ disease). However, a recent study using dupilumab (an antibody that blocks the common IL-4 and IL-13 receptor chain, IL-4Rα) as an add-on therapy in adults with uncontrolled persistent asthma showed efficacy irrespective of baseline eosinophil count (Wenzel et al, Lancet 2016). The aim of this work was to use IL-13 transgenic mice to test the hypothesis that a subset of IL-13 mediated airway responses are corticosteroid-unresponsive and contribute to ongoing airways symptoms.

Methods IL-13 expression in the lungs was induced using Doxycycline (DOX) in Ccsp-rtTA/Otet-Il-13 double-transgenic (Ccsp/Il-13) mice. Littermate control single transgenic mice also received DOX. Where indicated, mice received daily intra-peritoneal injections of 3 mg/kg Dexamethasone (Dex) for 3–7 days and control mice received saline. Methacholine challenge and lung function measurements were performed and lungs harvested for mRNA analysis and immunohistochemistry (IHC). BALF was obtained for ELISA and differential cell counts.

Results Compared to controls, Ccsp/Il-13 mice showed significantly increased airway hyperresponsiveness (AHR) to methacholine and IHC revealed increased bronchial smooth muscle and goblet cell metaplasia. The BALF of these mice contained mixed eosinophilic and neutrophilic inflammation, but neutrophils predominated. Characteristic Th2-responsive genes (Il-13, Eotaxin, MacSAC, Periostin and SerpinB2) as well as genes more characteristic of Th17 responses (Cxcl1/Kc, Cxcl2 and Csf3) were significantly elevated. Treatment with Dex did not abrogate AHR, even though eosinophilia and the ‘Th2’ gene signature were significantly reduced. However, neutrophils and the ‘Th17’ signature remained elevated.

Conclusion Although IL-13 promotes eosinophilic airways disease, it can also drive corticosteroid refractory inflammation characterised by persistent neutrophilia, Th17 cytokines and maintenance of AHR. These findings may help explain the beneficial effect of dupilumab in uncontrolled asthma. The Ccsp/Il-13 mouse may be a useful model for dissecting the molecular pathways and mechanisms associated with predominant neutrophilic, corticosteroid refractory disease.

EXTRACELLULAR MATRIX DEPOSITED BY ASTHMATIC HUMAN AIRWAY SMOOTH MUSCLE CELLS ENHANCES BASAL ACTIVATION OF TGFβ

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TGFβ is a widely distributed, pleiotropic cytokine implicated in tissue remodelling in many diseases including severe asthma. It is secreted in a latent form that requires activation for function. Mechanotransduction of intracellular forces through cell surface integrins can lead to TGFβ activation. We have previously shown that human airway smooth muscle (HASM) cells can activate TGFβ via αβ5 integrins. In the present study we have investigated the effect of extracellular matrix (ECM) on basal TGFβ activation in primary asthmatic and non-asthmatic HASM cells. We assessed basal TGFβ activation in non-asthmatic (n=9) and asthmatic (n=7) HASM cells. TGFβ activation was assessed using a TGFβ reporter cell assay and a phosphorylated Smad2 ELISA. Cell contractility was assessed using a collagen gel contraction assay and traction force microscopy. ECM was isolated from HASM cells and cross-over experiments performed where non-asthmatic cells were cultured on asthmatic ECM and vice-versa. Then TGFβ activity determined. Expression of ECM crosslinking enzymes was
determined at the mRNA and protein levels. Finally, expression of LOXL2 was determined in an Aspergillus fumigatus model of asthma. Asthmatic HASM cells activated 3-fold higher levels of TGFβ basally than non-asthmatic cells (p<0.01). Both diseased and control HASM cells increased TGFβ activation in response to methacholine confirming our previous data (Tatler et al 2011). A collagen gel contraction assay demonstrated that asthmatic HASM cells were hypercontractile compared with non-asthmatic cells under basal conditions (p<0.05) and that contractility weakly correlated with amount of TGFβ activated (p<0.05). Importantly, culturing non-asthmatic HASM cells on asthmatic ECM led to increased TGFβ activation (p<0.05) and culturing asthmatic HASM cells on non-asthmatic ECM decreased TGFβ activation (p<0.05). mRNA Expression of the ECM crosslinking enzymes LOXL2 and LOXL3 was significantly increased in asthmatic HASMs (p<0.05). Finally, LOXL2 protein was increased in asthmatic HASMs cells, and increased in the airway smooth muscle layer of animals challenged repeatedly with Asp. f compared with control challenged animals. In conclusion HASM cells derived from asthmatic patients exhibit enhanced activation of TGFβ compared with non-asthmatic HASM cells. This may be driven by the diseased ECM since asthmatic HASMs cells exhibit aberrant expression of ECM crosslinking enzymes.

Severe asthma represents a significant unmet clinical need and the molecular basis for disease persistence remains inadequately understood. Bronchial epithelial cells, at the interface of environment/tissue, are central to asthma pathogenesis. There is thus a need to evaluate genome-wide changes between health and asthma to better understand the molecular mechanisms underlying disease. The vast majority of genome-wide measurements have focused on determining changes at the DNA or mRNA levels, with little attention paid to how and which mRNAs are actually translated into protein. This may not disclose changes happening at the protein level, since mRNA and protein expression correlate poorly. To determine translation and its regulation in bronchial epithelial cells in severe asthma patients we analysed paired genome-wide expression of transcriptional (cytoplasmic) and translational (polyribosome-bound) mRNA levels employing Frac-seq (subcellular fractionation and RNA-sequencing) in primary bronchoepithelium in health and severe asthma patients. We also integrated those data with genome-wide profiling of microRNAs to understand their role in gene expression and impact on the pathophysiology of severe asthma bronchial epithelium. We found both genes (=all isoforms of a gene) and mRNA isoforms differentially expressed in severe asthma airways cells, with dysregulated transcriptional mRNA levels (194 genes) showing little overlap with dysregulated translational mRNA (243 genes) expression. We determined novel inflammatory and remodelling pathophysiological mechanisms disclosed solely by polyribosome-bound mRNAs, centred in epithelium remodelling and repair pathways. We also reveal six dysregulated microRNAs accounting for ~90% of all cellular microRNA targeting, displaying preferential targeting of ~50% of mRNAs undergoing translation in severe asthma airways cells. Thus, microRNAs in human severe asthma are major regulators of translation in airways epithelium and offer potential as future therapeutic targets.
SOLUBLE ADAM33 AUGMENTS THE PULMONARY IMMUNE RESPONSE PROMOTING ALLERGIC AIRWAY SENSITIVITY

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Rational A disintegrin and metalloproteinase 33 (ADAM33) was discovered in 2002 as an asthma susceptibility gene. Genetic associations have been made between ADAM33 polymorphisms and asthma disease severity, bronchial hyperresponsiveness (BHR) and rate of lung function decline in both adults and children. A soluble, catalytically active form of the protein (sADAM33) has been identified in the bronchoalveolar lavage fluid of patients, levels of which correlate with disease severity (Lee JY et al, AJRCCM 2006). To study the role sADAM33, a lung specific, doxycycline (Dox) inducible, transgenic mouse, expressing the human pro and metalloproteinase domains of the full-length protein was generated (Ccsp-rtTA/Otet-ADAM33-Pro-MP). Induction of sADAM33, followed by house dust mite (HDM) sensitisation and challenge, resulted in increased BHR and airway inflammation (Davies ER et al, JCI-Insight 2016). The mechanisms by which ADAM33 promotes this susceptibility are unclear. The aim of this work is to identify pathways that are augmented by the induction of sADAM33, which promote increased sensitivity to allergen.

Methods RNA samples from whole lung of adult mice, where sADAM33 had been induced for 4 or 8 weeks, were analysed by next generation RNA sequencing. Identified genes were confirmed across experimental time points (72 hour, 7 day, 4 and 8 weeks on Dox) in wider sample cohorts of Ccsp-rtTA/Otet-ADAM33-Pro-MP and control mice through RTqPCR.

Results The predominant signal from the RNAseq output was for modulation of immune response genes at 4 weeks of sADAM33 expression (GO:0006935 Immune response: 31 genes, 58.49% coverage, FDR p value=7.09 E-22). Genes associated with an immune activation signature (Ccl5, Igm1, Gmi12230, Gzm, Ncr1) were validated at least one time point. By 8 weeks of sADAM33 expression genes associated with negative regulation of the response were also validated (Ido1, Cd274).

Conclusion Induction of sADAM33 in murine lungs, without allergic sensitisation, augmented underlying immune processes in this transgenic mouse model, which may contribute to increased susceptibility to allergic airway inflammation and BHR when challenged with allergen. Further work is required to delineate how sADAM33 affects immune cell populations and their behaviour in the lung.

EARLY GROWTH TRAJECTORIES IN CYSTIC FIBROSIS

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Introduction Within CF-EpiNet; Harnessing Data to Improve Lives (a CF Trust funded Strategic Research Centre) we will
investigate relationships of lung function in early childhood with growth patterns (here considered as change in weight) before the age of five years. We use flexible longitudinal modelling methods to describe early growth trajectories, and identify factors associated with suboptimal growth.

Methods Growth measurements from diagnosis to five years were extracted from two national CF registries: UK (n=2999, years 2007–2015) and Canada (n=2690, years 1990–2013). SITAR (super-imposition by translation and rotation) was used to model weight (kg) over the 5 years. Output parameters were average growth curve, summaries of growth velocity and overall weight. Associations of growth and growth velocity with sex, genotype and new born screening (NBS) were investigated.

Results Most children in the UK had been diagnosed early in life (median age of diagnosis 0.06 years; inter quartile range 0.03 to 0.1) by NBS. 52% were homozygous for deltaF508. Despite similar initial average weight in boys and girls, males were heavier than females over the first five years. Children homozygous for deltaF508 were lighter than other children. No tested factor was associated with velocity of weight gain. Only 10% of the Canadian children were diagnosed by NBS, and, overall, the age at diagnosis was later (median 0.17 years; inter quartile range 0.08 to 0.53). Over the first five years, Canadian CF children were lighter than those in the UK (figure 1). Associations of weight with sex and genotype were similar to those seen in the UK. In addition, we observed that those diagnosed by NBS were heavier than those who were not.

Conclusions In children with CF there are sex differences in weight during the first 5 years, despite similar initial weight. In Canada, NBS has a positive impact on early growth. SITAR allows exploration of growth patterns in CF patients, but time independent characteristics were not associated with velocity of growth. Statistical modelling incorporating time dependent factors (e.g., infections, treatments) are required to explain variability of growth trajectories.
EFFECT OF LUMACAFTOR/IVACAFTOR ON TOTAL, BRONCHIECTASIS, AND AIR TRAPPING COMPUTED TOMOGRAPHY (CT) SCORES IN CHILDREN HOMOZYGOUS FOR F508DEL-CFTR: EXPLORATORY IMAGING SUBSTUDY

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Objective To evaluate the effects of lumacaftor/ivacaftor (LUM/IVA) combination therapy on lung morphology and physiology with computed tomography (CT) scanning in patients aged 6 to 11 years with cystic fibrosis (CF) homozygous for the F508del-CFTR mutation.

Methods Baseline CT scans were obtained in 19 patients (12 active treatment, 7 placebo) from the phase 3 LUM/IVA trial (NCT02514473), and 24 week CT scans were completed in 7 active treatment and 3 placebo patients. CT scans were obtained at total lung capacity and at residual volume (RV). CT scans were scored by 2 independent readers blinded to all patient and time point information using the Brody score, which evaluates the extent and severity of multiple aspects of CF lung disease, including bronchiectasis and air trapping. Scores are presented as mean (SD); no statistical testing was performed for this preliminary study.

Results Mean total CT score (sum of the subcomponent scores) decreased from 20.6 to 12.5 (mean change [SD], 8.1 [13.6]) in the LUM/IVA group and increased from 32.8 to 41.4 (8.6 [14.6]) in the placebo group. The mean bronchiectasis score decreased from 3.2 to 2.5 (0.7 [1.3]) in the LUM/IVA group and increased from 6.4 to 8.1 (1.7 [2.1]) in the placebo group. Additionally, the diameter of ectatic bronchi decreased in several patients on active treatment. The mean air trapping score decreased from 7.8 to 5.9 (mean difference [SD], 1.9 [6.8]) in the active group and increased from 9.8 to 14.5 (4.7 [11.7]) in the placebo group, as shown for 1 patient (figure 1).

Conclusion This is the first report to describe CT lung findings after CFTR corrector/potentiator therapy in patients aged 6 to 11 years homozygous for F508del. In this 24 week exploratory analysis, bronchiectasis and air trapping scores improved in patients treated with LUM/IVA and worsened in the placebo group. These data suggest that LUM/IVA treatment may reduce CF disease-related changes in lung morphology and/or physiology and support the need for further study.

Please refer to page A257 for declarations of interest in relation to abstract S93.

S94 DEVELOPMENT OF ASSAYS TO ASSESS SAFETY AND EFFICACY OF LENTIVIRAL GENE THERAPY FOR CYSTIC FIBROSIS

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Introduction The UK Cystic Fibrosis Gene Therapy Consortium has developed a novel lentiviral vector (rSIV/HN) designed to transduce airway epithelial cells efficiently and is preparing a first-in-man lentiviral gene therapy trial building on the recent success of the repeat-dosing non-viral trial. Assays to determine safety and efficacy of lentivirus-mediated gene transfer are now being evaluated. Here, we report validation of two comparatively novel techniques.

Methods and Results Digital droplet (DD) RT-PCR: Virus particles may be shed over time following topical administration to the airways. DD-RT-PCR allows absolute and sensitive quantification of vector genomes. Saliva and urine samples were spiked with known quantities of vector particles (VP) to determine recovery and lower limit of detection (LLD) of the assay. Recovery rates in both body fluids were dependent on the amount of input RNA (Saliva: 7.1%–15.7% when spiked with 20–400 VP/uL, urine: 42.5%–76% when spiked with 20–400 VP/uL). The LLD is 200 and 400 VP/ml in urine and saliva, respectively. However, in an average batch only approximately 1:700 to 1:1000 VP is able to transduce a cell.

In situ hybridisation Quantification of the number of airway cells transduced after pulmonary gene transfer has, to date, not been feasible. In situ hybridisation has traditionally suffered from poor sensitivity and high signal-to-noise ratio. RNAscope (ACDBio) is a novel in situ hybridisation technique based on overlapping probes and multiple levels of signal amplification to enhance specificity and sensitivity, respectively. A549 cells were transduced with rSIV/HN or were left untransduced as controls. Cells were harvested 4 hours after gene transfer to assess whether RNAscope (using a lentiviral vector-specific sequence) was able to detect vector genomes in transduced cells. Vector genomes were detectable in transduced, but not untransduced cells (figure) and we are currently evaluating the technique in lungs of mice and sheep models.

Conclusion Both DD-RT-PCR and RNAscope hold promise for assessment of safety and efficacy in the upcoming lentivirus CF gene therapy trial.
CLINICAL OUTCOMES OF ASPERGILLUS DISEASE PHENOTYPES IN ADULT CYSTIC FIBROSIS PATIENTS

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Objectives Aspergillus disease in cystic fibrosis (CF) patients has been proposed to encompass 4 classes: Class 1; No disease, Class 2; Allergic Bronchopulmonary Aspergillosis (ABPA), Class 3; Aspergillus sensitised, Class 4; Aspergillus Bronchitis. The clinical consequence of non-ABPA Aspergillus disease in CF is not fully understood. We evaluated the survival of patients with different classes of Aspergillus disease who were diagnosed as part of Baxter’s work between 2008–2011 in order to determine the clinical consequences of the different phenotypes of disease.

Methods A retrospective case note analysis was undertaken for all 129 patients from the Baxter et al. patient cohort. Survival outcomes were documented for all patients, and baseline demographics including age, gender, FEV₁, BMI and co-pathogens were collected. Any patients who received double lung transplantation or who moved away from the unit during this time were identified. The best FEV₁ for each year of follow up, FEV₁ closest to annual consent date, and BMI were collected for each year of follow in every patient until the current day, or date of death, transplant, or move away. Data was tested for normality and between group comparisons were calculated with one-way anova. Survival was assessed with Kaplan Meier survival curves. Adverse events (AEs) were reported in 91.8% of patients (34.7% mild; 49.0% moderate). Common AEs (cough, n=18; infective pulmonary exacerbation, n=18) were consistent with expected CF manifestations. Eight (16.3%) patients had serious AEs. Four (8.2%) patients had ≥1 respiratory AE (2 wheezing; 1 bronchial hyper-reactivity; 1 dyspnea; 1 respiration abnormal). Six (12.2%) patients had elevated alanine aminotransferase or aspartate aminotransferase (≥3 to 5×upper limit of normal [ULN]), n=3; ≥5 to 8×ULN, n=1; ≥8×ULN, n=2). No drug discontinuations were due to AEs. Changes from 011B baseline (BL) in ppFEV₁ and SwCl were similar to those at 011B week 24 (Table). BMI continued to improve. LCI₂₅ improvements were stable through EXT week 4 (n=18); values at EXT week 24 in a reduced sample size (n=12) were similar to those at 011B BL.

Conclusion LUM/IVA was well tolerated for up to 60 weeks in patients aged 6 to 11 years, with no new safety concerns compared with previous LUM/IVA studies conducted in this patient population. LUM/IVA was associated with improved BMI and maintenance of lung function.

Please refer to page A257 for declarations of interest in relation to abstract S96.

Abstract S96 Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Study 011B baseline, mean (SD)</th>
<th>Absolute change from 011B baseline with LUM/IVA, mean (SD)</th>
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<tbody>
<tr>
<td></td>
<td>Study 011B</td>
<td>EXT wk 4</td>
</tr>
<tr>
<td>ppmFEV₁, percentage points</td>
<td>91.4 (13.7) n=57</td>
<td>2.4 (10.2)</td>
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<tr>
<td>BMI, kg/m²</td>
<td>16.89 (1.93) n=58</td>
<td>0.65 (0.69)</td>
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<tr>
<td>SwCl, mmol/L</td>
<td>105.9 (10.2) n=58</td>
<td>(15.7) n=51</td>
</tr>
<tr>
<td>LCI₂₅</td>
<td>9.99 (2.67) n=25</td>
<td>(1.39) n=23</td>
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</tbody>
</table>

Improvements in lung cancer treatment

MANAGEMENT OF EARLY STAGE LUNG CANCER IN THE ELDERLY: AN OBSERVATIONAL STUDY

MPT Kennedy, K Franks, A Brunelli, MEJ Callister. Leeds Teaching Hospitals NHS Trust, Leeds, UK

Objective Lumacaftor/ivacaftor (LUM/IVA) was well tolerated and had beneficial effects on lung function, sweat chloride (SwCl), and body mass index (BMI) in a 24 week, open-label study (VX15–809–011B [011B]) in patients aged 6 to 11 years with cystic fibrosis (CF) homozygous for F508del. We report 36 weeks of additional safety and efficacy data in an ongoing 96 week extension (EXT) study (VX15–809–110; NCT02544451).

Methods Eligible patients from 011B received LUM 200 mg/IVA 250 mg every 12 hours (q12h; 6–11 years) or LUM 400 mg/IVA 250 mg q12h (≥12 years). Primary endpoint was safety. Secondary endpoints included changes in SwCl and lung clearance index based on lung volume turnover required to reach 2.5% of starting N₂ concentration (LCI₂₅) through week 24, and BMI and percent predicted FEV₁ (ppFEV₁) through week 36.

Results Of the 49 enrolled patients (mean age [SD], 9.2 [1.48] years), 47 completed 36 weeks of the EXT study. Adverse events (AEs) were reported in 91.8% of patients (34.7% mild; 49.0% moderate). Common AEs (cough, n=18; infective pulmonary exacerbation, n=18) were consistent with expected CF manifestations. Eight (16.3%) patients had serious AEs. Four (8.2%) patients had ≥1 respiratory AE (2 wheezing; 1 bronchial hyper-reactivity; 1 dyspnea; 1 respiration abnormal). Six (12.2%) patients had elevated alanine aminotransferase or aspartate aminotransferase (≥3 to 5×upper limit of normal [ULN]), n=3; ≥5 to 8×ULN, n=1; ≥8×ULN, n=2). No drug discontinuations were due to AEs. Changes from 011B baseline (BL) in ppFEV₁ and SwCl were similar to those at 011B week 24 (Table). BMI continued to improve. LCI₂₅ improvements were stable through EXT week 4 (n=18); values at EXT week 24 in a reduced sample size (n=12) were similar to those at 011B BL.

Conclusion LUM/IVA was well tolerated for up to 60 weeks in patients aged 6 to 11 years, with no new safety concerns compared with previous LUM/IVA studies conducted in this patient population. LUM/IVA was associated with improved BMI and maintenance of lung function.

Please refer to page A257 for declarations of interest in relation to abstract S96.
Introduction Elderly patients are less likely to receive radical treatment for lung cancer. Palma et al (2010) demonstrated an increase in radical treatment rates for patients aged ≥75 years in Holland following the introduction of Stereotactic Ablative Radiotherapy (SABR), without reduction in surgical resections. This was associated with improved overall survival. There are international differences in radical treatment rates and outcomes in lung cancer. We aim to evaluate the changes in lung cancer treatment and outcomes following the introduction of SABR in the UK.

Methods This is a retrospective observational study at a large UK teaching hospital. Data for patients diagnosed over seven years (2008–2014) were analysed from a local dataset maintained for the National Lung Cancer Audit. SABR was introduced for lung cancer in Leeds in 2010. Statistical analyses were performed using Chi-square , t-test and Kaplan Meier survival analysis.

Results There were 1874 new diagnoses of lung cancer in patients aged ≥75 years, accounting for 45.3% of all new diagnoses. Comparing patients ≥75 years pre-SABR (2008–2009) and post-SABR (2011–2014), there was an increase in the proportion of early stage disease (stage I-IIA 22.5% to 29.2%, p=0.0054). Of the 502 patients with early stage disease, there was no change in performance status (PS 0%–2 68.4% to 63.3%, p=0.2468) or age at diagnosis (median (IQR) 81.1 (78.0–84.3) to 80.9 (77.7–85.1) years, p=0.7422).

Rates of radical radiotherapy/SABR (12.2% to 39.2%, p<0.001) have increased, while surgical resections (28.9% to 28.5%, p=1.000) have remained stable and the proportion of patients receiving palliative treatment/best supportive care (BSC) has decreased (58.8% to 32.3%, p<0.001) (figure 1). Median overall survival has increased (518 to 687 days, p=0.0016).

Discussion The proportion of elderly patients being diagnosed with early stage lung cancer is increasing. There has been no significant change in the demographics of those with early stage disease. Following the introduction of SABR in 2010, there has been an increase in radical radiotherapy treatment for elderly patients with early stage disease, with no sustained change in surgical resection rates and increase in overall rates of radical treatment. This was associated with a significant improvement in overall survival.

Abstract S97 Figure 1 Treatment of stage I-IIA lung cancer in patients ≥75 years.

Abstract S98 Table 1 Treatment patterns and survival outcomes of stage 3a (N2) lung cancer (n=2305)

<table>
<thead>
<tr>
<th>Groups</th>
<th>Number</th>
<th>Percentage</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1: Surgery</td>
<td>450</td>
<td>19.5</td>
<td>74.4</td>
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<tr>
<td>Surgery</td>
<td>165</td>
<td>7.2</td>
<td>61.8</td>
</tr>
<tr>
<td>Surgery and Adjusvant Chemotherapy</td>
<td>222</td>
<td>9.6</td>
<td>82.9</td>
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<tr>
<td>Neoadjuvant chemotherapy and surgery</td>
<td>21</td>
<td>0.9</td>
<td>90.5</td>
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<tr>
<td>Surgery and Radical Radiotherapy</td>
<td>5</td>
<td>0.2</td>
<td>60.0</td>
</tr>
<tr>
<td>Triple therapy</td>
<td>37</td>
<td>1.6</td>
<td>73.0</td>
</tr>
<tr>
<td>Group 2: Radical Radiotherapy</td>
<td>435</td>
<td>18.9</td>
<td>63.2</td>
</tr>
<tr>
<td>Radical Radiotherapy</td>
<td>205</td>
<td>8.9</td>
<td>61.5</td>
</tr>
<tr>
<td>Radical Radiotherapy and Chemotherapy</td>
<td>230</td>
<td>10.0</td>
<td>64.8</td>
</tr>
<tr>
<td>Group 3: Palliative intent treatment</td>
<td>618</td>
<td>26.8</td>
<td>41.8</td>
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<tr>
<td>Palliative radiotherapy and chemotherapy</td>
<td>142</td>
<td>6.2</td>
<td>36.6</td>
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<tr>
<td>Palliative radiotherapy</td>
<td>249</td>
<td>10.8</td>
<td>29.7</td>
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<tr>
<td>Palliative Chemotherapy alone</td>
<td>227</td>
<td>9.8</td>
<td>58.2</td>
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<tr>
<td>Group 4: Best Supportive Care (No treatment)</td>
<td>802</td>
<td>34.8</td>
<td>23.1</td>
</tr>
</tbody>
</table>

1JB Adzie, 2A Khakwani, 3P Beckett, 4N Navani, 5S Harden, 6J Woolhouse. 7Heart of England NHS Foundation Trust, Birmingham, UK; 8Care quality improvement department, Royal College of Physicians, London, UK

10.1136/thoraxjnl-2017-210983.104

Introduction The optimal management of lung cancer patients with metastatic involvement of the ipsilateral mediastinum (N2 disease) remains controversial. Randomised controlled trials have failed to demonstrate superiority of one bimodality strategy over another (chemotherapy plus surgery versus chemoradiotherapy plus radiotherapy). There is little knowledge of real world experience of the uptake of different treatment regimens and the corresponding survival outcomes. Data collected via the National Lung Cancer Audit (NLCA) and linked for the first time to the national radiotherapy dataset (RTDS) allow us to describe the treatment patterns and outcomes of patients with N2 disease in England.

Methods Patients diagnosed with stage T1–3, N2, M0 non-small cell lung cancer between 1st January 2015 and 31st December 2015 were identified. The dose and schedule of radiotherapy treatments described in the RTDS were used to determine if the radiotherapy was given with radical or palliative intent. The proportion of patients alive at the time of data analysis (9–21 months from diagnosis) were calculated according to treatment category.

Results 2305 of 36 025 (6.4%) patients met the inclusion criteria. The proportion of patients receiving each treatment...
modality with corresponding survival are shown in Table 1. 243 (10.5%) patients received radical surgery and chemotherapy, 230 (10%) patients received radical radiotherapy and chemotherapy, 618 (26.8%) palliative radiotherapy or palliative chemotherapy and 802 (34.8%) received best supportive care. The proportion of patients alive was 74.4% in patients receiving surgery; 63.2% for patients receiving radical radiotherapy, 41.8% for palliative chemotherapy/radiotherapy and 23.1% for supportive care.

Conclusions The commonest curative intent treatments are bimodality treatment (chemotherapy combined with either surgery or radical radiotherapy), however only one fifth of patients received this. The majority of patient still receive palliative treatment only. Survival is higher in patients who receive surgery as part of their treatment however we are unable to exclude selection bias as the reason for this. Further risk adjustment analysis will be performed to assess this.

Abstract 599 Figure 1 Funnel plots of adjusted survival for 30 days (A) and 90 days (B) survival after surgery for lung cancer in English trusts.
PD-L1 expression in the cohort was high (≥50%) in 28.5%, weak (1%–50%) in 28.2%, whilst 43.3% of patients were PD-L1 negative. The only statistically significant predictor for PD-L1 expression in multivariate analysis was the presence of brain metastasis at diagnosis (OR 2.02; CI 1.04–3.90). 47 patients (11.4%) were treated with immunotherapy and the response rate was 16.2%. All patients that responded to immunotherapy had high (≥50%) expression of PD-L1.

Conclusions This large multicentre study demonstrates for the first time that samples obtained by EBUS-TBNA in routine practice are suitable for PD-L1 testing in patients with NSCLC. The presence of brain metastases at diagnosis predicts high PD-L1 expression in this cohort and this new finding should be tested in future clinical trials.

REFERENCE

A COMPARISON OF THE IMAGING FEATURES OF EARLY STAGE PRIMARY LUNG CANCER IN PATIENTS TREATED WITH SURGERY, SABR AND MICROWAVE ABLATION
1A Talwar, 1N Jenko, 1M Sarim, 1M Enescu, 2P Whybra, 3JMY Willaime, 3LC Pickup, 4W Hokes, 4M Gooding, 1D Boukerroui, 1NM Rahman, 1T Kadir, 1PV Gleeson, 1Oxford University Hospitals NHS Foundation Trust, Oxford, UK; 2Mirada Medical Ltd, Oxford, UK; 3Optellum Ltd, Oxford, UK

Introduction Stereotactic Ablative Radiotherapy (SABR) and percutaneous microwave ablation (PMWA) are now being performed in patients deemed “medically inoperable” with non-small cell lung cancer (NSCLC). The majority of these patients are treated without ground truth histology, relying on imaging to establish the diagnosis. The purpose of this study was to investigate whether there were differences in the visible imaging features including CT Texture Analysis (CTTA) between patients referred for surgery, SABR and PMWA, which might suggest differences in underlying diagnosis.

Methods 92 patients with one pulmonary nodule (PN) suspected as T1N0M0 to T2AN0M0 NSCLC on imaging were treated either with SABR (22 patients), PMWA (25) or Video-assisted thorascopic surgery (45) of which 23 had NSCLC (SURG M) and 22 had benign disease (SURG B). Patient characteristics, CT nodule morphology, presence of emphysema and percentage emphysema score, FDG avidity and CT textural features were compared. Twenty texture features (previously used in combination to create a nodule probability of malignancy score between 0–1) were extracted from each automatic contoured region surrounding the PN. The Kruskal-Wallis test was used to compare texture features between the 4 patient groups (SABR, PMWA, SURG M and SURG B).

Results There was no significant difference in nodule morphology, volume at presentation (p=0.280) or volume doubling times (p=0.149), and presence of emphysema (p=0.348) or emphysema score (p=0.367) between the 4 groups. There was no statistical difference in CTTA malignancy prediction score between the SABR, PMWA and SURG M groups (p≥0.05). The probability of malignancy score was significantly lower (p-value<0.01) for SURG B (0.58 mean ±0.19 sd) vs. SABR (0.79±0.15) treatment groups (figure 1).

Conclusion This is the first study to our knowledge to evaluate the radiological differences between patient groups referred for surgical and non-surgical treatments for NSCLC. On this small study, the Results support the hypothesis that the non-operative patient groups comprise the same proportion of benign and malignant as those in the operative group. The Results also demonstrate the potential clinical utility of CTTA in patient selection when histology is not obtainable. CTTA does not require volumetry detectable growth to detect change, and therefore may be a useful biomarker of malignancy at first diagnosis.
Fruit flies to footballers

**S102 IDENTIFICATION OF ALLERGENS PRESENT IN DROSOPHILA MELANOGASTER USING A SERUM IMMUNOBLOTTING METHOD**

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10.1136/thoraxjnl-2017-210983.108

**Background** Drosophila melanogaster, otherwise known as the fruit fly, is commonly used in laboratory animal research. We have reported (Jones, Blair et al. 2017) that laboratory workers (n=286) exposed to fruit flies have an overall sensitisation prevalence of 6%, based on measuring allergen-specific IgE by radioallergosorbent test to a whole fruit fly extract. Although IgE binding to fruit fly extract was detected, the allergenic proteins responsible for IgE binding have not been identified.

**Objective** To identify allergenic proteins from a fruit fly extract

**Methods** Fruit flies were collected from the workplace, extracted overnight in 0.01 mol/L ammonium carbonate at 4°C, dialysed against distilled water and lyophilised. SDS-PAGE was used to separate 150 µg of the extract according to protein molecular weight. Extracted proteins binding to serum specific IgE were detected with Western blotting, using 50 µl of sera from fruit fly sensitised workers (n=3). An alkaline phosphatase conjugated mouse anti-human IgE secondary antibody and NBT/BCIP chromogenic substrate were used in detection. Images were acquired with a ChemiDoc MP and the molecular weight of allergic proteins determined with a 10–250 kDa prestained protein ladder (ThermoScientific) on ImageLab software (v5.2.1).

**Results** From the fruit fly extract, six distinct proteins binding to serum specific IgE were observed (figure 1). In three sensitised workers, IgE binding to proteins with molecular weights of ~107 and 76 kDa was observed. For one individual, IgE binding was present to an additional four proteins from the fruit fly extract, with molecular weights of ~183, 54, 28 and 12 kDa. In a control blot, we did not observe any non-specific binding to the fruit fly extract.

**Conclusions** There are at least six distinct proteins from a fruit fly extract with IgE binding properties of an allergen. Currently, these proteins are not characterised as allergens in protein databases. We will carry out further proteomic testing to characterise these unknown allergens.

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**S103 OCCUPATIONAL ALLERGY TO FRUIT FLIES (DROSOPHILA MELANOGASTER) IN LABORATORY WORKERS**

1M Jones, 2S Blair, 3S MacNeill, 1J Welch, 1A Hole, 1P Baxter, 1P Cullinan. 1Imperial College, London, UK; 2Cambridge University Hospital NHS Foundation Trust, Cambridge, UK; 3University of Cambridge, Cambridge, UK

10.1136/thoraxjnl-2017-210983.109

**Introduction and Objectives** Drosophila melanogaster (the ‘fruit fly’) is commonly used in genetic research, but there is only one earlier report of immunoglobulin E-associated allergy in exposed workers. Four newly identified cases prompted us to examine the extent of this problem in a university laboratory. Our aim was to determine the prevalence and determinants of sensitisation to fruit flies in a population of exposed workers.

**Methods** In a cross sectional study we surveyed two hundred and eighty six employees working in a department carrying out research involving D. melanogaster. Sensitisation was assessed by specific IgE measurement in serum using radioallergosorbent assay (RAST) and examined in relation to work-related symptoms and to estimated exposure to fruit flies.

**Results** The overall prevalence of specific sensitisation was 6% with a clear relationship to increasing frequency/intensity of exposure (p trend <0.001). Work-related eye/nose, chest or skin symptoms were reported by substantial proportions of participants but for most of these there was no evidence of specific sensitisation to fruit fly. The overall prevalence of any work related symptoms and sensitisation was 2.4%, rising to 7.1% in those working in high exposure groups.

**Conclusions** We were able to demonstrate, for the first time, a clear exposure-response relationship between fruit fly exposure and specific sensitisation. Facilities housing fruit flies should carefully consider methods to reduce exposure levels in the workplace.

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**S104 INVESTIGATING THE DIAGNOSTIC PERFORMANCE OF SPECIFIC IMMUNOLOGICAL TESTS IN OCCUPATIONAL ASTHMA**

D Fernandes, J Cannon, B Fitzgerald, J Welch, M Jones, P Cullinan, J Sram. Imperial College London, London, UK

10.1136/thoraxjnl-2017-210983.110

The detection (or otherwise) of specific IgE sensitisation is an important tool in the investigation of employees with potential
occupational asthma from high molecular mass agents. We investigated the diagnostic performance of skin prick testing (SPT) and serum specific IgE (sIgE) in patients referred to a specialist clinic. Data from wheat flour sIgE (n=295) and SPTs (n=322) were compared to each other, as well as to results from specific inhalation challenge (SIC) to wheat flour (n=22). Mouse and rat sIgE (n=156 and n=143 respectively) and SPTs (n=166 and n=137 respectively) were compared against diagnosis by expert clinician. Sensitivity, specificity, and positive and negative predictive values were calculated at different IgE concentrations and wheal sizes and optimal cut-offs, maximising sensitivity and specificity, were generated. Receiver-operating characteristics (ROC) plots were generated, taking either SIC or sIgE and clinical diagnosis as the gold standard for diagnosis; area under the curve (AUC) was calculated. Using SIC as a gold standard, ROC curves (figure 1A) demonstrated wheat flour-sIgE to be a more accurate test than SPT in predicting occupational asthma (AUC 0.88 compared with AUC 0.77); an optimal cut-off for sensitivity and specificity for sIgE of ≥1 kU/L was calculated. This new cut-off was then used to identify an optimum cut-off for SPT to wheat flour of 2.5 mm was identified. Optimal cut-offs for mouse and rat protein SPT of ≥2 mm and ≥1 mm for sIgE and ≥1 kU/L and ≥0.35 kU/L respectively were calculated. Conclusion In this population, sIgE for wheat flour and rat proteins was more accurate than SPT at predicting occupational allergic disease; the opposite was true for mouse allergens. The standard ‘cut-off’ for sIgE ≥0.35 kU/L is sufficient for rodent allergens but may lack specificity in bakers.

REFERENCE

RESPIRATORY SYMPTOMS, LUNG FUNCTION AND SENSITISATION ACROSS DIFFERENT EXPOSURE GROUPS OF BRITISH WOODWORKERS

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Background Wood dust is a leading cause of occupational asthma (OA) in the UK, with over 2 00 000 people exposed annually. There have been no recent studies examining respiratory health in British woodworkers.

Aim We surveyed British woodworkers to examine how respiratory symptoms, airway inflammation, lung function and sensitisation relate to wood dust exposure.

Methods British woodworkers were recruited to a cross-sectional study. All workers underwent a validated respiratory symptom questionnaire, job history and exposure measurement. Spirometry and fractional exhaled nitric oxide (FENO)
were recorded to American Thoracic Society (ATS) standards. Blood was taken for total and specific IgE to hard and soft wood.

**Results** 269 workers participated (table 1). Most were men (n=261, 97%), with a mean age of 42.4 years (SD 12.6) and 18.9 (12.8) years woodworking. Mean current wood dust exposure was 1.9 mg/m³ (SD 0.9, IQR 1.4). Current asthma symptoms (CAS, defined as wheezing, nocturnal chest tightness, exertional/nocturnal/resting breathlessness, or asthma medication use within the last 12 months) were common, reported by 123 (46%). Work-related respiratory symptoms were less common, reported by 29 (11%). Forty one (18%) reported by 123 (46%). Work-related respiratory symptoms (WRRS) than those in the lowest quartile (OR 0.16 , 95% CI 0.03–0.81). Workers in the low exposure group were more likely to have a FENO ≥40 ppb (OR 3.59, 95% CI 1.09–11.77). However, there was no clear exposure response relationship when looking at percent predicted FEV1 or FVC (for FEV1_b=0.05, p=0.41).

**Conclusion** CAS are common among British woodworkers, reported by nearly half. One fifth fulfilled BTS criteria for high FENO despite low sensitisation rates. The highest exposed workers may not be IgE mediated, and longitudinal studies are needed to clarify the exposure response relationship.
determine the extent and distribution of occupational aetiology.

**Methods**

All HP cases identified from a database over a 13 year period were included. The demographic, clinical, exposure history and investigatory Results were reviewed from clinical notes. Cases were categorised in to three groups: occupational, non-occupational and no known cause. Hypothesis testing at the 95% confidence level was used to identify significant differences between the 3 groups.

**Results**

A total of 127 cases (13 occupational; 34 non-occupational; 80 no known cause) of HP were identified. Men were more likely to experience occupational HP (p=0.029) compared to the other groups. Occupational HP cases were younger (p=0.002), more likely to experience weight loss (p=0.004), to have systemic symptoms (p=0.007) and a recurrence of symptoms (p<0.001). Occupational HP were due to metal working fluids (MWF), birds, mould/fungi, Farmer’s lung, and cleaning and treatment sprays. Non-occupational HP were due to birds, mould/fungi in the home and medication. Percentage lymphocyte count in broncho-alveolar lavage (BAL) was significantly raised in occupational HP (p=0.001). Where no causative agent was identified, there was a greater absence of exposure history (13.2%–32.5%).

**Conclusion**

Occupations where there is exposure to birds or those working in trades where industrial processes and the use of chemical compounds predominate, are at risk of occupational HP. Birds remain an important cause of non-occupational HP. Clinical features such as weight loss, systemic symptoms and recurrent symptoms should raise a suspicion of an occupational cause of HP. BAL remains an important investigatory tool in HP, especially in occupational HP. An exposure history, especially an occupational history, is mandatory when assessing suspected cases of HP.

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**S107 SHOULD RESPIRATORY HEALTH BE ASSESSED AS PART OF A PRE-SEASON MEDICAL EVALUATION IN PROFESSIONAL FOOTBALLERS?**

1AR Jackson, 1JG Hopker, 1JW Dickinson, 2JH Hull. 1University of Kent, Chatham, UK; 2Royal Brompton Hospital, London, UK

10.1136/thoraxjnl-2017-210983.113

**Introduction and Objectives**

High rates of exercise induced bronchoconstriction (EIB) are consistently reported in elite endurance athletes, prompting calls to consider screening high risk groups of athletes for respiratory dysfunction.1 There are currently no robust data examining the prevalence of respiratory symptoms and airway dysfunction (hyper-reactivity and inflammation) in elite footballers. We therefore undertook this prospective study assessing airway health and the impact of treatment in a cohort of professional footballers undergoing squad pre-season screening.

**Methods**

Ninety-seven elite male footballers completed a respiratory assessment including measurement of airway inflammation (FeNO) and screening for EIB using an indirect bronchoprovocation challenge (Eucapnic voluntary hyperpnoea [EVH]). Players demonstrating a positive challenge result (EVH+) were prescribed appropriate standard asthma therapy directed by EIB severity and underwent repeated assessment after 9 weeks of treatment. Eight players (EVH+=3, EVH-=5) also completed a cardiopulmonary exercise test (VO2 peak) at the initial and follow-up visits (i.e., post-treatment).

**Results**

Twenty-seven players (29%) demonstrated EVH+. Of these, ten (37%) reported no previous history of asthma or EIB. EVH result was not predictable by respiratory symptoms. Seven (24%) of the EVH +players attended for follow-up and demonstrated a reduction in FeNO (pre=85±61 ppb, post=28±11 ppb, p=0.04) and a decrease in the fall in FEV1 post EVH (pre=−22.9±15.4%, post=−9.0±1.6%, p=0.018). At follow-up, VO2 peak was improved by 3.4±2.9 ml.kg⁻¹.min⁻¹ in EVH +players compared to 0.1±2.3 ml.kg⁻¹.min⁻¹ in EVH -players. Magnitude of inference analysis indicated treatment was possibly beneficial (74%) for exercise capacity.

**Conclusion**

Elite footballers have a high EIB prevalence, which remains undetected by a symptom based approach to assessment. Treatment with appropriate standard therapy reduces EIB severity, improves airway inflammation and may improve exercise performance. Therefore, the use of objective tests to screen for EIB in this population would be beneficial.

**REFERENCE**

Advances in understanding chronic thromboembolic disease and pulmonary hypertension

**GENOME-WIDE ASSOCIATION STUDY IN CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION REVEALS NEW INSIGHTS INTO AETIOLOGY**

1M Newnham, 1M Toshner, 1M Bleda, 1A Auger, 1A Bleda, 1G Coghlan, 1PA Cortis, 1M Delcroix, 1M Dunning, 1H Edgington, 1S Gibbs, 1C Hadinnapola, 1D Jenkins, 11D Kiely, 13I Lang, 15E Maher, 1C Ng, 1A Peacock, 1N Srebaton, 1K Sheares, 13M Simpson, 1N Soranzo, 1S Taboada, 13R Trembath, 1S Tsai, 16MR Williams, 15J Pepke-Zaba, 1NW Morrell. 1University of Cambridge, Cambridge, UK; 2UC San Diego, San Diego, USA; 3University of Barcelona, Barcelona, Spain; 4VU Medical Centre, Amsterdam, Netherlands; 5Papworth Hospital, Cambridge, UK; 6Royal Free Hospital, London, UK; 7Newcastle University, Newcastle, UK; 8KU Leuven – University of Leuven, Leuven, Belgium; 9Sanger institute, Hinxton, UK; 10Hammersmith Hospital, London, UK; 11Royal Hallamshire Hospital, Sheffield, UK; 12Medical University of Vienna, Vienna, Austria; 13Kerckhoff Heart and Lung Centre, Bad Nauheim, Germany; 14Golden Jubilee Hospital, Glasgow, UK; 15Kings College, London, UK; 16Imperial College, London, UK; 17Royal Brompton Hospital, London, UK.

10.1136/thoraxjnl-2017-210983.114

**Introduction**

Chronic thromboembolic pulmonary hypertension (CTEPH) is an infrequent but important complication of acute pulmonary embolism (PE). Thrombophilias and non-O blood groups are genetic risk factors for venous thromboembolism (VTE), however they are not independently associated with CTEPH. Identifying genetic risk factors for CTEPH would provide important insights into pathobiology and might allow risk-stratification following PE. We undertook a genome-wide association study (GWAS) in CTEPH to identify novel disease loci.

**Methods**

To date, 1457 Caucasian CTEPH patients were enrolled from 10 European and US Centres and compared to 1536 healthy Caucasian controls from the Wellcome Trust Case Control Consortium. Genotyping was performed using the HumanOmniExpressExome-8 array. Quality control criteria and statistical analysis are summarised in figure 1.

**Results**

1250 CTEPH cases, 1492 controls and 7 million single-nucleotide polymorphisms (SNPs) were included after quality control exclusions. Two loci, in chromosomes 4 and 9 were significantly associated with CTEPH (figure 1). The lead SNP in chr9 (rs532436, OR=2.38, p=4.6x10^{-32}) is highly correlated with the tagging SNP for the A1 blood group (rs507666, R^2=0.99). Reconstructing genetic ABO groups confirmed an over-representation of the A1A1 group in CTEPH compared to controls (7% vs. 2.9%, OR 4.5). Additionally, there were 11 significant SNPs in the chr9 ADAMTS13 gene locus that is moderately correlated with ABO (R^2=0.33).

The lead SNP in chr4 (rs13130318, OR=1.4, p=5.6x10^{-8}) is highly correlated with a missense variant in FGG (rs6050, R^2=0.89) associated with decreased fibrinogen protein and increased resistance to fibrinolysis in CTEPH. There were no associations at the F5 locus, which is highly significant in VTE.

**Conclusions**

We report the first GWAS in CTEPH, identifying at least 2 genetic loci associated with the disease. The ABO association is driven by the A1 blood group and represents the largest population attributable genetic risk factor for CTEPH, which is higher than previously reported for VTE. The potential ADAMTS13 association is a plausible biological candidate, and further work will establish whether it is independent from ABO. The lack of associations with other loci found in VTE suggests that ABO might have a pathobiological role in CTEPH in addition to its contribution to VTE.
ADAMTS13 PROTEIN LEVELS ARE DECREASED IN CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION AND IMPLICATED IN ITS PATHOBIOLOGY

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Introduction Chronic thromboembolic pulmonary hypertension (CTEPH) Results from failure of thrombus resolution following acute pulmonary embolism. Abnormalities in haemostasis are implicated in the pathobiology, including elevated levels of von Willebrand factor (VWF), which is normally regulated by ADAMTS13. Interim analysis of a genome-wide association study (GWAS) identified a significant association in CTEPH with the ADAMTS13 and ABO gene loci. We aimed to determine if ADAMTS13 protein levels are altered in CTEPH.

Methods ADAMTS13 and VWF plasma antigen levels were measured by ELISA in 208 individuals with CTEPH and compared to 68 healthy controls. Levels were also measured in subjects with chronic thromboembolic disease but without pulmonary hypertension (CTED), and other disease comparator groups summarised in figure 1. In 22 CTEPH individuals ADAMTS13 and VWF levels were measured pre-operatively and at least 3 months post-pulmonary endarterectomy (PEA).

Results ADAMTS13 levels were decreased in CTEPH (median ±IQR: 0.88±0.40 μg/ml; p=5.7x10^-9) and CTED (0.83±0.22 μg/ml; p=2.1x10^-6) patients compared to healthy controls (1.15±0.30 μg/ml) (figure 1). ADAMTS13 levels remained low in CTEPH patients following PEA (pre: 0.78 ±0.27 μg/ml vs. post: 0.83±0.29 μg/ml; p=0.92) even in those with normalised mean pulmonary arterial pressures (<25 mmHg) after PEA. Furthermore, ADAMTS13 levels were lowest in the CTEPH and CTED groups when covariates (age, gender and batch) were included in multivariate rank regression models. VWF levels were increased in CTEPH (16.7±15.2 μg/ml; p=4.0x10^-12) and CTED (17.0±10.1 μg/ml; p=3.9x10^-8) compared to healthy controls (8.5±8.8 μg/ml). There was no change post-PEA (pre: 22.2±17.3 μg/ml vs. post: 19.6±14.2 μg/ml; p=0.24).

Conclusions Plasma ADAMTS13 antigen levels are markedly decreased in CTEPH. This is not secondary to pulmonary hypertension, as demonstrated by the similarly low levels in CTED, and individuals with normal pulmonary artery pressures post-PEA. Thus, the VWF/ADAMTS13 axis is implicated in the underlying disease pathophysiology. Ongoing work will clarify if there is a causal link by defining whether genetic variation at the ADAMTS13 locus contributes to reduced ADAMTS13 protein levels and CTEPH.

HIF2A DELETION IN THE PULMONARY ENDOTHELIUM PREVENTS HYPOXIA-INDUCED PULMONARY HYPERTENSION


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Pulmonary arterial hypertension is a progressive and irreversible disease that leads eventually to right heart failure and death. The pathogenesis of this condition involves proliferation of endothelial and smooth muscle cells resulting in vascular remodelling of the pulmonary arterioles. Several factors are implicated in the remodelling process driven by hypoxia including stabilisation of hypoxia-inducible transcription factors (HIFs), HIF1α and HIF2α. Previous studies have shown that heterozygous deletions of HIF1α or HIF2α partially attenuate many of the remodelling process associated with the development of PAH. Consistent with these observations we have...
found that pulmonary endothelial specific deletion of HIF2α, achieved using murine cre-lox technology (L1 or alkl1-cre), offers protection against hypoxia-induced PAH. The rise in pulmonary artery pressure (PAP) normally observed following chronic hypoxia challenge was absent in mice with pulmonary endothelial HIF2α deletion. The right ventricular systolic pressure of L1cre-HIF2α mice post hypoxic challenge (26.17 ±1.67 mmHg, n=7) was not significantly different from untreated WT mice (22.48±1.19 mmHg, n=9) and much lower than the hypertensive values seen in WT littermate controls (41.91±1.88 mmHg, n=12, p<0.0001) and L1cre-HIF1α mice (36.25±2.37 mmHg, n=7, p<0.005). Only minimal remodelling was observed in lung sections from L1cre-HIF2α mice reflecting the normal physiological PAPs following chronic hypoxia. We next questioned whether deletion of lung endothelial HIF2α would be sufficient to reduce downstream arginase-1 and -2 gene expression and in turn influence plasma nitrite/nitrate (NO$_3^-$/NO$_2^-$) concentrations, which would be indicative of changes in nitric oxide homeostasis. The expression of both arginase-1 and -2 were significantly reduced in hypoxia-conditioned whole lung samples from L1cre-HIF2α mice relative to WT littermate controls. Plasma NO$_3^-$/NO$_2^-$ concentrations were also significantly elevated in the HIF2α mutant mice when compared to plasma from WT control mice. These observations fit a model whereby reduced arginase-1/2 expression leads to increased availability of l-arginine, and in turn increased NO synthesis via NO synthases. These data offer new insights into the role of pulmonary endothelial HIF2α in causing PAH, and offer new therapeutic opportunities for the treatment of this condition.

**Introduction**

Evidence has implicated neutrophil elastase (NE), a proteolytic enzyme, as a key driver of the pulmonary vascular remodelling that underlies pulmonary arterial hypertension (PAH). Moreover, studies using animal models and explanted human lung tissue have demonstrated that inhibition of NE attenuates pulmonary hypertension. However, there has been little investigation into neutrophil function in PAH patients versus healthy controls, with a focus on neutrophil degranulation.

**Methods**

Neutrophils were isolated from venous blood of PAH patients and healthy controls (HC) and treated with LPS; viability was assessed at 20 hours by morphology. Cell surface receptor expression was determined by flow cytometry. To evaluate degranulation, neutrophils were treated with priming agents, platelet activating factor (PAF, 1 μM) or tumour necrosis factor-α (TNF, 20 ng/ml), and subsequently stimulated with N-formylmethionyl-leucyl-phenylalanine (fMLP; 100 nM). NE release was measured by ELISA and released NE activity with N-formylmethionyl-leucyl-phenylalanine (fMLP; 100 nM).

**Results**

Neutrophil apoptosis 20 hours following stimulation with LPS was significantly lower in PAH (25.4%+/-2.2, n=12) versus HC samples (44.9%+/-4.7, n=9), p<0.001. There were no differences in TLR2 or TLR4 expression between PAH and HC neutrophils. PAH neutrophils released greater amounts of NE following stimulation (e.g., TNF-α priming: PAH 675.2 ng/ml+/−77 vs. HC 277 ng/ml +/−18.4, p<0.0001) but there was no increase in NE activity in the same supernatants, nor any difference in released MPO activity compared to healthy controls.

**Conclusions**

Our results indicate that neutrophil phenotype is altered in PAH, with a prolonged lifespan in response to a pro-inflammatory stimulus and increased release of NE. However, we did not detect a corresponding increase in NE activity, suggesting a concomitant increase in NE inhibitor release from PAH neutrophils. The potential role of this altered neutrophil phenotype in vascular remodelling requires further investigation.

**Conclusion**

These findings highlight a direct role for variant iron homeostasis in hPAECs which is linked to subsequent functional responses in hPASMCs of importance to vascular remodelling. These studies may provide novel insights regarding mechanisms for haemoglobin and hepcidin driven proliferative and migratory responses of relevance to PAH.
Mechanistic insights into COPD

DEFINING THE MOLECULAR SIGNATURE OF THE PULMONARY ENDOTHELIUM IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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Introduction COPD is thought to result largely from neutrophilic inflammation. Relatively little focus has been given to the endothelium, through which neutrophils transmigrate to reach the lung, despite observation of abnormal amounts of endothelial tissue in COPD which behaves in a dysfunctional manner. We sought to determine if coding (mRNA) and non-coding (miRNA) alterations in pulmonary endothelium exist in COPD, and if so what their effect is on endothelial function.

Methods Patients with and without COPD undergoing thoracic surgery were recruited (n=52); power calculations indicated that 10 in each group were required to detect differences in miRNA between health and COPD. Human Pulmonary Endothelial Cells (HPECs) were isolated from lung tissue by positive selection using Ulex europaeus lectin-coated magnetic beads and extracted RNA used for miRNA and mRNA microarrays, as well as confirmatory qPCR. Significance Analysis of Microarrays (SAM) was used to perform differential miRNA or mRNA analysis; ingenuity pathway analysis (IPA) was also carried out to guide functional work. The miRNA which differed most between health and COPD was transfected into endothelial cells and a range of cellular functions were assessed, including matrigel and spheroid assays.

Results 2071 genes and 43 miRNAs were significantly upregulated in COPD. 6 mRNAs and 8 miRNAs were appropriate for further validation. 4 targets were validated by qPCR, of which miR-181b-3p exhibited the most significant differential expression and was chosen for functional validation. The miRNA which differed most between health and COPD was transfected into endothelial cells and a range of cellular functions were assessed, including matrigel and spheroid assays.

Conclusions Upregulation of miR-181b-3p reduces tube formation and sprouting by endothelial cells. This might be significant in the development of emphysema, as lung vasculature is important in the structural maintenance of alveoli. Correcting miR-181b-3p expression levels could be a route for treating emphysema by promoting support of alveolar structure and regeneration.

REFERENCES
potentially contributing to the observed differential protein release.

**Conclusions**
Hypoxia augments NE release in a PI3K-dependent manner, further increased during COPD exacerbations, and hypoxic neutrophil supernatants injure endothelial cells in vitro. Unbiased characterisation of hypoxic neutrophil secretomes identified several upregulated proteins which may contribute to cellular/tissue damage. In addition to degranulation, NDMP release may underpin differential protein secretion under hypoxia. Hypoxia engenders a neutrophil phenotype with potential to cause local and distant tissue damage in COPD; novel targets in the hypoxic neutrophil secretome may identify new therapeutic opportunities.

**S115 MECHANISMS TO REVERSE IMPAIRED MACROPHAGE EFFEROCYTOSIS IN COPD**

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COPD patients have defective innate immunity, characterised in part by macrophage dysfunction. In established disease, both monocyte derived macrophages (MDM) and alveolar macrophages (AM), have impaired phagocytosis of bacteria and apoptotic cells (efferoctyosis). Failure to adequately efferoctyse dying cells leads to further release of inflammatory mediators and ongoing recruitment of immune cells, culminating in inflammation that is both damaging and ineffective. The transcription factor, Nrf2 is the master regulator of the antioxidant-response-element. Previous work using the non specific Nrf2 agonist, Sulforaphane, has partially restored defective bacterial phagocytosis in COPD AMs, however the specificity and mechanism of action in this context remains unknown. The role of Nrf2 activation in restoring macrophage efferoctyosis in COPD has yet to be examined. We questioned if impaired macrophage phagocytosis and efferoctyosis in COPD share a common mechanism and consequently if the defect in macrophage efferoctyosis can be therapeutically manipulated using highly selective Nrf2 agonists. AMs and MDMs were isolated from patients with established COPD (GOLD stage 1–3). Macrophage efferoctyosis of apoptotic neutrophils from each donor was correlated with bacterial internalisation of *Streptococcus pneumoniae*. Efferoctyosis assays were carried out in the presence or absence of Sulforaphane and Compound 7, a highly specific Nrf2 agonist (supplied by GSK). Both COPD MDMs and AMs have significantly impaired phagocytosis of bacteria and apoptotic cells compared to Healthy Controls (p values all<0.05). Moreover, there was a correlation between donor macrophage phagocytosis of apoptotic cells and of bacteria (r=0.71). In vitro studies using Sulforaphane enhanced efferoctyosis of apoptotic cells in both COPD MDMs and AMs (p<0.01). This effect was replicated using Compound 7 in both MDMs (p<0.05) and AMs. This was more pronounced in current smokers. In summary, we observe a correlation between impaired macrophage phagocytosis and efferoctyosis in COPD, suggesting a common mechanism. Furthermore, we describe partial rescue of defective COPD MDM and AM efferoctyosis by Sulforaphane and via specific activation of the Nrf2 pathway using Compound 7. Together, these data highlight the importance of the Nrf2 pathway in reversing macrophage dysfunction in COPD patients and provide key mechanistic insights into the underlying defect.

**S116 CELL-DISSOCIATED HAEMOPHILUS INFLUENZAE AND BACTERIA-ASSOCIATED INFLAMMATORY MEDIATORS IN THE AIRWAYS OF PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE**

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**Background**
Patients with COPD have a susceptibility to respiratory tract infections associated with increased pulmonary inflammation. Bacteria can reside within the host as cell-associated (attached to host cells via adhesins, pili or biofilm formation) or cell-dissociated bacteria. It is unclear how bacteria-to-cell interactions affect pulmonary inflammation and whether

Abstract S116 Figure 1 Levels of *H. influenzae* in the sputum plug (A) and in the sputum supernatant (B) during an exacerbation time course in 10 paired subjects with COPD.
these levels differ over an exacerbation time course. We sought to investigate the effects of Haemophilus influenzae cell-interaction upon airway inflammation and whether the levels of H. influenzae bacteria and cell-dissociated bacteria differ over an exacerbation time course.

Methods Cell differential counts were carried out on sputum samples as per standard protocol. Bacterial DNA was extracted and H. influenzae was quantified using qPCR from the sputum plug (contains cell-associated and dissociated bacteria) and the sputum cell-free supernatant (cell-dissociated bacteria only). Inflammatory mediators (IL-1α, TNF-α, IL-8 and neutrophil elastase (NE)) were measured in the sputum supernatant using commercial assays.

Results 63 patients (77% male; average age of 69 (45–88)); FEV₁ percentage predicted of 53%; mean percentage neutrophil count in sputum of 65%) at stable state were analysed. Levels of H. influenzae in the supernatant only correlated with the sputum total cell count (r=0.38; p=0.03). Levels of H. influenzae in the plug correlated with inflammatory mediators (sputum neutrophil percentage r=0.42, p=0.01; sputum macrophage percentage r=−0.35, p=0.04; IL-1α r=0.36, p=0.03; IL-8 r=0.49, p<0.01; NE r=0.40, p=0.02). The exacerbation time course in 10 paired COPD subjects was examined. There was no significant difference in H. influenzae levels in the plug (p=0.89) (figure 1A). However, there was a significant increase in levels in the supernatant over the exacerbation time course (p=0.03) (figure 1B).

Conclusion H. influenzae levels in the sputum plug appear to have much more of an effect on airway inflammation than levels of cell-dissociated H. influenzae suggesting that cell-associated bacteria may be a driver of airway inflammation in COPD. Further investigation into this highly complicated relationship needs to be conducted.

Of mice and men

S118 ELK1 GENE DELETION LEADS TO SPONTANEOUS EARLY FIBROTIC CHANGES IN THE AGEING LUNG

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Rationale Idiopathic pulmonary fibrosis is a chronic fibroproliferative disease with a median survival of approximately 3 years. αν6 integrins are upregulated in lung fibrosis and are associated with increased activation of the profibrotic cytokine TGF-β. The transcription factor Elk1 can repress gene expression of β6. We therefore hypothesise that animals lacking functional Elk1 (Elk1−/−) will develop age related pulmonary fibrosis.

Methods Elk1 knock-out (Elk1−/−) and wild-type (Elk1+/+) mice were allowed to age for 365 days. At 365 days old mice were sacrificed and their lungs harvested for evaluation of collagen gene expression, lung hydroxyproline concentration and histological assessment.

Results Lungs were extracted and lung wet weights were measured in Elk1−/− mice and wild-type (Elk1+/+) controls and no significant difference between the two genotypes was shown (175.7 mg, 161.8 mg respectively n=6). However, assessment of total lung hydroxyproline established that there was significantly more hydroxyproline in Elk1−/− mice compared with Elk1+/+ controls (852.3, 758.4 μg/lung set, respectively, n=3–8, p=0.0346). Assessment of Masson's trichrome stained Elk1−/− lung tissue sections found a small number of fibrotic lesions were present. Furthermore, there was a trend towards increased alveolar wall median thickness in Elk1−/− mice compared with Elk1+/+ animals (5.94 vs 5.56 μm respectively). In a small number of 12 week old mice we identified a trend towards increased α-smooth muscle actin (αSMA) mRNA expression in the lungs of Elk1−/− mice compared with
Elk1+/− controls (9.40, 2.24 median relative expression, respectively n=3). We therefore performed immunohistochemical staining for aSMA in the lungs of mice aged to 1 year and demonstrated visible increases in expression of aSMA in the alveolar epithelium of Elk1+/− mice but not in Elk1+/+ controls.

Conclusion These data suggest that Elk1 gene deletion results in age-related early fibrotic changes associated with the development of pulmonary fibrosis.

**S119 MAPPING MOUSE MODELS OF SEVERE ASTHMA ONTO HUMAN DISEASE**

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**Introduction** Severe asthma represents a significant unmet need in terms of therapeutics. Drug development in asthma has been slow and expensive and one of the reasons for this is that positive findings for drugs tested in preclinical models have not readily translated into successful therapies in man.

**Aims and Objectives** We sought to improve the predictive power of existing models of asthma by using novel bioinformatics techniques to align these models with subsets of human asthma.

**Methods** We applied differential gene expression analysis to transcriptomic data from whole lung samples of 6 murine models of asthma and oxidative stress to produce gene signatures that represented each model. These signatures were then used to calculate enrichment scores (ESs) for transcriptomic data from bronchial biopsies taken from 81 asthmatic and 26 control patients.

**Results** We found that no single mouse model was aligned well with all asthmatics. We identified three clusters of patients who were represented to varying degrees by different mouse models and who displayed clinical features that aligned well with all asthmatics. We identified three clusters of patients who were represented to varying degrees by different mouse models and who displayed clinical features that aligned well with all asthmatics. We identified three clusters of patients who were represented to varying degrees by different mouse models and who displayed clinical features that aligned well with all asthmatics. We identified three clusters of patients who were represented to varying degrees by different mouse models and who displayed clinical features that aligned well with all asthmatics. We identified three clusters of patients who were represented to varying degrees by different mouse models and who displayed clinical features that aligned well with all asthmatics.

**Conclusion** Our evidence supports the assertion that it is possible, on a transcriptional level, to align mouse models of asthma to subsets of human asthma and that doing so may have significant implications for the expedience of drug development in asthma.

**S120 GENE THERAPY FOR PULMONARY ALVEOLAR PROTEINOSIS**

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**Introduction** Pulmonary alveolar proteinosis (PAP) is characterised by accumulation of surfactant in the terminal airways. Granulocyte-Macrophage Colony-Stimulating-Factor (GM-CSF) stimulates alveolar macrophages to clear surfactant. The presence of GM-CSF autoantibodies in autoimmune PAP (aPAP) leads to surfactant build-up and impaired gas exchange. This causes respiratory symptoms and can ultimately be fatal due to hypoxaemic respiratory failure. We hypothesise that lentivirus-mediated gene transfer of GM-CSF may be suitable to treat aPAP and propose to assess efficacy of GM-CSF gene transfer in GM-CSF knockout mice, which recapitulate aPAP lung disease. The murine GM-CSF (mGM-CSF) cDNA was cloned into a lentiviral vector, which was pseudotyped with the F and HN proteins from Sendai virus to enable efficient lung transduction (SIVF/HN-mGM-CSF).

**Methods and Results** To confirm if the vector produces mGM-CSF we first transduced A549 cells with multiplicity of infection (MOI) of 0.1–100 (n=6/group). 48 hours after transduction dose-related mGM-CSF expression was confirmed in the medium. We next assessed whether the mGM-CSF produced after gene transfer was biologically active by comparing the proliferation rate of FDC-P1 cells, a mGM-CSF-dependent mouse myeloid progenitor cell line, in the presence of gene therapy-produced mGM-CSF (0.001–10 ng/ml) and purchased recombinant mGM-CSF protein (n=6/group). The dose-related proliferation rates in both conditions were similar (figure 1A). In preliminary experiments, we next assessed whether gene transfer led to GM-CSF production in vivo. SIVF/HN-mGM-CSF (1e7 transduction units (TU)/mouse) was administered to wild-type mice by nasal “sniffing”. Control mice remained untreated (n=3/group). mGM-CSF levels were quantified in lung tissue homogenate and broncho-alveolar lavage fluid (BALF) 14 days after gene transfer. mGM-CSF levels in untreated mice were below the limit of detection of the ELISA, but high levels of mGM-CSF were detectable in lung tissue (median: 825 (range 460–3790) pg/mg) and BALF (median: 4330 (range 2307–7958) pg/ml).

**Conclusion** SIVF/HN-mGM-CSF produced mGM-CSF in vitro and in vivo. The biological function of the protein was confirmed in vitro and evaluation of mGM-CSF gene transfer efficacy in murine aPAP model is ongoing.
Abstract S120 Figure 1  Comparison of biological function of murine (m) GM-CSF produced after lentiviral-gene transfer and purchased purified protein (red: mGM-CSF produced through gene transfer, black: purchased mGM-CSF protein).

S121  CELL TRACKING IN LUNG CANCER

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Introduction Lung cancer is the leading cause of cancer death worldwide with over 70% of patients presenting with incurable disease and few effective treatments. We previously demonstrated that mesenchymal stem cells transduced to express TNF-related apoptosis inducing ligand (TRAIL), will home to and induce apoptosis of tumour cells in vitro and reduce tumour growth in multiple in vivo models. A key unknown of cellular therapy is the location and duration of cells following intravenous delivery. 111Indium-oxine is established for lymphocyte tracking but it has low sensitivity and is toxic to cells. 89Zirconium-oxine is a novel PET tracer which has better sensitivity and lower toxicity. Our study aimed to label MSC-TRAIL with 89Zr with the aim of tracking cells in patients enrolled in the TACTICAL trial – an early phase trial delivering MSC-TRAIL to patients with metastatic lung adenocarcinoma.

Methods MSC-TRAIL cells were incubated with multiple doses of 89Zr-oxine and label retention measured using a gamma counter. Cells were assessed for cell viability using cell proliferation assays, TRAIL expression was determined using flow cytometry and ELISA and apoptosis was determined using co-culture experiments with luciferase expressing cancer cell lines and bioluminescent readout. DNA damage and cellular stress was assessed using western blotting. To determine whether radiolabelled cells could be detected in vivo, 2 × 106 89Zr-Oxine MSC-TRAIL cells were delivered intravenously and imaging was performed at multiple time points (Mediso PET-CT, AMI-X).

Results 89Zr-oxine labelling at clinically relevant doses did not affect cell proliferation and therapeutic efficacy was maintained in co-culture experiments. There was no evidence of DNA damage and cell stress response and cellular phenotype was maintained. CT/PET imaging after labelling and delivery of the cells into mice showed good correlation with bioluminescent signal confirming its use a high sensitivity tracking tool.

Conclusion 89Zr-oxine can be used to successfully radiolabel genetically modified stem cells without effecting cell viability or therapeutic efficacy. We are currently performing in vivo studies to enable further translation into a clinical trial and will ultimately track MSC-TRAIL after patient administration via radiolabelling with 89Zr-oxine.

S122  A ROLE FOR THE BONE MORPHOGENETIC PROTEIN TYPE 2 RECEPTOR (BMPR2) IN DIFFERENTIATION OF THE COMMON MYELOID PROGENITOR LINEAGE IN MICE AND HUMANS

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Rationale There is increasing evidence of a link between abnormalities in the myeloid cell lineage and pulmonary arterial hypertension (PAH). Heterozygous mutations in the gene encoding the bone morphogenetic protein type 2 receptor (BMPR2) are the most common genetic cause of PAH. We sought to characterise the impact of the genetic loss/reduction of BMPR2 function in the myeloid lineage in mice and humans, and whether this altered susceptibility to PAH.

Methods Mx1-cre mice were crossed with bmpr2stop/stop mice. At approximately 8 weeks of age cre-recombinase was induced with polyinosinic-polycytidylic acid (Poly I:C). Control mice (bmpr2stop/stop mice with no cre) were also induced with Poly I:C. At approximately 16 weeks post-induction mice underwent right-heart catheterisation, exanguination and tissue was removed for analysis. The spleens were weighed and histology was performed on the femurs. Mouse data are presented as mean ±SEM. In a large cohort of PAH patients with (n=160) and without (n=831) BMPR2 mutations blood count indices were analysed. Data presented as median [IQR].

Results 16 weeks after induction of cre-recombinase in Mx1-cre/bmpr2stop/stop mice we observed significant increases (p<0.05) in red blood cells (x106/mm3) (12.7±0.9 compared with 12.1±0.2), haematocrit (%) (64.8±0.7 compared with 16.1±0.2), and haemoglobin (g/dl) (16±0.9 compared with 15.4±0.2) compared with bmpr2stop/stop mice alone. A significant increase in circulating monocytes (x103/mm3) was also observed (p<0.05) (0.4±0.05 compared with 0.3±0.05). In addition, we identified a significant increase (p<0.05) in megakaryocytes in the femurs (80±10 compared with 17±5) and a significant increase (p<0.01) in the ratio of spleen weight/ body weight (0.003±0.0001 compared with 0.002±0.0001) in Mx1-cre/bmpr2stop/stop mice. During right heart catheterisation right ventricular systolic pressures were similar in both groups. In PAH patients significant differences (p<0.05) were seen in haemoglobin (BMPR2 mutation: 162g/L [151.75–173]) vs. no mutation: 150 g/L [135 – 163]), haematocrit (0.48 [0.43–0.52] vs. 0.44 [0.41–0.48]) and white blood cells (8.8 [7.3–10.4] vs. 8.11 [6.77–9.61]).

Conclusions We have identified a role for bmpr2 in the differentiation of the mouse myeloid lineage, which was also confirmed in PAH patients with BMPR2 mutations. BMPR2 appears particularly important in the differentiation of megakaryocyte-erythrocyte lineage.
Respiratory epidemiology

**S123** EXACERBATION RISK AND CHARACTERISATION OF THE UK'S ASTHMA POPULATION, FROM INFANCY TO OLD AGE

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Introduction and Objectives Few studies have examined the characteristics of a general asthma population; most have focussed on more severe patients or severe exacerbations. We sought to provide the first description of the UK's general asthma population.

Methods Population-based cohort study, April 2007 to September 2015, using linked primary and secondary care electronic healthcare records (Clinical Practice Research Datalink, Hospital Episode Statistics). Four age cohorts: 'Under 5 s', '5 to 17 s', '18 to 54 s', '55+', are described. Exacerbation risk factors, including asthma severity (measured by the 2016 BTS stepwise approach), were assessed using random effects Poisson regression.

Results 4,243,326 patients with current asthma were eligible (N, median follow-up: 'Under 5 s'=17,320, 1 year; '5 to 17 s'=82,707, 3.3 years; '18 to 54 s'=210,724, 4 years; '55+'=113,575, 5.1 years). Over 60% of the total study population had mild asthma (BTS steps 1/2). There were differences between the cohort's characteristics, including by gender, disease severity and exacerbation pattern. The oldest cohort had the highest proportion, and the '5–17 s' the lowest, on BTS step 3 or higher (figure 1). In the '55+' cohort, 23% also had a diagnosis of COPD. Of the patients who exacerbated, the youngest cohort had the highest proportion of patients that exacerbated more than once a year ('Under 5 s'=54.7%, '5 to 17 s'=13.1%, '18 to 54 s'=18.8%, '55+'=34.1%). The rate of any exacerbations was highest in the oldest cohort and lowest in the '5 to 17 s' cohort (rate per 10 person-years, 95% CI), 'Under 5 s'=4.27 (4.18–4.38), '5 to 17 s'=1.48 (1.47–1.50), '18 to 54 s'=3.22 (3.21–3.24), '55+'=9.40 (9.37–9.42)). In all cohorts, exacerbation rates increased with increasing asthma severity, after adjusting for potential confounders including gender, socioeconomic status, smoking, BMI, atopy, rhinitis, gastroesophageal reflux, anxiety, depression and COPD.

Conclusions This is the first descriptive study of the UK's general asthma population. The majority of UK asthma patients had mild disease, and did not exacerbate during follow-up. Patients aged ≥55 years had the lowest proportion with mild asthma and the highest rate of exacerbations; the opposite was found in patients aged between 5 to 17 years. Increasing BTS step was significantly associated with increasing exacerbation rates across all generations.

**S124** TRENDS IN MORTALITY FROM IDIOPATHIC PULMONARY FIBROSIS IN THE EUROPEAN UNION: AN OBSERVATIONAL STUDY OF THE WHO MORTALITY DATABASE FROM 2001 – 2013

1DC Marshall, 2JD Salciccioli, 3BS Shea, 4P Akuthota. 1University of Oxford, Oxford, UK; 2Mount Auburn Hospital, Cambridge, US; 3Alpert Medical School of Brown University, Providence, US; 4University of California San Diego, La Jolla, US

Background Idiopathic pulmonary fibrosis (IPF) is the most common of the idiopathic interstitial pneumonias and is characterised by progressive accumulation of scar tissue in the lungs. It carries a poor prognosis, with a median survival of only approximately 3 years after diagnosis. No previous reports have attempted to describe trends in IPF mortality across the European Union (EU).

Methods Country-level data for IPF mortality, identified in the WHO mortality database using ICD-10 codes for the period 2001–2013. Joinpoint analysis was performed to describe trends throughout the observation period.

Findings Median mortality was 3.75/1 00 000 (IQR, 1.37–5.30) and 1.50/1 00 000 (IQR, 0.63–2.02) for males and females, respectively. IPF mortality increased in the majority of the EU countries with the exceptions of Denmark, Croatia, Austria and Romania. There was a significant disparity in rates across Europe ranging from 0.41–12.1/100 000 for men and 0.24–5.63/100 000 for women. Most notable increases were

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Abstract S123 Figure 1 Proportion of asthma patients in each BTS step by age cohort.
observed in the UK and Finland. Rates were also substantially higher in males with gender disparity increasing across the period.

Interpretation Reported IPF mortality appears to be increasing across the EU, however there is substantial variation in mortality trends and overall reported mortality rates between countries. There are likely to be differences in coding practices and reporting levels between countries, particularly with specialist knowledge and equipment required to diagnose IPF.

**Abstract S124 Figure 1**  Idiopathic pulmonary fibrosis mortality trends of male and females in 17 European countries. Lines represent result of Joinpoint analyses dashed and continuous lines for males and females, respectively. Squares (males) and circles (females) represent raw data, where symbol is absent data has been imputed for respective year.

**S125**

DEATHS FROM RESPIRATORY DISEASE IN THE UK COMPARED TO EU15+ COUNTRIES: AN OBSERVATIONAL ANALYSIS OF NATIONAL MORTALITY STATISTICS, 1985 – 2013

1JD Salciccioli, 2DC Marshall, 3M Maruthappu, 4J Shalhoub. 1Mount Auburn Hospital, Cambridge, US; 2John Radcliffe Hospital, Oxford, UK; 3University College London, London, UK; 4Imperial College London, London, UK

10.1136/thoraxjnl-2017-210983.131

Introduction Respiratory disease consistently ranks among the most fatal disease processes globally. Previous reports from Global Burden of Disease have identified higher burden of respiratory disease in the UK compared to similar health systems.

Methods We compared UK to EU15 +countries (i.e., Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherland, Portugal, Spain, and Sweden, Australia, Canada, United States, and Norway) because of similar or higher health expenditure in these countries. We obtained respiratory-related, sex-specific mortality data from countries of interest from the WHO World Mortality database between 1985 and 2013 and covariate data from the World Bank’s Development Indicators DataBank. Age-standardised death rates (ASDR) were computed using the WHO World standard population. We used Joinpoint regression analysis to test changes in trends for respiratory disease. We used Poisson regression to test the difference between UK and EU15 +countries after controlling for smoking and pollution factors.

Results In the UK, there was a significant decreasing trend in respiratory-related mortality between 1985 and 1991 with an estimated annual percentage change (EAPC) of −0.89 and −1.70, for men and women respectively. Between 1994 and 2013, there was a steady decline in ASDR with EAPC −2.06 and −0.85, for men and women, respectively. For EU15 +men, there was a decreasing trend in ASDR between until 1999 with EAPC −0.81 and from 1999 onwards the EAPC was −2.14. For EU15 +women, there was an increasing trend in ASDR until 2002 with EAPC of +1.48 which was followed by overall decreasing trend with EAPC −0.44 until 2013. After multivariable adjustment for pollution exposure and smoking prevalence in each country there was a persistent significant difference in ASDR with approximately 20% higher mortality in UK compared to EU15+ (p=0.009).

Conclusion There was significantly greater mortality from respiratory-related illnesses in UK compared to EU15 +over the period from 1985 to 2013 after controlling for smoking and pollution exposure. System-level and population-level factors may contribute to this difference and additional investigations are necessary to further explain these differences.

REFERENCE

DESCRIPTION OF PALLIATIVE CARE SUPPORT FOR COPD PATIENTS WITHIN PRIMARY CARE IN THE UK

Cl Bloom, ASlaich, TSmeeth, PStone, JKQuint. Imperial College London, London, UK; London School of Hygiene and Tropical Medicine, London, UK; University College London, London, UK.

Introduction and Objective
Over 5% of UK deaths are secondary to COPD, only 1% less than from lung cancer. Yet, there remains a lack of palliative care support (PCS) for COPD patients, despite evidence that it improves their quality of life, improving both physical and physiological symptoms. NICE guidelines recommend its provision to all patients with end-stage COPD. Previous studies have found poor access for COPD patients in secondary care, this study aimed to assess PCS within primary care.

Methods
Population-based open cohort study, January 2004 to June 2015, using electronic healthcare records (Clinical Practice Research Datalink). Associations with PCS were measured using logistic regression.

Results
92,365 COPD patients were included (median follow-up = 4.2 years). Only 7.5% received PCS; of whom 47% had lung cancer. Only 21% of all deceased COPD patients received PCS, and within 6 months from their death only 48% of those patients had received PCS, by 3 months before their death up to 69% had received PCS (figure 1). Around a third of these patients had co-existing lung cancer (figure 1). The adjusted odds of receiving PCS was 14.6 times higher for COPD patients with lung cancer than without (95% CI 13.2–16.1), and 6.3 times higher for deceased COPD patients with lung cancer than without (95% CI 5.6–7.1), adjusted for gender, age, BMI, MI, heart failure, stroke, smoking, GOLD stage, MRC Dyspnoea grade, exacerbations, anxiety and depression. The proportion of patients that received PCS yearly increased gradually from 2004 to 2014, but remained low, only 2.1% of patients in the cohort in 2014 received PCS in 2014.

Conclusions
There was limited PCS for COPD patients; this appeared to be strongly driven by a co-existing diagnosis of lung cancer, not by their advanced COPD disease. PCS was often provided only towards the end of patient’s lives; this may have been related to the difficulty in prognosticating the end-of-life for individuals with COPD. Encouragingly PCS increased yearly and could indicate recognition of its value and thus the requisite to discuss PCS with patients, however, this clearly remains an important unmet need.

ARE GIRLS ALWAYS THINNER THAN BOYS? USING UK CYSTIC FIBROSIS (CF) REGISTRY DATA (2008–2013) TO EXAMINE WEIGHT CHANGES BETWEEN THE SEXES FROM CHILDHOOD AND BEYOND

SS Hippolyte, NSimmonds, DBilton, UGriesenbach, RKeegh. Gene Therapy Group, NHLI, Imperial College, London, UK; Royal Brompton Hospital, London, UK; NHLI, Imperial College, London, UK; London School of Hygiene and Tropical Medicine, London, UK.

Introduction
Worse BMI in CF is associated with worse survival. The UK-CF Registry was used to examine weight differences between sexes, and determine the age this occurs, and how this relates to feeding supplementation (FS) and outcomes, such as change in FEV1, intravenous antibiotic use (IVABx) and mortality.

Methods
Cross-sectional analysis (2013) of weight variables (expressed as BMI for subjects ≥16 years, BMI percentiles [BMI(P)] individuals <16 years and BMI Z-scores for 6–23 year-old subjects), FS and IVABx were compared between sexes using paired t-tests and chi-squared analyses. Age groups were
created to examine adolescence in detail (0–5.6–12.13–15–16–19,20–23.24–29 and ≥30 years). A longitudinal analysis (2008–2013) of weight change investigated potential explanatory variables between the sexes, such as diabetic status (CFRD) and FS.

**Results** Cross-sectional Boys 13–15 years had lower mean BMIP than girls (41.2 vs 50.5 p<0.001). Boys had a lower Z-score than girls for age 13–23 years. Mean BMI was significantly lower in females (21.9 vs 22.5 p<0.001). More females were underweight (BMI <19) than males (18.9% vs 14.0% p<0.001), this was specifically observed in ages ≥24 years. Underweight individuals died younger than individuals with BMI ≥19 (29.3 years vs 36.0 years p=0.007). Lower weight was associated with more IVAbx days. Males had higher rates of FS (34.7% vs 28.9% in females p<0.001) specifically when ≥16 years. These sex differences were not explained by differences in ethnicity, genotype or socio-economic status.

**Longitudinal** Boys had a greater fall in BMIP (8.3 vs 4.1 in females p=0.002). In adulthood, females had significantly less increase in BMI (0.20 vs 0.57 in males p<0.001). FEV1 decline was greater in females (7.4% vs 5.9% in males p=0.0016) not receiving FS, with no difference in change in FEV1 between the sexes in those receiving FS.

**Conclusion** From ≥16 years boys changed from having lower BMIP to higher mean BMI and lower rates of underweight status in adulthood. Higher rates of FS in adolescent boys might explain this. Lower weight is associated with earlier death and increased IVAbx use. In individuals without FS females have a greater decline in FEV1 than males, this is not seen in individuals on FS. This has not been previously shown and warrants further analysis.

Managing pleural disease: from intervention to conservation

**Abstract S128 Table 1**

<table>
<thead>
<tr>
<th></th>
<th>Mesothelioma</th>
<th>Other</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleurodesis Success</td>
<td>77/107 (72.0%)</td>
<td>142/173 (82.1%)</td>
<td>χ²=3.97, 1 df</td>
</tr>
<tr>
<td>Trapped lung</td>
<td>19/91 (20.9%)</td>
<td>26/177 (14.7%)</td>
<td>χ²=1.65, 1 df</td>
</tr>
<tr>
<td>Mean total fluid drained</td>
<td>2208</td>
<td>2345</td>
<td>p=0.621</td>
</tr>
<tr>
<td>Mean change in CRP (Day 0–1)</td>
<td>58 (SD 48)</td>
<td>32 (SD 50)</td>
<td>p=0.001</td>
</tr>
<tr>
<td>Mean change in WCC (Day 0–1)</td>
<td>2.33 (SD 2.83)</td>
<td>1.89 (SD 3.31)</td>
<td>p=0.13</td>
</tr>
<tr>
<td>Median enrolment pain VAS</td>
<td>4 (IQR 6)</td>
<td>5 (IQR 15)</td>
<td>p=0.016</td>
</tr>
</tbody>
</table>

**Methods** 298 patients had available data on their final diagnosis. A number of different variables were compared, including pleurodesis success, systemic inflammation, the prevalence of trapped lung, total fluid volume drained and baseline pain Visual Analogue Score (VAS).

**Results** Of the 298 patients included in the analysis 110 patients had mesothelioma (36.9%). Post pleurodesis, MPM patients had a significantly greater rise in CRP than those with other underlying pathologies but had a significantly lower rate of successful pleurodesis. Patients with MPM had a lower pain VAS score on enrolment. There was no significant difference in the rates of trapped lung, the total volume of pleural fluid drained or the change in White Cell Count (WCC) between the groups.

**Conclusion** There are significant differences in the outcomes of patients with MPM and those with other MPE. Patients with MPM had a lower pleurodesis rate but a significantly greater change in C-reactive protein levels post pleurodesis, signifying a higher inflammatory response to pleurodesis, which has been assumed to associate with pleurodesis success. The mechanisms causing the increased inflammatory response in MPM are unclear. The basis for the lower rates of pleurodesis is unexplained, especially as there was no significant different in the rates of trapped lung. Patients with MPM had a lower level of pain VAS scores on enrolment but further analyses are needed to determine whether this is clinically relevant and reproducible. These data indicate that MPM behaves differently to other forms of MPE and treatment strategies should be tailored towards MPM as a separate entity.

**Abstract S129 Table 1**

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**SD=Standard Deviation, df=degrees of freedom, CI=confidence interval, and IQR=Interquartile Range**

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Introduction Malignant pleural effusions are a common complication of advanced malignancy, have a poor prognosis and have a significant impact on quality of life. Treatment strategies include chest drain and pleurodesis, or insertion of an indwelling pleural catheter. Successful pleurodesis is thought to be due to the body’s inflammatory response resulting in pleural symphysis. This post hoc analysis of data from the TIME 1 trial was conducted to address whether there is a correlation between the pleurodesis and a systemic inflammatory response.

Methods A total of 282 patients from the TIME 1 trial had data on pleurodesis success, which was defined as no further pleural procedures for up to 3 months after pleurodesis. Patients who had undergone thorascopy and poudrage as well as those who had undergone chest drain with pleurodesis were included. Sterile talc was used in all patients. The difference in the white cell count (WCC) and C-reactive protein (CRP) levels was calculated between the day of pleurodesis (Day 0) and Day 1. The data are normally distributed thus independent t test was used for analysis. The CRP Day 0 and 1 data were not normally distributed, and therefore were log transformed to produce a normal distribution.

Results Two hundred and eighty two patients were included in the analysis with a mean age of 71 in both groups. 229 had a successful pleurodesis and 53 patients required a further pleural procedure on the ipsilateral side signifying failed pleurodesis. 193 patients had CRP levels and 220 patients had WCC levels recorded on both Day 0 and Day 1.

Patients who had a successful pleurodesis had a significantly greater rise in CRP than those who failed pleurodesis. There was no significant difference in the change in WCC between the groups. There was also no significant difference in Day 0 and Day 1 WCC or CRP levels between the two groups.

Conclusions This analysis demonstrates that systemic rise in CRP as an indicator of inflammation is a better predictor of pleurodesis success than the WCC. These data support the hypothesis that higher levels of inflammation are associated with pleurodesis success.

### Abstract S129 Table 1

<table>
<thead>
<tr>
<th></th>
<th>Pleurodesis Success</th>
<th>Pleurodesis Failure</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCC Day 0</td>
<td>8.84 (SD 4.00, n=213)</td>
<td>9.12 (SD 3.14, n=46)</td>
<td>p=0.582</td>
</tr>
<tr>
<td>WCC Day 1</td>
<td>11.14 (SD 3.78, n=191)</td>
<td>10.71 (SD 4.01, n=42)</td>
<td>p=0.525</td>
</tr>
<tr>
<td>WCC Change</td>
<td>2.30 (SD 3.07, n=180)</td>
<td>1.55 (SD 2.82, n=40)</td>
<td>p=0.140</td>
</tr>
<tr>
<td>CRP Day 0 (log)</td>
<td>1.46 (SD 0.58, n=181)</td>
<td>1.45 (SD 0.58, n=42)</td>
<td>p=0.900</td>
</tr>
<tr>
<td>CRP Day 1 (log)</td>
<td>1.92 (SD 0.34, n=179)</td>
<td>1.83 (SD 0.33, n=41)</td>
<td>p=0.123</td>
</tr>
<tr>
<td>CRP Change (log)</td>
<td>47.81 (SD 52.08, n=154)</td>
<td>27.05 (SD 32.47, n=39)</td>
<td>p=0.003</td>
</tr>
</tbody>
</table>

SD=Standard Deviation and n=number of patients

**Abstract S130 Table 1**

The diagnostic performance of pleural fluid cytology in 430 patients with suspected pleural malignancy. 390/430 (91%) had pleural fluid cytology performed. Prevalence of pleural malignancy in this cohort was 61% (n=264), 37/390 (9%) had steady benign effusions based on pleural fluid biochemistry and microbiology results and are excluded from the analyses below.
AMBULATORY MANAGEMENT OF SECONDARY SPONTANEOUS PNEUMOTHORAX

RV Reddy, F Khan, M Naeem, N Siddique, I Mash, Y Vali. Kettering General Hospital, Kettering, UK

10.1136/thoraxjnl-2017-210983.137

Introduction and Aim

Management of spontaneous pneumothorax is predominantly inpatient based despite availability of devices which facilitate ambulatory management. At our institution most patients meeting predefined criteria have outpatient management. We aimed to assess the effectiveness of ambulatory management of SSP.

Methods

Data on all secondary spontaneous pneumothorax patients presenting to the emergency department between September 2014 and June 2017 was prospectively recorded. Patients were initially managed by the emergency department practitioners, usually with insertion of a Rocket seldinger (size 12 F) chest drain. They were then referred to the respiratory team at the earliest opportunity. Patients meeting eligibility criteria (age 16–80, WHO performance status 0–1 and no co-existing condition requiring admission) had their underwater seal replaced with a Pneumostat valve (Atrium Medical Corporation) which was connected to their chest drain. They were then discharged from hospital with reviews on alternate days on the ambulatory care unit. Chest drains were removed once air leakage had stopped for 24 hours. Suction was not employed. Patients with a persistent air leak were referred to the thoracic surgeons on day five and were admitted electively from home for surgery with chest drains in-situ.

Abstract S131 Table 1

<table>
<thead>
<tr>
<th></th>
<th>Ambulatory Cohort</th>
<th>Non-ambulatory Cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of patients</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>No. requiring Chest drainage</td>
<td>44</td>
<td>47</td>
</tr>
<tr>
<td>Mean Age</td>
<td>60 (21–76)</td>
<td>70 (30–92)</td>
</tr>
<tr>
<td>Sex (M:F)</td>
<td>26:23</td>
<td>18:12</td>
</tr>
<tr>
<td>Size of pneumothorax</td>
<td>40:9</td>
<td>32:18</td>
</tr>
<tr>
<td>(Large:Small)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. resolved by day 5</td>
<td>29/49 (59%)</td>
<td>32/50 (64%)</td>
</tr>
<tr>
<td>No. requiring surgery due to non-resolution</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Mean length of drainage (days)</td>
<td>5.57</td>
<td>7.96</td>
</tr>
<tr>
<td>Mean length of out-patient (OP) drainage</td>
<td>4.77 (out of 5.57)</td>
<td>NA</td>
</tr>
<tr>
<td>Mean Number of OP reviews</td>
<td>2.08</td>
<td>NA</td>
</tr>
<tr>
<td>Total number of complications</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Mean pain score (scale 0–10)</td>
<td>3.65</td>
<td>NA</td>
</tr>
<tr>
<td>Mean Satisfaction score (scale 0–5)</td>
<td>4.95</td>
<td>NA</td>
</tr>
</tbody>
</table>

Results

Data on all 99 consecutive patients with spontaneous pneumothorax were collected prospectively. Patient characteristics and outcomes are shown in Table 1. 55 episodes qualified for ambulatory management of which 49 SSP had outpatient management. The six patients who were not treated on the ambulatory pathway had resolution of pneumothorax by day 2. Of the 49 SSP who had ambulatory treatment, nine (18.37%) required surgery due to non-resolution whilst 11 achieved resolution between 6 and 19 days. There were a total of six complications during ambulatory management.

Three patients experienced drain blockage which necessitated replacement of the tube. Two patients developed empyema; one of these was following prolonged drainage (19 days) as he declined surgery. One patient’s drain fell out but did not require reinsertion as the pneumothorax had already healed.

Conclusion

This study confirms that the use of chest drains with one-way valves in the ambulatory management of selected secondary spontaneous pneumothoraces is safe with few complications.

CONSERVATIVE MANAGEMENT IN TRAUMATIC PNEUMOTHORACES: AN OBSERVATIONAL STUDY

1S Walker, 2S Barratt, 1Thompson, 1N Maskell. 1Academic Respiratory Unit, Bristol, UK; 2Southmead Hospital, Bristol, UK

10.1136/thoraxjnl-2017-210983.138

Background

Traumatic pneumothoraces are a common consequence of major trauma. Despite this, there is a paucity of literature regarding their optimal management, including the role of conservative treatment. The aim of this study was to assess the treatment, complications and outcomes of traumatic pneumothoraces in patients presenting to a Major Trauma Centre.

Methods

The prospectively collected Trauma Audit: and Research Network (TARN) database was used to identify all patients presenting with traumatic pneumothoraces to a UK Major Trauma Centre from April 2012 to December 2016. Demographics, mechanism of injury, injury severity score (ISS), management and outcomes were analysed.

Results

602 patients were included in study period. Mean age 48 (SD 22) with 73% male. Mean ISS was 26 and inpatient mortality 9%. Of the 602 traumatic pneumothoraces, 277/602 (46%) were initially treated conservatively. 252/277 (90%) of this cohort did not require subsequent chest tube insertion, including the majority, 356/62 (90%), of patients on admission positive pressure ventilation (PPV). Hazard ratio for failure of conservative management showed no difference between the ventilated and non-ventilated patients (HR 1.1 p 0.84). Only the presence of large hemothorax was associated with increased likelihood of failure of conservative management.

Conclusions

In the largest observational study of traumatic pneumothoraces published to date, over 90% of patients whose pneumothorax was managed conservatively never required subsequent tube drainage. Importantly, this also applies to patients requiring PPV, with no significant increased risk of failure of expectant management. This data supports a role for conservative management in traumatic pneumothoraces.

Core outcomes for mechanical ventilation

A CORE OUTCOME SET FOR MECHANICAL VENTILATION TRIALS: THE COVENT STUDY

1SM Ringrose, 1DF McAuley, 1M Clarke, 1JC Marshall, 1B Connolly, 1L Rose, 1B Blackwood. 1Queens University Belfast, Belfast, UK; 2St Michael’s Hospital, Toronto, Canada; 3Lane Fox Clinical Respiratory Research Centre, London, UK; 4Sunnybrook Health Sciences Centre, Toronto, Canada

10.1136/thoraxjnl-2017-210983.139
EFFECT OF CONTINUOUS POSITIVE AIRWAY PRESSURE ON NEURAL RESPIRATORY DRIVE AND FUNCTIONAL CAPACITY IN EXCESSIVE DYNAMIC AIRWAY COLLAPSE PATIENTS

G Kaltakas, M Patout, G Ahmed, D D’Cruz, M Polkey, J Hull, N Hart, PB Murphy. Lane Fox Respiratory Unit, Guy’s and St Thomas’ NHS Foundation Trust, London, UK; Department of Thoracic Medicine, Guy’s and St Thomas’ NHS Foundation Trust, London, UK; NIHR Respiratory Biomedical Research Unit at the Royal Brompton and Harefield Foundation NHS Trust and Imperial College, London, UK; Department of Respiratory Medicine, Royal Brompton Hospital, London, UK.

10.1136/thoraxjnl-2017-210983.140

Excessive dynamic airway collapse (EDAC) and tracheobronchomalacia (TBM) occur due to weakening of the walls of the central airways leading to airway collapse on expiration. Positive airway pressure provides a pneumatic stent maintaining airway patency. CPAP is used to prevent airway collapse during sleep, but could also facilitate improved exercise capacity in this patient group. The aim of this study was to investigate the effect of ambulatory continuous positive airway pressure (CPAP) on neural respiratory drive and exercise capacity. Patients with CT or bronchoscopic evidence of EDAC or TBM underwent baseline testing and 6 min walk test (6MWT). Physiological testing was performed with patients self-ventilating and on CPAP at 4, 7 and 10 cm H₂O to identify optimal ambulatory CPAP pressure. Patients then underwent repeat 6MWT on sham or active CPAP in a random order. Neural respiratory drive index (NRDI) was assessed by surface electromyography of the parasternal intercostals (EMG-para%max x respiratory rate) while self-ventilating and on

Abstract S134 Figure 1 The 6MWT while on optimal CPAP was increased comparing to self-ventilation and sham CPAP.
CPAP. We studied 20 (9 male), ambulatory adult patients with EDAC and/or TBM: mean ±SD age 60±13 years, height 1.67 ±0.86 m, and BMI 34.1±6.6 kg/m². The NRDI was 356±182 AU while self-ventilating and reduced when CPAP was applied (231±122 AU; p<0.001). The 6MWT while on optimal CPAP was increased comparing to self-ventilation and sham CPAP (296±112 m vs 264±120 m vs 252±125 m, respectively; p<0.001) (figure 1). The treatment effect between sham and optimal CPAP was 31±39 m (95% CI: 13 to 50 m). While on optimal CPAP, 12 patients increased their 6MWT more than 30 m compared to self-ventilation (responders). Comparing responders with non-responders, differences were identified for NRDI (−167±110 AU vs. −63±90 AU, respectively; p=0.039) and 6MWT while self-ventilating (203±94 m vs. 336±133 m, respectively; p=0.022).

In conclusion, CPAP reduces neural respiratory drive and increases exercise capacity in patients with EDAC/TBM. Furthermore, the degree of functional limitation and off-loading of the respiratory muscles on CPAP can identify those likely to have a reduction in neural respiratory drive and enhanced exercise tolerance.

**Discussion**

Our study has several strengths including objective confirmation of COPD, capture of consecutive patients and liberal NIV use. Compared to patients with respiratory acidaemia on or shortly after admission, later development was associated with progressively higher mortality. 12 and 48 hours were identified as clinically useful thresholds. Of note, lower pH, FEV1 and prior LTOT prescription do not account for worse outcome. Older age, greater comorbidity, frailty (eMRCD5b: requiring help washing and dressing when recently stable), and a strong trend towards increasing pneumonia are associated with later development of acidaemia. Timing of acidaemia should be considered when deciding whether to initiate NIV.

### Abstract S135 Table 1

<table>
<thead>
<tr>
<th>Time</th>
<th>N (n=356)</th>
<th>Up to 12 hours</th>
<th>12–48 hours</th>
<th>&gt;48 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>71.9 (9.8)</td>
<td>73.8 (10.0)</td>
<td>76 (9.8)</td>
<td>*</td>
</tr>
<tr>
<td>FEV1%</td>
<td>37.1 (15.6)</td>
<td>42.8 (18.9)</td>
<td>38.1 (17.4)</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>24.9 (7.5)</td>
<td>24.7 (5.9)</td>
<td>22.8 (7.2)</td>
<td>†</td>
</tr>
<tr>
<td>LTOT</td>
<td>109 (30.6%)</td>
<td>18 (26.1%)</td>
<td>15 (25.0%)</td>
<td></td>
</tr>
<tr>
<td>eMRCD</td>
<td>5a (4–5a)</td>
<td>5a (4–5a)</td>
<td>5a (4–5b)</td>
<td>†</td>
</tr>
<tr>
<td>eMRCD Ss</td>
<td>120 (33.7%)</td>
<td>25 (36.2%)</td>
<td>19 (29.7%)</td>
<td></td>
</tr>
<tr>
<td>Inpatient Mortality</td>
<td>65 (18.3%)</td>
<td>22 (31.9%)</td>
<td>21 (37.8%)</td>
<td>†</td>
</tr>
<tr>
<td>Charlson Index</td>
<td>1 (1–2)</td>
<td>2 (1–3)</td>
<td>2 (1–3)</td>
<td></td>
</tr>
<tr>
<td>Consolidation at NIV</td>
<td>157 (44.1%)</td>
<td>38 (55.1%)</td>
<td>36 (56.3%)</td>
<td></td>
</tr>
<tr>
<td>pH at NIV</td>
<td>7.23 (0.09)</td>
<td>7.26 (0.08)</td>
<td>7.26 (0.08)</td>
<td></td>
</tr>
<tr>
<td>PCO2 at NIV</td>
<td>10.3 (2.5)</td>
<td>10.0 (2.4)</td>
<td>9.3 (1.8)</td>
<td></td>
</tr>
<tr>
<td>Peak Pressure (IPAP)</td>
<td>20 (18–22)</td>
<td>19 (17–20)</td>
<td>18 (16–20)</td>
<td></td>
</tr>
<tr>
<td>p&lt;0.05; †p&lt;0.01: compared to “Up to 12 hours group”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**S136**

**Lung Protective Mechanical Ventilation for Acute Respiratory Failure is Not Being Implemented in UK Clinical Practice**

**Introduction**

The benefits of lung protective ventilation have been replicated in multiple trials.1,2 However, we suspected that adherence to this standard of care remained poor. Using the NIHR critical care Health Informatics Collaborative (cHIC) database, we analysed data from 11 teaching hospital intensive care units (22,524 patient episodes) to investigate real-world clinical practice.

**Methods**

1248 patient episodes, where ventilation was continued for ≥48 hours, with 232,600 hours of concurrent mechanical ventilation and blood gas data were identified as suitable for analysis. Short gaps in ventilation (<6 hours) were imputed based on the median of nearest known values, and
only the single longest period of ventilation from each patient episode was analysed.

Results The median tidal volume received by patients was 7.3 ml/kg\textsuperscript{-1} PBW (IQR:5.7–8.8). Female patients, especially those with higher BMI (≥30 kgm\textsuperscript{-2}) consistently received higher tidal volumes than males. Patients with severe respiratory failure (PaO\textsubscript{2}:FiO\textsubscript{2} <13 kPa) received a median tidal volume of 7.1 ml/kg\textsuperscript{-1} PBW, and had 71% ICU mortality (Table 1). Patients with respiratory failure sufficient to qualify for recruitment into recent clinical trials (PaO\textsubscript{2}:FiO\textsubscript{2} <20 kPa with PEEP ≥5 cm/H\textsubscript{2}0), who were exposed to tidal volumes≥12 ml/kg\textsuperscript{-1} PBW for longer than two hours had significantly increased risk of ICU mortality (odds ratio=2.89 [1.25–7.2]; p=0.007); This was not observed for patients with PaO\textsubscript{2}:FiO\textsubscript{2} ≥40 kPa (odds ratio=0.95 [0.58–1.56], p=0.91).

Conclusions More than 15 years after the ARMA study\textsuperscript{1} demonstrated a mortality benefit from lung protective ventilation, we are still not implementing 6 ml/kg\textsuperscript{-1} PBW ventilation into clinical practice, and are exposing even patients with a severe respiratory failure (PaO\textsubscript{2}:FiO\textsubscript{2} <13 kPa) to higher than recommended tidal volumes, with females and higher BMI patients at particular risk. We have also demonstrated that failure to institute lung protective ventilation in patients with a PaO\textsubscript{2}:FiO\textsubscript{2} ≥20 kPa leads to increased ICU mortality, which is not present in patients with PaO\textsubscript{2}:FiO\textsubscript{2} ≥40 kPa.

REFERENCES
1. ARDS Network. Ventilation with lower tidal volumes as compared with traditional tidal volumes for ALI and ARDS. NEJM 2000;342:1301–1308.
Complications of TB and extra-pulmonary TB

**P1** ACCESS TO BEDAQUILINE AND DELAMANID IN ENGLAND FOR TREATMENT OF DRUG RESISTANT MYCOBACTERIAL DISEASE – RESULTS OF A TB SAG SURVEY

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Introduction and objectives Bedaquiline and delamanid were centrally commissioned by NHS England for management of MDR and XDR-TB, within specified criteria (including age 16–65, pulmonary disease, discussion in BTS MDR-TB forum and six months usage) in Aug 2015. We sought to determine ease of availability, obstacles faced and off licence use by prescribing centres.

Methods An electronic survey was sent to the leads or nominated deputy of MDR-TB centres in England, and the responses analysed using the Surveymonkey web tool.

Results Response rate was 64% (18/28). Of the respondents, 8 centres (44%) had not used the drugs since Aug 2015. Of the remainder, indications in all cases were either drug resistance (90% of centres) or intolerance (70% of centres). Intolerance was usually hearing loss from second line injectable agents and tendonitis from fluoroquinolones; a minority of patients also could not tolerate prolonged linezolid. 90% of cases had been discussed in the BTS MDR-TB forum; the exception was a case of non tuberculous mycobacterial (NTM) disease (M. abscessus) which was discussed with other NTM experts. There was minimal delay (<2 weeks) between the MDR-TB forum decision to use the drugs and NHS England approval when used for licenced indications; one delay occurred when requesting an extension beyond 6 months (7 weeks delay). There was minimal delay (<2 weeks) between NHS England approval and the patient actually receiving the drug. Both drugs were used in the same patient by two centres (20%). The drugs had been used ‘off licence’ by 6/10 centres. Details in Table 1. Free text responses highlighted difficulty in obtaining the outcome of individualised funding request decisions, difficulty obtaining funding for children (being paid for by the children’s hospital in one case), and two rejections of the use in NTM disease.

Conclusions Access to bedaquiline and delamanid within licenced indications seems to have minimal delay. Difficulties may arise when the drug needs to be used for >6 months. Problems are also reported with funding in children. There is emerging evidence of benefit in difficult NTM disease; this is an unlicensed indication that may expand in the future. Consideration may need to be given to a forum for difficult NTM disease.

**Abstract P1 Table 1** Off licence use of bedaquiline and delamanid by MDR-TB centres

<table>
<thead>
<tr>
<th>Reason for off-licence use of bedaquiline/delanamid</th>
<th>% of centres (note each centre may have more than one off licence usage)</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration longer than 6 months</td>
<td>30%</td>
<td>All cases pulmonary XDR with large burden of disease and/or limited treatment options</td>
</tr>
<tr>
<td>Extra-pulmonary MDR/XDR disease</td>
<td>20%</td>
<td>Lymph node TB</td>
</tr>
<tr>
<td>NTM disease</td>
<td>20%</td>
<td>M. chimaera sternal wound infection (multiple drug intolerances) and M. abscessus extensive pulmonary disease (funding declined by NHS England in both cases, funded by hospital in one case and appeal for compassionate use in the other)</td>
</tr>
<tr>
<td>Drug intolerance in fully sensitive disease</td>
<td>10%</td>
<td>Tox epidermal necrolysis to first line agents</td>
</tr>
</tbody>
</table>

**P2** USING AN APP TO DETECT EARLY ETHAMBUTOL TOXICITY

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10.1136/thoraxjnl-2017-210983.144

Aim Ethambutol is one of the first-line drugs used to treat tuberculosis (TB) but its side effects include optic neuropathy, causing sight loss and changes in colour-vision. Early detection can mean any toxicity is reversible. Careful monitoring of sight is therefore required in patients taking ethambutol. After a patient irreversibly lost his sight from ethambutol toxicity and a successful claim was made against the hospital, more robust methods of monitoring eyesight were needed in patients taking ethambutol.

Method Currently in our department, all patients being started on ethambutol are referred to the ophthalmology department for baseline eye testing of visual acuity and colour vision. They are tested again at 4–6 months if they remain on ethambutol past 2 months. In between this, we previously relied on the patient reporting any change in vision to the TB team who would then arrange additional formal testing. To improve monitoring, we purchased two apps- a Munsell D15 Colour Vision Test and a LogMAR acuity test- to be used on an iPad. Four members of clinic staff were trained to use the apps. All patients on prolonged ethambutol now have their vision tested at all TB clinic appointments (usually monthly).
Any change from previous or any problems detected by the apps mean stopping the ethambutol and urgent referral to ophthalmology for formal testing.

**Outcomes** In six months of using the apps, sixteen patients on ethambutol have had regular testing. Two patients have had changes in vision picked up by the apps. One patient's formal eye testing showed no change. The other showed objective change in acuity and colour vision. Without using the apps, these changes may not have been picked up for several more weeks reducing the likelihood of reversibility. The apps are straightforward and a questionnaire of the staff trained in their use rated them easy to use.

**Conclusion** By using the apps, additional ophthalmology appointments are avoided unless needed and problems are potentially detected before the patient notices any change in their vision. Early detection enables ethambutol to be stopped with the aim of reversing any optic neuropathy before it becomes permanent.

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**P3**


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10.1136/thoraxjnl-2017-210983.145

**Background** An accurate estimate of TB mortality is required to monitor progress towards the end TB goal of reducing deaths by 95% by 2035. In England and Wales (E and W), treatment outcome, including death from all causes, is reported for TB cases notified to the Enhanced Tuberculosis Surveillance system (ETS). The UK Office for National Statistics (ONS) compiles TB mortality statistics from death certificates. We compared data collected in ETS and ONS to inform how best to estimate TB mortality.

**Methods**TB cases notified in ETS were probabilistically matched to ONS deaths (DONS) between 2005 and 2015 which had ICD-10 codes indicating TB caused or contributed to the death. Deaths reported in ETS (DETS) were identified in DONS to assess if ONS captured all TB deaths. DONS were identified in ETS data to determine if all people dying with TB were notified. Data from ETS and death certificates enabled stratification of deaths into: active TB, TB sequelae and not TB. Risk factors for deaths recorded in only one system were identified with multivariable analysis.

**Results** In E and W, the number and proportion of DETS (2005: 470 (6.0%), 2014: 364 (5.5%)) was lower than the number of DONS (2005: 654, 2014: 587). 57% of deaths from all causes reported as DETS were recorded as DONS. 53% of DONS were notified as DETS. In total 9289 deaths were identified in one or both systems: 64% were active TB, 23% TB sequelae, 7% were not TB and in 6% TB was incidental. DETS not recorded in ONS were more likely to be culture and smear negative and diagnosed post-mortem. DONS not notified to ETS were more likely to be female, over 65 years old and born in the UK.

**Conclusions** Data on TB deaths captured in ETS and ONS differ significantly, suggesting neither system captures all TB deaths. Almost one third of TB deaths recorded by ONS are not active TB, and coding changes in ONS could resolve much of this. Further work, including an audit to determine whether there is under notification of TB or incorrect completion of death certificates or both is needed.

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**Abstract P3 Figure 1** Flow chart of all “TB deaths” identified in ETS and ONS between 2005 and 2015, including details of which have matched to ETS notifications (cases notified between 2000 and 2015). TB deaths classified into active TB, TB sequelae, not TB and TB incidental to death.
**P4**

**ISOLATED MEDIASTINAL LYMPH NODE TUBERCULOSIS (IMLNTB) IS CHARACTERISED BY ELEVATION IN SYSTEMIC AND BRONCHIAL IL-12 PATHWAY MEDIATORS COMPARED TO PULMONARY TB**

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10.1136/thoraxjnl-2017-210983.146

**Introduction/Aims**

The incidence of isolated mediastinal lymph node tuberculosis (IMLNTB) has increased in recent years in the UK. These patients exhibit a distinct clinical phenotype compared to patients with pulmonary TB (PTB), more likely to be asymptomatic or presenting with immune hypersensitivity. The mediastinal lymph nodes are of particular interest in TB as they have been implicated as a key site for host-pathogen interaction, the outcome of which determines infection status within the dynamic spectrum of disease. Indeed, studies have suggested that IMLNTB may represent a sub-clinical phenotype with a greater degree of immune containment compared to PTB. This study assessed immune status in patients with IMLNTB, PTB and healthy controls with the hypothesis that these states vary in levels of protective immunity.

**Methods**

A novel sampling technique using a synthetic absorptive matrix (bronchosorption) placed on the respiratory mucosa of the bronchus was used to obtain mucosal lining fluid (MLF) of patients undergoing bronchoscopy. Serum samples were also collected in addition to clinical, radiological and demographic data. Eluted bronchosorption fluid, together with serum, were then analysed for a range of soluble inflammatory mediators using a multiplex immunoassay platform.

**Results**

Patients with IMLNTB (n=12) had elevated levels of IL-12/IL-23-p40 in both the serum and bronchial MLF compared to patients with PTB (n=12) and healthy controls (n=19). In addition, IL-12 induced IFN-γ pathway mediators, including TNF-α, were elevated in the serum in the IMLNTB group. Conversely, levels of serum acute phase reactants (CRP/SAA) were elevated in PTB compared to IMLNTB and healthy controls.

**Conclusion**

These Results suggest that IMLNTB and PTB have different molecular phenotypes, with IMLNTB showing less systemic inflammation in the form of serum CRP/SAA, but greater or equal levels of levels of certain immune mediators in both the serum and the bronchus. These findings may reflect that IMLNTB is a distinct clinical state to PTB, with immune activation through the IL-12 pathway playing a role in achieving immune containment.

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**P5**

**PLEURAL TUBERCULOSIS IN LONDON: A PERSISTENT DIAGNOSTIC CHALLENGE**

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10.1136/thoraxjnl-2017-210983.147

**Background**

Five percent of disease due to *Mycobacterium tuberculosis* is reported to be associated with a pleural effusion. We conducted a retrospective review of all patients at our institution treated for pleural tuberculosis (TB) between 2010 and 2015, reviewing demographics, fluid microbiology, histology, and radiology to characterise our cohort and review diagnostic certainty.

**Results**

71% (36/51) of our cohort were male; with a mean age of 41 years. 59% of cases had clear evidence of concurrent parenchymal involvement (five did not have cross sectional imaging). All effusions were exudates. 46 patients had imaging one year after treatment started. 16/46 had residual fluid, 16/46 demonstrated complete resolution and 14/46 had pleural thickening. Pleural fluid TB culture was performed in 47/51 patients and was positive in 43% of cases. Pleural fluid TB PCR was performed in 18/51 patients. 3/18 were PCR positive; in 1 patient PCR provided a diagnosis 10 days before culture. Two PCR Results provided diagnoses despite negative cultures and demonstrated a rifampicin resistance mutation in one case. 21 pleural biopsies were done, 13 were video assisted thoracoscopic procedures and 8 were taken with closed cutting needles. Pleural biopsy TB culture was...
performed on 16/21 samples. 63% (n=10) were culture positive. 4/6 culture negative samples that were sent for histopathology also demonstrated granulomas. The combined yield of fluid and biopsy culture in addition to fluid PCR was 57% in our cohort increasing to 65% when histology is included. 4 patients had a positive culture or PCR from another site. 15/ 51 (29%) of patients were treated empirically without positive TB cultures, positive TB PCR results, or granulomas on biopsy.

Conclusions This analysis demonstrates that the characteristics of our cohort are similar to previously reported cohorts; that TB PCR of pleural fluid has provided some diagnostic benefits, but that there remains diagnostic uncertainty in a significant proportion of patients. New tools are required to improve diagnostic accuracy of this difficult disease and we propose that NICE-approved analysis of fluid for adenosine deaminase may be a useful additional investigation for this patient group.

Background Ophthalmic manifestations of tuberculosis (TB) are described as inflammatory events in one or both eyes involving the uvea, optic nerve or orbit. TB is almost always presumptive as mycobacterium are rarely cultured from ocular/periorcular tissues. Ocular TB is rare in the developed world and there is a general lack of consensus regarding diagnosis and treatment duration. We surveyed UK specialists involved in the diagnosis and treatment of tuberculous uveitis to examine current clinical practice.

Method A previously validated survey based on two clinical cases (one more likely to have TB, one less likely to have TB) was used to examine diagnostic and treatment practices amongst consultants from three different specialities across different institutions in the UK: ophthalmologists with an interest in uveitis, respiratory, and infectious disease (ID) physicians with a TB interest.

Results Ten ophthalmologists, 24 ID and 29 respiratory physicians completed the survey. Responses varied greatly within the same specialty as well as between different specialities. For example, in a patient with chronic granulomatous panuveitis and a known TB risk factor, the pre-test likelihood of having TB was estimated at the time of procedure. Sarcoïdosis was diagnosed in 15.6% (n=29), mycobacteriosis in 9.7% (n=18), fungal infection in 2.7% (n=5) and other granulomatosis in 1% (n=2). Mycobacteriosis was due to M.tuberculosis in 88.9% (n=16), M.kansasii in 5.55% (n=1) and M.avium in 5.55% (n=1). EBUS-TBNA established the diagnosis in 56.3% (n=9) of TB cases: 25% (n=4) caseous granuloma in cell block, 18.8% (n=3) positive acid-fast bacilli (AFB) and 12.5% (n=2) M. Tuberculosis in aspirated sample culture. In 37.5% (n=6) cell block from EBUS-TBNA showed granulomas but definite diagnosis was made by presence of caseous granuloma in biopsy (12.5%,n=2) or positive AFB (6.25%,n=1) in other organs, positive PCR of bronchoalveolar lavage in 6.25% (n=1) or pleural fluid in 6.25% (n=1), and sputum culture in 6.25% (n=1). One patient needed mediastinoscopy. 25% (n=4) of patients diagnosed with TB had cancer and 31.6% (n=5) was submitted to EBUS-TBNA for cancer suspicion. In our setting, the prevalence of TB was 8.6% and the diagnostic yield of EBUS-TBNA was 77.7%.

Conclusions Our study showed granulomatosis in 29% of patients with TB as second most frequent cause. Brazil belongs to the five countries that collectively account for about 50% of the world TB cases and, despite lymphadenopathy is not a major form of TB, our study emphasises its importance in differential diagnosis of ITLN in endemic countries. EBUS-TBNA showed to be a useful diagnostic tool.

REFERENCES

Poster sessions

P6 OCULAR TUBERCULOSIS: A SURVEY OF UK CLINICAL PRACTICE
1R Hussain, 2H Petrushkin, 1C Barracough, 1H Kunst, 2C Pravesio, 1VLC White, 3JL Potter.
1Barts Health NHS Trust, London, UK; 2Moonfields Eye Hospital NHS Foundation Trust, London, UK; 3Queen Mary University London, London, UK
10.1136/thoraxjnl-2017-210983.148

Background Tuberculosis (TB) remains a global public health concern. It is one of intrathoracic lymphadenopathy (ITLN) numerous causes and must be taken into account in differential diagnosis, especially in endemic countries. Diagnostic yield of EBUS-TBNA for mediastinal hilar TB has been reported to be 80%. Diagnostic strategy of ITLN in endemic countries. EBUS-TBNA was 77.7%.

Aim To determine the prevalence of TB in patients with ITLN undergoing EBUS-TBNA and calculate diagnostic yield.

Methods Retrospective study of all patients undergoing EBUSTBNA for ITLN, from August 2011 to March 2017. Clinical, laboratorial, histopathological and radiological data were assessed. We considered for diagnosis by EBUS-TBNA all cases with TB confirmed and granulomatous lymph node with TB confirmation by other methods.

Results 186 patients were included, mean age of 57 years (SD=14), 53.8% male. Granulomatous disease was diagnosed in 29% (n=54), 42.6% (n=23) with cancer diagnosis or suspicion at the time of procedure. Sarcoïdosis was diagnosed in 15.6% (n=29), mycobacteriosis in 9.7% (n=18), fungal infection in 2.7% (n=5) and other granulomatosis in 1% (n=2). Mycobacteriosis was due to M.tuberculosis in 88.9% (n=16), M.kansasii in 5.55% (n=1) and M.avium in 5.55% (n=1). EBUS-TBNA established the diagnosis in 56.3% (n=9) of TB cases: 25% (n=4) caseous granuloma in cell block, 18.8% (n=3) positive AFB and 12.5% (n=2) M. Tuberculosis in aspirated sample culture. In 37.5% (n=6) cell block from EBUS-TBNA showed granulomas but definite diagnosis was made by presence of caseous granuloma in biopsy (12.5%,n=2) or positive AFB (6.25%,n=1) in other organs, positive PCR of bronchoalveolar lavage in 6.25% (n=1) or pleural fluid in 6.25% (n=1), and sputum culture in 6.25% (n=1). One patient needed mediastinoscopy. 25% (n=4) of patients diagnosed with TB had cancer and 31.6% (n=5) was submitted to EBUS-TBNA for cancer suspicion. In our setting, the prevalence of TB was 8.6% and the diagnostic yield of EBUS-TBNA was 77.7%.

Conclusion Our study showed granulomatosis in 29% of patients with TB as second most frequent cause. Brazil belongs to the five countries that collectively account for about 50% of the world TB cases and, despite lymphadenopathy is not a major form of TB, our study emphasises its importance in differential diagnosis of ITLN in endemic countries. EBUS-TBNA showed to be a useful diagnostic tool.

P9 IMPACT OF THE 2016 TUBERCULOSIS GUIDELINE ON A SINGLE PAEDIATRIC TB CENTRE IN THE UK

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10.1136/thoraxjnl-2017-210983.151

Background NICE released an updated Tuberculosis (TB) guideline in January 2016. Compared with the 2011 guideline this reduced the Mantoux threshold from 15 mm to 5 mm irrespective of BCG status, thus increasing the number of patients requiring assessment for latent TB infection (LTBI) and TB disease. In 2015 we predicted a paediatric workload increase of 37%.

Objectives To determine the impact of the 2016 guideline on the number of children diagnosed with LTBI and TB disease.

Methods A retrospective analysis of children aged <16 years attending our TB service January–December 2016. All children were assessed by a TB nurse followed by a consultant if there were concerns about LTBI or TB disease. Management followed 2016 NICE guidelines. Treatment given was then compared with that recommended in the 2011 guidelines.

Results 411 children were seen by the TB nurse. Of these, 294/411 fulfilled the 2016 criteria for screening (new entrants and pulmonary contacts). 50/294 (17%) had a positive Mantoux. Based on Mantoux Results 40/294 (14%) were diagnosed with LTBI. 9/294 (3%) had TB disease. Following the 2011 guideline 22/294 (7%) had a positive Mantoux with 16/294 (5%) treated for LTBI and 6/294 (2%) for TB disease. Of those with positive Mantoux tests, IGRA tests were positive in 20/40 (50%) and 14/22 (64%) of the 2011 and 2016 guideline groups respectively (Table 1). 43 additional children (household contacts of non-pulmonary disease) would have been screened by the 2011 but not the 2016 guideline. These children were seen in our clinic. None had TB disease but 8 had Mantoux≥5 mm (1 IGRA positive).

Conclusion Compared with the 2011 version, the NICE 2016 TB guideline more than doubles the number of children receiving chemoprophylaxis for LTBI but identifies 33% more children with TB disease. Not screening household contacts of non-pulmonary cases Results in a 14.6% reduction in referrals but also misses a significant number of children with a positive mantoux.

REFERENCE
and response to anti-tuberculous therapy (ATT). We test the hypothesis that FG-PET CT imaging might be useful in OTB patients, most of whom describe visual symptoms as the presenting feature of TB, without respiratory or constitutional symptoms. Patients were identified by analysing referrals between a tertiary referral centre for ophthalmology and its regional TB service, over a five year period, with data collection continuing prospectively. Additional cases were identified from our region’s TB Register, where the eye(s) had been recorded as an extra-pulmonary site of TB. As part of TB screening, all patients had a chest X-ray (CXR) and interferon gamma release assay (with or without Tuberculin Skin Test). The TB medical team then assessed whether thoracic CT was indicated, to identify lymphadenopathy for endobronchial sampling, or an FG-PET scan to look for avid thoracic or extra-thoracic lymph nodes. In 40 patients, CXRs were essentially normal in two thirds and reported as abnormal, but not indicative of pulmonary TB, in one third. Thoracic CT in 15 patients demonstrated abnormal features in 8, half of whom went on to have endobronchial sampling. FDG-PET scans in 18 patients demonstrated avid nodes in 12: thoracic in 8 and extra-thoracic in 7 (cervical, axillary, pancreatic and inguinal). Overall, FDG-PET directed additional endobronchial sampling in 4 patients without enlarged thoracic nodes on conventional CT and ultrasound-guided biopsy of extra-thoracic sites in 7 patients, 2 of which subsequently demonstrated TB in culture. We describe a highly phenotyped cohort of OTB patients. There are currently no published series utilising FG-PET CT scanning as a routine part of the investigation strategy in this condition. Whilst OTB treatment remains empirical in many cases, our preliminary Results indicate that FDG-PET is a useful imaging modality for some patients and has a potential additional yield in subclinical TB over thoracic CT imaging, allowing activity to be detected in normal-sized thoracic nodes and also extra-thoracic sites.

**P11 HOW EXPERT IS THE XPERT MTB/RIF FOR DRUG SUSCEPTIBLE TUBERCULOSIS?**

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**Background** The Xpert MTB/RIF is a point of care, fully-automated diagnostic molecular test that simultaneously detects tuberculosis and rifampicin drug resistance which is used as a surrogate for multidrug resistant tuberculosis (MDR-TB). However, not much is known about susceptibility to other anti-TB drugs in patients having Rifampicin susceptibility on the Xpert. The Indian National Tuberculosis Programme recommends isoniazid and rifampicin in the continuation phase as part of category I first line therapy. However, in cases with isoniazid mono-resistance, which may be missed by the Xpert MTB/Rif, this would lead to rifampicin monotherapy and possible amplification of resistance. Hence it is essential to know the background rates for isoniazid resistance, before deciding on the drugs to be used in the continuation phase.

**Aim** To analyse drug susceptibility patterns (DST) in patients with rifampicin susceptibility.

**Methods** This study was carried out at the microbiology laboratory of PD Hinduja National Hospital, Mumbai, India. All Mycobacterium tuberculosis (MTB) isolates who underwent 14 drug susceptibility testing (DST) between December 2015-November 2016 were analysed retrospectively. All drugs were tested at WHO defined critical concentrations (CC).

**Results** Of a total of 2750 samples undergoing 14 drug DST, 1383 (50.29%) were rifampicin susceptible. Among the rifampicin susceptible isolates, the most common resistance was observed to Isoniazid (INH) in 182 (13.1%) samples of which 127 (9.18%) were isoniazid monoresistant. Ofloxacin resistance was seen in 55 (3.97%) samples; of these 33 (2.38%) were also moxifloxacin resistant at CC of 0.5 mcg/ml. Poly drug resistance was seen in 71 (5.1%) isolates; of these the most common cross resistance involved INH and Ethionamide seen in 55 (3.97%) isolates. Concomitant INH and fluoroquinolone resistance was seen in 11 (0.8%) isolates. Concomitant resistance to INH, Pyrazinamide and Ethambutol was seen in 2 isolates.

**Conclusion** Complete DST, when available, can identify poly-drug resistance and help design a more effective regimen. Increased access to Line probe assays would identify isoniazid resistance even in patients showing rifampicin susceptibility on the Xpert MTB/Rif. With high rates of INH resistance observed (13.1%) in our setting, it may be prudent to include Ethambutol in the continuation phase to avoid rifampicin monotherapy.
had ≥80% prescription pick-up rates checked with GP records. FeNO levels decreased from 121±63 ppb to 71±36 ppb at day 4 and 66±43 ppb at day 8 (p<0.01). 10 subjects had significant FeNO suppression by day 4 (figure 1). ACQ-7 score improved from 2.7±1.2 to 1.7±1.1 (p<0.01). Eosinophil count (0.65±0.51) and percent predicted FEV1 (79±19) did not change significantly.

Conclusion Combining the use of once a day therapy with remote assessment using appropriate technology, FeNO suppression is a feasible objective test of adherence in the routine clinical setting. Despite appropriate refill collection rates over half of subjects were identified as non-adherent to inhaled therapy. Although these individuals did not commence biological therapy, improvements have been sustained. We recommend routine use of this assessment in severe asthma services.

**P13 BRONCHIAL THERMOPLASTY MAINTAINS A LONG-TERM REDUCTION IN PERIPHERAL BLOOD EOSINOPHILS IN SEVERE ASTHMA**

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Introduction Severe Asthma, characterised by persistent symptoms despite maximal medical therapy, represents 5% of asthma cases. Bronchial Thermoplasty (BT) is a novel therapy where radiofrequency thermal energy is applied to airways distal to the main-stem bronchi, permanently reducing airway smooth muscle mass. It is unknown whether treatment of smooth muscle hypertrophy impacts persistently upon systemic signs of allergic inflammation. Peripheral blood eosinophils (PBEs) are a marker of inflammation in asthma. We have previously shown that BT modifies signs of Th2 inflammation as measured by PBEs and therefore wanted to ascertain whether this persisted over time?

**Method** We reviewed the 13 consecutive Severe Asthma cases treated with BT who were included in the initial analysis. Serial PBEs measured up to 3 years post BT were compared to those in the year preceding BT. Blood eosinophil levels taken peri-procedure were excluded from analysis due to escalated steroid therapy at this time.

**Results** Figure 1 demonstrates the absolute values of PBE for each patient during the 3 time periods (year before BT, Year immediately after BT and third year post BT). The group mean in year 3 has remained suppressed compared to baseline (year 3; 0.17 baseline p=0.0035).

**Conclusion** Previous findings showed that Severe Asthma patients undergoing BT had a significant reduction in average peripheral blood eosinophil levels from baseline. The data shows overall the group of 13 patients continue to remain eosinophil suppressed supporting the possibility of a long term eosinophil suppressive impact of BT.
**Poster sessions**

**P14** THERAPEUTIC BENEFIT OF MEPOLIZUMAB IN THE NATIONAL INSTITUTE OF HEALTH AND CARE EXCELLENCE (NICE) SUB-POPULATION– A POST-HOC META-ANALYSIS OF PHASE IIIB/III TRIALS

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10.1136/thoraxjnl-2017-210983.156

**Rationale** NICE provide evidence-based recommendations and guidance to the NHS regarding newly licensed drugs. Positive guidance for the use of mepolizumab, an anti-IL-5 mAb, was issued for adults with severe refractory eosinophilic asthma in a sub-population who 1) have had eosinophils of ≥300 cells per microlitre (0.30 × 10^9/L) within the previous twelve months, and 2) have had ≥4 asthma exacerbations needing systemic corticosteroids in the previous 12 months, or have had continuous oral corticosteroids (of at least the equivalent of prednisolone 5 mg/day) for six months previously. A post-hoc meta-analysis of 3 pivotal phase III studies was done to inform healthcare professionals' understanding of mepolizumab's efficacy in this subgroup.

**Methods** Three randomised double-blind, placebo-controlled studies (DREAM [NCT01000506], MENSA [NCT01691521], SIRIUS [NCT01691508]), using the licensed 100 mg SC dose or the bioequivalent 75 mg IV dose of mepolizumab, were identified. Both treatment arms were combined for analysis purposes. Data for key outcome measures (exacerbations, asthma control, and health-related quality of life) included within these trials was analysed in the sub-population and combined using the inverse-variance method. Data from SIRIUS was included in a sensitivity analysis due to differences in design and inclusion criteria from DREAM and MENSA.

**Results** 228 patients were included in the meta-analysis from DREAM and MENSA, 289 including SIRIUS. The mean patient age was 52.1 and 51.4 years, respectively, with a respective 60% and 61% female. In the meta-analysis of the UK NICE-specific subpopulation of DREAM and MENSA, a 53% (95% CI: 0.36, 0.62; p<0.001) reduction in clinically significant exacerbations was seen, with a 49% (95% CI: 0.01, 0.64, p<0.001) reduction including sensitivity analysis with SIRIUS. An improvement in ACQ score of -0.50 (95% CI: -0.73, -0.27; p<0.001) and -0.53 (95% CI: -0.73, -0.33; p<0.001) was observed, respectively. SGRQ was used as an outcome measure in MENSA and SIRIUS only, showing an improvement in score of -7.3 (95% CI: -11.1, -3.5, p<0.001).

**Conclusion** In the NICE sub-population, mepolizumab showed clinically meaningful and statistically significant effectiveness. These results aim to inform UK healthcare professionals' understanding of the likely treatment effect of mepolizumab in this sub-population.

**Funding** GSK (NCT01000506, NCT01691521, NCT01691508).

**P16** IMPLICATIONS OF NICE GUIDANCE IN ENGLAND AND WALES ON ELIGIBILITY FOR TREATMENT WITH MEPOLIZUMAB ANDomalizumab – AN IDEAL STUDY ANALYSIS

CEA Hartmann, H Starke Camejo, NB Gunsoy, RA Mehta, FC Albers. GlaxoSmithKline, Research Triangle Park, NC, US

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**Rationale** Severe asthma (SA) patients are a heterogeneous population with diverse clinical characteristics and biomarkers, including eosinophils and IgE. It is of clinical relevance to understand the relationship between different severe asthma phenotypes and thus eligibility for biologic therapies. The IDEAL study (Identification and Description of Severe Asthma Patients in a Cross-Sectional Study) aimed to define the proportion of patients in England and Wales who are eligible for anti IL-5 (mepolizumab) or anti-IgE (omalizumab) targeted therapy, and those who may be eligible for both, given current NICE guidance.

**Methods** IDEAL, an observational study, included SA subjects aged ≥12 years defined according to ATS/ERS guidelines by treatment with high-dose ICS plus additional controller(s) for ≥12 months. A post hoc analysis of IDEAL was conducted to identify eligibility to mepolizumab and omalizumab in accordance with current NICE guidance for each. Mepolizumab eligibility was defined as per NICE guidance: 'severe refractory eosinophilic asthma patients who have eosinophils≥300 cells/μL (0.30 × 10^9/L) or more in the previous 12 months and have had ≥4 asthma exacerbations needing systemic corticosteroids in the previous 12 months, or
have had continuous oral corticosteroids of at least the equivalent of prednisolone 5 mg per day for the previous 6 months'. Omalizumab eligibility defined as 'evidence of severe persistent allergic asthma and need for continuous or frequent treatment with oral corticosteroids (defined as ≥4 courses in the previous year), and meeting bodyweight and IgE criteria for omalizumab treatment'.

**Results** Of 748 SA subjects enrolled in the study, 670 met the analysis criteria and were included in this post-hoc analysis (mean age=50.9 years; 62% female). 90 subjects (13%) were eligible for mepolizumab and 184 (27%) were eligible for omalizumab. Of the 90 mepolizumab eligible patients, 31 (35%) were receiving mepolizumab therapy, while of the remaining 59 (9%) patients not on a biologic 11 (2%) were also eligible for omalizumab.

**Conclusions** This is the first cross-sectional study providing estimation of the proportion of SA patients eligible for biologic therapy in accordance with NICE guidance, indicating 13% mepolizumab-eligibility and 27% omalizumab-eligibility with limited overlap. (Funded by GSK; 2 01 722.)

**REFERENCE**

1. Asthma Control Questionnaire. https://www.qoltech.co.uk/acq.html

### Abstract P17 Table 1

<table>
<thead>
<tr>
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<th>Adherent group (76%)</th>
<th>Non-adherent group (9%–75%)</th>
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<td>Baseline%</td>
<td>55.00 (SD 15.72)</td>
<td>61.95 (SD 22.65)</td>
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<td>69.85 (IQR 28.00)</td>
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<td>22.00 (IQR18.75)</td>
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<td>Current FeNO (ppb)</td>
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<td>2.85 (IQR 1.72)</td>
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<td>Baseline ACQ-7</td>
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<td>1.79 (SD 1.02)</td>
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<td>Current ACQ-7</td>
<td>2000 (IQR 1000)</td>
<td>1600 (IQR1200)</td>
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</table>

**P18**

**EARLY EXPERIENCE INITIATING MEPOLIZUMAB FROM NICE TO THE REAL WORLD**

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10.1136/thoraxjnl-2017-210983.160

**Objective** To identify barriers which prevent patients meeting the NICE criteria for mepolizumab.

**Background** Mepolizumab is a steroid sparing agent for patients with severe eosinophilic asthma. All patients must meet the NICE criteria:

- Eosinophil count>300 cells/microlitre in past 12 months
- Adherence to optimised therapy
- Four or more courses of oral corticosteroids (OCS) in past 12 months or continuous OCS equivalent to at least 5 mg of for 6 months

**Methods** Adherence data was obtained from the patient’s GP and eosinophil counts recorded from the hospital electronic patient records. If a patient did not meet the approval criteria the following data was collected: their current OCS dose; number of years under the severe asthma service; last eosinophil count >300 cells/ microlitre.

**Results** Of the 269 patients identified as potential mepolizumab candidates 133 have been assessed and 32 (24%) have so far been approved, 38 (28%) have not been approved due to non-adherence to inhaled corticosteroid (ICS) therapy. In this cohort the average ICS adherence was 47% (±SD 0.23) and time under severe asthma specialist care equates to 6.1 years (±3.6). 63 (51%) patients did not have an eosinophil count >300 cells/microlitre in the last 12 months. In this
group the mean OCS dose is equivalent to 11.5 mg (±7.6) of prednisolone. The mean of the highest historical eosinophil level was 700 cells/microlitre (±360).

**Conclusions** The following barriers to mepolizumab therapy have been identified:

- Poor adherence to ICS therapy in patients believed to be on optimal therapy.
- Long-term OCS treatment is suppressing the eosinophil count below 300 cells/microlitre.

Firstly, this highlights the need for service improvement to ensure that adherence is regularly monitored. Those who are non-adherent can be referred to the RASP study or for inhaled nitric oxide (FeNO) monitoring. Secondly, patients on long-term OCS may be prevented from benefiting from the steroid sparing effects of mepolizumab. To achieve the necessary eosinophil counts steroids must be progressively reduced risking destabilisation of asthma control.

**REFERENCE**


**P19 IMPACT OF MONTH OF INITIATION OF OMALIZUMAB ON TREATMENT OF SEVERE ALLERGIC ASTHMA, A SUB-ANALYSIS OF THE APEX II STUDY**

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**Introduction and Objectives** In asthma, seasonal variation in outcomes is known with seasonal peaks in exacerbation. Allergic inflammation is associated with greater susceptibility to viral infections. The UK real world studies, APEX I and II, demonstrated omalizumab reduced exacerbation frequency, healthcare utilisation, OCS burden and improved lung function in severe allergic asthma patients, but initial analyses excluded an assessment of seasonal impact. Patients initiated during their usual symptom season, may have inadequate time to suppress basophils and mast cells prior to exacerbating and consequently fail their 16 week treatment assessment assessing response. The objective was to determine if season/month of initiation had any impact on response (16 week clinical assessment according to usual clinical practice at each centre), hospital (A and E attendance and/or admission) and ‘dose exacerbation’, (OCS dose increase ≥10 mg for ≥3 days) rates. 

**Methods** The APEX II data was reanalysed, directly comparing response rate and frequency of exacerbations with time of initiation. We also looked at the pattern of seasonal exacerbations pre- and post- omalizumab initiation.

**Results** In the 258 cases included, response rate at 16 weeks where response was known was 82.4%. Highest response rates were in those initiated on treatment in December (90%) and July (89%) and lowest were January (62%) and August (69%). The total number of ‘hospital exacerbations’, over the 12 month period pre- and post-initiation was reduced from 362 to 151. Pre-initiation, there was a seasonal peak of hospital exacerbations (figure 1) from August to October. This was suppressed by omalizumab, with greatest reduction observed in September (76%) and lowest in March (29%). The total number of ‘dose exacerbations’, over the 12 month period pre- and post-initiation was reduced from 948 to 522. The seasonal pattern was different than for hospital admissions, with a relatively consistent reduction of dose exacerbations across the year. The season/month of initiation was not statistically different for response, hospital and dose exacerbation rates.

**Conclusions** Regardless of the timing of initiation, the response rate to omalizumab is consistent through the year, the biggest observable seasonal effect, was the diminishing of the seasonal peak of hospital exacerbations around early autumn.

Please refer to page A257 for declarations of interest in relation to abstract P19.

**Abstract P19 Figure 1** Impact of omalizumab on hospital exacerbations. 2 point moving average is the average of the previous data point and the current data point.

**P20 LATENT HELMINTH DISEASE AS A CAUSE OF EOSINOPHILIA IN RESPIRATORY PATIENTS**

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**Introduction** Within the UK, eosinophilia is most commonly associated with allergy and respiratory diseases such as asthma. Increasingly raised blood eosinophil counts are seen as a biomarker of heightened Th2 inflammation indicating a need to prescribe steroids in airways diseases. New treatments for severe Th2-high asthma aim to inhibit the eosinophilic pathway to reduce pathological inflammation. However by inhibiting this pathway we risk suppressing the body’s natural defences against parasitic helminth disease – in patients with asymptomatic latent Strongyloides stercoralis there is the risk of catastrophic hyper-infection. Our particular patient cohort in East London is a diverse international community who travel frequently. We therefore sought to evaluate the prevalence of asymptomatic helminth disease in respiratory, and particularly asthma patients, within our Trust, which includes a severe asthma service where we prescribe biologics that inhibit the Th2 pathway.

**Methods** We prospectively tested eosinophil patients reviewed in respiratory clinic for helminth infection using serological screening as part of a Service Evaluation. Inclusion criteria were an eosinophilia (≥0.3) or those being considered for
treatment with Mepoluzimab. Patients were tested for strongyloidiasis, filariasis and schistosomiasis depending on travel history. Patients symptomatic of helminth infection (e.g., diarrhoea) were excluded from this evaluation.

**Results** We tested 80 patients, 32 from severe asthma clinic, 42 from the general asthma clinic and 6 from other clinics. From these 16 (20%) had positive parasite serology: 14 of these were for *Strongyloides stercoralis* and 1 each for filarial and schistosomal. All the positives had asthma and 4 were from the severe asthma service. The average IgE was 433 and the average eosinophil count was 0.7. There was no statistical difference between the eosinophil counts, or total IgEs, between the positive and negative groups.

**Conclusion** There is a high prevalence of asymptomatic parasitic infection within our cohort, suggesting local patients who have an eosinophilia should be screened for helminth disease even in the presence of another cause eosinophilia. Furthermore, we recommend all patients being assessed for a biologic that would inhibit Th2 responses, such as Mepoluzimab, should be screened for latent *Strongyloides stercoralis* infection given the danger of hyper-infection upon immunosuppression.

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**P21** EVALUATING THE CLINICAL IMPACT OF CORTICOSTEROID SENSITIVITY AND INSENSITIVITY OF PERIPHERAL BLOOD MONONUCLEAR CELLS IN SEVERE ASTHMA

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Steroid insensitivity and the heterogeneous nature of asthma represent a significant clinical challenge for patients with severe asthma. The use of peripheral blood mononuclear cells (PBMC) in recent studies has allowed researchers to demonstrate that poor steroid response could be due to corticosteroid insensitivity in immune cells. These cells have been used as a model to investigate the underlying molecular mechanisms of corticosteroid resistance. These models were however inconclusive and have failed to consider asthma phenotypes. Our aim was to determine *in vitro* corticosteroid sensitivity of isolated PBMCs in T112 high and T112 low patients. Severe asthma patients as classified by the Global Initiative for Asthma were recruited and divided into T112 high and T112 low cohorts based on fractional exhaled nitric oxide (FeNO). Isolated PBMCs were stimulated with αCD3/28 alone or in the presence of dexamethasone (10^{-10} M-10^{-6} M). IL-5, IL-13 and IL-17 cytokine release were measured using ELISA. Correlation studies were carried out to determine whether the LogIC_{50} or FeNO correlated with markers of asthma severity. PBMCs stimulated with αCD3/28 showed significant IL-5 and IL-17 release in T112 low but not T112 high patients. Production of IL-5 or IL-7 was dose-dependently suppressed by dexamethasone with different potencies. IL-13 was only significantly stimulated in T112 low patients and did not show suppression by dexamethasone. A significant negative correlation between αCD3/28 stimulated IL-17 production and FeNO was observed. Overall, PBMCs from severe asthmatics retain cell responsiveness to TCR engagement with production of T112 and T11217 cytokines and inhibition by dexamethasone. Additional studies comparing T112 high vs T112 low patients are required to determine whether differences in *in vitro* CS response exist between these 2 categories of patients.
Conclusion This classification system can be useful to accurately describe laryngoscopic findings during Ilo assessment. This system is now incorporated into our reporting practices to increase capture of Ilo diagnosis. The inclusion of supraglottic presentation with symptoms supports accurate diagnosis and treatment and further understanding of Ilo.

P23 PATIENT-REPORTED ONSET FACTORS IN INDUCIBLE LARYNGEAL OBSTRUCTION

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Introduction and Objectives Inducible Laryngeal Obstruction (Ilo) is poorly understood, in terms of aetiology and onset by patients and clinicians. Patients presenting to our Tertiary Airways service commonly seek an understanding of the causes and triggers of their Ilo episodes. This study aims to develop a taxonomy of categories of patient-reported onset factors for Ilo from a sample of patients with confirmed Ilo on laryngoscopy, referred to our service.

Method Within a nine month period, 103 patients referred to the Airways service (76% female, 24% male; age range 15–86 years (median=52)) with endoscopically-confirmed Ilo were asked to report historical factors contemporaneous with the initial onset of Ilo symptoms. A retrospective analysis of patient notes was also conducted to identify co-morbidities and additional onset factors. Single or multiple onset factors for each patient were collected, which were coded into initial themes. From these themes, second-order onset categories were developed which incorporated factors reported by all participants.

Results Thirteen initial onset themes were developed. These included psychological factors (25% of patients), upper respiratory tract infections (23%), reflux (17%), chest infections (14%), medical conditions (12%) and surgery (10%). These were then refined into a taxonomy of five categories of onset factors:

- Respiratory Tract Infections and Viruses (40% of patients)
- Underlying Medical Conditions, e.g., rhinitis with post nasal drip, reflux (34%)
- Psychological difficulties (23%)
- Irritants, e.g., medication (23%)
- Exercise (7%)

Only one patient had onset factors in multiple categories, indicating that these categories are largely independent of each other. The prevalence of certain onset factors was mediated to some degree by age, e.g., medical conditions were more frequent factors for older participants, whereas exercise was a more common factor in younger participants.

Conclusions This study demonstrates patient-reported onset factors for Ilo can be useful translated into a detailed taxonomy based on specific conditions/triggers. This understanding may be useful in furthering our understanding, both of common trigger and onset factors that can be communicated to patients, and may help to inform therapeutic interventions aimed at the active self-management of Ilo.

Clinical update in COPD

P24 MAPPING OF END OF LIFE RECOGNITION AND PALLIATIVE CARE PROVISION IN COPD

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10.1136/thoraxjnl-2017-210983.166

COPD kills about 25 000 people per year in England and Wales (DoH 2011). NICE guidelines (2010) suggest patients with end stage COPD should have access to palliative services. The national COPD audit showed on-site palliative care provision has increased from 50% in 2008 to 87% in 2014 but less is known about out of hospital provision. The Gold Standard Framework (GSF) prognostic indicators assist clinicians to identify patients who are approaching end of life at an earlier stage enabling appropriate interventions to take place. These patients are more likely to receive well-coordinated and high quality care (GSF/RCGP 2011). The aim of our study was to map the number of QoF registered COPD patients, the frequency of COPD specific GSF indicators, the number included on primary palliative care registers (≥2 GSF prognostic indicators) and the number reviewed by palliative care.

Methods A multidisciplinary group with membership from CCG, acute trust, hospice and the community team oversaw the project. After a data sharing agreement was completed, data was collated from across all health care sites in our area for COPD patients enabling us to confirm the number and type of GSF prognostic indicators for each patient and healthcare activity including palliative care reviews.

Results As of March 2016 there were 4999 COPD patients; 52% were male with an average age of 69.2 years. 25.7% of the patients (n=1285) had ≥1 GSF prognostic indicator. The most common indicator was MRC dyspnoea score of 4/5 (65.5%), followed by body mass index <20 (25.7%). Of the 294 patients with ≥2 GSF prognostic indicators 14.6% were on the GP palliative care register. 19.0% of the 294 patients had been reviewed by the palliative care team.

Conclusion GSF prognostic indicators in COPD are prevalent with breathlessness being the most common. Only a small proportion of appropriate patients were included on the palliative care register (14.6%) with more being seen by palliative care teams than on the registers. Further work is needed to ensure effective communication and education is provided across the whole health care system to identify patients earlier who are approaching end of life.

P25 LIVING WITH COPD: A PUBLIC AWARENESS AND SCREENING CAMPAIGN

1MG Crooks, 2J Thompson, 3S Platten, 4C Evans, 5S Faruqi. 1Hull York Medical School, Hull, UK; 2Hull and East Yorkshire Hospitals NHS Trust, Hull, UK; 3City Health Care Partnership, Hull, UK; 4British Lung Foundation, London, UK

10.1136/thoraxjnl-2017-210983.167

The national COPD audit showed on-site palliative care provision has increased from 50% in 2008 to 87% in 2014 but less is known about out of hospital provision. The Gold Standard Framework (GSF) prognostic indicators assist clinicians to identify patients who are approaching end of life at an earlier stage enabling appropriate interventions to take place. These patients are more likely to receive well-coordinated and high quality care (GSF/RCGP 2011). The aim of our study was to map the number of QoF registered COPD patients, the frequency of COPD specific GSF indicators, the number included on primary palliative care registers (≥2 GSF prognostic indicators) and the number reviewed by palliative care.

Methods A multidisciplinary group with membership from CCG, acute trust, hospice and the community team oversaw the project. After a data sharing agreement was completed, data was collated from across all health care sites in our area for COPD patients enabling us to confirm the number and type of GSF prognostic indicators for each patient and healthcare activity including palliative care reviews.

Results As of March 2016 there were 4999 COPD patients; 52% were male with an average age of 69.2 years. 25.7% of the patients (n=1285) had ≥1 GSF prognostic indicator. The most common indicator was MRC dyspnoea score of 4/5 (65.5%), followed by body mass index <20 (25.7%). Of the 294 patients with ≥2 GSF prognostic indicators 14.6% were on the GP palliative care register. 19.0% of the 294 patients had been reviewed by the palliative care team.

Conclusion GSF prognostic indicators in COPD are prevalent with breathlessness being the most common. Only a small proportion of appropriate patients were included on the palliative care register (14.6%) with more being seen by palliative care teams than on the registers. Further work is needed to ensure effective communication and education is provided across the whole health care system to identify patients earlier who are approaching end of life.
Background Chronic Obstructive Pulmonary Disease (COPD) is a smoking related lung disease characterised by airflow obstruction on spirometry. COPD patients are prone to acute exacerbations, frequently leading to health care utilisation. There are over 7500 people in Hull with COPD and it is estimated over 6000 patients are living with the condition without a diagnosis. Early identification of COPD with targeted smoking cessation and early initiation of treatment has potential to improve outcomes. We describe the early Results of a COPD screening initiative in Hull.

Methods A collaborative screening program was developed involving the acute hospital trust, community services, clinical commissioning group and city council. The initiative was supported by British Lung Foundation, branded under their ‘Love Your Lungs’ campaign. Screening was undertaken over 4 days in public venues in areas with high smoking prevalence. Individuals completed symptom and lifestyle questionnaires and FEV-1/FEV-6 assessment. Symptomatic individuals with FEV-1 ≤80% predicted and/or FEV-1/FEV-6 ratio <0.73 were invited to attend a one-stop clinic where they underwent diagnostic spirometry and saw a respiratory physician and smoking cessation specialist.

Results 253 individuals were screened (41% male, 25% current smokers). 67/253 screened positive and 60 were given a one-stop clinic appointment. Individuals not offered appointments either declined or lived outside the area. 31/60 individuals attended their appointment, 6/60 are awaiting review and 23/60 either cancelled or did not attend (DNA). 17/31 clinic attenders were diagnosed with COPD and 13/31 received an alternative diagnosis in addition to or instead of COPD. 57/60 were discharged for on-going care under their GP and 3/60 remain under specialist follow-up. The characteristics of screen positive individuals are presented in Table 1.

Conclusions In this unselected screening program, the COPD diagnosis rate was 7% and would likely have been higher if all screen positive individuals had attended a one-stop clinic. This compares favourably with diagnosis rates in targeted COPD case finding trials reported previously. Engaging current smokers proved challenging with high DNA rates in this group. Further research is required to assess whether early COPD diagnosis through screening alters smoking behaviour or disease outcomes.

Abstract P25 Table 1 Characteristics of screen positive individuals

<table>
<thead>
<tr>
<th>Value</th>
<th>Screen Positive</th>
<th>Clinic Attenders</th>
<th>Confirmed COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>67</td>
<td>31</td>
<td>17</td>
</tr>
<tr>
<td>Age (years) - mean (SD)</td>
<td>60.5 (13)</td>
<td>62.4 (13)</td>
<td>63.3 (13.1)</td>
</tr>
<tr>
<td>Smoking Status - n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Current</td>
<td>21 (31)</td>
<td>6 (19)</td>
<td>3 (18)</td>
</tr>
<tr>
<td>- Ex</td>
<td>33 (49)</td>
<td>16 (52)</td>
<td>11 (69)</td>
</tr>
<tr>
<td>- Never</td>
<td>10 (15)</td>
<td>6 (19)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>- Unknown</td>
<td>3 (4)</td>
<td>3 (10)</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td>Pack Year - mean (SD)</td>
<td>28.4 (25.2)</td>
<td>25.6 (28.4)</td>
<td>41.1 (31.8)</td>
</tr>
<tr>
<td>CAT Score - mean (SD)</td>
<td>17.3 (9.5)</td>
<td>18.2 (10)</td>
<td>19.1 (11.5)</td>
</tr>
<tr>
<td>Screening Spirometry - mean (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- FEV-1 (l) / % predicted</td>
<td>1.8 (0.6)</td>
<td>1.8 (0.7)</td>
<td>1.8 (0.7)</td>
</tr>
<tr>
<td>- FEV-6 (l)</td>
<td>70.4 (17.5)</td>
<td>66.6 (16.4)</td>
<td>65.4 (18.8)</td>
</tr>
<tr>
<td>- FEV-6 (l)</td>
<td>2.5 (0.9)</td>
<td>2.4 (1.0)</td>
<td>2.7 (1.0)</td>
</tr>
<tr>
<td>- Ratio</td>
<td>0.76 (0.11)</td>
<td>0.74 (0.12)</td>
<td>0.66 (0.10)</td>
</tr>
<tr>
<td>Diagnostic Spirometry - mean (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- FEV-1 (l) / % predicted</td>
<td>1.9 (0.7)</td>
<td>1.9 (0.7)</td>
<td>1.9 (0.7)</td>
</tr>
<tr>
<td>- FEV-6 (l)</td>
<td>66.5 (20.8)</td>
<td>68.8 (17.9)</td>
<td>68.4 (26.3)</td>
</tr>
<tr>
<td>- FVC (l) / % predicted</td>
<td>2.9 (1.1)</td>
<td>3.2 (1.1)</td>
<td>69.9 (15.7)</td>
</tr>
<tr>
<td>- Ratio</td>
<td>17 (25.4)</td>
<td>17 (55)</td>
<td>0.60 (0.11)</td>
</tr>
<tr>
<td>Confirmed COPD - n (%)</td>
<td>13 (19.4)</td>
<td>13 (42)</td>
<td></td>
</tr>
<tr>
<td>Other diagnosis - n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HOW DOES THE SALFORD LUNG STUDY IN COPD (SLS COPD) PATIENT POPULATION FIT INTO THE GOLD 2017 CLASSIFICATION GRID?

J Vestbo, I Boucot, L Frith, N Diar Bakerly, DA Leather, JM Gibson, A Woodcock. Manchester Academic Health Sciences Centre, The University of Manchester, and University Hospital South Manchester NHS Trust, Manchester, UK; GSK, Uxbridge, UK; Salford Royal NHS Foundation Trust, Salford, UK and Manchester Academic Health Sciences Centre, The University of Manchester, Manchester, UK.


Aim Map SLS COPD patient distribution and treatment patterns to the GOLD 2017 classification grid.

Methods In this post-hoc analysis, patients were classified by GOLD 2017 (groups A–D based on exacerbation frequency history and baseline CAT score) and by the previous spirometry-based GOLD 2007 system (stages 1–4 based on baseline post-BD FEV1).

Results Baseline characteristics were (ITT; n=2799): 49%/21 moderate/severe exacerbations in past year; 90% CAT score ≥10; 14% on long-acting BD only, 34% ICS ±LABA or LAMA, 52% ICS/LABA+LAMA. The figure shows key data. Distribution by GOLD 2017 was (n=2796): A 7%; B 43%; C 3%; D 47% and by GOLD 2007 (n=2199 with spirometry data): no airflow obstruction 12%; 1 10%; 2 48%; 3 24%; 4 5%. Around 60% of patients had mild/moderate airflow obstruction while 90% were GOLD group B/D due to symptoms and exacerbation risk. GOLD ABCD distribution and treatment patterns in patients without spirometry data were similar to the overall population.

Conclusion These data suggest that COPD exacerbations and symptoms are driving appropriate GP COPD management in routine primary care.

Funding GSK (HZC115151/NCT01551758).

Please refer to page A258 for declarations of interest in relation to abstract P26.

DEPRIVATION IN THE COPD SALFORD LUNG STUDY (SLS) IS ASSOCIATED WITH HIGHER HEALTHCARE COSTS BUT DOES NOT MODERATE THE MAIN OUTCOMES

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Introduction and Objectives The SLS was a pragmatic randomised controlled trial (RCT) of initiating fluticasone furoate/vilanterol (FF/VI) versus continuing usual care (UC) and aimed to recruit a real life population in a near normal care setting. The 12 month study required only two patient visits and most data was collected using electronic health records. This post-hoc sub-study assesses the impact of deprivation on health behaviours, healthcare costs and main/safety outcomes.

Methods Deprivation scores were derived by postcode using the countrywide indices of deprivation (version 2010). The indices were categorised into quintiles. The primary effectiveness endpoint of mean annual rate of moderate or severe
exacerbations, and primary and secondary care contacts were re-analysed using the same generalised linear models as for the original SLS study but with the addition of a treatment by deprivation quintile interaction term.

**Results** Participants in the more deprived categories were more likely to be younger, more likely to smoke and slightly more obese but were balanced between genders. There was no association with deprivation and withdrawal rates or with adherence (proportion of days covered). An additional post-hoc analysis demonstrated that deprivation was associated with more primary and secondary care contacts and higher costs (Table). Deprivation did not interact with the effect of FF/VI v UC on the primary outcome measure (annual rate of moderate to severe exacerbations) or health care contacts or safety endpoints including all-cause mortality and pneumonia.

**Conclusions** The unique design of SLS allowed the RCT to be conducted in a deprived population who would normally be excluded from RCTs. Higher deprivation was not associated with higher drop-out rates or poor adherence, but was associated with higher rates of smoking, obesity and co-morbidities and higher health care consumption and costs. With its once daily dosage and ease of use FF/VI had potential to benefit people with poor adherence and preferentially benefit deprived populations, however deprivation scores did not moderate the effect of FF/VI v UC in primary, secondary or safety outcomes.

**Funding** GSK (HZC115151/NCT01551758).

Please refer to page A258 for declarations of interest in relation to abstract P27.

### Abstract P27 Table 1

<table>
<thead>
<tr>
<th>Deprivation Quintile</th>
<th>Mean (SD) Number of Healthcare Contacts</th>
<th>COPD Care Costs Per Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FF/VI</td>
<td>UC</td>
</tr>
<tr>
<td>1 (most deprived)</td>
<td>32.0 (23.38)</td>
<td>29.4 (22.24)</td>
</tr>
<tr>
<td>2</td>
<td>29.7 (21.77)</td>
<td>28.4 (21.84)</td>
</tr>
<tr>
<td>3</td>
<td>29.9 (19.02)</td>
<td>28.4 (20.32)</td>
</tr>
<tr>
<td>4</td>
<td>29.2 (19.26)</td>
<td>27.4 (18.59)</td>
</tr>
<tr>
<td>5 (least deprived)</td>
<td>27.5 (22.40)</td>
<td>21.3 (14.89)</td>
</tr>
</tbody>
</table>

Note: SD=Standard deviation

---

**Abstract P28**

**THE USE OF A NOVEL CASE-FINDING ALGORITHM IN THE IDENTIFICATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) PATIENTS IN PRIMARY CARE – EARLY RESULTS OF THE ASSIST STUDY**

1C Healy, 1A Hicks, 1K Gillett, 2E Ray, 2H Kruk, 3M North, 1C Newell, 1DM Thomas, 2T Wilkinson. 1University Hospital Southampton, Southampton, UK; 2National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care Wessex, Southampton, UK; 3University of Southampton, Romsey, UK

10.1136/thoraxjnl-2017-210983.170

**Introduction** In the UK around 9 00 000 people have a diagnosis of COPD. Despite its high prevalence under-diagnosis is common in primary care with an additional 2 million cases suggested. Opportunities for early diagnosis and intervention are frequently missed. The best strategy for targeted case finding is unclear.

**Methods** The ASSIST study (Rec: 15/5C/598580) used a previously trialled, computerised case-finding algorithm,3 applied remotely into primary care systems for case finding. It applies weighted risk factors as search terms (e.g., smoking history, history of breathlessness, use of inhalers and antibiotics). To date, eight GP Practices, serving 1 01 754 patients in Hampshire, UK have been screened (figure 1). The algorithm identified 1 725 possible undiagnosed patients; 506 were excluded by their GP and study team. The remaining 1 216 were invited for an hour long assessment with a specialist respiratory nurse at their surgery, which included medical and smoking history, vital signs and spirometry.

**Results** To date, response rates are 18% (222). Of responders, 178 were eligible and attended for screening (Male 55%, mean age 64.1, SD 5.5, age range 48–72). 27% (48) had obstructive spirometry (FEV1/FVC<0.7) without reversibility. 40% (19) of these had moderate obstruction (FEV150%–79% predicted) (mean FEV1% predicted 88%, SD 15.6). Of those with obstructive lung function, 46% (22) have a MRC score of ≥2% and 8% (4) had exacerbations within the previous year. The mean pack year history was 31.9/34.9 (SD 24/108) for obstructed vs. non-obstructed.

**Conclusion** Early Results from the ASSIST study show 27% of primary care patients who were identified as at risk of having COPD by the algorithm and attended for screening were confirmed to have the disease. Many had a significant disease
burden with 40% having moderate airflow obstruction and 46% having quality of life impairment. We are continuing to recruit further practices. Subsequent work will examine whether using this algorithm results in earlier identification of COPD in a cost-effective manner and an improvement in quality of life for patients.

REFERENCE

P29 CLINICAL CHARACTERISTICS AND MANAGEMENT OF PATIENTS WITH AN INACCURATE DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN PRIMARY CARE; RESULTS FROM THE WELSH NATIONAL COPD PRIMARY CARE AUDIT

Introduction
Spirometry is required to make a clinical diagnosis of COPD, confirming persistent airflow limitation. However, studies suggest that making the correct diagnosis of COPD in primary care can be challenging. We sought to evaluate the clinical characteristics and management in primary care of patients registered with COPD but with incompatible spirometry, compared to patients with spirometry compatible with COPD.

Methods
This analysis used data from the Welsh national COPD primary care audit, which prospectively collected data of patients, registered with COPD from 61% of GP practices in Wales covering January 2014–March 2015. Patients registered with COPD but with incompatible spirometry (post-bronchodilator forced expiratory lung volume in 1 s (FEV1)/forced vital capacity (FVC) >0.70) were compared to COPD patients with compatible spirometry (FEV1/FVC <0.70).

Results
In total, 8957 patients registered with COPD were evaluated, 2255 (25%) had incompatible spirometry, 6702 had compatible spirometry. There were no differences in age (71 ±10 vs 70±11 years) or asthma co-diagnosis (13.1% vs 13.1%), between these respective groups, but patients with incompatible spirometry had a higher body mass index (29.41 ±6.69 vs 27.04±5.94 kg/m², p<0.001) and were more likely female (48.8% vs 45.6%, p=0.009). There were also differences in smoking status (14.3% vs 8.6% never-smokers, p<0.001), and spirometry [(FEV1/FVC: 0.78 vs 0.55, p<0.001), (FEV1% predicted: 72±18% vs 58±18%, p<0.001)], but similar levels of breathlessness (MRC: 2.52 ±0.94 vs 2.55±0.98, p=0.17) and exacerbation frequency (6.86±7.5 vs 7.3±8.8, p=0.05). Despite incompatible spirometry, 30.4% of these patients received long acting beta agonist (LABA) therapy, 51.7% inhaled corticosteroids (ICS), 73% long acting muscarinic antagonist (LAMA), and 74.6% combined inhaled LABA/ICS therapy. Furthermore, there were no differences for LAMA (73% vs 73%, p=0.99) or LABA/ICS (76.7% vs 74.3%, p=0.37) in patients with incompatible spirometry with or without a diagnosis of asthma respectively, although more patients with asthma received LABA (38.9% vs 29.1%, p=0.001) and ICS (57.1% vs 50.8%, p=0.05) therapies.

Conclusion
Patients without persistent airflow limitation diagnosed incorrectly with COPD, are symptomatic and receiving inappropriate pharmacological therapies. These data suggest that a breathlessness pathway may be helpful to aid diagnosis and management of such patients seen in primary care.
Introduction and Objectives COPD is a clinical diagnosis comprising symptoms, risk factors and evidence of post-bronchodilator airflow obstruction (AFO). While spirometry is fundamental to the diagnosis, the National COPD Audit Programme reported in 2016 that one quarter of spirometry values were not consistent with COPD. Our objective was to explore this further, using patient-anonymised data in Hampshire Health Record Analytical database, an NHS database for ≥1.4 million patients, to compare characteristics, comorbidity and respiratory medication in patients diagnosed with COPD with and without evidence of AFO.

Methods Read codes in primary care records were used to identify a prevalent COPD cohort as at 01/01/2011 and define and describe three patient categories based on consistency of FEV1/FVC% since diagnosis: all <70% (persistent AFO), some <70% (variable AFO), all ≥70% (absent AFO).

Results 16 479 patients were identified with diagnosed COPD of whom 13 653 (82.9%) had FEV1/FVC% data: 7609 (55.7%) showed persistent AFO, 4413 (32.3%) variable AFO and 1631 (11.9%) absent AFO (table 1). In the 2826 patients without recorded FEV1/FVC%, half had no evidence of any spirometry. In patients without AFO, mean FEV1/FVC% was high (80.5%), though mean FEV1 was <80% predicted (77.6%). There was no clinically relevant age difference across the groups, but patients without AFO were more often women, had higher mean BMI and contained proportionally fewer active smokers than those with persistent AFO. Never smokers were rare in all groups. Mean number of comorbidities was highest in patients without AFO. Overall, 47.7% of this cohort also had a recorded diagnosis of asthma, slightly more among those with variable AFO unsurprisingly, but with very similar proportions in those with persistent and absent AFO. Among patients without AFO, 58% were receiving some form of respiratory medication (compared to 70% of those with persistent AFO). Many were receiving expensive treatments only recommended for confirmed moderate or severe COPD (long-acting bronchodilators or inhaled corticosteroids).

Conclusion Twelve percent of patients with a primary care COPD diagnosis did not have obstructive spirometry. If COPD diagnosis is incorrect, there is potential overuse of harmful or ineffective treatments and other causes of patients’ symptoms may be missed.

---

Abstract P31 Table 1 Baseline demographic and clinical characteristics by consistency of airflow obstruction

<table>
<thead>
<tr>
<th>Consistency of airflow obstruction in patients with FEV1/FVC%</th>
<th>Persistent (all values)</th>
<th>Variable (some values)</th>
<th>Absent (all values)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=7699)</td>
<td>(n=4413)</td>
<td>(n=1631)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender male n (%)</td>
<td>4400 (57.8)</td>
<td>2254 (51.1)</td>
<td>752 (46.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age, years</td>
<td>69.9 (10.5)</td>
<td>70.8 (10.4)</td>
<td>68.4 (11.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>BMI, kg/m² mean (SD)</td>
<td>26.3 (5.7)</td>
<td>28.1 (5.9)</td>
<td>29.2 (6.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Smoking status n (%)</td>
<td>2971 (41.0)</td>
<td>1490 (34.5)</td>
<td>534 (35.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Active smoker</td>
<td>2187 (28.3)</td>
<td>1263 (28.6)</td>
<td>388 (23.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ex-smoker</td>
<td>4187 (57.7)</td>
<td>2742 (63.5)</td>
<td>915 (56.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Never smoker</td>
<td>94 (1.3)</td>
<td>83 (1.9)</td>
<td>58 (3.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>FEV1%predicted mean (SD)</td>
<td>54.4 (18.1)</td>
<td>65.2 (18.5)</td>
<td>77.6 (19.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>FEV1/FVC% mean (SD)</td>
<td>51.1 (10.6)</td>
<td>66.0 (12.5)</td>
<td>80.5 (7.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>MRC Dyspnoea score (1–5 median (IQR))</td>
<td>2 (2,3)</td>
<td>2 (2,3)</td>
<td>2 (1,3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Number of comorbidities mean (SD)</td>
<td>2.4 (1.7)</td>
<td>2.9 (1.8)</td>
<td>3.0 (1.9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>On treatment at baseline n (%)</td>
<td>4231 (55.6)</td>
<td>2370 (53.7)</td>
<td>695 (42.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Short-acting bronchodilator</td>
<td>4172 (54.8)</td>
<td>2238 (50.7)</td>
<td>611 (37.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Long-acting bronchodilator</td>
<td>364 (4.8)</td>
<td>159 (3.6)</td>
<td>36 (2.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Theophyllines</td>
<td>3731 (49.0)</td>
<td>2130 (48.3)</td>
<td>631 (38.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mucolytics</td>
<td>436 (5.7)</td>
<td>205 (4.6)</td>
<td>56 (3.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>On none of the above drugs</td>
<td>2266 (29.8)</td>
<td>1283 (29.1)</td>
<td>692 (42.4)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

BMI, body mass index; FEV1, forced expiratory volume in 1 second; FVC, forced vital capacity; MRC, Medical Research Council.

*Test for difference depends on variable type / summary measures stated: ANOVA (for mean, SD), Kruskal-Wallis (for median, IQR) and Chi-squared test (for n, %).
Introduction and Objectives Physical inactivity can increase the burden of COPD and is a predictor of mortality and hospitalisations. There has been a paucity of data examining the relationship between physical activity and COPD treatment responses. 

Methods Multicentre, cross-sectional, observational survey (Study: D5970R00003) conducted in the US. Patients (≥40 years) with a physician-confirmed diagnosis of COPD completed a questionnaire that included the Functional Performance Inventory-Short Form (FPI-SF) to assess physical activity (32 items/6 domains, rated from 1=much difficulty, to 3=no difficulty). Investigators provided information on treatment history.

Results 1775 patients participated (71.9% Caucasian, 55.1% male, 87.1% current/ex-smokers, mean age 65.2 years, mean BMI 27.5 kg/m²). 14.8% of patients were classed as GOLD 2017 group A, 46.6% in group B, 2.6% in group C and 36.0% in group D. Activity impairment based on FPI-SF scores was seen in patients across all treatment classes (Table), with the greatest impairment observed in patients receiving triple therapy and in the FPI-SF domains requiring most physical activity ('maintaining the household' and 'physical exercise').

Conclusions Patients with COPD who required triple therapy tended to report the lowest levels of physical activity. Longitudinal studies are needed to evaluate the effect of bronchodilator treatment on the relationship between lung function, COPD symptom burden and physical activity.

Abstract 32 Table 1  

<table>
<thead>
<tr>
<th>Current COPD treatment</th>
<th>Functional Performance Inventory-Short Form domain, mean score (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patients n (%)</td>
</tr>
<tr>
<td>All</td>
<td>1743 (100.0)</td>
</tr>
<tr>
<td>Short-acting bronchodilator</td>
<td>140 (8.0)</td>
</tr>
<tr>
<td>Mono long-acting bronchodilator</td>
<td>195 (11.2)</td>
</tr>
<tr>
<td>Dual long-acting bronchodilator</td>
<td>153 (8.3)</td>
</tr>
<tr>
<td>ICS/long-acting bronchodilator</td>
<td>648 (37.2)</td>
</tr>
<tr>
<td>Triple therapy</td>
<td>535 (30.7)</td>
</tr>
<tr>
<td>Other&lt;sup&gt;a&lt;/sup&gt;</td>
<td>72 (4.1)</td>
</tr>
</tbody>
</table>

<sup>a</sup>Mono long-acting bronchodilator includes treatment with a LAMA or LABA. ICS/long-acting bronchodilator includes treatment with ICS and a LAMA or LABA. Dual long-acting bronchodilator includes treatment with a LAMA and a LABA. Triple therapy is treatment with ICS, a LAMA and a LABA.

<sup>b</sup>Patients rated how difficult each activity was for them to perform on a three-point scale: 1=much difficulty, 2=some difficulty, 3=no difficulty. If patients did not perform an activity (either for health reasons or by choice), the item is not included in the mean for that domain.

<sup>c</sup>Number of patients with completed Functional Performance Inventory-Short Forms

<sup>d</sup>Other treatments included, but were not limited to: ICS, short-acting bronchodilators in combination with other treatments, and phosphodiesterase-4 inhibitors or oral corticosteroids alone or in combination with other treatments.

COPD, chronic obstructive pulmonary disease; ICS, inhaled corticosteroids; LABA, long-acting β2-agonist; LAMA, long-acting muscarinic antagonist; SD, standard deviation.
Conclusions What mattered to people with COPD encompassed not just health-related issues but also meaning, purpose and relationships. This underlines the importance of a patient-centred and holistic approach to delivering healthcare. This co-production process provided a non-clinical setting in which the patient voice could be heard and provide a meaningful input for health service planning.

REFERENCE

Abstract P33 Table 1 Themes derived from patient statements. Figures in brackets refer to the number of statements within the theme. Themes in bold were voted as the most important themes in the "what's not working" category.

<table>
<thead>
<tr>
<th>Category</th>
<th>What’s not working</th>
<th>What’s important for the future</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health care and professional support</strong></td>
<td>I don’t think the right hand knows (4)</td>
<td>I want help in all respects from public services (12)</td>
</tr>
<tr>
<td>Good access (9)</td>
<td>what the left hand is doing (12)</td>
<td>professional support (7)</td>
</tr>
<tr>
<td>Medication (6)</td>
<td>I can’t get professionals with the right knowledge (6)</td>
<td>I want to be seen by my own doctor when I need it, on time (3)</td>
</tr>
<tr>
<td>Great staff (4)</td>
<td>I want them (4)</td>
<td>I’m not treated as a person with a serious illness (4)</td>
</tr>
<tr>
<td>Feeling safe (4)</td>
<td>I’m confused by conflicting advice (3)</td>
<td>I would like more organised exercise (3)</td>
</tr>
<tr>
<td>Listening and understanding</td>
<td>I’m angry when there are errors (3)</td>
<td>I feel like I’m not being heard (3)</td>
</tr>
<tr>
<td>practitioners (4)</td>
<td>I feel rushed (2)</td>
<td>I was ill informed (2)</td>
</tr>
<tr>
<td>Complementary support (1)</td>
<td>I haven’t had enough physical therapy (2)</td>
<td>I haven’t had enough appointments when I was informed (2)</td>
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<tr>
<td>Looking after myself and others (13)</td>
<td>I can’t do what I want to do (16)</td>
<td>I want to stay independent for ever (10)</td>
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<tr>
<td>Keeping of breathlessness and independent/well (12)</td>
<td>I live in fear (6); fear of dying (2)</td>
<td>I want to stay in my own home (9)</td>
</tr>
<tr>
<td>I don’t have enough energy (6)</td>
<td>I would like to stay as healthy as possible to achieve my aspirations (6)</td>
<td>I need help to stay confident (6)</td>
</tr>
<tr>
<td>I’m anxious and depressed (5)</td>
<td>I want to be mobile (7)</td>
<td>I can’t eat well (4)</td>
</tr>
<tr>
<td>I feel like I’m begging (3)</td>
<td>I would like to stay as healthy as possible to achieve my aspirations (6)</td>
<td>I need help to stay confident (6)</td>
</tr>
<tr>
<td>I’ve lost my mojo (3)</td>
<td>I don’t have enough money (2)</td>
<td>I can’t eat well (4)</td>
</tr>
<tr>
<td>I don’t have enough money (2)</td>
<td>I feel like a burden (2)</td>
<td>I’m angry when there are errors (3)</td>
</tr>
<tr>
<td>I am lonely (2)</td>
<td>I keep forgetting things (1)</td>
<td>I feel like I’m begging (3)</td>
</tr>
<tr>
<td>Social support</td>
<td>I value family support (3)</td>
<td>I want to be able to maintain my social network (2)</td>
</tr>
<tr>
<td>Family and friends support (11)</td>
<td>I want to be able to maintain my social network (2)</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>I would like good clinical and professional support from public services (12)</td>
<td></td>
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<tr>
<td>Amenities</td>
<td>Transport (2)</td>
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<td>Location (1)</td>
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</table>

Interventional procedures in respiratory disease

**P34** PROSPECTIVE VALIDATION OF A RISK STRATIFICATION MODEL FOLLOWING NEGATIVE EBUS-TBNA IN ISOLATED MEDIASTINAL AND/OR HILAR LYMPHADENOPATHY

Introduction Isolated mediastinal and/or hilar lymphadenopathy (IMHL) is a common indication for EBUS-TBNA. Causes of IMHL include granulomatous and malignant disorders or reactive lymphadenopathy due to associated comorbidity (e.g., emphysema, cardiac failure). A previous study developed a risk stratification model following a negative EBUS-TBNA for IHML to guide future sampling/surveillance. We conducted a prospective validation of this model.

Methods Consecutive patients undergoing EBUS-TBNA for IMHL at two large EBUS centres in Greater Manchester underwent prospective risk stratification immediately prior to EBUS. Low risk was defined as the presence of at least one comorbidity known to be associated with IMHL AND largest lymph node diameter less than 20 mm, short axis. EBUS-TBNA pathology, Results of any subsequent lymph node sampling and a minimum of six months clinical-radiological follow-up were used to define the final diagnosis in each case.

Results 298 patients (mean age 58.4 years) with IMHL underwent EBUS-TBNA between September 2013 and December 2016 (table 1). Pathological diagnosis of malignancy or granulomatous disease was established by EBUS-TBNA in 98 patients. Of the 200 patients with negative EBUS-TBNA, 143 were ultimately diagnosed with reactive lymphadenopathy, and 57 patients categorised as false negative (46 with sarcoidosis). In the 200 patients with a negative EBUS, all 84 patients prospectively classified as low risk were subsequently diagnosed with reactive lymphadenopathy (NPV 100%). All patients with false negative EBUS were initially classified as high risk (PPV 48%). Only 2/86 patients classified as low risk pre EBUS had a pathological diagnosis at EBUS-TBNA (lungs cancer and TB).

Conclusions The risk stratification model following negative EBUS in IMHL has been validated across two EBUS centres demonstrating an excellent NPV. It may provide a simple tool to aid decision making following negative EBUS for IMHL, questioning the role of further sampling or surveillance in such cases. The use of this model as a pre-test decision aid to possibly avoid EBUS-TBNA in low risk patients is a topic for debate and further research.

REFERENCE
**P35**

A SINGLE CENTRE PROSPECTIVE ANALYSIS OF THE EFFECT OF NEEDLE GAUGE ON EBUS-TBNA SENSITIVITY AND SAFETY

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10.1136/thoraxjnl-2017-210983.177

Introduction EBUS-TBNA is the current gold standard technique for lymph node sampling in mediastinal lymphadenopathy. Traditionally our trust has used size 21 gauge needles for all EBUS-TBNA cases, however recently we have used 19 gauge needles in an effort to increase diagnostic yield. We present preliminary Results from a small, randomised, single centre study assessing the sensitivity and safety of 19 and 21 gauge EBUS needles in EBUS-TBNA.

Methods Patients attending for EBUS-TBNA were prospectively randomised to either 19 gauge or 21 gauge groups. Samples were sent for analysis and the pathologist was blinded to the needle size used. The primary outcomes measured were positive sampling of lymphoid tissue and diagnostic sampling. Complications including severe bleeding and pneumothorax were included in the analysis.

Results A total of 61 patients were enrolled in the study, with 32 assigned to the 21 gauge group and 29 assigned to the 19 gauge group. The average age was 57.5 +/- 6.8 years and 53.2 +/- 5.4 for the 21 gauge and 19 gauge groups respectively (p=0.05). In the 21 gauge needle group lymphoid tissue was obtained in 27 of the 32 cases (84.38%), whereas the 19 gauge needle group lymphoid tissue was obtained in 25 of 29 cases (86.2%) (p=0.05). Diagnostic sampling was obtained in 20 of the 32 (62.5%) cases in the 21 gauge needle group versus 19 of the 29 cases in the 19 gauge group (65.5%) (p=0.05). None of our patients in either cohort suffered severe bleeding or pneumothorax.

Conclusions/Limitations Currently our study has shown no significant difference in either sensitivity or safety between 19 and 21 gauge EBUS-TBNA. However we recognise that as yet our study is under powered and continued enrolment of patients is required to obtain valid Conclusions Given that size 21 gauge needles confer a significant cost saving (£7800 per annum) our trust are likely to continue using these needles if our preliminary Results are confirmed.

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**P36**

EBUS-TBNA DIAGNOSTIC YIELD CAN BE MAINTAINED WHEN PERFORMED BY A TRAINER SUPERVISING A SECOND OPERATOR TRAINEE

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10.1136/thoraxjnl-2017-210983.178

Introduction Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) facilitates diagnosis of hilar and mediastinal lymphadenopathy. The procedure usually requires two operators; one guiding the bronchoscope and other undertaking needling for biopsy. British Thoracic Society Quality Standards recommend a diagnostic yield of 88%. Increased training and experience has been shown to improve diagnostic yield over time. Services face a potential conflict between delivering a high quality service, as evidenced by high diagnostic yield, and training specialty registrars. Our EBUS-TBNA trainers have trained 35 trainees since 2011. We evaluated EBUS diagnostic yield at a tertiary centre with procedures carried out by trainer and trainee operators.

Methods Retrospective analysis of two operator EBUS-TBNA procedures from March 2011 to December 2016 was carried out. Data was collected on gender, age, procedure date and clinicians...
involved in the procedure. Overall diagnostic yields were calculated for trainers compared to trainees for both manoeuvring the bronchoscope and needling. Diagnostic rates according to year of EBUS-TBNA for trainers vs trainees were also calculated. Mann-Whitney U test was used to check for differences in hit-rates for trainers vs trainees between the two components of the procedure, whilst Kruskal Wallis test was used to assess difference in diagnostic yield between 2011–2016.

**Results**

1083 patients underwent EBUS-TBNA with mean age 61 years (SD +/-14), 464 (43%) were female. The overall diagnostic rate was 88%, with 479 (44%) malignant, 212 (20%) granulomatous, 262 (24%) benign and 130 (12%) non-diagnostic. Trainees manoeuvred the bronchoscope for 577 (53%) and needleed for 461 (43%) patients. There were no differences in diagnostic yields between trainers compared to trainees for manoeuvring [88% vs 88% (p=0.84)] nor for needling [88% vs 88% (p=0.84)]. There were also no significant differences in diagnostic yield between years (figure1).

**Conclusion**

In our institution we can teach multiple trainees whilst maintaining high diagnostic yield in two operator EBUS-TBNA for both manoeuvring the bronchoscope and needling when one operator is fully trained.

**REFERENCE**


### Abstract P37 Table 1

<table>
<thead>
<tr>
<th>Final diagnosis</th>
<th>Granuloma at ROSE</th>
<th>Granuloma at final cytology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarcoïdosis</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>TB (all)</td>
<td>16</td>
<td>33</td>
</tr>
<tr>
<td>TB (culture positive)</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>TB (culture negative)</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>Reactive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>71</td>
</tr>
</tbody>
</table>
carcinoid. In all of LC diagnosed by EBUS-TBNA, staging was achieved in the same procedure (8.1% N0, 5.4% N1, 67.6% N2 and 18.9% N3). EBUS-TBNA showed a sensitivity of 86%, specificity of 88.9%, PPV of 97.4% and PNV of 57.1% for simultaneous diagnosis and staging in our setting.

**Conclusions** In our study EBUS-TBNA was useful to simplify the diagnosis and staging of LC, allowing both simultaneously in 77.1% of the patients and may be the preferred method for the initial approach after CT or PET/CT scan in this group of patients, in order to achieve faster diagnosis.

**REFERENCES**


**Background** Malignant or benign diseases can cause isolated intrathoracic lymphadenopathy (ITLN), a common dilemma in clinical practice. Our aim was to analyse differential diagnosis of isolated ITLN in patients undergoing EBUS-TBNA and to calculate its sensitivity, specificity, positive predictive value (PPV) and predictive negative value (PNV).

**Methods** Retrospective study of patients with isolated ITLN undergoing EBUS-TBNA for diagnosis, from August 2011 to April 2017. For non-specified granuloma, reactive LN or inconclusive LN by EBUS-TBNA, a definite diagnosis was established by other procedures or clinical, laboratorial and radiological follow-up of 18 months. Exclusion criteria: suspicion or history of cancer.

**Results** We included 58 patients with mean age of 53 years (SD=15), mostly female (56.9%). EBUS-TBNA diagnosed 21 (36.2%) granulomatosis, 15 (25.9%) reactive LN, 8 (13.8%) cancer and 4 (6.9%) other diseases. 17.2% (n=10) of cases were inconclusive by EBUS-TBNA and definite diagnosis was established by surgical biopsy (60%) and other bronchoscopic methods (40%). In granulomatous disease, EBUS-TBNA diagnosed mycobacteriosis in 23.8%, sarcoidosis in 4.7%, silicosis in 4.7% and 66.6% remained as non-specified granuloma.

The definite diagnosis of these granulomas was made by other bronchoscopic methods (42.9%), surgical methods (21.4%) and clinical follow-up (35.7%). 73.3% of reactive LN (n=11) were subsequently confirmed by follow-up (91%) or mediastinoscopy (9%). 26.7% (n=4) of reactive LN resulted in tuberculosis (6.7%), sarcoidosis (6.7%) and neoplasia (13.3%) by others procedures or follow-up. EBUS-TBNA showed a sensitivity of 74%, 66.7% and 92.3%, specificity of 94.7%, 100% and 91.1%, PPV of 95.2%, 100% and 75%, and PNV of 84.4%, 92.6% and 97.6% for granulomatosis, neoplasia and reactive LN diagnosis, respectively.

**Conclusions** Isolated ITLN were mostly benign and reactive LN was the second most frequent cause. More than 70% of reactive LN by EBUS-TBNA were confirmed and the majority had no need for more invasive procedures. EBUS-TBNA showed to be a useful diagnostic procedure in isolated ITLN, with a great PPV, and its accuracy can be optimised by follow-up or minimal invasive procedures.

**Abstract P40 Table 1**

<table>
<thead>
<tr>
<th></th>
<th>No pneumothorax (n=166)</th>
<th>Pneumothorax (n=61)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (mean±SD)</strong></td>
<td>71.3±9.8</td>
<td>69.2±10.3</td>
</tr>
<tr>
<td><strong>FEV1% predicted</strong></td>
<td>68.5±22.3</td>
<td>71.5±22.8</td>
</tr>
<tr>
<td><strong>Smokers</strong></td>
<td>145 (87.3%)</td>
<td>52 (85.2%)</td>
</tr>
<tr>
<td><strong>Emphysema on CT</strong></td>
<td>80 (48.2%)</td>
<td>32 (52.5%)</td>
</tr>
<tr>
<td><strong>Needle depth (median±SEM)</strong></td>
<td>8±1.9</td>
<td>11±1.9</td>
</tr>
<tr>
<td><strong>Gauge of needle (median)</strong></td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

**Conclusion** The incidence of pneumothorax following CTGB was 26.9% but only 3.5% of all patients undergoing CTGB had a chest drain inserted for their pneumothorax. While CTGB is a safe procedure with a good diagnostic yield one
needs to be watchful of the risk of pneumothorax. The size of the lesion correlated with the development of pneumothorax with a smaller size associated with a higher risk.

**P41**

**INDWELLING PLEURAL CATHETER OR TALC PLEURODESIS: WHICH SHOULD WE FAVOUR?**

FL Sheel, S Akbar, HE Davies. University Hospital Llandough, Cardiff, UK

10.1136/thoraxjnl-2017-210983.183

**Introduction** Malignant pleural effusions (MPE) cause disabling symptoms often relieved by thoracentesis. Indwelling pleural catheter (IPC) insertion and t alc pleurodesis (TP) are equally effective treatments1 yet; current BTS guidelines suggest talc pleurodesis as the preferred method of fluid control2 IPCs may reduce hospital bed-days and minimise the need for repeated pleural intervention.3

**Aim** To compare the impact of IPC and TP on length of hospital stay (LOS) and need subsequent pleural intervention. Complication frequency and survival rates were also measured.

**Methods** Retrospective review of Pleural clinic and electronic case note records of all MPE patients at our institution requiring TP or IPC insertion over an 18 month period (01/05/15–01/11/16).

**Results** A total of 73 procedures (46 TP, 27 IPCs) were carried out on 71 patients. Mean LOS was shorter in the IPC group (0.85 (0–7) days) than with TP (7.65 (2–36) days). 11 patients (24%) required further pleural intervention following TP (2 had repeat TP, 8 had an IPC and one patient underwent therapeutic pleural aspiration). One patient in the IPC group had a second procedure (2nd IPC placed – a patient with cognitive impairment cut his tube). There were no hospitalisations as a consequence of complications in the IPC patients; 2 patients required antibiotics for drain site cellulitis (7%). In the TP group, 3 drains fell out (7%); one patient had a pneumothorax. 52 patients (73%) had died at follow-up (until January 2017). Median (IQR) survival after IPC insertion was 62 (24–146) compared with 74 (23–153) days.

**Conclusions** Our findings support first-line use of IPC in patients with a symptomatic MPE. IPCs resulted in shorter LOS and reduced the need for subsequent ipsilateral pleural drainage. All patients necessitating definitive intervention for a symptomatic MPE should be offered the choice between IPC and TP.

**REFERENCES**


**Abstract P42 Table 1**

<table>
<thead>
<tr>
<th>Combined LENT Score</th>
<th>Mesothelioma</th>
<th>Lung</th>
<th>Haematological</th>
<th>Breast</th>
<th>Gynaecological</th>
<th>Renal</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low 319 risk days (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Med risk 130 days (57%)</td>
<td>7 (23%)</td>
<td>3 (10%)</td>
<td>0 (0%)</td>
<td>11 (35%)</td>
<td>5 (10%)</td>
<td>0 (0%)</td>
<td>5 (16%)</td>
</tr>
<tr>
<td>High risk 44 days (43%)</td>
<td>0 (0%)</td>
<td>14 (81%)</td>
<td>1 (4.5%)</td>
<td>1 (4.5%)</td>
<td>0 (0%)</td>
<td>1 (4.5%)</td>
<td>6 (26%)</td>
</tr>
</tbody>
</table>

M Parsonage, NJ Stevenson, CA Paxton. Wirral University Teaching Hospital NHS Foundation Trust, Merseyside, UK

10.1136/thoraxjnl-2017-210983.184

**Introduction and Objectives** We introduced our Indwelling Pleural Catheter (IPC) Service in 2015 to allow ambulatory management of patients with malignant pleural effusions (MPE). Our aim was to review data to establish our patient group, prognostic indicators, rate of autopleurodesis, complications and length of stay (LOS).

**Methods** Data was collected from Trust electronic records for patients who had IPC placement for MPE June 2015 – July 2017. In addition to patient demographics and outcomes, LENT prognostic score1 (pleural fluid lactate dehydrogenase, Eastern Cooperative Oncology Group (ECOG) performance status (PS), neutrophil-to-lymphocyte ratio and tumour type), complications and LOS were analysed.

**Results** 54 patients had IPC placement, 32 (59%) female. Median age was 71 years (24–92). IPC placement by tumour type based on histopathology: mesothelioma 7 (13%), lung 17 (32%), haematological 1 (2%), breast 12 (22%), gynaecological 5 (9%), renal 1 (2%), other tumour types 11 (20%). Median ECOG PS 3. 59% patients died with median survival of 44 days (4–257). Death by tumour type: mesothelioma 6 (19%), lung 11 (34%), haematological 1 (3%), breast 5 (16%), gynaecological 2 (6%), renal 1 (3%), other tumour types 6 (19%). No recorded complications at insertion. Late infection rate 4/54 (7.4%). IPC removal for autopleurodesis 7/54 (13%), with timing of autopleurodesis occurring at 4–8 weeks 1 (14%), 8–12 weeks 3 (43%), ≥12 weeks 3 (43%). Median LOS=1 day. Patients reported a high degree of satisfaction with the service.

**Conclusions** Our IPC service has helped us offer a patient focused choice through the use of a validated prognostication tool. We have demonstrated that it is safe and effective, and supports admission avoidance. We believe an IPC service promotes cost and clinical effectiveness, through a more modern approach when managing patients with MPE.

**REFERENCES**

**Factors influencing length of chest drain insertion in children with empyema**

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10.1136/thoraxjnl-2017-210983.185

Introduction Many factors might influence length of chest drainage (LOCD) when managing parapneumonic effusions/empyema including effusion size, sepsations, extent of pneumonia, presence of air leaks, pathogen virulence, fibrinolytic therapy with urokinase and local policies. UK guidelines recommend using the same fixed volumes for infants and for all children older than a year regardless of size. This preliminary retrospective survey was undertaken to determine whether there may be a signal to suggest an optimal urokinase volume based on weight which might warrant a controlled study.

Objectives To investigate clinical factors that affect length of chest drain insertion (LOCD) in children with empyema and to examine if there is an optimal urokinase dosing based on patient’s weight would affect the LOCD.

Methods We conducted a retrospective review of clinical data from 52 children with empyema admitted to our centre between January 2015-December 2016. Chest drains were in place for a range of 2 to 12 days with a median of 5 days. We conducted a comparison of these data between the group of patients who required chest drain insertion for ≤5 days and those ≥5 days. We also grouped the patients into two levels of urokinase dose based on patients weight to create a frequency table and eventually to look if a certain dose is associated with a shorter LOCD.

Results The median LOCD insertion in our group was 5 days. Patients with a longer LOCD showed a trend to be younger and had a higher WCC, but this was not statistically significant. There were no statistically significant difference in the dose/kg of urokinase and LOCD.

Conclusion Our study did not show whether a certain urokinase dose based on weight would affect the LOCD. There were no other clinical indicators among our population that can predict the LOCD.

<table>
<thead>
<tr>
<th>Abstract P43 Table 1</th>
<th>LOCD≤5 days</th>
<th>LOCD&gt;5 days</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (Male)</td>
<td>n. (28)</td>
<td>n.(22)</td>
<td></td>
</tr>
<tr>
<td>Age (Mean)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>O2 requirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US fluid depth (mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urokinase U/Kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of patients on low dose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of patients on high dose</td>
<td></td>
<td></td>
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</tbody>
</table>

**The utility of bedside lung ultrasound in the assessment of emergency medical admissions presenting with acute dyspnoea: A prospective analysis**

P44

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10.1136/thoraxjnl-2017-210983.186

Introduction Lung Ultrasound (LUS) is emerging as a potentially useful bedside investigation to aid assessment of acute dyspnoea. However, little UK based data exists regarding the impact of LUS when performed over and above standard care in subjects presenting to hospital with acute dyspnoea.

Methodology Subjects presenting with acute dyspnoea as Emergency Admissions to 2 University Hospitals were evaluated within 24 hours of admission by a Respiratory Physician with Level 2 Ultrasound competency. A chest radiograph and appropriate blood tests had been performed beforehand. In all cases, the precise aetiology of the subject’s dyspnoea remained uncertain following review of the patient/existing investigations by the Respiratory Physician but prior to bedside LUS being performed.

Results 80 subjects (Age 68 (SD 17) years; 43% Male) were included with 77 surviving to discharge. LUS findings comprised Diffuse Bilateral B lines suggestive of Acute Heart Failure (AHF)/Intestinal Syndrome in 29% (23/80), Consolidation in 23% (18/80), A lines/”normal” in 24% (19/80), unilateral focal B lines in 21% (17/80), unspecified sub-pleural focus (1/80), small pleural effusion (1/80) and loss of lung sliding/lung point indicative of pneumothorax (1/80). In the 18 cases of consolidation and the 23 cases of AHF identified on LUS, only 39% (7/18) and 30% (7/23) of the plain chest radiographs respectively were subsequently reported by a radiologist as showing any parenchymal abnormalities. In 29% (23/80) cases, the addition of LUS was felt to have given a specifically alternative diagnostic to the patient’s presentation not previously considered (7/23 Pneumonia, 12/23 AHF, 2/23 Abdominal Sepsis, 1 Pneumothorax, 1 Pulmonary embolism) whilst in a further 44% (35/80) cases, LUS was felt to have strengthened the certainty of an existing differential diagnosis considered prior to LUS being performed. The diagnosis made post LUS was found to be concordant with the subject’s “Discharge Diagnosis” in 83% (66/77) cases.

Conclusion Use of bedside LUS as an adjunct to standard care in the assessment of acute dyspnoea often resulted in either the consideration of an alternative diagnosis to account for a patient’s symptoms or offered clinicians greater certainty on an existing differential diagnosis thus better directing management.

**Cellular insights into lung injury repair**

P45

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10.1136/thoraxjnl-2017-210983.187

Mechanisms of regeneration: retinoic acid acts via the endothelium to drive human lung repair.
Retinoic acid (RA) is essential for correct mammalian lung development and remarkably can induce alveolar regeneration in rodent models of COPD. However, clinical trials of RA and RA-Receptor gamma agonists in patients with COPD were disappointing. The reasons for the lack of effect in COPD patients are unknown but there is a clear need for a greater understanding of the underlying biology driving RA-induced lung regeneration. To investigate this, I studied the role of RA in human alveolar repair using isolated human pulmonary microvascular endothelial cells (HPMEC), alveolar epithelial cells (A549) and developed a novel human alveolar model using Precision-Cut Lung Slices (PCLS). In HPMECs, All-trans RA (ATRA) induced angiogenesis in a dose dependent manner (p<0.01, n=5). Pharmacological inhibition of VEGF receptor-2 with the selective inhibitor Ki8751 (Tocris) abolished this effect (p<0.05, n=6) (figure 1). A proteome profiler array of PCLS, demonstrates an increase in pro-angiogenic proteins in the ATRA group, including CXCL16, IGFBP-3, PIGF, VEGF-A, HB-EGF and MCP-1. In addition, ATRA treatment of PCLS generated from histologically normal human lung lead to increased endothelial (PECAM-1) and alveolar type 2 (Pro-SPC) cell markers (n=3). Further investigation revealed that in wound-healing (scratch) assays of confluent cell monolayers, ATRA had no direct effect on the rate of wound healing in alveolar epithelial cells (A549) but significantly increased healing in HPMECs (p<0.01, n=3). Moreover, siRNA knock-down of VEGF-R2 inhibited ATRA-induced wound-healing in HPMECs. Conditioned media from ATRA-treated HPMECs increased wound healing in A549 cells suggesting that the effects of RA on alveolar epithelial repair are mediated indirectly via the vascular network. HPMEC secreted HB-EGF with ATRA stimulation and HB-EGF treatment significantly increased A549 wound healing (n=2) suggesting it may act as a paracrine endothelial-epithelial regulator. My work demonstrates that RA has biological activity in human lung with direct effects on human lung microvasculature including cell migration, angiogenesis, and regulation of proteins likely to be important in alveolar repair. Together my data significantly advances our understanding of the mechanisms of RA induced repair in human lung tissue.

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CIGARETTE SMOKE- AND HYPOXIA-INDUCED IMBALANCED VASOACTIVE GENE EXPRESSION IN HUMAN PULMONARY ARTERY ENDOTHELIAL AND SMOOTH MUSCLE CELLS

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10.1136/thoraxjnl-2017-210983.188

Background Pulmonary Hypertension (PH) is a common and serious complication of Chronic Obstructive Pulmonary Disease (COPD) associated with increased mortality and morbidity and characterised by Pulmonary Artery Smooth Muscle Cell (PASMC) hyperproliferation and vascular remodelling. Studies suggest that chronic hypoxia and Cigarette Smoke (CS) can cause aberrant PASMC proliferation and vascular remodelling, however, how cigarette smoke and hypoxia contribute to pulmonary artery wall thickening and PH in COPD is not fully understood. We hypothesise that hypoxia and CS can induce an imbalance between excessive vasoconstrictors and deficient vasodilators, which then contribute to aberrant PASMC proliferation in COPD-associated PH and can be a target for therapeutic intervention.

Method To prove the hypothesis, confluent Human Pulmonary Artery Smooth Muscle Cells (hPASMCs) and Human Pulmonary Artery Endothelial Cells (hPAECs) were treated with different concentrations of Cigarette Smoke Extract (CSE) (1%, 2.5%, and 5%) under normoxic (21% O2) or hypoxic (1% O2) condition for 72 hour. The protein and mRNA expression of Prostacyclin Synthase (PGIS), Cyclooxygenase-2 (COX-2), Endothelial Nitric Oxide Synthase (eNOS), Thromboxane A Synthase (TXAS), and Endothelin 1 (ET-1) was analysed by Western blotting and real-time RT-PCR, respectively.

Results The expression of vasodilator genes eNOS and PGIS was noticeably downregulated in both hPASMCs and hPAECs,
whereas TXAS and COX-2 expression was markedly induced by CSE and hypoxia, either individually or in combination in both hPASMCs and hPAECs. ET-1 expression was increased by CSE and hypoxia in hPAECs. Interestingly, ET-1 was upregulated by hypoxia, but reduced by CSE, with a net increase when both were combined in hPASMCs.

Conclusion These findings support our hypothesis that CS and hypoxia can cause an imbalance between excessive vasoconstrictors and deficient vasodilators in hPASMC and hPAECs. This imbalance may eventually lead to aberrant PASMC proliferation and vascular remodelling in COPD-associated PH. Further experiments are being conducted to confirm this by analysing vasoactive gene expression and mediator release in both hPASMCs and hPAECs. Our findings also pave the way for further studies on cellular functions and intervention drug effects.

**P47 HYPERCAPNIA IMPAIRS THE ABILITY OF MESENCHYMAL STEM CELLS TO PROMOTE DISTAL LUNG EPITHELIAL WOUND REPAIR IN ARDS**

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10.1136/thoraxjnl-2017-210983.189

**Background** Alveolar epithelial cell death and denudation of the basement membrane are hallmarks in the pathophysiology of Acute Respiratory Distress Syndrome (ARDS). Successful recovery requires basement membrane re-epithelialisation. While no pharmacological therapy exists for ARDS to date, Mesenchymal Stem Cells (MSCs) demonstrate promising therapeutic potential and are being tested in early-phase clinical trials. Heterogeneity of patients with ARDS is an obstacle for further development of an MSC-based therapy. While 20% of patients with ARDS develop hypercapnia (high CO2) as a result of lung protective ventilation, the efficacy of MSCs has never been studied in this setting. We have previously found that transfer of functional mitochondria to surrounding cells is an important mechanism of the MSC therapeutic effect. The aims of this study therefore were to investigate the effect of MSCs on repair of the distal lung epithelium in normocapnia and hypercapnia in an in vitro model of ARDS, and to assess the role of mitochondrial transfer in mediating the MSC effect.

**Methods** Primary, human small airway epithelial cell (SAEC) monolayers were wounded in an *in vitro* scratch assay, stimulated with cytokines (IFN-gamma, I L-1 beta, TNF-alpha), and co-cultured with MSCs in normocapnia (5% CO2) or hypercapnia (15% CO2). Percentage wound closure was measured at 24 hour. SAEC proliferation was assessed by Ki67 staining. Mitochondrial transfer from MSCs to SAECs was assessed by flow cytometry using MitoTracker Green dye. MSC mitochondrial membrane potential was analysed by flow cytometry using JC-1. ATP production was measured by luminescent assay.

**Results** Epithelial wound closure was impaired by hypercapnia. MSCs promoted epithelial wound closure in the inflammatory setting in normocapnia via enhanced migration. This reparative capacity was lost in hypercapnia. Mitochondrial transfer from MSCs to SAECs was observed to a similar extent in normocapnia and hypercapnia. However, hypercapnia attenuated mitochondrial membrane potential and ATP production in MSCs.

**Conclusion** While they promote epithelial wound repair in an inflammatory environment in normocapnia, MSCs lose this ability in hypercapnia. This suggests that their therapeutic efficacy may be lost in such an environment. An inhibitory effect of hypercapnia on MSC mitochondrial function may be at least partially responsible for this effect.
Sulfamethoxazole and dapsone share the same sulphonamide ring with similar antibacterial effects. Detailed studies of dapsone show extensive effects on the immune system with the reduced generation of oxygen free radicals (ROS) and inhibition of neutrophil (Neutrophil) myeloperoxidase. These effects reduce intra and extracellular ROS reducing endothelial damage, lipid peroxidation and apoptosis. The bacterial peptide N-formylmethionine-leucine-phenylalanine (fMLP) activates the (Neutrophil) via its formyl peptide receptor (FPR) generating ROS much of which is extracellular. The FPR receptor also induces cell migration, granule secretion and lysosomal activation. Dapsone very significantly reduces fMLP activation of Neutrophil (Neutrophil) and lysosomal activation. Dapsone very significantly reduces fMLP activation of Neutrophil (Neutrophil) and lysosomal activation.

**Findings**

Despite the small numbers to date, similar to dapsone there is a significant blocking of oxidative burst to fMLP in Neutrophil and Monocyte pre- and post cotrimoxazole with a similar trend in IPF. There is also some reduction in PMA oxidative burst, but none to E.coli. The reduced Monocyte stimulation may reflect the lower Monocyte blood counts. If Neutrophil and Monocyte ROS generation are reduced by cotrimoxazole, this may stabilise the disease process protecting against severe exacerbations.

### Abstract P49 Table 1

<table>
<thead>
<tr>
<th>Neutrophils</th>
<th>Healthy controls (HC) n=9</th>
<th>Healthy controls n=6 post Cotrimoxazole 7 days (960 mgBD)</th>
<th>Paired t test +significance at the 5% level</th>
<th>IPF on long-term Cotrimoxazole (mean treatment duration 23 months, 960 mgBD) n=8</th>
<th>Mann Whitney U test HC versus IPF +significance at the 5% level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean neutrophil blood count 10⁹/l (SEM)</td>
<td>Mean fluorescence ±SEM of stimulated cells (arbitrary units)</td>
<td>3.32±0.24</td>
<td>109/l (SEM) 3.43±0.16</td>
<td>4.49±0.39</td>
<td>0.017</td>
</tr>
<tr>
<td>PMA N°</td>
<td>7014±1623</td>
<td>5930±503</td>
<td>p=0.683</td>
<td>3866±823</td>
<td>0.082</td>
</tr>
<tr>
<td>fMLP N°</td>
<td>989±242</td>
<td>246±244</td>
<td>p=0.015</td>
<td>448±407</td>
<td>0.061</td>
</tr>
<tr>
<td>E coli N°</td>
<td>4417±447</td>
<td>3302±413</td>
<td>p=0.331</td>
<td>3606±358</td>
<td>0.803</td>
</tr>
</tbody>
</table>

**Monocytes**

<table>
<thead>
<tr>
<th>Healthy controls HC n=9</th>
<th>Healthy controls n=6 post Cotrimoxazole 7 days (960 mgBD)</th>
<th>Paired t test +significance at the 5% level</th>
<th>PAIP1 on long-term Cotrimoxazole (mean treatment duration 23 months, 960 mgBD) n=8</th>
<th>Mann Whitney U test HC versus IPF +significance at the 5% level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean monocyte blood count 10⁹/l (SEM)</td>
<td>Mean fluorescence ±SEM of stimulated cells (arbitrary units)</td>
<td>0.55±0.06</td>
<td>109/l (SEM) 0.52±0.08</td>
<td>0.77±0.07</td>
</tr>
<tr>
<td>PMA N°</td>
<td>503±149</td>
<td>236±109</td>
<td>p=0.99</td>
<td>424±166</td>
</tr>
<tr>
<td>fMLP N°</td>
<td>1467±460</td>
<td>38±24</td>
<td>p=0.05</td>
<td>1340±807</td>
</tr>
<tr>
<td>E coli N°</td>
<td>990±168</td>
<td>787±136</td>
<td>p=0.57</td>
<td>808±144</td>
</tr>
</tbody>
</table>

*fluorescein agent dihydrodihorodamine123-maximum absorption 488–490 nm.

**Introduction**

Idiopathic pulmonary fibrosis (IPF) is the most common form of interstitial lung disease, with a poor prognosis and a lack of therapeutic options that halt disease progression. While the aetiology of IPF is unknown, dysregulated epithelial and mesenchymal response following persistent epithelial insult is thought to be critical in driving fibrosis. Recent evidence suggests that, akin to cancer, metabolic reprogramming may be important in driving many of these processes. In both cancer and fibrosis development, inducible expression of the pyruvate kinase isozyme M2 (PKM2) represents an important adaptation for increasing the availability of glycolytic intermediates for biosynthesis and cell proliferation.

**Aim**

We aim to investigate the expression of PKM2 in relation to cell-specific markers in the IPF lung.
**Poster sessions**

**P51** LUNG EPITHELIAL CELL INHIBITION OF CYTOKINE PRODUCTION BY PERIPHERAL BLOOD MONONUCLEAR CELLS AND LUNG LYMPHOCYTES

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10.1136/thoraxjnl-2017-210983.193

**Introduction** Type 2 cytokines such as IL-5, IL-13 and IL-4 produced by primed type 2 T cells have been shown to be important in the pathogenesis of eosinophilic airway inflammation. Factors regulating the state of activation of these cells are incompletely understood. We and others have shown that release of IL-13 by stimulated T cells can be inhibited by epithelial cells. This study used a PBMC based bulk culture system to: 1) determine whether production of other type-2 cytokines is inhibited by co-culture with epithelial cells; 2) compare inhibition of activated PBMC and human lung lymphocytes and 3) investigate whether specific soluble mediators modified inhibition of IL-13 release. PBMC isolated from blood and lymphocytes isolated from lung tissue were cultured with IL-2 for five days in the absence and presence of A549 and BEAS2B epithelial cells. The cytokines IL-13, IL-5, IL-9 and TNFα were measured in the supernatant of these cells. Similar co-culture experiments were performed in the presence of different inhibitors or blocking cytokine antibodies.

**Results** Production of all cytokines measured were reduced in the presence of epithelial cells: IL-13 shown as mean pg/10⁶ cells+/−SD in 200 U/ml IL-2) PBMC: 1184+/−24, A549 12 +/−1 or lung cells 795+/−138, A549 50+/−2. PBMC and lung cells were inhibited to a similar degree although, importantly, lung cells produced more IL-9 and less TNFα than a comparable number of PBMC. We found that adding inhibitors to IL-10, TGF-β, Aryl Hydrocarbon Receptor (AHR blocked with CH-223191), prostaglandins (indomethacin) and nitric oxide (NMMA) did not alter the A549 mediated regulation of IL-13 release by the PBMC or lung cells.

**Conclusions** The inhibition of cytokine release by PBMC and lung cells in the presence of epithelial cells could indicate generalised regulation of inflammatory cytokine release. Blocking of IL-10, TGF-β, AHR, prostaglandins and nitric oxide was not able to reduce the regulation of the cytokine release but more specific inhibitors or further titration may be required. The characterisation of cells from lung tissue and the regulation of these by epithelial cells could further elucidate possible ways of regulating and reducing cellular inflammatory responses in asthma.

**P52** EXPLORING THE INTERACTION BETWEEN HIV-1 GP120, BRONCHIAL AIRWAY EPITHELIAL CELLS AND MACROPHAGES

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10.1136/thoraxjnl-2017-210983.194

**Rationale and Hypothesis** HIV-1-seropositive individuals receiving highly active antiretroviral therapy (HAART) have an increased incidence of chronic obstructive pulmonary disease (COPD), independent of smoking history. Although HIV-1 infection is associated with impaired redox homeostasis and increased pro-inflammatory cytokine expression in the lungs despite HAART, the mechanisms driving HIV-1-associated COPD are poorly understood. Free HIV-1 envelope glycoprotein gp120 is detectable in bronchoalveolar lavage fluid from HAART-treated individuals. gp120 displays affinity (tropism) for either CCR5 or CXCR4 chemokine receptors, and has been implicated as a mediator of inflammation and oxidative stress in various HIV-1-associated disease processes. We hypothesised that gp120 directly induces bronchial epithelial cell oxidative stress, and drives airway inflammation indirectly via alveolar macrophages, a response which is augmented following secondary exposure to pro-inflammatory stimuli such as bacterial pathogens.

**Objectives** To explore the mechanisms and consequences of gp120 interactions with bronchial epithelial cells and macrophages.

**Methods** An immortalised bronchial epithelial cell line (BEAS-2B), primary bronchial epithelial cells (PBECs) or monocyte-derived macrophages (MDMs) from healthy volunteers were treated with recombinant gp120 (CCR5- or CXCR4-tropic, 100 ng/mL) for 24–48 hour. BEAS-2B were primed (or not) with IL-1β. MDMs were co-cultured with confluent BEAS-2B cells at a ratio of 1:5 in the presence or absence of LPS (100 ng/ml). Cytokine outputs were quantified by ELISA, and cellular reactive oxygen species (ROS) production assessed by confocal microscopy using CellROX or MitoSOX reagents.

**Findings** Picomolar concentrations of CXCR4- but not CCR5-tropic gp120 induced CXCL8 release from IL-1β-primed BEAS-2B mononcultures and upregulated cellular ROS production in both BEAS-2Bs and PBECs, consistent with expression of CXCR4 but not CCR5 on these cells. gp120 stimulation of BEAS-2B/MDM co-cultures caused no detectable changes in cytokine release. However, co-cultures primed with gp120 (of either tropism) and stimulated with LPS demonstrated significant CXCL8 release at 48 hours, reflecting MDM expression of both chemokine receptors. Impaired redox homeostasis and upregulated inflammatory responses may contribute to gp120-mediated airway epithelial dysfunction, and may drive neutrophil recruitment in this setting.
**Conclusion** HIV-1 gp120 influences key airway cell interactions to disturb redox homeostasis and inflammatory responses at concentrations equivalent to those found in the lungs of individuals receiving long-term HAART.

**P53** PHOSPHOINOSITIDE-3 KINASE AND MEK INHIBITION PREVENTS UPTAKE OF BACTERIA BY AIRWAY EPITHELIAL CELLS

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Introduction Bacteria are associated with COPD exacerbations with *Haemophilus influenzae*, and *Streptococcus pneumoniae* being predominant. Airway epithelium can protect pathogens from host defences and antibiotic treatment by internalisation. The mechanisms of this are unclear but may involve phosphoinositide-3 kinase (PI3K), p38, and ERK pathways. This requires many primary cells and therefore a validated cell line model would be of benefit. Therefore, we compared uptake of pathogenic bacteria by airway epithelial cells from non-smokers and COPD patients with A549 and BEAS-2B cell lines and the effects of pathway inhibitors were examined.

Methods Non-smoker (*n=7*) and COPD (*n=8*) primary airway epithelial cells, and cell lines (BEAS-2B and A549 *n=5*) were incubated with fluorescently-labelled, heat-killed, *H. influenzae*, *S. pneumoniae*, or *E. coli* for up to 72 hours and uptake fluorimetrically. Confocal microscopy was used to confirm internalisation of bacteria. CXCL8 release was measured using ELISA. Effects of pathway inhibitors were determined by pre-treating cells with increasing concentrations of LY294002 (PI3K inhibitor), VX745 (p38 inhibitor), or PD98059 (ERK pathway inhibitor). Cell viability was assessed by MTT assay.

Results Primary airway epithelial cells internalised respiratory bacteria spp. but not *E. coli*, in a time-dependent manner, with COPD cells internalising more *H. influenzae* than *S. pneumoniae* compared to non-smokers at 48 hour (*H. influenzae* Non-smoker: 0.97±0.23 vs COPD: 2.49±0.7 RFU *χ* 10^3, *p*<0.05) and 72 hour (*H. influenzae* Non-smoker: 1.44±0.35 vs COPD: 3.01±2.2 RFU *χ* 10^3, *p*<0.05). A549 cells engulfed more bacteria than primary cells but the responses of BEAS-2B cells were similar to COPD cells and were used for subsequent experiments. Uptake was inhibited by LY294002 and PD98059, but not VX745. Conversely VX745, but not LY294002 or PD98059 inhibited CXCL8 release (Table 1). None of the treatments affected cell viability.

**Conclusion** COPD airway epithelial cells engulf more *H. influenzae* than cells from non-smokers and this can be modelled by BEAS-2B cells. Uptake appears to require PI3K and ERK pathways but not p38 although, p38 is required for cytokine release. These data suggest that PI3K or MEK inhibitors in combination with antibiotics might be a good therapeutic strategy to treat bacterial exacerbations and recolonisation in COPD.

**P54** EOSINOPHIL MIGRATION IS ENHANCED TOWARDS IL-5 AND EOTAXIN IN COPD


Introduction Eosinophilic COPD is an important inflammatory phenotype, but the mechanism is unknown. In this study we examine the migration of eosinophils in different inflammatory COPD phenotypes towards IL-5 and eotaxin which was unelucidated.

Methods Whole blood from 4 eosinophilic COPD patients, 4 non-eosinophilic COPD patients and 6 healthy controls was collected, with eosinophils isolated by ficoll-paque and dextran methods. Eosinophils were assessed for chemotactic ability. Briefly, eosinophils re-suspended at 1 c 10^5 cells/ml were placed on a 3 μm pore membrane above solutions of IL-5 and eotaxin (50 ng/ml and 10 ng/ml respectively for one hour). Cells which passed through the membrane were treated with Cell-Titer-Glo solution to allow their detection by plate reader. Eosinophilic COPD was defined as patients with a peripheral blood eosinophil count of ≥2% of white blood cells.

Results Eosinophils from eosinophilic COPD patients showed significantly greater migration than both healthy controls towards IL-5 (median: 7021 cells, IQR: 6098–10 013 v median: 2288 cells, IQR: 1389–2702, *p=0.0095*) and non-eosinophilic COPD patients (median: 3219 cells, IQR: 2488–3785, *p=0.0286*). Eosinophils from eosinophilic and non-eosinophilic patients (median: 5363 cells, IQR: 4101–5420 and median: 3683, IQR: 3091–4179 respectively) showed significantly greater migration towards eotaxin than healthy controls.

**Conclusion** Eosinophils from eosinophilic COPD patients showed significantly greater migration than both healthy controls towards IL-5 and eotaxin.

Abstract P54 Figure 1 Eosinophil migration towards IL-5 and eotaxin.
Exploring rhinovirus-induced ER stress in bronchial airway epithelial cells

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10.1136/thoraxjnl-2017-210983.197

Rational and Hypothesis Human rhinovirus (HRV) infections are major contributors to the increased morbidity burden associated with asthma and COPD acute exacerbations. There are currently no effective treatments or vaccines targeting exacerbations, therefore understanding the host-virus interactions that drive cellular damage will help identify potential therapeutic targets. Viral infections alter the airway environment through increased production of inflammatory mediators, defensive factors and viral proteins. This results in the upregulation of cellular processes such as the unfolded protein response (UPR), an ER (endoplasmic reticulum) stress pathway that acts to alleviate ER stress caused by increased demands on protein synthesis. In the event that UPR fails to restore cellular homeostasis, pro-apoptotic pathways are activated. Many viruses induce ER stress and have evolved mechanisms to modify UPR to promote their own replication. Interestingly, the mechanisms and consequences of HRV-induced ER stress in bronchial epithelial cells have yet to be explored. We therefore hypothesised that HRV infection induces and manipulates ER stress processes within bronchial epithelial cells.

Objectives To explore the mechanisms and consequences of HRV-induced ER stress within bronchial epithelial cells.

Methods The immortalised bronchial epithelial cell line, BEAS-2B was infected with HRV for 1 hour at MOI 1.5. Induction and subcellular localisation of ER stress markers (GRP78 and ATF4) were measured at various time points by western blotting and confocal microscopy. Tunicamycin (a known ER stress inducer) and filtered HRV were included as positive and negative controls respectively.

Findings Virally infected BEAS-2B cells induced ER stress as evidenced by the significant induction of the UPR chaperone protein, GRP78 at 24 hour. ATF4, a transcriptional activator of UPR target genes, redistributed from a cytoplasmic location to perinuclear regions, as assessed by immunofluorescence and confocal microscopy. Translocation was seen from as early as 1 hour following treatment with Tunicamycin, but this response was relatively delayed in HRV-infected BEAS-2B cells, with ATF4 redistributing to perinuclear regions from 8 hour post infection.

Conclusion Our data demonstrate for the first time HRV-induced ER stress within bronchial epithelial cells, and suggest that HRV may manipulate ER stress pathways to facilitate its own replication.

Poster sessions

HUMAN RHINOVIRUS IMPAIRS PHAGOCYTOSIS OF HAEMOPHILUS INFLUENZAE IN ALVEOLAR MACROPHAGES IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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10.1136/thoraxjnl-2017-210983.198

Introduction COPD exacerbations are the main cause of hospital admission and death in COPD. Respiratory viruses are identified in over half COPD exacerbations with human rhinovirus (HRV) being the most commonly detected. Secondary bacterial infection is associated with prolonged exacerbations, higher rates of hospital admission and increased symptom severity. Our group have previously shown that secondary bacterial infection in HRV induced COPD exacerbations is driven by an outgrowth of Haemophilus influenzae.

Hypothesis We hypothesised that HRV may impair phagocytosis of bacteria by alveolar macrophages which may lead to secondary bacterial outgrowth in COPD exacerbations.

Methods Bronchoscopy was performed on participants of the London COPD cohort and healthy controls. Alveolar macrophages were obtained by bronchoalveolar lavage. Alveolar macrophages were incubated with HRV at a multiplicity of infection (MOI) of 5 for 24 hours or media control. Phagocytic capacity was assessed by incubating with fluorescently labelled heat killed Haemophilus influenzae or Streptococcus pneumoniae for 4 hours. Uptake was measured in Relative Fluorescent Units (RFU) using a fluorimeter.

Results Alveolar macrophages were obtained from 14 COPD patients and 9 healthy controls. HRV significantly impaired phagocytosis of H. influenzae by alveolar macrophages in patients with COPD (HRV median 0.97 (0.50–2.17 interquartile range) RFU x10³ vs media control median 1.38 (0.70–2.50 interquartile range) RFU x10³ p<0.05) but did not impair phagocytosis of S. pneumoniae. HRV did not impair phagocytosis in alveolar macrophages from healthy controls. Baseline phagocytic capacity of H. influenzae was impaired in COPD patients compared to healthy controls (COPD 1.59+/–1.31 RFU x10³ vs healthy control 3.81+/–1.82 RFU x10³). Phagocytosis of H. influenzae correlated with worsening FEV1 percent predicted in COPD (R²=0.452 p<0.05).

Conclusions The presence of HRV impaired phagocytosis of H. influenzae in alveolar macrophages from patients with COPD but not healthy controls. This may contribute to secondary bacterial infection in COPD exacerbations.

SOLUBLE RECEPTOR FOR ADVANCED GLYCATION END-PRODUCTS (SAGE) IN PATIENTS WITH COPD: THE ERICA STUDY

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10.1136/thoraxjnl-2017-210983.199
Background Advanced glycation endproducts (AGE) in patients with chronic obstructive pulmonary disease (COPD) has been considered in the pathology of the disease and as a biomarker of emphysema severity. In addition, AGE has been implicated in cardiovascular (CV) disease, a common comorbidity in COPD. Whether the soluble receptor for AGE (sRAGE) predicts CV status in COPD is unclear.

Objective The aim of this study was to assess the associations between sRAGE and measures of both lung and CV function in patients with COPD from the ERICA cohort.

Methods Patients with confirmed COPD performed spirometry, blood pressure, aortic pulse wave velocity (PWV), carotid intima media thickness (CIMT) at clinical stability. Blood for sRAGE was taken.

Results Of the 729 subjects in ERICA, 677 patients had a sRAGE result. 417 patients were male; mean (SD) age was 67.4 (7.8) years and 31% were current smokers. There was a weak association of sRAGE with age (r=0.16, p<0.001), FEV1% predicted (r=0.12, p<0.05) and FEV1/FVC (r=0.15, p<0.001). There was no difference in sRAGE in current or ex-smokers. In multiple linear regression, a lower sRAGE was associated with more severe lung function: FEV1% predicted, B 4.3 [95% CI 1.6, 6.8, p=0.0012]. There was no significant relationship was observed between sRAGE and cardiovascular variables: aortic PWV (p=0.418) and CIMT (p=0.596) in the multivariate models. sRAGE in those with concurrent presence of CV disease, diabetes or cerebrovascular disease or not was not different (p=0.579).

Conclusion Despite literature supporting the role of AGE in both lung and CV disease, there was no apparent association of sRAGE with CV status in patients with COPD in the ERICA cohort. There were associations with spirometry variables of FEV1% predicted and FEV1/FVC.

Respiratory medicine: common problems, new insights

A QUALITATIVE AND QUANTITATIVE ASSESSMENT OF PATIENTS’ ATTITUDES TO PULMONARY TARGETED ANTIBIOTICS IN BRONCHIECTASIS

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Background Bronchiectasis is a chronic lung condition commonly affecting adults in middle to later years. Quality of life can be poor with a chronic, productive cough, dyspnoea and significant fatigue. Treatments aim to reduce symptoms, exacerbation frequency and severity, preserve lung function and improve health related quality of life. Regular, often twice daily nebulised antibiotics are commonly used in managing bronchiectasis. This patient population typically has severe bronchiectasis requiring multiple other medications. Little is known on patients’ views and preferences for such therapies. We aimed to assess this and define patient preferences and experiences.

Methods We conducted three focus groups and three single interviews to define patients’ experience of nebulised antibiotics. 19 patients and/or carers attended focus groups providing in-depth information of lived experience using inhaled antibiotics. Thematic data analysis (TA) was used to derive a patient experience survey and a further 120 adult bronchiectasis patients completed surveys.

Results Thematic analysis of the focus group data identified that many patients found nebulised therapy an imposition on their daily routine and this impaired adherence. Reducing treatment burden/time administering therapy was important. Others reported that nebulisation time was a period of rest, often incorporated into daily routines. The survey data showed although 70% of those currently taking nebulised antibiotics found them easy/very easy to administer, 10% found these hard/very hard to administer. 20% found taking the nebuliser in front of others “uncomfortable”. When nebulising, 47% excluded themselves in a separate room on a daily basis. 53% stopped nebulised therapy during vacations. If an inhaler that was as effective as nebulised therapy at preventing exacerbations was available 76% strongly agreed/agreed that they preferred an antibiotic delivered by an inhaler over a nebuliser if it was as effective at preventing exacerbations. 16% stated a preference for nebulised. Notably, only 10% wished to remain on nebulised therapy.

Conclusions Bronchiectasis patients do not fully adhere with current treatments based upon treatment burden, life experience and lay knowledge. Inhaled antibiotics via dry power devices are quicker and easier to use and preferred by patients providing they were at least as effective as current nebulised treatments.
breathing and we offer the facility to insert PICC lines and use surfusers. Our aim was to demonstrate the benefits of managing patients with infective exacerbations of bronchiectasis in the community.

**Method** We performed a retrospective analysis of 51 patient records. We looked at a number of clinical outcomes including length of stay, infection rates, culture rates and potential cost implications.

**Results** Patients managed through AHAH had shorter lengths of inpatient stays; 2.5 days compared to 9.1. The cost of an AHAH bed is £100/day and an acute medical bed is £280/day which results in a saving of £1140 per patient per admission. Patients managed in the community were more likely to have their sputum cultured in accordance with BTS guidelines. We proved equivalence in rates of hospital acquired infections, readmissions and death. Patient satisfaction was significantly better in those managed in the community, 98% would recommend the service to family or friends compared to 83% of patients managed on an inpatient ward.

**Conclusion** Our Results demonstrate clear benefits of managing patients with exacerbations of bronchiectasis in the community, not only in terms of a reduction in hospital bed days and cost but also improved patient satisfaction. We believe that our AHAH service is a safe and beneficial clinical service which could be applied to other clinical conditions.

**REFERENCE**

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**P61**

**SELF-MANAGEMENT FOR NON-CYSTIC FIBROSIS BRONCHIECTASIS: COCHRANE SYSTEMATIC REVIEW**

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**Background** The aims of therapeutic management for non-cystic fibrosis (non-CF) bronchiectasis are: preservation of lung function 6 months prior to conception assessed using forced expiratory volume in 1 s (FEV₁) and forced vital capacity (FVC). Longitudinal statistics were recorded for outcome of pregnancy, mode of delivery, infection status, obstetric cholestasis and haemoptysis during pregnancy, and respiratory function at baseline (6 months prior to gestation), conception, delivery and 6 months postpartum. Statistical analysis was made using the Pearson’s two-tailed correlations, with p-values of <0.05 considered as statistically significant.

**Results** There were 11 successful pregnancies in 10 women with bronchiectasis during the study period. In all cases pregnancy was well tolerated with no significant adverse events. Mean age was 33.9 (range 23.9–43.5). Evidence of negative investigations for cystic fibrosis was found in 9/10 patients. Mean baseline FEV₁ prior to pregnancy was 70.2%-predicted (SD 19.6) compared with 66.5% (SD 20) at delivery (p>0.05) and 66.2% (SD 20.7) at 6 months after delivery (p>0.05). FEV₁/FVC ratio at conception, delivery and at 6 months after delivery was 0.77 (SD 0.1), 0.75 (SD 0.1) and 0.73 (SD 0.1) respectively (p>0.05). 60% of women had positive sputum cultures during pregnancy: *Pseudomonas aeruginosa* in 27.3%, *Haemophilus influenzae* 45.5%, *Staphylococcus aureus* 18.2%, *Streptococcus pneumoniae* 9.09% and coiforms 9.09%. Positive sputum microbiology was not correlated with any change in respiratory function or pregnancy outcomes.

**Conclusion** Pregnancy in women with non-CF bronchiectasis was largely well tolerated in our cohort. Larger studies are needed to determine the true impact of pregnancy on lung function in this population.
function, reduction of symptoms and exacerbations and to improve quality of life. Self-management interventions are beneficial in the management of other airway diseases and are a research priority for bronchiectasis.

**Objectives** To assess the efficacy, cost-effectiveness and adverse effects of self-management interventions for adults and children with non-CF bronchiectasis.

**Methods** Cochrane Airways Group’s Specialised Register, ClinicalTrials.gov and the World Health Organisation trials portal were searched. We included all parallel and cluster-randomised controlled trials which included adults and children with non-CF bronchiectasis and assessed self-management interventions delivered in any form (e.g., mobile device, face-to-face) compared with usual care or alternate form of self-management. Two reviewers independently assessed studies for eligibility and quality, and extracted data.

**Results** We identified 53 records and included 2 studies: one RCT of early rehabilitation in adults in two centres in England and one proof-of-concept RCT of an expert patient programme in adults in a single regional respiratory centre in Northern Ireland. A total of 84 adult patients with bronchiectasis were randomised. Data aggregation was not possible. For primary outcomes, health-related quality of life was reported in both studies but showed no significant benefit. One study reported more deaths in the intervention group compared to the control group, (Intervention: 4 of 8, Control: 2 of 12), although small numbers limit interpretation. Neither study reported data on exacerbations requiring antibiotic therapy. For secondary outcomes, frequency of hospital admissions was reported in one study but was not significantly different between groups, Both studies reported lung function in terms of FEV1 and there were no significant differences between groups. One study reported data on self-efficacy and showed evidence of benefit. Neither study reported data on respiratory symptoms, economic costs or adverse events. Using GRADE guidelines, the outcomes included were judged as very low quality.

**Conclusions** There is insufficient evidence to determine whether self-management has benefits in adults and children with non-CF bronchiectasis. Future studies should more clearly define self-management interventions, control for sources of variability, be adequately powered, measure clinically important outcomes, and include children.

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**P62**

**OXYGEN DESATURATION INDEX FOR DIAGNOSING OBSTRUCTIVE SLEEP APNOEA IN PATIENTS WITH MORBID OBESITY**

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10.1136/thoraxjnl-2017-210983.204

**Introduction and Objectives** Obstructive sleep apnoea (OSA) is often undiagnosed and hence untreated. Its prevalence is ever increasing given the escalating obesity of the population. Apnoea/hypopnoea index (AHI) is commonly used to diagnose and classify the severity of OSA. The overnight oximetry, which measures oxygen desaturation index (ODI), is far simpler to measure than a full respiratory polysomnography, but its diagnostic accuracy at predicting OSA has not been formally established. We proposed that in patients with morbid obesity (BMI $\geq 40$), the diagnostic accuracy for establishing an OSA diagnosis using ODI is as effective as AHI.

**Methods** The data from the respiratory polysomnography of those individuals with a BMI greater than 40 kg/m$^2$, who were referred between January to December 2015 to the sleep service at St Peter’s Hospital, were reviewed and measures of AHI and ODI were compared.

**Results** 79 individuals with a BMI greater than 40 who underwent respiratory polysomnography were identified.

- Mean BMI 47.4 (BMI range 40–66.2)
- Mean AHI 36 (AHI range 2.7–112.1)
- Mean ODI 36.6 (ODI range 3–105.5)

For BMI’s $\geq 40$, ODI is as effective as AHI in diagnosing OSA with a strong positive correlation ($R^2=0.955$). For those at the more severe end of the spectrum, the correlation is deeper.

**Discussion** The data provided by a respiratory polysomnography test provides a range of parameters, but polysomnography is resource intensive and requires significant time and expertise to assess properly. SIGN guidance states that oximetry can positively diagnose OSA but cannot exclude it. There are multiple benefits to having a simple tool that can identify high-risk individuals that may suffer with OSA including early diagnosis and reduced cost as well as resource utilisation. This is likely to improve patient care with earlier diagnosis and treatment of OSA. Overnight oximetry can safely diagnose OSA in morbidly obese patients. This has the potential to optimise efficiency and reduce cost without impacting patient care.

**REFERENCES**

### ESTABLISHING THE COST OF HOSPITALISED COMMUNITY ACQUIRED PNEUMONIA (CAP): A HOSPITAL EPISODE STATISTICS (HES) ANALYSIS

**Introduction** There are two types of pneumococcal vaccine available for adults: polysaccharide vaccine (PPV23) and a conjugate vaccine (PCV13). PCV13 vaccination is efficacious in adults aged 65 and over at preventing both invasive pneumococcal disease (IPD) and pneumonia caused by the serotypes in the vaccine while the evidence is inconsistent for PPV23. The Joint Committee on Vaccination and Immunisation (JCVI) concluded that vaccination of ≥65 years with PCV13 was not cost-effective, and recommended against a national immunisation programme. As part of this analysis, a pneumonia admission (ICD-10 code J18) was costed at £715.4

**Aim** To obtain an alternative estimate of the cost of a hospitalised CAP both during the acute admission and following discharge.

**Materials and Methods** All patients aged ≥65 years with ICD10 J18 registered in HES between April 1st 2014 and March 31st 2015 were identified and their hospital-based activity tracked for 12 months. All in-patient, out-patient, and A and E attendances for these patients were extracted and the overall volumes and costs of these activities assessed over various timeframes. Costs were derived from the tariff via the Healthcare Resource Group codes.

**Results** The average cost of the initial in-patient (aged ≥65 years) admission for pneumonia (J18) was estimated at £325.40. Over the 1–90 day period following the initial admission 69% of patients registered some additional utilisation of health care at an average cost of £2090.

**Conclusion** It is important that any cost effectiveness assessment accurately captures the costs averted by the intervention. Our analysis suggests that the cost of a pneumonia admission (J18) is 4-fold higher than that utilised in the 2016 analysis. In addition, significant additional costs may result from exacerbation of any underlying co-morbidities, thereby increasing the cost associated with a CAP infection. Even if only some of these additional costs were due to the original CAP infection, the value used in the original analysis significantly underestimated the cost of CAP.

Please refer to page A258 for declarations of interest in relation to abstract P63.

### QUALITY OF INPATIENT CARE FOR COPD EXACERBATIONS AND IT’S IMPACT ON CLINICAL OUTCOMES

**Aim** To evaluate the impact of tobacco price increase policies on COPD burden in Italy.

**Methods** As part of the Ageing Lungs in European Cohorts (ALEC) project (www.alecstudy.org), we used DYNAMO-HIA, a Markov-based modelling approach to HIA analysis. Demographic and smoking data from the Italian population were used, together with data on the effects of smoking and health burden of COPD. A ‘maximum’ and a ‘realistic’ scenario were simulated to reflect different price increase policies: a 138% increase to match UK price (highest in Europe), and a 50% increase. Using published figures for price elasticities, we simulated changes to smoking behaviours over a 40 year period, evaluated their effects on COPD burden, and compared the two scenarios to a ‘business as usual’ scenario.

**Results** The projected population pyramid confirmed Italy as an ageing population with increasing COPD burden. Over the 40 year period, the maximum scenario showed reduction in smoking prevalence mainly through an increase in never smokers. Compared with ‘business as usual’, this translated in a substantial decrease in COPD incidence and prevalence, with consequent reduction in mortality and increase in average life expectancy. The realistic scenario showed effects of smaller magnitude in the same direction.

**Conclusions** Tobacco price increase policies would be effective in reducing future COPD burden in Italy. To provide a wider European perspective, we are now extending this work to countries with different smoking behaviours and tobacco prices.
LOS was 8 days; 80% were discharged directly to home. In the majority of cases only 3 of the 5 acute management components were completed. More than 90% of patients received antibiotics but only one-third were prescribed guideline-directed therapy. Intravenous steroids were used in the majority of cases, 67%, in preference to oral steroids. On multivariate linear regression analysis adjusting for exacerbation severity, age, FEV1, and discharge destination, appropriate prescription of oral steroid therapy reduced LOS by 1.3 days, p=0.023. By day 90, 38% of patients had been readmitted to hospital. The probability of readmission was decreased in those who had received guideline-directed antibiotic therapy, OR 0.35 (95% CI 0.15–0.79) p=0.012. Adherence to acute COPD management guidelines is suboptimal. The greatest improvements in clinical outcomes were associated with prescription of oral steroids, where applicable, and guideline-directed selection of antibiotic therapy. These components should, therefore, be a focus of strategies to improve quality of inpatient care in COPD.

**Introduction and Objectives** Recent works shown that it was possible to predict COPD exacerbation based on monitoring of simple parameters, such as an increase of the breathing rate in spontaneous ventilation or under non-invasive ventilation. Continuous breathing rate monitoring of COPD patients could be, by consequence, a pertinent way to follow their state of health, or even to alert for exacerbation situation. We aim to validate the breathing rate measurement of a tele-monitoring solution (TeleOx, SRETT, Boulogne-Billancourt, France) on COPD patients under long term oxygen therapy, as a first step towards this perspective.

**Methods** Breathing rates of COPD patient under long term oxygen therapy were recorded over a night, simultaneously by TeleOx and by a reference polygraph (Nox T3, Nox Medical Inc. Reykjavik, Iceland). A median breathing rate was extracted every 5 min by TeleOx and compared to the exact same measurement from the reference polygraph. The agreement between the two methods is considered using Passing-Bablok regression on the measured breathing rate points set.

**Results** Passing-Bablok regression on 1099 measurement points coming from 14 representative patients, comparing Results from TeleOx and reference polygraph gives, within a confidence interval of 95%, a slope b within [0.976; 1.000] and an intercept a within [−0.217; 0.325].

**Discussion** The connected tele-monitoring device TeleOx, is capable of measuring the breathing rate of COPD subjects under long term oxygen therapy in excellent agreement with a reference polygraph. It opens encouraging e-medecin perspectives for this patient population.
IMPLEMENTING BTS ASTHMA DISCHARGE BUNDLE IMPROVES DISCHARGE PLANNING IN CHILDREN

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10.1136/thoraxjnl-2017-210983.210

Introduction The Challenge The 2015 BTS Paediatric Asthma Audit had showed unit's performance at delivering a Written Management Plan (WMP) at discharge to have deteriorated to 2%. The same audit found a national average of 50%. We were concerned about how to improve this. In 2016 the BTS introduced the Asthma Care Bundle.

Method We asked staff why they did not always use the bundle. We designed A4 posters, an A4 mouse mat, group training delivered by nursing staff, real time private one to one feedback to nurses and doctors who forgot to use the bundle, group teaching by a nurse (VM), regular reminders by a consultant of the audit (JF) and an audit by a medical student (NP). A department Asthma Care Pathway was updated (LN) to encourage staff to use the discharge bundle. NP and did a retrospective case note audit of admissions between 1/9/16 to 20/1/2017 comparing the number of children discharged with a new and previous WMP who had an asthma care pathway (ACP), diagnosis of asthma, on inhaled corticosteroids (ICS) and those between 2–5 years and over 5 years of age.

Results

The use of WMP at discharge rose to 50% for children diagnosed with asthma and 80% for those using an Asthma Care Pathway including the BTS Asthma Care Bundle.

Conclusions and Implications Implementing the BTS discharge bundle in paediatrics is hard work. The neglect of this hard work is associated with a decrease in WMP use. Multiple tools and clear guidelines were effective at improving use by staff. Most important appears to be the use an ACP.

Abstract P68 Table 1 Spearman's Rho correlation between asthma-related symptoms and other patient-reported outcomes and FEV1 at baseline and end of treatment

<table>
<thead>
<tr>
<th>Variables For Correlation</th>
<th>Baseline</th>
<th>Change From Baseline to End of Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Benralizumab</td>
<td>Placebo</td>
</tr>
<tr>
<td>Daily diary assessments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity function: Limitation of activities</td>
<td>0.77</td>
<td>0.76</td>
</tr>
<tr>
<td>Activity function: Avoidance of activities</td>
<td>0.76</td>
<td>0.73</td>
</tr>
<tr>
<td>Activity function: Need to pace self</td>
<td>0.76</td>
<td>0.72</td>
</tr>
<tr>
<td>Feeling tired</td>
<td>0.76</td>
<td>0.72</td>
</tr>
<tr>
<td>Feeling stressed</td>
<td>0.50</td>
<td>0.48</td>
</tr>
<tr>
<td>Percentage of night-time awakening</td>
<td>0.65</td>
<td>0.62</td>
</tr>
<tr>
<td>Total rescue medication use (puffs per day)</td>
<td>0.57</td>
<td>0.56</td>
</tr>
<tr>
<td>ACQ 6 score</td>
<td>0.68</td>
<td>0.68</td>
</tr>
<tr>
<td>AQLQ(S)+12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>−0.60</td>
<td>−0.55</td>
</tr>
<tr>
<td>Symptoms</td>
<td>−0.62</td>
<td>−0.59</td>
</tr>
<tr>
<td>Activity limitation</td>
<td>−0.54</td>
<td>−0.50</td>
</tr>
<tr>
<td>Emotional function</td>
<td>−0.47</td>
<td>−0.44</td>
</tr>
<tr>
<td>Environmental stimulation</td>
<td>−0.37</td>
<td>−0.33</td>
</tr>
<tr>
<td>Pre-bronchodilator FEV1 (L)</td>
<td>−0.09</td>
<td>−0.08</td>
</tr>
</tbody>
</table>

P68

ASTHMA SYMPTOM IMPROVEMENTS WITH BENRALIZUMAB ARE ASSOCIATED WITH IMPROVEMENTS IN ACTIVITY FUNCTIONS AND QUALITY OF LIFE FOR PATIENTS WITH SEVERE, UNCONTROLLED ASTHMA: RESULTS OF POOLED PHASE III BENRALIZUMAB STUDIES

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10.1136/thoraxjnl-2017-210983.210

Introduction and Objectives Benralizumab is an anti-cytotoxic monoclonal antibody that improves daily symptoms for patients with severe, uncontrolled asthma with eosinophilic inflammation. This study evaluated the association of asthma symptom improvements with activity function and health-related quality of life assessments.

Methods Pooled analyses of two Phase III benralizumab trials (NCT01928771, NCT01914757) of adult patients with severe asthma (1474 benralizumab, 742 placebo) who received high-dose inhaled corticosteroids/long-acting β2-agonists were conducted. Daily asthma symptoms (daytime and night-time symptoms), daily activity function (activity limitations, activity avoidance, need to pace oneself during activities), feeling stress, feeling tired, rescue medication use, night-time awakenings, Asthma Control Questionnaire, 6-question version (ACQ-6), and Standardised Asthma Quality of Life Questionnaire for patients 12 years and older (AQLQ(S)+12) were captured with an electronic diary. Daily assessments were summarised as biweekly means.

Results Associations were observed between asthma symptoms and daily activity function items, daily stress, ACQ-6, AQLQ(S)+12 overall and domain scores, and FEV1 at baseline and change from baseline to end of treatment in both benralizumab and placebo arms (table). Strong correlations were...
observed between daily symptoms and daily assessments of activity function items (r=0.66–0.77), feeling tired (r=0.66–0.76), and ACQ-6 scores (r=0.58–0.68) at baseline and change from baseline to end of treatment. Moderate correlations were observed between symptom scores and feeling stressed (r=0.36–0.50); rescue medication use (r=0.49–0.57); and AQLQ(S)+12 overall and symptoms, activity limitation, and emotional domains (r=−0.41–0.62). Although a very weak correlation between symptom improvement and FEV₁ was expected, benralizumab-treated patients had a better correlation between symptom improvement and FEV₁ improvement compared with placebo (r=−0.21 vs. −0.13), possibly because of substantial FEV₁ improvement observed in benralizumab-treated patients.

Conclusions Asthma-related symptoms and improvements are associated with other important aspects of improvement in patient well-being, especially for patients uncontrolled on optimal care.

Introduction and Objectives Benralizumab, a humanised anti- eosinophil monoclonal antibody, is in development as an add-on treatment for severe, uncontrolled, eosinophilic asthma. During Phase III trials, benralizumab significantly reduced annual asthma exacerbation rates and was well-tolerated.

The GREGALE study (NCT02417961) assessed patient and caregiver-reported functionality, performance, and reliability of an accessorised pre-filled syringe (APFS) used to administer benralizumab subcutaneously in an at-home setting.

Methods Patients (n=116) with severe, uncontrolled asthma despite receiving medium- or high-dose inhaled corticosteroids and long-acting β₂-agonists, received up to five APFS-administered subcutaneous doses (Weeks 0, 4, 8, 12, and 16) of 30 mg benralizumab. The first three doses were administered at the study sites. The patient/caregiver administered the last two doses at home. Endpoints included the percentage of patients/caregivers who successfully administered benralizumab subcutaneously in an at-home setting.

Results Nearly all patients and caregivers successfully administered benralizumab with an APFS at home (Week 12: 112/114, 98%; Week 16: 108/109, 99%; figure 1). Two at-home administrations were unsuccessful because of patient-use error. One APFS was recorded as nonfunctional because it was not returned for evaluation. Product Complaints identified only 1 APFS malfunction of 573 dispensed. Mean ACQ-6 scores decreased from baseline through all postbaseline time points through end of treatment (baseline: mean 2.14 [standard deviation (SD) 0.81]; Week 20: mean 1.40 [SD 0.90]). Near-complete depletion of eosinophils was observed at end of treatment vs. baseline (baseline: median 250 cells/μL [interquartile range (IQR) 175–430 cells/μL]; and Week 20: median 0 cells/μL [IQR 0–10 cells/μL]). Incidence of adverse events leading to benralizumab discontinuation was 2.6%. Most common adverse events (≥5% of patients) were nasopharyngitis, upper respiratory tract infection, headache, and sinusitis. Five patients (4.3%) experienced transient mild or moderate injection-site reactions.

Conclusions Most patients and caregivers successfully administered benralizumab in an at-home setting. The APFS was functional, reliable, and performed well.

Please refer to page A258 for declarations of interest in relation to abstract P69.

REFERENCES

P69 FUNCTIONALITY, RELIABILITY, AND PERFORMANCE OF AN ACCESSORISED PRE-FILLED SYRINGE WITH HOME-ADMINISTERED SUBCUTANEOUS BENRALIZUMAB FOR ADULT PATIENTS WITH SEVERE ASTHMA

Introduction and Objectives Benralizumab, a humanised anti-eosinophil monoclonal antibody, is in development as an add-on treatment for severe, uncontrolled, eosinophilic asthma. During Phase III trials, benralizumab significantly reduced annual asthma exacerbation rates and was well-tolerated.

The GREGALE study (NCT02417961) assessed patient and caregiver-reported functionality, performance, and reliability of an accessorised pre-filled syringe (APFS) used to administer benralizumab subcutaneously in an at-home setting.

Methods Patients (n=116) with severe, uncontrolled asthma despite receiving medium- or high-dose inhaled corticosteroids and long-acting β₂-agonists, received up to five APFS-administered subcutaneous doses (Weeks 0, 4, 8, 12, and 16) of 30 mg benralizumab. The first three doses were administered at the study sites. The patient/caregiver administered the last two doses at home. Endpoints included the percentage of patients/caregivers who successfully administered benralizumab subcutaneously in an at-home setting.

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Conclusions Most patients and caregivers successfully administered benralizumab in an at-home setting. The APFS was functional, reliable, and performed well.

Please refer to page A258 for declarations of interest in relation to abstract P69.

REFERENCES

P70 RELATION BETWEEN BRONCHIAL ASTHMA AND PARASITIC (NEMATODES) INFECTION IN EGYPTIAN CHILDREN

Background Among the many factors influencing the prevalence of asthma in developing countries from the tropics are geo-helminthic infections.

Aims This work aims to study the relation between bronchial asthma and parasitic infestation in Egyptian children.

Patients and Methods A cross-sectional, analytical study design was chosen to perform this research on 100 school aged children. All children were interviewed and examined clinically and laboratory.
**Setting** Alexandria Police Hospital.

**Results** 86% of patients with bronchial asthma lived in urban areas, while 64% of patients with parasitic infestation lived in rural areas. Statistically significant negative correlations were found between blood level of IgE and FEV1% of predicted in patients with bronchial asthma as well as patients with parasitic infestation with $r = -0.381, -0.325$ at $p = 0.006, 0.021$ respectively. Inverse relationship was found between blood level of IgE and FEV1/FVC% in patients with parasitic infestation with $r = -0.358$ with statistical significant difference at $p = 0.011$. Statistically significant higher values of IgE were found in patients with parasitic infestation compared to patients with bronchial asthma. It was noted that patients with combined bronchial asthma and parasitic infestation demonstrated statistically significant higher values of IgE which suggest a possible synergistic effect of two diseases.

**Recommendations** Improving personal and environmental hygiene and regular screening, treatment and health education for children as regard parasitic infections is recommended.

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**Abstract P70 Figure 1** Comparison between the three groups according to IgE.

![Figure 1](image_url)

KW: Kruskal Wallis test, Sig bet. grps: was done using Mann Whitney test

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**Mepolizumab in Adolescents with Severe Eosinophilic Asthma Not Eligible for Omalizumab: One Centre’s Experience**

E Weir, JY Paton. Royal Hospital for Children, Glasgow, UK; School of Medicine, College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow, UK

**Methods** Mepolizumab was offered to adolescents with severe eosinophilic asthma not eligible for Omalizumab because of previous allergic reaction ($n = 2$) or failure to respond ($n = 1$) to Omalizumab, or excessively high IgE ($n = 4$). Eosinophilic asthma was confirmed: blood eosinophil count $\geq 300$ cells/µL or exhaled nitric oxide concentration (FeNO) $\geq 50$ ppb in the previous year. All received high-dose ICS +LABA and had low ACT scores ($mean \ 10.4 \pm 2.88$). Four were on daily oral steroids. Mean exacerbations requiring oral steroids in the previous year were $4.9 \pm 1.68$. Prior to commencing and before each monthly injection, pulmonary function (FeNO and forced expiratory volume in 1 s (FEV1)), blood eosinophil count, Asthma Control Test (ACT) and Paediatric Asthma Quality of Life Questionnaire (PAQLQ) were measured. Long-term medications not adjusted. Data from clinical case notes.

**Results** Seven adolescents (mean age 13.9±1.9, range 11–17 years; 5 males, 2 females) each received 4 Mepolizumab doses (100 mg sc) at monthly intervals with no serious adverse reactions. Blood eosinophil count decreased in all (mean pre-treatment $0.8 \pm 0.62 \times 10^9$ cells/L, $0.1 \pm 0.06 \times 10^9$ cells/L after 4 doses). ACT score improved in 6/7 patients (86%) (mean pre-treatment $10.4 \pm 2.88$, 13.6±5.16 after 4 doses). PAQLQ improved in 4/7 patients (57%) (mean pre-treatment 3.8±1.30, 4.4±1.41). We did not demonstrate improvement in FEV1. Mean FeNO was $-15 \pm 29$ ppb (figure 1). During treatment, none required hospitalisation for asthma attacks, 2/7 patients (29%) were attack free, 5/7 patients (71%) had reduced attack frequency.

**Conclusions** In adolescents with refractory eosinophilic asthma not eligible for Omalizumab, these data suggest that Mepolizumab is well tolerated, reduces risk of exacerbations, may improve asthma control and quality of life but does not improve lung function.

**Reference**


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**Pulmonary rehabilitation: walk this way**

**Abstract P71 Figure 1**

![Figure 1](image_url)

**P72 Is the Use of a Novel High Frequency Airway Oscillating Device Feasible for the Management of Chronic Obstructive Pulmonary Disease?**

E Daynes, TC Harvey-Dunstan, NJ Greening, SJ Singh. Centre of Exercise and Rehabilitation Sciences, Leicester Biomedical Research Centre - Respiratory, Leicester, UK

**Introduction** Mepolizumab is an anti-interleukin-5 monoclonal antibody shown to reduce asthma exacerbations in adults and adolescents with severe eosinophilic asthma. The Scottish Medicines Commission has accepted it for restricted use in adults as an add-on treatment for severe refractory eosinophilic asthma. Here we describe the use of Mepolizumab as an unlicensed medicine with local approval for use in adolescents with severe asthma.
Introduction and Objectives Chronic Obstructive Pulmonary Disease (COPD) is characterised by expiratory flow limitation contributing to dyspnoea and impacting on exercise capacity and quality of life. Inspiratory muscle training is commonly used to improve inspiratory muscle strength and endurance, exercise capacity and quality of life. The High Frequency Airway Oscillating (HFAO) device uses flow resistance to provide combined inspiratory and expiratory muscle training. It is hypothesised that the use of a HFAO device may improve the strength of the respiratory muscles resulting in reduced sensation of dyspnoea. This study was designed to explore the feasibility of HFAO in COPD.

Methods Patients with symptomatic COPD were included (MRC of ≥3). This was a single arm feasibility study using a HFAO device. All participants used the device for 5 min, 3 times per day, for eight-weeks. The primary outcomes were recruitment, attrition and compliance. Self-reported daily diaries identified participants as adherent if they completed ≥75% of device use. Secondary outcome measures included maximal inspiratory and expiratory pressures (P_{max}/P_{e_{max}}), Incremental and Endurance Shuttle Walking Tests (ISWT/ESWT) and health related quality of life questionnaires. Data was analysed by a Wilcoxon Signed Rank test and considered statistically significant if p<0.05.

Results 23 participants with COPD were recruited (65% male, mean [SD] age 65[5] years, FEV_{1}/predicted 44[16], FEV1/FVC ratio 0.46 [0.13]), median [IQR] MRC 4 [3–5], of which 20 participants completed the intervention. 62% of potential participants were recruited and there was an attrition rate of 13%. 90% of participants were considered adherent to device use. A significant improvement in MRC score (median change −1 [IQR 3–3]) was observed (p<0.01). Significant improvements were seen in P_{max} and P_{e_{max}} (table 1). Pre and post intervention exercise performance and quality of life are shown in Table 1.

Conclusions This shows promising Results in the use of HFAO to reduce dyspnoea within COPD. Recruitment and attrition was appropriate and compliance rates were considered suitable and therefore it is feasible to proceed to a randomised controlled trial.

Abstract P72 Table 1

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRC</td>
<td>4 [3–5]</td>
<td>3 [3–3]</td>
<td>&gt;0.01</td>
</tr>
<tr>
<td>P_{max} (cm H_{2}O)</td>
<td>59 [34–74]</td>
<td>63 [42–85]</td>
<td>0.04</td>
</tr>
<tr>
<td>P_{e_{max}} (cm H_{2}O)</td>
<td>102 [82–125]</td>
<td>110 [97–137]</td>
<td>&gt;0.01</td>
</tr>
<tr>
<td>ISWT (m)</td>
<td>200 [140–260]</td>
<td>240 [170–270]</td>
<td>0.68</td>
</tr>
<tr>
<td>ESWT (secs)</td>
<td>170.5 [137–247]</td>
<td>203 [142–274]</td>
<td>0.51</td>
</tr>
<tr>
<td>CRQ dyspnoea</td>
<td>2.6 [2–3]</td>
<td>2.5 [2–4]</td>
<td>0.32</td>
</tr>
<tr>
<td>LCO total</td>
<td>15.71 [13–19]</td>
<td>21.5 [16–26]</td>
<td>0.14</td>
</tr>
<tr>
<td>HADS Depression</td>
<td>6 [4–10]</td>
<td>5 [4–7]</td>
<td>0.19</td>
</tr>
<tr>
<td>LCADL total</td>
<td>32 [28–45]</td>
<td>29 [23–39]</td>
<td>0.26</td>
</tr>
<tr>
<td>CAT Total</td>
<td>24[18–29]</td>
<td>21.5 [16–26]</td>
<td>0.14</td>
</tr>
<tr>
<td>CAT Sputum</td>
<td>3[2–4]</td>
<td>3 [2–4]</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Median [IQR] and p-value. MRC, Medical Research Council dyspnoea score; P_{max}, Maximal Inspiratory Pressure; P_{e_{max}}, Maximal Expiratory Pressure; ISWT, Incremental Shuttle Walking Test; ESWT, Endurance Shuttle Walking Test; CRQ, Chronic Respiratory Questionnaire; LCO, Leicester Cough Questionnaire; HADS, Hospital Anxiety and Depression Score; LCADL, London Activity of Daily Living, CAT COPD Assessment Test.

Poster sessions

P73 SYSTEMATIC REVIEW OF THE USE OF PHYSICAL ACTIVITY DEVICES AS AN ADJUNCT TO PULMONARY REHABILITATION IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Introduction and Objectives Approximately 1.2 million people in the UK are diagnosed with chronic obstructive pulmonary disease (COPD), which costs the NHS over £800 million per year in direct healthcare costs. Pulmonary rehabilitation (PR) is beneficial in improving health-related quality of life and exercise capacity. It is recommended in guidelines for COPD, however the initial beneficial effects diminish over time. This study reviewed the evidence for using any devices capable of detecting movement as an adjunct to PR, with the aim of prolonging improvements in physical activity (PA).

Methods The MEDLINE and CENTRAL databases were searched for the terms “pulmonary rehabilitation” AND (“COPD” OR “chronic obstructive pulmonary disease”) AND (“pedometer” OR “biofeedback” OR “motion detector” OR “movement detector” OR “movement sensor” OR “accelerometer” OR “smartphone”). Studies that met the following criteria were included: (1) adult population (age ≥18 years) undergoing pulmonary rehabilitation, (2) a primary clinical diagnosis of COPD, (3) the use of any device, as defined above, as an adjunct to pulmonary rehabilitation by comparison to a control group. Exclusion criteria were non-English studies and studies for which the full report was inaccessible via the researchers’ OpenAthens and Shibboleth logins. Data was extracted and risk of bias assessed by two authors, using the Cochrane Risk of Bias tool.

Results Six studies fulfilled the inclusion criteria, with two showing statistically significant improvements in physical activity levels at the end of follow-up. The other four showed either no statistically significant benefit, or a benefit that was not sustained for the full follow-up period. The studies used a variety of devices, methodologies, and PR programmes. A summary of studies is provided in Table 1.

Conclusions This review has found some evidence that the use of PA measurement devices may be beneficial in augmenting the PA gains achieved following PR, however it is not currently clear how to best calculate PA goals and how important face-to-face feedback is. Further research is therefore required to support the role of such interventions as a long-term intervention for management of COPD.
### Abstract P73 Table 1  Summary of study characteristics

<table>
<thead>
<tr>
<th>Study</th>
<th>Objectives</th>
<th>Sample and design</th>
<th>Device intervention</th>
<th>Outcome measures</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Determine whether using pedometers as an adjunct to PR can enhance time spent in at least moderate intensity PA in people with COPD</td>
<td>152 participants recruited from initial PR assessment. Randomised into pedometer (n=76) and control (n=76) groups. Both underwent 8 weeks’ PR.</td>
<td>Pedometer, individualised daily step count target (with weekly review for 8 weeks) and step count diary during the PR program and the following 6 months</td>
<td>Time spent ≥ 3 METs, daily step count, Incremental Shuttle Walk Test (ISWT), Chronic Respiratory Questionnaire (CRQ)</td>
<td>Intervention did not enhance mins/day ≥ 3 METs (p=0.16)</td>
</tr>
<tr>
<td>2</td>
<td>Investigate the impact of a PA-focused behavioural intervention during and after a PR programme on PA levels</td>
<td>32 patients from 3 primary care centres and a district hospital. Randomised into intervention (n=16) and control (n=16) groups. Both underwent 12 weeks’ PR.</td>
<td>Intervention was during PR with follow-up support for 3 months after. Participants completed a ‘Health Contract’ with long-term step-count goal and registered daily steps in a calendar</td>
<td>Daily time in moderate-to-vigorous PA (MVPA), total daily PA, daily steps, 6 min walk test (6MWT), quadriceps muscle strength, St Georges Respiratory Questionnaire (SGRQ), Self-Efficacy Scale</td>
<td>Experimental group had improved mins/day at moderate-to-vigorous PA at 3 months, which remained improved after follow-up support (p=0.03)</td>
</tr>
<tr>
<td>3</td>
<td>Evaluate the effect of low-intensity exercise and home-based PR with or without feedback of a pedometer on PA levels</td>
<td>39 patients randomised to pedometer (n=19) and control (n=20) groups. Both underwent ongoing home-based PR.</td>
<td>Pedometer and monthly feedback about pedometer use by PR staff for one year</td>
<td>Time spent walking/standing/sitting, frequency of postural change, pulmonary function test, mouth pressure, quadriceps femoris muscle force, 6MWT, MRC Dyspnea Scale, Body-mass index/airflow Obstruction/Dyspnea Exercise (BODE) index, CRQ</td>
<td>Pedometer group had greater change in time spent walking from baseline to 1 year later (p=0.036)</td>
</tr>
<tr>
<td>4</td>
<td>Evaluate the effects of a PA counselling programme on three groups of COPD patients from primary care, outpatient clinic and PR</td>
<td>Study randomised 155 patients in total, 61 of whom were from the PR group into counselling (n=78 total, n=31 from PR group) and usual care (n=77 total, n=30 from PR group). PR group received 12 weeks’ exercise training.</td>
<td>Patients wore a pedometer all day during the intervention, for feedback and motivation, and kept a diary of steps taken and activities other than steps.</td>
<td>Daily steps, daily PA, spirometry, fat-free mass, 6MWT, Short Form Health Survey (SF-36), Clinical COPD Questionnaire, CRQ, Dutch Exertion and Fatigue Scale, Hospital Anxiety and Depression Scale, Perceived Physical Ability Scale, Self Regulation Questionnaire for Exercise</td>
<td>PR subgroup undergoing intervention had improved PA at 3 months (p=0.030) but not at 15 months (p=0.97)</td>
</tr>
<tr>
<td>5</td>
<td>Investigate the short-term effects of a lifestyle PA counselling program with feedback of a pedometer during a standard PR on daily PA</td>
<td>21 patients entering PR at rehabilitation centre were randomised into experimental (n=10) and control (n=11) groups. All patients followed a regular 9 weeks’ PR programme</td>
<td>Lifestyle counselling programme (4 sessions during PR) with feedback of a pedometer as a motivational feedback tool</td>
<td>Daily PA, chair stand test, arm curl test, 8-foot up-and-go test, 2 min step test, SGRQ, RAND-36, Groningen Activity Restriction Scale, Dutch Exertion Fatigue Scale, Beck Depression Inventory, LIVAS (Dutch version of Perceived Physical Ability subscale of the Physical Self-Efficacy Scale)</td>
<td>Short-term effect of lifestyle PA counselling program with feedback of pedometer was not significant (p=0.38, 0.24, 0.11 for different measures)</td>
</tr>
<tr>
<td>6</td>
<td>Test the efficacy of an milehealth intervention after discharge from PR at enhancing or maintaining PA</td>
<td>183 patients from 32 physiotherapy practices randomised into intervention (n=102) or usual care (n=81). All patients had completed a PR programme of 3 months within the past 6 months</td>
<td>Smartphone application that displayed PA in real time with automated persuasive messages to achieve their personalised PA goal. Physiotherapists could monitor PA via website and adjust PA goals and send group of individual text messages</td>
<td>Steps per weekday, METs, 6MWT, self-administered standardised CRQ</td>
<td>Milehealth intervention did not improve or maintain PA after a period of PR (p=0.811, 0.364 for different measures)</td>
</tr>
</tbody>
</table>
WHY DO PATIENTS WITH COPD DECLINE POST EXACERBATION PULMONARY REHABILITATION?


Background Despite the known benefits of post exacerbation Pulmonary Rehabilitation (PR), recruitment can often be difficult. A greater understanding of the reasons why patients hospitalised for an Acute Exacerbation of Chronic Obstructive Pulmonary Disease (AECOPD) declined the offer of PR is important.

Methods Patients (n=76) admitted to hospital with an AECOPD received a COPD care bundle delivered by COPD specialist nurses. From July to December 2015 patients receiving the care bundle who declined a referral to PR were asked for their reasons for declining. Hospital records were followed up in January 2017 to record admissions and mortality data since the first data collection.

Abstract P74 Table 1 Demographic Characteristics of patients who declined PR

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>76 participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>25 female, 51 male</td>
</tr>
<tr>
<td>Age</td>
<td>70.82 (8.78)</td>
</tr>
<tr>
<td>Smoking pack years (PY)</td>
<td>50 (50)</td>
</tr>
<tr>
<td>MRC (QQR)</td>
<td>4 (1.00)</td>
</tr>
</tbody>
</table>

Reasons given as to why participants declined PR

<table>
<thead>
<tr>
<th>Reason given</th>
<th>Number of people who gave this reason for declining PR</th>
<th>Number of people who died since data collection to January 2017 in these different reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previously done PR</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Not interested in doing the programme</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Do not feel they need PR</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Too unwell</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Other Co-morbidities</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Doesn’t feel able to manage it</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>szy</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Mental Health</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Reasons</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Transport</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Work</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Commitments</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Would like to do PR elsewhere</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No reason given</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Results Mann Whitney U Tests were carried out to see if there were any differences between the main reasons (Table 1) for declining referral and age, MRC, pack years (PY) and/or co-morbidities. Participants who reported that they were not interested in doing PR had a statistically significantly higher PY history (60 vs. 43; p=0.02) compared to patients that chose another reason to decline PR. There was a significant difference between participants MRC scores and the reason they did not want to do PR. Those who did not feel they needed PR reported a lower MRC score range (2–4), compared with the participants in the other options for declining PR; MRC range (3–5; p=0.005). Patients who gave the reason that felt they did not need PR had a statistically significantly lower number of admissions between their data collection periods (median 2.00 vs. 0.00; p=0.02). Patients who declined PR because they had previously completed the programme and others who gave other reasons, had a significantly higher number of hospital admissions during the follow up period (median 4.00 vs. 1.00 p=0.008). There was no statistically significant difference between the number of co-morbidities that patients had and the three main reasons given by patients for declining PR.

Conclusions This data has demonstrated that there are some consistent reasons why people decline PR. Further research is required to identify whether changing how PR is discussed with patients may encourage and help us recruit these types of patients to the PR.

P75 SELF-REPORTED STAFF KNOWLEDGE, CONFIDENCE AND SKILLS TO DELIVER PATIENT EDUCATION IN PULMONARY REHABILITATION

CLA Bourne, NY Gardiner, MN Orme, SJ Singh. Centre for Exercise and Rehabilitation Science (CERS), NIHR Leicester Biomedical Research Centre – Respiratory, Leicester, Leicestershire

Introduction and Objectives Education is considered integral to a comprehensive pulmonary rehabilitation (PR) programme, intended to provide the underpinning knowledge base for behaviour change to improve and maintain positive outcomes. We aimed to explore staff perceptions of their knowledge, skills and confidence to deliver education topics to identify training needs if re-designing PR education.

Methods 15 hospital-based (n=9) and community-based (n=6) multidisciplinary PR staff in Leicestershire completed a qualitative and quantitative questionnaire. The questionnaire comprised items relating to professional background and formal experience/training in delivering education. Likert scales (1=low level, 5=high level) were used to assess knowledge, skills and confidence in delivering 12 PR education topics (Exercise, Diet, Managing Breathlessness, Avoidance and Exacerbations, Signposting, Anxiety Management, Medication, Disease Education, Chest Clearance, Energy Conservation, Relaxation and Question and Answer) alongside open response questions. A ‘Yes/No’ item asked about skills to deliver more unstructured sessions. Mean rank was calculated using the frequency of ‘high-level’ scores across knowledge, skills and confidence (1=highest and 12=lowest). Friedman tests with post-hoc Wilcoxon Rank tests compared knowledge, skills and confidence between education topics. Free text responses were also examined.

Results The majority of staff were physiotherapists (73.3%) and had previous formal education training (66.7%). PR staff
reported feeling most knowledgeable, skilled and confident to deliver Exercise, Managing Breathlessness and Disease Education (mean rank out of 12: 1.7, 2.0 and 3.0, respectively). PR staff reported feeling least knowledgeable, skilled and confident to deliver Medication, Diet and Anxiety Management (mean rank: 10.3, 11.0 and 11.7, respectively). Figure 1 displays median scores for knowledge, skills and confidence for each of the education topics. Anxiety Management and Diet had significantly lower scores compared with all other education topics (all p<0.05). Free text responses confirmed staff felt less skilled in delivering Diet and Anxiety Management topics; “Not too confident addressing a group if they have any issues [with anxiety].” The majority of staff stated they felt unable to deliver all topics in an unstructured manner, particularly Diet (n=9), Medications (n=8) and Anxiety Management (n=7).

Conclusions If re-designing PR education, additional training should be provided for staff particularly around Diet and Anxiety Management and delivery style.

**Abstract P75**

**Figure 1** Pulmonary rehabilitation staff’s perceived knowledge, skill and confidence to deliver each education topic (Likert scale 1=low level, 5=high level).

Therefore we explored patient’s experiences of PR and what they would say to promote PR. **Methods** Following completion of a twice-weekly, 6 week, supervised programme of outpatient PR, patients were asked to complete an anonymous patient satisfaction questionnaire, which included the following questions:

1. What were the most useful aspects of the course?
2. Do you have a comment that we could use for promotion of the programme which would encourage other patients to participate?

Each response was taken as a unit of analysis and the results were analysed using thematic content analysis. **Results** There were 140 responses to Question 1 and 77 responses to Question 2 over an eight month period. Main themes are reported. Question 1: Some patients found exercise to be the most useful component of PR (n=20), whilst others reported it was education (n=15). Those who gave more specific examples spoke about the benefits gained from exercise including improved fitness (n=13) and increased motivation to exercise (n=4). With regards to education, specific talks (n=5) and information given (n=6) were mentioned. Patients also felt PR helped them develop coping skills (n=20) and increase their confidence to self-manage (n=10). Staff were important for encouragement and support (n=17), as was meeting other patients with similar conditions (n=18). See Table 1. Question 2 (n=77): Many comments suggested by patients centred on gains in well-being; being better able to cope with their condition (n=21), meeting others with similar problems (n=6), increased confidence (n=6) and improvements in fitness (n=4). Another major theme was “do it, you’ve got nothing to lose” (n=21). See Table 1.

**Conclusion** Both the exercise and education components of PR provide benefit to patients; supporting them in coping with their condition would encourage other patients to participate.

**Poster sessions**

"JUST DO IT!" PATIENT SATISFACTION AFTER A COURSE OF PULMONARY REHABILITATION AND ADVICE TO OTHER POTENTIAL PARTICIPANTS

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10.1136/thoraxjnl-2017-210983.218

Introduction Quality Standards for Pulmonary Rehabilitation (PR) state that patient experience should be sought during PR evaluation. However, a greater understanding of patient’s perceptions and expectations still needs to be established.
with their condition. Patients thought telling others about improved well-being and that there was much to gain from PR and nothing to lose would encourage others to participate. This new information could be used to stimulate patient engagement.

### Abstract P76 Table 1 Results of thematic content analysis

<table>
<thead>
<tr>
<th>Question 1: What were the most useful aspects of the course?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Theme</strong></td>
</tr>
<tr>
<td>1. Exercise and improvements in fitness</td>
</tr>
<tr>
<td>2. Motivation to exercise</td>
</tr>
<tr>
<td>3. Learning and gaining information through the Education sessions. Gaining coping skills.</td>
</tr>
<tr>
<td>4. Increasing confidence to self-manage.</td>
</tr>
<tr>
<td>5. Importance of the Role of Healthcare Professionals</td>
</tr>
<tr>
<td>6. Meeting other patients with similar conditions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2: Do you have a comment that we could use for promotion of the program which would encourage other patients to participate?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Theme and Sub Themes</strong></td>
</tr>
<tr>
<td>1. Wellbeing</td>
</tr>
<tr>
<td>2. Just do it, nothing to lose</td>
</tr>
<tr>
<td>3. Meeting similar others</td>
</tr>
<tr>
<td>4. Increasing confidence to self-manage.</td>
</tr>
<tr>
<td>5. Importance of the Role of Healthcare Professionals</td>
</tr>
<tr>
<td>6. Meeting other patients with similar conditions</td>
</tr>
</tbody>
</table>

### Methods

Patients attending a PR assessment were asked to score their confidence levels according to the above criteria prior to their first ISWT, and then again following their 1st ISWT. Patients answered the following questions before and after completing an ISWT with regards to their confidence in the following conditions: 1) Walking at home (Q1), 2) Managing breathlessness (Q2), and 3) Completing the ISWT (Q3). All questions were graded on a VAS scale of 0–10.

### Results

90 patients (Mean age: 68.51 years; 48 Males; FEV1 1.46 L; MRC median 3) with respiratory disease answered the questions. There were statistically significant differences in confidence pre and post ISWT in all 3 questions (p=0.00). Pre-ISWT the values were (Q1) 5.74, (Q2) 6.25, (Q3) 7.07, the mean changes were: (Q1) +1.51; (Q2) +0.92; (Q3) +1.13 points. No significant changes in distance covered in the second ISWT were noted (21.2 m). There was no correlation between the change in confidence and change in distance covered between the two tests (r²= (Q1) 0.003, (Q2) 0.003, (Q3) 2.50, p≥0.05).

### Conclusion

Performing the ISWT increased patients’ perceived confidence levels to manage their breathlessness and walking at home. This may have implications when designing clinical trials particularly in the control group where the performance of an ISWT may alter exercise behaviours. Further research is required to investigate the effects of completing outcome measures in clinical trials.

### Reference


### Poster sessions

**P78 CARDIOVASCULAR AND MUSCULOSKELETAL PHENOTYPES AND THE CLINICAL OUTCOMES IN COPD: A SYSTEMATIC REVIEW AND META-ANALYSIS**

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10.1136/thoraxjnl-2017-210983.220

Systematic reviews examining the relationship between cardiovascular and musculoskeletal phenotypes and relevant clinical outcomes in chronic obstructive pulmonary disease (COPD) are currently lacking. We have systematically summarised and examined the predictive value of selected phenotypes that could be utilised in clinical practice. We identified 61 cohort studies with longitudinal data collection. Meta-analysis indicated that the 6 min walking distance (6 MWD; HR 0.83, 95% CI 0.79 to 0.87), resting heart rate (HR 1.09, 95% CI 1.02 to 1.15), C-reactive protein (HR 1.24, 95% CI 1.08 to 1.40), fibrinogen (HR 4.18, 95% CI 1.13 to 7.22) and tumour necrosis factor-alpha (HR 0.91, 95% CI 0.82 to 1.00) were independent predictors of clinical outcomes in stable COPD patients, after adjusting for sex, age, body mass index and smoking status. Very few studies examined the association between musculoskeletal phenotypes such as the short physical performance battery, quadriceps maximum voluntary contraction, and sniff nasal inspiratory pressure and clinical outcomes in COPD. With the limited adoption of the 6 MWD in clinical practice there is a need for faster and simpler tests to identify COPD patients at an increased risk for adverse events in an early stage of disease.
**Poster sessions**

**Update in paediatric lung disease**

**P79** CHILDREN WITH COMPLEX CONGENITAL HEART DISEASE: WHO NEEDS A PRE-FLIGHT HYPOXIC CHALLENGE TEST?

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10.1136/thoraxjnl-2017-210983.221

**Introduction** Commercial airplanes fly with an equivalent cabin FiO2 of 0.15 leading to reduced oxygen saturation (SpO2) in passengers. Although evidence-base for recommending supplemental O2 when flying in children with complex congenital heart disease (CHD) is practically non-existent. We conducted hypoxic challenge tests (HCT) to determine which children need a pre-flight assessment.

**Methods** Children<16 years with complex CHD were recruited; exclusions were SpO2 <75%; pulmonary hypertension; oxygen requirement; or concomitant respiratory disease. Children had a standard HCT in a sealed body plethysmograph with FiO2 of 0.15. We measured SpO2, pulse rate, transcutaneous CO2 (PtcCO2), corrected QT interval (QTc), and total Hb by co-oximetry (SpHb). Supplemental O2 was given (which meant a ‘failed’ test) if (1) children with baseline SpO2 95%-100% desaturated to 85%, (2) or baseline SpO2 85%-94% desaturated to 15% of their baseline; (3) or baseline SpO2 75%-84% desaturated to 70%.

**Results** There were 68 children, mean age 3.3 years (range 10 weeks to 14.5 years); 53% were boys. Grouping by normal baseline SpO2 (>75%), both groups had a significant fall in SpO2 (p<0.0001). 3/38 (8%) children failed with normal baseline SpO2 vs 5/32 (16%) with abnormal baseline (non-significant difference). In terms of cardiac status, both groups had a significant fall in SpO2 (p<0.0001); however in those with no residual for potential R-L shunt 0/27 failed vs those with residual potential R-L shunt or who had not undergone repair or who had palliative surgery in whom 8/41 (20%) failed (p<0.02). PtcCO2 did not change significantly (i.e., no-one hyperventilated to compensate for hypoxia); pulse rate and QTc were not different between groups, and unaffected by the hypoxic state.

**Conclusions** This is the first evidence to help inform which children with CHD need a pre-flight HCT. We suggest all children with residual potential R-L shunt or who have not undergone repair or who have only had palliative surgery should be tested (as 20% are expected to need supplemental O2), whereas those with no potential for R-L shunt need not be. Baseline SpO2 does not help predict who will need supplemental O2 when flying.

**P80** ASSESSMENT OF ASSOCIATION BETWEEN DURATION OF OXYGEN THERAPY IN CHILDREN WITH CHRONIC LUNG DISEASE OF PREMATURITY (CLDP) AND MANAGEMENT OF PDA

A Zafar, S Alifairaki, J Bhatt. Queens Medical Centre, Nottingham, UK

10.1136/thoraxjnl-2017-210983.222

**Background** The presence of hemodynamically significant Patent Ductus arteriosus (PDA) is associated with the development and severity of chronic lung disease of prematurity (CLDP). Pulmonary hypertension (PHTN) is also associated with CLDP, may precede and contribute to its development and severity. We explored the relationship between the flow rate as well as the duration of home oxygen therapy (Home O2) (surrogate for severity of CLDP) in children with CLDP and interplay between the presence or absence of PDA, mode of managing PDA as well as PHTN.

**Setting** Tertiary CLDP service.

**Methods** Retrospective observational study All infants (median gestational age 26 weeks, range 23 to 35), born between 2009 and 2016, were included (n=172; 96 males). We excluded data for infants where there were incomplete records for ECHO or loss of follow-up due to management of further care in other centres. The date oxygen was discontinued by following a structured weaning protocol is prospectively recorded to calculate the length of home oxygen therapy. The presence or absence of PDA and if present whether this was managed medically or surgically as well as the presence or absence of PHTN (assessed by echocardiography) was recorded.

**Results**

**Abstract P80 Table 1**

<table>
<thead>
<tr>
<th></th>
<th>Number of babies (%)</th>
<th>Mean duration Home O2 in days (±sd)</th>
<th>Median oxygen flow rate in litres per minute (IQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDA</td>
<td>Present 112</td>
<td>180 (±117)</td>
<td>p=0.637* 0.3 (0.2–0.5)</td>
</tr>
<tr>
<td></td>
<td>Not present 31</td>
<td>180 (±150)</td>
<td>0.3 (0.2–0.5)</td>
</tr>
<tr>
<td>Medically managed</td>
<td>39</td>
<td>191 (±107)</td>
<td>p=0.547* 0.3 (0.2–0.5)</td>
</tr>
<tr>
<td>Surgically managed</td>
<td>13</td>
<td>168 (±63)</td>
<td>0.3 (0.2–0.5)</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
<td>Present 19</td>
<td>218 (±186)</td>
<td>p=0.117* 0.3 (0.2–0.5)</td>
</tr>
<tr>
<td>Absent 124</td>
<td>176 (±101)</td>
<td>0.3 (0.2–0.5)</td>
<td></td>
</tr>
</tbody>
</table>

* no significant difference

**Conclusions** In our cohort, there was no significant difference between the duration of home oxygen therapy and the presence or absence of PDA and if present whether it was medically or surgically managed. Similarly, there was no significant difference between duration of home in presence or absence of pulmonary hypertension.

**REFERENCE**


**P81** WHAT IS THE IDEAL TARGET PRETERM POPULATION THAT MIGHT BENEFIT FROM THE EXPENSIVE PALIVIZUMAB PROPHYLAXIS?

L Tsilika, D Batra, AP Prayle, M Hurley, JM Bhatt. Nottingham Children’s Hospital, Nottingham, UK

10.1136/thoraxjnl-2017-210983.223

**Background** The role of palivizumab prophylaxis (P81) in preventing respiratory syncytial virus (RSV) hospitalisation in preterm infants is well established. Despite its high cost, its target population has not been defined. We aimed to identify the preterm population that might benefit from the expensive palivizumab prophylaxis.

**Methods** Retrospective observational study. Post neonatal infants born between 2012 and 2017, at the Queen’s Medical Centre, Nottingham, were included in the study. Infants received palivizumab prophylaxis if they were born before 32 weeks’ gestation and/or weighing <1500 g. Proven RSV infection (clinical presentation and RSV PCR) was required for hospitalisation.

**Results**

**Abstract P81 Table 1**

<table>
<thead>
<tr>
<th></th>
<th>Number of babies (%)</th>
<th>Mean duration Palivizumab prophylaxis in days (±sd)</th>
<th>Median RSV hospitalisation rate in days (IQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present 112</td>
<td>180 (±117)</td>
<td>p=0.637* 0.3 (0.2–0.5)</td>
</tr>
<tr>
<td></td>
<td>Not present 31</td>
<td>180 (±150)</td>
<td>0.3 (0.2–0.5)</td>
</tr>
<tr>
<td>Medically managed</td>
<td>39</td>
<td>191 (±107)</td>
<td>p=0.547* 0.3 (0.2–0.5)</td>
</tr>
<tr>
<td>Surgically managed</td>
<td>13</td>
<td>168 (±63)</td>
<td>0.3 (0.2–0.5)</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
<td>Present 19</td>
<td>218 (±186)</td>
<td>p=0.117* 0.3 (0.2–0.5)</td>
</tr>
<tr>
<td>Absent 124</td>
<td>176 (±101)</td>
<td>0.3 (0.2–0.5)</td>
<td></td>
</tr>
</tbody>
</table>

* no significant difference

**Conclusions** In our cohort, there was no significant difference between the duration of palivizumab prophylaxis and the presence or absence of RSV hospitalisation. Similarly, there was no significant difference between duration of palivizumab prophylaxis and the presence or absence of RSV hospitalisation.

**REFERENCE**

L Tsilika, D Batra, AP Prayle, M Hurley, JM Bhatt. Nottingham Children’s Hospital, Nottingham, UK

10.1136/thoraxjnl-2017-210983.223
Introduction

Palivizumab is a monoclonal antibody that reduces the likelihood of serious respiratory tract infection by Respiratory Syncytial Virus (RSV) in infants with Chronic Lung Disease (CLD) defined as an ongoing oxygen requirement at 36 weeks corrected gestation. In the UK (UK), Palivizumab is offered to high-risk infants with moderate to severe CLD according to their chronological age at the time of RSV season as per Joint Committee on Vaccination and Immunisation (JCVI) guidelines. The American Academy of Paediatrics, in contrast, recommends Palivizumab prophylaxis for all infants born before 29 weeks’ gestation who are younger than 12 months at the start of the RSV season.

Materials and Methods

We hypothesised that the RSV hospitalisation rate and length of hospital stay (LOS) within the 1st year of life between preterm babies with CLD immunised according to the JCVI criteria (CLDJCVI) and the additional babies who are considered eligible by the AAP criteria would be comparable. Our cohort included babies born in Nottingham UK between 2009 and 2015. Data was collected from hospital records and the Nottingham CLD database, and analysed using Fisher’s exact test for proportions and Mann-Whitney test for continuous data.

Results

In total there were 3478 babies born preterm (<37 weeks GA) in Nottingham UK from 2009 to 2015. 459 babies were born in Nottingham at <29 weeks GA. 245 babies had CLD at 36 weeks corrected GA and 135 of these babies were eligible for Palivizumab (JCVI).

Abstract P82 Table 1

<table>
<thead>
<tr>
<th>Number of babies</th>
<th>Babies immunised according to JCVI criteria</th>
<th>Additional babies who would be eligible by AAP criteria</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>135</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Confirmed RSV hospitalisations following discharge from neonatal unit within 1 st year of life</td>
<td>13 (9.6%)</td>
<td>13 (8.13%)</td>
<td>0.68</td>
</tr>
<tr>
<td>Average LOS in days (IQR) following discharge from neonatal unit in 1st year of life</td>
<td>10.3 days</td>
<td>6.92 days</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Conclusion

The RSV hospitalisation rate and LOS were not statistically different in babies under JCVI criteria and additional babies qualifying by AAP criteria. A larger multi-centre prospective study is required to prove health and economic benefits of adopting AAP Palivizumab recommendations.

Abstract P83

Respiratory morbidity and assessment of respiratory risk factors in school aged children with severe neurological impairment

L Thomson, L Gardner, K Sharp, P Davies. Royal Hospital for Children, Glasgow, UK

10.1136/thoraxjnl-2017-210983.225

Introduction

Respiratory morbidity is well documented in children with neurological impairment. Early intervention programmes to identify children at high risk are not well established. We proactively reviewed respiratory status of children with severe neurological impairment in local special schools to identify and manage those at high risk.

Methods

School nurses identified all children with severe neurological impairment (GMFCS IV and V). All had a multidisciplinary respiratory assessment at school. Data was collected on...
Poster sessions

P84  LONGER TERM TOLERABILITY OF NEBULISED HYPERTONIC SALINE IN CHILDREN WITH RESPIRATORY DISEASE

GM Housley, N Sanghani, A Bush. Royal Brompton and Harefield NHS Foundation Trust, London, UK

10.1136/thoraxjnl-2017-210983.226

Introduction Ultrasonically nebulised hypertonic saline (HS) is used to obtain microbiology samples from children with respiratory disease and is generally well tolerated [Pediatr Pulmonology2016;51:778–86]. Evidence for long term use is poor. Hypothesis Despite an initial successful trial, HS would be discontinued at follow-up due to treatment burden. Aims Report the Results of initial nebulised HS trial; determine reported HS use in the longer term. Methods We determined prevalence of bronchoconstriction (>15% drop in FEV1 ±symptoms) in children who had a first dose (Drug Reaction Assessment (DRA)) of 3.5 or 7% HS from April 2011-March 2016, and one year later identified if use was ongoing, or reasons for stopping. Results 88 DRAs were conducted in patients (45 male) age 5 months-16 years (median 8 years, 6 months). Main groups were Cystic Fibrosis (30%); Primary Ciliary Dyskinesia (30%), bronchiectasis (15%), asthma (5%); miscellaneous (22%). Spirometry was used in 70% of tests; FEV1 was 0.61 l – 3.89 l (43%–106% pred). 26 patients could not perform spirometry. 7/78 (9%) tests with 7% HS failed due to intolerance or >15% decrease in FEV1 despite bronchodilator; failure was unpredictable. All 3.5% HS tests were successful. 31% of tests included a pre-test bronchodilator; 21% who passed used a post-test bronchodilator. 11/12 patients whose FEV1 was <70% pred safely completed the trial. Of those who passed, 3 were lost to follow up. 67% reported still using HS 1 year later (see table). Reasons for stopping were not always recorded although tolerability was the commonest cited reason.

Conclusions HS testing in children with different underlying pathologies is safe even in those with pre-existing airflow obstruction. Many still used HS after a year, but strategies to improve adherence are needed.

Abstract P84 Table 1

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Still using at 1 year</th>
<th>Stopped using by 1 year</th>
<th>Unknown/lost to f/up</th>
<th>DRA failure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF</td>
<td>16</td>
<td>8</td>
<td>0</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>PCD</td>
<td>22</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>27</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Asthma</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>12</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>17</td>
<td>5</td>
<td>7</td>
<td>88</td>
</tr>
</tbody>
</table>

P85  PRESCCHOOL WHEEZE: A ROLE FOR ANTIBIOTICS?

RL Langley, RA Lewsey, P Davies. Royal Hospital for Children, Glasgow, UK

10.1136/thoraxjnl-2017-210983.227

Introduction Acute wheeze in pre-school children is a common paediatric presentation which is usually secondary to viral illness. One of the most common and challenging situations faced by the paediatrician is whether the child also requires empirical antibiotics to cover the risk of concurrent bacterial infection. Recent studies have suggested a role for antibiotics in the management of preschool wheeze in reducing duration of episodes. However, antibiotics can increase microbial resistance and alter the host microbiome.

Objective To evaluate the role of antibiotics in reducing duration of episodes and readmission rates for wheeze in pre-school children.

Design Retrospective analysis of wheeze presentations in pre-school children requiring hospital admission over a one year period. Those children receiving antibiotics were compared to those who did not. Outcome measures included length of stay, number of oxygen days and long term readmission rates. Virology and chest radiograph data was also collected.

Results 673 cases of children (aged 1–5, 64% male) receiving inpatient management for wheeze were analysed. All patients received bronchodilators. Patients receiving antibiotics (n=64; 9.5%) were found to have a significantly increased length of inpatient stay and number of oxygen days (p<0.0001; figure 1A & B) compared to children not receiving antibiotics (n=609; 90.5%). However, children in the antibiotic group were more likely to receive a chest radiograph (77% vs 11%, p<0.0001); although formal radiographic appearance was often non-specific. Virus isolation did not predict wheeze readmission rates since patients with a negative sample at presentation accounting for 46% of overall readmissions. Furthermore, there was no statistical difference in wheeze readmission rates 6–12 months after initial presentation (p=0.94) between the two groups (figure 1C).
Conclusions Early administration of antibiotics did not shorten disease course in our cohort but is correlated with prolonged inpatient stay and oxygen therapy. Furthermore, antibiotics prescribed at presentation in preschool children with wheeze do not reduce future episodes of wheeze requiring hospital admission.

REFERENCE

Abstract P85 Figure 1

Conclusions Early administration of antibiotics did not shorten disease course in our cohort but is correlated with prolonged inpatient stay and oxygen therapy. Furthermore, antibiotics prescribed at presentation in preschool children with wheeze do not reduce future episodes of wheeze requiring hospital admission.

REFERENCE

P86 IN VITRO AND CLINICAL CHARACTERISATION OF THE ANTISTATIC VALVED HOLDING CHAMBER AEROCHAMBER PLUS® FLOW-VU® FOR ADMINISTERING TIOTROPIUM RESPIMAT® IN 1–5 YEAR-OLD CHILDREN WITH PERSISTENT ASTHMATIC SYMPTOMS

Introduction Characterisation of any inhalation product requires a comprehensive assessment including in vitro, pharmacokinetic (PK), and clinical Results We assessed tiotropium Respimat® administered with the AeroChamber Plus® Flow-Vu® antistatic valved holding chamber (test VHC) using in vitro, PK and clinical data in 1–3 year-olds with persistent asthmatic symptoms.

Methods We evaluated tiotropium delivered into a cascade impactor under fixed paediatric flow rates with and without holding times in the test VHC. Tidal breathing simulations and an anatomically correct ADAM-III Child Model were employed to assess the tiotropium mass likely to reach the lungs of preschool children when Respimat® was administered with the test VHC. Clinical characterisation was based on a 12 week, randomised trial of once-daily tiotropium Respimat® or placebo as add-on to background therapy in 1–5 year-olds with persistent asthmatic symptoms (NCT01634113). PK data on systemic exposure to tiotropium Respimat® administered with test VHC in preschool children were compared with pooled data from older patients with symptomatic persistent asthma not using VHCs (NCT01383499/NCT01122680/NCT01233284/NCT01152450/NCT01696071/NCT00772538/NCT00776984/NCT01172808/NCT01172821).

Results In vitro emitted mass decreased with lower flow conditions, indicating age-dependent dose reduction. In terms of dose per kg/body weight, delivered dosing at flow rates corresponding to preschool children was comparable to that at flow rates corresponding to older children (Table). Transmission and holding properties of tiotropium Respimat® administered by test VHC were fully sufficient for aerosol delivery of patients. Standardised tidal inhalation resulted in emitted mass from the test VHC of approximately one-third of labelled dose, independent of coordination and face mask use, indicating predictable tiotropium administration by Respimat® when used with test VHC. ADAM-III model data correlated well with standardised tidal breathing Results in terms of total mass delivered and mass delivered to filter (available to lungs). In separate clinical trials, tiotropium exposure in 1–5 year-old patients using the test VHC, adjusted by height or body surface, was comparable with that observed in older patients not using VHCs, with no overexposure. Safety of tiotropium Respimat® in 1–5 year-olds was comparable to placebo.

Conclusion This study supports administration of tiotropium Respimat® with the AeroChamber Plus® Flow-Vu® VHC in 1–5 year-old children with persistent asthmatic symptoms.
**Abstract P86**

**Table 1** *In vitro* medication delivery through the test VHC with small/medium face masks at different flow rates and holding times

<table>
<thead>
<tr>
<th>Flow rate and corresponding age</th>
<th>Mask</th>
<th>Holding time, s</th>
<th>Mean medication delivery through test VHC, µg/dose</th>
<th>Body weight (50th percentile), kg</th>
<th>Medication delivered per dose, ng/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.9 L/min (6–12 months)</td>
<td>Small</td>
<td>0</td>
<td>0.85 (±0.04)</td>
<td>7.5–9.9</td>
<td>86–113</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>0.86 (±0.14)</td>
<td>87–115</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>0.55 (±0.16)</td>
<td>56–73</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>0.62 (±0.02)</td>
<td>63–83</td>
<td></td>
</tr>
<tr>
<td>8.0 L/min (2–5 years)</td>
<td>Medium</td>
<td>0</td>
<td>0.74 (±0.05)</td>
<td>12.3–18.0</td>
<td>41–60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>0.93 (±0.05)</td>
<td>52–76</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>0.72 (±0.07)</td>
<td>40–59</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>0.57 (±0.05)</td>
<td>32–46</td>
<td></td>
</tr>
<tr>
<td>12.0 L/min (&gt;5 years)</td>
<td>Medium</td>
<td>0</td>
<td>1.16 (±0.07)</td>
<td>18.0</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>0.96 (±0.0)</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>0.78 (±0.18)</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>0.61 (±0.02)</td>
<td>34</td>
<td></td>
</tr>
</tbody>
</table>

Data corresponding to age group 13–23 months are not available.

* Inhalation of 2.5 µg tiotropium Respimat (as two actuations) in a 70 kg adult without use of the test VHC and face mask delivers approximately 2.5 µg or 36 ng/kg.

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**P87**

**BENCHMARKING OF PAEDIATRIC DIFFICULT ASTHMA PHYSIOTHERAPY SERVICES**


10.1136/thoraxjnl-2017-210983.229

**Introduction** Children with difficult asthma (DA) comprise 2%–5% of all children with asthma but use 50% of national asthma health care provisions, they have high levels of morbidity and poor quality of life. Guidelines recommend children with DA should be assessed by a specialist multidisciplinary team, including physiotherapy, to confirm an asthma diagnosis, exclude alternative causes of persistent symptoms, manage co-morbidities, confirm adherence and ensure treatment is appropriate. Physiotherapy may involve breathing pattern retraining, airway clearance, exercise, symptom differentiation, relaxation techniques, self-management and overcoming barriers to adherence. Currently there are no validated condition specific screening tools, outcome measures, methods of assessment or standardised treatments for breathing pattern disorders in children. Physiotherapy intervention improves asthma symptom scores, quality of life and A and E attendances and hospital admissions. We aimed to investigate physiotherapy services and treatments currently being offered at paediatric centres nationally and whether the current guideline recommendations were being met.

**Method** Physiotherapists from twenty-two UK hospitals were invited to complete a questionnaire about service size and provision, referral systems, screening tools, assessment and outcome methods and treatments offered.

**Results** 18/22 centres responded. Sixteen (89%) did not have funded DA physiotherapy, twelve (66%) had no dedicated DA physiotherapy time. Seventeen (94%) relied on referrals from DA consultants and nurses, rather than physiotherapists having the opportunity to routinely assess DA patients. There was no consensus about paediatric screening tools, assessment protocols or outcome measures (figure 1). There was marked variation in what was offered ranging from only performing airway clearance reviews to a full breathing pattern assessment, cough management, sleep, continence, exercise prescription, musculo-skeletal treatment, relaxation/anxiety management, sinus management and advice and education.

**Conclusion** Paediatric physiotherapy services for DA are largely ad hoc and reactive. Despite guideline recommendations, physiotherapy for paediatric DA is currently an unmet clinical need with no agreed diagnostic or management algorithms. There is a clear need to better define the role of physiotherapy in DA.

**REFERENCES**


**Abstract P87 Figure 1** Outcome measures used by physiotherapists across the UK.
**Introduction** Both exhaled nitric oxide (FeNO), a non-invasive marker of eosinophilic airway inflammation, and lung clearance index (LCI), an effort independent assessment of distal airway function, are increased in pre-school children with multiple trigger wheezing (Sonnapa JACI 2010;126:519–26). However, whether there is any relationship between the two measures is unknown. We hypothesised that FeNO and LCI are positively related in pre-school children with a range of respiratory symptoms and this relationship would be strongest in pre-school wheeze.

**Methods** Patients aged between 2 and 6 years were recruited from the paediatric respiratory department at our tertiary centre. FeNO was measured using the offline technique (Niox Mino, Aerocrine AB, Sweden) and LCI was measured using the multiple breath washout technique (Sulphur hexafluoride tracer gas, photoacoustic gas analyser (Innocor, Innovation, Denmark)).

**Results** 19 children (median age 4.2, range 2.7–5.8 years) had assessments of both FeNO and LCI on the same day. Respiratory diagnoses were: multiple trigger wheeze (MTW) n=10, episodic viral wheeze (EVW) n=5, cough n=1, recurrent infections n=1, obliterative bronchiolitis (OB) n=1, sleep disordered breathing n=1. A significant correlation was found between FeNO and LCI, in pre-school children with respiratory symptoms (Spearman correlation coefficient r=0.5, p=0.02) (figure 1). When the MTW and EVW groups were compared, there was no correlation between FeNO and LCI in EVW, but there was a significant relationship in MTW (r=0.6, p=0.05).

**Conclusions** There was a positive relationship between FeNO and LCI in pre-school children with a range of respiratory symptoms. The relationship was strongest in those with recurrent multiple trigger wheeze. These data provide further evidence for different pathophysiology in MTW and EVW, implying the need for different treatment approaches.

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**Abstract P89 Table 1** MBNW results, displayed as median (range). Comparisons made using mann-whitney test, *p<0.05=significant

<table>
<thead>
<tr>
<th></th>
<th>Controls n=7</th>
<th>Mild-Moderate Asthma n=7</th>
<th>Severe Asthma n=21</th>
<th>Mild-Moderate vs Severe Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCI</td>
<td>6.48</td>
<td>6.69</td>
<td>7.50</td>
<td>p=0.023*</td>
</tr>
<tr>
<td></td>
<td>(5.78–7.03)</td>
<td>(5.63–7.40)</td>
<td>(5.79–9.79)</td>
<td></td>
</tr>
<tr>
<td>Scond</td>
<td>0.014</td>
<td>0.016</td>
<td>0.026</td>
<td>p=0.186</td>
</tr>
<tr>
<td></td>
<td>(0.008–0.022)</td>
<td>(0.007–0.051)</td>
<td>(0.009–0.079)</td>
<td></td>
</tr>
<tr>
<td>Sasin</td>
<td>0.055</td>
<td>0.054</td>
<td>0.082</td>
<td>p=0.291</td>
</tr>
<tr>
<td></td>
<td>(0.035–0.077)</td>
<td>(0.043–0.158)</td>
<td>(0.044–0.151)</td>
<td></td>
</tr>
</tbody>
</table>

**Results** 35 participants aged 7–16 completed testing (7 controls, 7 mild-moderate asthma, 21 severe asthma). Results for MBNW displayed in Table 1. All MBNW parameters were normal in control subjects. Only the severe asthmatics had MBNW Results significantly higher than controls (LCI p=0.006, Scond p=0.021, Sasin p=0.040). LCI was raised in 1/7 mild-moderate and 13/21 severe asthmatics. Scond was raised in 2/7 mild-moderate and 11/21 severe asthmatics. Sasin was raised in 1/7 mild-moderate and 4/21 severe asthmatics. 18/28 asthmatics had uncontrolled symptoms as assessed by the C-
ACT/ACT. Of these, 14 had abnormal LCI but only 4 had abnormal FEV1. 8/28 asthmatics had raised LCI despite normal FEV1.

Conclusions LCI, a measure of ventilation heterogeneity, is raised in a high proportion of children with severe asthma. Most children with raised LCI had normal spirometry. This suggests that LCI is more sensitive to detect lung function deficits in asthma compared to spirometry. LCI also correlates well with symptom control. MBNW and LCI may be useful in the monitoring of children with severe asthma.

| P90 HOW DOES BMI STATUS INFLUENCE SPIROMETRY AND RESPIRATORY MUSCLE STRENGTH IN CHILDREN? |

1 GSI Duncan, NT Gharbawi, VM Viskaduraki, EA Gaillard, CS Beardsmore. 1Department of Infection, Immunity and Inflammation (Child Health), University of Leicester, Leicester, UK; 2Bioinformatics and Biostatistics Hub, College of Medicine, Biology and Psychology, University of Leicester, Leicester, UK

Introduction While BMI correlates positively with spirometry during childhood, young children who are overweight or obese have been shown to have a reduced FEV1/FVC compared to their peers. In childhood, obesity has been shown to have a negative effect upon inspiratory muscle strength.

Aims To assess whether there are differences in spirometry of children of varying BMI status and whether this relates to respiratory muscle strength.

Methods Within schools, we measured each child’s height, weight, and spirometry. Respiratory muscle strength was assessed via maximal inspiratory and expiratory pressures (MIP/MEP). The child breathed through a pneumotachograph attached to a shutter. To measure MIP, the child exhaled maximally and the shutter was activated. The child made an inspiratory effort against the shutter and peak pressure was recorded. The test was repeated several times. Measurements of MEP were similar, except that the child inhaled maximally and then made a forceful expiratory effort. We calculated BMI and grouped children by centile score into underweight, healthy, overweight or obese, using epidemiological cut-offs. Results were adjusted for age and height via an ANCOVA.

Results We studied 297 children (5–11 year). We obtained data for spirometry in 258, MIP in 231 and MEP in 262. Mean adjusted values are shown (Table). All individual parameters showed significant positive correlation with BMI, while FEV1/FVC was significantly negatively correlated with BMI. The obese group had a significantly greater adjusted mean value for MEP than the healthy group and a significantly greater mean adjusted value for FVC than the underweight group, while having a significantly lower mean adjusted FEV1/FVC than both healthy and overweight groups.

Conclusion Despite having the greatest adjusted mean value for expiratory muscle strength and vital capacity, the obese group demonstrated the lowest adjusted mean FEV1/FVC, indicating a potential alteration in respiratory flow dynamics for children of greater BMI.

REFERENCES

<table>
<thead>
<tr>
<th>Abstract P90 Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Underweight</td>
</tr>
<tr>
<td>FEV1 (L)</td>
</tr>
<tr>
<td>FVC (L)</td>
</tr>
<tr>
<td>FEV1/FVC (%)</td>
</tr>
<tr>
<td>MIP (kPa)</td>
</tr>
<tr>
<td>MEP (kPa)</td>
</tr>
</tbody>
</table>

Multi-morbidity in COPD

P91 HIGH PREVALENCE OF VITAMIN D DEFICIENCY AMONGST PATIENTS WITH COPD IN THE NORTH EAST. HIGHLIGHTING A DEFICIENCY AND NEED FOR IMPROVED ASSESSMENT

H Tedd, K Conroy, A Mitchell, Y Shanshal, H Curtis. Queen Elizabeth Hospital, Gateshead, UK

Background Vitamin D plays a key role in osteoporosis and also contributes to sarcopenia, muscle weakness, fatigue and depression. Patients with COPD are likely to be at higher risk of Vitamin D deficiency due to reduced mobility especially outdoors, with previous studies in the London area demonstrating prevalence rates around 60%. However, within our population group in the North East of England, little is known about the prevalence of Vitamin D deficiency.

Aims To identify the prevalence of serum 25-hydroxyvitamin D (25(OH)-D) deficiency in patients admitted with an acute exacerbation of COPD.

Method We identified 50 patients admitted with an exacerbation of COPD. Data on demographics and prescription of vitamin D supplementation was recorded. 25(OH)-D titres were measured.

Results 50 patients included, mean age 73.6 years (age range 45–95 years). 44% of patients were prescribed vitamin D supplementation (95% of supplementation was in the form of combined calcium and vitamin D). Overall 62% of patients were found to have low 25(OH)-D titres. Of those not taking vitamin D supplementation, only 14% of patients had sufficient 25(OH)-D titres (≥50 nmol/L). 11% were 25(OH)-D insufficient (30–50 nmol/L), 57% were 25(OH)-D deficient (8–30 nmol/L) and 18% were profoundly deficient (<8 nmol/L). Of those patients taking vitamin D supplementation, 68% were found to have sufficient 25(OH)-D titres, whilst 32% still had inadequate 25(OH)-D highlighting potential issues with compliance or insufficient replacement.

Conclusions We have demonstrated a very high prevalence of vitamin D deficiency amongst our patients with COPD, with 86% of our patients having inadequate vitamin D titles who were not on vitamin D supplementation. This is leading them to increased exposure to the risks of vitamin D deficiency, including the impact on bone health in at already ‘at-risk’ population. In response to this, locally we are now measuring 25(OH)-D titres routinely on patients with COPD and prescribing vitamin D supplementation when indicated, forming
part of our new multisystem, comprehensive, holistic assessment of COPD patients.

REFERENCE

EFFICACY OF BETA BLOCKERS PRESCRIBED AMONG COPD PATIENTS WITH CONCOMITANT HEART FAILURE

1S Ashraf, 2A Ashraf. 1Pulmonology Department, Khyber Medical College/Khyber Teaching Hospital; 2Cardiology Department, Khyber Medical College/Khyber Teaching Hospital

Background Due to common risk factors, there is considerable number of COPD patients who has concomitant heart failure. There is always reluctance in prescribing beta blockers in patients with COPD, though recent literature has supported the use of cardio-selective beta blockers among these patients. We conducted this study to determine the effect of cardio-selective beta blockers on dyspnea grade and exacerbation rate among COPD patients with concomitant heart failure.

Methods This was a prospective cohort study among COPD patients with concomitant heart failure, conducted in a clinic during the last one year. Patients were recruited into 2 groups those who were prescribed cardio-selective beta blockers (group 1) and those managed without beta blockers (group 2). Patients were followed for one year. Outcomes measured were the reduction in MRC dyspnea grade and reduction in number of exacerbations in this year as compare to last year. Those patients having renal disease, liver disease, cancer, any Pneumonia leading to hospitalisation, stroke, etc. were excluded from the study.

Results Total of 95 patients (45 in group 1 and 50 in group 2), mean age 61.3±11 years, BMI 27.5±6.8, mean COPD exacerbation rate of 2.45±0.8 were included in the study according to inclusion criteria. There was statistically significant difference in the two groups regarding their smoking history and BMI, though no difference in the gender distribution and mean COPD exacerbation rate in the last year. At the end of one year follow up, we found statistically significant difference in reduction in COPD exacerbation rate and reduction in dyspnea grade with p<0.05.

Conclusion Cardio-selective beta blockers when prescribed among sub group of COPD patients who had concomitant heart failure may benefit in terms of reduction in dyspnea grade and reduction in COPD exacerbation rate.

COPD: CT THORAX – FRIEND OR FOE: CLINICAL UTILITY OF CT THORAX IN DIAGNOSING COMORBIDITIES

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Introduction Chronic obstructive pulmonary disease (COPD) is associated with several pulmonary and extra-pulmonary comorbidities. Comorbidities have a significant impact on health, healthcare services, and mortality in COPD patients, who have, on average, ≥4 additional diseases. Earlier detection and treatment will lead to better patient outcomes. This study aims to demonstrate the added value of non-contrast CT Thorax in revealing previously unreported co-morbidities. Our hypothesis is CT Thorax is often requested in COPD patients primarily for co-existing lung disease however extra-pulmonary comorbidities are often under requested and under reported.

Methods Setting Tertiary cardio thoracic centre

Study design Retrospective review 1000 non-contrast CT thorax scans in COPD patients. Using a pre-formed list of co-morbidities (listed below), images were reviewed by a single operator. Pulmonary bronchiectasis, infection, lung cancer, ILD Extra-pulmonary Coronary artery calcification, Pulmonary artery diameter, hiatus hernia, vertebral fractures.

Abstract P93 Figure 1  Pie charts showing extra pulmonary (a) and pulmonary findings (b) on retrospective analysis of 227 CT scans.
**Poster sessions**

Corresponding Diagnoses Ischaemic heart disease, Pulmonary artery hypertension, Gastroesophageal reflux disease and Osteoporosis.

**Results**

1000 CT chest scans were reviewed. Here is analysis from first 227 scans. Common reasons for requesting imaging: lung transplant assessment (29%), excluding bronchiectasis (18%), acute exacerbation of COPD (12%) and LVRS assessment. Retrospective analysis of 227 CT Thorax scans showed a total of 450 pulmonary (138) and extra pulmonary (312) findings. (Figure 1) Pulmonary findings Bronchiectasis: 40% (90/227), lung nodules: 6% (13/227) of which new cancer diagnoses were 23% (3/13), Consolidation 4% (9/227), Small airway changes 3% (7/227), Interstitial lung changes: 6% (14/227), Pleural plaques 2% (5/227). Extra pulmonary findings Hiatus hernia: 18.5% (42/227), Vertebral fractures: 17% (39/227), Enlarged Pulmonary artery diameter (more than or equal to 29 mm): 38% (87/227), Coronary artery plaques: 55% (124/227).

**Summary**

Preliminary analysis indicates a high incidence of potentially treatable extra pulmonary comorbidities. Incidence of co-existing radiological bronchiectasis is 40%.

**Conclusions**

To our knowledge this is the first report quantifying the added value of non-contrast CT Thorax in the assessment of COPD patients. Our recommendation is that a list of co-existing radiological bronchiectasis is 40%.

**REFERENCE**


**Abstract P94 Table 1**

<table>
<thead>
<tr>
<th>Cardiorespiratory</th>
<th>Absolute eosinophil count</th>
<th>Percentage eosinophil count</th>
</tr>
</thead>
<tbody>
<tr>
<td>variables</td>
<td>Beta coefficient</td>
<td>95% CI</td>
</tr>
<tr>
<td>Aortic PWV (m/s)</td>
<td>0.23</td>
<td>-1.3 to 0.77</td>
</tr>
<tr>
<td>CIMT (mm)</td>
<td>0.16</td>
<td>-6.60 to 0.69</td>
</tr>
<tr>
<td>Diameter right</td>
<td>0.17</td>
<td>0.91 to 0.65</td>
</tr>
<tr>
<td>Diameter left</td>
<td>-0.56 to 0.89</td>
<td>-0.13 to 0.23</td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>0.10</td>
<td>-0.11 to 0.21</td>
</tr>
<tr>
<td>FVC (L)</td>
<td>0.17</td>
<td>-0.29 to 0.46</td>
</tr>
</tbody>
</table>

* Adjustment for sex, age, MAP, HR, FEV1, FVC, smoking pack years, history of diabetes and peripheral vascular disease

**P95**

**CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN SYMPTOMATIC AORTIC STENOSIS: A MAIN UNDERLYING DIAGNOSTIC CONFounder AND PROGNOSTIC FACTOR**

**Introduction and Objectives**

COPD is associated with increased prevalence of cardiovascular comorbidities and mortality from cardiac pathologies. In heart valve diseases, the onset of dyspnoea is the main determinant of outcome and treatment. Thus, COPD may represent a confounding factor in patients with severe aortic stenosis (AS) whilst influencing management. Moreover, the correct diagnosis of COPD in symptomatic AS is extremely challenging. We investigate the prevalence of COPD in patients with symptomatic AS and its relation with all-cause mortality.

**Methods**

Consecutive patients with symptomatic severe AS referred to a cardiology tertiary centre for their clinical management were recruited. The severity of aortic valve disease diagnosis of COPD and symptomatic status were recorded. Patients were treated with either surgical or percutaneous...
valve implantation or were excluded from any invasive option at the discretion of the responsible physician. Full pulmonary function testing (PFT) was performed.

**Results** A total of 425 symptomatic AS patients were included. Of these, 313 (74%) underwent PFT. COPD was clinically recognised in 25% (n=110) of the total group and in 20% (n=64) of the AS patients with PFT. On PFT Results analysis, the actual prevalence of COPD was even higher (33%). COPD severity in AS based on FEV1 was classified as follows: mild in 46%, moderate in 41%, severe in 12%, and very severe in 1%. There were no differences in terms of aortic disease severity, body habitus, functional class nor cardiac function in patients with or without COPD. AS patients with COPD were more likely to be males (56% vs 43%, p<0.001) and with a non-significant tendency to older age (80±7 vs 78±8, p=0.07). Of the AS COPD patients, only 9% were on inhaled treatment. During a mean follow-up of 16±10 months, patients with COPD showed higher rates of all-cause mortality compared to patients without COPD (39% vs. 20%, p<0.001). COPD was an independent predictor of all-cause death (HR: 2.1, 95% CI: 1.4 to 3.2, p<0.001).

**Conclusion** COPD in symptomatic AS is common, undertreated and associated with an increased risk of death. Spirometry and COPD case-finding should be performed when managing patients with symptomatic AS.
Poster sessions

however, compared to the control group patients with COPD demonstrated significantly lower scores in memory (p<0.01), attention (p=0.013) fluency (p=0.002) and language (p=0.004) domains. Interestingly the pattern of cognitive impairment in patients with COPD was similar but less severe compared to patients with AD who demonstrated significantly lower total ACE-III scores (p<0.001).

Conclusions This study demonstrates a high burden of cognitive impairment in patients with COPD. Interestingly the cognitive domains of memory, attention, fluency and language seem to be predominantly affected in this population. These findings further our understanding of cognitive impairment in patients with COPD, with patients exhibiting a similar but less severe pattern of cognitive impairment to that seen in the AD group.

P98 GREY MATTER ATROPHY, RETINAL VESSEL DILATATION & REDUCTION IN AORTIC DISTENSIBILITY IN COPD: THE RELATIONSHIP BETWEEN MULTI-ORGAN VASCULAR MEASURES

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Background COPD is linked to risk of MI, stroke and white matter brain lesions, but there is no recognised method of identifying those who go on to have acute vascular events. It also remains unclear if vascular risk in COPD is truly independent of smoking. The Novel Vascular Manifestations of COPD (NoVasC) study was designed to address this limitation through direct comparison of COPD patients and smoking controls using multimodal brain MRI, retinal photography, cardiac MRI (CMR) and aortic stiffness in addition to cognitive and disease severity measures.

Methods MR brain volumes, diffusion, blood flow and white matter lesions were acquired for 27 COPD patients (age 67±8, 41% male, pack years 30±14, FEV1 58%±18% predicted) and 23 controls (age 63±9, 48% male, pack years 39±21, FEV1 58%±18% predicted). CMR of LV and RV function, and 23 controls (age 63±9, 48% male, pack years 30±14, FEV1 58%±18% predicted). COPD is linked to risk of MI, stroke and white matter lesions were acquired for 27 COPD patients (age 67±8, 41% male, pack years 30±14, FEV1 58%±18% predicted). CMR of LV and RV function, and 23 controls (age 63±9, 48% male, pack years 30±14, FEV1 58%±18% predicted). COPD is linked to risk of MI, stroke and white matter lesions were acquired for 27 COPD patients (age 67±8, 41% male, pack years 30±14, FEV1 58%±18% predicted). CMR of LV and RV function, and 23 controls (age 63±9, 48% male, pack years 30±14, FEV1 58%±18% predicted).

Conclusions Grey matter atrophy, retinal vessel dilatation, and aortic distensibility are present in COPD. White matter lesions volume is associated with lung function but there was no relationship between other MRI brain measures, cognition or disease severity. Non-invasive vascular measures of retinal vessels and cardiac MR appear to relate to lung function and white matter damage and warrant further investigation in larger longitudinal studies of vascular events in COPD.

Abstract P98 Table 1 COPD group vs. smoker controls ANOVA corrected for age, gender, mean arterial blood pressure and pack years smoked

<table>
<thead>
<tr>
<th>Measure</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalised White Matter Volume</td>
<td>Between Groups</td>
<td>0.625</td>
<td>1</td>
<td>0.625</td>
<td>0.115</td>
</tr>
<tr>
<td>Voxel based Morphometry (VBM)</td>
<td>Within Groups</td>
<td>260.862</td>
<td>48</td>
<td>5.435</td>
<td>261.487</td>
</tr>
<tr>
<td>Total</td>
<td>19.169</td>
<td>1</td>
<td>19.169</td>
<td>9.181</td>
<td>0.004†</td>
</tr>
<tr>
<td>Normalised Grey Matter Volume. VBM</td>
<td>Between Groups</td>
<td>100.216</td>
<td>48</td>
<td>2.088</td>
<td>119.385</td>
</tr>
<tr>
<td>Groups</td>
<td>Within Groups</td>
<td>45.000</td>
<td>45</td>
<td>0.973</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>45.000</td>
<td>45</td>
<td>0.973</td>
<td>0.011†</td>
<td></td>
</tr>
<tr>
<td>Retinal Factor</td>
<td>Between Groups</td>
<td>39.796</td>
<td>45</td>
<td>0.884</td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>Within Groups</td>
<td>37.411</td>
<td>44</td>
<td>0.850</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>46.000</td>
<td>46</td>
<td>0.973</td>
<td>0.011†</td>
<td></td>
</tr>
<tr>
<td>Cerebral Diffusion Tensor</td>
<td>Between Groups</td>
<td>2.283</td>
<td>1</td>
<td>2.283</td>
<td>2.345</td>
</tr>
<tr>
<td>Groups</td>
<td>Within Groups</td>
<td>46.717</td>
<td>48</td>
<td>0.973</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49.000</td>
<td>49</td>
<td>0.973</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerebral Blood Flow</td>
<td>Between Groups</td>
<td>0.454</td>
<td>1</td>
<td>0.454</td>
<td>0.449</td>
</tr>
<tr>
<td>Groups</td>
<td>Within Groups</td>
<td>48.546</td>
<td>48</td>
<td>1.011</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49.000</td>
<td>49</td>
<td>0.973</td>
<td>0.011†</td>
<td></td>
</tr>
<tr>
<td>White Matter Lesions</td>
<td>Between Groups</td>
<td>0.412</td>
<td>1</td>
<td>0.412</td>
<td>0.407</td>
</tr>
<tr>
<td>Groups</td>
<td>Within Groups</td>
<td>48.588</td>
<td>48</td>
<td>1.012</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49.000</td>
<td>49</td>
<td>0.973</td>
<td>0.011†</td>
<td></td>
</tr>
</tbody>
</table>

†p value<0.01
Clinical Characteristics and Management of Risk of Stroke Associated with Acute Exacerbations of Chronic Obstructive Pulmonary Disease (COPD): A Self-Controlled Case Series

OL Connell, KJ Rothnie, JK Quint, NHLI, Imperial College London, London, UK

Introduction and Objectives Chronic Obstructive Pulmonary Disease (COPD) patients are at increased risk of cardiovascular disease. Previous studies have suggested that acute exacerbations of COPD (AECOPD) are associated with an increased risk of stroke in COPD patients. We aimed to characterise the size and duration of the increased risk of stroke following AECOPD as well as factors that modify the risk.

Methods Using data from the Clinical Practice Research DataLink linked with Hospital Episode Statistics, we conducted a self-controlled case series on COPD patients who had an AECOPD and a stroke. Fixed-effects conditional Poisson regression was utilised to estimate the incidence rate ratio (IRR) of stroke in the 91 day period following AECOPD compared with stable periods. The 91 day period was also segmented into shorter time periods, which were compared with stable periods in order to determine how the risk of stroke post-AECOPD changes over time. We stratified by various factors (including AECOPD severity, exacerbation frequency, cardiovascular disease history, and cardiovascular and respiratory drug prescription) to identify which modified this risk.

Results 3,466 COPD patients were identified as having at least one AECOPD and a first stroke during the study period. We observed an increased risk of stroke in the 91 day period following AECOPD compared with stable periods (IRR=1.47, 95% CI: 1.36–1.59), which peaked on days 4–7 (IRR=1.93, 95% CI: 1.57–2.37), not returning to baseline until after 91 days post-AECOPD. This increased risk was observed for ischaemic strokes only (IRR=1.51, 95% CI: 1.39–1.65). The relative risk of ischaemic stroke post-AECOPD was significantly higher for those with lower exacerbation frequency, and significantly lower for aspirin users and those with a previous angina diagnosis.

Conclusions There is a 1.47-fold increased risk of stroke in the 91 days following AECOPD which peaks on days 4–7 and does not return to baseline until after 91 days post-AECOPD. This may provide the basis of future interventions such as the introduction of aspirin to reduce this risk and possibly reduce mortality in COPD patients.
**Poster sessions**

**Abstract P100 Table 1** Incidence rate ratios (IRR) of first stroke in risk periods after acute exacerbations of chronic obstructive pulmonary disease (AECOPD) relative to stable periods

<table>
<thead>
<tr>
<th>Risk period</th>
<th>N outcome events (stroke) during risk period (91 days following AECOPD)</th>
<th>IRR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total risk period (91 days)</td>
<td>1046</td>
<td>1.47 (1.36–1.59)</td>
</tr>
<tr>
<td>1–3 days</td>
<td>70</td>
<td>1.75 (1.38–2.23)</td>
</tr>
<tr>
<td>4–7 days</td>
<td>99</td>
<td>1.93 (1.57–2.37)</td>
</tr>
<tr>
<td>8–14 days</td>
<td>146</td>
<td>1.68 (1.41–1.99)</td>
</tr>
<tr>
<td>15–28 days</td>
<td>239</td>
<td>1.62 (1.41–1.86)</td>
</tr>
<tr>
<td>29–91 days</td>
<td>492</td>
<td>1.29 (1.16–1.42)</td>
</tr>
</tbody>
</table>

Table of Incidence rate ratios of first stroke in risk periods (the 91 day-period following each AECOPD) relative to stable periods (up to and including 15 days before, and 91 days after, each AECOPD), adjusted for age, current smoking status and season. AECOPD: acute exacerbation of Chronic Obstructive Pulmonary Disease; IRR: Incidence rate ratio; 95% CI: 95% Confidence interval.

**P101** REASONS FOR ACCIDENT AND EMERGENCY DEPARTMENT ATTENDANCE BY PEOPLE WITH HEART FAILURE OR CHRONIC OBSTRUCTIVE PULMONARY DISEASE: RECIPIENTS’ AND PROVIDERS’ PERSPECTIVES. AN EXPLORATORY STUDY

1 J S Lee, 2 E Barley, 2 H Lempp, 1 V Srivastava. 1 Guy’s and St Thomas’ NHS Foundation Trust, London, UK; 2 King’s College London, London, UK

10.1136/thoraxjnl-2017-210983.243

**Objective** This study examined why patients with Chronic Obstructive Pulmonary Disease (COPD) or Heart Failure (HF) use Accident and Emergency (A and E) services and whether their perceived reasons are similar to or different from those of their family members or carers, or the hospital medical team.

**Design** A mixed method approach was undertaken; (i) semi-structured interviews with patients and their family members (or carer) and (ii) a self-developed survey with hospital health professionals.

**Participants** A purposive sample of 15 patients (9 COPD, 6 HF), six family members and carers (2 COPD, 4 HF) and 12 health professionals (5 doctors, 8 nurses) participated in the study.

**Setting** The research was in one large teaching hospital in South London, UK, covering a diverse ethnic population.

**Results** The patients’ main reason for A and E admission was severe exacerbation of their symptoms and all three parties (patients, family members or carers, health professionals) agreed with this decision. Three key factors were highlighted in relation to A and E attendance: (i) patients’ health seeking behaviour, (ii) perceptions about GP and A and E services by patients and (iii) patients’ attitudes towards managing their own conditions.

**Conclusions** Improving patients’ perceptions of GP services in the management of exacerbations of HF and COPD will be important to increase patients’ trust in GP services so that patients will access primary care in a timely manner to prevent exacerbations of symptoms that require A and E admission. This may be achieved by developing a close collaboration between the patients, family members (carers) and health professionals over time.

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**Abstract P101 Figure 1** Patients’ pathways to A and E.

**Triggers and treatment of cough**

**P102** THE SENSATIONS PROVOKING COUGH: QUANTITATIVE STUDY

Y K Huong, D Yuille, A Caress, J Smith, J Yorke. University Hospital of South Manchester, Manchester, UK

10.1136/thoraxjnl-2017-210983.244

**Introduction** The Sensation Provoking Cough (TOPIC) questionnaire, which is in the process of development, quantifies cough experiences, triggers and sensations. It currently consists of 49 descriptors, derived from face to face interview and focus groups.

**Aim** To evaluate if demographics, total St George’s Respiratory Questionnaire (SGRQ) and Cough Severity Diary (CSD) correlate with total TOPIC score (TTS).

**Methods** Adult patients with chronic cough and various respiratory diseases were recruited and compared to patients with idiopathic/refractory chronic cough. A TOPIC draft questionnaire (49 items, each with a 0–5 Likert-type response, total score range 0–245), SGRQ and CSD were completed and repeated 5–7 days later, with a Global Rating of Change (GRC).

**Results** A total of 52 patients (49.2% females, mean age 53.2 +/-15.6) were recruited (n=17 idiopathic chronic cough, n=13 severe asthma, n=13 interstitial lung disease, n=9 cystic fibrosis). Total TOPIC score (TTS) mean 95.8 (+/-46.2). Patients with idiopathic cough had significantly higher TTS compared with cough in chronic lung disease (mean TTC=121.7 vs 83.3, p=0.004). Gender, age (r=-0.03) and FEV1% predicted (r=0.18) were not statistically significant.
correlated with TTS (p=0.91, p=0.82, p=0.22, respectively). TTS demonstrated high levels internal consistency (alpha) of 0.94 and test re-test reliability of 0.94 (p<0.001); suggesting that some items could be removed in subsequent stages. TTS correlated with total SGRQ score (r=0.32, p=0.02), in particular with SGRQ's symptoms score (r=0.44, p=0.001) and impacts score (r=0.61, p<0.001), but not with SGRQ's activity score (r=0.19, p=0.17). A significant relationship was found between TTS and total CSD score (r=0.56, p<0.001). Conclusion Our preliminary data suggests that current TOPIC questionnaire items have value in discriminating idiopathic chronic cough from cough associated with chronic lung disease. Further data will be collected across different patient groups to identify the best items to retain in the final questionnaire. The TOPIC questionnaire may be a useful tool to quantify sensations or triggers of cough and may help us to better understand cough mechanism.

**P103 THE URGE TO COUGH IN COPD**

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**Introduction** Urge to cough is a conscious perception of the need to cough. We investigated urge-to-cough, triggers and somatic sensations associated with cough in patients with COPD and compared it to patients with chronic refractory cough (CRC).

**Methods** We undertook a prospective case-control study of COPD patients with chronic cough (≥8 weeks) and patients with CRC. All patients completed a 27-item structured questionnaire (Cough Hypersensitivity Questionnaire; CHQ), that has a 5-point Likert response scale to assess urge-to-cough, aggravating factors/triggers and somatic sensations (0–4; 0=never and 4=occurs all the time in relation to cough). 10 COPD patients underwent a capsaicin challenge test to provoke an urge-to-cough sensation and to assess cough reflex sensitivity. The concentration of capsaicin that elicited 2 or more coughs (C2) and 5 or more coughs (C5) was recorded.

**Results** 62 COPD and 40 CRC patients were recruited (mean [SD] age 64(11) vs 54(14) years, 48% vs 70% females, FEV1% predicted 48.2% (19.0) vs 94.1% (16.6) respectively). The top 5 cough triggers and somatic sensations in patients with COPD and CRC are summarised in Table 1. The severity of sputum trigger of cough and chest sensation associated with cough were significantly greater in COPD compared to CRC; median[IQR] sputum scores: 3 (2–4) vs 2 (1–2) and chest sensation scores: 2 (2–4) vs 1 (0–2) respectively, both p<0.01. The prevalence of urge-to-cough was higher in CRC vs COPD: 97.5% vs 75.8% respectively. The severity of urge to cough and eating/drinking trigger of cough were significantly greater in CRC compared to COPD; median[IQR] urge to cough scores: 3 (2–3) vs 2 (1–3) and eating and drinking scores: 2 (0–3) vs 1 (0–2) respectively, both p=0.02. Geometric mean(SD) C2 and C5 in COPD were 9.5 (18.2) and 10.9 (18.0) micromol.L⁻¹. There was a significant correlation between C5 and urge to cough in COPD (r=−0.74, p=0.02) but not with sputum trigger score (r=−0.10, p=0.80).

**Conclusion** Sputum is a significant self-reported trigger of cough in COPD. In contrast, urge to cough occurs more frequently in CRC. There are likely to be multiple mechanisms of cough in COPD and further studies should investigate whether phenotyping cough on the basis of self-reported triggers and somatic sensations can guide therapy.

**Abstract P103 Table 1 Prevalence of triggers and somatic sensations associated with cough in COPD and chronic refractory cough. Data presented as percentage of all patients**

<table>
<thead>
<tr>
<th>Top 5 triggers and somatic sensations associated with cough</th>
<th>Prevalence (% patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sputum</td>
<td>87</td>
</tr>
<tr>
<td>Chest sensation</td>
<td>86</td>
</tr>
<tr>
<td>Smoke or smoky atmosphere</td>
<td>81</td>
</tr>
<tr>
<td>Dry throat</td>
<td>77</td>
</tr>
<tr>
<td>Exercise</td>
<td>77</td>
</tr>
</tbody>
</table>

**Introduction and Objectives** Patients with chronic cough complain of a variety of sensations that they perceive as provoking coughing, identifying irritation, tickle and the urge to cough (UTC) as important. Effective therapies for chronic cough such as low dose morphine have failed to reduce experimentally evoked cough responses, but their effect on the sensations driving cough is unknown. We hypothesised that low dose morphine treatment reduces the sensations driving cough and predicted that the sensations experienced during inhalational cough challenge may demonstrate this mechanism.

**Methods** Twenty-two refractory chronic cough patients (mean age 61.7 years, 18 female, mean cough duration 14 years) taking low dose morphine sulphate treatment enrolled into a double-blind randomised controlled crossover trial comparing the effects of low dose morphine sulphate with matched placebo. Following withdrawal of their morphine therapy, participants were randomised to receive morphine (5–10 mg BD slow release) or matched placebo during two treatment period (5–7 days duration) separated by a 5–7 day washout. On the final day of each treatment period subjects inhaled increasing concentrations of citric acid (0.01–4 M, 18 ascending concentrations), rating irritation, tickle, UTC and taste on 100 mm visual analogue scales (VAS; 0 mm=none and 100 mm=worst) after each inhalation. The challenge continued until subjects coughed at least twice on any concentration of citric acid (C2). For the analysis, general estimating equation (GEE) models evaluated the effect of treatment on reported sensations, with increasing per citric acid dose.

**P104 SENSATIONS ASSOCIATED WITH EXPERIMENTALLY EVOKED COUGH: INFLUENCE OF LOW DOSE MORPHINE SULPHATE IN OPIOID RESPONDERS**

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**Introduction** and Objectives Patients with chronic cough complain of a variety of sensations that they perceive as provoking coughing, identifying irritation, tickle and the urge to cough (UTC) as important. Effective therapies for chronic cough such as low dose morphine have failed to reduce experimentally evoked cough responses, but their effect on the sensations driving cough is unknown. We hypothesised that low dose morphine treatment reduces the sensations driving cough and predicted that the sensations experienced during inhalational cough challenge may demonstrate this mechanism.

**Methods** Twenty-two refractory chronic cough patients (mean age 61.7 years, 18 female, mean cough duration 14 years) taking low dose morphine sulphate treatment enrolled into a double-blind randomised controlled crossover trial comparing the effects of low dose morphine sulphate with matched placebo. Following withdrawal of their morphine therapy, participants were randomised to receive morphine (5–10 mg BD slow release) or matched placebo during two treatment period (5–7 days duration) separated by a 5–7 day washout. On the final day of each treatment period subjects inhaled increasing concentrations of citric acid (0.01–4 M, 18 ascending concentrations), rating irritation, tickle, UTC and taste on 100 mm visual analogue scales (VAS; 0 mm=none and 100 mm=worst) after each inhalation. The challenge continued until subjects coughed at least twice on any concentration of citric acid (C2). For the analysis, general estimating equation (GEE) models evaluated the effect of treatment on reported sensations, with increasing per citric acid dose.
Results Compared with placebo, low dose morphine significantly reduced the VAS scores for tickle and irritation during the citric acid challenge (p=0.021, p=0.039), however UTC, taste and the number of coughs evoked were not improved (p=0.105, p=0.167, and p=0.337). Of particular note, morphine had no significant impact on the UTC, numbers of coughs triggered or the traditional C2 endpoint, suggesting that reducing somatic sensations may be an important component of the mode of action of opioids in the treatment of cough.

Conclusions This data shows that treatment with low dose morphine significantly reduces the noxious sensations driving cough. The effects on tickle and irritation appear more important than any impact on the UTC, numbers of coughs triggered or the traditional C2 endpoint, suggesting that reducing somatic sensations may be an important component of the mode of action of opioids in the treatment of cough.

P104 Poster sessions

Abstract P104 Figure 1 Figure showing the effects of morphine and placebo on noxious sensations (A “Irritation” B “tickle”) evoked by increasing doses of citric acid in our cough challenge *p < 0.05.

Conclusions By evaluating the demographic data, 24 hours cough count, HARQ and LCQ in high FeNO and low FeNO groups, different characteristics between these two cohorts observed. FeNO predicted the gender-related differences in demographic, with women markedly over represented in the low FeNO cohort. A female preponderance in patients with chronic cough has been well documented. However, the possible relationship between different inflammatory profiles as reflected by FeNO has not previously been described.

Introduction and Objectives Chronic cough is a poorly understood condition with a limited number of treatment options available. Gabapentin and pregabalin are used in the treatment of neuropathic pain and may have some efficacy in patients with refractory chronic cough.1,2 We evaluated the real-world outcomes of using these medicines in a tertiary cough clinic.

Methods We performed a retrospective review of new referrals to a tertiary cough clinic (October 2013-October 2015). Patient characteristics (age, sex, duration of cough and test results) were collected. Follow up clinic letters were reviewed until April 2017. We recorded details regarding the prescribing of gabapentin and pregabalin for patients with refractory chronic cough, their impact on cough and the associated side effects.

Results 136 new patients were reviewed (mean age 56.3 years, 98 (72.1%) female) with a mean duration of cough of 7.5 years (SD 12.2). Gabapentin or pregabalin was prescribed for 38 patients (9 gabapentin and 29 pregabalin). Highest dose achieved was 1800 mg/day for gabapentin and 300 mg/day for pregabalin. Overall, fifteen patients (39%) responded favourably to these medicines initially. Fourteen (37%) tolerated them but derived no benefit and stopped the medication. Nine patients (24%) developed immediate side effects and were unable to tolerate the medications. Out of the 15 patients that tolerated these medicines, only 8 (21%) were able to continue with therapy long term, as the other seven (18%) eventually developed intolerable side effects. The most common side effect was drowsiness (see below).
Conclusions Our data suggests that in clinical practice, alpha-two delta ligands are effective in a subgroup of chronic cough patients, but side effects may outweigh their potential benefits, affecting nearly half the population trialled. Prospective work is needed to objectively quantify their anti-tussive effects and tolerability over longer treatment periods, allowing clinicians and patients to better understand the risk-benefit ratio associated with their use.

REFERENCES

P107 TIME TO RE-GROUP: A NOVEL APPROACH TO THE DELIVERY OF SPEECH AND LANGUAGE THERAPY FOR CHRONIC REFRACTORY COUGH
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Introduction Specialist speech and language therapy (SLT) has an important role in the treatment of chronic refractory cough (CRC). Therapy is typically delivered to patients individually; however, this approach is resource-intensive and reduces service capacity. Moreover, the content of SLT for CRC is often similar across patients. The aim of this work was to describe the efficacy of a SLT-delivered cough therapy group (CTG).

Methodology Eligible patients attended the CTG (2016–2017) after an initial 1:1 assessment to determine suitability. Individuals with an infectious cause of cough were excluded. All patients had undergone prior assessment and treatment optimisation at the RBH chronic cough clinic. Cough severity was rated using a visual analogue scale (VAS) at first attendance and on discharge from the group. Patients attended a maximum of four sessions with 4–8 patients per session, after which they were referred for individual review if they felt no improvement had been made. CTG sessions consisted of strategies to reduce cough frequency (through improved upper airway lubrication, reduction of laryngeal muscle strain and use of cough control strategies), sharing experiences, observing other patient-therapist interactions and time to talk individually with the SLT.

Results Ninety-one patients (n=26 males, 28.6%) aged between 30 and 83 years (M=61.4, SD 11.1) attended CTG. The majority of attendees (n=46, 50.5%) reported cough duration of greater than 15 years. There was a reduction in mean VAS following group attendance (p<0.05) (figure 1) with the greatest reduction noted after 3 attendances (p<0.05). The most common patient-reported benefits of group attendance were sharing advice (80.2%) and meeting other people with a cough (76.9%).

Conclusion A group-delivered SLT treatment intervention was associated with reduction in cough severity in a cohort of patients with CRC. Service benefits included reduced waiting time and improved access to individual SLT sessions. Future work should focus on qualitative analysis of patient-reported benefits of group therapy and evaluation of efficacy in a prospective, randomised study.

P108 CHRONIC PRODUCTIVE COUGH (CPC) CLINIC – STANDARDISING CARE FOR CHILDREN WITH NON-CF BRONCHIECTASIS
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Abstract P107 Figure 1 Mean VAS scores of cough severity pre- and post-CTG attendance.

Abstract P106 Figure 1 Side effects/interactions reported by patients when taking gabapentin/pregablin for chronic refractory cough.
Introduction and Objectives
Non-CF bronchiectasis is a major cause of morbidity in the UK. 60%–80% of adults with newly diagnosed bronchiectasis have had CPC since childhood. Studies show this condition can be prevented by interventions in childhood designed to improve airway clearance and elimination of bacteria. Children with CPC/non-CF bronchiectasis are often assessed in general paediatric clinics with no physiotherapy input. A study highlighted that patients attending specialist bronchiectasis clinics are more likely to be managed according to BTS quality standards. We setup a multidisciplinary clinic with standardised care for children with chronic productive cough.

Methods
We introduced a one-stop multidisciplinary (CPC) clinic, lead by a designated respiratory consultant, respiratory physiotherapist and physiologist. CPC clinic runs on a monthly basis but patients can be seen between appointments if required in the physiotherapy department. We performed targeted clinical assessment using formal clinical assessment proforma, improved airway clearance techniques by regular assessment with respiratory physiotherapist and lung function by physiologist, engaged with patient and parents by providing information leaflets and involving them in formulating an individualised action plan.

Results
22 patients are assessed in CPC clinic with 90% attendance. 15 patients have established bronchiectasis among which 6 children have a diagnosis of primary ciliary dyskinesia, 7 children have CPC. All patients attending the clinic were seen by respiratory physician, chest physiotherapist and physiologist. 91% had clinical proforma sheet completed, 100% had airway clearance assessment by physiotherapist with sputum microbiology sent in 90%. 100% of children/C21 years age had lung function performed and individualised action plan given.

Conclusions
Since setting up the clinic, children with CPC are getting targeted care by a multidisciplinary team. The clinic is being extended to include children with immunodeficiency under joint care with a clinical immunologist. There will be a focussed annual review with involvement of a dietician, ENT, radiology and microbiology. Feedback from users is very positive and in the short term QoL for families has improved. However it will require long term follow-up to determine if the prognosis has also improved.

P109  UTILITY OF A MULTIDIMENSIONAL UPPER AIRWAY VISUAL ANALOGUE SCALE TO CHARACTERISE LARYNGEAL DYSFUNCTION
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Introduction
Laryngeal hypersensitivity is now recognised as underpinning many features of laryngeal dysfunction, such as chronic refractory cough (CRC), inducible laryngeal obstruction (ILO) and globus sensation (Hull et al., 2016). Many respiratory patients present with overlapping upper airway symptoms, yet current subjective rating scales have focused narrowly on single clinical features and potentially failed to capture the importance of this overlap. The aim of this work was to assess overlapping laryngeal features in patients in an upper airway service, using a multidimensional upper airway visual analogue scale (VAS).

Methodology
Patients with CRC, asthma, ILO and voice difficulties were referred from the RBH specialist cough and upper airway clinic to speech and language therapy (SLT). They rated cough severity, throat discomfort and voice change on the multidimensional upper airway VAS at their initial assessment. Mean VAS scores were calculated for each diagnostic group.

Results
Data from 122 patients (91 females, 75%; 31 males, 25%) aged between 18 and 82 years (M=52.4, SD=15.8) were collected over a six month period. Sixty-nine patients were referred with CRC (56.5%), 16 (13.1%) with asthma, 32 (26.2%) with ILO and 5 (4.1%) with voice changes. There was an interaction between diagnosis and all three ratings combined (p <0.05) and between all pairs of ratings for each diagnosis (p <0.05), apart from cough severity and voice change in patients with ILO (figure 1).

Conclusion
The multidimensional upper airway VAS captures the overlap between upper airway symptoms and highlights the importance of comprehensive assessment to ensure all features of laryngeal dysfunction are treated effectively. The multidimensional VAS will be further developed to include ratings of breathlessness and swallow function and used to evaluate response to treatment.
Feasibility of continuous laryngoscopy during provoked laryngeal obstruction

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Introduction Inducible laryngeal obstruction (ILO) is typically provoked by a range of stimuli, including perfumes and exercise, and characterised by transient throat tightness, dyspnoea and stridor. Central to the diagnosis of ILO is paradoxical adduction of laryngeal structures on inspiration. Continuous laryngoscopy during exercise (CLE) is now established as the gold-standard diagnostic test for exercise-ILO, but diagnosis of other forms of ILO is currently dependent on non-continuous laryngeal visualisation, where crucial diagnostic behaviour of the larynx may be missed. We report the first application of continuous laryngoscopy during provocation (CLP).

Methodology Fifteen female patients (aged 36–58) suspected of having ILO and referred from the RBH specialist upper airway clinic underwent CLP using self-selected provocation agents to elicit their typical symptoms. Three patients had a prior confirmed diagnosis of asthma. The flexible nasendoscope (CMOS, Karl Storz) was passed without anaesthetic and secured on specialist headgear (figure 1). Patients entered a sealed provocation booth, where they were exposed to the agents they had selected, unable to see the monitor. On elicitation of upper airway symptoms, the specialist SLT initiated laryngeal control strategies with visual biofeedback. The test ended when the patient’s typical symptoms had been generated or when exposure exceeded the point of previous symptom provocation.

Results All patients tolerated continuous placement of the scope and confirmed that exposure in the chamber had been sufficiently concentrated to provoke typical symptoms. Only one patient exhibited classical paradoxical glottic movement. Pre-exposure, the vocal cords were closely adducted in three (20%) patients and fully adducted during unintentional breathing in three patients (20%). All patients subsequently attended a review with the specialist SLT to consolidate understanding of CLP findings and use of control strategies.

Conclusion CLP is a safe and well-tolerated method for evaluating laryngeal movement during provocation and negates repeated passage of the nasendoscope. Continuous monitoring throughout provocation testing improves diagnostic accuracy by capturing the presence or absence of paradoxical movement and may be linked with software that tracks laryngeal movement digitally. Further work is needed to develop standardised CLP protocols and identify clinical phenotypes of ILO.
Analysis of patient demographics and potential breath contaminants revealed no significant difference between groups. The targeted analysis incorporated 35 VOCs. Of these, 2 were found to be significantly more abundant (figure 1) in culture-positive than culture-negative patient samples. These compounds most likely represent limonene ($p=0.017$) and alpha-terpinene ($p=0.007$).

**Conclusion** This pilot study has identified differences in the exhaled VOC profile of patients with sputum culture-positive and culture-negative pulmonary aspergillosis. The finding of elevated levels of terpenoids in the breath of culture positive patients concurs with current understanding of the *Aspergillus* volatome *in vivo* and *in vitro*. A larger study using multivariate analysis should be performed to identify discriminating exhaled VOC signatures in patients with aspergillosis for future clinical use.

**Abstract P111 Figure 1** Box-and-whisker plots of relative VOC abundance in culture-positive and culture-negative groups.

(n=11). Analysis of patient demographics and potential breath contaminants revealed no significant difference between groups. The targeted analysis incorporated 35 VOCs. Of these, 2 were found to be significantly more abundant (figure 1) in culture-positive than culture-negative patient samples. These compounds most likely represent limonene ($p=0.017$) and alpha-terpinene ($p=0.007$).

**Conclusion** This pilot study has identified differences in the exhaled VOC profile of patients with sputum culture-positive and culture-negative pulmonary aspergillosis. The finding of elevated levels of terpenoids in the breath of culture positive patients concurs with current understanding of the *Aspergillus* volatome *in vivo* and *in vitro*. A larger study using multivariate analysis should be performed to identify discriminating exhaled VOC signatures in patients with aspergillosis for future clinical use.

**Abstract P112 Figure 1** Achromobacter spp. antibiotic sensitivities in CF (above) and non-CF Bronchiectasis (below) patients.

**Background** *Achromobacter* is considered an emerging Gram-negative pathogen in cystic fibrosis (CF) although its pathogenic potential is controversial and its impact in other patients groups largely unknown.

**Methods** All *Achromobacter*-positive respiratory samples analysed at our institution from 2007–2016 were identified. Antibiotic susceptibility was tested using the disc-diffusion method. Clinical data were collected from medical records. The Leeds criteria were adapted to define chronicity of infection.

**Results** 48 patients were identified, with a diagnosis of CF in 25, bronchiectasis in 16 and miscellaneous other conditions in 7. Median (IQR) number of samples provided was 4 (1–16), 1.5 (1–2.25) and 1 (1–1.5) in the CF, bronchiectasis and other groups respectively. In the CF group, the median age at first *Achromobacter* isolate was 22.3 years (IQR 17–30) and mean BMI 21.8 kg/m$^2$ (SD 4.1). Baseline FEV$_1$% predicted in the CF population was 50.4% (SD 22.6%). Among bronchiectasis patients, median age at first isolate was 61 years (IQR 58–78) and FEV$_1$ 1.35 L/s (SD 0.75). During the study period, the yearly rate of detection of *Achromobacter* infection increased across all groups, with 4 cases in 2007 rising to 25 in 2016 and a mean of 9.9 cases/year. In any given year during the period 2012–2016, the mean proportion of CF patients with chronic, intermittent and cleared infection was 25%, 54% and 29% respectively, whilst in the bronchiectasis group it was 11%, 37% and 57%. Co-infection with *Staphylococcus aureus* was seen in 20% of samples from CF patients. Equivalent figures for other pathogens were: *Pseudomonas aeruginosa* 14%, *Aspergillus* 11% and non-tuberculous mycobacteria 7%. In the bronchiectasis group, co-infection was mainly seen with *Pseudomonas aeruginosa* (15%). Antibiotic resistance was significantly greater in the CF group compared to the bronchiectasis group, particularly to meropenem (57% of CF isolates vs 0% of bronchiectasis isolates), piperacillin-tazobactam (31% vs 0%) and colistin (20% vs 0%); $p<0.05$.

**Conclusions** Detection of *Achromobacter* spp from respiratory samples increased over the study period with CF patients more likely to develop chronic infection. *Achromobacter* spp isolates from CF patients had greater levels of antibiotic resistance than those from patients with bronchiectasis.
Introduction Antimicrobial peptides act to defend the host from microbial action and colonisation. Patients with COPD and neutrophilic inflammation experience bacterial colonisation more frequently than other COPD phenotypes. Here we assess the levels of five antimicrobial peptides in peripheral blood and sputum in relation to their inflammatory phenotype. We hypothesise that patients with neutrophilic inflammation have lower antimicrobial peptide levels than other COPD inflammatory phenotypes and that the presence of non-typeable haemophilus influenzae (NTHi) is associated with low antimicrobial peptide levels.

Method Plasma and sputum supernatants from 8 healthy donors, 18 COPD patients and 10 non-eosinophilic asthmatics were tested for SLPI, osteopontin, lysozyme, elastin and beta defensin-1 by ELISA. Patients were stratified into eosinophilic and neutrophilic groups with a 3% sputum eosinophil cut-off. NTHi was measured in sputum plugs by qPCR of the Omp P6 gene.

Results Levels of antimicrobial peptides in plasma and sputum showed no difference between those with eosinophilic and neutrophilic COPD. Between disease groups, beta defensin-1 levels are higher in plasma of COPD patients (median: 10.92 ng/ml (IQR: 4.137–18.09)) than healthy individuals (median: 3.665 ng/ml (IQR: 2.59–4.549), p=0.0033) and non-eosinophilic asthmatics (median: 4.549 ng/ml (IQR: 3.334–7.208), p=0.0442) (figure 1). No antimicrobial peptide correlated with NTHi levels in the sputum plug.

Conclusions Similar levels of SLPI, osteopontin, lysozyme, elastin and beta defensin-1 in sputum and plasma between COPD phenotypes suggests that defence against pathogens by these antimicrobial peptides is not lacking in differential inflammatory COPD phenotypes. The role antimicrobial peptides play in NTHi colonisation remains to be determined.

Abstract P113 Figure 1 Concentrations of beta defensin-1 in plasma from healthy individuals, asthmatics and COPD patients.

**P114** GLUCOCORTICOID RECEPTOR α AND β EXPRESSION IN BRONCHIAL EPITHELIAL CELLS INFECTED WITH NTHI

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Introduction Steroids act through the glucocorticoid receptor (GR), of which the alpha-isoform (GRα) is most abundant. Neutrophilic COPD is associated both with resistance to steroids and with airway bacterial infection, most commonly by non-typeable Haemophilus influenzae (NTHi). We hypothesised that NTHi downregulates GRα or upregulates its inhibitory beta-isoform (GRβ) in bronchial epithelial cells, thereby inhibiting their response to steroids.

Method Bronchial epithelial cell line Beas-2B were treated with the corticosteroid Fluticasone propionate (0, 1 nM or 100 nM) for 2 hours prior to infection with 1.5 × 10⁴, 1 × 10⁵ and 1.5 × 10⁷ CFU/ml NTHi (low, medium and high load respectively), 6 hours post-infection supernatants were collected and RNA extracted from cells. RNA was reverse transcribed to cDNA in which levels of GRα, GRβ and GAPDH were determined by SYBR Green PCR and expression calculated using the Pfaffl method relative to untreated cells.

Results GRα expression in Beas-2B was enhanced by corticosteroid treatment in a stepwise manner for 1 nM (median fold increase from untreated: 1.491, IQR: 1.305–1.668), and 100 nM (median: 1.742 fold, IQR: 1.51–1.9) (p<0.05 for both). Increasing load of NTHi showed no effect on GRα expression. GRβ expression showed little fluctuation from levels of untreated cells upon infection with NTHi alone or high dose corticosteroid, however the two showed a trend to synergistically decrease in GRβ expression when treated with high corticosteroid and high load of NTHi (median fold change from untreated cells: 0.542 (IQR:0.453–0.578) (p=0.25) (figure 1).

Conclusions Corticosteroid treatment shows a trend to increased GRα expression in Beas-2B cells. Increased NTHi load has no effect on GRα expression of Beas-2B cells. GRβ expression appears not to be affected by NTHi infection alone, however with corticosteroid shows a trend to decreased expression. The experiments are to be repeated in primary bronchial epithelial cells to determine whether they follow the trend seen here in a cell line.

Abstract P114 Figure 1 Expression of GRβ in Beas-2B cells relative to untreated cells normalised to GAPDH.
Background Chronic obstructive pulmonary disease (COPD) is an inflammatory disorder of the respiratory tract characterised by airflow obstruction. It is increasingly recognised that the innate immune pattern-recognition receptors may contribute to airway inflammation in COPD in response to environmental factors such as cigarette smoke (CS). One pattern-recognition receptor that has recently come to attention in chronic airway disease is the cell surface receptor for advanced glycation end products (RAGE). RAGE also exists as a soluble form (sRAGE) that primarily functions as receptor decoy and an endogenous inhibitor of RAGE signalling. Clinical studies show that smokers with or without COPD have significantly greater levels of RAGE expression in airway epithelial cells compared with never smokers. However, the role of RAGE in mediating CS-induced inflammatory gene expression has not been understood. We hypothesise that CS can induce RAGE expression, sRAGE reduction, and inflammatory gene expression in human bronchial epithelial cells (BEAS-2B).

Method Confluent BEAS-2B cells were treated with different concentrations of Cigarette Smoke Extract (CSE) (1%, 2.5%, and 5%) for 24 hours. Western blotting was used to assess protein expression of RAGE in cell lysate. ELISA was used to measure interleukin 6 (IL-6), CXCL1 (GRO-α), CXCL5 (ENA-78), CXCL8 (IL-8), CXCL10 (IP-10), CCL11 (eotaxin), and sRAGE in culture medium.

Result We found that IL-6 and CXCL8 releases were markedly increased by CSE in a concentration-dependant manner, but CXCL-1, CXCL5, CXCL10 and CCL11 could not be detected in both untreated and CSE-treated cells. Interestingly, RAGE was highly expressed in untreated cells and CSE treatment did not further increase its expression. Furthermore, sRAGE was also undetectable in both untreated and CSE-treated cells.

Conclusion These findings suggest that CSE can induce inflammatory gene expression in BEAS-2B cells. Further experiments are being conducted to explore the effect of CSE on other inflammatory gene expression and to investigate the role of RAGE in mediating CSE-mediated inflammatory response in BEAS-2B cells.

Introduction Alpha-1 antitrypsin deficiency (AATD) is a genetic disorder which predisposes to the development of lung disease. The PiSZ phenotype is associated with a lower risk of disease and a pattern of emphysema more characteristic of patients with chronic obstructive pulmonary disease (COPD) than the PiZZ phenotype. Aberrant migration of neutrophils has been observed in stable COPD, possibly contributing to the pathogenesis. Neutrophils from PiZZ patients show a significantly reduced migratory ability compared with PiSZ phenotypes. Despite this, the migratory characteristics of PiSZ neutrophils have not been investigated.

Methods The chemotaxis of peripheral blood neutrophils in PiSZ patients was characterised using an Insall chamber and time-lapse video microscopy. Migratory characteristics of the neutrophils were compared with existing data from PiZZ and usual COPD patients. A marker of neutrophil elastase activity known as Ast-Val660 was compared between patient groups and the relationship between patient characteristics and neutrophil migration was examined.

Results PiSZ neutrophils moved with a reduced velocity compared to cells from PiZZ patients in the presence of IL-8 treatment. Translation of the ProAxis NE Activity Based Immunoassay (ABI) to a Point of Care (PoC) device, would facilitate routine monitoring of those patients at highest risk of upcoming exacerbations; enabling pre-emptive medical intervention, and mitigating the patient’s risk of developing serious complications.

Methods Active NE levels in sputum samples (n=10) were determined using the NE ABI (ProAxis Ltd, Belfast), in accordance with manufacturer's instructions; followed by assessment using the NEATstik PoC test (threshold 10 µg/ml in sputum). For measurement of NE using NEATstik, sputum was diluted x10, gently rotated for 1 min, an aliquot (70 µl) was then transferred onto the test sample port of the device and allowed to develop for 10 min, after which the signal intensity at the test-line was visually graded (0–10).

Results NE ABI analysis of sputum samples revealed that 7 out of 10 samples under investigation contained active NE at levels above the NEATstik test threshold. All 7 samples were found to produce a strong positive test line on the PoC device. Moreover, no test line was visible for the remaining samples with active NE concentrations below 10 µg/ml.

Conclusion Availability of NEATstik, the first highly sensitive and specific PoC test for the rapid detection of active NE in complex clinical samples, should enable the proactive management of multiple chronic respiratory diseases. It has the potential to assist in the identification of patients at highest risk of imminent exacerbations, and thus allow closer monitoring by their clinical team and/or pre-emptive treatment to avoid/minimise the impact of such exacerbations. Additionally, for those presenting with an ongoing exacerbation, the test facilitates patient stratification, with those most likely to respond to antibiotic therapy identified and their response to treatment assessed.
Procalcitonin can reduce antibiotic usage in patients with suspected respiratory infections in an acute respiratory service

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Introduction
Procalcitonin (PCT) guidance can help safely decrease antibiotic exposure in patients with confirmed respiratory infections.1 Its use however across UK hospitals remains limited. We set out to see if utilising it in an acute respiratory service will aid consultant decision making and reduce unnecessary antibiotic usage.

Methods
A case series of 222 patients with suspected respiratory infections were consecutively included over 3 months. Their records where examined retrospectively. A PCT result of <0.25 μg/L would have suggested no potential need for antibiotics.

Results

- 75 patients (34%) with a COPD exacerbation; 45 (20%) a lower respiratory tract infection; 34 (15%) community acquired pneumonia; 17 (8%) asthma exacerbation; 13 (6%) Hospital acquired pneumonia; 11 (5%) Exacerbation of bronchiectasis; 10 (4%) aspiration pneumonia; 17 (8%) with other conditions, not a primary respiratory infection.
- 172 patients (77%) had a PCT of <0.25 μg/L and 50 (23%) ≥ 0.25 μg/L.
- In 96 patients (56%) with a low PCT, consultants decided not to prescribe antibiotics: stopped in 56 (33%) and not started in 40 (23%).
- In 76 patients (44%) the consultant prescribed antibiotics: continued in 32 (19%); started in 28 (16%) and in 16 (9%) switched to another antibiotic.
- Bronchiectasis and Aspiration pneumonia patients were more likely to get Antibiotics despite low PCT, 6 patients in both groups (54%) and (60%) respectively.
- Lower respiratory tract infections and Hospital acquired pneumonia patients were less likely to be given antibiotics if the PCT was low, 9 patients (20%) in the first group and 3 (23%) in the second.
- In Patients with a PCT level≥0.25 μg/L 45 (90%) received antibiotics.

Conclusion
Low levels of Procalcitonin can reduce antibiotic usage in patients admitted with respiratory infections. This could have an effect on reducing the risk of antimicrobial resistance and costs associated with antibiotic prescriptions. Apprehension remains among respiratory physicians in utilising it as expressed in the number of patients who had antibiotics despite low PCT levels. The validation of the test in conditions like Bronchiectasis and aspiration pneumonia requires further evidence.

REFERENCE

Percy paper: PICKING UP A BUG BY PICKING YOUR NOSE HAND TO NOSE TRANSMISSION OF STREPTOCOCCUS PNEUMONIAE IN HEALTHY PARTICIPANTS – PILOT STUDY

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Introduction and Objectives
Streptococcus pneumoniae (pneumococcus) is a leading cause of morbidity and mortality worldwide, causing community acquired pneumonia (CAP), otitis media, bacterial meningitis and septicemia. Respiratory illnesses are reduced by handwashing, but for pneumococcus, the importance of non-aerosolised modes of spread is unknown. Our objective was to investigate the modes of transmission of S. pneumoniae from the hands to nose that are able to cause colonisation.

Methods
This study examines “hand-to-nose” transmission using a modification of our established controlled human infection model: healthy volunteers were administered pneumococcus (serotype 6B) onto their fingertip or back of their hand (‘wet poke’). Drying of the bacterial residue, or make direct contact with the nasal mucosal surface (pick/poke their nose). Colonisation was defined as pneumococcal culture at any time point between day 2 and 9 post exposure.

Results
Colonisation rates were highest in those participants who poked their nose with wet pneumococcus (‘wet poke group’ 4/10, 40%), and who sniffed the wet bacteria from the back of their hands in a wet or dry dot, and asked to either sniff the bacterial residue, or make direct contact with the nasal mucosal surface (pick/poke their nose). Colonisation was defined as pneumococcal culture at any time point between day 2 and 9 post exposure.

REFERENCE
Conclusion  We have shown that hands can be vehicles for transmission of *Streptococcus pneumoniae* and that wet particles increased transmission. This reinforces the imperative for good hand hygiene especially in populations at risk of invasive pneumococcal disease or pneumonia such as young children, elderly and immunosuppressed people.

**P120**

WHICH SCORING SYSTEM IS BETTER AT PREDICTING LIKELY MORTALITY AND INTENSIVE CARE UNIT (ICU) ADMISSION IN COMMUNITY ACQUIRED PNEUMONIA RELATED SEPSIS?

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Introduction and Aim  Sepsis and pneumonia commonly present together, however the preferred clinical scoring system to use is unclear. NEWS (National Early Warning Score) and SIRS (Systemic Inflammatory Response Syndrome) and SOFA (Sequential Organ Failure Assessment) scores can be used to evaluate patients admitted with sepsis. Due to complexity of SOFA scoring, qSOFA has been proposed for routine practice.\(^1\) We compared sepsis scores in patients with community acquired pneumonia related sepsis (CAP sepsis) and compared this to sepsis from other causes (non-CAP sepsis). We also evaluated how sepsis scoring systems compared with the CURB-65 score to predict mortality and ICU admission in CAP sepsis.

Methods  Medical records were audited between 01/09/2016–20/03/2017 at Barking Havering and Redbridge University Hospitals NHS Trust. Adult patients were included if ICD-10 codes on discharge/death were Sepsis A40/A41. Physiological and blood parameters were collected at time of trigger from medical/electronic records. All plain chest x-rays (CXR) and CT-chest scans were reviewed independently by two respiratory registrars to confirm consolidation. We calculated the positive predictive value (PPV) and negative predictive value (NPV) of each sepsis scoring system against two outcome measures; i) ICU Admission <24 hours ii) Mortality (death) at 30 days.

Outcomes/Results  We identified 114 cases of sepsis. Median age 78 years, Male:female ratio 56:58. We found 22/114 (19%) of patients had a diagnosis of CAP sepsis with CXR/CT-chest confirming consolidation <48 hours from admission. Scores for CAP sepsis (n=22) triggered more often than non-CAP sepsis (n=92) for NEWS \(\geq 4\) (77% vs 54%, p=0.05), SOFA \(\geq 2\) (86% vs 54%, p<0.01). For CAP sepsis and non-CAP sepsis, the PPV and NPV for each sepsis score including CURB-65 were calculated for <24 hour ICU admission and 30 day mortality (Table 1). In patients with CAP sepsis, scores for NEWS/SIRS/SOFA had a high PPV for ICU admission and mortality. CURB-65 \(\geq 3\) had a low PPV but higher NPV.

Conclusion  Patients with CAP sepsis triggered more often with NEWS \(\geq 4\) and SOFA\(\geq 2\) compared to non-CAP sepsis. Our data suggests that NEWS \(\geq 4\), SIRS\(\geq 2\), SOFA\(\geq 2\) or CURB-65\(\geq 2\) may be used as initial screening for CAP sepsis. However, all had low NPV for ICU admission and 30 day mortality. Further studies are needed to evaluate the best scoring system to assess clinical severity for CAP sepsis and avoid unnecessary duplication.

**REFERENCE**


**Abstract P120 Table 1**  Triggering of sepsis scoring systems and CURB-65 scores for predicting ICU admission within 24 hours and 30 day mortality in patients with community acquired pneumonia related sepsis and non-community acquired pneumonia related sepsis

<table>
<thead>
<tr>
<th>Sepsis Scoring System</th>
<th>CAP sepsis (n=22)</th>
<th>non-CAP sepsis (n=92)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total cases triggered n (%)</td>
<td>Admission to ICU&lt;24 hours</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>NPV</td>
</tr>
<tr>
<td>NEWS(\geq 4)</td>
<td>17 (77.2%)</td>
<td>100.0%</td>
</tr>
<tr>
<td>SIRS(\geq 2)</td>
<td>18 (81.8%)</td>
<td>100.0%</td>
</tr>
<tr>
<td>SOFA(\geq 2)</td>
<td>7 (31.8%)</td>
<td>100.0%</td>
</tr>
<tr>
<td>qSOFA(\geq 2)</td>
<td>7 (31.8%)</td>
<td>100.0%</td>
</tr>
<tr>
<td>CURB 65(\geq 2)</td>
<td>16 (72.7%)</td>
<td>85.7%</td>
</tr>
<tr>
<td>CURB 65(\geq 3)</td>
<td>7 (31.8%)</td>
<td>28.5%</td>
</tr>
</tbody>
</table>

**P121**

THE RESPIRATORY INFECTIONS TEAM – A NOVEL PARADIGM IN THE MANAGEMENT OF COMMUNITY-ACQUIRED PNEUMONIA

G Cresswell, T Bewick. Derby Teaching Hospitals NHS Foundation Trust, Derby, UK

10.1136/thoraxjnl-2017-210983.263

Background  The recent British Thoracic Society national audit of community-acquired pneumonia (CAP) has shown that guideline concordance and antimicrobial stewardship remain poor in the UK. Furthermore, mis- and over-diagnosis are common.\(^1\)

Methods  A Respiratory Infections Team was developed, comprising a specialist nurse supported by a respiratory consultant and antimicrobial pharmacist. Its aims were to review patients admitted to hospital with CAP, and to a) identify patients with low severity CAP for remote outpatient management with early supported discharge; b) facilitate streamlined antibiotic regimens using bedside point-of-care (POC) tests (BinaxNOW pneumococcal and legionella urinary antigens, and nasopharyngeal swab for influenza PCR), reducing total amount of antibiotic prescribed both in route and spectrum; and c) improve diagnostic accuracy, communication with clinical coders, and concordance with the BTS pneumonia care bundle. Outcomes were compared with a prospective cohort of consecutive radiographically-confirmed CAP admissions from winter 2013/2014.
Results Over the first year the team reviewed 351 patients with suspected CAP; 50 had a chest radiograph reported as clear and were excluded, leaving 301 for analysis. Length of hospital stay (LOS) was reduced when compared with pre-intervention after adjustment for disease severity using CURB-65 (low severity, 2.8 vs 4.4 days, p<0.01; moderate severity, 4.3 vs 7.6 days, p<0.01; high severity, 6.0 vs 8.9 days, p=0.07). Readmission rate at 30 days was unchanged (54/301, 17.9% vs. 50/324, 15.4%, p=0.45). Early supported discharge was appropriate in 51/172 (30%) patients with low severity CAP; in this group median LOS was 1.4 days and readmission rate 6/51 (11.8%). A positive microbiological diagnosis was made in 69/301 (22.9%) patients compared with 16/324 (4.9%) pre-intervention; 60/301 (19.9%) had a positive POC test with a result available within the acute admitting area. As a result, broad spectrum antibiotic regimens were streamlined in 43 (14.3%) patients.

Conclusion A dedicated respiratory infections team can significantly reduce LOS for patients admitted with CAP. A robust microbiological diagnosis early in the admission episode Results in an improvement in antibiotic stewardship.

REFERENCE

P122
THE EFFECT OF ALCOHOL ON SEVERE RESPIRATORY DISEASES: A SERIES OF SYSTEMATIC REVIEWS AND META-ANALYSES

E Simou, J Britton, J Leonardi-Bee. University of Nottingham, Nottingham, UK

Introduction and Objectives Alcohol consumption is a well-recognised risk factor for a range of diseases, but there is relatively little knowledge on the association between alcohol consumption and respiratory disease risk. We present systematic reviews of alcohol effects on Adult Respiratory Distress Syndrome, asthma, COPD, community acquired pneumonia, obstructive sleep apnoea and tuberculosis.

Methods Systematic reviews identified comparative observational studies listed on Medline, EMBASE and Web of Science, published between 1985 and December 2015, with the exception of tuberculosis, for which we performed a separate search from 2005 to 2017. The reference lists of the eligible studies were also searched. We imposed no language restrictions. Random effects meta-analysis was used to estimate pooled effect sizes with 95% confidence intervals (CI). Heterogeneity was explored using subgroup analyses. funnel plots and Egger’s asymmetry test were used for the assessment of publication bias.

Results A total of 120 papers were included in these reviews (see Table 1). Our reviews confirmed an approximate doubling in the risk of CAP among drinkers. In addition, we found that there is an 8% increase in the risk of CAP for every 10–20 grams higher alcohol intake per day. Also, heavy alcohol consumption was found to significantly increase the odds of ARDS/ALI. Furthermore, a subgroup analysis indicated that this association was primarily due to alcohol abuse. Alcohol consumption increased the risk of TB between 2 and 3-fold, depending on study design. We found no evidence of an effect of alcohol consumption on the risk of asthma and COPD.

Conclusions Our review highlights that high alcohol intake is linked to the risks of several respiratory diseases, and that reducing alcohol intake may have an important role to play in respiratory disease prevention.

Abstract P122 Table 1

<table>
<thead>
<tr>
<th>Alcohol consumption</th>
<th>Respiratory Diseases</th>
<th>Number of studies included in the review</th>
<th>Number of high quality studies</th>
<th>Effect estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARDS/ALI</td>
<td>11</td>
<td>7</td>
<td>0.89–1.98, 95% CI: 1.50–2.60</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>15</td>
<td>2</td>
<td>0.83–1.20</td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>13</td>
<td>7</td>
<td>0.86–1.28</td>
<td></td>
</tr>
<tr>
<td>CAP</td>
<td>11</td>
<td>7</td>
<td>1.20–1.63</td>
<td></td>
</tr>
<tr>
<td>OSA</td>
<td>31</td>
<td>1</td>
<td>1.23–2.56</td>
<td></td>
</tr>
<tr>
<td>TB</td>
<td>39</td>
<td>20</td>
<td>1.63–2.43</td>
<td></td>
</tr>
</tbody>
</table>

Ventilatory strategies for patients with respiratory failure

P123
REVIEW OF PATIENT CHARACTERISTICS AND THEIR ASSOCIATION WITH SURVIVAL IN PATIENTS WITH COPD ON HOME NON – INVASIVE VENTILATION FOR HYPERCAPNIC RESPIRATORY FAILURE: 5 YEAR RETROSPECTIVE STUDY

JE Bleksley, NR Ward, R Pritchard, J Davidson, PD Hughes, J Palmer, B Kathiresan. Plymouth Hospitals NHS Trust, Plymouth, UK

Introduction Home non-invasive ventilation (NIV) can improve outcomes in some patients with chronic obstructive pulmonary disease (COPD) and chronic hypercapnic respiratory failure. It remains unclear how to identify which patients will benefit most from this treatment. We have assessed patient characteristics and ventilator settings, and their association with survival, in individuals with COPD referred to our home NIV service.

Methods Database and case notes of patients with COPD referred to our centre for home NIV between April 2011 and January 2017 were retrospectively analysed. We compared patient characteristics and ventilator settings in those who survived ≥12 months, to those who died earlier.

Results 150 patients were referred for home NIV; 41 patients did not tolerate NIV and discontinued treatment. Of the 109 who used NIV, 50 were alive in July 2017. Full data was available for 87 (58%) patients. Median survival in patients who used NIV (n=73) was 14.2 months (Interquartile Range IQR) 3.2–28.8). In patients who discontinued NIV (n=14), survival was 21 months (IQR 5.2–18.2; p=0.81). Characteristics and NIV settings in the 79 patients who used NIV are shown in Table 1.
Discussion 109 (73%) patients with COPD and hypercapnic respiratory failure continued using NIV after set up. Our data demonstrates lower body mass index was significantly associated with surviving<12 months after starting NIV. Patients who survived more than 12 months showed a non-significant trend to be male, younger and use NIV for more than 4 hours each night at higher inspiratory pressures. An unexpected finding was that patients intolerant of NIV showed a trend to longer survival, compared to those who continued with NIV. This may be due to the small number of patients with full data, or that 50% of these patients had stable hypercapnic respiratory failure at NIV initiation, compared to 25% in the patients who used NIV.

Conclusions These observations highlight the need for careful patient selection when considering which patients with COPD may benefit from home NIV, an awareness of the different features that may contribute to survival, and subsequent attention to ventilator settings and compliance once the treatment has begun.

Methods Between February and June 2017 67 patients (26 OHV, 21 COPD, 20 other cause hypventilation) who had clinical indications for home NIV were commenced on iVAPS with auto-EPAP and intelligent backup rate mode NIV (Lumis, ResMed) with remote monitoring (Airview, ResMed) and their data was retrospectively reviewed.

Results 31 patients commenced NIV as a day-case rather than as inpatients (our previous service model), saving 93 occupied bed days. Patients required on average 3 data reviews and 1 telephone consultation. Remote prescription change – eg changing of pressures or adjustment of iVAPS targets to achieve symptomatic benefit or tolerance – was required in 38 patients, with 20 requiring more than 1 change. Adverse monitoring findings triggered beneficial early follow up day-case review in 12 patients. The majority of patients realised good NIV usage and benefit (based on standard monitoring parameters) after optimisation; 6 patients discontinued NIV use despite treatment adjustments. Disease-specific patterns of iVAPS pressure support provision with volume assured mode were noted. Auto-EPAP was poorly tolerated in COPD patients.

Conclusion 2-way remote monitoring highlights NIV therapy issues, allowing early remote or daycase troubleshooting and optimisation, which should translate to improved treatment outcomes. Remote monitoring facilitates day-case initiation, saving occupied bed days and outpatient visits vs our previous service model. 2-way monitoring identifies intractable non-compliant patients, expediting ventilator recovery. Disease-specific iVAPS prescription patterns have been identified which will provide novel management and pathophysiological insights.

Poster sessions

<table>
<thead>
<tr>
<th>Abstract P123 Table 1</th>
<th>Survived&lt;12 months (n=30)</th>
<th>Survived&gt;12 months (n=43)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>71.1 (64.3–74.8)</td>
<td>65.5 (62.4–75.3)</td>
<td>=0.47</td>
</tr>
<tr>
<td>Number (%) Male</td>
<td>10 (33%)</td>
<td>24 (56%)</td>
<td>=0.06</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>21.3 (17.2–25.3)</td>
<td>26.1 (21.0–30.8)</td>
<td>=0.03</td>
</tr>
<tr>
<td>Number (%) initiated after acute admission</td>
<td>24 (80%)</td>
<td>31 (72%)</td>
<td>=0.44</td>
</tr>
<tr>
<td>Forced Expiratory Volume in 1 s (L)</td>
<td>0.65 (0.44–0.85)</td>
<td>0.82 (0.52–0.95)</td>
<td>=0.89</td>
</tr>
<tr>
<td>Baseline pCO2 (kPa)</td>
<td>9.9 (8.4–11.7)</td>
<td>9.2 (8.2–10.7)</td>
<td>=0.33</td>
</tr>
<tr>
<td>Inspiratory Positive Airway Pressure (cm H2O)</td>
<td>22 (19–28)</td>
<td>25 (20–27)</td>
<td>=0.23</td>
</tr>
<tr>
<td>Expiratory Positive Airway Pressure (cm H2O)</td>
<td>5 (5–6)</td>
<td>5 (4–5)</td>
<td>=0.02</td>
</tr>
<tr>
<td>Number (%) using NIV&gt;4 hours per night</td>
<td>20 (67%)</td>
<td>39 (90%)</td>
<td>=0.1</td>
</tr>
</tbody>
</table>

Data are presented as median (Interquartile Range)

P124 EARLY EXPERIENCE WITH 2-WAY REMOTE MONITORING FOR THE INITIATION OF VOLUME-ASSURED HOME NON-INVASIVE VENTILATION

G McDowell, D MacFarlane, R Tourish, C Canavan, A Brown, H Ambler, C Carlin. Queen Elizabeth University Hospital, Glasgow, UK

10.1136/thoraxjnl-2017-210983.266

Introduction The prevalence of conditions requiring nocturnal breathing support is increasing. 2-way remote monitoring via a cloud based system provides access to home non-invasive ventilation (NIV) data, highlights therapy issues and facilitates prescription changes to optimise NIV and potentially rationalise patient follow up. Remote-adjustable volume-assured NIV modes with auto-EPAP and intelligent backup rates offer prospects for improved NIV titration. We have adopted these emerging technologies with aim of improving patient outcomes and service efficiency. Interrogation of remote monitoring NIV data will provide insights to the utility of new NIV modes.

Method

Discussion

10.1136/thoraxjnl-2017-210983.267

In practice but fell short of statistical significance (Stygall G, Justice I, Chakraborty B, Oakes A, Watson A, Antoine-Pitterson P, Mukherjee R, Birmingham Heartlands Hospital, Birmingham, UK, University of Birmingham, Birmingham, UK)

10.1136/thoraxjnl-2017-210983.267

Introduction There are over 4 000 acute care mask application episodes coded in the treatment of acute respiratory failure in the UK every month according to a 2017 survey (NCEPOD). Most guidelines on acute NIV use suggest good skin care strategies including regular mask pressure relief. However, data on the magnitude of the problem of nasal bridge pressure ulceration and the effect of proactive preventative steps (e.g., hydrocolloid dressings) remains scant. A previous smaller but similar survey in a district general hospital showed a trend in the reduction of Grade2 Pressure ulcer rates following change in practice but fell short of statistical significance (Stygall G, Morley K, Pickup L, et al. Thorax 2016. 71:3. A124–A125.). We set out on a quality improvement project and systematically examined the effect of a proactive approach to prevent Grade2 Pressure ulcers in a dedicated ward-based Physiotherapy-led acute NIV service in a teaching hospital serving a population of about 40 000.

Methods

In addition to the routine acute NIV data for the unit, additional data was collected from 30/10/14 to 31/08/2015 on: NIV mask used (model and size), total number of admissions with days of NIV (NIV bed-days) and nasal bridge tissue viability grading. This included a 12 month period before (period1) and a 12 month period after (period2) the
introduction of the proactive prevention approach. A pressure ulcer was defined as Grade2 or above. Pearson’s chi-squared test for comparison between groups and Fisher’s exact test were applied to assess significance.

**Results** [See Table] In period1, there were 161 admissions and 9 Grade2 pressure ulcers from 666 NIV bed-days (ulceration rate=9/666); in period2 there were 134 admissions and 0 pressure ulcers from 718 NIV bed-days (ulceration rate=0/718). There was a statistically significant reduction in Grade2 Pressure ulceration rates (Pearson’s chi-square statistic=7.786; p-value=0.0013 in period2 compared to period1). Application of an early prophylactic pressure-relieving hydrocolloid nasal dressing reduces the chance of developing Grade2 pressure ulcers in patients using NIV acutely. Further longitudinal studies including data on a preventative approach towards NIV-related nasal bridge pressure ulceration are needed to confirm the utility of this approach.

### Abstract P125 Table 1

<table>
<thead>
<tr>
<th>30/10/14 – 29/10/15</th>
<th>30/10/15-29/10/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>12th month – AFTER preventative strategy introduced</td>
</tr>
<tr>
<td>12th month – BEFORE preventative strategy introduced 30/10/15 (PERIOD1)</td>
<td></td>
</tr>
<tr>
<td>NIV</td>
<td>Admissions</td>
</tr>
<tr>
<td>161</td>
<td>134</td>
</tr>
<tr>
<td>Total NIV duration (NIV bed-days)</td>
<td>718</td>
</tr>
<tr>
<td>Grade2 nasal bridge pressure ulcers</td>
<td>9</td>
</tr>
</tbody>
</table>
Results Five studies involving 73 patients were included in this review. Four studies (59-subjects) compared the efficacy of nebulisers against MDI, and one study (14-subjects) compared ELB against MDI. The review found that all three modes were effective in significantly reducing both PIP and $R_{aw}$ with two studies suggesting that nebulisers appear to be more effective than MDI (GRADE – moderate). ELB was found to be especially effective as a rescue therapy when conventional management had failed (GRADE – moderate). The studies were limited by small sample sizes, large variability in outcomes measures, incomplete reporting and a high degree of heterogeneity; thus, precluding a meta-analysis. The risk of bias ranged from low to uncertain across most domains.

Conclusions A systematic review of RCTs found that there was insignificant evidence to assert the superiority of any one mode of bronchodilators over the other, and thus a balanced and nuanced approach to managing acute bronchospasm should be contextualised to the individual needs and best-interest of the patient using a multi-modal approach. Further high-quality RCTs with larger samples sizes, preferably comparing all three modalities are required to conclusively provide a tangible answer.

Abstract P128 Figure 1 rBPG signal spectrum with examples of respiration rate estimation during the HFJV.

P129 IMPLEMENTING TARGET RANGE OXYGEN IN CRITICAL CARE (TROCC): A BASELINE SURVEY AND PILOT STUDY

Iatrogenic hyperoxaemia is common on Critical Care Units (CCUs) throughout the world and high blood oxygen levels have been associated with adverse outcomes including increased mortality. We have commenced a pilot quality implementation study to analyse the views of Critical Care staff regarding oxygen therapy and to change practice to ensure that all patients in the Critical Care Unit have a prescribed target oxygen saturation range. 33 CCU staff responded to an online questionnaire (16 doctors, 7 nurses, 9 physiotherapists, 1 ACCP). 76% thought that slightly too much oxygen was used on the unit but only 53% favoured a formal prescription for oxygen for all patients. For ventilated patients not at risk of hypercapnia, 83% would favour a target range of 94%–98% and 10% would opt for a target range of 90%–94%. For patients at risk of hypercapnia, all respondents favoured a target range of 88%–92%. A baseline audit of practice on the unit studied 54 patients (28 on ventilators) over one month prior to the implementation of a programme of change. 85% of audited patients (46 of 54) had a formal oxygen prescription with target range. Forty patients had target range 94%–98% and six patients had target range 88%–92%, all...
prescriptions were judged to be appropriate. The mean PaO₂ on blood gas samples was 13.1 kPa compared with 15.1 kPa in 2005 and 14.9 kPa in 2010. Mean PaCO₂ was 5.3 kPa. The mean SpO₂ (pulse oximetry) was 96.8% [median 97%, range 91%–100%]. 82% of SpO₂ values were within the target range but four of six patients with target range 88%–92% were at least 2% above this range. Attitudes and practice in our Critical Care Unit have changed in the past decade and hyperoxaemia is less common now. However, practice still lags behind the declared ambition of our Critical Care colleagues to maintain normoxaemia for most patients. We have instituted changes to CCU practice in May–June 2017. These changes will inform the design of a technological randomised cluster implementation study using a step-wedge design to implement current best practice in a wide range of Critical Care units.

**Introduction**

Automatic evaluation of spontaneous breathing recovery for patients during artificial ventilation is one of the central problems in the early postoperative period. The basic criteria for adequate breathing recovery are rhythmic movements and respiration muscle tone. The current paper presents the possibilities of using video processing technology to determine spontaneous breathing recovery in patients during high frequency jet ventilation (HFJV). We refer to this technology as remote body plethysmography (rBPG).

**Materials and Methods**

The 16 subjects (male and female) involved in the experiment, aged between 24 and 76, had undergone operation of the thoracic cavity. Each patient provided written informed voluntary consent prior to study procedures. Immediately after operation, patients enter the intensive care unit, and have HFJV administered for a time between 30 min up to 2 hours or until the full recovery of muscle tone, consciousness and adequate spontaneous breathing is made. The HFJV was performed by the ZisLine JV100A device (Triton Electronics Systems Ltd., Russia, registration No 2010/08739). The HFJV was performed by the ZisLine JV100A device (Triton Electronics Systems Ltd., Russia, registration No 2010/08739). The reference respiration rate was measured by impedance pneumography with an MP 6–03 monitor (Triton Electronics Systems Ltd., Russia, registration No N2007/00597). The patient body video recording was performed at a distance of 80 cm using two Logitech C920 webcams with 640 × 480 pixel resolution and 30 Hz sampling frequency. The original video processing software was used to rBPG signals assessment in real-time. The chest and epigastric movements were processed independently.

**Results**

The results of rBPG measurement showed that in most cases the process of restoring spontaneous breathing begins with diaphragmatic breathing. The thoracic breathing recovery can be quantified through the measurement of chest movement amplitude. The example of breathing recovery presented in figure 1. The amplitude is raised alongside muscle tone recovery.

**Conclusion**

rBPG provides readings of measurements of diaphragmatic and thoracic breathing from epigastric and chest regions. It allows the relative contribution of each region in total respiration to be quantified. Thus, rBPG can be used for assessing respiration muscle tone recovery and for measuring respiration parameters. It can be used to accurately select the appropriate time for turning off the ventilator and for extubation.

**Abstract P130 Figure 1** The chest and abdomen movement amplitude alongside spontaneous breathing recovery.

**P131**

**WEANING OUTCOMES FROM TRACHEOSTOMY VENTILATION IN AN ACUTE RESPIRATORY CARE UNIT (ARCU): A THREE-YEAR EXPERIENCE**

S. Sufyan, MN Khan, M Thirumaran, SP Meghjee, AOC Johnson, A Dwarakanath. Mid Yorkshire Hospitals NHS Trust, Wakefield, West Yorkshire

**Introduction**

Patients who had tracheostomy in intensive care unit (ICU) as part of acute admission and are slow to wean from ventilation are admitted to our acute respiratory care unit (ARCU). We evaluated the long-term outcomes of attempted weaning from ventilator support in terms of underlying diagnosis, comorbidities, length of stay (LOS), level of support at discharge and one year survival.

**Methods**

Twelve patients admitted to ARCU as a step-down from ICU between January 2014 and December 2016 were included. Patients were identified using discharge database and data was collected from electronic records and patient notes. Patients were excluded if they had tracheostomy inserted on a previous admission.

**Results**

The patient demographics, length of stay on ARCU and primary diagnosis leading to respiratory failure requiring intubation and subsequent tracheostomy and the LOS on ICU and ARCU are described in Table 1. All but two had significant other comorbidities including neuromuscular disorders, COPD, cardiovascular disorders and OSA. No patients died in hospital. Eight (67%) patients were discharged without any ventilatory support after decannulation, Two (17%) required overnight ventilation and were discharged with tracheostomy ventilation. One patient was transferred to the neuro rehabilitation unit and one to a different ARCU with tracheostomy (self ventilating). Complications during weaning included pneumonia, pneumothorax, delirium, persistent secretions/mucus...
The role of ventilation in pneumonic acute hypercapnic respiratory failure; methods.

Conclusion Respiratory weaning from tracheostomy ventilation represent a heterogeneous group which is complex with diverse aetiology and multiple comorbidities. There is a considerable variation in the LOS on ARCU and is often unpredictable. Although more than two third of patients wean successfully on our unit it carries a high one year mortality. LOS is influenced by the complexity of discharge planning. We are not a dedicated weaning unit and our unit is not staffed to look after more than two tracheostomy-ventilated patients at any one time which combined with prolonged stay slows down patient flow from ICU to ARCU and from ARCU to the wards. Multidisciplinary approach and dedicated weaning units are needed that is able to look after complex needs in hospital and coordinate complex discharges.

P132
THE ROLE OF VENTILATION IN PNEUMONIC EXACERBATIONS OF COPD

1TM Hartley,1ND Lane,1J Steer,1C Echevarria,1SC Bourke.1Northumbria Healthcare NHS Foundation Trust, North Shields, UK; 1The Newcastle upon Tyne Hospitals NHS Foundation Trust, Newcastle upon Tyne, UK

Introduction In isolated pneumonia, most trials show that NIV does not improve outcome, and may delay more appropriate intubation. However in pneumonia complicating COPD with acidaemic respiratory failure (AHRF), an RCT showed NIV reduced the need for intubation and conferred a survival benefit at 2 months.1 UK NIV guidelines state NIV is not indicated in pneumonia; whether this was intended to apply when pneumonia complicates another condition associated with a favourable response to NIV is unclear and there is substantial variation in practice. In our institution, most patients with pneumonic exacerbation of COPD (pECOPD) and AHRF receive NIV; few decline ventilation or are immediately intubated.

Methods From a consecutive historical cohort of patients receiving assisted ventilation for spirometry confirmed ECOPD and AHRF, chest radiographs, electronic data and clinical notes were reviewed. The presence of consolidation was determined in the following hierarchy: attending consultant physician interpretation (to mimic reality); radiologist report; or researcher interpretation. Analysis performed using IBM SPSS; significance identified using student’s t-test, Mann Whitney U or chi-squared test for parametric, non-parametric and categorical data respectively.

Results Among patients surviving to discharge, 90 day and 6 month mortality was 12.8% and 20.3% respectively in those with consolidation, compared to 12.9% and 18.4% respectively in those without.

Discussion Compared to those without pneumonia, patients with pECOPD were older, had more comorbid illnesses, more severe acidaemia and greater functional limitation. In addition, AHRF was more likely to have developed after admission, despite initial medical therapies (an adverse prognostic marker). Unsurprisingly, in-hospital mortality was significantly higher in those with pECOPD, but approximately 2/3 survive to hospital discharge and post-discharge outcomes between the two groups are comparable. Coexistent consolidation is a marker of adverse acute outcome and an indication for closer monitoring but should not preclude ventilation, especially when few are considered eligible for intubation.

P133
ACUTE HYPERCAPNIC RESPIRATORY FAILURE; APPLICATION OF A NOVEL HUMAN FACTORS APPROACH TO IMPROVE RECOGNITION AND MANAGEMENT

1Hi Pick, 1P Cull, 1E Mullaney, 1S Smith, 2N Taylor, 1G Lowrey. 1Royal Derby Hospital, Derby, UK; 2Hu-Tech Human Factors Ergonomics, London, UK

Introduction In isolated pneumonia, most trials show that NIV does not improve outcome, and may delay more appropriate intubation. However in pneumonia complicating COPD with acidaemic respiratory failure (AHRF), an RCT showed NIV reduced the need for intubation and conferred a survival benefit at 2 months.1 UK NIV guidelines state NIV is not indicated in pneumonia; whether this was intended to apply when pneumonia complicates another condition associated with a favourable response to NIV is unclear and there is substantial variation in practice. In our institution, most patients with pneumonic exacerbation of COPD (pECOPD) and AHRF receive NIV; few decline ventilation or are immediately intubated.

Methods From a consecutive historical cohort of patients receiving assisted ventilation for spirometry confirmed ECOPD and AHRF, chest radiographs, electronic data and clinical notes were reviewed. The presence of consolidation was determined in the following hierarchy: attending consultant physician interpretation (to mimic reality); radiologist report; or researcher interpretation. Analysis performed using IBM SPSS; significance identified using student’s t-test, Mann Whitney U or chi-squared test for parametric, non-parametric and categorical data respectively.

Results Among patients surviving to discharge, 90 day and 6 month mortality was 12.8% and 20.3% respectively in those with consolidation, compared to 12.9% and 18.4% respectively in those without.

Discussion Compared to those without pneumonia, patients with pECOPD were older, had more comorbid illnesses, more severe acidaemia and greater functional limitation. In addition, AHRF was more likely to have developed after admission, despite initial medical therapies (an adverse prognostic marker). Unsurprisingly, in-hospital mortality was significantly higher in those with pECOPD, but approximately 2/3 survive to hospital discharge and post-discharge outcomes between the two groups are comparable. Coexistent consolidation is a marker of adverse acute outcome and an indication for closer monitoring but should not preclude ventilation, especially when few are considered eligible for intubation.

REFERENCE
Aim Acute hypercapnic respiratory failure (AHRF) is a medical emergency. Data from National COPD Audit Programme identified that median time from admission to Non-Invasive Ventilation (NIV) is 4.1 hours and only 42.7% of patients requiring ventilatory support receive it in under 3 hours. We utilised a novel human factors approach, reviewing AHRF case examples and undertaking multi-disciplinary discussion, to review current systems and develop interventions to improve the recognition and management of AHRF.

Methods Multi-disciplinary workshops were undertaken across emergency medicine, acute medicine, and specialist medicine to discuss case examples of AHRF. Attendees discussed the identification and management of AHRF based on the presented cases and their clinical experience. Output from the workshops and case reviews were analysed and informed the development of a Bow-Tie model that reviewed current systems in AHRF. The model identified barriers which usually facilitate effective management of these patients and threats to barriers which compromise patient care (figure 1). Interventions to address threats were developed and implemented.

Outcome/Results Interventions resulting from the multidisciplinary workshops and novel application of Bow-Tie analysis (figures 1) included: automated flag of Results showing AHRF on electronic Results software; AHRF management and referral checklists; multifaceted training of teams in management of AHRF (simulation training, capillary blood gases training, ward based training).

Conclusions The novel application of this human factors approach in a healthcare setting allowed the identification of specific threats and development of interventions to strengthen barriers targeted at improving patient care and reducing harm.
Characterisation of lung disease with imaging and physiology

**P134** AN EVALUATION OF A NEW LUNG FUNCTION TEST: TLNO IN HEALTHY SUBJECTS

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**Background and Aims** TLNO, transfer factor for nitric oxide, is a pulmonary function test of gas transfer. The test, in combination with carbon monoxide, allows for calculation of the alveolar membrane diffusing capacity and red blood cell conductance. This allows physicians to recognise physiologically where issues with gas transfer arise. Currently, there are very few papers looking at TLNO reproducibility in healthy subjects and none aiming with a target of 5% repeatability between efforts. This study attempts to look at the reproducibility of TLNO over 10 sessions (7 weeks total) with an intra-session repeatability of 5%. In addition, comparison of TLCO measurements between 10 and 5 s breath holds are made.

**Methods** 14 normal subjects were recruited and a baseline spirometry was taken and height, weight, age and sex were recorded. Subjects were asked to perform a TLCO test with a 10 s breath hold followed by 10 repeated sessions of the TLNO test on different days. Measurements within 5% of each other were considered acceptable repeated Results in one session. A Bland-Altman plot and regression line were constructed to compare TLCO measures between different breath hold times. One-way repeated measures ANOVA, measurement error values, intra and inter-session variability were calculated for TLNO and TLCO recordings obtained over the 10 repeated sessions.

**Results** Bland-Altman plot revealed no statistically significant (p=0.783, p>0.05) difference between TLCO breath hold times. Coefficient of determination from the regression line, $r^2=0.860$. Repeated measures ANOVA revealed no significant difference for TLNO and TLCO measurements over time at $p=0.374$ and $p=0.842$ (p≥0.05) respectively. Intra-session and inter-session variability for TLNO were calculated as 15.02 ml/min/mmHg and 16.12 ml/min/mmHg respectively. TLCO intra-session and inter-session variability were 4.30 ml/min/mmHg and 3.70 ml/min/mmHg. We have shown that TLNO values recorded with the shorter 5 s breath hold agree with the conventional 10 s technique. Over a 7 week period TLNO and TLCO do not change significantly and calculated session variability is consistent with ERS/ATS guidelines.

**Conclusion** TLNO is a highly reproducible test over a 7 week period and a shortened breath hold in healthy people provides the same values as the traditional 10 s breath hold for TLCO.
Introduction The current gold standard assessment of diaphragm contractility involves invasive measures of transdiaphragmatic pressure (Pdi) (ATS/ERS 2002). Surface mechanomyography (sMMG) is a non-invasive measure of muscle fibre vibration during contraction. Sarlabous et al (ERJ 2015) reported a high correlation between diaphragm sMMG (sMMGdi) amplitude and inspiratory mouth pressure, a measure of global respiratory muscle function. To further validate the technique, the relationship between sMMGdi and Pdi was examined in this study, hypothesising that there would be a close relationship between sMMGdi and Pdi in healthy subjects.

Methods Pdi and sMMGdi (right lateral chest) were measured in 12 healthy subjects (6 male, age 33 (30–38) years, BMI 22.2 (20.6–24.2) kg/m²) during an increasing inspiratory threshold loading protocol. sMMGdi signals were analysed using fixed sample entropy (fSampEn). Mean and peak values, and the area under the curve of inspiratory Pdi and fSampEn sMMGdi, were calculated and compared.

Results Strong correlations between the non-invasive sMMGdi and the invasive Pdi measures were observed for all three parameters (figure 1).

Conclusion The strong correlation between measures of sMMGdi and Pdi in healthy subjects suggests that sMMGdi could provide a clinically applicable noninvasive index of respiratory muscle contractility in patients with respiratory muscle weakness for diagnosis and monitoring.
Kinetics of intrathoracic pressure change following administration of CPAP


Introduction An understanding of the changes in intra-thoracic pressure in response to application of Continuous Positive Airway Pressure (CPAP) is important in the study of thoracic and ventilator mechanics and device tolerability. It is unclear how quickly intra-thoracic pressure, measured directly with balloon catheters, responds to a change in CPAP. The aim of this study was to evaluate the kinetics of pressure stabilisation in healthy subjects.

Methods Mouth pressure (Pmo) was measured directly at the facemask of a NIPPY3 CPAP system, oesophageal pressure (Poes) and gastric (Pga) pressures were measured with balloon catheters in healthy subjects (n=7), seated at rest, with 10 min spontaneous ventilation followed by 20 min at CPAP of 5 cmH2O, then 20 min at CPAP 10 cmH2O, then 10 min no CPAP.

Results Pmo was lower than the setting for CPAP on the NIPPY3 machine; for CPAP=5 cmH2O mean Pmo=4.67 cmH2O, SD 0.29 cmH2O; for CPAP=10 cmH2O, mean Pmo=9.09 cmH2O, SD 0.3 cmH2O. Poes with 5 cmH2O was higher than with no CPAP; 3.31 v 0.13 cmH2O, p<0.05; with 10 cmH2O, 5.16 v 3.31 cmH2O, p<0.05; with CPAP back to 0 cmH2O, 5.18 v 1.1 cmH2O, p<0.05. There was a wide variability of gastric pressures both with and without CPAP; no significant changes in Pga with CPAP. Stabilisation of Pmo and Poes pressures after CPAP settings were changed occurred within 2 min for change in CPAP from 0–5 cmH2O, 5–10 cmH2O, and 10–0 cmH2O with Pmo maximum time to stabilise 80 s, Poes maximum time to stabilise 86 s. Pga stabilisation took longer; for CPAP setting change 0–5 cmH2O, time to stability for Pga was 111–470 s; for CPAP 5–10 cmH2O, 46–183 s; for CPAP setting change 10–0 cmH2O, 37–135 s.

Conclusions In healthy subjects the kinetics of thoracic pressure stabilisation, following application of CPAP, is highly variable. Gastric pressure takes longer to stabilise and varies more than Pmo and Poes. This may reflect variation in diaphragm tonicity, gastric contraction or abdominal wall tone. These variable time constraints need considering when evaluating CPAP intervention. Subject variability in gastric pressure may contribute to reduced tolerability in some individuals and requires further study.

Poster sessions

Abstract P137 Figure 1 Example 19F images (coronal views) Acquired during an 18s breath-hold after 3 deep gas inhalations.

REFERENCES

A randomised comparative study of cough peak expiratory flow (CPEF) using full face mask vs mouthpiece interfaces in healthy subjects

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Background Cough Peak Expiratory Flow (CPEF) is a respiratory muscle function test designed to assess the ability to clear airway secretions adequately. Present practice requires CPEF to be measured using a mouthpiece, which has proven problematic in patients the neuromuscular disease(s). The study aimed to determine the effectiveness of using a facemask vs mouthpiece in measuring CPEF.

Hypothesis CPEF measured via an Intersurgical Anaesthetic Full-Face Mask will provide comparably similar (CI 0.95) Results to those obtained using a flanged mouthpiece.

Participant Population Healthy participants were recruited into the study through faculty newsletters, social media advertisements and random convenient sampling of network connections. Participants were screened, following ethical approval, using a specifically-designed Pre-screening Medical Questionnaire (PSMQ) against an Inclusion criterion, before inclusion to the study.

Methods Testing procedure ensured standard spirometry position was adopted. The participant was asked to expire to residual volume (RV), followed by a rapid inhalation to total lung capacity (TLC) where a forceful cough manoeuvre was made. Procedure was repeated at least 3 times, with 45 s rest between attempts. A maximum of 8 attempts per interface was allowed, with a 10 min change-over period between interfaces. A students 2-sample t-test, Bland-Altman and regression analysis were employed to statistically analyse the data. Randomisation occurred using the excu RAND command on the sample ID’s.

Results 60 healthy subjects were recruited, of which 58 participants’ Results were deemed appropriate to study. The mean result of each interface was analysed to indicate no significant differences of CPEF measurements in healthy subjects (CI 95%, p=0.971). There were no significant differences between Age and Gender (CI 95%, Age p=0.453, Gender p=0.902).
with the different interfaces. Analysis of each interfaces' maximal effort (CPEF max) indicated no significant differences (CI 95%, p=0.943). Randomised sequence data was analysed, where it concluded that there was no significant influence of interface sequencing on the Results (CI=95%, p=0.671).

**Conclusion** The study's Results support the hypothesis, suggesting interchangeability of both interfaces. This now offers a platform for further study in the viability of facemask CPEF within the clinical setting, as well as providing a standardised protocol and CPEF reference values.

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**P140** HYPOXIC CHALLENGE TESTING IN MOTOR NEURONE DISEASE

I J Cliff, N Mustfa, H Stone. University Hospitals of North Midlands, Stoke-on-Trent, UK

Introduction Respiratory muscle weakness is a feature of motor neurone disease (MND), develops insidiously and presents with subtle symptoms. It can be difficult to assess in MND patients who, as a result, may be at risk of desaturation at altitude. Hypoxic challenge tests (HCT) can identify patients who would benefit from in-flight oxygen, but evidence as to which patients should be referred is lacking. The aim of this study was to identify factors that may predict the need for in-flight oxygen in this group of patients where maintaining their independence for as long as possible is paramount.

Methods 81 consecutive HCT's in 53 male, 28 female patients, and the contemporaneous assessments for respiratory muscle weakness on patients with MND. Data from patients requiring in-flight oxygen according to the HCT was compared to data from patients who did not, in accordance with the BTS Guidance for Air Travel 2011.

Results The median patient age of patients who passed the HCT was 62 years; those that failed the HCT were significantly older with a median age of 68 years (p=0.009). There was a significant difference in baseline PaO2 and PaCO2 between the groups as shown in Table 1; patients who passed the HCT had higher baseline PaO2 and lower PaCO2 (10.4 kPa and 5.3 kPa versus 9.3 kPa and 6.2 kPa respectively p=0.0001 and 0.0014). No other parameter, including BMI, smoking history, or physiological measurement including SNIP, or spirometry, could predict the outcome of the HCT.

Conclusions Although MND patients that are likely to fail a HCT have a higher baseline CO2, a threshold CO2 value that could identify patients needing in-flight oxygen was not determined. We recommend that the safest approach is to refer all patients with MND that intend to fly for HCT assessment until more evidence-based data is available, which is the current practice at this regional centre.

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**Abstract P139 Table 1** Descriptive statistics of individual subgroups of the study

<table>
<thead>
<tr>
<th></th>
<th>CPEF(f) (L/min)</th>
<th>CPEF (m) (L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Total</td>
<td>512.30 ± 89.40</td>
<td>511.70 ± 87.90</td>
</tr>
<tr>
<td>Gender; Male</td>
<td>584.24 ± 49.43</td>
<td>583.58 ± 48.84</td>
</tr>
<tr>
<td>Gender; Female</td>
<td>435.30 ± 48.60</td>
<td>434.78 ± 43.22</td>
</tr>
<tr>
<td>Age; 18-39</td>
<td>525.00 ± 85.40</td>
<td>523.0 ± 85.2</td>
</tr>
<tr>
<td>Age; 40-60</td>
<td>479.80 ± 95.20</td>
<td>483.70 ± 92.80</td>
</tr>
<tr>
<td>CPEFmax</td>
<td>522.60 ± 89.60</td>
<td>523.80 ± 88.80</td>
</tr>
</tbody>
</table>

**P141** PULMONARY FUNCTION TEST PHYSIOLOGY AND PROGRESSION IN DIFFUSE IDIOPATHIC PULMONARY NEUROENDOCRINE CELL HYPERPLASIA (DIPNECH)

1 I Barlow, 2 D Ryan, 3 W Mansoor, 4 M Howell, 4 N Clayton, 4 R Niven. University of Manchester, Manchester, UK; 2 Beaumont Hospital, Respiratory Department, Dublin, Ireland; 3 The Christie NHS Foundation Trust, Manchester, UK; 4 North West Lung Centre, University Hospital South Manchester, Manchester, UK

Introduction Respiratory muscle weakness is a feature of motor neurone disease (MND), develops insidiously and presents with subtle symptoms. It can be difficult to assess in MND patients who, as a result, may be at risk of desaturation at altitude. Hypoxic challenge tests (HCT) can identify patients who would benefit from in-flight oxygen, but evidence as to which patients should be referred is lacking. The aim of this study was to identify factors that may predict the need for in-flight oxygen in this group of patients where maintaining their independence for as long as possible is paramount.

Methods 81 consecutive HCT’s in 53 male, 28 female patients, and the contemporaneous assessments for respiratory muscle weakness on patients with MND. Data from patients requiring in-flight oxygen according to the HCT was compared to data from patients who did not, in accordance with the BTS Guidance for Air Travel 2011.

Results The median patient age of patients who passed the HCT was 62 years; those that failed the HCT were significantly older with a median age of 68 years (p=0.009). There was a significant difference in baseline PaO2 and PaCO2 between the groups as shown in Table 1; patients who passed the HCT had higher baseline PaO2 and lower PaCO2 (10.4 kPa and 5.3 kPa versus 9.3 kPa and 6.2 kPa respectively p=0.0001 and 0.0014). No other parameter, including BMI, smoking history, or physiological measurement including SNIP, or spirometry, could predict the outcome of the HCT.

Conclusions Although MND patients that are likely to fail a HCT have a higher baseline CO2, a threshold CO2 value that could identify patients needing in-flight oxygen was not determined. We recommend that the safest approach is to refer all patients with MND that intend to fly for HCT assessment until more evidence-based data is available, which is the current practice at this regional centre.
Introduction Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia (DIPNECH) is a rare condition characterised by a generalised proliferation of pulmonary neuroendocrine cells within the respiratory epithelium. Current literature is limited, in particular little is known of its effects on pulmonary function both at the time of diagnosis and prospectively, though it is recognised to cause small airway obstruction.

Objective The aim of this study was to characterise pulmonary function, both at baseline and to also define the change in pulmonary function over time in patients with DIPNECH.

Methods Retrospective analysis of pulmonary function data for patients with a histological diagnosis of DIPNECH was performed. At baseline, pulmonary function was characterised as either obstructive, small airways obstruction, restrictive, mixed (obstructive and restrictive) or normal. Normal lung function data was also described. FEV1 was used as the main measure of pulmonary function, and simple linear regressions were created for patients with longitudinal data. This then allowed basic statistical analysis of the change in FEV1 compared to the predicted change.

Results 17 patients (82% female), with a mean age of 59, were included. All had pulmonary function data at baseline and 9 (53%) had prospective data. Baseline pulmonary function was predominantly obstructive in nature with 6 (35%) having classical obstruction, and 7 (41%) small airways obstruction alone with a normal FEV1/FVC ratio, the remaining 4 having either normal (n=3, 23%) or mixed (n=1, 6%) physiology. The mean FEV1 at baseline was 81.6%, and a statistically significant difference was present between mean measured and predicted FEV1 values for the cohort (p=0.02). Mean DLCO (n=13) was mildly decreased at 84.6% predicted however corrected to normal with volume. Lung volume data (n=8) where available was normal, except in two patients (12%) who had significantly increased residual volume. Patients with longitudinal data (n=9, 53%) predominantly showed a stable pattern of obstruction with minimal decline. Two patients (12%) did have a significantly increased decline compared to predicted values.

Conclusion Patients with DIPNECH typically have a stable degree of fixed obstruction, however exceptions to this will be seen in patients with a more progressive disease.

P142 HYPOXIC CHALLENGE TEST (HCT) FOR IN-FLIGHT OXYGEN ASSESSMENTS CAN BE AVOIDED IN PATIENTS WITH LUNG DISEASE AND LOW RESIDING PAO2

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Introduction Hypoxic challenge test consisting of breathing 15% FiO2 for 20 min with blood gas measurements is recommended by BTS guidelines for the assessment of the requirement for in-flight oxygen. FEV1 and SpO2 have been demonstrated to be poor predictors of desaturation with no established reliable upper limit of PaO2, above which patients will not desaturate. We investigated whether there were lower-limit thresholds, beyond which oxygen is always required and hence HCT can be avoided.

Methods Retrospective analysis of all hypoxic challenge tests conducted at our centre between 2010 and 2017 was undertaken. Baseline demographics, diagnosis and contemporaneous lung function data was recorded. HCT was performed as per BTS guidance and included baseline resting blood gas followed by a repeat after 20 min inspiring 15% FiO2. If PaO2 was <6.65 kPa or SpO2 <85%, 2 L oxygen via nasal cannulae was applied and a repeat blood gas performed to confirm PaO2 ≥6.65 kPa.

Results HCT was performed on 170 occasions during the study period. COPD was the underlying diagnosis in 110 (64.7%) of tests, ILD in 40 (23.5%) and CF (13, 11.8%). Average age (median [range]) was 67.5 years [49.1–83.8] COPD, 67 [52.3–83.3]ILD, 32.5 [19.1–66.8]CF. Lung function (FEV1%pred) was 49.7[21–115]COPD, 71.6 [31–124]ILD, 36.5[23–65]CF. Following HCT, in-flight oxygen was recommended in 99 (58.2%) patients all of whom were recommended 2 l/min. A threshold of <7.55 Kpa on resting blood gas was 100% predictive for requirement of in-flight oxygen and a threshold of <8 kPa was 97.9% predictive. Incorporating the <7.55 kPa and <8 kPa thresholds into clinical practice by proceeding straight to 2 l oxygen could negate the need for HCT in 20.6% and 43.9% of cases respectively.

Conclusion HCT is a useful tool for assessing the need for in-flight oxygen in lung diseases but is a resource heavy test and requires multiple blood samples taken from patients. Our data suggests that there are lower-limit thresholds for resting PaO2 beyond which HCT can be avoided in a significant proportion of patients.

Poster sessions

P143 USING BIG DATA TO INVESTIGATE PHYSIOLOGY: RETENTION OF CO2 DOES NOT IMPACT THE OXYGEN-DISSERTATION CURVE OF CRITICALLY ILL ADULTS

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Introduction Since its initial description in 1904, the oxygen-haemoglobin dissociation curve (ODC) has been well described under physiological conditions. However, the impact of pathology has been less well characterised, with most data arising from small clinical studies of anaesthetized adults/patients (<100 subjects), or experimentally-induced hypoxemia/hypercapnia. Routinely collected clinical data, including arterial blood gas analyses, are now available from many thousands of critically ill patients. We sought to investigate the impact of pCO2 on the ODC of critically ill adults, and hypothesised that pCO2 would not significantly alter the relationship between pO2 and haemoglobin saturation.

Methods Data was extracted from the National Institute for Health Research Critical Care Health Informatics Collaborative (NIHR ccHIC). Statistical analysis was undertaken on 3 99 000 blood gases from 13 942 patients, using R version 3.4.0. After data cleaning, the predicted oxygen saturation for each arterial blood gas sample was calculated using both the Severinghaus and Dash, Kroman and Bassingthwaighte equations. Non-linear regression modelling was undertaken to construct ODCs based on both the predicted and observed data.
Abstract P143 Figure 1  The observed oxygen dissociation curve of critically ill patients with varying levels of hypercapnia.

to allow comparison. Observed data was stratified into strata based on pCO2 to investigate the influence of hypercapnia on the ODC.

Results No clinically significant impact of pCO2 on the relationship between pO2 and oxygen saturation was observed in samples obtained from critically ill adults (mean difference 0.35 kPa (SD=0.2 kPa) for a given oxygen saturation). Interestingly, we did not observe “right shift” of the ODC in response to elevated arterial pCO2, and there was no impact of either acute (HCO3 <28 mmol/L) or chronic (HCO3 ≥28 mmol/L) hypercapnia on the relationship between haemoglobin saturation and pO2.

Conclusions These data suggest that the relationship between haemoglobin saturation and pO2 described by data from small scale studies may not reflect physiology observed in critically ill adults, and further that the right shift of the ODC reported in experimental hypercapnia, induced in healthy subjects, is not reproduced in the critically ill.

REFERENCES

P144 THE PREVALENCE OF DYSFUNCTIONAL BREATHING AND ITS ASSOCIATION WITH PERSONALITY TYPE IN A UNIVERSITY POPULATION
A Thain, L Silva Vidotto, A Harvey, M Jones. Brunel University, London, UK

Background Dysfunctional breathing (DB) is an umbrella term used to describe an abnormal breathing pattern which can be psychologically or physiologically based. DB has been shown to be exacerbated at times of increased stress and to be related to anxiety disorders; both factors are common within a university setting, particularly around exam time. Personality types, specifically type A personality, share common risk factors with DB, suggesting a possible association. The prevalence of DB within a university population has not been previously investigated.

Aims To investigate the prevalence of dysfunctional breathing within a university population and assess any association between DB and type A personality.

Methods A cross sectional study was undertaken involving participants recruited at Brunel University. The primary outcome measure was the Nijmegen questionnaire (validated diagnostic tool for DB), and the secondary outcome measure was the breath hold test (BHT) (clinical diagnostic tool for DB). Additionally, the Behaviour Pattern Scale was used to classify participants as type A or type B personality.

Results 40 participants completed the study. 17.5% (7/40) were positive for DB on the Nijmegen questionnaire (≥23/64). Positive scores only occurred in women; consistent with previous data on gender and DB. 7.5% (3/40) had a positive result using the BHT (<20 s). 50% of participants were type A and 50% type B personality. Pearson’s Chi-Square test was used which demonstrated a significant association between DB (Nijmegen questionnaire) and type A personality (p=0.037). No association was found between the Results of the BHT and personality type (p=0.548), or between the Nijmegen questionnaire and BHT Results (p=0.453). At baseline there were no significant differences in participant characteristics, other than gender, between the groups that received a positive or negative DB diagnosis.

Conclusion Dysfunctional breathing may affect a significant percentage of people in a university population; and a significant association with type A personality type has been shown. Raising awareness of DB in the university population may lead to earlier diagnosis and timely referral to physiotherapy or counselling services as appropriate. A larger study is needed to further validate these findings.
Introduction As part of our tertiary multi-disciplinary complex breathlessness service we run a weekly ‘one-stop assessment day’ for new referrals. Referral requests include assessment of refractory breathlessness felt due to inducible laryngeal obstruction (ILO) and/or dysfunctional breathing. Patients undergo clinical history and evaluation, spirometry, fractional exhaled nitric oxide (FENO), blood testing and laryngoscopy (with challenge if appropriate).

Aims To evaluate initial clinical plans of those attending one-stop assessment days and understand the prevalence and type of medical comorbidities.

Methods Patient demographics and clinical data were retrospectively collated from clinical records of individuals who attended for assessment between November 2016 and June 2017.

Results Full assessments were available for 79 patients (72% female; mean (SD) age 45.6 (13.6) years; FEV1 (n=40) 2.6 (0.7) L; FVC (n=40) 3.3 (0.9) L; FENO (n=33) 39.0 (41.2) ppb; blood eosinophils (n=68) median (range) 0.2 (0.1–10.1) x10^9 cells/ml]. Fifty two percent had endoscopically confirmed upper airway obstruction, 13% had exaggerated expiratory closure, 18% had inspiratory ILO, and of these 15% had an associated dysfunctional breathing pattern. Initial clinic plans included instigation of medical treatment (n=30), physiotherapy assessment and treatment (n=9) and onward referral to non-respiratory specialists (n=5). Of those requiring further investigation 73% were asthma related and 21% were for reflux. Medical treatments instigated were mainly related to asthma or bronchiectasis (92%). Secondary analysis of those needing further investigation or medical treatment revealed 39% had inspiratory laryngeal obstruction, 13% had exaggerated expiratory closure, and 23% had noted laryngeal hypersensitivity alone.

Conclusion There is a significant proportion of individuals who have untreated or under investigated co-morbidity (predominantly asthma) when referred for specialist complex breathlessness assessment. Those with untreated disease demonstrated abnormal responses in the upper airway and further support the relationship between ILO and asthma. Optimised medical intervention is important to ensure any aggravants of secondary diagnoses (e.g., ILO) are addressed adequately and their impact is minimised.

A clinical update in interstitial lung disease
Background Idiopathic pulmonary fibrosis (IPF) is a progressive, irreversible and ultimately fatal disease. An association between diabetes, obesity and IPF has previously been demonstrated. Decreasing body mass index (BMI) is predictive of worse survival in Japanese cohorts. Objective To investigate the metabolic characteristics in our cohort of IPF patients (South West Peninsula, England) receiving anti-fibrotic therapy (nintedanib or pirfenidone), observe how BMI changes over time and relationships with changes in forced vital capacity (FVC) and survival.

Method Data was collected from IPF patients at the Regional Exeter ILD Centre at diagnosis (age, gender, FVC, BMI, co-morbidities) and subsequent appointments (FVC and BMI). Change between BMI/FVC at diagnosis and most recent BMI/FVC were calculated and standardised to time elapsed between data points (DBMI or DFVC respectively). National data were from Public Health England (2014 datasets).

Results We reviewed 90 patients receiving antifibrosis. 76 were male (84%), mean age was 74. Their co-morbidities are illustrated by Table 1. Type 2 diabetes mellitus affected 14 patients (16%), compared with 12% in the age-adjusted general population. Recent BMIs were available for 46 patients. 10 patients (20%) had a normal BMI 18.5–24.99 (compared with a national average of 37%). Mean BMI (28.3) was significantly increased above the national average (27.3; p<0.05 one-tailed t-test). Pearson correlation coefficient for change in BMI and survival was r=−0.55, 95% confidence interval −0.90 to 0.25 (8 patients). Where DBMI and DFVC were temporally overlapping (19 patients), no correlation was found.

Conclusions A large proportion of our IPF cohort were classified as obese. Diabetes was a common comorbidity, and higher than the national average. Over time, most patients demonstrated a reduction in their BMI. In contrast to East Asian data, this reduction in BMI did not correlate with reduction in FVC or survival.

REFERENCES

Abstract P147 Table 1 Characteristics of the exeter IPF cohort (SD=standard deviation)

<table>
<thead>
<tr>
<th>IPF patients</th>
<th>n=90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) (SD)</td>
<td>74 (9)</td>
</tr>
<tr>
<td>Gender, male</td>
<td>76 (84%)</td>
</tr>
<tr>
<td>Current Treatment</td>
<td>n=90</td>
</tr>
<tr>
<td>Nintedanib</td>
<td>55 (61%)</td>
</tr>
<tr>
<td>Pirfenidone</td>
<td>35 (39%)</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td>23 (26%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>18 (20%)</td>
</tr>
<tr>
<td>Gastroesophageal Reflux Disease</td>
<td>17 (19%)</td>
</tr>
<tr>
<td>Type 2 Diabetes Mellitus</td>
<td>14 (16%)</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>9 (10%)</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>7 (8%)</td>
</tr>
<tr>
<td>Hypercholesterolaemia</td>
<td>6 (7%)</td>
</tr>
<tr>
<td>Asthma</td>
<td>5 (6%)</td>
</tr>
<tr>
<td>Inflammatory bowel disease</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Other connective tissue disease</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Gout</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Chronic Kidney disease</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Obstructive sleep apnoea</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>

WHO BMI Classification | n=46
| Underweight (<18.5) | 0 |
| Normal (18.5–24.99) | 10 (22%) |
| Pre-obese (25–29.99) | 17 (37%) |
| Obese Class 1 or 2 (30–39.99) | 18 (39%) |
| Obese Class 3 (>40) | 2 (2%) |

Delta BMI | n=43
| (change in BMI per month) | Median (SD) | −0.05 (0.2) |
| | Range | −0.41 to+0.63 per month |

Delta FVC | n=44
| (Change in FVC per month) | Median (SD) | −0.3% (0.81%) |
| | Range | −2.44% to+1.5% |

Poster sessions

P148 IDIOPATHIC PULMONARY FIBROSIS: "LOST IN THE SYSTEM" IN THE NORTH WEST OF ENGLAND?

T Lodhi, C Leonard, R Abdulqawi, H Morris, N Chaudhuri. University Hospital South Manchester, Manchester, UK

Introduction Idiopathic Pulmonary Fibrosis (IPF) is a debilitating lung disease with average life expectancy of 3–5 years. IPF services in England, commissioned by NHS England, occur in a finite number of designated specialist centres. With the advent of antifibrotics early referral is paramount to impact disease pathogenesis. Inequalities in UK healthcare have been documented in lung disease. Our objective was to assess whether we received the expected number of referrals compared to the NICE predicted disease prevalence (0.0277%).

Methods This is a single centre review of University Hospital of South Manchester (UHSM) British Thoracic Society (BTS) entries from 2013 to 2017. Patient’s entry postcodes were mapped to individual clinical commissioning groups (CCG). IPF patients within each CCG were compared to the expected disease prevalence (0.0277%).

Results UHSM is the largest contributor to the BTS-IPF registry with 457 of the total 1119 patient record (41%). 451 patients from 35 English CCGs were represented. 6 patients were from outside England (Wales and Isle of Man). There are two specialist centres in the North West, Aintree and UHSM. 13 CCGs are located geographically closest to Aintree and 14 closest to UHSM with a further 8 CCGs located equidistant. Patients are referred to either specialist service at the discretion of the clinician and patient preference. The expected number of patients seen at UHSM according to IPF prevalence varied greatly in the 14 CCGs geographically closest with an average of 19 referrals per CCG (range 3–37) compared to the expected 51 referrals. CCGs varied in their referral rates with the top three CCGs Trafford (71%), Tameside and Glossop (65%) and Salford (54%) and the lowest referrals from Central (6%) and North Manchester (19%) (Table 1).
Conclusions Equality of access to specialist treatments for IPF remains a challenge. There is wide variation in the number of referrals to our specialist centre per patient population. The reasons for this disparity could be lack of detection of IPF, physician or patient factors. This presents a continued challenge for IPF management.

REFERENCE


DESCRIPTION OF A NATIONAL PULMONARY FIBROSIS COHORT IN SWEDEN

1K Bartley, 2A Levine, 3L Arnheim-Dahlstrom, 4G Ferrara, 5K Kirchgaessler, 2R Linder, 6C Janson, 5Uppsala University, Uppsala, Sweden; 6Karolinska Institutet, Stockholm, Sweden

10.1136/thoraxjnl-2017-210983.291

Background Idiopathic pulmonary fibrosis (IPF) is a rare disease, and estimates of incidence and prevalence vary considerably by geographic region. There have been few studies of patient populations with IPF in Sweden and here we describe the first national cohort of patients with pulmonary fibrosis.

Methods A retrospective longitudinal study with linked datasets from Swedish population-based registers and electronic medical records from 2001–2017. Included patients had a registration of International Classification of Diseases, Tenth Revision (ICD-10) code J84.1, were aged ≥40 years and did not have a competing diagnosis after the initial J84.1 code; a diagnosis algorithm was used to refine the population for patients with IPF. This national cohort was based on linked patient-level data from national, population-based health registers.

Objectives To describe incidence of pulmonary fibrosis and clinical characteristics (comorbidities and concomitant medications) at diagnosis and at any time.

Results Cohort 1 included 17244 patients with pulmonary fibrosis. Incidence of pulmonary fibrosis ranged from 10.4–15.4 cases per 100 000 per year between 2001 and 2015, with an incidence of 13.9 cases per 100 000 per year in 2015. Incidence increased with age and was higher in males. Patients had a mean (standard deviation [SD]) age of 74.6 (10.5) years at time of diagnosis and 62.5% were male. Clinical characteristics of these patients are shown in the table; patients had a mean (SD) Charlson comorbidity index of 1.4 (1.7).
Sarcoidosis is a multi-system granulomatous disease of uncertain aetiology. It is characterised by bilateral hilar lymphadenopathy. The diagnosis is best supported by the histological evidence of non-caseating granulomas in the affected organ(s). The diagnostic procedures for histological confirmation are invasive and a less invasive approach to diagnostic pathway is warranted.

**Objectives** The utility of diagnostic value of neck ultrasound was retrospectively evaluated in this study. A histological diagnosis was made by ultrasound guided head and neck core biopsy to confirm clinically and radiologically suspected sarcoidosis.

**Methods** Following clinical assessment by a respiratory physician, 25 patients were referred for sonographic evaluation of the head and neck by a thoracic radiologist after CT scan in an attempt to avoid the use of more invasive and expensive tests such as endobronchial ultrasound (EBUS) and mediastinoscopy. Typically these patients had obvious mediastinal adenopathy +/-parenchymal lung disease, but not clinically apparent neck nodes. Where no cervical lymph node suitable for biopsy was seen, the parotid glands were evaluated and biopsied if deemed abnormal. Patients with no suitable lymph nodes and normal parotid glands were returned for consideration of other diagnostic techniques.

**Results** A diagnosis of sarcoidosis was made in all cases where a core biopsy of cervical lymph nodes (figure 1) was attempted (23 out of 25 patients). It is emphasised that the cervical lymph nodes in this series were not particularly enlarged, short axis dimensions being under 10 mm in the majority of cases biopsied, and that these sub-centimetre short axis lymph nodes did not have any specific sonographic appearances to mark them as pathological. Nevertheless histological examination revealed non-caseating granulomas in all cases. In a further two cases, where no neck nodes were seen, a histological diagnosis of sarcoidosis was made from biopsy of diffusely abnormal parotid gland tissue.

**Conclusions** Given the clear advantages of cervical diagnosis in terms of invasiveness and economy compared to mediastinal alternatives, it is suggested that where the expertise for core biopsy of normal sized cervical lymph nodes is readily available, the technique may be considered as a first line investigation for the diagnosis of sarcoidosis.

**Abstract P149 Table 1** Summary of clinical characteristics of patients with pulmonary fibrosis in Sweden (cohort 1)

<table>
<thead>
<tr>
<th>Clinical characteristic</th>
<th>Variable</th>
<th>Patients with this characteristic, n (%)</th>
<th>At or within 1 year after diagnosis (n=17,244)</th>
<th>At any time (n=17,244)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comorbidities</td>
<td>Ischaemic heart disease</td>
<td>3638 (21.1)</td>
<td>4338 (25.2)</td>
<td>3664 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Other infections of Airways</td>
<td>2664 (15.4)</td>
<td>6960 (40.4)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Acid-related disorders</td>
<td>2394 (13.9)</td>
<td>3605 (17.7)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>COPD</td>
<td>2249 (13.0)</td>
<td>2845 (16.5)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Angina</td>
<td>2233 (12.9)</td>
<td>2539 (14.7)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Diabetes (types 1 and 2)</td>
<td>1471 (8.5)</td>
<td>1901 (11.0)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Bacterial pneumonia</td>
<td>998 (5.8)</td>
<td>2954 (17.1)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Myocardial infarction</td>
<td>612 (3.5)</td>
<td>2408 (14.0)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Sleep apnoea</td>
<td>514 (3.0)</td>
<td>665 (3.9)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Depression</td>
<td>429 (2.5)</td>
<td>547 (3.2)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>329 (1.9)</td>
<td>450 (2.6)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Pulmonary hypertension</td>
<td>303 (1.8)</td>
<td>447 (2.6)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Bronchitis</td>
<td>280 (1.6)</td>
<td>1146 (6.6)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Peripheral vascular disease</td>
<td>259 (1.5)</td>
<td>313 (1.8)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td>Concomitant medications</td>
<td>Cardiovascular medication</td>
<td>7965 (46.2)</td>
<td>11 852 (68.7)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Anti-coagulants/anti-thrombotics</td>
<td>6569 (38.1)</td>
<td>10 493 (60.9)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Corticosteroids for systemic use</td>
<td>6086 (35.3)</td>
<td>10 307 (59.8)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Acid-related disorders</td>
<td>5889 (34.2)</td>
<td>10 183 (59.1)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>medication</td>
<td>5889 (34.2)</td>
<td>10 183 (59.1)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Heart failure medication</td>
<td>5224 (30.3)</td>
<td>9250 (53.6)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Cholesterol-lowering medication</td>
<td>3653 (21.2)</td>
<td>6451 (37.4)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Anti-neoplastic and immunomodulating agents</td>
<td>1793 (10.4)</td>
<td>3688 (21.4)</td>
<td>3653 (59.8)</td>
</tr>
<tr>
<td></td>
<td>Oxygen</td>
<td>1218 (7.1)</td>
<td>2447 (14.2)</td>
<td>3653 (59.8)</td>
</tr>
</tbody>
</table>

COPO, chronic obstructive pulmonary disorder

**Conclusions** Analysis of the first national cohort of patients with pulmonary fibrosis in Sweden has found slightly higher incidence rates of IPF than those of previous studies, though this may be due to identification of patients with IPF using ICD-10 code J84.1 (‘other interstitial pulmonary diseases with fibrosis’). Though a diagnosis algorithm was used to refine the population for those with IPF, these criteria might not exclude all patients with non-IPF interstitial lung diseases. The frequencies of clinical characteristics in this population were broadly in line with those previously observed in patient populations with IPF.

**P150 NECK AS MEDIASTINAL EXTENSION: DIAGNOSIS OF SARCOIDOSIS BY CORE BIOPSY OF CERVICAL LYMPH NODES**

A Fahim, MM Qasim, D Rosewarne. New Cross Hospital, Wolverhampton, UK

10.1136/thoraxjnl-2017-210983.292

**Background** Sarcoidosis is a multi-system granulomatous disease of uncertain aetiology. It is characterised by bilateral hilar lymphadenopathy. The diagnosis is best supported by the histological evidence of non-caseating granulomas in the affected organ(s). The diagnostic procedures for histological confirmation are invasive and a less invasive approach to diagnostic pathway is warranted.

**Objectives** The utility of diagnostic value of neck ultrasound was retrospectively evaluated in this study. A histological diagnosis was made by ultrasound guided head and neck core biopsy to confirm clinically and radiologically suspected sarcoidosis.

**Methods** Following clinical assessment by a respiratory physician, 25 patients were referred for sonographic evaluation of the head and neck by a thoracic radiologist after CT scan in an attempt to avoid the use of more invasive and expensive tests such as endobronchial ultrasound (EBUS) and mediastinoscopy. Typically these patients had obvious mediastinal adenopathy +/-parenchymal lung disease, but not clinically apparent neck nodes. Where no cervical lymph node suitable for biopsy was seen, the parotid glands were evaluated and biopsied if deemed abnormal. Patients with no suitable lymph nodes and normal parotid glands were returned for consideration of other diagnostic techniques.

**Results** A diagnosis of sarcoidosis was made in all cases where a core biopsy of cervical lymph nodes (figure 1) was attempted (23 out of 25 patients). It is emphasised that the cervical lymph nodes in this series were not particularly enlarged, short axis dimensions being under 10 mm in the majority of cases biopsied, and that these sub-centimetre short axis lymph nodes did not have any specific sonographic appearances to mark them as pathological. Nevertheless histological examination revealed non-caseating granulomas in all cases. In a further two cases, where no neck nodes were seen, a histological diagnosis of sarcoidosis was made from biopsy of diffusely abnormal parotid gland tissue.

**Conclusions** Given the clear advantages of cervical diagnosis in terms of invasiveness and economy compared to mediastinal alternatives, it is suggested that where the expertise for core biopsy of normal sized cervical lymph nodes is readily available, the technique may be considered as a first line investigation for the diagnosis of sarcoidosis.

**P151 THE ROLE OF BRONCHOALVEOLAR LAVAGE AND ITS QUALITY IN THE DIAGNOSIS OF INTERSTITIAL LUNG DISEASE**

A Ebraheem, L Macfarlane, R Booton, N Chaudhuri. University Hospital Of South Manchester NHS Foundation Trust, Manchester, UK

10.1136/thoraxjnl-2017-210983.293

**Background** Bronchoalveolar lavage (BAL) is a widely used diagnostic tool for suspected Interstitial Lung Disease (ILD) patients and is advocated in ILD guidelines. We aimed to evaluate the quality of BAL sampling in the diagnosis of ILD compared to BAL guidelines.

**Methods** Retrospective cohort study of all BALs performed in ILD at the University Hospital of South Manchester (UHSM) between January 2015 and November 2016. Electronic reports and histopathological cellular analysis were assessed for qualitative outcomes as per BAL guidelines.

**Results** 416 patients coded as BAL sampling, 95 (24%) were performed in the diagnostic strategy for ILD. The mean age was 58.9 (range 18–89). 36 (37.9%) were Female and 59 (62.1%) were male. 13 (13.7%) had lymphocyte count ≥15%,
and 4 (4.2%) had a percentage ≥50%. Eosinophil count was ≥5% in 17 (17.9%), and ≥25% in 2 (2.1%). When assessing quality of samples as per guidelines the percentage of other cells (epithelial/columnar cells) at analysis was more than 5% in 57 (60%) patients. In 37 (38.9%) patients the volume instilled was more than 100 ml. In only 13 (13.7%) patients the volume of fluid retained back was ≥30% of instilled volume. Despite this 76 (80%) patients the volume of fluid obtained for analysis was more than 10 ml. There were no immediate complications reported. 50 (52.6%) of the operators were consultants, 30 (31.6%) were registrars, and in 15 (15.8%) operator was not recorded.

Conclusion The quality of BAL sample is very important for diagnostic accuracy in ILD. Our data shows that BAL performed by general respiratory physicians can be of poor quality. We would advocate adequate training in BAL plus investment in dedicated ILD lists may improve engagement and quality. This data supports the BTS bronchoscopy guidelines in performing regular audit to ensure quality is maintained.

REFERENCE


Background Idiopathic pulmonary fibrosis (IPF) is an increasingly important public health issue worldwide, but the underlying aetiology is still unknown. The aim of this study was to investigate whether adult height or socioeconomic status are associated with the lifetime risk of developing IPF.

Methods We used data from The Health Improvement Network (THIN), an electronic longitudinal UK primary care database to conduct a matched case-control study to investigate if adult height and socioeconomic status are associated with IPF. Incident cases of IPF were identified using previously published Read Codes. General population controls were identified as a 4:1 incident density sample, matched by age, gender and general practice. Our exposures were adult height and socio-economic index as measured by Townsend Index recorded before the date of diagnosis. We used conditional logistic regression to estimate odds ratios for the associations between each exposure and IPF. Adult height was modelled as quintiles and as a continuous variable.

Results The final study population consisted of 1699 incident cases of IPF and 5339 matched general population controls. Mean age of cases was 74.6 years (Standard Deviation [SD] 9.6) and 64.2% were male. Mean height in men and women were 1.73 (SD 0.07) and 1.59 (SD 0.6) metres respectively. There was no association between adult height quintiles and IPF after adjusting for socio-economic status (see Table 1). However, when modelled as a continuous variable, we found a weak inverse association between every metre increase in adult height and IPF, after controlling for socio-economic status. (OR 0.46, 95% CI 0.19–1.07; p = 0.07). There was also strong evidence of effect modification between adult height and sex (p=0.03), such that the effect of increasing height quintile was stronger in women (OR 0.93, 95% CI 0.87–0.99) and weaker in men (OR 0.99, 95% CI 0.94 to 1.04).

We found no association between socio-economic status and IPF (see Table 1).

Conclusions Our findings raise the possibility that early life exposures may influence the lifetime risk of developing idiopathic pulmonary fibrosis. We also demonstrated that unlike many respiratory diseases, IPF is spread evenly through all sections of society.

Abstract P152 Table 1 Odds ratios for the association between IPF, height quintile and Townsend score

<table>
<thead>
<tr>
<th>Quintile of Height</th>
<th>Odds ratio (95% confidence interval)</th>
<th>Odds ratio (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (shortest)</td>
<td>1.00 (1.00)</td>
<td>1.00 (1.00)</td>
</tr>
<tr>
<td>2</td>
<td>0.94 (0.78–1.14)</td>
<td>0.94 (0.78–1.14)</td>
</tr>
<tr>
<td>3</td>
<td>0.92 (0.74–1.15)</td>
<td>0.93 (0.74–1.15)</td>
</tr>
<tr>
<td>4</td>
<td>0.86 (0.65–1.05)</td>
<td>0.87 (0.65–1.06)</td>
</tr>
<tr>
<td>5 (tallest)</td>
<td>0.83 (0.67–1.00)</td>
<td>0.85 (0.68–1.11)</td>
</tr>
</tbody>
</table>

*Adjusted for all other variables in the table

REFERENCE

1. T Glover, JP Hutchinson, RB Hubbard, Navaratnam. 1Nottingham University Medical School, University of Nottingham, Nottingham, UK; 2Division of Epidemiology and Public Health, University of Nottingham, Nottingham, UK

10.1136/thoraxjnl-2017-210983.294

Background Antifibrotic medication (AFM) is indicated for the treatment of idiopathic pulmonary fibrosis (IPF), but medication related side effects can lead to early discontinuation of therapy in some patients. Factors that may predict intolerance of AFM are poorly described.

Methods Retrospective data from all patients from a single District General Hospital that had received AFM for IPF between January 2014 and March 2017 were analysed. Patients were defined at four months as either tolerant or intolerant of AFM determined by either continuation of treatment, or discontinuation of treatment because of medication related side effects respectively. Fisher’s exact test was used to compare age, body mass index (BMI) and Clinical Frailty Score (CFS) between the two groups. Frailty was defined as a
CFS of ≥6 (scale 1–9 with a high score indicating greater frailty).

**Results** 35 patients received AFM and 10 (29.4%) were intolerant of treatment at 4 months. Patients without frailty were more likely to be tolerant of treatment than those with frailty (86.4% versus 33.3%, p = 0.0074). Patients with a BMI in the upper three quartiles of the sample were more likely to be tolerant of treatment than those in the lowest quartile, but this trend did not reach statistical significance (80.7% versus 44.4%, p = 0.081), and there was no difference in tolerance between patients over 80 years of age and younger patients (77.8% versus 75.0%, p = 0.99).

**Conclusions** Frailty and low BMI may predict treatment intolerance with AFM in IPF, whereas age does not appear to influence this outcome. Clinicians should consider a patient’s frailty when considering this therapy. Further analysis of a larger dataset and a prospective study are warranted.

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**P154 GENDER AND HEIGHT DRIVE VARIATION BETWEEN FORCED VITAL CAPACITY REFERENCE EQUATIONS: IMPLICATIONS FOR IPF TREATMENT**

F Frost, R Peat, S Town, C Brocketsby, L Johns, E Hilal. Liverpool Heart and Chest Hospital, Liverpool, UK

10.1136/thoraxjnl-2017-210983.296

**Introduction** NICE guidance mandates that anti-fibrotic therapy for interstitial pulmonary fibrosis (IPF) is only recommended as an option for people with a forced vital capacity (FVC) between 50%–80% predicted. The guidance recognises different reference values are used across the UK to calculate predicted FVC but does not specify which should be utilised. We were interested to see how different formulas impacted on eligibility for these treatments.

**Methods** We reviewed all patients with a diagnosis of IPF or possible IPF attending our ILD clinic for the time period 2016–2017. Baseline demographics were recorded and% predicted FVC (ppFVC) was calculated using both the European Society for Coal and Steel (ESCS) and Global Lung Initiative 2012 (GLI) formulas.

**Results** We identified 97 patients from our database and complete data was available for 96 (median age [range] 71.2 years [42–89], 62.5% male, median FVC 2.39 L). Overall the ESCS formula resulted in a higher ppFVC compared to GLI (+6.2% FVC, p<0.001). We observed a strong inverse correlation between variation in ppFVC and height (Rho −0.7, p<0.0001). No relationship was observed between age and variation. For the 24 patients with GLI ppFVC within 10% of the upper and lower thresholds for treatment, 15 (62.5%) would have their eligibility for anti-fibrotic treatments changed by use of the ESCS formula.

**Conclusions** Females and those with shorter height saw the greatest variation between the two formulas. A significant proportion of patients with borderline eligibility for anti-fibrotic treatments have their status changed by the use of a different formula. Clinicians must be aware of their local reference values and how this may affect patients’ eligibility for IPF treatment.

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**P155 USE OF MYCOPHENOLATE MOFETIL AND AZATHIOPRINE IN PATIENTS WITH CHRONIC HYPERSENSITIVITY PNEUMONITIS**

CA Fiddler, N Smiler, M Thilai, H Parfrey. Papworth Hospital NHS Foundation Trust, Papworth Everard, UK

10.1136/thoraxjnl-2017-210983.297

**Background** The optimal pharmacological management of chronic hypersensitivity pneumonitis (cHP) is unknown. Corticosteroids are often used as first line therapy but can be associated with side effects. There is a paucity of data examining the role of MMF but not FVC (Morisset J et al. Chest. 2017). We aimed to determine the efficacy of steroid-sparing agents in cHP. A recent retrospective study demonstrated that treatment with either mycophenolate mofetil (MMF) or azathioprine (AZA) was associated with improvements in FVC and AZA on lung function and prednisolone dose in cHP patients.

**Methods** Patients initiated on either MMF or AZA following a MDT diagnosis of cHP were retrospectively identified from the ILD service Papworth Hospital, Cambridge. Changes in lung function in the 9–12 months before and after treatment initiation were analysed. Daily prednisolone dose at initiation and 9–12 months treatment was recorded.

**Results** Twenty eight patients were identified between 2008 and 2016; 20 were treated with MMF (1–2 g daily) and 8 with AZA (25–150 mg daily). The mean age at drug initiation was 59.6±1.7 years and 61% were female. The mean duration from diagnosis to commencing MMF or AZA was 30.9±5.5 months. Twenty patients remained on either drug at 9–12 months and were include in the effectiveness analysis (FVC and TLCO data were available for 20 and 13 patients respectively). Five patients discontinued treatment due to drug side effects. Treatment with either MMF or AZA resulted in a significant reduction in prednisolone dose from 16.1±2.1 mg to 8.0±0.8 mg (p<0.001). MMF or AZA treatment for 9–12 months was associated with a significant improvement in TLCO (−0.62±0.3 vs +0.32±0.17 mmol/kPa/min, p<0.05). Although treatment reduced rate of FVC decline (−100±65 vs −30±66 mls), it was not significant (p=0.4).

**Conclusions** In our cohort of cHP, treatment with either MMF or AZA was associated with an improvement in TLCO consistent with findings of a previous retrospective study. Moreover, the addition of MMF or AZA enabled a significant reduction in prednisolone dose.

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**P156 MAINTAINING PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS (IPF) ON ANTIFIBROTIC THERAPY; THE NURSES’ CHALLENGE**

GA Burge, H Aldrick, E Briggs, K Neighbour, PS Burge, GI Walters. Heart of England NHS Foundation Trust, Birmingham, UK

10.1136/thoraxjnl-2017-210983.298

Pirfenidone and nintedanib are the first licensed drugs for IPF. Both reduce the rate of disease progression but have significant intolerability issues limiting long-term use. This study aims to identify areas where changes in practice might improve outcomes. We compared baseline characteristics of disease severity with the reasons for stopping treatment and the proportion stopping treatment within the first 4 weeks,
for all patients from our centre up to December 2016, including those receiving treatment on a named patient basis. Data was available for 150/153 patients started on pirfenidone and 56/57 on nintedanib. Table 1 compares patients who were dispensed treatment but never took it, patients who stopped after the first prescription, and those continuing treatment. 8 patients consented to treatment but never took the drug; they were older and had less advanced disease. 39 patients stopped treatment after the first prescription; they had slightly more advanced disease, and had a longer interval between drug delivery and the first nurse (60.7 SD 57 days vs. 45.4 SD 30; p=0.032), and more often had a shared care arrangement, but did not have a lower BMI. Photosensitivity for pirfenidone and diarrhoea for nintedanib were usually managed by treatment and were uncommon reasons for stopping antifibrotic therapy, which was more often related to upper GI intolerance and disease progression.

Conclusion Patients stopping antifibrotic treatment early cannot be identified from baseline data but can be reduced by intensive nursing support. Prescribing centre based ILD-CNS’s should be responsible for early treatment tolerability and aim to see patients monthly until established on treatment. Uncertain delays between prescription and drug delivery make this more difficult.

### Abstract P156 Table 1

<table>
<thead>
<tr>
<th>Prescription dispensed</th>
<th>Once and never taken</th>
<th>Once and not repeated</th>
<th>continued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>8</td>
<td>39</td>
<td>159</td>
</tr>
<tr>
<td>FVC% predicted (SD)</td>
<td>89.5 (27)</td>
<td>69.3 (16)</td>
<td>74.8 (14) **</td>
</tr>
<tr>
<td>Composite physiology index</td>
<td>36.4 (16)</td>
<td>56.0 (70)</td>
<td>48.9 (10)</td>
</tr>
<tr>
<td>Shared care%</td>
<td>38</td>
<td>20</td>
<td>**</td>
</tr>
<tr>
<td>Age</td>
<td>78.0 (6)</td>
<td>72.5 (7)</td>
<td>70.4 (9) *</td>
</tr>
<tr>
<td>BMI</td>
<td>30.0 (2)</td>
<td>28.5 (6)</td>
<td>29.2 (5)</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001

Introduction The British Thoracic Society guidelines suggest that pre-flight risk assessment should be considered in all individuals with Interstitial Lung Disease (ILD) intending to undertake commercial air travel. Hypoxic challenge testing (HCT) can be used to aid decisions about the need for in-flight oxygen but there is a lack of evidence as to which patient variables might predict the outcome of HCT to guide referral for assessment.

Objective To investigate variables that might predict a hypoxaemic response to HCT in patients with ILD.

Methods A multi-centre retrospective analysis of all ILD patients attending for HCT at three tertiary care ILD referral centres between January 2010 and March 2017 was undertaken. The outcome of HCT was correlated to baseline demographic data, oxygen saturations (SpO2), capillary ear lobe PaO2, pulmonary function testing, 6MWT and GAP index, performed within 6 months of the HCT. Groups were compared using unpaired t-test with Welch’s correction, unless otherwise stated (p<0.05 was considered statistically significant).

Results A total of 106 ILD patients (61 of whom (58%) had IPF) underwent HCT. Of these, 54 (51%) patients (of whom 30 (49%) had IPF) failed HCT and were recommended supplemental in-flight oxygen. ILD patients who failed HCT had significantly lower resting SpO2, FEV1, FVC and TLCO% predicted, but higher GAP index (Table 1). In addition to these variables, the IPF subgroup failing HCT also had significantly lower minimum SpO2 during 6MWT.

Conclusions To our knowledge this is the largest retrospective study exploring predictors of HCT outcomes in ILD. Several baseline physiological parameters are significantly different between those ILD patients requiring in-flight oxygen based on HCT, and those who do not, including in a well-defined subgroup of IPF patients. Work is underway to establish a risk model to guide clinician decisions regarding the need for HCT in ILD.

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**P157 CAN BASELINE PHYSIOLOGICAL TESTS HELP PREDICT THE OUTCOME OF HYPOXIC CHALLENGE TESTING (HCT) IN INTERSTITIAL LUNG DISEASE (ILD)?**

1. S. Barratt, 1J Shaw, 1R Jones, 1H Adamali, 1C Cliff, 1N Clayton, 1N Mustafa, 1H Stone, 1N Chaudhuri, 1Bristol interstitial Lung Disease Service, Bristol, UK; 2University Hospital of South Manchester, Manchester, UK; 3Royal Stoke University Hospital, Stoke, UK

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### INTRODUCTION

The British Thoracic Society guidelines suggest that pre-flight risk assessment should be considered in all individuals with Interstitial Lung Disease (ILD) intending to undertake commercial air travel. Hypoxic challenge testing (HCT) can be used to aid decisions about the need for in-flight oxygen but there is a lack of evidence as to which patient variables might predict the outcome of HCT to guide referral for assessment.

### OBJECTIVE

To investigate variables that might predict a hypoxaemic response to HCT in patients with ILD.

### METHODS

A multi-centre retrospective analysis of all ILD patients attending for HCT at three tertiary care ILD referral centres between January 2010 and March 2017 was undertaken. The outcome of HCT was correlated to baseline demographic data, oxygen saturations (SpO2), capillary ear lobe PaO2, pulmonary function testing, 6MWT and GAP index, performed within 6 months of the HCT. Groups were compared using unpaired t-test with Welch’s correction, unless otherwise stated (p<0.05 was considered statistically significant).

### RESULTS

A total of 106 ILD patients (61 of whom (58%) had IPF) underwent HCT. Of these, 54 (51%) patients (of whom 30 (49%) had IPF) failed HCT and were recommended supplemental in-flight oxygen. ILD patients who failed HCT had significantly lower resting SpO2, FEV1, FVC and TLCO% predicted, but higher GAP index (Table 1). In addition to these variables, the IPF subgroup failing HCT also had significantly lower minimum SpO2 during 6MWT.

### CONCLUSIONS

To our knowledge this is the largest retrospective study exploring predictors of HCT outcomes in ILD. Several baseline physiological parameters are significantly different between those ILD patients requiring in-flight oxygen based on HCT, and those who do not, including in a well-defined subgroup of IPF patients. Work is underway to establish a risk model to guide clinician decisions regarding the need for HCT in ILD.

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### P156 PULMONARY VASCULAR DISEASE MARKERS PREDICT DEATH IN INTERSTITIAL LUNG DISEASE PATIENTS PROVEN NOT TO HAVE PULMONARY HYPERTENSION AT RIGHT HEART CATHETER

1. SRB Bax, 1C Breedy, 1K Dimopoulos, 1A Kempny, 1A Devaraj, 2S Walsh, 1J Joseph, 1S Nair, 1M Kokosi, 1G Kier, 1C Harries, 1V Kouranos, 1C McCabe, 1W Li, 1M Wilde, 1AU Wells, 1LC Price*, 1SJ Wort*. 1Royal Brompton Hospital, London, UK; 2Kings College Hospital Foundation Trust, London, UK; 3Guy’s and St Thomas’ NHS Foundation Trust, London, UK; 4Princess Alexia Hospital, Brisbane, Australia; 5Surrey and Sussex NHS Trust, London, UK; *Joint final author

10.1136/thoraxjnl-2017-210983.300

### INTRODUCTION

Patients with interstitial lung disease (ILD) often have signs of pulmonary hypertension (PH) when assessed non-invasively. The presence of pulmonary hypertension (PH) at right heart catheter (RHC) is a negative prognostic factor; however, the impact of elevated pulmonary vascular biomarkers in the absence of PH is poorly understood. We hypothesised that pulmonary vascular disease biomarkers would predict mortality in patients without PH at RHC.

### METHODS

Demographics, ILD subtype, PFTs, echocardiogram, and CTs were reviewed in consecutive patients undergoing right heart catheterisation (RHC) for suspected ILD-PH. Patients with a mean pulmonary arterial pressure (mPAP) <25 mmHg at RHC were studied. Predictors of prognosis were evaluated in their ability to predict mortality using Cox proportional hazard analysis.
**Results** Between 2005 and 2015, 68 patients (47% male) were evaluated that did not subsequently have PH (mPAP at RHC 19±4 mmHg; Pulmonary vascular resistance (PVR) 2.5±1.4 Wood units). On CT scanning main pulmonary artery diameter (MPAdiam) was 29.9±5 mm and main pulmonary artery to aorta ratio (MPAdiam:aa) was 0.97±0.1. Median brain natriuretic peptide (BNP) was 44[29–72] (normal <20 ng.L) and predicted right ventricular systolic pressure (RVSP) at echocardiogram was 48±13 mmHg. Forced vital capacity (FVC) was 62%±22% predicted. PVR as a continuous variable predicted mortality (hazard ratio (HR):1.35, p=0.02) per unit increase. A MPAdiam ≥32 mm was associated with mortality (hazard ratio (HR):3.35, p=0.02) as was MPAdiam:aa ratio ≥0.9 (HR:4.05, p=0.001). BNP ≥40 ng.L (HR:2.47, p=0.02) and a RVSP ≥40 mmHg (HR:2.74, p=0.02) also predicted mortality. MPAdiam and PVR (expressed as a continuous variable) remained independent predictors of mortality after adjusting for ILD diagnosis, forced vital capacity (% predicted) and age at RHC.

**Conclusion** Even in the absence of PH at RHC, elevated pulmonary vascular biomarkers are useful in risk stratification of patients suspected of having ILD associated PH.

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**Abstract P157 Table 1** Physiological variables of Interstitial Lung Disease patients referred for hypoxic challenge testing (HCT). All statistical analyses performed using unpaired t-test with Welch’s Correction, except as indicated by ^ where Fisher’s exact test was used. (*p<0.05, **p<0.01, ***p<0.001, ****p<0.0001, n=number of patients, S.D.=standard deviation)

<table>
<thead>
<tr>
<th>Interstitial Lung Disease</th>
<th>Failed HCT</th>
<th>Passed HCT</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (S.D)</td>
<td>n</td>
<td>Mean (S.D)</td>
</tr>
<tr>
<td>Gender</td>
<td>36 M : 18 F</td>
<td>54</td>
<td>38 M : 14 F</td>
</tr>
<tr>
<td>Age (years)</td>
<td>69.44 (8.99)</td>
<td>54</td>
<td>68.80 (8.54)</td>
</tr>
<tr>
<td>FEV1 (litres)</td>
<td>1.90 (0.62)</td>
<td>53</td>
<td>2.20 (0.57)</td>
</tr>
<tr>
<td>FEV1% predicted</td>
<td>73.83 (20.36)</td>
<td>53</td>
<td>81.96 (16.93)</td>
</tr>
<tr>
<td>FVC (litres)</td>
<td>2.31 (0.78)</td>
<td>54</td>
<td>2.72 (0.73)</td>
</tr>
<tr>
<td>FVC% predicted</td>
<td>72.20 (22.53)</td>
<td>54</td>
<td>80.14 (17.33)</td>
</tr>
<tr>
<td>FEV1:FVC (%)</td>
<td>81.42 (6.74)</td>
<td>53</td>
<td>80.94 (7.25)</td>
</tr>
<tr>
<td>TLCO</td>
<td>3.21 (0.89)</td>
<td>46</td>
<td>4.35 (1.45)</td>
</tr>
<tr>
<td>TLCO% predicted</td>
<td>41.04 (10.77)</td>
<td>46</td>
<td>52.64 (14.47)</td>
</tr>
<tr>
<td>KCO</td>
<td>0.70 (0.29)</td>
<td>45</td>
<td>1.17 (0.35)</td>
</tr>
<tr>
<td>KCO% predicted</td>
<td>79.49 (22.48)</td>
<td>45</td>
<td>86.96 (23.48)</td>
</tr>
<tr>
<td>Baseline P02 (kPa)</td>
<td>9.00 (1.06)</td>
<td>51</td>
<td>9.67 (1.64)</td>
</tr>
<tr>
<td>Resting SpO2 (%)</td>
<td>94.14 (3.37)</td>
<td>53</td>
<td>95.43 (2.03)</td>
</tr>
<tr>
<td>GAP index</td>
<td>4.31 (1.44)</td>
<td>51</td>
<td>3.42 (1.39)</td>
</tr>
<tr>
<td>6MWT</td>
<td>308.42 (120.08)</td>
<td>33</td>
<td>365.90 (81.90)</td>
</tr>
<tr>
<td>-actual distance(m)</td>
<td>64.94 (23.93)</td>
<td>33</td>
<td>75.29 (18.15)</td>
</tr>
<tr>
<td>-% theoretical distance</td>
<td>85.46 (6.06)</td>
<td>17</td>
<td>87.77 (6.65)</td>
</tr>
<tr>
<td>(minimum SpO2 (%)</td>
<td>112.12 (11.73)</td>
<td>111.47</td>
<td>111.47 (17.10)</td>
</tr>
<tr>
<td>6MWT</td>
<td>308.42 (120.08)</td>
<td>33</td>
<td>365.90 (81.90)</td>
</tr>
<tr>
<td>-actual distance(m)</td>
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<tr>
<td>-% theoretical distance</td>
<td>85.46 (6.06)</td>
<td>17</td>
<td>87.77 (6.65)</td>
</tr>
</tbody>
</table>

**Abstract P158 Figure 1** Main pulmonary artery diameter.
Background Dyspnea, muscle wasting, and fatigue are common manifestations in interstitial lung disease (ILD). Pulmonary rehabilitation programmes (PRP) aim to improve symptoms and quality of life in ILD but research is very limited about the role and feasibility of inspiratory muscle training (IMT) in PRP.

Methods Six patients with a mixed disciplinary team diagnosis of ILD (5 males, median age 80 range 67–85) participated in a tailored PRP either in an IMT (n=3) or control group (n=3). PRP involved three days of exercises, one conducted in a hospice day therapy unit and two at home. The PRP session involved aerobic, strength, and stretching exercises with integrated education and relaxation sessions. Both groups received the same PRP, supplemented in the IMT group by the use of a POWERbreathe Medic plus respiratory muscle trainer. The trainer use consisted of 30 breaths twice daily with personalised resistance levels of 40% Maximal Inspiratory Pressure (MIP), which was measured and adjusted weekly. ILD outcome measures were recorded before and after PRP.

Results All patients completed the PRP with adherence of ≥80% for the full program. There were no major complications or adverse events and patients reported liking and enjoying the PRP and environmental setting. Table 1 report the PRP outcomes. Description: there was a considerable prevalence of baseline limitation in term of depression, anxiety, fatigue severity scale (FSS), forced vital capacity (FVC) and six-minute walk test (6MWT). These limitations were maintained after PRP and there was a reduction in FVC in both groups, consistent with disease progression. In the IMT group there was a trend for an improvement in MIP, 6MWT, FSS, and visual analogue fatigue scale and a maintenance of quadriceps strength when compared with the control group.

Conclusion We believe this is the first description of a successful pilot of bespoke ILD PRP in a hospice and home setting. The PRP was acceptable and appreciated by both patients and healthcare professionals. IMT during PRP for ILD in a hospice setting is feasible and longitudinal measurements of fatigue, 6MWT, and MIP were practicable end points that warrant further study.

Abstract P159 Table 1

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>IMT</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal Values</td>
<td>Before PRP</td>
</tr>
<tr>
<td></td>
<td>(mean ±SD)</td>
<td>(mean ±SD)</td>
</tr>
<tr>
<td>K-Bild</td>
<td>105</td>
<td>70.0±15</td>
</tr>
<tr>
<td>Depression</td>
<td>0–7</td>
<td>4±2.64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.577</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0–7</td>
<td>6±1.73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.577</td>
</tr>
<tr>
<td>FSS</td>
<td>9</td>
<td>46±20</td>
</tr>
<tr>
<td>Visual analogue Fatigue</td>
<td>10</td>
<td>2.67±2.08</td>
</tr>
<tr>
<td>scale</td>
<td></td>
<td>±0.577</td>
</tr>
<tr>
<td>MIP (mmHg)</td>
<td>(n=65 to 75)</td>
<td>43±12.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±18.3</td>
</tr>
<tr>
<td>FVC (L)</td>
<td></td>
<td>3.13±0.33</td>
</tr>
<tr>
<td>Quadriceps strength</td>
<td></td>
<td>289±67</td>
</tr>
<tr>
<td>(Newton)</td>
<td></td>
<td>±38.7</td>
</tr>
<tr>
<td>6MWT (M)</td>
<td></td>
<td>380±49</td>
</tr>
</tbody>
</table>

The table reports the mean and standard deviation of outcomes measured in the pulmonary rehabilitation program. 
6MWT, six-minute walk test; IMT, inspiratory muscle training; SD, standard deviation; MIP, maximum inspiratory pressure; FVC, forced vital capacity; FSS, fatigue severity scale; KBild, King’s Brief Interstitial Lung Disease health status questionnaire.

Abstract P160 Figure 1

P160 MORTALITY FROM IDIOPATHIC PULMONARY FIBROSIS IN ENGLAND AND WALES BY BIRTH COHORT

Introduction and Objectives The incidence of idiopathic pulmonary fibrosis (IPF) has been increasing at a rate of 5% per annum since 2000. By definition, the diagnosis of IPF is not made in the presence of an identifiable cause. However, the distribution of the disease in the population (more common in men, manual workers, and those living in more industrial areas of the country) suggests a causal contribution from an occupational or environmental source. This would be expected to produce a cohort effect. Our aim was to examine trends in IPF mortality data for evidence of such an effect.

Methods Age and sex stratified mortality data for IPF were obtained for England and Wales from the Office of National Statistics for the period 1974–2012. Data were age-
standardised and visualised using the Python Pandas data analysis library and matplotlib.

**Results** There is evidence of a cohort effect with age-specific IPF death rates increasing in successive cohorts, most clearly seen from age 60. Overall rates were higher for men but there were not marked sex differences in cohort mortality trends (data not shown).

**Conclusions** The birth cohort effect we observed is consistent with a proportion of IPF cases being due to an occupational or environmental exposure with latency and further research is needed.

**Early detection and screening in TB**

**P161** TUBERCULOSIS CONTACT SCREENING: WILL THE 2016 GUIDELINES LEAD TO MISSED DIAGNOSES?


10.1136/thoraxjnl-2017-210983.303

**Background** UK TB contact screening guidelines changed in 2016, requiring screening only of contacts of patients with potentially transmissible disease, specifically pulmonary or laryngeal TB. TB contacts and the index case are likely to have had similar TB exposure, and it is possible that contacts who have not been directly infected by the index case will be missed using the new screening guidelines.

**Aims and Objectives** This study aimed to evaluate whether all cases of TB diagnosed through contact tracing in 2012 at a University Hospital would have been identified using the new screening guidelines.

**Methods** Case notes of all patients contact screened for TB aged 16 and over in 2012 were examined. Data were collected on the diagnosis of the patient screened (negative, latent, or active TB) and the site of TB of the index case.

**Results** Of the 445 screened, 394 (88.5%) were negative for TB, 44 (9.9%) had latent TB, and 7 (1.6%) had active TB. For 19.6% of those with latent or active TB diagnoses, the TB site in the index case was neither pulmonary nor laryngeal.

**Conclusion** By restricting contact screening of this 2012 cohort to those with pulmonary or laryngeal TB contact, 10 (19.6%) cases of TB would potentially have been missed. As these missed contacts and the TB index case may have had exposure to TB from the same, albeit unknown, person with a transmissible form of TB, the only way to identify these cases is with a broad screening approach. While the current guidelines are in place, this study highlights the importance of assessing the need for contact screening based on the individual clinical picture in each identified case of TB.

**REFERENCE**

Introduction The revised Quantiferon-TB Gold assay (QFT-Plus) has an extra tube (TB2), containing peptides thought to stimulate CD8+ T cells; TB7 antigen is no longer included. The test is designed to detect latent tuberculosis infection.

Hypothesis Levels of interferon-γ in TB2 should always be greater than TB1.

Methods QFT-Plus was used routinely in a TB contact clinic June 2016 – January 2017. Interferon-γ values were recorded minus the negative control; a significant difference was defined as a two-fold variation. Clinical details were recorded after consent on a standard form, which included age, sex, reason for test, tuberculin response (mm) and HIV status.

Results Data was available from 259 subjects; 2 were HIV-positive. Four gave an indeterminate result. The majority (194; 75%) gave a negative test for both tubes. For 65 positive tests with a ≥2 fold difference (all >0.7 IU/mL difference), TB1 ≥ TB2 occurred in 4 (6%) and TB2 ≥ TB1 occurred in 3 (5%). All 4 TB1 ≥ TB2 had no TB2 response; there were 2 contacts (10 and 0.68 IU/mL); one was PPD positive with neck lymphadenopathy (4.23 IU/mL); one was PPD negative with haemoptysis after nasal surgery (1.75 IU/mL). Where TB2 was positive in the ‘grey zone’ and TB1 negative, one had Crohn’s disease (0.24, 0.01 IU/mL) and the other (0.23, 0.01 IU/mL) was a contact of non-pulmonary TB, but in none was there HIV co-infection. Three had TB2 ≥ TB1: one with smear-positive lung TB had a TB2=0.6 with a TB1=0.25, but the latter was in an accepted ‘grey zone’; two had positive tests for both tubes, of which one was a contact 30 years previously and one had testicular TB.

Conclusion These data may indicate a technical failure of the TB2 tube. Alternatively, the absent immune response, associated with active disease, might prove useful in determining who could benefit from preventive treatment.

Abstract P164 Table 1

<table>
<thead>
<tr>
<th>Highest TB1 or TB2 value (IU/mL)</th>
<th>Difference (IU/mL)</th>
<th>&lt;0.2 (n=186)</th>
<th>&gt;0.2 and&lt;0.35 (n=4)</th>
<th>&gt;0.35 (n=65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0−0.1</td>
<td>182</td>
<td>2</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>&gt;0.1 to&lt;0.35</td>
<td>4</td>
<td>2</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>≥0.35</td>
<td>0</td>
<td>0</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>&gt;2-fold</td>
<td>na</td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

P165 LATENT TUBERCULOSIS INFECTIONS (LTBI) NATIONAL SCREENING PROGRAMME

Background The new entrant TB screening programme identified very few persons for Latent TB screening locally. However, following national funding for community LTBI screening, 12 GP practices were identified to undertake IGRA testing in “high risk” registered persons.

Aims To evaluate the feasibility and clinical outcomes of the LTBI National Screening Programme

Methods From May 2016 until April 2017, persons from countries with high TB incidence (>150/100,000 population) and sub-Saharan Africa were identified by the GP practices and offered LTBI screening with IGRA if they had arrived in the UK in the last 5 years and were aged 16–35 years. IGRA Results were forwarded to the TB team at the local hospital.

Results 360 persons were community-screened for LTBI. Of the 360 persons, 305 (84.7%) had non-reactive IGRA Results and therefore did not require follow up. The remaining 55 (15.3%) had either positive, borderline positive or 2 indeterminate Results and were referred to the local TB team. Of 55 persons referred 2 did not attend any appointments offered and 53 attended 2 of whom were subsequently found to have active TB. The treatment completion rate was 89.2% (see Table 1). Despite the inclusion criteria, of the 55 persons offered consultation, 16 had been residing in the UK for more than 5 years and 7 were over the age of 35.
Conclusion Retrospective case-finding in General Practice is feasible and the uptake for screening appeared very successful. Inclusion criteria were not strictly adhered to but identified persons with LTBI were offered non-funded treatment. Treatment completion rates were excellent. These Results will hopefully inspire on-going prospective screening of newly registered persons and prove to be more successful in the long-term than new entrant screening.

<table>
<thead>
<tr>
<th>IGRA results</th>
<th>Outcomes</th>
<th>Number of persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative and borderline negative</td>
<td>Discharged</td>
<td>298</td>
</tr>
<tr>
<td>Technical error/ insufficient cells</td>
<td>Discharged</td>
<td>7</td>
</tr>
<tr>
<td>Indeterminate</td>
<td>Referred to the local TB clinic</td>
<td>5</td>
</tr>
<tr>
<td>Positive and borderline positive</td>
<td>Referred to the local TB clinic</td>
<td>50</td>
</tr>
</tbody>
</table>

Abstract P165 Table 1

Outcome of the 55 referred to the local TB clinic

- Diagnosis of active TB: 2
- Completed LTBI treatment: 33
- Stopped LTBI treatment: 2
- Declined LTBI treatment: 2
- Postponed treatment – pregnancy: 2
- Postponed treatment – other: 2
- Not suitable for treatment: 7
- (previous active/latent treatment or due to age)
  - Negative IGRA – 2nd test: 1
  - DNA: 2
  - Lost to follow up: 2

POTENTIAL TB TREATMENT NON-COMPLIANCE

H Patel, Y Abunga, SO Brij. Peterborough City Hospital, Peterborough, UK

10.1136/thoraxjnl-2017-210983.309

Background Early identification of non-compliance in patients taking anti-tuberculous therapy (ATT) may improve treatment outcomes and prevent the emergence of drug therapy resistance. Since 2012, the TB Pharmacy Team has been tablet counting to identify missed doses. Strategies to improve ATT compliance such as provision of dosette boxes, more frequent appointments and directly observed therapy (DOT) can then be initiated.

Aim To evaluate the usefulness of tablet counting as an effective strategy to help identify and reduce non-compliance with ATT.

Methods A retrospective review of active TB cases diagnosed between January 2012 and December 2016 was undertaken. Objective compliance was graded according to accuracy of tablet counting. Treatment outcomes were assessed clinically and subsequent change from normal practice identified.

Results 248 persons received at least 2 months ATT from the TB Clinic and were further evaluated. The majority of persons (87.5%) were graded as fully (61.3%) compliant (accurate tablet counting) or mostly (26.2%) compliant (few missed doses) both with good clinical response. The commonest strategy to improve treatment outcome was to increase duration of therapy. Poor compliance (missed doses, poor clinical response, more than 1 non-attendance) in 4 patients resulted in admission and completion of DOT as an in-patient. NICE guidance would have identified 22 persons for DOT. 19/22 received DOT (2 MDR-TB; 12 prisoners; 3 homelessness, 2 intravenous iv drug users). 3 (2 with mental health disorders; 1 alcohol dependence) successfully completed therapy with increased frequency of appointments and family involvement. Tablet counting identified 25 partially compliant persons (12 had no obvious risk factor; 5 prisoners on DOT; 2 persons with mental health disorders and 1 with alcohol dependence as above; 3 HIV; 2 pregnant). Treatment

DIAGNOSING PULMONARY TUBERCULOSIS: HOW USEFUL IS THE CHEST X-RAY REPORT?

KJ Myall, W Owen, RA Breen, F Perrin. King’s College Hospital, London, UK; 2Guy’s and St Thomas’ NHS Foundation Trust, London, UK

10.1136/thoraxjnl-2017-210983.308

Introduction and Objectives The diagnosis of pulmonary tuberculosis (TB) is frequently delayed, resulting in increased morbidity and mortality. One factor may be a delay in referral for chest X-ray (CXR). The NICE quality statement of January 2017 suggests that all patients with imaging suggestive of active pulmonary tuberculosis are assessed by the next working day. We wanted to understand how many patients with confirmed TB have an initial CXR which correctly reported the diagnosis. In 29 (12%), the report did not mention TB, but did suggest referral to a respiratory physician, meaning that overall, 65% of cases would have been assessed. 198 patients (86%) had culture-positive disease, and of these, 91 (46%) had a CXR which suggested the diagnosis. In 123 cases (50%), the sputum was smear-positive for AFB and of these, 63 (51%) had a CXR reported as TB. Of those patients whose CXR was reported as TB, 92 (87%) had a positive culture, and 63 (51%) were smear-positive.

Conclusions In our study, the initial CXR was abnormal in most cases of pulmonary tuberculosis, but in only 52% of these TB was suggested as the diagnosis. Thus almost half of diagnoses were missed on initial CXR, including those with smear-positive disease, and an automatic referral for assessment would not have been triggered. We think that these data highlight the importance of considering radiologist training as part of TB control efforts.

REFERENCE

1 National Institute for Health and Care Excellence. Tuberculosis 2017QS141. Available at: nice.org.uk/guidance/qs141
outcomes were adequate although 11/25 were lost to follow-up (did not attend their end of treatment consultation) including 5 prisoners (released or transferred).

Conclusions Treating TB in prisoners and homeless persons continues to be a challenge, even when DOT is undertaken. Tablet counting can help identify potential non-compliance in persons without obvious risk factors. In our experience, tablet counting is an effective and relatively cheap objective adjunct in the assessment of ATT compliance.

**P168 SHOULD WE CONTINUE SCREENING HOUSEHOLD CONTACTS OF ALL INDEX CASES WITH TB IRRESPECTIVE OF INFECTIVITY? AN ANALYSIS OF CONTACT SCREENING YIELDS STRATIFIED ACCORDING TO INDEX SITE OF DISEASE AND SMOAR STATUS**


10.1136/thoraxjnl-2017-210983.310

Aim NICE Guidance (2016) recommends that TB contact screening is only carried out on close contacts (household and workplace/school contacts) of patients with infectious tuberculosis ie pulmonary tuberculosis (AFB smear positive) and laryngeal tuberculosis. However previous guidance recommended screening all household contacts of any index with TB irrespective of infectious status. The aim of this study was to look at the yields of contact screening amongst 3 groups of index cases- infectious smear positive pulmonary TB, smear negative pulmonary TB and extrapulmonary TB.

Method We analysed our records for contact screening of index cases with tuberculosis notified between January 2011 and May 2016. Index cases were divided into pulmonary smear positive, pulmonary smear negative and extrapulmonary. Contacts were divided into close, casual and workplace. The screening yields for each population were compared.

Results Between 1st January 2011 and 31st May 2016 1887 contacts of 408 notified index cases with TB were screened; 1109 were screened as contacts of smear positive pulmonary TB, 176 contacts of smear negative pulmonary TB, 506 contacts of extrapulmonary TB, the remainder the index site of disease was not specified. CXR screening was performed on the 510 contacts over the age of 35 (2011 guidelines). Patients 35 and under had 2 step immunological assessment with Mantoux and IGRA. There was a strong correlation between size of Mantoux response and IGRA positivity; 6% of Mantoux <6 mm, 23% Mantoux 6-10 mm, 40% Mantoux 11-15 mm, 55% Mantoux 15-20 mm, 84% Mantoux ≥25 mm. 604 contacts of index cases with AFB smear positive sputum were assessed immunologically – 123 (20.3%) were positive, 136 contacts of AFB smear negative pulmonary TB were assessed – 19 (10.5%) were positive, and 383 contacts of extrapulmonary TB were assessed – 42 (11%) were positive. 26 of 239 (11%) workplace/school contacts of infectious TB were positive, compared to 21.5% of close/casual contacts.

Conclusions Although contact screening yields for index cases with smear positive pulmonary TB are high, the Results for extrapulmonary and smear negative pulmonary TB are not insubstantial. Our data would suggest that we should continue screening close contacts of all TB index cases irrespective of infectious status.
Methods Patients screened in 2016 by our Secondary Care service using NICE-recommendations were included. Those aged 16–65 had an Interferon Gamma Test (QuantiFERON) and those aged 0–16 a Mantoux Test (reported as positive if ≥5 mm). Results were then stratified by the TB incidence in their country of birth and by age.

Results 345 patients were offered screening, and 235 patients attended (68%). 44 patients (19%) were found to have LTBI and none had active TB. The Results are displayed in Table 1. 120 patients (51%) were in the Strategy-recommended group, which had the lowest LTBI-positivity rate (10%). Restricting screening to just this group would have resulted in 32 of the 44 LTBI cases (72%) being ‘missed’. The LTBI-positivity rate was high in the younger and older age groups from the ≥150 cases/100,000 countries (25%) and 33% respectively, and 1/3 of those screened in the age 16–35 group from the 40–150 cases/100,000 countries tested positive, the majority being Romanian.

Conclusions The LTBI rate in New Entrants is high in groups not currently screened. Broadening the programme to include patients from a wider age range and from countries not currently widely screened. Broadening the programme to include patients from a wider age range and from countries not currently widely screened. Broadening the programme to include patients from a wider age range and from countries not currently widely screened. Broadening the programme to include patients from a wider age range and from countries not currently widely screened. Broadening the programme to include patients from a wider age range and from countries not currently widely screened. Broadening the programme to include patients from a wider age range and from countries not currently widely screened.

REFERENCE

Pulmonary vascular disease: monitoring and managing

Abstract P170 Table 1  LTBI screening results stratified by TB incidence in the country of birth and by age range (shaded cells indicate the Strategy-recommended screening group results)

<table>
<thead>
<tr>
<th>Age range (n=335 patients)</th>
<th>TB rate 40-150/100,000 (n=72 patients)</th>
<th>TB rate ≥150/100,000 (n=263 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 years</td>
<td>1/20 (5%)</td>
<td>2/13 (15%)</td>
</tr>
<tr>
<td>16-35 years</td>
<td>1/17 (6%)</td>
<td>1/1 (100%)</td>
</tr>
<tr>
<td>36-64 years</td>
<td>1/13 (8%)</td>
<td>2/3 (67%)</td>
</tr>
<tr>
<td>65 years or older</td>
<td>1/5 (20%)</td>
<td>1/1 (100%)</td>
</tr>
</tbody>
</table>

Abstract P171 Table 1

<table>
<thead>
<tr>
<th>Median/mean</th>
<th>Red flags, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom progression</td>
<td>N/A</td>
</tr>
<tr>
<td>NT-proBNP (ng/L)</td>
<td>60.5</td>
</tr>
<tr>
<td>WHO functional class</td>
<td>N/A</td>
</tr>
<tr>
<td>6 min walk distance (m)</td>
<td>295</td>
</tr>
<tr>
<td>Echo RA area (cm²)</td>
<td>17.5</td>
</tr>
<tr>
<td>Right heart catheter (any criterion)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

P171 ARE THE EUROPEAN SOCIETY OF CARDIOLOGY PULMONARY HYPERTENSION GUIDELINE RISK ASSESSMENT CRITERIA ASSOCIATED WITH 12-MONTH MORTALITY?


Background The European Society of Cardiology (ESC) guidelines for management of pulmonary hypertension (PAH) advocate comprehensive assessment of patients to determine prognosis and to guide treatment decisions, using a set of risk assessment criteria based on expert advice. These criteria are coded Red (high), Amber (medium) and Green (low). It is unclear whether these criteria are associated with short term survival.

Aim To determine whether red/amber/green risk status according to ESC guidelines is associated with 12 month mortality.

Methods This was a “snapshot” observational study using routinely collected clinical data for patients eligible for targeted drug treatment at a regional centre, under shared care with a national centre. All data available at the latest visit within the study period were collated, including demographics, echocardiogram and right heart catheterisation data. Data are reported as mean/median/count/%. Characteristics of deceased and surviving patients were compared using Mann-Whitney U-test. Association with 12 month mortality was assessed using Receiver Operator Characteristics (ROC) curve analysis.

Results Routinely collected clinical data were available for 104 patients, echocardiograms for 88 and right heart catheter data for 68. 25% were male, mean age 68.2 years. 45.2% had connective tissue disease-associated PAH, 32.7% inoperable chronic thromboembolic PH, 18.3% Idiopathic PAH. 101 were on treatment, of which 35.6% were on monotherapy, 51.0% on dual oral therapy, 9.6% on intravenous treatments. Baseline data are shown in the table. 25% had one red criterion, 14.4% had two and 8.6% had three or more. 19 patients died in the 12 month follow-up period, 6 of whom had no red criteria. Deceased patients were older (p=0.015) and had shorter walking distance (p=0.003). Risk criteria were worse for symptom progression, WHO functional class, walking distance and for the overall number of red criteria. ROC-curve analysis showed that symptom progression (c-statistic 0.695, p=0.048), walking distance (0.748, p=0.012) and the overall number of red flags (0.710, p=0.033) were the only elements associated with 12 month mortality.

Conclusions The ESC risk assessment criteria are associated with 12 month mortality in this cohort when all criteria are collated. Further work in a large cohort is needed to confirm the clinical utility of these criteria.

P172 PRE-OPERATIVE INSIGHTS FROM CARDIOPULMONARY EXERCISE TESTING IN PATIENTS WITH PULMONARY ARTERIOVENOUS MALFORMATIONS

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Background Pre-operative assessment of patients with pulmonary arteriovenous malformations (PAVMs) is recommended to guide surgical management. The utility of exercise testing for pre-operative assessment is unclear.

Methods This was an observational study of patients referred for surgical closure of PAVMs at a regional centre from January 2012 to July 2016. Exercise testing was part of a standard pre-operative assessment.

Results A total of 31 patients were assessed. 24 patients (77.4%) had PAVMs associated with connective tissue disease and 11 (35.5%) patients had PAVMs associated with connective tissue disease. 14 patients (45.2%) had ≥2 red risk criteria, 22 patients (70.9%) patients had ≥2 red risk criteria. 19 patients died in the 12 month follow-up period, 6 of whom had no red criteria. Deceased patients were older (p=0.015) and had shorter walking distance (p=0.003). Risk criteria were worse for symptom progression, WHO functional class, walking distance and for the overall number of red criteria. ROC-curve analysis showed that symptom progression (c-statistic 0.695, p=0.048), walking distance (0.748, p=0.012) and the overall number of red flags (0.710, p=0.033) were the only elements associated with 12 month mortality.

Conclusions The ESC risk assessment criteria are associated with 12 month mortality in this cohort when all criteria are collated. Further work in a large cohort is needed to confirm the clinical utility of these criteria.
Introduction and Objectives Patients with pulmonary arteriovenous malformations (PAVMs) are difficult to assess for anaesthetic risks. Generally, they display well-preserved exercise tolerance, yet may have very low oxygen saturation due to their anatomical intrapulmonary right-to-left shunts. During pre-operative assessments in the general population, anaerobic threshold and peak VO₂, measured by cardiopulmonary exercise testing (CPET), are increasingly recommended to identify high-risk patients, and appropriately plan post-operative management. For example, “high-risk” for major abdominal surgery has been suggested as an anaerobic threshold <11 ml min⁻¹ kg⁻¹ and peak VO₂ <20 ml min⁻¹ kg⁻¹.

Methods In order to evaluate “pre-operative” risk categories for PAVM patients, anaerobic threshold and peak VO₂, measured by ethically approved research cardiopulmonary exercise tests, were evaluated.

Results 26 PAVM patients underwent research CPET evaluations between April 2011-May 2017. Their median age was 57 years (interquartile range (IQR): 42–66). 16 (61.5%) were male. The median oxygen saturation (SaO₂) was 92% (IQR: 88–95) and median haemoglobin 15.6 g/dl (IQR: 14.2–16.6). Overall, the PAVM group achieved a median 92% of the predicted maximum work (IQR: 67–106), anaerobic threshold ranged from 7.6–24.5 ml min⁻¹ kg⁻¹ (median: 12.35; IQR: 9.5–17.35), and peak VO₂ ranged from 11.2–45.5 ml min⁻¹ kg⁻¹ (median: 19.8; IQR: 16.7–28.4). Anaerobic threshold placed 11/26 (42.3%) in the suggested high-risk category for major abdominal surgery. In this group, the anaerobic threshold ranged from 7.6–10.8 ml min⁻¹ kg⁻¹. Similarly, peak VO₂ placed 14/26 (53.8%) in a high-risk category. Their peak VO₂ ranged from 11.2–16.5 ml min⁻¹ kg⁻¹. There was full concordance between the categories determined by the 2 measurements. Notably, 6 patients were retested 3–31 months after embolization treatment resulting in increased SaO₂. However, there was no increase in anaerobic threshold or peak VO₂, and the 3 patients from this group initially in a higher risk category remained.

Conclusion Anaerobic threshold and peak VO₂ suggest high proportions of PAVM patients are in a high-risk pre-operative risk category. The data suggest an important role for anaesthetic assessments. Noting that 1 in 2600 people are estimated to have PAVMs, further study is recommended to develop appropriate clinical guidance, and allocate resources to optimise care.

P172 PROGNOSTIC FACTORS FOR SURVIVAL IN IDIOPATHIC PULMONARY ARTERIAL HYPERTENSION

CR Popplewell, A Greenhalgh, PA Corris. Freeman Hospital, Newcastle-upon-Tyne, UK

10.1136/thoraxjnl-2017-210983.315

Introduction Idiopathic pulmonary arterial hypertension (IPAH) is rare with an estimated prevalence of 5.9 cases/million population.¹ Untreated, prognosis is poor with one year survival 68%.² The ESC/ERS guidelines’ risk assessment tool estimates one year mortality.¹ This tool was used to assess the number of green prognostic factors and observe survival.

Methods Patients were identified retrospectively from a cohort of incident IPAH patients. Prognostic factors of WHO functional class, 6MWT and NT-proBNP were selected at 0 (baseline), 6 and 12 months. The number of green prognostic factors at baseline was compared with 6 and 12 months and survival observed.

Results 28 patients were identified; 11 male (39%), 17 female (61%), mean age at diagnosis 65 years (range 42–85). At baseline 19 (68%) patients had no green prognostic factors compared with 12 (43%) at 6 months (p=0.0043) and 11 (39%) at 12 months (p=0.002). At baseline 8 (29%) had 1 green prognostic factor compared with 5 (18%) at 6 months (p=0.08) and 10 (36%) at 12 months (p=0.17). At baseline 1 (3%) had 2 green prognostic factors compared with 11 (39%) at 6 months (p=0.0001) and 7 (25%) at 12 months (p=0.006). No patients had 3 green prognostic factors. The number of patients with 0 red prognostic factors increased from 13 (46%) at baseline to 20 (71%) at 12 months (p=0.005). At one year all patients survived.

Conclusions There was a statistically significant increase (p=0.005) in the number of patients with two green (low risk of mortality) prognostic factors at 6 and 12 months and patients with zero red (high risk) prognostic factors at 12 months, compared with baseline. A concurrent statistically significant reduction in number of patients with no green prognostic factors was seen. These suggest decreased one year mortality. One year survival between patients with 0, 1 or 2 green prognostic factors was identical. Patients are being followed for long term survival.

REFERENCES
Conclusion This findings of this study supports the use of PESI scoring systems in predicting early mortality. Study data suggests that sPESI has non-inferior predictive properties compared to the PESI, and therefore may prove of higher utility in day-to-day clinical practice. These tools may be reliably used to consider outpatient management of patients with PE, which includes imaging up to 72 hours after A&E attendance.

Abstract P174 Table 1

<table>
<thead>
<tr>
<th>PESI</th>
<th>Day 1</th>
<th>Day 3</th>
<th>Day 7</th>
<th>Day 30</th>
<th>Day 90</th>
</tr>
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<tbody>
<tr>
<td>Class I (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Class II (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (1.8)</td>
<td>1 (1.8)</td>
<td>2 (3.5)</td>
</tr>
<tr>
<td>Class III (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Class IV (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (4.3)</td>
<td>3 (6.4)</td>
<td>5 (10.6)</td>
</tr>
<tr>
<td>Class V (%)</td>
<td>1 (1.8)</td>
<td>3 (5.3)</td>
<td>7</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>p value</td>
<td>0.735</td>
<td>0.024</td>
<td>0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<tr>
<td>sPESI</td>
<td>Low risk</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>High risk</td>
<td>1 (0.5)</td>
<td>3 (1.6)</td>
<td>10</td>
<td>18 (9.7)</td>
<td>22</td>
</tr>
<tr>
<td>p value</td>
<td>0.648</td>
<td>0.271</td>
<td>0.012</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>AUROC PESI</td>
<td>0.9</td>
<td>0.9</td>
<td>0.82</td>
<td>0.86</td>
<td>0.84</td>
</tr>
<tr>
<td>AUROC sPESI</td>
<td>0.9</td>
<td>0.89</td>
<td>0.86</td>
<td>0.9</td>
<td>0.88</td>
</tr>
</tbody>
</table>

% – Percentage of mortality within the PESI class. AUROC – area under receiver operating characteristic

Introduction and objectives Patients with pulmonary arteriovenous malformations (PAVMs) are at high risk of cerebral abscess with life-changing morbidity and mortality. These patients often concurrently have hereditary haemorrhagic telangiectasia (HHT). A recent study of patients with PAVMs/HHT at a single institution suggested several environmental associations with cerebral abscess, particularly dental care, higher iron intake, and long-haul flights. In example, 4/37 (10.8%) cerebral abscess patients reported their abscess occurred after long-distance travel.

Methods In order to capture data on wider exposure of this population to such risk factors, an online questionnaire was developed using Survey Monkey. In total, 139 non-biassed questions gathered data online about an individual’s HHT and/or PAVM phenotype, and environmental factors of relevance to cerebral abscess and other study foci in our group. With ethical approval (16/LO/1909), participants were recruited following advertisement through global HHT support networks.

Results The survey opened on 31st May 2017. Within 7 weeks, 449 patients with self-reported HHT had completed the questionnaire. The majority (≥60%) were North Americans, with Europeans constituting the second largest group. 229 (51%) had PAVMs, usually diagnosed in their twenties to fifties. 89/229 (38.9%) had been treated by PAVM embolization and 13 (5.7%) by surgery. 17 (7.4%) had experienced a cerebral abscess and 46 gave a family history of cerebral abscess. Preliminary analysis of long-distance travel data revealed most patients rarely travelled for ≥3 hours. 266 participants reported the number of flights they had taken in their lifetime of durations<4 hours, 4–8 hours and ≥8 hours.
Posters sessions

In total, an estimated 27,722 hours were flown giving a mean average of 122 hours, i.e., approximately 10 long-distance flights per lifetime.

Conclusions This survey provides a large dataset from individuals with PAVMs/HHT, captured without a bias toward flight usage as in flight-specific surveys. The data suggest long-distance travel is less common than previously thought for the HHT population, which adds greater weight to the previously published association[1] between long-distance travel and cerebral abscess risk. This approach should enable the development of better tools to predict and reduce the risk of cerebral abscess for these patients.

REFERENCE

P177 COMPUTED TOMOGRAPHY DIAGNOSTIC MODEL FOR DIAGNOSIS OF PULMONARY HYPERTENSION
Al Swift, M Chin, B Currie, CA Elliot, A Charalampopoulos, S Rajaram, JM Wild, C Johns, DG Kiely, University of Sheffield, Sheffield, UK
10.1136/thoraxjnl-2017-210983.319

Introduction Pulmonary hypertension (PH) is severe cardiorespiratory condition associated with poor prognosis with diagnosis reliant on invasive right heart catheterization (RHC). Several measurements on computed tomography (CT) have been shown to have diagnostic value in PH, however few studies have attempted to identify the added value of combining CT metrics for the diagnosis of PH.

The aim of this study is to develop a composite diagnostic CT model for patients with suspected PH.

Methods Patients with suspected PH who underwent CT and RHC were identified. Standard axial and reconstructed images were used to derive CT metrics of cardiac and pulmonary vasculature anatomy. A derivation and validation cohort were randomly constructed to derive and test a binary logistic regression model of PH. Receiver operating characteristic (ROC) analysis assessed the diagnostic value of the model and individual metrics.

Results 491 patients were identified (derivation cohort n=247 and validation n=244). Main pulmonary arterial (MPA) diameter, right ventricular outflow tract (RVOT) thickness, right ventricular muscle area and interventricular septal (IVS) angle variables correlated strongest to mean pulmonary arterial pressure, r=0.458 (p<0.001), r=0.441 (p<0.001), r=0.481 (p<0.001) and r=0.622 (p<0.001), respectively. The diagnostic regression model included RVOT, IVS angle, MPA diameter, LV size and the interlobar artery to bronchus ratio. The area under the curve from ROC analysis was 0.931 (p=<0.001) in the derivation cohort and a 0.938 (p=<0.001) value in the validation cohort, more accurate the individual CT metrics (p<0.05). A highly sensitive threshold of 0 units had a sensitivity of 95% and specificity of 50% and a highly specific threshold of 3.3 units had sensitivity of 69% and specificity of 100%.

Conclusion A multivariate diagnostic model derived from axial CT images is accurate in suspected PH. The identified highly sensitive and specific thresholds may help in both patient screening and in selection for referral to specialist centres.

Abstract P177 Figure 1 ROC curve showing the performance of model 2 in the validation cohort with all included variables.

P178 5 YEAR FOLLOW UP OF PATIENTS INVESTIGATED FOR SUSPECTED PE. WHAT FURTHER TESTS FOR SUSPECTED VTE ARE PERFORMED AND ARE THEY POSITIVE?
11J Henderson, 1S Hainey, 2M Avev, 3NCD Morley, 4KC Muir, 5EIR van Beek, 2JT Murchison.
1University of Edinburgh, Edinburgh, UK; 2Clinical Research Imaging Centre, Edinburgh, UK
10.1136/thoraxjnl-2017-210983.320

The diagnosis of a Pulmonary Embolism (PE) is a challenging clinical problem, our approach to which has changed greatly since the introduction of Computed tomographic pulmonary angiography (CTPA). CTPA is now established as the imaging modality of choice for the diagnosis of PE, however there are concerns that CTPA causes the over-diagnosis of clinically irrelevant PE,1,2 and there is little data concerning the outcomes and further imaging following a CTPA at long follow-up times. Here we present long term follow-up of CTPAs over 5 years, looking at further imaging related to suspected thromboembolic disease after more than 2000 studies. After their initial CTPA, further studies were documented retrospectively using electronic patient records. Figure 1 demonstrates what further imaging for suspected venous thromboembolic event (VTE) patients had following their CTPAs scans over 5 years. In a one-year period, 24% of the negative studies, 38% of the positive, and 50% of the indeterminate studies had repeat testing for suspected thromboembolic disease. Indeterminate studies received repeat testing faster (p<0.001), and those with negative studies received fewer repeat tests (p<0.001). Those with a positive initial result were more likely to have positive recurrent testing over the whole 5 year period, and these data also suggest a trend showing increased risk with positive PEs rather than other VTEs. Furthermore, although CTPAs had a very high calculated negative predictive value for excluding PE (over 99%), many patients went on to have repeat testing following a negative result. Understanding
how test Results influence the predictive value of further testing is essential for effective risk stratification, and this work adds to the growing body of data examining the long-term implications of a CTPA result.

REFERENCES

P179
UTILISATION OF RESPIRATORY AND HAEMATOLOGY MULTI-DISCIPLINARY TEAM (MDT) MEETING FOR EFFECTIVE FOLLOW-UP AND MANAGEMENT OF PULMONARY EMBOLISM (PE) IN A DISTRICT GENERAL HOSPITAL

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Background Patients are diagnosed with PE in our hospital by a variety of health care practitioners in numerous clinical settings including Ambulatory Care. Following diagnosis and initiation of therapy, all patients should be referred to the PE Clinic for follow-up at 3 months to ensure that risk stratification for on-going venous thrombotic episode (VTE) is undertaken, anti-coagulation therapy duration is optimised and adequate screening for cancer and chronic thrombo-embolic pulmonary hypertension (CTEPH) undertaken.

Aim To evaluate the effectiveness of PE MDT (Respiratory and Haematology) meeting prior to Respiratory-led PE follow-up Clinic.

Methods PE patients referred to the PE MDT from January 2016–2017 were included. Demographic data was collected (gender, age, co-morbidities, referral source). The cause of VTE was established and duration of anti-coagulation therapy reviewed. Risk stratification and screening for cancer and PHT outcomes were documented.

Results 113 patients (56 male [49.5%]; average age 64 years; range 20–96) were discussed. 51 (45%) presented via Ambulatory Care with only 9 (8%) from Respiratory. PE was idiopathic in 56 (49.5%) of which 14 (25%) were a second VTE. Secondary causes included surgery (24) and BMI ≥40 (11). 66 (58%) received screening tests to exclude underlying cancer: new cancer diagnosed in 2 (lung, urological); 2 had cancer recurrence within 1 year; 5 required lung nodule surveillance. All patients were screened with echocardiography and only 3 did not undertake 6 min walk test (immobility). Subsequently, 2 patients required referral for further investigation of CTEPH. Haematology advice changed management in 47 (42%) cases, usually increased duration of anti-coagulation therapy. 4 patients had high DASH (D-Dimer, Age, Sex, Hormones) score post-treatment necessitating anti-coagulation restart. 1 patient had early PE recurrence following completion of recommended duration anti-coagulation. Only 7 patients required on-going Haematology referral and investigation. Respiratory advice changed treatment in 3 persons by reducing recommended duration of therapy; 16 patients required on-going Respiratory review for another respiratory illness.

Conclusion A systematic MDT approach has been shown to be safe and effective and optimises PE patient care. The next step would be to have Respiratory and Haematology input at MDT with an Acute Physician-led PE follow-up Clinic.

P180
MANAGING PREGNANCY IN PULMONARY HYPERTENSION USING A MULTI-PROFESSIONAL APPROACH: A 16-YEAR EXPERIENCE IN A SPECIALIST REFERRAL CENTRE

L ten Klooster, V Wilson, K Selby, R Newton, S Gandhi, T Bonnet, J Fletcher, L Armstrong, N Martin, N Hamilton, G Mills, R Thompson, A Charalampopoulos, I Sabroe, C Elliot, R Condiffe, D Kiley. Sheffield Teaching Hospital, Sheffield, UK

Conclusion A systematic MDT approach has been shown to be safe and effective and optimises PE patient care. The next step would be to have Respiratory and Haematology input at MDT with an Acute Physician-led PE follow-up Clinic.
Background Pulmonary hypertension (PH) in pregnancy is associated with a high risk of maternal death (30%–50%). Despite risks, patients may actively plan pregnancy. Patients may also present whilst pregnant with previously undiagnosed PH.


Results A total of 27 patients were identified over a 16 year period from 2001 till April 2017. Patients were classified as WHO group 1 (n=25) or group 4 (n=2). Eight of the 27 patients had 2 or more pregnancies and in total 36 pregnancies were managed during the study period. Of the 36 pregnancies, 20 resulted in live birth, 9 ended with medical termination and 7 resulted in a miscarriage. All patients were supervised by a multi-professional team (PH physicians, anaesthetists, obstetricians, intensivists and nurse specialists). 19 deliveries were by Caesarean section with 1 vaginal delivery and planned between 32 to 36 weeks; the earliest live birth was at 25+5 weeks post cardiorespiratory arrest at 25 weeks. Patients underwent epidural or combined spinal/epidural regional anaesthesia and were monitored peri-delivery in an intensive care environment with arterial and central venous access. Of 36 pregnancies, 2 women died within 6 months of delivery (3 and 28 days post-delivery) and none during pregnancy. Patients were followed until January 2017; mean follow up 64 months (range 0–174 months) after last pregnancy. The 5 year survival for all patients (n=27) from date of last pregnancy with PH was 92%.

Conclusion Mortality of PH in pregnancy in a setting of experienced and coordinated care is less than historical series but remains significant. Counselling women with PH of these risks remains an essential part of disease management. In the event of pregnancy, patients should be managed by a multiprofessional team with peripartum care in an intensive care environment.

Introduction Patients with pulmonary arteriovenous malformations (PAVMs) usually have underlying hereditary haemorrhagic telangiectasia (HHT), when iron deficiency often develops due to recurrent nasal and gastrointestinal haemorrhage. Iron deficient PAVM/HHT patients have more ischaemic strokes and venous thromboemboli. However, recent UK data indicate that cerebral absceses are more common in PAVM patients using intravenous iron and/or with high normal transferrin saturation index.1 Furthermore,~1 in 20 HHT patients report that iron treatments exacerbate their nose-bleeds.2 The goal of this study was to evaluate clinical patterns of iron treatments in patients with PAVMs and HHT.

Methods Iron, red cell and microbiology indices were evaluated as part of routine clinic assessments of patients with PAVMs and/or HHT. With ethical approval, all available patient datasets between 04/2015 and 07/2017 were recorded, categorised according to patient status, and analysed using STATA IC v13 (Statacorp, Texas).

Results At first assessment, 72 patients were using oral iron alone, and 21 were using intravenous iron +/- iron tablets. As noted in figure 1, intravenous iron users had lower haemoglobin concentrations than oral iron users, despite higher serum ferritin. None of the 16 selected PAVM patients evaluated had positive blood cultures in the clinic, or developed positive cultures following ex vivo iron treatments. Three of seven selected patients had low serum haptoglobin (0.32–0.36 g/L, reference range 0.5–2.4 g/L) potentially indicative of shortened intravascular red cell survival. 31 patients were commenced on oral or intravenous iron, or recommended a dose increase, but 56 were advised dose reduction. Post assessment, daily iron dosages tended to be lower (elemental iron content 14–130, median 35 mg/day) than at first assessment (elemental iron content 14–260, median 65 mg/day, p=0.08). In two patients, external clinicians advised that iron dose reduction led to at least temporary cessation of blood transfusion requirements. Reported nosebleed improvements were common, though may have also been due to intervening treatment of PAVMs.2

Conclusions Further study on the clinical efficacy and sequelae of iron treatments, and a more personalised approach to therapy, appears warranted in this patient group.

REFERENCES

Poster sessions

<table>
<thead>
<tr>
<th>P181</th>
<th>PULMONARY ARTERIOVENOUS MALFORMATIONS, HEREDITARY HAEMORRHAGIC TELANGIECTASIA AND IRON TREATMENTS</th>
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<tbody>
<tr>
<td>1CL Shovlin, 2El Boother, 3CH Fung, 4KB Bamford, 5DM Layton, 6JE Jackson, 7BS Brownlow. 1Imperial College London, London, UK; 2Imperial College School of Medicine, London, UK; 3Imperial College Healthcare NHS Trust, London, UK.</td>
<td></td>
</tr>
</tbody>
</table>

Introduction Patients with pulmonary arteriovenous malformations (PAVMs) usually have underlying hereditary haemorrhagic telangiectasia (HHT), when iron deficiency often develops due to recurrent nasal and gastrointestinal haemorrhage. Iron deficient PAVM/HHT patients have more ischaemic strokes and venous thromboemboli. However, recent UK data indicate that cerebral absceses are more common in PAVM patients using intravenous iron and/or with high normal transferrin saturation index. Furthermore,~1 in 20 HHT patients report that iron treatments exacerbate their nose-bleeds. The goal of this study was to evaluate clinical patterns of iron treatments in patients with PAVMs and HHT.

Methods Iron, red cell and microbiology indices were evaluated as part of routine clinic assessments of patients with PAVMs and/or HHT. With ethical approval, all available patient datasets between 04/2015 and 07/2017 were recorded, categorised according to patient status, and analysed using STATA IC v13 (Statacorp, Texas).

Results At first assessment, 72 patients were using oral iron alone, and 21 were using intravenous iron +/- iron tablets. As noted in figure 1, intravenous iron users had lower haemoglobin concentrations than oral iron users, despite higher serum ferritin. None of the 16 selected PAVM patients evaluated had positive blood cultures in the clinic, or developed positive cultures following ex vivo iron treatments. Three of seven selected patients had low serum haptoglobin (0.32–0.36 g/L, reference range 0.5–2.4 g/L) potentially indicative of shortened intravascular red cell survival. 31 patients were commenced on oral or intravenous iron, or recommended a dose increase, but 56 were advised dose reduction. Post assessment, daily iron dosages tended to be lower (elemental iron content 14–130, median 35 mg/day) than at first assessment (elemental iron content 14–260, median 65 mg/day, p=0.08). In two patients, external clinicians advised that iron dose reduction led to at least temporary cessation of blood transfusion requirements. Reported nosebleed improvements were common, though may have also been due to intervening treatment of PAVMs.2

Conclusions Further study on the clinical efficacy and sequelae of iron treatments, and a more personalised approach to therapy, appears warranted in this patient group.

REFERENCES
literature showed that CPTA Results can vary considerably depending on the clinical setting from 6.6% for patients seen in A and E, to up to 31% for patients admitted in General Medicine with mean positive yield of 18.8%. The documentation of pre-test probability was also poor (between 0% and 24%). Results from UK teaching and non-teaching hospitals were similar.

Conclusions Our regional clinical audit showed that our positive yield is lower than the recommended standards. We made good use of d-dimer testing when PE was suspected in patients with high pre-test probability. Adherence to current guidelines could increase the diagnostic yield and reduce costs and risks associated with CTPA scans. Extrapolated to a larger scale, this would translate into significant reduction in costs and risks associated with radiation and contrast exposure. Most of the reported clinical audits from UK hospitals revealed acceptable CTPA positive rates.

<table>
<thead>
<tr>
<th>Audit results</th>
<th>Positive CTPA result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Wells score (n=183)</td>
<td>Tested positive: 92 (50%)</td>
</tr>
<tr>
<td>Not tested: 88 (49%)</td>
<td>6</td>
</tr>
<tr>
<td>Negative: 3 (0.2%)</td>
<td>0</td>
</tr>
<tr>
<td>High Wells score (n=53)</td>
<td>Tested positive: 17 (32%)</td>
</tr>
<tr>
<td>Not tested: 36 (68%)</td>
<td>13</td>
</tr>
<tr>
<td>Negative: 0</td>
<td>-</td>
</tr>
<tr>
<td>Total=236</td>
<td>34 (14%)</td>
</tr>
</tbody>
</table>

P183 IMPACT OF PATIENT CHOICE ON SURVIVAL IN PATIENTS WITH CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION OFFERED PULMONARY ENDARTERECTOMY

Introduction Chronic thromboembolic pulmonary hypertension (CTEPH) is potentially curable by pulmonary endarterectomy (PEA). Despite this a significant proportion of patients offered PEA decline surgery.

Objective To compare long term survival and prognostic indicators in patients with technically operable CTEPH who underwent PEA and those who declined surgery.

Methods Data were collected for consecutive, treatment-naïve patients diagnosed with CTEPH between 2001 and 2014 identified from the ASPIRE-pulmonary-hypertension-registry.

Results Of 588 patients with CTEPH, 368 patients were offered surgery. Seventy six percent (n=281) underwent PEA, 20% (n=72) declined surgery and 4% (n=15) were planned to undergo surgery. Five year survival was superior in patients undergoing PEA at 83% compared to patients who declined surgery at 56% (p=0.001, log-rank test). In patients who were offered surgery, mixed venous oxygen saturation (SvO2) (p=0.003), gas transfer (DLco) (p=0.042), history of coronary artery disease (p=0.031) and patient choice (declining surgery) (p<0.001) were independent predictors of mortality. For patients who declined surgery a median threshold of DLco 62%, right atrial pressure 11 mmHg, and SvO2 62% the positive and negative predictive values for 3 year survival were 31% and 100%, 32% and 95% and 30% and 97%, respectively.

Conclusion In a cohort of consecutive patients with CTEPH the long-term survival of patients undergoing PEA is excellent and superior to patients declining surgery and strongly favours surgical intervention in eligible patients. More work is required to understand factors influencing decision making in CTEPH and to ensure that patients are counselled and supported to make informed decisions.
matched UK reference population (p=0.5) (Office of National Statistics). The hospital length of stay was longer in those over 80 (median: 19 vs. 14 days; p=0.001), however, there was no difference in NYHA class, haemodynamics, type of surgical disease, CAMPHOR score or ICU length of stay between the two age groups. There were more concomitant cardiac surgical procedures in the over 80 group (26% vs 11%, p=0.006), although this was not statistically significant when accounting for multiple testing.

Conclusions We found similar outcomes in patients under and over 80 years old undergoing PEA, except for a prolonged hospital length of stay in those over 80. Whilst survival is reduced in the over 80 group compared to the under 80, it is no different to the age-sex matched population. Age alone should not be a contraindication for PEA and individuals with suspected CTEPH should be referred for specialist evaluation.

REFERENCE

Biomarkers, imaging and outcomes in COPD

URINE BIOMARKER PROFILES ASSOCIATED WITH COPD EXACERBATIONS

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10.1136/thoraxjnl-2017-210983.327

Introduction COPD exacerbations cause considerable morbidity and mortality. Early identification and appropriate treatment might improve patient outcomes. We sought to determine whether urinary biomarkers are associated with a COPD exacerbation.

Method Urine samples from paired stable and exacerbation visits from 55 subjects were available from the COPD-BEAT study. 50 biomarkers were analysed in each sample at Mologic (Mologic LTD). Biomarkers that fulfilled the criteria i) a
significant parametric pairwise t-test (p ≤ 0.05) and ii) area under the receiver-operator characteristic curve (AUROC ≥ 0.59) were selected for inclusion in a logistic regression model.

Results The biomarkers that met criteria and were taken forward for further analysis are shown in Table 1. Of these CC16, CRP, MMP8 and NGAL combined had an AUROC of 0.82 (95% confidence interval 0.74 to 0.90). The Youden’s index gave a sensitivity and specificity of 78% and 82% respectively.

Conclusion COPD exacerbations can be identified by urinary biomarkers. The biomarker panel requires further validation in a prospective longitudinal study.

Abstract P185 Table 1 Candidate urine biomarkers of COPD exacerbation short listed from a list of 50 biomarkers

<table>
<thead>
<tr>
<th>Biomarker</th>
<th>AUROC</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrinogen</td>
<td>0.6395</td>
<td>0.0029</td>
</tr>
<tr>
<td>Secretory leukocyte peptidase inhibitor (SLPI)</td>
<td>0.5917</td>
<td>0.0268</td>
</tr>
<tr>
<td>Interleukin – 6 (IL-6)</td>
<td>0.6025</td>
<td>0.0325</td>
</tr>
<tr>
<td>N-Formyl-methionyl-leucyl-phenylalanine (FMLP)</td>
<td>0.6132</td>
<td>0.0121</td>
</tr>
<tr>
<td>Desmosine</td>
<td>0.6210</td>
<td>0.0386</td>
</tr>
<tr>
<td>Clara Cell protein (CC16)</td>
<td>0.6405</td>
<td>0.0025</td>
</tr>
<tr>
<td>Tissue Inhibitor of Metallopeptidase 1 (TIMP 1)</td>
<td>0.6446</td>
<td>0.0325</td>
</tr>
<tr>
<td>Tissue Inhibitor of Metallopeptidase 2 (TIMP 2)</td>
<td>0.6271</td>
<td>0.0287</td>
</tr>
<tr>
<td>C-reactive Protein (CRP)</td>
<td>0.6463</td>
<td>0.0002</td>
</tr>
<tr>
<td>Chitinase 3 like 1 protein (CH3L1)</td>
<td>0.6172</td>
<td>0.0139</td>
</tr>
<tr>
<td>Alpha 1 Anti-Trypsin (A1AT)</td>
<td>0.7240</td>
<td>6.3 E-6</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.6460</td>
<td>0.0009</td>
</tr>
<tr>
<td>Beta –2 Microglobulin (B2M)</td>
<td>0.6972</td>
<td>0.0001</td>
</tr>
<tr>
<td>Cystatin C</td>
<td>0.6747</td>
<td>0.0098</td>
</tr>
<tr>
<td>Matrix Metallopeptidase B (MMPB)</td>
<td>0.6003</td>
<td>0.0170</td>
</tr>
<tr>
<td>Neutrophil Gelatinase-Associated Lipocalin (NGAL)</td>
<td>0.6169</td>
<td>0.0072</td>
</tr>
</tbody>
</table>

P186 DEMONSTRATING HIGHER DIFFUSION COEFFICIENTS IN PATIENTS WITH EOSINOPHILIC VS. NON-EOSINOPHILIC EXACERBATIONS OF COPD

1R Barker, 2C Jones, 2J Fenton-Woods, 2L Smith, 2M Johnson, 1R Barker. 1University of Oxford, Oxford, UK; 2Kings College Hospital, London, UK

Background There is evidence that acute exacerbations of COPD (AECOPD) may be stratified by peripheral blood eosinophil count and that this may allow identification of a pathologically distinct phenotype with clinical value. We have compared lung function measures between patients with eosinophilic and non-eosinophilic AECOPD.

Methods All admissions to an inner London teaching hospital with AECOPD were recorded between 2004 and 2012. The eosinophilic phenotype is defined as a first blood count within 24 hours of admission showing peripheral blood eosinophil count ≥ 2% of white blood cells. The first lung function test recorded, performed in a dedicated-laboratory between admissions, were used in analysis. We used non-parametric statistics (Mann-Witney U) for univariate comparisons, and linear regression for multivariate analyses.

Results There were 2793 admissions with AECOPD recorded, we used only first admissions (1,279). Of the first admissions 1104 (86.3%) have a recorded peripheral blood eosinophil phenotype (≥2=331,<2=773) and 821 (64.1%) had a recorded FEV1. Of 821 the mean age was 69, 364 were female and 457 male. Proportion with eosinophilic AECOPD 31.1%. The mean FEV1 was 1.12 L (SD 0.55), mean FEV1% predicted 45.47 (SD 20.46) and Mean FEV1/VC (47.78 SD 15.88). The eosinophilic group had a higher FEV1 (mean 1.26 vs 1.05, p<0.001) and higher percent predicted FEV1 (mean 48.75 vs. 44.00, p=0.01) than those in the non-eosinophilic group. 565 patients had Dl,CO measured (44.2%). Eosinophilic phenotype was associated with a higher Dl,CO even after adjusting for FEV1% predicted (p<0.001).

Discussion In this cohort, patients admitted to hospital with acute exacerbations of COPD associated with an eosinophilic phenotype had a higher FEV1 and higher DLCO% predicted. A lower DLCO is more associated with an “emphysematous” than “bronchial” form of COPD. Our Results suggest that the eosinophilic phenotype of AECOPD may be associated with less alveolar and pulmonary capillary damage.

P187 SEASONALITY OF EOSINOPHILIC AND NON-EOSINOPHILIC EXACERBATIONS OF COPD

1R Barker, 5R Shrimanker, 1R Russell, 2J Fenton-Woods, 2C Jones, 2L Smith, 2M Johnson, 1I Pavord. 1Oxford University, Oxford, UK; 2King’s College Hospital, London, UK

Background Patients presenting with an acute exacerbation of COPD (AECOPD) and a peripheral blood eosinophil count ≥2% of the total white cell count have a better response to oral cortico-steroids, suggesting that stratification by this biomarker identifies a pathologically distinct phenotype
and has clinical value. We have tested the hypothesis that the eosinophilic and non-eosinophilic exacerbations of COPD have different seasonality using a dataset of patents admitted to an inner London teaching hospital with AECOPD over 9 years.

**Methods**
All admissions with AECOPD were recorded between 2004 and 2012. We recorded the first blood test result within 24 hours of admission. The month of admission was recorded. Seasons were defined as per figure 1 and the distribution of eosinophilic (blood eosinophil count ≥ 2%) and non-eosinophilic events compared.

**Results**
2793 admissions with AECOPD were recorded, of which 2416 (86.5%) had a FBC result available and 750 (31.0%) were eosinophilic. The mean age of the entire population was 70 with 44.3% female. Eosinophilic admissions had a median age 69.3 of which 40.5% were female. Non-eosinophilic admissions had a median age 70.9 of which 46.9% were female. There were no significant differences between the number of eosinophilic exacerbations across seasons. In contrast, non-eosinophilic exacerbations occurred more commonly in winter compared to summer. The proportion of eosinophilic events was 36.5 vs 28.1% in summer and winter respectively (mean difference 9%; 95% CI 4%–14%; p=0.003).

**Discussion**
Exacerbations of COPD associated with a higher blood eosinophil count do not vary according to season whereas non-eosinophilic exacerbations occur more commonly in winter and account for a significantly higher proportion of winter events.

**REFERENCE**

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**P188**
A FEASIBILITY STUDY OF SALIVARY PEPsin MEASUREMENT TO ASSESS AIRWAYS REFLUX IN EXACERBATING COPD PATIENTS

1TJB Brown, ²P Dettmar, ³AH Morrice, ⁴SP Hart, ⁵MG Crooks. ¹Hull York Medical School, Hull, UK; ²RD Biomed, Hull, UK

10.1136/thoraxjnl-2017-210983.330

**Introduction**
Chronic Obstructive Pulmonary Disease (COPD) patients experience dyspnoea and cough and are prone to episodes of rapid worsening, termed acute exacerbations (AECOPD). Infections, air pollution and gastroesophageal reflux (GOR) have all been implicated in AECOPD. Identification of GOR during AECOPD may allow targeted treatment. However, confirmation of GOR requires invasive procedures (e.g., pH manometry). Salivary pepsin measurement using Peptest (RD Biomed Ltd) offers a non-invasive alternative. We investigated the feasibility of using Peptest to detect salivary pepsin as a biomarker in AECOPD.

**Methods**
30 consecutive patients admitted within the last 24 hours with AECOPD were recruited and saliva collected daily for 7 days using a standard method. Pepsin was measured using Peptest. GOR was considered present if pepsin was ≥ 75 ng/ml. Participants completed the following questionnaires on day 1: Frequency Scale for Symptoms of GORD, Hull Airways Reflux Questionnaire and COPD assessment test. Additional demographic and clinical data were collected. Data are presented as mean ± SD.

**Results**
Thirty patients (Males: 18, Age: 64.1±12.6, current smokers: 18) were recruited over 30 days. 81% of eligible patients consented. 70% completed the study. Salivary pepsin levels over 7 days are presented in figure 1. 24/30 participants (80%) had salivary pepsin ≥ 75 ng/ml on day 1. Mean pepsin levels reduced significantly during the 7 days with highest levels observed on day 1 (p<0.01). There was no correlation...
between day 1 salivary pepsin and symptom questionnaires. Salivary pepsin measurement over 7 days identified four patterns: persistently low (n=3); persistently high (n=3); high on day 1 only (n=6); and variable (n=13).

**Discussion**

PepTest was acceptable to patients. Salivary pepsin measurement appears to be able to categorise different population groups by pattern of pepsin concentration throughout the week. As a feasibility study, it was not powered to identify correlation with clinical outcomes. Our Results suggest that using salivary pepsin as a marker of GOR is feasible and is worthy of further study in a large prospective cohort to evaluate its relationship to outcomes.

**REFERENCE**


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**P188** REDUCING READMISSION IN HIGH RISK COPD PATIENTS

K Sunderland, K Pears, D Anderson. Queen Elizabeth University Hospital, Glasgow, UK

10.1136/thoraxjnl-2017-210983.331

**Introduction and Objectives**

COPD patients with acute exacerbations make up a significant proportion of the inpatient hospital population. This patient group is at risk of recurrent readmission to hospital, which not only reduces patient quality of life but also has financial implications. The aim of this study was to correctly identify COPD patients at high risk of readmission and reduce this by addressing reversible factors and/or creating an anticipatory care plan (ACP).

**Methods**

200 consecutive admissions with an acute exacerbation of COPD were reviewed to identify risk factors for readmission at 28 days or mortality within 6 months. Patients who were identified as high risk of readmission were reviewed using an algorithm to identify potential reversible factors and if ACP would be appropriate. This review was carried out either during admission or at the point of discharge.

**Results**

The following factors were shown to predict readmission or death, recurrent admissions (≥2 in the last year) (readmission: \( p=0.002 \), OR=3.56, death: \( p=0.001 \), OR=11.64), NIV during admission (readmission: \( p=0.073 \), OR=4.06, death: \( p=0.023 \), OR=7.17) and long term oxygen therapy (readmission: \( p=0.034 \), OR=3.23, death: \( p=0.001 \), OR=9.22). 72 subjects were identified as having a high risk of readmission. Of these 72 subjects, 14 had the algorithm applied during admission (prospectively) and 58 at the point of discharge (retrospectively). 53% of the study population was readmitted within 28 days. 21% of the prospective group was readmitted compared to 60% of the retrospective group. 55% of the prospective group had an ACP in place compared to 32% of the retrospective group.

**Conclusions**

By identifying characteristics associated with high risk of readmission in patients with COPD, we were able to apply an algorithm in the hope of reducing readmission. Although current numbers are small, initial Results indicate that the use of the algorithm during a hospital admission could significantly reduce readmission to hospital. Undoubtedly more data is required. In the future routine use of this proactive approach could potentially improve patient care as well as reduce the financial burden for healthcare providers.

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**P190** SPECIALIST EMERGENCY CARE AND COPD OUTCOMES

ND Lane, K Brewin, TM Hartley, K Gray, M Burgess, J Steer, SC Bourke. Northumbria HealthCare NHS Foundation Trust, North Tyneside, UK

10.1136/thoraxjnl-2017-210983.332

**Introduction**

On 16/06/15 the Northumbria Specialist Emergency Care Hospital (NSECH) opened, introducing 24/7 specialist consultant on-call, direct transfer from the emergency department to specialty wards and 7 day consultant review. A Respiratory support unit opened for non-invasive ventilation (NIV), with enhanced staffing ratios. Pre-NSECH the NIV service included mandated training and competency assessment, 24/7 single point of access, initiation of ventilation in the Emergency Department, a door-to-mask time target, early titration of pressures, and structured weaning. Pneumonia or hypercapnic coma complicating ECOPD is not considered a contra-indication to NIV. Post-NSECH staff-patient ratios increased, the NIV pathway was streamlined and structured review introduced. The NCEPOD 2015 enquiry and 2013 BTS NIV audit showed ≥34% of patients receiving acute NIV died.

**Methods**

Patients hospitalised with ECOPD between 1/1/13 and 31/12/16 were identified using ICD10 J44 codes. Ventilation status was confirmed from rolling audit data, combined with a coding search (J96) and verification from patient records. Age, gender, admission from nursing home, consolidation, Charlson index, key comorbidities, length of stay and 30 day mortality were captured. Population characteristics and outcomes were compared pre- and post-NSECH. Independent predictors of mortality were identified by logistic regression. Inpatient and 30 day mortality, adjusted for baseline performance and prognostic indices, was plotted (VLAD: Variable Life Adjusted Display).

**Results**

6291 patients were identified. Pre- and post-NSECH, demographic and clinical indices were similar. Among ventilated patients, 96.5% and 98% received NIV respectively. Inpatient plus 30 day mortality was lower post-NSECH for the whole cohort, and for ventilated and non-ventilated subgroups. Independent predictors of mortality in a) the whole cohort were: NSECH [Beta=0.64; \( p=0.0001 \)], age, admission from nursing home and Charlson Index; and b) in ventilated patients were: NSECH [Beta=0.51; \( p=0.0016 \)], age and male gender. The VLAD plot showed sustained improvement in observed/expected mortality post-NSECH. Post-NSECH median length of stay fell by one day in both sub-groups.

**Conclusions**

Introduction of 24/7 specialist emergency care was associated with a substantial fall in ECOPD mortality from strong baseline performance. Improved outcome was not redeployed.
limited to high-risk patients receiving ventilation. Furthermore, mortality day 0–30 post discharge also fell.

**Abstract P190 Table 1**

<table>
<thead>
<tr>
<th>Inpatient Mortality</th>
<th>Pre-NSECH</th>
<th>Post-NSECH</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>223/394</td>
<td>90/2348</td>
<td>0.0012</td>
</tr>
<tr>
<td>(%)</td>
<td>(5.66)</td>
<td>(3.83)</td>
<td></td>
</tr>
<tr>
<td>Ventilated (%)</td>
<td>71/540</td>
<td>32/346</td>
<td>0.086</td>
</tr>
<tr>
<td>(%)</td>
<td>(13.15)</td>
<td>(9.25)</td>
<td></td>
</tr>
<tr>
<td>Not ventilated (%)</td>
<td>152/3403</td>
<td>58/2002</td>
<td>0.0035</td>
</tr>
<tr>
<td>(%)</td>
<td>(4.47)</td>
<td>(2.90)</td>
<td></td>
</tr>
</tbody>
</table>

**Inpatient+30 day combined mortality**

| All patients              | 309/3943  | 123/2348   | <0.0001 |
| (%)                       | (7.84)    | (5.24)     |         |
| Ventilated (%)            | 98/540    | 36/346     | 0.0015  |
| (%)                       | (18.15)   | (10.40)    |         |
| Not ventilated (%)        | 211/3403  | 87/2002    | 0.0037  |
| (%)                       | (6.20)    | (4.35)     |         |

**Introduction and Objective** In recent years accumulating evidence supports gender differences in COPD, suggesting a steady increase in COPD prevalence and mortality rates in women. In this analysis we evaluated gender differences in COPD exacerbations in a cohort of COPD patients from the Clinical Practice Research Datalink (CPRD), a general practice electronic primary medical care records database in the UK. Methods This is a retrospective cohort study comparing women and men with an incident diagnosis of COPD, using secondary data from the linkage between the CPRD and the Hospital Episode Statistics (HES) databases. The study period was between 01 January 2005 and 28 February 2016; patients with an incident diagnosis of COPD between 01 January 2010 and 28 February 2015 were included in this study. Results A cohort of 22,429 COPD patients (48% women) with an incident diagnosis of COPD was identified. At diagnosis, women were younger, more often current or non-smokers and had lower BMI, better lung function (as expressed by FEV1%, predicted), worse mMRC dyspnea scale scores and lower blood eosinophils. Women also had a higher prevalence of asthma, anxiety, depression and osteoporosis, whereas men had more often cardiovascular comorbidities (myocardial infarction, heart failure and atrial fibrillation). The risk of first moderate or severe exacerbation was 17% greater in women than in men (adjusted HR, 1.17; 95% CI, 1.12 to 1.23), with a median time to first exacerbation of 504 days for women and 637 days for men. These gender differences were more prominent in patients aged 40–64 years and in those with moderate-to-severe airflow obstruction (30% ≤ FEV1<80% predicted). Women also had a greater rate of moderate or severe exacerbations at year 1 (adjusted RR, 1.15; 95% CI, 1.07 to 1.23), year 2 (adjusted RR, 1.14; 95% CI, 1.08 to 1.21) and year 3 (adjusted RR, 1.14; 95% CI, 1.08 to 1.20) of follow-up. Conclusions Despite evidence for milder disease at the time of COPD diagnosis, women were at greater risk of COPD exacerbations than men, especially at younger ages. These Results highlight the unmet need for appropriate identification and management of women with COPD in clinical practice.

**P192 FUNCTIONAL RESPIRATORY IMAGING (FRI) AND LUNG FUNCTION ASSESSMENT OF GLYCOPYRRONIUM/FORMOTEROL FUMARATE DIHYDRATE FIXED-DOSE COMBINATION DELIVERED USING INNOVATIVE CO-SUSPENSION DELIVERY TECHNOLOGY (GFF MDI) IN COPD**

10.1136/thoraxjnl-2017-210983.333
THE DEGREE OF LUNG DESTRUCTION WITH EMPHYSEMA ON QUANTITATIVE LUNG CT SCANS VERSUS SUBJECTIVE AND OBJECTIVE IMPAIRMENT IN PATIENTS WITH ADVANCED EMPHYSEMA REFERRED FOR VOLUME REDUCTION THERAPIES

DT Betney, N Jarad. Bristol Royal Infirmary, Bristol, UK
10.1136/thoraxjnl-2017-210983.335

Background Quantitative CT (QCT) scans of the lungs have been recently introduced for directing clinicians to the most appropriate lobes needing treatment with lung volume reduction (LVR) therapies. Changes in QCT have been considered as a key marker of procedure success. However, despite procedures aiming to improve quality of life and exercise tolerance, there has been no understanding if the degree of emphysema on QCTs correlates with the subjective and objective parameters used in patient selection for LVR.

Methods The pre-treatment QCT used was able to segment the lungs by tracing inter-lobar fissures thus providing data on the volume of each lobe. It was also able to digitally assess the proportion of emphysematous tissue area (defined by Hounsfield units of −910 or less) in each lobe. Utilising these two properties we calculated the volume of the lungs affected by emphysema by the summation of the emphysema volumes in all lobes. Values and percentage predicted of FEV1, residual volumes (RV) and gas transfer for carbon monoxide (TLC0) were obtained from standard measurements; along with a 6 min walk distance (6 WD) and COPD assessment test (CAT) score. Spearman non-parametric correlation test was used to correlate emphysema volume with these parameters.

Results A total of 47 patients (19 female), mean age (SD) of 66.2 (8.9) years were included. Their mean (SD) FEV1 was 0.81 L (0.28). There was no correlation between the total emphysema volume and CAT score (r=-0.21, p=0.2) or with 6 WD (r=-0.34, p=0.054). Total emphysema volume and the value of RV were strongly correlated; r=0.68, p<0.0001. There was no correlation with FEV1 or TLCo values. However, percentage of predicted values of lung function tests weakly correlated with total emphysema volume; for FEV1 (r=-0.36, p=0.01), for RV (r=0.34, p=0.02) and for TLCo (r=-0.32, p=0.04).

Conclusion The lack of strong correlation between anatomical changes and lung function is probably due to changes in airway diameter (as well as tissue destruction) which is not captured by QCT. To add to that, the lack of correlation with 6 WD or CAT score is probably due to non-pulmonary factors affecting the values of these two measurements.
values. Analysis by QCT and SPECT is available on 235 lung lobes. For all lung lobes, mean low attenuation at $-910$ HU was 53.7% and at $-950$ HU of 36.9%. Median Score on SPECT was 5.3 points. A weak correlation between uptake score on SPECT and QCT scores; Spearman $r=-0.33$, $p<0.0001$ for emphysema area at $-910$ HU and $r=-0.33$, $p<0.001$ for emphysema area at $-950$ HU. Significant discordance is present between the two methods (graph.1) which could lead to either treating lobes with low perfusion but preserved lung tissue or not treating lobes with high perfusion but with significant emphysema.

Conclusion Despite the wide usage of perfusion scan to guide identification of lung lobes targeted for LVR, this study shows that this method needs to be interpreted with caution. QCT's should be relied upon to choose lobes needing treatment. Longitudinal analysis is needed to evaluate the outcome of treatment when the treated lobe was selected according to low perfusion.

External influences on asthma

P195 “SYNDROME Z” IN THE ASTHMA POPULATION

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Introduction Current literature demonstrates associations between asthma, obstructive sleep apnoea (OSA) and obesity. Syndrome Z is the occurrence of OSA with the metabolic syndrome, and the relevance of this condition in asthma populations remains unclear.

Methods 192 patients were recruited from a regional severe asthma service and associated respiratory clinics during January 2016-June 2017. 37 had a pre-existing diagnosis of OSA, 116 patients were screened regardless of symptoms, 39 patients with symptoms of OSA were included. Patients underwent an overnight limited channel sleep study and bioelectrical impedance measurements. The groups were split into OSA and no-OSA to compare metabolic profile, associated co-morbidities and body fat composition. Data were analysed using MedCalc version 15.

Results 192 patients with asthma (137 females, 55 males), 173 (90%) had severe asthma, 19 (10%) had non-severe asthma. 37 (19.3%) had pre-existing OSA, 26 of which required Continuous Positive Airway Pressure (CPAP). A total of 97 (51%) had OSA, 58 (30%) had OSA excluded. The OSA group had significantly higher mean Body Mass Index (BMI) (34.8 ±8.2 versus no-OSA group 28.1±6.0, $p<0.001$), body fat% (38.2%±11% versus no-OSA group 32.2%±12%, $p=0.002$), visceral fat rating (12.8±5.1 versus no-OSA group 7.4±4.1, $p<0.001$) and mean metabolic age (59.5±12.8 years versus no-OSA 44.4±16.7 years, $p<0.001$). The OSA group also had significantly higher rates of diabetes (OSA 0.25±0.47, no-OSA 0.06±0.23, $p=0.005$), hypercholesterolaemia (OSA 51/132 (38.6%), no-OSA 9/53 (28.6%), $p=0.0046$) and hypertension (OSA 50/132 (37.9%), no-OSA 6/53 (10.7%), $p=0.0004$).
P196 A NEW QUESTIONNAIRE TO MEASURE QUALITY OF LIFE IN SEVERE ASTHMA (SAQ): PRELIMINARY VALIDATION

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There was no significant difference in GORD (p=0.305), rhinosinus disease (p=0.388) or oral corticosteroid requirement (p=0.6896). Asthma Control Questionnaire (ACQ) was significantly higher in OSA 3.3±1.3 compared to the no-OSA group 2.8±1.3, p=0.022 (Apnoea Hypoxia Index (AHI) ≥10).

Conclusion Asthmatics with co-morbid OSA are more likely to have poor asthma control with significantly higher ACQ scores. Additionally, these patients have significantly higher rates of diabetes, dyslipidaemia and hypertension. Routine screening for OSA and metabolic syndrome (“syndrome z”) is recommended in asthmatics.

Poster sessions

P197 THE IMPROVING ASTHMA CARE TOGETHER (IMPACT) PROJECT

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10.1136/thoraxjnl-2017-210983.339

The Improving Asthma Care Together (ImpACT) project implements a novel model of care which provides an integrated responsive services for asthma patients in Derby.

Aim The hypothesis of this project was that rapid review by a specialist asthma nurse in the community during an asthma exacerbation, would result in an improvement in patient’s asthma control and their ability to self-manage their asthma.

Methods Four specialist asthma nurses were recruited to provide seven day cover for the service. Patients who reported increasing asthma symptoms could access the service by self-referral or referral from a healthcare professional. The intervention involved a face-to-face review or a telephone call from a specialist asthma nurse. Patients were offered a 30 min face to face review at a variety of GP locations in the region. A template for each ImpACT review was constructed and a management plan issued at each consultation. A questionnaire was devised and patients were asked to complete this approximately 6 weeks following the intervention. A 10 point scale was used to ask patient’s what their confidence levels were in self-managing their asthma (0=no confidence and 10=highly confident) and how they rated their asthma control (0=poor and 10=excellent).

Results This project commenced in January 2017. Between the start date and June 2017 a total of 884 patients were reviewed as part of the service. 397 face-to-face visits, 470 telephone consultations and 17 home visits. Patient’s self-rating of their asthma control significantly improved following the intervention (pre-intervention mean 3.4, standard deviation [SD] 2.2 versus post-intervention mean 8.1 [SD 1.4]; paired t-test <0.001; n=23). Patient’s self-reported confidence in
Managing their own asthma also significantly improved following the intervention (pre-intervention mean 4.1 [SD 2.5] versus post-intervention mean 8.9 [SD 1.1]; paired t-test <0.001; n=24). Total number of hospital admissions and emergency department attendances did not decrease compared to the previous year’s data during this period (308 in 2016 versus 352 in 2017).

Conclusion Results to-date show that this integrated and responsive service for asthma exacerbation is well utilised and demonstrates a significant improvement in patient reported asthma control and confidence in self-managing their condition.

**P198** FENO AND BLOOD EOSINOPHILS AS BIOMARKERS IN PREDICTING ASTHMA EXACERBATIONS

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Introduction and Objectives Blood eosinophil counts (Bl–Eos) and fractional exhaled nitric oxide concentrations (FeNO) are established biomarkers in asthma. While patients with raised Bl–Eos are at increased risk of asthma exacerbations, it is unclear whether raised FeNO is associated with further increased risk. We sought to determine if raised Bl–Eos combined with raised FeNO was associated with increased frequency of asthma exacerbations.

Methods This was a cross-sectional study of data from the Optimum Patient Care Research Database. Patients included were aged 18–80 years with ≥1 year of continuous electronic health records prior to their most recent FeNO readings, had evidence of asthma, had received ≥1 inhaled corticosteroid prescription, and had Bl–Eos recorded within 5 years of FeNO reading. Cohorts were determined by: Bl–Eos raised (≥0.25×10^9/L, a cutoff representing the sample mean) and not raised (≤0.25×10^9/L) and, FeNO raised (≥35 ppb) and not raised (≤35 ppb). Patients were directly matched on age, sex, and smoking status. Patients with (i) raised Bl–Eos and not raised FeNO, (ii) raised FeNO and not raised Bl–Eos, or (iii) both biomarkers raised were compared with reference patients (neither biomarker raised). Comparison of exacerbations (evidenced by acute oral corticosteroid prescription or unplanned asthma-related hospital attendance) was conducted using conditional Poisson regression.

Results The unmatched study population consisted of 610 patients (mean age 52, 38% male, 46% non-smokers). With 1:1 matching, both the (i) raised Bl–Eos and not raised FeNO cohort (n=186) and the (ii) raised FeNO and not raised Bl–Eos cohort (n=98) demonstrated a trend toward greater exacerbation rates (unadjusted rate ratio: 1.41 [95% CI 0.91, 2.19] and 1.35 [95% CI 0.99 1.84], respectively) vs. reference group. Importantly, however, when both biomarkers were raised (n=53), a significantly greater exacerbation rate was observed (1.72 [95% CI 1.00, 2.93]).

Conclusion The combination of raised FeNO and raised Bl–Eos was associated with a greater exacerbation rate compared with neither biomarker raised. FeNO and Bl–Eos are simple primary care measurements that could reliably predict exacerbation risk for asthma patients. This should be confirmed prospectively in larger populations.

Please refer to page A258 for declarations of interest in relation to abstract P198.

**P199** ADVERSE EVENTS PROFILE OF ORAL CORTICOSTEROIDS AMONG ASTHMA PATIENTS IN THE UK

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Background and Objectives Previous studies have linked oral corticosteroid use in asthma patients to various adverse events. This study aimed to assess in more depth than has previously been done the toxicity profile of oral prednisolone among adult asthma patients.

Methods Using data from the UK-based Clinical Practice Research Datalink, we conducted a series of cohort studies, each with a nested case-control analysis, to quantify the risk of 11 different potential corticosteroid-related adverse events.

Results Incidence rates per 1000 person-years of potential corticosteroid-related adverse events in patients with new current use of oral prednisolone ranged from 1.4 (95% confidence interval [CI], 1.0–1.8) for peptic ulcer to 78.0 (95% CI, 74.8–81.2) for severe infections. After adjusting for confounding, current oral prednisolone use was most strongly associated with an increased risk of severe infection (odds ratio [OR] 2.16; 95% CI, 2.05–2.27) compared with non-use of prednisolone. There were smaller elevated risks of peptic ulcer (OR 1.47; 95% CI, 1.12–1.92), affective disorders (OR 1.47; 95% CI, 1.32–1.63), herpes zoster (OR 1.32; 95% CI 1.19–1.48), cardiovascular events (OR 1.33; 95% CI 1.18–1.49), diabetes mellitus type 2 (OR 1.35; 95% CI 1.22–1.49), bone related conditions (OR 1.27; 95% CI 1.17–1.37), and cataract at higher cumulative doses (cumulative dose ≥2000 mg: OR 1.43; 95% CI 1.17–1.73), compared with non-use of prednisolone. We did not observe an association between current oral prednisolone use and glaucoma, chronic kidney disease, or hypertension. Past use of oral prednisolone was not associated with any of the study outcomes. We observed possible dose-response relationships between current oral prednisolone use and the risk of cardiovascular events, affective disorders, bone-related conditions, severe infections, diabetes mellitus type 2, and cataract, but not the other investigated outcomes.

Conclusion Oral prednisolone use is associated with an increased risk of infections, gastrointestinal, neuropsychiatric, ocular, cardiovascular, metabolic, and bone-related complications among adult asthma patients. The risk is associated with current but not past use of oral prednisolone use, and for some outcomes with the prescribed dose of oral prednisolone.

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10.1136/thoraxjnl-2017-210983.342

Introduction and Objectives Asthma accounts for an economic loss of €72 billion annually in the 28 countries of the European Union with a monetised value of DALYs cost of €38 billion. One of the key priorities in asthma management is achieving asthma control. It is crucial to understand whether providing a minimally clinical important difference (MID) of the asthma control test (ACT) score can bring better clinical, utility and economic outcomes.

Aim To test whether the A.B.O.V.E. ASTHMA (Achieving-Better-Outcomes-and-Value-for-Everybody-in-Asthma) tool works in terms of securing the MID in ACT and, in doing so, we can provide positive outcomes for patients, payers, providers and policy makers.

Methods Using the data obtained from the Italian Medicines Use Review (I-MUR) cluster randomised controlled trial (C-RCT; 2014–2015) involving 1263 asthma patients and 283 pharmacists in Italy, we tested whether A.B.O.V.E. ASTHMA was able to (1) link a clinical outcome (ACT score) to economic and utility dimensions; (2) secure a MID improvement in ACT and the outcomes attached in terms of cost savings.

<table>
<thead>
<tr>
<th>Possible shifts* (current to target scenario)</th>
<th>@ 3 months Total n=1000</th>
<th>@ 6 months Total n=1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current scenario (ACT)</td>
<td>Target scenario (ACT)</td>
<td>% of success</td>
</tr>
<tr>
<td>1 RED to RED</td>
<td>5-10</td>
<td>8-13</td>
</tr>
<tr>
<td>2 RED to YELLOW</td>
<td>15-16</td>
<td>14-17</td>
</tr>
<tr>
<td>3 YELLOW to YELLOW</td>
<td>15-16</td>
<td>18-19</td>
</tr>
<tr>
<td>4 YELLOW to GREEN</td>
<td>18-19</td>
<td>20-21</td>
</tr>
<tr>
<td>5 GREEN to GREEN</td>
<td>20-21</td>
<td>≥23</td>
</tr>
<tr>
<td>Total (1+2+3+4+5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The calculation of the cost-saving for the NHS was estimated for a population of 1,000 asthma patients.
for the healthcare provider and gains in health utility (% of being in perfect health).

Results Data from the C-RCT showed that after receiving the A.B.O.V.E. ASTHMA intervention, patients improved their asthma control, assessed by the ACT, shifting from not controlled (RED) towards partially controlled (YELLOW), and fully controlled (GREEN) groups. Asthma control improved in the vast majority of patients (median ACT score was 19 at baseline, 20 at 3 month and 21 at 6 month post intervention). The number of patients who were on MID target and reached the GREEN group at 3 and 6 months were 129 (15.8%) and 162 (19.9%) respectively. The overall annual cost savings per 1000 patients attached to the shift towards the MID target was equal to: 3 46 012 euros (NHS) at 3 months and increased to 4 25 483 euros (NHS) at 6 months (see Table). Health utility gains were equal to 0.9 and 0.29 years in full health, respectively.

Conclusions The A.B.O.V.E. ASTHMA tool can secure MID in ATC and, in doing so, better outcomes in terms of clinical, utility and economic results.

The calculation of the cost-saving for the NHS was estimated for a population of 1000 asthma patients.
asthma when compared to non-severe asthma. Eosinophilic disease was significantly lower in the OSA group, suggesting an alternative driver of symptoms with this asthma phenotype. The current screening questionnaire failed to predict OSA in this specific population, suggesting routine overnight sleep studies are required to screen patients with severe asthma.

P203 A COMPARISON OF ADVERSE EVENTS ASSOCIATED WITH LICENSED AND UNLICENSED SPACER USE WITH NON-EXTRAFINE BECLOMETASONE DIPROPIONATE TREATMENT IN A REAL-LIFE PATIENT POPULATION WITH ASTHMA IN THE UK

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Background Spacers may be compatible but unlicensed for an inhaler device. A prior study showed that co-prescription of unlicensed spacers with non-extrafine (non-EF) beclometasone dipropionate (BDP) asthma therapy was common. This study aimed to compare the occurrence of patient-reportedinhaled corticosteroid (ICS)-related adverse events (AEs) in patients with asthma co-prescribed the licensed Volumatic or unlicensed Aerochamber spacer with their non-EF BDP therapy.

Method A cross-sectional study using completed questionnaires and data extracted from the Optimum Patient Care Research Database including patients with asthma, aged ≤65 years, ≥2 prescriptions for non-EF BDP and co-prescription of either a Volumatic or Aerochamber spacer. Patient characterisation was performed for the year prior to receipt of the completed questionnaire. AEs captured via questionnaire included continual sore mouth/throat, oral thrush, hoarse voice, bruising, weight gain and cough. The primary outcome was non-inferiority of the proportion of patient-reported oral candidiasis (reported as oral thrush/hoarse voice). The two spacer groups were compared using logistic regression, adjusted for gender, ICS average dose and smoking status. Non-inferiority was claimed if the upper 95% confidence interval (CI) of the marginal effect estimate was <0.13. Comparisons by age (<16, 16–65, >65 years) and ICS dose (<1000 µg, ≥1000 µg) were additionally performed.

Results Of the patients co-prescribed the licensed Volumatic spacer (n=155), 29.9% reported oral candidiasis, compared to 27.7% of patients co-prescribed the unlicensed Aerochamber device (n=385, p=0.622). The marginal effect estimate was –0.043 (95%CI –0.133, 0.047) and the Aerochamber was determined to be non-inferior to the Volumatic spacer. In terms of the total number of reported AEs, there were no significant differences for the main population (≤65 years) (p=0.797), 16–65 years (p=0.875), <16 years (p=0.687), >65 years (p=0.425), high dose (p=0.084) and low dose (p=0.443) groups between those co-prescribed a Volumatic or an Aerochamber spacer.

Conclusion Co-prescription of the unlicensed Aerochamber spacer with non-EF BDP asthma therapy, in recommended patient groups, does not increase the risk of developing oral candidiasis or other ICS-related AEs, as compared to co-prescription of the licensed, Volumatic device.

REFERENCE
1. ICAIUS study submitted to PCRS 2017.

Abstract P204 Table 1

<table>
<thead>
<tr>
<th>HADS n=55</th>
<th>Anxiety (HADS-A)</th>
<th>Depression (HADS-D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-case (8–7)</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>Mild (8–10)</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Moderate (11–15)</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Severe (16–21)</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>SF-36 n=52*</td>
<td>Physical component</td>
<td>Mental component</td>
</tr>
<tr>
<td>Non-case (≥40)</td>
<td>26</td>
<td>35</td>
</tr>
<tr>
<td>Poor quality of life range (&lt;40)</td>
<td>26</td>
<td>17</td>
</tr>
</tbody>
</table>

*Incomplete data in 3 cases
National Review of Asthma Deaths (NRAD)\(^1\) stated that “there is a well-recognised link between asthma and psychological problems; the prevalences of anxiety, depression and panic disorder are much higher in people with asthma than in matched controls and are associated with poor outcomes.” We aim to evaluate the prevalence of psychological illness within our difficult asthma clinic and its impact on asthma outcomes using data from the BTS Difficult Asthma Registry.

**Methods** Retrospective analysis of data submitted to the BTS Difficult Asthma Registry from July 2009 to June 2016. Outcomes were compared in those with and without anxiety or depression as defined by Hospital Anxiety and Depression (HAD) scores for at least 11/21. Categories for comparison included Asthma Control Questionnaire (ACQ) and Asthma Quality of Life Questionnaire (AQLQ) scores, Forced expiratory volume in one second (FEV1), Fraction of exhaled nitric oxide (FeNO), Unplanned GP/A+E attendances, Hospital Admissions, and need for oral prednisolone. Simple statistical tests such as Mann-Whitney and unpaired t-tests were used to analyse the data.

**Results** The database included 198 individuals (68 male and 130 female), of whom 69 (35%) had anxiety and 49 (25%) had depression. There were no statistically significant differences between each group for FEV1, FeNO and peripheral eosinophil count. Anxiety was associated with higher ACQ and lower AQLQ scores than non-anxiety (4 vs 2.8 and 2.9 vs 3.8 respectively, both \(p<0.0001\)) and increased number of steroid boosts per year (6 vs 5, \(p=0.013\)). Depression was associated with higher ACQ and lower AQLQ scores than non-depression (\(p<0.0001\)) and increased number of steroid boosts per year (6 vs 5, \(p=0.021\)).

**Conclusions** There is a high prevalence of anxiety and depression in the difficult asthma clinic, and both co-morbidities are associated with a greater symptom burden and an increased number of steroid boosts per year not explained by objective measures of asthma control. Further research is required to evaluate the impact of clinical psychology in this setting.

**REFERENCE**

1. NRAD – https://www.rcplondon.ac.uk/projects/outputs/why-asthma-still-kills

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**P206**

**A STUDY TO INVESTIGATE THE MECHANISMS UNDERLYING CIRCADIAN RHYTHM IN ASTHMA**

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**Background** Time of day is critical in the pathogenesis of asthma, and has been realised for centuries. Symptoms of asthma are worse around 4 am, when airway restriction is at its highest. Many asthma treatments are taken in the morning or evening, however there is increasing data that steroids are more efficacious if taken mid-afternoon. Investigating the biological timing of asthma is crucial to better understand the pathogenesis of asthma, this may lead to the discovery of new drug targets, and the identification of dynamic biomarkers that change by time of day and would be useful in a future chronotherapeutics study.

**Aims**

- Define new biochemical pathways involved in the circadian variation in asthma
- Determine a circadian biomarker in asthma

**Method** We recruited 10 atopic, moderately severe asthmatics and 10 healthy volunteers to complete 4 study visits, including an overnight stay. Blood, induced sputum and breath were sampled at intervals throughout the day and night, and physiological measurements made. PBMCs were harvested from peripheral blood at 4 am and 4 pm and plated in 6 groups, control, +LPS/anti-CD3/anti CD28, +P38 i, +LPS/anti-CD3/anti CD28 +P38i, +Dexamethasone, +LPS/anti-CD3/anti CD28 +dexamethasone for 2 hours. Conditioned medium was collected and frozen at −80°C, cell lysates were prepared for RNA extraction, and protein purification.

**REC reference** 14/NW/1352.

**Results** There is a high amplitude circadian change in FEV1 in asthmatics compared to healthy controls. The nadir is at 4 am (figure 1). There was also an increase in sputum and serum eosinophils (a key effector cell in asthma) at 4 am compared to 4 pm in asthmatics (figure1).

**On-going workflow includes**

- Transcript measurement from PBMCs using a combination of RNA-Sequencing and nanostring technology (for clock genes; inflammatory mediators; Signalling regulators; MAP kinase family members)
- Bioplex screen for expression and activation of additional MAPkinase components, and IkBa, from protein extracts and conditioned media
- Lipidomic analyses of serial, matched serum samples will allow analysis of the ceramide/sphingolipid pathway
- Breathomics analysis for volatile organic compounds in serial, matched breath samples.

**Discussion** We have demonstrated a significant diurnal effect on asthma lung physiology and eosinophil profiles. Further downstream analysis of serum, breath and sputum is underway.

**REFERENCE**

F Thompson, A Hujan, M Richardson, G Woltmann, S Siddiqui, S Gonem. University of Leicester, Leicester, UK

10.1136/thoraxjnl-2017-210983.349

**P207**

**AMBIENT AIR POLLUTION AND ADMISSIONS TO HOSPITAL WITH EXACERBATIONS OF ASTHMA**

F Thompson, A Hujan, M Richardson, G Woltmann, S Siddiqui, S Gonem. University of Leicester, Leicester, UK

10.1136/thoraxjnl-2017-210983.349

**Background** Air pollution has been linked to increased morbidity and mortality associated with a number of chronic health conditions including asthma. We hypothesised that levels of ambient air pollution would be related to the number of hospital admissions with exacerbations of asthma.

**Methods** Data on asthma admissions to a large acute NHS trust in the East Midlands were extracted using discharge diagnosis codes over a five-year period from April 2011 to March 2016. Ambient air pollution levels during this period were obtained from the website of the Department for Environment, Food and Rural Affairs. These data were based on a single monitoring station located in the centre of the City which recorded hourly readings of ozone, nitrogen oxides and
small particulate matter (PM$_{2.5}$). Daily mean data were utilised in the analysis. The effect of ambient air pollution on daily admissions for asthma was assessed using a generalised linear model in R version 3.3.1. Independent variables in the model were time, Ozone, NO, NOx and PM$_{2.5}$. Fourier terms to capture any long-term trend or seasonality were also included in the model. Delayed exposure effects where investigated by fitting separate constrained lag models.

**Results** During the period from April 2011 to March 2016 there were 4204 admissions due to asthma exacerbations (71% female, mean age 48 years). Admission numbers increased progressively from 726 in 2011/12 to 1043 in 2015/16. Admissions were most frequent in the month of December (2.9 per day) and least frequent in August (1.5 per day). None of Ozone, NO, NOx and PM$_{2.5}$ or their lagged terms were found to be independent predictors of daily admissions for asthma.

**Conclusion** Ambient air pollution measured at a single fixed monitoring station within a city is not able to predict the frequency of admissions due to asthma. Further research on the health effects of air pollution should make use of more detailed assessments of city-wide exposure, for instance by utilising satellite imaging and geospatial mapping.
(PM$_{2.5}$ and PM$_{10}$) based upon satellite imaging data, as well as directly measured ozone, NO$_2$ and PM$_{2.5}$ levels from a monitoring station in central Leicester.

Participants were provided with an electronic symptom diary and peak expiratory flow metre (Micro Diary; Carefusion, Basingstoke, UK) and a portable exhaled nitric oxide monitor (NOBreath; Bedfont, Maidstone, UK), and made daily measurements using these for 12 weeks. Relationships between exposure and outcome variables were analysed using cross-correlation.

**Results**

At a group level there were no consistent relationships between personal air pollution exposure and clinical outcomes. However, a number of individuals (n=6) manifested strong correlations between exposure and outcome variables, particularly those residing within inner-city Leicester. Figure 1 shows overlaid time series of modelled ambient NO$_2$ levels and exhaled nitric oxide measurements in Participant 13 (Panel A). Results of the cross-correlation analysis are shown in Panel B, indicating a strong positive correlation centred on a lag of zero days.

**Conclusions**

Air pollution exposure appears to have a significant effect on symptoms, lung function and airway inflammation in selected patients with asthma. These individuals may have a combination of increased susceptibility and higher than average levels of exposure. Future studies should focus on understanding the genetic and epigenetic mechanisms underlying susceptibility to air pollution, as well as developing strategies to mitigate the effects of exposure in susceptible individuals.

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**Sleep and breathing**

**P209**

**CHARACTERISTICS OF EAST LONDON CHILDREN WITH SEVERE OBESITY REQUIRING NON-INVASIVE VENTILATION FOR SLEEP DISORDERED BREATHING**

SMN Brown, J Rae, A Franklin, E Mapazire, J Bettencourt. Royal London Children’s Hospital, Barts Health NHS Trust, London, UK

**Introduction and objectives**

Childhood obesity is an increasing problem leading to significant health concerns. Children are referred to our Tier 3 obesity service if they have BMI ≥3.5 standard deviations (SD) or BMI ≥3 SD with comorbidities. There are currently 120 children under the care of the service; 22 have severe sleep disordered breathing (SDB) requiring non-invasive ventilation (NIV) overnight. We sought to characterise the demographics of those with sleep disordered breathing, the extent of associated comorbidities and to assess adherence to NIV.

**Methods**

A retrospective review of all data from patients under the care of the obesity service with SDB requiring NIV was undertaken. Adherence to NIV was assessed by patient and parent/guardian verbal report.

**Results**

The median onset of obesity was <5 years of age. 45% of patients reported poor adherence to NIV. The majority of children had obstructive sleep apnoea (OSA) requiring CPAP. 45% of patients had also undergone adenotonsillectomy. Those requiring BiPAP support had evidence of hypoventilation. Further patient demographics and comorbidities are presented in Table 1. There were no patients with pulmonary hypertension although one had cardiomyopathy.

**Conclusion**

There is a high level of associated comorbidities in our patient cohort – highlighting the severe medical complications already present in these young patients. This is important to note for respiratory paediatricians who may be looking after these children for SDB. Obesity services are fragmented throughout the UK and not all children will have access to an obesity service. Vitamin D deficiency is independently associated with obesity and our Results highlight the importance of screening for this. In addition a high level of non-adherence to NIV was reported, although probably underestimated. Although only 9% were known to mental health services, severe obesity is associated with mental health issues which are currently not adequately addressed by our service. NICE guidance states that Tier 3 obesity services should include a psychologist and social worker. Most services do not fulfil these requirements through lack of funding. We aim to recruit a psychologist to support this group of patients in weight loss management and NIV support.
Background Obstructive sleep apnoea (OSA) is common in bariatric patients undergoing surgery. However, its contribution to peri-operative respiratory complications and mortality has not been established. We sought to pre-operatively identify OSA in bariatric patients and record peri-operative complications following bariatric surgery.

Methods Data were collected and analysed from June 2014 to March 2017 for 410 bariatric surgery patients referred to the sleep laboratory for pre-operative screening and treatment of OSA. The STOP-BANG questionnaire, Epworth Sleepiness Scale (ESS) and nocturnal pulse oximetry were recorded and treatment was allocated with continuous positive airway pressure (CPAP). Peri-operative complications and mortality were the primary outcome measures for patients receiving CPAP treatment for OSA, with patients not requiring CPAP used as control. The mean follow-up time for all patients was 433 days; 732 days for the patients who had undergone bariatric surgery. The two groups were compared with Chi-square test and unpaired two-tailed t-test.

Results Significant OSA was present in 70% of the screened patients, 40% of patients involved in the study received CPAP treatment. Patients receiving CPAP treatment [49.5 (11.3) years old, 61% female, 50.3 (8.5) kg/m2] were older, had a lower female percentage and had a higher BMI than those not receiving CPAP [44.9 (12.0), 81% female, 46.6 (7.7)]. No significant differences, including hospital stay or rate of complications, were observed between patients on CPAP and those not on CPAP. Out of 53 patients who had undergone bariatric surgery at the cut-off date, only 1 respiratory complication had occurred.

Conclusion Bariatric patients who are screened pre-operatively for OSA and treated per guidelines have no increased risk of respiratory complications compared to patients without OSA.
**P211** FEASIBILITY AND EARLY BENEFITS ACHIEVED BY ADOPTING TELEPHONE CONSULTATION AND 2-WAY REMOTE MONITORING FOR INITIATION OF CPAP THERAPY

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10.1136/thoraxjnl-2017-210983.353

**Introduction** Obstructive sleep apnoea syndrome (OSAS) is common and UK sleep services are under considerable pressures. Adopting telephone consult based follow up supported by 2-way remote monitoring of CPAP treatment via a cloud-based system, with usage and treatment problem alert algorithms may achieve service efficiencies, rationalise patient travel for follow up, and improve treatment quality and outcomes.

**Methods** In February 2017, our clinical physiology team selectively adopted 2-way remote monitoring and telephone consult follow up for initiation of auto-titrating CPAP (Airsense 10 and Airview system, ResMed) for definite or suspected OSAS, prioritising those living distant from our hospital. Data from 61 patients who had completed follow up by June 2017 was retrospectively reviewed.

**Results** After monitoring period and telephone consult follow up (typically requiring 15 min of clinician time), 44 of 61 patients were benefiting from and using CPAP therapy ongoing. Remote monitoring review triggered remote therapy adjustment in 9 patients and day-case follow up of 7 patients. 16 patients required humidifier or alternative interface posted to them. CPAP trial was concluded with no symptomatic benefit in 8 patients. 7 patients were non-compliant and non-contactable: CPAP unit return was requested. Single telephone consultation was achieved in 27 patients; 18 patients required a 2nd call and 12 3 or more calls to make contact. 54 outpatient visits (median residence distance from hospital of 31 miles) were avoided, saving 3498 total travel miles.

**Conclusions** Adoption of 2-way remote monitoring facilitated telephone follow up of auto-CPAP initiation within a busy sleep service is feasible. Early treatment outcomes match our existing audit data for face-face follow up. Follow up hospital attendance was avoided in the majority of patients, with improvements in patient travel requirements. Remote monitoring facilitated recognition and intervention for early CPAP problems, which should in future translate into improved outcomes. Structured approach to telephone consultation and use of other communication methods should further improve service efficiency.

**P212** REPEATABILITY OF SELF-REPORTED SLEEPINESS IN THE CONTEXT OF FITNESS-TO-DRIVE

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10.1136/thoraxjnl-2017-210983.354

**Introduction** Excessive daytime sleepiness (EDS) is a contributing factor to road traffic accidents, it is assessed using self-administered questionnaires. These assessments are important information when discussing with the Driver and Vehicle Licensing Agency (DVLA) about fitness-to-drive. We hypothesised that patients may be confounded in their assessments after being informed about these potential implications.

**Patients and Methods** This was a prospective study carried out at a tertiary hospital between June 2017 and July 2017 (registration number: 2017–7478). Patients attending clinics for sleep-disordered breathing were asked to fill in the Epworth Sleepiness Scale (ESS) and the Stanford Sleepiness Scale (SSS) prior to their clinic appointment. Following the consultation, patients were informed about the risk of EDS and driving and they were informed that the DVLA might request information based on their self-assessed sleepiness. They were then asked to fill in the questionnaires a 2nd time. Parameters recorded included age, gender, BMI and driving licence. Results of the ESS and SSS before and after clinic were compared using the student’s t-test for paired observations. Subgroups of patients were analysed based on EDS (ESS≥10) and SSS. Data are presented as mean (SD).

**Results** 66 subjects were included (41 males, 25 females; age 59.0 (15.7) years, BMI 32.9 (9.1) years, driving licence held for 27.8 (20.9) years (n=50), smoking 26.9 (28.2) pack years). A total of 25 sleepy and 41 non-sleepy patients were identified.

There was no difference in the ESS between the occasions [8.6 (6.2) vs 8.6 (6.2) points; p=0.738] or the SSS [2.5 (1.3) vs 2.4 (1.3) points; p=0.253]. Subgroups analyses based on sleepiness ESS (p=0.108) and SSS (p=0.233) showed no significant differences either. A total of four patients (6.1%) changed their assessment from “sleepy” to “non-sleepy” and three patients (4.5%) changed from “non-sleepy” to “sleepy” after receiving information about the DVLA.

**Discussion** Providing patients with information about the risk of driving in the context of sleepiness does not significantly change how they score the extent of their sleepiness using self-administered questionnaires, despite high intra-individual variability in about 1/10 of the patients depending on the information provided.

**P213** IMPLEMENTATION OF A NOVEL OBSTRUCTIVE SLEEP APNOEA PATHWAY

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10.1136/thoraxjnl-2017-210983.355

**Introduction** Obstructive Sleep Apnoea (OSA) is a common but under-diagnosed form of sleep disordered breathing. It causes debilitating symptoms and significant morbidity. The gold standard treatment for moderate to severe OSA is continuous positive airway pressure (CPAP) accompanied by lifestyle advice and weight loss. It is estimated that between 2%–4% of middle aged men and 0.5%–1% of women are affected and this service receives around 200 referrals per year consistent with national predictions. Staffing remains unchanged since service set up in 2007 with two consultant sessions and one full time nurse specialist (CNS) however due to ever increasing demand the existing service was exhibiting unacceptable long referral to treatment times (RTT).

**Method** 202 referrals from April 2016 to end of April 2017 were retrospectively reviewed. 101 patients were seen according to the established pathway consisting of initial clinic consultation with onward investigation and management. A novel OSA pathway was initiated in February 2017 and the next 101 consecutive patients were reviewed. All patients were
REMOTE MONITORING IN THE EARLY STAGES OF CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) INITIATION IN OBSTRUCTIVE SLEEP APNOEA (OSA) ALLOWS EARLY DETECTION OF POOR COMPLIANCE AND MASK PROBLEMS

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10.1136/thoraxjnl-2017-210983.356

Background OSA is an increasingly recognised disease and successfully treated with CPAP. There are ever increasing demands on sleep services in the UK, in terms of provision, compliance and safety. One possible solution is the use of remote monitoring soon after CPAP set-up to determine usage patterns, residual apnoea-hypopnoea index (AHI) and mask problems. We have analysed our remote monitoring database to assess new patients with OSA set-up on CPAP.

Method Retrospective data was collected from patients with OSA commenced on CPAP from start of June 2017 for thirty days. All patients referred to the Aintree University Hospital Sleep service had a cardio-respiratory sleep study and subsequently, if appropriate, referral for CPAP. All patients with OSA were commenced on a Resmed Airsense S10 device with humidification, using a predictive algorithm, and had an assessment for an appropriate interface. All data was collected with patient consent using Resmed Airview.

Results This new pathway improved RTT from a median of 121 days to 35 days. There was also significant improvement in diagnostic clinic outcomes from 18% to 88% (figure 1). Implementation of this new OSA pathway incorporating a symptom questionnaire and early diagnostic testing has enabled a significant increase in clinic capacity achieving an improvement in RTT of 70%. Earlier treatment commencement will also lead to quicker resolution of day time somnolence limiting the time during which patients must abstain from driving and the resulting negative impact on their livelihood and lifestyle. At a time when healthcare budgets demand more for less we have demonstrated the efficacy of this new pathway.

Conclusion Remote monitoring provides a large amount of useful data which can potentially help improve CPAP provision in the UK. There is large proportion of patient with nocturnal hypoventilation, and despite effective treatment with CPAP, a group with a residual increase in AHI. Non-compliance and mask leak are identified issues and twenty patients used CPAP for less than an hour a night, with seven of those not at all. Remote monitoring allows early detection of non-compliance and an opportunity for earlier intervention to improve management in this patient group.

Abstract P214 Table 1 Patient characteristics and effect of CPAP on OSA

<table>
<thead>
<tr>
<th>Variable (units)</th>
<th>n=71 Mean(SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>53.2 (12.4)</td>
<td>26–80</td>
</tr>
<tr>
<td>BMI (Kg/m²)</td>
<td>36.8 (8.1)</td>
<td>24–65</td>
</tr>
<tr>
<td>ESS</td>
<td>13.0 (5.5)</td>
<td>2–23</td>
</tr>
<tr>
<td>Pre-treatment ODI (events/hour)</td>
<td>34.5 (20.0)</td>
<td>7.1–83.4</td>
</tr>
<tr>
<td>Pre-treatment AHI (events/hour)</td>
<td>36.1 (23.5)</td>
<td>5.7–104</td>
</tr>
<tr>
<td>Pre-treatment central events (events/hour)</td>
<td>2.5 (4.6)</td>
<td>0–23.9</td>
</tr>
<tr>
<td>Time spent below 90% SpO2 (%)</td>
<td>29.8 (26.3)</td>
<td>0–98.9</td>
</tr>
<tr>
<td>CPAP pressure (cm/H2O)</td>
<td>9.6 (1.5)</td>
<td>6–14</td>
</tr>
<tr>
<td>Time used (hours: minutes: seconds)</td>
<td>05:04:15</td>
<td>00:00:00 – 09:33:00</td>
</tr>
<tr>
<td>Residual AHI (events/hour)</td>
<td>8.5 (10.7)</td>
<td>0–44.1</td>
</tr>
<tr>
<td>Residual Central events (events/hour)</td>
<td>1.0 (0.0)</td>
<td>0–20.1</td>
</tr>
<tr>
<td>Mask leak (litres/minute)</td>
<td>26.0 (24.6)</td>
<td>0–75.9</td>
</tr>
</tbody>
</table>

Abstract P213 Figure 1 Days between referral and first seen date for all referrals to sleep clinic since April 2016.

CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) VERSUS AUTO-CPAP (APAP) FOR THE INITIAL TREATMENT OF OBSTRUCTIVE SLEEP APNOEA SYNDROME: CLINICAL Efficacy and COST

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10.1136/thoraxjnl-2017-210983.357

Introduction and Objectives APAP has been shown to be an effective way of titrating CPAP levels. Systematic reviews have shown similar treatment effects for APAP and CPAP. APAP devices are increasingly used for outpatient initiation of CPAP and subsequent long term use. In this service evaluation we assessed the clinical effectiveness and cost implications of APAP pressure titration followed by switching to long term CPAP.

Methods We collected data on 93, newly diagnosed patients with OSAS, starting on PAP, at baseline and at a 3 months follow-up visit. Patients initiated on APAP in an outpatient setting were asked to return in 2 weeks’ time to swap APAP for CPAP, set at average pressure estimated by APAP. The
compliance, Epworth Sleepiness Scale (ESS) score and physiological indices; mean nocturnal SpO_2, 4% oxygen desaturation index (ODI), from nocturnal oximetry were collected at 3 months. Cost of device CPAP vs. long term APAP were compared. We also compared outcomes between patients with mild and moderate/severe OSA (ODI≥15).

Results Following 3 months of treatment patients had clinically and statistically significant improvements in measured parameters aside from change in weight (Table 1). There was no significant difference in CPAP compliance between patients with mild and moderate/severe OSA, 5.6 (3.2–6.9) vs. 5.3 (3.7–7.0) hours/night respectively, p=0.9. We found 74% of patients with mild OSA and 75% of patients with moderate/severe OSA used CPAP for ≥4 hours. Patients with mild OSA were sleepy with median ESS 12 (10–15) and treatment with CPAP led to significant reduction to ESS 8 (4–11), at 3 months. No patients asked to be transferred back to APAP.

Transferring patients to CPAP, after initial APAP pressure titration, led to a calculated cost saving of £1 98 144 p/a, estimating that 1536 new patients initiate CPAP each year.

Conclusions
- Auto CPAP titration pathway is effective in terms of the outcomes measured.
- Good compliance with significant reduction in ESS has been shown in patients with mild OSA, confirming that appropriately selected mild OSA patients can benefit from CPAP.
- Transferring patients from APAP to long term CPAP can lead to significant cost reduction.

**P216 ACCURACY OF SLEEP POSITION DETECTION BY SLEEP POSITIONAL TRAINERS**

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10.1136/thoraxjnl-2017-210983.358

**Introduction** Positional Obstructive Sleep Apnoea (P-OSA) – where apnoeas or hypopnoeas occur predominantly or exclusively in the supine sleep position – is common. 5% of patients attending our service for home sleep studies meet current diagnostic criteria. Sleep positional trainer (SPT) devices provide vibro-positional feedback to minimise supine sleep time. As discomfort difficulties which limited previous positional therapy approaches are potentially avoided, SPT devices may be a worthwhile alternative to CPAP therapy for P-OSA patients. Accuracy of SPT’s positional analysis has however not been benchmarked. We compared positional analysis from 2 SPT devices with that from polygraphy equipment and sleep video recordings.

**Methods** 21 patients attending for home (Somnoscreen, S-Med) or in-hospital (S-Med +video) sleep study wore additional collar (Nightshift, NS) and/or belt (Nightbalance, NB) SPT device, with vibration positional feedback disabled.

% sleep time supine for each device was determined. Concordance analysis evaluating sleep position registered by each device for 15 min epochs of sleep was performed from the NS, S-Med and video sleep positional analysis reports (this data is not reported by the Nightbalance device software).

**Results** Despite standard instructions, device setup failure occurred with NS device in 6 patients and NB device in 9 patients. Bland-Altman plots (figure 1) demonstrate reasonable but incomplete agreement between SPT devices, S-Med and video for% sleep time supine. Kappa analysis demonstrated poor overall sleep positional concordance for NS vs S-Med (k=-0.002), NS vs video (k=0.196) and S-Med vs video (k=0.092). Individual patient data analysis demonstrated complete sleep time concordance between NS vs S-Med or video, and S-Med vs video in some patients but consistent concordance for all 3 modalities in any individual was not seen, and there was complete discordance between modalities in other patients. Mismatch between head and torso sleep position accounted for some of these differences.

**Conclusion** In a real world setting we identified difficulties with SPT device setup and incomplete accuracy for sleep positional analysis by both SPT and home polygraphy equipment. Further consideration of cost-effective diagnostic precision, patient selection for SPT therapy, SPT device choice and setup and clinically relevant monitoring is required before SPT therapy is adopted.
EVALUATION OF UPPER AIRWAY (UA) ANTHROPOMETRY USING MAGNETIC RESONANCE IMAGING (MRI) AND LATERAL CEPhALOMETRY IN PATIENTS OF OBSTRUCTIVE SLEEP APNOEA (OSA) IN NORTH INDIAN POPULATION

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Aim To study the anthropometric measurements of UA in patients of OSA and assess the relation between UA anatomy and severity of OSA.

Introduction Anatomical and nonanatomical factors are implicated in OSA in which repetitive collapse of UA occurs. Scarcity of data regarding UA anthropometry in OSA exist especially in Indian population.

Materials and Methods A prospective observational case control study was carried in which 60 OSA (mild: n=20, moderate: n=20, severe: n=20) and control group (n=20) underwent MRI and lateral cephalometry of UA. Linear Regression analysis (univariate and multivariate linear regression) of various parameters was done to find out the factors correlated with OSA.

Results In MRI, distance between hyoid bone and posterior nasal spine (H-PNS) and hyoid and posterior pharynx wall near vertebral column (H-COL) was found to be statistically significant (mild=60.23 mm, moderate=68.72 mm, severe=77.26 mm: control=60.23 mm: p=0.001) and (mild=14.8 mm, mod=15.2 mm, severe=19.09 mm: control=11.5 mm: p<0.001). Laterolateral dimension of tongue and lateral pharyngeal wall thickness were found to be statistically significant and increases with severity of OSA. Significant narrowing was found at level 1 i.e., rhinopharynx level and low retropalatal oropharynx level i.e., level 3 (p<0.001). In lateral cephalometry, distance between hyoid bone and mandibular plane increase with severity of OSA and was found to be statistically significant among all groups (mild=16.68 mm, mod=25.25 mm, severe=28.1 mm: control=16.15 mm: p-value<0.001). On univariate analysis, Epworth sleepiness scale (ESS), neck circumference, Modified Mallampati Score, anteroposterior and laterolateral dimension at level 3 and 4, hyoid bone position and laterolateral length of tongue were associated with severity of OSA. On multivariate analysis, the following parameters remained significant- anteroposterior and...
laterolateral dimensions at level 3, hyoid bone position, ESS and neck circumference.

**Conclusion** In OSA, significant alteration of anthropometry of upper airway occurs and is associated with severity of OSA.

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**P218 THE EFFECTS OF SUPPLEMENTAL OXYGEN ON BLOOD PRESSURE IN OBSTRUCTIVE SLEEP APNOEA DURING CPAP WITHDRAWAL**

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10.1136/thoraxjnl-2017-210983.360

**Introduction** Intermittent hypoxia and/or intermittent arousals are thought to be the two key pathological mechanisms in the development of hypertension in obstructive sleep apnoea (OSA). We aimed to investigate the effect of abolishing the hypoxia on the rise in blood pressure (BP) that has been shown to follow continuous positive airway pressure (CPAP) withdrawal in patients with OSA. In addition, we explored the effect of supplemental oxygen on obstructive events during sleep.

**Abstract P218 Table 1** The results of early morning blood pressure and overnight sleep studies on supplemental oxygen and supplemental air. Paired t-tests were used for home early morning blood pressure and heart rate measurements. Wilcoxon rank tests were used for home respiratory sleep study derivatives which were not normally distributed.

<table>
<thead>
<tr>
<th>Supplemental air</th>
<th>Supplemental oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Home early morning blood pressure and heart rate measurements</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Mean systolic BP (mmHg)</td>
<td>129.2 ±14.1</td>
</tr>
<tr>
<td>Mean diastolic BP (mmHg)</td>
<td>81.7 ±7.8</td>
</tr>
<tr>
<td>Mean heart rate (bpm)</td>
<td>61.7 ±8.3</td>
</tr>
<tr>
<td><strong>Home respiratory sleep study derivatives</strong></td>
<td></td>
</tr>
<tr>
<td>AHI (hour)</td>
<td>34.4 (22.7–44.4)</td>
</tr>
<tr>
<td>ODI (hour)</td>
<td>31.4 (21.0–49.2)</td>
</tr>
<tr>
<td>Mean oxygen saturations (%)</td>
<td>93.7 (92.1–95.2)</td>
</tr>
<tr>
<td>Sleep study length (mins)</td>
<td>392 (364–448)</td>
</tr>
</tbody>
</table>

**Methods** Patients with OSA, established on CPAP ≥1 year, and with ≥4 hours/night usage, underwent a week of screening oximetry and were eligible if they had a nocturnal oxygen desaturation index ≥4% (ODI) of <10 on 3 nights on CPAP, and an ODI ≥20 on at least 1 of 4 nights off CPAP. Patients then received overnight supplemental oxygen or air (via real or sham concentrators) at a flow rate of 5 l/min during 2 weeks off CPAP. After at least two weeks ‘washout’ back on CPAP, subjects crossed over. Treatment order was randomised.

**Results** Twenty-five patients completed the study. Their mean ± standard deviation age was 63 ±7 years, mean BMI was 35.3 ±6.7 kg/m², median (interquartile range) ODI at diagnosis was 48/hour (25, 68), and 21 (84%) were male. Table 1 shows the Results of the primary outcome and the overnight sleep studies.

**Discussion** Supplemental oxygen abolished the rise in early morning blood pressure during CPAP withdrawal when compared to supplemental air. As expected, supplemental oxygen substantially attenuated intermittent hypoxia and had only a small non-significant effect on the apnoea hypopnoea index. Thus intermittent hypoxia appears to be the dominant determinant of the rise in morning blood pressure seen in patients with OSA, rather than any other consequence of the obstructive events.

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**P219 THE USE OF ORAL MODAFINIL IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS WITH CHRONIC HYPERCAPNIC RESPIRATORY FAILURE**

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**Poster sessions**

Hypercapnic respiratory failure (HRF) is common in advanced COPD. The standard treatment is usually nasal ventilation (NIV) to reduce the blood carbon dioxide level acutely or regular nocturnal use in chronic cases. Not all patients tolerate such treatment and failures occur. Published studies are conflicting showing variable benefit and a 2013 Cochrane review concluded that there was no evidence of significant benefit in any of the measured parameters.1 Other studies suggest a reduction in re-admission and death at 1 year between regular nocturnal NIV use and standard care.

We have used oral modafinil 200 mg/day as a respiratory stimulant for chronic HRF in COPD without NIV. We present the data from the first 11 cases (6 out of study and 7 in our current open randomised crossover study). The study patients had documented HRF for 6–12 months with PaCO₂ ≥6.5 before entry but refused NIV. We present the data at baseline and day 10 and 40 of modafinil, including mean arterial oxygen and carbon dioxide, Daytime and overnight oxygen saturations along with spirometry. We compare these Results with 2 published studies of NIV reported, one after 4 weeks2 and the other 12 months.3

The study showed a mean improvement by day 40 of +1.8 kPa in PaO₂ and a reduction in PaCO₂ by 2.7 kPa. Daytime saturations, improved by +15% and overnight
**Abstract P219 Table 1**

<table>
<thead>
<tr>
<th>Study Data</th>
<th>Baseline</th>
<th>Day 10</th>
<th>Day 40</th>
<th>Improvement</th>
<th>4 week NIV</th>
<th>Improvement</th>
<th>1 year study</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>modafinil</td>
<td>modafinil</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>200 mg/day</td>
<td>200 mg/day</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arterial PaO2 (kPa)</td>
<td>5.8</td>
<td>6.7</td>
<td>7.67</td>
<td>+1.87 kPa</td>
<td>7.5</td>
<td>+1.7</td>
<td>7.0</td>
<td>+2.4</td>
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<tr>
<td>On air (range)</td>
<td>4.3–7.3</td>
<td>4.1–8.1</td>
<td>5.5–9.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mean Arterial PaCO2 (kPa)</td>
<td>8.6</td>
<td>6.7</td>
<td>5.9</td>
<td>–2.7 kPa</td>
<td>7.5</td>
<td>–0.7</td>
<td>7.2</td>
<td>–1.35</td>
</tr>
<tr>
<td>On air (range)</td>
<td>6.5–13.4</td>
<td>5.2–8.0</td>
<td>5.0–6.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean daytime saturations on air (range)</td>
<td>75% (58–89)</td>
<td>85% (65–92)</td>
<td>90% (79–95)</td>
<td>15%</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Mean overnight saturations on air (range)</td>
<td>72% (58–86)</td>
<td>79% (67–89)</td>
<td>83% (68–91)</td>
<td>+11%</td>
<td>79%</td>
<td>0%</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Mean FEV1 (%)</td>
<td>28%</td>
<td>30%</td>
<td>32%</td>
<td>+4%</td>
<td>31%</td>
<td>+6%</td>
<td>25%</td>
<td>–1%</td>
</tr>
<tr>
<td>Mean FVC (%)</td>
<td>48%</td>
<td>45%</td>
<td>53%</td>
<td>+5%</td>
<td>No data</td>
<td>No data</td>
<td>54%</td>
<td>No data</td>
</tr>
</tbody>
</table>

Danger at work: occupational lung disease and asthma

**P220** PROFILING OCCUPATIONS AND EXPOSURES OF PATIENTS DIAGNOSED WITH OCCUPATIONAL RESPIRATORY DISEASES AT A UK REGIONAL REFERRAL UNIT

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Introduction Patients with suspected work-related respiratory symptoms are referred to tertiary NHS clinics in the UK for diagnosis of an occupational lung disease. Analysis of diagnosis data provides an opportunity to understand the profile of occupations and workplace exposures.

Methods The study population comprised 500 patients who were referred to a tertiary occupational respiratory unit (Heart of England NHS Foundation Trust, UK) and diagnosed with an occupational respiratory disease. The 500 cases were randomly selected from a database of 2400 patients diagnosed over the period 2010–2015. Information on patients included: occupation (current), industry type, gender, diagnosis and date of diagnosis. The occupation titles were first reviewed and then coded (using CASCOT) at the four-digit level using SOC codes. The job coding was conducted independently of knowledge of diagnosed lung diseases.

Results Job titles and diagnosis were available for 497 patients. 73% of the job titles were coded automatically. The most common diagnosis was asthma 141 (28%), pleural plaques 119 (24%) and pneumoconiosis 81 (16%). 402 (81%) of the patient jobs were allocated to three of nine main SOC occupational groups; ‘skilled trade occupation’, ‘process, and machine operators’ and ‘elementary occupations’. Over 89% of asthma and pneumoconiosis cases were exposed to vapours, gases, dust or fumes (VGDF). Of the asthma cases the highest proportion were exposed to dusts (81%, 114/141) and mineral dusts (66%, 93/141), and assigned as exposed to moderate or high level of dust exposure. Only 29% of the asbestosis cases were assigned as exposed to fibres. The most common 4 digit code for asthma was 5241 (Electricians and electrical fitters), followed by 5315 (carpenters and joiners).

Conclusion The use of a general population JEM and coding of patient jobs enables a standardised approach to understanding the nature of occupations and workplace exposures for different lung disease. The approach overcomes the reliance on patient recall of workplace exposures.

**P221** SILICOSIS AND MYCOBACTERIUM DISEASE: IS IT A PROBLEM IN THE UK?

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Introduction and objectives An association between silicosis and mycobacterium disease is well reported globally particularly amongst gold miners. The rate of mycobacterium infection in silicosis cases in the last 15 years in the UK is unclear. The aim of this study was to establish the frequency of either

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2. P Sivasothy. ERJ 1998;11:34
3. SS Sadhra, OP Kurmi, GI Walters. 1 University of Birmingham, Birmingham, UK; 2 University of Oxford, Oxford, UK; 3 Heart of England NHS Foundation Trust, Birmingham, UK

10.1136/thoraxjnl-2017-210983.363

10.1136/thoraxjnl-2017-210983.362
tuberculosis (TB) or non-tuberculous mycobacterium (NTM) disease in a UK cohort.

Methods An occupational lung disease database (2004–2017) identified those with an MDT diagnosis of silicosis. Case notes were examined.

Results 22 patients were identified. 100% men, mean age 59.1 years (24–83) and mean length of silica exposure of 23.0 years (2–51). 63.6% were current or ex-smokers with a mean pack year history of 27.1 pack years (5–40). Figure 1 shows the relevant occupational history. 5 (22.7%) had an obstructive pattern of spirometry, 5 (22.7%) restrictive, 5 (22.7%) mixed and 7 (31.9%) normal spirometry. Mean FEV1 was 79% predicted (29%–106%) at presentation and FVC 90% predicted (48%–116%). 36.4% of patients had evidence of progressive massive fibrosis on chest radiology at presentation. 5 (22.7%) had an obstructive pattern of spirometry, 5 (22.7%) restrictive, 5 (22.7%) mixed and 7 (31.9%) normal spirometry. Mean FEV1 was 79% predicted (29%–106%) at presentation and FVC 90% predicted (48%–116%). 36.4% of patients had evidence of progressive massive fibrosis on chest radiology at presentation. 5 (22.7%) had an obstructive pattern of spirometry, 5 (22.7%) restrictive, 5 (22.7%) mixed and 7 (31.9%) normal spirometry. Mean FEV1 was 79% predicted (29%–106%) at presentation and FVC 90% predicted (48%–116%).

Conclusion This study indicates that rates of TB and NTM in silicosis are relatively high, supporting previously published international data. In addition, this study also highlights the difficulty in diagnosis of TB/NTM in silicosis due to similar clinical and radiological features, frequently leading to patients being treated empirically for TB and high relapse rates. The need for lung transplantation in accelerated disease may also necessitate careful screening for TB/NTM.

REFERENCE
exposure is known to result in a better prognosis; health care professionals need to have a low threshold for suspecting OA so that patients can be identified early.

REFERENCE

P223 UPDATE OF THE BRITISH OCCUPATIONAL HEALTH FOUNDATION (BOHRF) EVIDENCE-BASED GUIDELINES ON THE PREVENTION AND MANAGEMENT OF OCCUPATIONAL ASTHMA
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Introduction and Objectives Occupational asthma (OA) can be prevented by eliminating or at least minimising exposures to the causal agents at work. However, the rapid development of industrial technologies constantly introduces new potential asthmagens at work and therefore up-to-date knowledge of these changes is pivotal to diagnose and prevent new OA cases. The current evidence-based guidance on the prevention and management of OA was commissioned by the British Occupational Health Foundation (BOHRF) in 2010.1 Our aim was to update these guidelines to help stakeholders reducing the incidence of OA by improved prevention, and the severity of individual cases of disease by earlier identification and better management.

Methods We conducted a literature systematic review according to state-of-the-art methods via search of two electronic database (Embase and Medline), using the Ovid interface, from January 2009 to November 2016. Both MeSH and free-text terms were used for combinations of ‘work’ and ‘asthma’. The retrieved references were managed using EndNote software and evaluated blindly by paired reviewers. Critical appraisal of the included articles was performed using the GRADE (Grading of Recommendations, Assessment, Development and Evaluations) scoring system to link evidence-quality evaluations to clinical recommendations.

Results From the 2424 references retrieved, 133 met the inclusion criteria (see attached PRISMA flow-chart diagram). Briefly, in terms of occupations, many previously identified were confirmed, such as bakers, and painters, but new ones emerged such as cleaners, suggesting also underlying irritative-mediated causal mechanisms. Not substantial changes in the diagnosis of OA emerged, but new potential frameworks for better management and health surveillance of OA arose.

Conclusions Exposure to respiratory hazards at work is still an important cause of asthma worldwide and in the UK, with important costs for both the individual and the society. Updated evidence-based guidelines on the prevention and management of OA are key to guide healthcare workers’ decision-making in their routine clinical practice.

REFERENCE

Abstract P223 Figure 1 PRISMA flow diagram.
Timings of asthmatic reactions following specific inhalation challenge (SIC) have been defined as immediate, late, dual and prolonged immediate. How they translate into usual workplaces exposure is unknown. We postulated that those with an immediate component would start to react within one hour of regular occupational exposure and start to recover within one hour of leaving work, whereas those with a late reaction would have delayed starting and recovery. Those with dual or prolonged immediate reactions would show early deterioration and delayed recovery. We have compared the timings of reactions in 48 consecutive workers who had positive SIC and had kept serial PEF records at home and with real-world work exposures. These were analysed by the ABC plot from the Oasys analytical program which combines all measurements done on different work days into 2-hourly blocks and produces plots similar to that seen with SIC, with days away from work as the control exposure. Four experts independently scored the ABC plots to identify workplace deterioration starting at the first timepoint after the start of work, or ≥2 hours later (delayed deterioration), and starting to recover at the first timepoint after leaving work, or ≥2 hours later (delayed recovery). Records with disagreements were resolved in a joint meeting when all records available for an individual worker were compared. The relationship between SIC and real-world exposures is shown in the table. The relationship between laboratory and workplace reactions was only modest, complete concordance in 44%. Exposures may vary from day to day at work, or that the first reading at work was made before significant exposure has occurred; workers are instructed to make the last reading before work immediate before entering the workplace which should mitigate this. For those with immediate reactions alone during SIC, more showed deterioration in the first workplace reading than showed early recovery after leaving work.

<table>
<thead>
<tr>
<th>Laboratory challenge reaction</th>
<th>Start of deterioration</th>
<th>Start of recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Immediate</td>
<td>Delayed</td>
</tr>
<tr>
<td>Immediate (n=19)</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Late (n=10)</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Dual or prolonged immediate (n=20)</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Workers with asthma frequently complain asthma symptoms are worse at work. Work aggravated asthma (WAA) is asthma made worse by but not caused by workplace exposures. Work practices and exposures can affect asthmatics with mild, moderate or severe asthma.

The aim of this study was to explore the personal perception and impact of WAA. A purposive sampling strategy was used to recruit subjects into this study. The sample was selected from a group of participants in a WAA cross sectional postal questionnaire study. For enrichment qualitative data was also used from the postal questionnaire. All subjects had self-reported WAA and were stratified according to asthma severity. Data were analysed using thematic analysis.

Eighty five subjects provided qualitative data from the postal questionnaire, 6 subjects were interviewed with an in depth face to face interview and one subject an in depth telephone interview. No further interviews were conducted when data saturation point was met. Five main themes concerning the workers perception of WAA were identified. These were: the working environment, lack of understanding about asthma, mental health, social impact and financial impact. Workers believed that a variety of triggers within the workplace caused them to have asthma symptoms. High levels of stress impacted on quality of life and job satisfaction. Some workers were willing to leave the workplace or change career because of the emotional impact feeling stressed at work had on their lives. WAA had an impact on social and family life with individuals giving up socialising when they had asthma symptoms. Feelings of guilt for relying on a partner, children and family to care for them were common. The financial burden of buying inhalers, attending appointments and in some cases reducing working hours or changing to less well paid roles had an impact. There was a perception that employers and colleagues had a lack of understanding of asthma, in particular the variable nature of the disease.

Asthma education programmes in workplaces could help employers and workers understand how to deal with a colleague with asthma and alleviate the stress those workers with WAA experience.
(7%) silicosis, 1 sarcoidosis and 3 unclear. 61 of 102 (60%) were referred with either possible work related airflow obstruction, asthma like symptoms at work or work related allergy symptoms. 16/61 (26%) were confirmed as occupational asthma due to a sensitising agent, 10 (16%) constitutional asthma, 20 (33%) no lung disease, 1 (1.6%) smoking related COPD, 5 (8%) inducible laryngeal obstruction, 2 anxiety, 1 (1.6%) Reactive Airways Dysfunction syndrome, 1 (1.6%) Bysinosis, 1 (1.6%) work related anaphylaxis, 1 (1.6%) work related urticaria, 3 had asthma but the cause remained unclear. 20/61 (33%) or 1 in 3 cases referred with possible work related airflow obstruction, asthma or allergy had a work related final diagnosis.

Conclusion The majority of cases seen are to determine causes of airflow obstruction/asthma like symptoms rather than interstitial lung disease in the tertiary setting. Most of these are found not to have asthma or a work related diagnosis. More cases of occupational asthma (16+1 cases) were identified in total than asbestosis (13 cases); however asbestos related pleural disease was frequently identified (15 cases), making asbestosis related disease the most common occupational related lung diagnosis. The likelihood of diagnosing occupational asthma due to a sensitising agent in this tertiary setting is 1 in 4. 1 in 3 cases referred with possible interstitial lung disease had sufficient exposure and clinical/radiological evidence for a diagnosis of asbestosis, 1 in 14 (7%) had silicosis.

**P227**

**A NOVEL CT SCORING SYSTEM DIFFERENTIATES ADMISSIONS SECONDARY TO EOSINOPHILIC FROM NON-EOSINOPHILIC ASTHMA**

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Introduction Post-mortem studies of patients who have died from asthma show that mucus plugging of the airways is a prominent feature. We have investigated whether this can be identified and quantified on CT scans taken at the time of a severe asthma attack and tested the hypothesis that mucus plugging is specific to attacks associated with a raised blood eosinophil count.

Methods We developed a scoring system based on features on CT scans of asthmatic patients potentially associated with mucus plugging (see Table 1). We used this scoring system to retrospectively score CT scans of 6 patients admitted to the John Radcliffe Hospital, Oxford, with acute attacks of asthma. CT scans were performed within three days of admission to investigate whether there was an alternative cause for the patients’ presenting symptoms. Two radiologists, blinded to clinical measures for the patients, independently scored the CT scans.

Results Four patients had a blood eosinophil count ≥0.3 × 10^9/litre at the time of admission. The mean (range) CT score was 18 (17) in these patients and 6 (4) in the non-eosinophilic patients. The intraclass correlation coefficient between the two radiologists’ scores was 0.823. The largest contributors to the difference between the eosinophilic and non-eosinophilic patients’ scores was bronchial wall thickening (6 v 1) and mucus plugging (3 v 0).

Conclusion Our scoring system was repeatable between observers and might potentially identify a pathophysiological mechanism particularly associated with eosinophilic asthma attacks.

<table>
<thead>
<tr>
<th>CT Scoring Protocol</th>
<th>None</th>
<th>Some</th>
<th>Prominent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronchial wall thickening</td>
<td>None</td>
<td>Some</td>
<td>Prominent</td>
</tr>
<tr>
<td>Mucus plugging</td>
<td>None</td>
<td>Some</td>
<td>Prominent</td>
</tr>
<tr>
<td>Emphysema</td>
<td>None</td>
<td>Minor</td>
<td>Major</td>
</tr>
<tr>
<td>Atelectasis</td>
<td>None</td>
<td>Linear</td>
<td>Segmental</td>
</tr>
</tbody>
</table>

**P228**

**FATTY ACID SUPPLEMENTATION AND ASTHMA: A SYSTEMATIC REVIEW**

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10.1136/thoraxjnl-2017-210983.370

Background Emerging evidence suggests that fatty acid supplementation has a direct effect on the inflammatory cascade, with recently discovered pro-resolving lipid mediators inducing anti-inflammatory mechanisms in animal studies. We aimed to conduct a systematic review to investigate the relationship between omega-3 fatty acid supplementation and respiratory outcomes in adult patients with asthma compared to non-supplementation.

Methods We identified randomised controlled studies of fatty acid supplementation in adults with asthma through a systematic review of the databases Pubmed, Medline, Embase, CINAHL. Returned Results were screened, quality assessed and cross-checked according to the study inclusion criteria by two researchers.

Results The search found seven high quality studies in the literature suitable for inclusion in the review. Four studies did not show a significant difference in FEV1 between intervention and control groups. Two studies showed an improvement with bronchodiator use, two did not. Three studies showed improvement in Asthma symptoms compared to two studies of no benefit. Two studies showed improvement in peak flow, whereas two did not.  Small patient numbers recruited in the studies, differences in fatty acid supplementation at different dosages and lack of published studies limit the strength of evidence presented.

Conclusion There is no significant evidence to suggest supplementation with fatty acids improve pulmonary function in adult patients with Asthma. Evidence for improvement in symptom control is unequivocal. Much of the data is from small short duration studies. Larger studies are required, with non-biologically active control, In the future to evaluate clinical correlation between supplementation and effect on asthma control.
A SYSTEMATIC REVIEW OF THE IMPACT OF RHINITIS AND ITS TREATMENT IN SEVERE ASTHMA

Background The unified airway hypothesis proposes rhinitis and asthma are manifestations of a single inflammatory process. However, evidence regarding the association between allergic rhinitis/chronic rhinosinusitis (with or without nasal polypsis) and severe asthma is lacking. This systematic review aimed to identify the relationship between severe asthma and upper airway disease with the objective of understanding how they are best jointly managed.

Methods We included relevant studies published between 2007 and 2017 in English. Studies were assessed for relevance and quality using predetermined criteria. Two authors independently reviewed the evidence using the GRADE system.

Results Thirteen studies were included; none were randomised controlled trials and five were non-randomised controlled studies. Four themes were identified across the literature: 1. the relationship between allergic rhinitis and severe asthma; 2. the impact of allergic rhinitis treatment on severe asthma; 3. the relationship between chronic rhinosinusitis and severe asthma; 4. the impact of chronic rhinosinusitis treatment on severe asthma. Evidence pertaining to each theme was assessed as low quality and Results varied. Three studies demonstrated weak evidence for increased prevalence or severity of allergic rhinitis in severe asthma. One study demonstrated no relationship. Six studies demonstrated weak evidence for the increased prevalence or severity of chronic rhinosinusitis in severe asthma.

Poster sessions

Abstract P228 Table 1 Summary of studies

<table>
<thead>
<tr>
<th>Study and population (n)</th>
<th>Study Objective</th>
<th>Supplement and dose</th>
<th>Outcome</th>
<th>Quality rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arm et al, 1988 n=20</td>
<td>To test the effect of fish oil supplements on asthma control and neutrophil function.</td>
<td>10 week, daily supplements containing 3200 mg EPA and 2200 mg DHA compared to control group taking olive oil capsules (dose not stated).</td>
<td>1. No significant difference in self-report symptoms between the two groups. 2. No significant change in neutrophil count.</td>
<td>Strong</td>
</tr>
<tr>
<td>Arm et al, 1989 n=17</td>
<td>To evaluate effect of fish oil supplements on airway response to allergens.</td>
<td>10 week, daily supplement capsules containing 3200 mg EPA and 2200 mg DHA compared to control group taking olive oil (dose not stated).</td>
<td>1. No significant difference in peak flow, symptom scores or bronchodilator use. 2. Significantly attenuated late asthmatic response following allergen challenge after supplementation.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Brannan et al, 2015 n=23</td>
<td>Whether Omega-3 fatty acids inhibit airway sensitivity to inhaled mannitol, a test for bronchial hyper responsiveness.</td>
<td>3 week, daily dose of 400 mg EPA and 200 mg DHA vs control group taking a placebo containing a blend of omega-6 and omega-9 Fatty acids.</td>
<td>No difference in FEV1 between intervention and control group.</td>
<td>Strong</td>
</tr>
<tr>
<td>Emelyanov et al, 2002 n=46</td>
<td>Assess effect of New Zealand Green-lipped mussel supplement on asthma symptoms and Peak expiratory flow rate (PEFR)</td>
<td>8 week, daily capsule of lipid extract containing 50 mg of polyunsaturated fatty acids EPA and DHA compared to control taking daily 150 mg olive oil capsules.</td>
<td>1. No difference in mean FEV1 or evening PEFR. 2. Mean morning PEFR higher after supplementation compared to control. 3. Significant reduction in daytime wheeze but not bronchodilator use in intervention group.</td>
<td>Strong</td>
</tr>
<tr>
<td>Lindemann et al, 2009 n=21</td>
<td>To evaluate impact of the medical food EFF1009 containing fatty acids gamma-linolenic acid (GLA), DHA and EPA on asthma-related quality of life.</td>
<td>4 week, daily meal of EFF1009 containing 750 mg GLA, 500 mg EPA, 350 mg DHA compared to control taking a placebo emulsion containing no GLA, EPA, or DHA.</td>
<td>1. No significant difference in FEV1. 2. Significant improvement in self-reported asthma symptoms using the Asthma Control Questionnaire after supplementation.</td>
<td>Strong</td>
</tr>
<tr>
<td>Mickleborough et al, 2006 n=16</td>
<td>To investigate effect of fish oil supplements on exercise induced bronchoconstriction (EIB)</td>
<td>3 week, daily dose of fish oil capsules containing 3200 mg EPA and 2000 mg DHA compared to control taking olive oil capsules (dose not stated).</td>
<td>1. No significant difference baseline FEV1. 2. Significant attenuated EIB response after supplements. 3. Significant reduction in bronchodilator use after supplements.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Mickleborough et al, 2013 n=20</td>
<td>Evaluate the effect of New Zealand green-lipped mussel supplement (PCSO-524) on airway inflammation and bronchoconstrictor response to eucapnic voluntary hyperpnoea (EVH).</td>
<td>3 week, daily dose of PCSO-524 containing 72 mg EPA and 48 mg DHA compared to control group taking daily 150 mg olive oil capsules.</td>
<td>1. Bronchodilator use significantly reduced whilst taking supplement compared to normal diet or placebo. 2. Significantly improved mean asthma symptom scores. 3. Significantly improved morning and evening peak flow.</td>
<td>Strong</td>
</tr>
</tbody>
</table>

EPA: Eicosapentaenoic Acid, DHA=Docosahexaenoic acid, FEV1=Forced Expiratory Flow
Quality Rating adapted from the quality assessment tool for quantitative studies published by the effective public health practice project
Closing the flood gates of the pleura

**P231** THE USE OF INDWELLING PLEURAL CATHETERS IN PATIENTS WITH MALIGNANT PLEURAL EFFUSION AND UNEXPANDABLE LUNG

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**Introduction** British Thoracic Society (BTS) guidelines suggest that Indwelling Pleural Catheters (IPC) are the best treatment for malignant pleural effusion (MPE) associated with unexpandable lung (UL), where pleurodesis is contraindicated. Although, comprehensive data highlight the benefit of IPCs in MPE, their efficacy in patients with UL is less well known.

**Method** We conducted a systematic review following searches of the MEDLINE, EMBASE and Web of Science databases up until June 2017. Studies specifically reporting IPC use in patients with MPE and UL were identified.

**Results** 24 studies using IPCs in MPE in general were analysed, 15 of which stated the proportion with UL. Only three trials specifically reported outcomes in patients with UL, ranging from 11–52 patients. 77%–94% of UL patients had symptomatic benefit with IPC. Complication rate ranged from 15%–56% depending on criteria used, common complications reported included pain, cellulitis, catheter leak and occlusion.

**Conclusion** While a unified airways model supports the relationship between rhinitis and asthma, evidence regarding severe asthma specifically is of low quality and Results are varied. Although it is likely that rhinitis symptoms improve alongside successful treatment of severe asthma, adequately powered randomised studies are necessary to substantiate this relationship.
in patients without evidence of trapped lung. However, talc pleurodesis is unsuccessful in 10%–40% of cases, with implications in relation to cost and morbidity. Yet ambiguity exists regarding the factors affecting success in MPE talc pleurodesis. Aim This study aims to investigate the predictive factors relating to successful talc pleurodesis in MPE and the impact of a positive outcome on patient mortality.

Methodology Retrospective analysis of patients admitted for management of MPE to the Belfast City Hospital between September 2013 – October 2016 was conducted. Demographic and clinical data relating to drain size, volume of fluid drained and grade of the doctor performing talc pleurodesis was collected. Survival at 18 months post procedure was reviewed through electronic patient records. A positive outcome was defined as successful pleurodesis with the lack of recurrence of pleural effusion.

Results Twenty-seven patients were identified (♂: 40.8/59.2%; age 72.4 ± /12.3 years). Two thirds (n=18) received pleurodesis with a 44.4% success rate (n=8). Pleurodesis was precluded in one third of patients (n=9) with displaced and blocked drains the predominant causative factor (n=4). In those receiving talc pleurodesis, drain size (12 F vs 18 F) was not a predictive factor of positive outcomes. Similarly, the grade of doctor performing talc pleurodesis did not affect efficacy. However, compared to 18 F drains, 12 F drains were associated with a significant complication rate precluding pleurodesis (p=0.02). Critically, achieving a successful outcome with talc pleurodesis was associated with improved 18 month mortality (p=0.004).

Conclusion Promoting the exclusive utilisation of 18 F drains in the management of MPE could potentially alleviate the propensity for intercostal drain failure to preclude talc pleurodesis, conceivably improving patients’ short term mortality.

REFERENCE

Method We recruited 18 adult patients with MPE undergoing drainage and talc slurry pleurodesis to a prospective single-centre cohort study. Patients underwent standardised TUS assessment pre- and post-pleurodesis, evaluating pleural sliding and adhesions at nine points (three anterior, three lateral, three posterior) across the affected hemithorax. Lung sliding was graded as per Zhu et al., creating a total pleurodesis score out of 18. Pleurodesis failure was defined as radiological and symptomatic fluid recurrence in the same hemithorax requiring further intervention at any point up to 3 months post-pleurodesis. Patients also completed a questionnaire addressing satisfaction with TUS assessment.

Results 3/18 patients (16.7%) died before 1 month follow-up. Of 15 patients seen at one month, 11 (73.3%) had successful pleurodesis and 4 (26.7%) had failed. No patient had delayed pleurodesis failure between 1 and 3 month follow-up. There was a significant difference observed in the day 1 TUS pleurodesis score between patients who went on to have successful pleurodesis and those who failed during follow-up (table 1). TUS assessment was acceptable to patients, with none considering it either time-consuming or unwilling to have it again if needed.

Conclusion Our data suggest TUS assessment 24 hours post-pleurodesis for MPE predicts success or failure of this intervention, with significant implications for clinical care. A larger randomised study is now underway to further evaluate this hypothesis.

REFERENCE

Abstract P233 Table 1 Ultrasonographic pleurodesis score at day 0 (pre-pleurodesis) and day 1 (24 hours post-pleurodesis) in patients being treated for malignant pleural effusion

<table>
<thead>
<tr>
<th>Score</th>
<th>Successful Pleurodesis</th>
<th>Failed Pleurodesis</th>
<th>p value unpaired t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 0 Pleurodesis score (mean±SD, total out of 18)</td>
<td>10.89±3.98</td>
<td>6.50±1.29</td>
<td>0.054</td>
</tr>
<tr>
<td>Day 1 Pleurodesis score (mean±SD, total out of 18)</td>
<td>13.45±2.63</td>
<td>6.75±2.94</td>
<td>0.002</td>
</tr>
<tr>
<td>Change from day 0 to 1 (mean±SD)</td>
<td>2.57±3.98</td>
<td>0.25±3.59</td>
<td>0.326</td>
</tr>
</tbody>
</table>

P234

PATIENT AND FLUID CHARACTERISTICS ASSOCIATED WITH NON-DRAINING MALIGNANT PLEURAL EFFUSION

Introduction TIME3, a randomised controlled trial of intrapleural urokinase versus placebo for patients with non-draining malignant pleural effusion (MPE), demonstrated that these patients appear to be a distinct subgroup of patients with a poor prognosis (median survival 58 days). The aim of this study was to identify patient and fluid characteristics
associated with this subgroup, to enable further understanding of why patients with non-draining effusion may have poor prognosis.

**Methods** Baseline demographics and pleural fluid (PF) characteristics of patients enrolled in TIME3 were compared to patients enrolled in TIME2, a randomised controlled trial of indwelling pleural catheter versus chest drain and pleurodesis for patients with recurrent MPE. Demographic characteristics compared were: age, sex, histological type of cancer and ECOG performance status (PS). Pleural fluid characteristics compared were: total protein, glucose, cytology (positive or negative), pH, lactate dehydrogenase (LDH) and presence of septations on ultrasound. These characteristics were compared using t test for linear variables and chi squared for categorical variables.

**Results** The median survival was 58 days (IQR 27–123) in TIME3 versus 187 days (IQR 48–358) in TIME2. Patients with non-draining effusions had a significantly higher PF LDH (mean 1900 (SD 3100) versus 660 (SD 840), p<0.001) and CRP (mean 117 (SD 80) versus 62 (SD 55), p<0.001). Patients in TIME3 were on average 4 years older (mean 71 years in TIME3 versus 67 in TIME2, p=0.01) and less likely to be cytology positive (24% versus 51%, p=0.021).

**Conclusion** Non draining MPEs have a higher LDH than those without. There was a large difference in mortality between groups, but despite this no identifiable differences in baseline ECOG, PS or tumour type, despite these variables being associated with a poor prognosis in unselected cohorts of patients with MPE. We postulate that survival in MPE may be associated with septations and the intrapleural inflammatory milieu. Further study of the association between PF LDH, septations and survival is warranted.

**REFERENCES**


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**Abstract P234 Table 1**

<table>
<thead>
<tr>
<th>Variable</th>
<th>TIME2</th>
<th>TIME3</th>
<th>Difference (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>106</td>
<td>71</td>
<td>1</td>
</tr>
<tr>
<td>Mean age (years) (SD)</td>
<td>67 (11)</td>
<td>71 (9.4)</td>
<td>0.013</td>
</tr>
<tr>
<td>Male-female (% male)</td>
<td>46.60 (43)</td>
<td>41.30 (58)</td>
<td>0.06</td>
</tr>
<tr>
<td>Median time to death (days) (IQR)</td>
<td>187 (48–358)</td>
<td>58 (27–123)</td>
<td></td>
</tr>
<tr>
<td>Type of cancer (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- breast</td>
<td>27 (25)</td>
<td>12 (17)</td>
<td>0.47</td>
</tr>
<tr>
<td>- lung</td>
<td>25 (24)</td>
<td>22 (31)</td>
<td></td>
</tr>
<tr>
<td>- mesothelioma</td>
<td>11 (10)</td>
<td>9 (13)</td>
<td></td>
</tr>
<tr>
<td>- other</td>
<td>43 (41)</td>
<td>28 (39)</td>
<td></td>
</tr>
<tr>
<td>ECOG PS 0–2,3–4 (% 0–2)</td>
<td>60.46 (57)</td>
<td>42.29 (59)</td>
<td>0.11</td>
</tr>
<tr>
<td>Bloods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White cell count</td>
<td>9.8 (5.4)</td>
<td>11.0 (5.4)</td>
<td>0.15</td>
</tr>
<tr>
<td>CRP</td>
<td>62 (55)</td>
<td>117 (80)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pleural fluid characteristics:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cytology positive: negative (% positive)</td>
<td>54.48 (51)</td>
<td>17.34 (24)</td>
<td>0.021</td>
</tr>
<tr>
<td>- pH (SD)</td>
<td>7.4 (0.24)</td>
<td>7.4 (0.34)</td>
<td>1.0</td>
</tr>
<tr>
<td>- mean glucose (mmol/L) (SD)</td>
<td>5.4 (2.8)</td>
<td>4.6 (3.6)</td>
<td>0.13</td>
</tr>
<tr>
<td>- LDH (U/L) (SD)</td>
<td>660 (840)</td>
<td>1900 (3100)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>- Total protein (g/dL) (SD)</td>
<td>48 (8.1)</td>
<td>41 (10)</td>
<td>0.18</td>
</tr>
<tr>
<td>Septated on ultrasound (yes/no)</td>
<td>Not recorded</td>
<td>59.7</td>
<td>(-)</td>
</tr>
</tbody>
</table>
Aims To perform a systematic review of the published literature to examine the efficacy of interventions in improving quality of life outcomes of patients with malignant pleural effusion.

Methods Five electronic databases were systematically searched and assessed. We included all studies evaluating HRQOL outcomes for the following interventions: therapeutic thoracocentesis, talc slurry pleurodesis (TS), indwelling pleural catheter insertion (IPC) and thoracoscopic talc poudrage pleurodesis (TTP). Meta-analysis was not performed due to substantial heterogeneity in the published data.

Results Of 56 abstracts, 16 were included in the review, all of which reported HRQOL outcomes as a secondary endpoint. Six of these studies were randomised controlled trials (RCTs) with two considered very good quality. One eligible study on therapeutic thoracocentesis outcomes was identified. 880 patients in eight studies received TTP; 475 patients in six studies received TS; 750 patients in eight studies underwent IPC insertion. TTP, TS and IPCs were all associated with modest but inconsistent improvements in HRQOL up to 12 weeks. In eight comparative studies (both randomised and non-randomised data), no intervention was significantly different to another in HRQOL outcomes at any time point. The attrition to follow up was 47.3% (582/1228) at three months.

Conclusion To our knowledge, this is the first study to systematically review the evidence for HRQOL outcomes following invasive pleural interventions for malignant pleural effusion. TTP, TS and IPCs seem to improve HRQOL in MPE over 4 to 12 weeks, but there is insufficient longer term data due to high attrition rates. Evidence for the most effective treatment strategy is limited by the small number of randomised or comparative studies.

REFERENCE

P237
PLEURAL ABNORMALITIES PREDATING THE DEVELOPMENT OF MESOTHELIOMA

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10.1136/thoraxjnl-2017-210983.379

Background Pleural mesothelioma is an aggressive tumour of the pleura that is closely related to asbestos exposure. Asbestos is known to cause benign pleural thickening, effusion and plaques and the majority of patients with these abnormalities do not develop mesothelioma. It has been noted, however, that asbestos-exposed patients who have pleural plaques are at an increased risk of mesothelioma.[1] This study aimed to describe the range of pleural abnormalities seen on CT done at some time before the diagnosis of mesothelioma was made.

Methods Electronic radiological records of all patients who were diagnosed with mesothelioma in the trust from 2009 till June 2017 were screened for any chest CT (or abdomen CT with at least half of the thorax imaged) obtained at least 6 months prior to the CT that triggered the diagnosis of mesothelioma. CTs were examined for the presence of pleural plaques, thickening, nodules and/or effusion. CT studies were divided into 3 time periods: within one year (A), 1–3 years before (B), and more than 3 years before (C) the diagnostic CT.

Results 170 patients were screened. 39 patients had one or more pre-diagnosis CTs. A total of 53 CTs were available for comparison. Effusion was the most common abnormality seen in 23/53 CTs followed by thickening seen in 17/53, then plaques 15/53 and pleural nodules in 5/53. Four nodules (2 in period A and 2 in period B) progressed to tumour later on. Effusion was seen in 50% of studies from periods A and B. Pleural thickening and plaques were noticeable in around 40% of CTs from periods A and B. 13 studies did not show any pleural abnormality (3 studies in period A, 4 in period B and 6 in period C).

Conclusion Mesothelioma is a rapidly progressive disease that can be difficult to track in radiological studies done before clinical presentation. Pleural effusion, followed by smooth thickening and plaques, are fairly common abnormalities in pre-diagnosis CTs.

REFERENCE

P238
TRAINING OPPORTUNITIES IN THORACIC ULTRASOUND FOR RESPIRATORY REGISTRARS – ARE CURRENT GUIDELINES USER FRIENDLY?

1. AE Stanton, 2 M Evison, 3 M Roberts, 4 J Latham, 5 A Clive, 6 E Battala-Duran, 7 R Bhatnagar, 8 R Asciak, 9 B Diggins, 10 O Bintcliffe, 11 D Lees, 12 M Parsonage, 13 P Denny, 14 K Gow, 15 C Avram, 16 M Gautham, 17 NMR Rahman. 1 Great Western Hospitals NHS Foundation Trust, Swindon, UK; 2 University Hospital of South Manchester, Manchester, UK; 3 King’s Mill Hospital, Sutton-In-Ashfield, UK; 4 Raigmore Hospital, Inverness, UK; 5 Bristol Royal Infirmary, Bristol, UK; 6 Royal Devon and Exeter Hospital, Exeter, UK; 7 Southmead Hospital, Bristol, UK; 8 Churchill Hospital, Oxford, UK; 9 Royal Cornwall Hospital, Truro, UK; 10 Royal United Hospitals, Bath, UK; 11 Mid-Cheshire Hospitals NHS Foundation Trust, Crewe, UK; 12 Wirral University Teaching Hospitals NHS Foundation Trust, Wirral, UK; 13 East Lancashire Hospitals NHS Trust, Blackburn, UK; 14 Fairfield General Hospital, Burnley, UK; 15 North Manchester General Hospital, Manchester, UK; 16 Royal Liverpool and Broadgreen University Hospital, Liverpool, UK.

Introduction Acquiring competency in thoracic ultrasound (US) is mandatory for all respiratory trainees by the end of ST3, but it is often challenging for trainees to meet the requirements in current RCR guidelines for level 1 competency (>1 session/week over>three months, with 5 scans per session performed by trainee). We aimed to clarify where thoracic ultrasound training opportunities currently exist for respiratory registrars to inform further debate around the competency framework.

Methods Trainees in the South west, North West and Oxford deaneries were invited to submit data on numbers of thoracic US scans performed by both radiology departments (specifying numbers of scans per morning/afternoon session) and respiratory teams (specifying pleural clinic/procedure list/respiratory ward/other ward or clinic) over a randomly selected 4 week period between January and May 2017. Data was to represent total number of scans performed within each department, not number of scans done by one individual.

Results Data was provided from 14 hospitals (6 South West, 7 North West, 1 Oxford) including 3 tertiary pleural centres. Results are shown in Table 1. Full Results from 2 centres represent estimated numbers and one site (North Manchester) submitted 3 weeks data. There was no radiology session in
any hospital with \( \geq 5 \) thoracic ultrasound scans performed (out of total of 55 weeks sampled across all sites).

Conclusions In almost all surveyed hospitals from two deaneries, and a tertiary centre from a third, the majority of thoracic ultrasound is performed by respiratory teams rather than radiologists and in a variety of elective and unscheduled situations. Similarly the principle opportunity for USS training exists within the respiratory team and is deliverable out-with the tertiary setting. The currently recommended exposure of regularly attending a list or session to undertake 5 USS is not achievable in radiology departments even where thoracic USS is being performed, including surveyed tertiary pleural centres. Future recommendations on USS training requirements for respiratory trainees need to be flexible to take account of where opportunities exist and should recognise the role that both radiology and respiratory teams provide.

### Abstract P239 Table 1  Numbers of thoracic USS examinations performed by radiology and respiratory departments

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Radiology Numbers</th>
<th>Respiratory numbers (range, mean per week)</th>
<th>No. Pleural clinics / week</th>
<th>No. Pleural procedure lists / week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (in 4 weeks)</td>
<td>Pleural clinic</td>
<td>Pleural Procedure list</td>
<td>Ad hoc resp ward</td>
</tr>
<tr>
<td>GWH, Swindon</td>
<td>0</td>
<td>0-7</td>
<td>4.5</td>
<td>*</td>
</tr>
<tr>
<td>Exeter</td>
<td>0</td>
<td>0-7</td>
<td>4.5</td>
<td>*</td>
</tr>
<tr>
<td>BRI</td>
<td>20</td>
<td>0-2</td>
<td>5</td>
<td>*</td>
</tr>
<tr>
<td>Southmead</td>
<td>0</td>
<td>0-7</td>
<td>4.5</td>
<td>*</td>
</tr>
<tr>
<td>RUH, Bath</td>
<td>0</td>
<td>0-2</td>
<td>5</td>
<td>*</td>
</tr>
<tr>
<td>Royal Cornwall</td>
<td>44</td>
<td>0-3</td>
<td>7.25</td>
<td>23-44</td>
</tr>
<tr>
<td>Oxford</td>
<td>29</td>
<td>0-3</td>
<td>4</td>
<td>12-16</td>
</tr>
<tr>
<td>University Hospital South Manchester</td>
<td>16</td>
<td>0-3</td>
<td>4</td>
<td>12-16</td>
</tr>
<tr>
<td>Bury</td>
<td>1</td>
<td>0-1</td>
<td>0.25</td>
<td>*</td>
</tr>
<tr>
<td>East Lancashire</td>
<td>49</td>
<td>0-4</td>
<td>12.25</td>
<td>0-5</td>
</tr>
<tr>
<td>Mid-Cheshire</td>
<td>4</td>
<td>0-1</td>
<td>1</td>
<td>*</td>
</tr>
<tr>
<td>Wirral University NHS Trust</td>
<td>40</td>
<td>0-4</td>
<td>10</td>
<td>0-4</td>
</tr>
<tr>
<td>North Manchester</td>
<td>0</td>
<td>0-3</td>
<td>4</td>
<td>0-4</td>
</tr>
<tr>
<td>Royal Liverpool and Broadgreen</td>
<td>0</td>
<td>0-3</td>
<td>4</td>
<td>0-4</td>
</tr>
</tbody>
</table>

**IS A PLEURAL ON-CALL SERVICE BENEFICIAL?**

R Asciak, R Halifax, RM Mercer, J Corcoran, J Wrightson, M Hassan, C Bradley, I Psallidas, NM Rahman. Oxford University Hospitals, Oxford, UK

10.1136/thoraxjnl-2017-210983.381

**Aim** To audit the pleural on-call service referrals and outcome.

**Method** Our unit instituted the provision of a “pleural phone” and pleural email service as a central point of contact for pleural related questions, both internally for our large Trust, and externally including local GPs, to facilitate a more open model of care, increase efficiency of the diagnostic pathway and prevent unnecessary admissions or procedures. All documented pleural phone (9 am-5 pm, Monday-Friday) and email (any time) referrals between March 2016-February 2017 were analysed.

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*Thorax 2017;72(Suppl 3):A1–278*
Results 506 cases were discussed via email (n=257) or via phone calls (n=249), and this only included logged phone calls (mean 1.9 referrals per working day). This is an underestimation of the number of calls received because phone calls documented on the electronic patient record were not accessible and therefore not included. The number of cases discussed via email is not a reflection of the number of emails, as each case may have involved several emails. Table 1 shows the reasons for referral. The outcome of the referrals included advice (33.6%, n=170), advice and pleural clinic follow up (23.7%, n=120), advice and scheduling for a pleural procedure (42.7%, n=216). Of the 216 scheduled for procedures, 49.1% (n=106) were scheduled for a procedure by the pleural team (n=29 pleural one-stop-shop appointments for procedure and review), 49.1% (n=106) were scheduled for a procedure by the radiology team, 1.4% (n=3) were scheduled for an initial procedure by the radiology team (pleural fluid aspiration) then a further procedure by the pleural team (indwelling pleural catheter insertion(n=2), medical thoracoscopy(n=1)), 0.5% (n=1) were scheduled for bronchoscopy. An analysis of the referrals revealed that 22 unnecessary procedures and clinic appointments were avoided after discussion with the pleural team including new pleural outpatient referrals (n=4), follow up pleural outpatient appointment(n=10), pleural procedure appointment (n=5), referral to another clinic(n=2), CT scan (n=1). Advice given on the most appropriate investigation, such as advising large volume aspiration rather than chest drain insertion and hospital admission for a new undiagnosed pleural effusion, was not quantifiable in this retrospective study.

Discussion Pleural on-call service is beneficial and can help avoid unnecessary clinic and procedure list appointments. Pleural phone and email service

Abstract P239 Table 1 Shows the reasons for referral to the pleural phone and email service

<table>
<thead>
<tr>
<th>Reason for referral</th>
<th>Percentage of total referrals (number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleural effusion (new, previously known, hydropneumothorax)</td>
<td>66.8% (n=133)</td>
</tr>
<tr>
<td>Empyema (diagnosed or clinically/radiologically suspected)</td>
<td>8.3% (n=42)</td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>6.5% (n=33)</td>
</tr>
<tr>
<td>Indwelling pleural catheter-related queries</td>
<td>5.1% (n=26)</td>
</tr>
<tr>
<td>Other (eg pleurodesis-related, pleural thickening)</td>
<td>13.2% (n=67)</td>
</tr>
</tbody>
</table>

P240 OUTCOMES OF THOSE DIAGNOSED WITH CHRONIC FIBRINOUS PLEURITIS AFTER MEDICAL THORACOSCOPY: A LOCAL REVIEW

B Teng, D Cooper, A Aujayeb. North Tyneside General Hospital, North Shields, UK
10.1136/thoraxjnl-2017-210983.382

Introduction Chronic Fibrinous Pleuritis (CFP) is a common histological diagnosis encountered after medical thoracoscopy (MT), particularly in areas with high incidences of mesothelioma. This poses a challenge for clinicians as a proportion of patients are subsequently proven to have an alternative diagnosis. A local review was undertaken to discern the clinical outcome for those diagnosed with having CFP.

Methods A retrospective review of 202 MT performed at a regional pleural unit over a 6 year period was conducted. For those initially diagnosed with CFP, details including further biopsies, length of follow up, final diagnoses and survival times were recorded.

Results Mesothelioma (77), breast (13) and lung (12) were the commonest malignancies encountered. Eighty-four biopsies were consistent with CFP, all were followed up with either CXR, CT (a mean interval of 4.5 months) or both. A further 31 had the diagnosis refined: 19 were subsequently diagnosed with malignancy by alternative methods (4 VATS, 3 Ct guided, 1 axillary lymph node biopsy, 11 progressive radiology).

Mean time to repeat biopsy was 6.82 months (95% CI 3.14 to 10.87) and mean follow up was 16.7 months (95% CI 14.06 to 19.46). The remaining 53 patients were alive or passed away due to unrelated causes at time of writing (range of 3 to 86 months).

Conclusion An initial finding of CFP should be investigated further in the right clinical context, particularly where there is still a high suspicion of cancer. Patients must be made aware of this possibility. This study has shown a conclusive diagnosis can be made in a further 15% of patients, in keeping with other studies. Clinicians can be reassured in those with stable symptomology and radiology after a period of observation, though this timeline remains undefined.

P241 DIAGNOSTIC TIMELINE OF PATIENTS WITH SUSPECTED MALIGNANT (UNILATERAL) EFFUSION IN A LARGE TERTIARY CENTRE

L Crowley, A Rajgor, AKA Abi Musa Asaari, N Yoganayagam, T Palt, A Ali, N Rowe, S Bikmalla, M Iqbal, B Ganae, M Haris, T Cusay, S Khan, N Maddaker. Royal Stoke University Hospital, University Hospitals of North Midlands NHS Trust, Stoke-on-Trent, UK
10.1136/thoraxjnl-2017-210983.383

Introduction Malignant pleural effusions (MPE) remain a significant problem with approximately 50% of all cancer patients developing a MPE during their disease process. Our pleural service is one of the largest in the country. This day case service has the potential to accelerate MPE diagnosis, management and thus enhance patient experience.

Objectives The aim was to assess the timeline of patients referred to pleural clinic with suspected malignant (unilateral) effusion.

Method Retrospective analysis of 178 consecutive patients referred to pleural clinic with suspected MPE from March 2015 to November 2016. Data was collated from electronic patient records, including route of referral, diagnosis methodology, speed of diagnosis (MDT) and procedures performed.

Results 126 (70.8%) of the 178 patients had pleural effusion and underwent pleural aspiration. 61 patients (48.4%) had positive malignant fluid cytology. 26 (43%) and 35 (57%) were thoracic and extra thoracic malignancies respectively. Out of the 61 patients, 26 (43%) had systemic treatment and 35 (57%) had palliative management. These patients were diagnosed on average within 17 days from referral to clinic (SD 17.3). Mean time taken from referral to pleural clinic review was 5 days (SD 6.6) and 12.3 days (SD 16.6) elapsed from pleural clinic review to diagnosis. Average time from cytology diagnoses to treatment was 26 days. 20 (16%) patients were referred for VATS (Video Assisted Thoracoscopic Surgery).

The average time from VATS diagnosis to treatment was 37
days (for further breakdown see Table 1). The remaining (64%) were benign till to date.

**Conclusion** The data demonstrates that a dedicated pleural service has the ability to rapidly review and diagnose patients with suspected MPE (especially the cytology positive). There is a need for improvement in patient’s timeline for those referred for VATS. Perhaps a dedicated pleural multidisciplinary meeting may help to reduce the delay and improve patient care.

<table>
<thead>
<tr>
<th>Abstract P241 Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean time from referral to Pleural clinic</td>
</tr>
<tr>
<td>Mean time from referral to pleural clinic to diagnosis (pleural fluid cytology positive)</td>
</tr>
<tr>
<td>Mean time from diagnosis (pleural fluid cytology positive) to treatment</td>
</tr>
<tr>
<td>Mean time from pleural clinic to VATS referral</td>
</tr>
<tr>
<td>Mean time from VATS referral to VATS procedure</td>
</tr>
<tr>
<td>Mean time from VATS to diagnosis</td>
</tr>
</tbody>
</table>

**P242**

**THE PROGNOSIS OF PATIENTS DIAGNOSED WITH PULMONARY ADENOCARCINOMA AT LOCAL ANAESTHETIC THORACOSCOPY (LAT): THE ROLE OF PRIMARY T STAGE**

F Khan, RK Panchal, C Richards, S Ahmed, J Bennett, M Tufail. Glenfield Hospital, University Hospitals of Leicester, Leicester, UK

10.1136/thoraxjnl-2017-210983.384

**Background** Adenocarcinoma is the commonest type of lung cancer and may present with metastatic malignant pleural effusion (MPE). We observed that some patients with pulmonary adenocarcinoma diagnosed at LAT did not have radiological evidence of primary lung parenchymal lesion. We hypothesised that these patients may have a better prognosis than those with lung nodules or masses due to reduced tumour burden.

**Methods** We retrospectively reviewed all patients who underwent LAT from 2006–2016 and screened those diagnosed with pulmonary adenocarcinoma. We reviewed these patients’ radiology, age, gender, TNM staging and prognosis.

**Results** 491 patients underwent LAT from 2006–2016. 69/491 (14.05%) were diagnosed with pulmonary adenocarcinoma on histology of parietal pleura. 8 patients out of 69 (3 females, 5 males; mean age 68.25 years) did not have any radiologically detectable lung parenchymal lesion. The TNM staging (7th edition) of these eight patients without lung parenchymal lesion was T0N0M1a, T0N2M1a, T0N2M1a, T0N3M1a, T0N0M1b, T0N1M1b, T0N2M1b. Overall prognosis of MPE with lung parenchymal lesion was 331.7+/−63.14 days and without lung parenchymal lesion was 143.5+/−32.8 days, p=0.31 (figure 1)

**Conclusion** We have demonstrated no significant difference in the prognosis of patients with MPE secondary to pulmonary adenocarcinoma in the absence or presence of a radiologically determined primary lung parenchymal lesion. Although not statistically different (p=0.31) those patients without a primary lung parenchymal lesion may have a worse prognosis and this requires further investigation in larger cohorts as this may prove to be an important prognostic factor for MPE.

**REFERENCE**


**P243**

**SURVIVAL PREDICTION IN MALIGNANT PLEURAL MESOTHELIOMA: FUNDAMENTAL LIMITATIONS OF ROUTINELY AVAILABLE CLINIC PREDICTORS**

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10.1136/thoraxjnl-2017-210983.385

**Introduction** Accurate prognostication is difficult in Malignant Pleural Mesothelioma (MPM). Published prognostic models antedate optimal staging, a range of emerging predictors and use methods that cannot be up-scaled to incorporate these. Most existing models allocate patients to risk groups rather than precisely predicting survival. We developed robust computational models that can be up-scaled and provide quantitative statistics regarding the predictions offered. Here we report their performance using routinely available clinical data, on which previous models are based.

**Materials and Methods** Baseline information regarding 20 candidate predictors was collected for 269 MPM patients diagnosed in the West of Scotland (January 2008 – April 2014). Patients were allocated to balanced training (n=169) and validation sets (n=100). Prognostic signatures (minimal length best-performing multivariate trained models) were generated.
by Least Absolute Shrinkage and Selection Operator (Lasso) regression for Overall Survival (OS), OS<6 months and OS<12 months. OS prediction was quantified using Somers DXY statistic, which varies from 0 to 1, with increasing concordance between observed and predicted outcomes. 6- and 12 month survival were described by area under the curve (AUC) scores.

**Results** Median OS was 270 (IQR 140–450) days. The primary OS model assigned high weights to 4 predictors: age, performance status, white cell count and serum albumin, and after cross-validation performed significantly better than would be expected by chance (mean DXY 0.332 (+/-0.019) figure 1). However, validation set DXY was only 0.221 (0.0935-0.346), equating to a 22% improvement in survival prediction than would be expected by chance. 6- and 12 month OS signatures included the same 4 predictors, in addition to epithelioid histology plus platelets and epithelioid histology plus C-reactive protein (mean AUC 0.758 (+/-0.022) and 0.737 (+/-0.012), respectively). The <6 month OS model demonstrated 74% sensitivity and 68% specificity. The <12 month OS model demonstrated 63% sensitivity and 79% specificity. Model content and performance were generally comparable with previous studies.

**Discussion** The prognostic value of the basic clinical information contained in these, and previously published models, is fundamentally of limited value in accurately predicting MPM prognosis. The methods described are suitable for expansion using emerging predictors, including tumour morfom and volumetric staging.

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**Clinical implications of cystic fibrosis**

**P244** EXTENDED CFTR SCREENING FOR PATIENTS WITH A CLINICAL DIAGNOSIS OF CF BUT ONLY ONE GENE ON INITIAL SCREENING

F Frost, P Griffiths, MJ Ledson, MJ Walshaw, D Nazareth. Liverpool Heart and Chest Hospital, Liverpool, UK

10.1136/thoraxjnl-2017-210983.387

Introduction Standard CF genotyping only identifies 94% of CF genes, resulting in the emergence of a "cystic fibrosis screen positive, inconclusive diagnosis" (CFSPID) designation. This, and the advent of genotype-specific CFTR directed therapies has highlighted the need for more comprehensive genotyping, particularly to identify rarer genes when only a single gene is found on initial screening. However, extended CFTR screening is an expensive investigation and we wished to assess its use and yield.

**Methods** Between 2014 and 2016 we identified 40 people with CF attending our large regional adult unit without two known pathogenic CFTR genes and offered them extended CFTR screening. We looked at the yield in terms of additional genes identified and their clinical significance in 37 of these (3 refused/did not attend).

**Results** A new molecular diagnosis (i.e., two pathogenic genes) was made in 18 (48.5%) people with CF. Genes associated with CFTR related disorders were found in a further 2 (5.5%), genes of uncertain pathogenicity were found in 3 (8.1%), and one or no genes were found in 14 (37.8%). Of the 18 people with CF with additional identified genes, 8 had those associated with responsiveness to the CFTR potentiator ivacaftor (4 × 3272–26 A>G, 1 × 711+3 A>C, 1 × R347H, 1 × 2789+5G>C, 1 × S945L) and 2 of these (R347H and S945L) have recently been approved for ivacaftor use by the U.S. Food and Drug Administration.

**Conclusions** In people with a clinical diagnosis of CF but only one pathogenic gene on initial screen, extended CFTR screening identified a second gene in nearly half of cases. Furthermore, a significant proportion of the identified genes have been reported to respond to ivacaftor. It is therefore important that all people with CF without two known mutations undergo extended mutation screening in order to establish who may benefit should the current license for ivacaftor be expanded in the UK.

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**Poster sessions**

**P245** INFLUENZA B OUTBREAK AT A LARGE ADULT CF CENTRE: CLINICAL CONSEQUENCES AND POTENTIAL CONTRIBUTING FACTORS

1JB Dennis, 2W Welfare, 3A Turner, 3PJ Barry, 3RJ Bright-Thomas. 1University of Manchester, Manchester, UK; 2Central Manchester University Hospitals NHS Foundation Trust, Manchester, UK; 3Manchester Adult Cystic Fibrosis Centre, Manchester, UK

10.1136/thoraxjnl-2017-210983.387

Introduction In May 2016 an outbreak of influenza was declared on the adult cystic fibrosis (CF) ward at the Manchester Adult Cystic Fibrosis Centre (MACFC), where all patients are treated in individual rooms and strongly encouraged not to mix. The aim of this study was to investigate the outbreak, its clinical consequences, and potential contributing factors.

**Method** Notes of all patients admitted to the CF ward in May 2016 were retrospectively reviewed and data recorded included: patient location, respiratory viral PCR results, spirometry data (baseline measurements in the 6 month prior to onset, at onset of influenza, and at 3 months post infection), influenza vaccination status (all staff and patients), and measurements of ventilation in patient rooms.

**Results** Ten patients tested positive for influenza B; all were shown to have been infected with the same strain of the virus: B/Brisbane/60/2008. An outbreak timeline identified the likely index case (only patient admitted within the incubation period of influenza, first to develop symptoms and test positive for influenza B). Subsequently, 8 patients whose rooms
were in close proximity on the ward to the index case became infected, as did 1 patient at other end of ward. Influenza B infection was followed by an average reduction in FEV1 of 10.54% (SD 11.25) at the time of infection (p=0.0124). Follow-up data demonstrated a persistent FEV1 reduction of 10.50% (SD 5.95) 3 months post infection (p=0.0034). 70% of patients on the ward and 62% of staff had received the seasonal influenza vaccine. Further investigation revealed this to be a trivalent influenza vaccine that did not cover the strain B/Brisbane/60/2008. A ward ventilation survey identified that ventilation measurements in affected patient rooms ranged from 1.75 to 2.10 air changes/hour, well below DOH recommendations of 6 air changes/hour for single room ventilation.

**Conclusion** The influenza B outbreak at the MACFC had a detrimental effect on patients’ lung function, which was still present after 3 months. Inadequate ward ventilation and a lack of protection from the influenza vaccine given to patients and staff may have contributed to the spread of the virus.

**P246**

**THE IMPACT THE INTRODUCTION OF A UNIVERSAL PAYMENT BY RESULTS ANNUAL TARIFF CF CENTRES UPON THE NORTH SOUTH DIVIDE IN ENGLAND**

1SO Nyangoma, 1P Cullinan, 2SB Carr. 1Imperial College London, London, UK; 2Royal Brompton Hospital, London, UK

10.1136/thoraxjnl-2017-210983.388

**Background** Our preliminary work demonstrated inequalities in key demographic characteristics, clinical outcomes and medication use in Cystic Fibrosis (CF) patients between the relatively economically disadvantaged North of England compared to the South. The analyses presented here aimed to assess if this North-South divide has been closed following the introduction of a new and equal CF payment policy (“banding”) in 2012.

**Methods** We compared the cross-sectional data from Annual Review Encounter in 2010 and 2015 for patients registered on the UK CF Registry. The data for each year were analysed separately and the North/South Results compared. We used Wilcoxon and t-tests to compare continuous outcomes, and the chi-squared test to compare proportions.

**Results** The 2010 and 2015 cohorts included 6417 and 8007 patients, respectively (Table 1). There were no significant gender differences. Mean age of the populations increased, the significantly higher age in the South in 2010 levelled out by 2015. A new gap in overall lung function emerged in 2015: the better FEV1 in adults in the North (73.5±24.53) vs 72.24% in the South (72.24% vs 73.5% (p=0.041), the significantly higher FEV1 in children in the South remained, although the gap narrowed from 3.27% to 1.7%. The better FEV1 in adults in the North disappeared post banding. More patients in the North were diagnosed before turning 3 months. Prescription of key medications (DNase and Hypertonic saline) increased overall between 2010 and 2015 but higher use in the South remained (p<0.001). Rates of chronic *Pseudomonas aeruginosa* fell but remained significantly higher in the North. Rates of MSSA and NTM remain higher in the South.

**Conclusions** There appears to be a closing of the North-South gap in some key areas such as FEV1 and age, this may suggest improved outcomes although survival analysis is not possible on small cohorts such as these. The higher use in the South of the high cost drug DNase must now be down to clinician preference rather than funding problems. These markers of overall improvements (higher mean age, higher FEV1, lower *Pseudomonas*) may be associated with the introduction of equality of funding in England but could equally represent improved care in general with similar improvements seen in other international registries.

<table>
<thead>
<tr>
<th>Abstract P246 Table 1</th>
<th>Patient characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
<td>South of England/North of England (n=3017/3400)</td>
</tr>
<tr>
<td><strong>Summary statistics</strong></td>
<td><strong>p-value</strong></td>
</tr>
<tr>
<td>Age: Means±SD</td>
<td>19.7±13.2±4/18.81</td>
</tr>
<tr>
<td></td>
<td>±12.52</td>
</tr>
<tr>
<td>Median</td>
<td>18/18</td>
</tr>
<tr>
<td>Gender, n(%) Female</td>
<td>1423 (47.17)/1578</td>
</tr>
<tr>
<td>Age at diagnosis, n (%)</td>
<td></td>
</tr>
<tr>
<td>&lt;3 months; n (%)</td>
<td>1280 (42.43)/1590</td>
</tr>
<tr>
<td>≥18 years; n (%)</td>
<td>188 (6.23)/191 (5.62)</td>
</tr>
<tr>
<td>FEV1 percent predicted</td>
<td></td>
</tr>
<tr>
<td>(Overall) Means±SD</td>
<td>70.98±24.66/71.23</td>
</tr>
<tr>
<td></td>
<td>±24.23</td>
</tr>
<tr>
<td>Age&lt;16 Means±SD</td>
<td>84.51±17.99/81.57</td>
</tr>
<tr>
<td></td>
<td>±19.80</td>
</tr>
<tr>
<td>Age≥16 Means±SD</td>
<td>64.69±24.81/66.73</td>
</tr>
<tr>
<td></td>
<td>±24.61</td>
</tr>
<tr>
<td>Hypertonic Saline (n (%)</td>
<td>433 (14.35)/311 (9.15)</td>
</tr>
<tr>
<td>Dornase Alfa (n(%)</td>
<td>1394 (46.2)/1393 (40.97)</td>
</tr>
<tr>
<td>Chronic macrolides (n (%)</td>
<td>1284 (42.56)/1445 (42.5)</td>
</tr>
<tr>
<td>Asthma (n(%)</td>
<td>534 (17.7)/393 (11.56)</td>
</tr>
<tr>
<td>CFRD (n(%)</td>
<td>528 (30.14)/623 (32.5)</td>
</tr>
<tr>
<td>NTM (n(%)</td>
<td>116 (3.84)/55 (1.62)</td>
</tr>
<tr>
<td>Pseudomonas (n(%)</td>
<td>1058 (35.07)/1359 (39.97)</td>
</tr>
</tbody>
</table>
Poster sessions

P247 LUMACAFTOR/IVACAFTOR IS ASSOCIATED WITH HIGH DISCONTINUATION RATES IN PATIENTS WITH Baseline SEVERE LUNG FUNCTION BUT ALSO BENEFITS IN THOSE WHO TOLERATE THERAPY

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Lumacaftor/ivacaftor (LUM/IVA) is a combination CFTR modulator which is licensed for patients with cystic fibrosis homozygous for the Phe508del mutation. In clinical trials, use of LUM/IVA resulted in modest improvements in lung function, a reduction in pulmonary exacerbations and small increases in nutritional parameters. Although these trials excluded patients with FEV1 <40%, licensing does not restrict therapy on this basis. In the UK, LUM/IVA is only available on a managed access programme for patients with low lung function. We aimed to examine the safety, tolerability and effectiveness of LUM/IVA in patients with severe lung disease. 32 patients were admitted to commence LUM/IVA and 8 (25%) permanently discontinued therapy. One patient successfully recommenced therapy after discontinuation. Adverse event rate was 88%, with 87% related to respiratory symptoms. Therapy initiation was associated with significant relative falls in both FEV1 (−14±11.6%) and FVC (−11.6±13.1%) at 24 hours. A significant increase in CRP (mg/L) was identified at both day 3 [ 18 (7–40) p<0.001] and day 7 [16.5 (5–49), p=0.038] compared to baseline [7.5 (4–18.8)]. Those patients who discontinued therapy had a higher increase in CRP at day 3 (p=0.01), a lower baseline pO2 (p=0.013) in the preceding year, and were more likely to complain of dyspnoea (p=0.017). For those who continued therapy, FEV1 increased compared to day 0 values (32.0%±6.9% vs. 29.5%±6.7%, p=0.01) but not compared to best FEV1 in the preceding 3 months (31.1%±6.5%, p=0.23). A 2 kg increase in weight from day 0 was identified in those who continued LUM/IVA (p<0.001). In 14 patients who had at least 6 months therapy there was a reduction in the annualised rate of pulmonary exacerbations requiring iv antibiotics compared to the preceding year (3.2±2.8 vs. 5.2±2.3, p=0.001) and days on iv antibiotics (47.3±33 v. 69±39, p=0.026). We report a very high adverse events rate associated with the initiation of LUM/IVA which was associated with adverse changes in objective markers. In those who tolerate therapy benefits may be similar to those reported in clinical trials.

P248 CFRD IS NOT AN INDEPENDENT RISK FACTOR FOR STENOTROPHOMONAS MALTOPHILIA ACQUISITION – 5 YEAR ANALYSIS OF UK CF REGISTRY DATA

F Frost, D Nazareth, MJ Walshaw, MJ Ledson. Liverpool Heart and Chest Hospital, Liverpool, UK

Introduction Recently, Stenotrophomonas maltophilia (SM) has been shown to have an increased prevalence in the sputum of people with CF-related diabetes (CFRD), raising the question as to whether CFRD is a risk factor for its acquisition. We investigated this at a population level by looking at UK CF Registry data. Methods We analysed national UK CF Registry data for 2011–2015, looking at demographics, lung function and sputum microbiology, using descriptive and multivariable strategies to establish independent predictors for SM culture and associated outcomes. 6234 people with CF older than age 12 (mean 26 years, CFRD 26%, SM 15%, 54% male) with more than 3 years complete sputum microbiology and lung function data were included. Results Although on univariate analysis those with SM were more likely to have CFRD (odds ratio [95% CI] 1.18 [1.01–1.39] p<0.0001), lower lung function (mean FEV1 [% predicted] 66.6 vs. 74.15, p<0.001) and more IV days (24 vs. 10, p<0.0001), multivariate logistic regression analysis showed no independent association for CFRD or Hba1c but IV antibiotic use and Aspergillus culture independently demonstrated an increased likelihood of SM growth (see Table 1). Furthermore, longevity of SM growth showed weak but statistically significant correlations with poorer FEV1 (rho = −0.2, p<0.0001) and more IV days (rho=0.1, p<0.0001) but no association with CFRD (OR 1.09 [0.98–1.21]) or Hba1c (rho=-0.01, p=0.94). Conclusion Our data suggests CFRD is not an independent risk factor for SM growth in CF. The increased prevalence of SM in CFRD may be explained by increased intravenous antibiotic pressure in this group. Acknowledgment We would like to thank the CF Registry Research Committee for releasing the data used in this analysis.

Abstract P248 Table 1 Multivariate analysis of potential predictors of SM growth

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) &gt;18</td>
<td>0.99 (0.98–1.00)</td>
<td>NS</td>
</tr>
<tr>
<td>FEV1 (% predicted)</td>
<td>1.22 (0.92–1.64)</td>
<td>NS</td>
</tr>
<tr>
<td>&lt;50</td>
<td>1.28 (0.82–2.01)</td>
<td>NS</td>
</tr>
<tr>
<td>&lt;30</td>
<td>0.41 (0.31–0.52)</td>
<td>NS</td>
</tr>
<tr>
<td>IV antibiotics (days/year) &gt;0</td>
<td>1.46 (1.05–2.02)</td>
<td>NS</td>
</tr>
<tr>
<td>Hba1c&lt;48</td>
<td>1.64 (1.06–2.23)</td>
<td>NS</td>
</tr>
<tr>
<td>Dysglycaemia</td>
<td>1.08 (0.80–1.46)</td>
<td>NS</td>
</tr>
<tr>
<td>CFRD</td>
<td>0.98 (0.62–1.58)</td>
<td>NS</td>
</tr>
<tr>
<td>Microbiology Pseudomonas aeruginosa</td>
<td>0.69 (0.55–0.87)</td>
<td>NS</td>
</tr>
<tr>
<td>Aspergillus</td>
<td>3.76 (2.93–4.82)</td>
<td>NS</td>
</tr>
<tr>
<td>Burkholderia cepacia complex</td>
<td>0.59 (0.34–1.03)</td>
<td>NS</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>1.46 (1.18–1.83)</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS=not statistically significant *,p<0.05 **,p<0.01 ***,p<0.001
IT IS POSSIBLE TO DETECT ACTIVE NEUTROPHIL ELASTASE IN EXHALED BREATH CONDENSATE OF PATIENTS WITH CYSTIC FIBROSIS

1,2C Edmondson, 1R Murphy, 1K Moffitt, 1,2D Ribeiro, 1,2,4EWFW Alton, 1,2,4JC Davies. 1NHLI Imperial College London, London, UK; 2Royal Brompton Hospital, London, UK; 3ProAxsis Ltd, Belfast, UK; 4UK CF Gene Therapy Consortium London, London, UK

10.1136/thoraxjnl-2017-210983.391

Introduction CF is characterised by chronic progressive respiratory decline punctuated with periods of acute pulmonary exacerbations (PEXs). Given the relationship between PEX number and chronic rate of decline and that ~25% of PEX patients fail to regain their baseline FEV1, there remains a need for a reliable biomarker to predict PEXs and/or monitor responses to treatment. Several biomarkers have been explored, including sputum Neutrophil Elastase (NE). However, any sputum-based biomarker will only be suitable for patients able to expectorate, whereas significant disease begins earlier in life. Previously, our group (Thorax 2013;68: 532–9) reported the change of physiological, functional and structural markers over a PEX within which we collected exhaled breath condensate (EBC). These samples were analysed with a newly-developed immunoassay; detection of NE would offer the potential to detect airway inflammation in non-expectorating subjects.

Methods EBC was collected using an Ecoscreen condenser, stored at −80°C, and then analysed using the ProteaseTag® Active Neutrophil Elastase Immunoassay (ProAxsis Ltd).

Results 35 EBC samples from 19 participants were available. Participants were 12–44 years; 10 female. Median FEV1% predicted was 52.5% (IQR 43.75%–74.8%). All had chronic Pseudomonas aeruginosa infection apart from 1 who had chronic Burkholderia cepacia complex infection. NE could be detected (≥LLD 7.2 ng/ml) in 28 of 35 samples (80%). For the whole group, median concentration was 15.45 ng/ml (IQR 10.36–19.02 ng/ml).

Discussion This was a small, pilot study seeking to demonstrate the feasibility of measuring active NE in EBC and successfully reporting, for the first time to our knowledge, detectable levels of this inflammatory marker. However, levels were near the lower end of detection of the immunoassay; therefore development of a more sensitive assay could be helpful. Further work is needed to establish CF/non-CF differences and the relevance of levels to accepted measures of airway disease. The use of EBC could allow monitoring of airway inflammation at the early stages of CF lung disease when patients cannot expectorate sputum, and during a period in their disease progression when the potential impact of interventions on long term outcomes may be greatest.

Supported by ProAxsis Ltd and the CF Trust UK.

A NATIONAL STUDY OF NON-INVASIVE VENTILATION AND CLINICAL OUTCOMES IN CYSTIC FIBROSIS

1O Archangelidi, 1NJ Simmonds, 1SB Carr, 1P Cullinan. 1Imperial College London, London, UK; 2Royal Brompton Hospital, London, UK

10.1136/thoraxjnl-2017-210983.392

Introduction/Objectives Non-invasive ventilation (NIV) is often used as a ‘bridge’ to transplantation, for symptom control or as an adjunct to physiotherapy. Whether or not NIV is being appropriately used in UK patients with CF, successfully targeting those who will benefit most, is unknown; nor is there information on the life expectancy of those who start on NIV.

Methods The present study is part of the CF-Epidemiological Network (CF-EpiNet project) and uses data from the UK Cystic Fibrosis Registry to describe the patterns of NIV use by
patients in the UK. We examined the records of 11,120 patients and assembled a longitudinal, retrospective cohort from those seen between 2007 and 2015. We used Cox proportional hazard models to assess the survival of patients on NIV.

**Results** 1077 patients (715 adults and 362 children < 16 years) had reported use of NIV recorded at least once. Usage increased after 2012 (figure 1). At the first recorded use of NIV the median (IQR) age was 21 years (14, 28), BMI 18.4 kg/m² (16.8, 22.7), 49.2% were male, 90.3% on PERT, 75.1% growing Pseudomonas, 54.6% homozygous F508del; the mean FVCpp was 64.5% and FEV₁ pp 47.2%. At this time 68.8% of patients had a FEV₁ pp < 60%; 52% were < 40%, while in adults this percentage reached 61%. In children there was a higher proportion starting treatment with better lung function ie ≥ 60% (33.8%). The median survival of patients who start NIV is 3.47 years. The hazard ratio for NIV use was 3.90 (95% CI: 3.06–4.96).

**Conclusions** Not surprisingly, patients start NIV when their lung function is significantly impaired. Yet, increased proportions of people with FEV₁ pp ≥ 40% on NIV were also identified. The higher lung function at the start of NIV for children may reflect that it is used for purposes other than a bridge to transplant in this group; the registry only collects a yes/no variable for NIV use and not the reason for use. Survival after initiation of NIV is poor; this is likely reflect that NIV is a marker of disease severity but further analysis will be needed to explore this.
INVESTIGATING THE COMPLEXITY OF THE RELATIONSHIP BETWEEN GASTRO-OESOPHAGEAL REFUX AND CF LUNG DISEASE

1RW Lord, 2S Treadway, 3JS Pearson, 4PJ Barry, 5B Bianco, 6PJ Whorwell, 7RJ Jones, 8PS McNamara, 9Fl Beyron, 10JA Smith, 11AM Jones. 1Manchester Adult Cystic Fibrosis Centre, Manchester, UK; 2University Hospital South Manchester, Manchester, UK; 3Alder Hey Childrens Hospital, Manchester, UK; 4University of Liverpool, Liverpool, UK

Background There has been a suggested connexion between gastro-oesophageal reflux (GOR) and CF lung disease. Lung disease can result in increasingly negative inspiratory thoracic pressures. These create gastro-oesophageal pressure gradients along which gastric contents may move. Then if aspirated reflux may have the potential to cause lung damage. We aimed to assess if there is a relationship between GOR and markers of lung disease severity.

Methods We are conducting a prospective observational study in stable adult CF patients, measuring GOR with combined pH and impedance (pH-MII). In preliminary analyses, we have compared reflux measures (total, proximal, supine and supine proximal events) and retrospective data including routinely collected lung function and number of courses of intravenous antibiotics.

Results 51 patients were recruited with 36 patients (mean age 30 years, mean FEV1 54% predicted, 28 males) completing all measures. Total number of reflux episodes were increased in 58% (median 81, IQR 55–103) compared to established normative values (<75 episodes). ‘High risk’ reflux (increased proximal or supine proximal events) was noted in 47%. Increasing reflux and higher number of IV courses in the preceding year displayed a positive trend (r=0.300, p=0.075), but this relationship was not seen for number of courses over 2 years. Curiously, patients with greater numbers of reflux events exhibited less decline in lung function over the preceding year (r=0.416, p=0.016). None of the reflux measures were correlated with baseline lung function.

Conclusions We have demonstrated that patients with stable CF lung disease have high rates of total reflux events in comparison to normative values. Almost half have reflux which has the potential to be high risk for aspiration. There was a suggestion that increased reflux events may be associated with increased exacerbation risk. However our data also suggests, in complete contrast, that increased reflux relates to less progression of lung disease – this is not in keeping with commonly held beliefs. Further studies will be needed to unpick what is undeniably a complex relationship.

FEASIBILITY OF ULTRASHORT ECHO TIME (UTE) MRI TO EVALUATE THE EFFECT OF LUMACAFTOR/IVACAFTOR THERAPY IN CHILDREN WITH CYSTIC FIBROSIS (CF) HOMOZYGOUS FOR F508DEL

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Objective To evaluate ultrashort echo time (UTE) magnetic resonance imaging (MRI) as a feasible endpoint in a multicenter trial using a subset of patients aged 6 to 11 years with cystic fibrosis (CF) homozygous for the F508del mutation treated with lumacaftor/ivacaftor (LUM/IVA) combination therapy (NCT02514473).

Methods UTE MRI scans were obtained at study baseline (n=10); a second scan was completed at week 24 in 9 subjects (4 active treatment, 5 placebo) at 3 institutions using MRI hardware from 2 vendors. One of the platforms was 3D radial UTE (Johnson et al. Magn Reson Med. 2013;70:1241–1250); the other was 3D “stack of stars” UTE (Lederlin et al. J Magn Reson Imaging. 2014;40:839–847). Scans were obtained during 5 min of tidal breathing without the use of intravenous contrast. MRI scans were scored by 2 independent readers using the Brody score after supervised training on UTE MRI scans. Readers were blinded to time point and treatment group. Scores are presented as mean (SD); no statistical testing was performed.

Results Despite the lower image quality of MRI compared with computed tomography, potential treatment effects were seen on the UTE MRI images (figure 1A). Mean total Brody score decreased from 41.1 to 32.5 with treatment, a change from baseline (SD) of 8.4 (11.2) with active treatment, but increased from 31.3 to 34.6, a change from baseline of 3.3 (8.2) with placebo (figure 1B). Mucus plugging subscore decreased by 5.0 (5.1) from 8.5 to 3.5 with active treatment but increased by 1.4 (4.4) from 4.2 to 5.6 with placebo. There were no noticeable changes in other subscores (bronchiectasis, peribronchial thickening, parenchyma, or hyperinflation).

Conclusion In this analysis from an exploratory substudy in patients with CF aged 6 to 11 years homozygous for F508del, UTE MRI was a feasible approach for detecting the effect of LUM/IVA, despite the small sample size, short duration of treatment, and limitations in image quality. As optimisation in UTE MRI technology improves image quality, monitoring disease course in patients with CF may improve.

Please refer to page A259 for declarations of interest in relation to abstract P254.
Objective Patients with cystic fibrosis (CF) and mutations associated with residual CFTR chloride transport have improved survival rates compared with those homozygous for the F508del-CFTR mutation. Since little is known about rate of lung function decline in patients with CF and residual function (RF) mutations, we evaluated differences in rates of percent predicted FEV1 (ppFEV1) decline between patients with an RF mutation who were heterozygous for F508del and those who were homozygous for F508del, and whether rates of ppFEV1 decline differed across age groups.

Methods Patients in the US CF Foundation Patient Registry from 2006 to 2014 with an RF mutation heterozygous for F508del were compared with F508del-homozygous patients. Mutations were identified based on clinical or in vitro evidence of residual ion transport. Annual rates of ppFEV1 decline were estimated for patients 6 to 45 years of age with ≥3 ppFEV1 values spanning ≥0.5 years in a randomly chosen 2 year period that began at the first ppFEV1 measurement in the calendar year.

Results A total of 1242 RF and 11,916 F508del-homozygous patients were included. At the first visit, the RF cohort was older (mean [SD], 23.0 [12.1] vs 18.0 [9.6] years) and had better nutritional status (mean [SD] BMI z score, 0.36 [1.09] vs −0.29 [1.08]). Mean (SD) ppFEV1 differed at the first visit between cohorts (80.4 [24.8] vs 73.4 [26.5]; p<0.001). Annual rate of ppFEV1 decline was estimated at −0.70 (SE, 0.20) in the RF cohort compared with −1.91 (0.03) in the F508del-homozygous cohort (p<0.001). After excluding patients with R117H (n=889), the rate of decline was −1.05 (0.39) ppFEV1 per year (p<0.001 vs F508del). The rate of decline for RF patients was most rapid in the 18 to 24-year age group, −1.38 (0.39), but was still significantly less than the −2.52 (0.09) for F508del-homozygous young adults (p=0.004).

Conclusion Patients with CF and an RF mutation have lower rates of lung function decline compared with F508del-homozygous patients. However, patients with an RF mutation still demonstrate progressive lung disease, particularly during young adulthood.

Please refer to page A259 for declarations of interest in relation to abstract P255.
TRAIL. Successful transduction was confirmed by flow cytometry and cells were subsequently pooled and seeded into a multilayer bioreactor. Once confluent, cells were harvested to form the primary seed stock (PSS). PSS vials underwent further expansion rounds to form a working cell stock (WCC) and subsequent investigational medicinal product (IMP) ready for patient dosing.

**Trial Design** Patients with stage IIIb/IV adenocarcinoma of the lung (EGFR and EML4-ALK negative) will be eligible for enrolment Phase I is a dose de-escalation study (figure 1A) where patients will receive pemetrexed and cisplatin on day one then $4 \times 10^8$ MSC-TRAIL cells on day 2 of a 21 day cycle for 3 cycles. Dose limiting toxicities will be recorded. Phase II is a single blinded, randomised, placebo controlled trial consisting of standard chemotherapy and either MSC-TRAIL or placebo (figure 1B). Safety data will be collected and efficacy will be assessed using CT with RECIST (v1.1) criteria at 12 weeks. All patients will be monitored for up to 2 years.

**Outcomes** Phase I primary outcome is safety and tolerability of MSC-TRAIL.

Phase II is tumour response rate by RECIST (v 1.1) criteria at 12 weeks.

**Conclusion** We have produced a viable working bank of genetically modified stem cells, if therapy is effective we will plan to expand into larger phase III trials.
Conclusions This paper supports a move away from the traditional follow-up duration of 5 years by proposing a reduced programme of yearly scans in years 1, 2 and 4 for stage 1 disease, and years 1–3 for stage 2 and 3 disease. Patients who are free of disease at this point could be discharged from the clinic accepting a 1.6% annual rate of metachronous disease. More investigation is warranted on the optimal framework for surveillance within the first 2 years post-surgery.

REFERENCE
1. Kamalatharan G, Moorcroft C, Shah R, Taggart S. P76 when is it safe to discharge resected stage 1a/1b NSCLC from the clinic? Thorax 2014;69(2):A109–A.

Abstract P258 Figure 1  Graph showing rates of recurrence by stage of disease when metachronous disease was not included as an event of interest.

P259  PURSUIT OF TISSUE: ARE WE DOING PATIENTS A DISSERVICE?
RM Williams, HE Davies, Llandough University Hospital, Cardiff, UK
10.1136/thoraxjnl-2017-210983.401

Background Whilst pursuit of a histological diagnosis in patients with suspected lung cancer (LC) and good performance status (PS) is indisputable, the advent of novel anti-cancer agents is making us re-examine our approach in patients with poor performance status. NICE guidelines advocate use of anti-cancer therapies in patients with PS 0–1 (37.1% of LC patients locally); (NICE 2011); this contrasts with National Lung Cancer Audit recommendations concerning optimal pathological diagnosis rates (≥80%) (NLCA 2017). Our work evaluates local pathological confirmation rates in patients with poor performance status (3–4) and its impact on patient care.

Method All new LC diagnoses over a 12 month period were identified and data collated retrospectively through the CAN-ISC database and electronic record system. Analysis of whether pathological confirmation impacted on the MDT’s treatment plan was undertaken.

Results Overall, 277 patients were diagnosed with LC over the 12 month period. 89 patients (32%) had a PS of 3–4 at diagnosis. The MDT treatment plan for 77% of this group was specialist palliative care or active monitoring; chemotherapy was recommended for 15 patients – 1 received it. Pathological confirmation was obtained in 38% of PS 3–4 patients (43% adenocarcinoma); it influenced management in 43% of these. Histocytological diagnoses were achieved in 4 patients of PS 4 through a variety of invasive investigations; some unscheduled (pathological fracture fixation), others reflecting diagnostic uncertainty.

Discussion Historically LC patients with a poor performance status received best supportive care and securing a tissue diagnosis was unnecessary. With the advent of personalised treatment and novel therapies, traditional views may need re-examining. Our data demonstrates that, whilst more patients with a poor PS may be considered suitable for anti-cancer therapy, very few receive it. Target driven practice with an unmitigated pursuit of a pathological diagnosis in poor PS may be associated with adverse clinical sequelae and waste of valuable resource. Scheduled tests in this population should be considered on an individual basis and involve early MDT discussion. This said, whilst pressure to reach recommended pathological confirmation rates goals remain variables on which hospital LC MDTs are measured; this blanket approach to gaining tissue is likely to continue.

P260  SURVIVAL IMPROVES IN STAGE IV LUNG CANCER PATIENTS
1B Mata, 1M Shaw, 2J Maguire, 2M Ledson. 1Research Unit, Liverpool Heart and Chest Hospital, Liverpool, UK; 2Liverpool Lung Cancer Unit, Liverpool, Anfield, UK
10.1136/thoraxjnl-2017-210983.402

Introduction Liverpool is an area of high socioeconomic deprivation, with more than twice the national incidence of lung cancer. In order to benchmark our survival performance at the Liverpool Lung Cancer Unit (diagnosing about 400 new cases/year) we wanted to compare our Units performance against national figures (32% 1 year survival, and 10% 5 year survival). We were also interested in determining if our survival rates had changed over time.

Methods We conducted a retrospective analysis of data for all patients diagnosed over a period of 9 years. All analyses were conducted on the entire dataset stratified on the basis of 3 years’ time intervals (2007–2009; 2010–2012; 2013–2015). Demographic data were analysed and compared using descriptive statistics. Survival analysis was conducted by Kaplan Meier survival plots and log- Rank tests. P-values less than 5% were considered statistically significant.

Results 3710 patients were diagnosed, with a mean age of 71.3, 52.5% male. Performance state (PS) 0=15%, 1=29.4%, 2=22.2%, 3=19.8%, 4=6.4%. Stage at diagnosis 1=19.7%, 2=6.6%, 3=23.3%, 4=41.3%. There was no significant change in numbers, age, PS, histological subtypes and stage over the 3 time periods. However, a survival rate of 40% and 16% was observed for 1 year and 5 years respectively, which is higher than the national average (figure 1). In addition, there was an increase in survival for patients diagnosed in later time period compared with the earlier time periods. Interestingly, only stage IV patients showed significant improvement in survival for 2013–2015(p<0.001), a pattern that strongly correlated with an increased oncological treatments (both chemotherapy and radiotherapy) 41.7% vs 57.0% (p<0.001). The differences in survival for stage IV patients did not relate with any significant change in age, gender, histological subtype or PS.
Conclusions Survival rates for our unit are higher than the national average. An increase in oncological treatments for stage IV patients appears to have contributed to the significant improvement in survival for these patients.

P261 IMPACT OF PHYSICIAN-LED ULTRASOUND-GUIDED TISSUE SAMPLING IN SUSPECTED LUNG CANCER
R Patel, R Reddy, M Naeem, A Singh, Y Vali. Kettering General Hospital, Kettering, UK
10.1136/thoraxjnl-2017-210983.403

Introduction and Aim Patients with suspected lung cancer require a prompt histological diagnosis to help plan treatment. Respiratory physicians traditionally obtain samples via bronchoscopy and ultrasound (USS)-guided pleural aspiration. Other sampling methods usually rely on interventional radiology and are often a source of delay. In 2014, Kettering General Hospital developed a range of USS-guided procedures performed by physicians in an ambulatory care setting. These bedside procedures offered at the initial consultation include sampling of supraclavicular lymph nodes, lung/pleural-based lesions, subcutaneous and bone metastases. This study aims to evaluate the impact of these techniques on histological diagnosis and demand for bronchoscopy and interventional radiology.

Methods All patients with suspected lung cancer in the 12 months from January 2016 were reviewed and the histological diagnosis rate was compared to that of 2013 using cancer databases. We identified the method for tissue sampling, and for patients who underwent supraclavicular node sampling, we looked at whether the lymphadenopathy had been reported on by the CT radiologist. Neck ultrasound was carried out if the physician identified any supraclavicular lymphadenopathy on review of CT imaging.

Results 238 lung cancers were diagnosed in 2016, with a histology positive rate of 77.2% (Table 1). 51 physician-led bedside ultrasound-guided procedures (excluding pleural fluid aspiration) were carried out in 2016. For those with histology, this comprises 23.8% of histological diagnoses. Of the 23 who underwent sampling of a supraclavicular lymph node, only eight (34.8%) had the nodes mentioned in the CT report. The number of bronchoscopy procedures fell 26.8% and CT guided biopsies fell 19.1%.

Conclusion The introduction of these novel physician-led bedside procedures appears to have improved the rate of histological lung cancer diagnosis whilst reducing demand on bronchoscopy and interventional radiology. This study also suggests physicians should seek out supraclavicular lymphadenopathy unless the CT radiologist has commented on their absence. This may reduce the need for more invasive procedures.

REFERENCES

Abstract P261 Table 1

<table>
<thead>
<tr>
<th>Table 1</th>
<th>2013</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of confirmed lung cancer (histology positive)</td>
<td>195 (135)</td>
<td>238 (185)</td>
</tr>
<tr>
<td>Histological diagnosis rate</td>
<td>69.2%</td>
<td>77.7%</td>
</tr>
<tr>
<td>USS-guided sampling of supraclavicular nodes (histology positive)</td>
<td>0</td>
<td>23 (19)</td>
</tr>
<tr>
<td>USS-guided lung biopsy (histology positive)</td>
<td>0</td>
<td>21 (18)</td>
</tr>
<tr>
<td>USS-guided sampling of bony/subcutaneous metastases (histology positive)</td>
<td>0</td>
<td>7 (7)</td>
</tr>
<tr>
<td>Number of bronchoscopy procedures</td>
<td>183</td>
<td>134</td>
</tr>
<tr>
<td>Number of CT guided biopsy procedures</td>
<td>63</td>
<td>51</td>
</tr>
</tbody>
</table>

P262 PULMONARY BENIGN METASTASING LEIOMYOMA: AN SINGLE-INSTITUTION CASE SERIES
K Chandarana, V Rizzo, EJ Caruana, AG Dawson, S Rathinam, A Nakas. Glenfield Hospital, Leicester, UK; Belfast Health and Social Care Trust, Belfast, UK
10.1136/thoraxjnl-2017-210983.404

Introduction Pulmonary benign metastasizing leiomyoma (BML) is a rare and often asymptomatic presentation of
smooth muscle tumour of uterine origin, occurring within the lung. Just over a hundred individual cases have been described in the literature; with two series of ten patients each, from continental Europe and North America.

**Objectives** We sought to present the first comprehensive descriptive series from a contemporary U.K. population.

**Methodology** Patients at a single U.K. thoracic surgical centre, between 2003 and 2017, were identified from prospective histology databases. Retrospective data was collected from physical and electronic data sources, and cross-referenced for accuracy.

**Results** 6 patients – all postmenopausal females – were identified over a 15 year period. Average age was 44±8 years (mean ±SD). Half of the patients were asymptomatic with an incidental finding of pulmonary nodules, whilst the remaining 50% complained of nonspecific respiratory symptomatology. Plain imaging of the chest failed to reveal any abnormality in 2 (33.3%) patients. 5 (83.3%) patients had multiple lesions – median of 9 (range 2 to 12) – with bilateral distribution; measuring a median 11 mm (range 7 to 27) in size on cross-sectional imaging. All patients underwent diagnostic surgical wedge biopsy, with 5 (88.3%) procedures completed thoracoscopically; and no perioperative morbidity. 4 (66.7%) patients had a history of previous hysterectomy, and a further patient underwent a hysterectomy following the diagnosis of BML – all for uterine leiomyomata. 4 (66.7%) patients underwent oophorectomy, whilst one patient required hormonal suppression therapy. Survival was 100% at a median follow up of 37 months (range 4 to 150).

**Conclusion** BML is a rare clinical entity accounting for a small proportion of patients presenting with pulmonary nodules. Following successful tissue diagnosis, outcomes with conservative or medical management are excellent.

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**Poster sessions**

Cancer investigation targets are set nationally with current 14 day referral to review and 62 days to treatment. Nationally and locally there has been difficulty meeting these current standards and timescales are being revised with published NHS strategy 2015–20 (28 days referral-treatment plan). Wirral University Hospital is a large non-tertiary trust who diagnosed a total of 341 lung cancers in 2015, 147 following GP urgent referrals (total 547 referrals) Previously we ran a traditional “one stop” weekly clinic with CT scan, review and same day endoscopy. Study of delayed pathways highlighted problems– lack of same day “best test”, delay of arranging PET/physiology testing and anticoagulation/sedation issues were preventing same day investigations. In September 2015 we changed to a daily virtual review clinic post CT (day 5–7). First patient contact is via telephone call from CNS to explain further investigations and give contact details. We audited 3 months diagnoses following primary care referrals Sept-Nov 2015 vs 2014 and completed patient satisfaction questionnaire post diagnosis on communication and perceived management. Results- Diagnoses – 38 (2014)/36 (2015). 2015 showed reduction in average investigations (1.4 vs 1.18); outpatient attendances (2.4 vs 1.75); time to PET-CT (19.8 vs 15.7 days) and total radiological diagnoses (7 vs 3). There was no reduction in median time to diagnosis (20 vs 21 days) but less variance in pathways with shorter range. On survey 16/18 of patients rated the care/communication as excellent. For the 36 new diagnoses post implementation we saved equivalent of 23 follow-up appointments and 9 invasive investigations (£30,000/year savings) within the group diagnosed with cancer. We feel the change from traditional one-stop outpatient clinics to a more individual case based management with virtual review and non-OPD based communication is essential to develop lung cancer pathways and would advise other units to adopt similar
Introduction Lung nodules are a common incidental finding on chest imaging. Their identification on CXR or CT thorax is a common trigger for referral to the lung cancer MDT. Low risk nodules (<8 mm diameter, <300 mm³ volume, or <10% risk of malignancy on Brock Model) do not require urgent intervention, but may require CT surveillance. These patients, however, are usually aware that they have been referred as “suspected cancer” and require prompt reassurance. In Leeds Teaching Hospitals, patients with low risk nodules were previously brought to lung cancer fast-track clinics for initial consultation. In 2016, we introduced 10 min telephone appointments for patients with new lung nodules, followed by a letter and an information leaflet to the patient. The aim is to improve access to fast-track appointments for patients with a CT scan showing suspected cancer, while allowing patients with low risk lung nodules to receive reassurance sooner and with less inconvenience. We aim to assess the impact of this service on access to fast-track clinics and patient experience.

Methods Patients with new low risk pulmonary nodules were identified from MDT records. We sent surveys to the most recent 24 patients that attended fast-track clinics and 24 patients that had received telephone appointments.

Results During the first three months of the Leeds Pulmonary Nodule Service, a mean of 6 patients per week received telephone consultations, projecting to 325 patients per year. The survey response rate was 13 (54.1%) from fast-track patients and 14 (58.3%) from telephone patients; Table 1.

Discussion The Leeds Pulmonary Nodule Service has led to increased availability of fast-track appointments for patients with suspected lung cancer and improved patient satisfaction and patient-rated quality of care for patients with low risk lung nodules. The new service is currently delivered solely by consultants and this may have impacted on the survey results.

Abstract P264 Table 1

<table>
<thead>
<tr>
<th>Type of clinic appointment</th>
<th>Face-to-face</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel time</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Appointment on time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rating of explanation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunity for questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provided written information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall rating of care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How would patients prefer to have had their appointment?</td>
<td>66.7%</td>
<td>14.3%</td>
</tr>
<tr>
<td></td>
<td>8.3%</td>
<td>28.6%</td>
</tr>
<tr>
<td></td>
<td>25.0%</td>
<td>57.1%</td>
</tr>
</tbody>
</table>

Introduction There is not currently consensus in the UK regarding optimal follow up of patients with non-small cell lung cancer (NSCLC) after radical treatment. Survivorship clinics aim to detect treatment related complications, assess for disease recurrence, support patients and families as well as detect new primaries. Computed tomography (CT) is superior to chest x-ray (CXR) for NSCLC follow-up and although several professional bodies have issued guidance on CT follow-up after treatment, real-world practice on when to perform CT follow-up varies according to local protocols, resources as well as patient-related variables.

Aim To determine local patterns of CT surveillance in patients treated radically for NSCLC.

Methods An online questionnaire was sent to 40 different specialists involved in lung cancer treatment in the North West of England. They included respiratory physicians, thoracic surgeons, and clinical and medical oncologists.

Results 21 questionnaires were completed. Surveillance patterns varied between the treatment modality delivered and specialty. Following curative surgery (n=19 respondents): Short-term CT surveillance intervals varied between no routine CT (n=5), 3–6 monthly (n=4), 1–2 yearly (n=10). Following radical radiotherapy (n=16): Frequency of CT varied between no routine CT (n=4), 3–6 monthly (n=5) and 1–2 yearly (n=7). Following Stereotactic Ablative Radiotherapy (SABR) (n=7): Frequency of CT surveillance varied from 3–6 monthly (n=5) to 1–2 yearly (n=2). The total duration of routine follow-up also varied from “Indefinitely” (n=2) to 5 years (n=16), and 10 years (n=3).

Conclusion This survey has demonstrated that wide variation exists in the NW England in relation to when to perform CT scans in patients who have had a radical treatment for NSCLC. There is no standardised follow up protocol for this patient group in NW England. An agreed protocol for follow up of patients after radical treatment for NSCLC based on variables that predict recurrence is needed. It is hoped that data from on-going research should help to inform follow up protocols in the future. We have demonstrated that there is a need for a more uniform and evidence based strategy for CT scan follow up of patients with NSCLC.
investigation. The remaining 64 (75%) were subsequently admitted to 29 different locations (8 medical specialties, surgical, vascular and orthopaedic wards). Of these, 55 (86%) were seen by the lung CNS within one working day and an appropriate management plan initiated. This was aided by our live CT database, where 50 suspicious scans were coded the same day enabling early review by the lung clinician and CNS, often before formal referral from the responsible clinical team was made.

Overall 70 patients (82%) who presented as emergencies subsequently were diagnosed with a malignancy, and of these 34 (49%) had histological confirmation.

Conclusions Our Results show that, by coordinating care between the emergency and radiology departments and the lung cancer team, patients presenting unwell can be managed rapidly even if they remain in hospital. In addition, by actively seeking them out we can not only provide them with timely and appropriate investigations but also early CNS intervention, facilitating symptom management and psychological support.

P267 OPTIMISING TISSUE SAMPLING FOR THE MOLECULAR DIAGNOSIS OF LUNG ADENOCARCINOMA
C Brockelsby, P Griffiths, M Walshaw, M Ledson. Liverpool Heart and Chest Hospital, Liverpool, UK
10.1136/thoraxjnl-2017-210983.409

Background The development of drugs that target lung adenocarcinoma caused by epidermal growth factor tyrosine kinase (EGFR-TK) and anaplastic lymphoma kinase (ALK) mutations has focused the need to obtain sufficient tissue at biopsy to allow the detection of such molecular markers and so improve treatment options for selected patients. To investigate this further, we looked at the diagnostic yield from various biopsy techniques in our large lung cancer unit (400 cases per year, overall histological yield 77.5%).

Methods We collected data from all patients with an ultimate histological diagnosis of adenocarcinoma for the years 2014 to 2016, looking at the diagnostic method, whether tissue was analysed for molecular mutations, and whether repeat procedures were necessary for EGFR-TK and ALK testing.

Results 224 patients were identified: 42 by EBUS-TBNA, 66 by CT-guided biopsy, 44 at bronchoscopy, 66 at surgical resection, 6 from pleural fluid, and 1 by lymph node FNA. For molecular testing see Table. In addition to those patients where sampling was insufficient to make the diagnosis, a further 30 had inadequate cell numbers for mutation analysis and the reporting pathologist recommended repeat procedures. Of the 10 patients who underwent this, only 2 were retested for molecular markers, and the Results were unchanged.

Conclusion This study shows that all our pre-resection positive diagnostic samples for lung cancer do not always provide sufficient tissue for molecular analysis. Although insufficiency rates were similar between CT, EBUS and bronchoscopy, one third of CT-guided specimens had few cells for the definitive exclusion of mutations. With the advent of new therapies for lung cancer, we need to optimise our diagnostic sampling techniques when testing for molecular mutations.

Abstract P267 Table 1 Rate of insufficient tissue or inadequate cell number for molecular mutation detection per sampling technique

<table>
<thead>
<tr>
<th>Biopsy Technique</th>
<th>Insufficient tissue for EGFR testing (% of biopsy samples per sampling technique)</th>
<th>Insufficient tissue for ALK testing (% of biopsy samples per sampling technique)</th>
<th>Inadequate cell number for definitive molecular mutation detection (% of samples per sampling technique)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBUS-TBNA</td>
<td>7.70%</td>
<td>12.80%</td>
<td>20%</td>
</tr>
<tr>
<td>CT-Guided Biopsy</td>
<td>9.50%</td>
<td>20%</td>
<td>35%</td>
</tr>
<tr>
<td>Bronchoscopy</td>
<td>11%</td>
<td>11%</td>
<td>6.25%</td>
</tr>
<tr>
<td>Surgical resection</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pleural fluid analysis</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Lymph node FNA</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Pharmacotherapies for COPD

P268 RELATIONSHIP OF INHALER ADHERENCE BEHAVIOUR TO CLINICAL OUTCOMES IN COPD: AN OBSERVATIONAL STUDY
B Cushen, G Greene, I Sulaiman, K Bennett, E MadHale, MC Mokoka, JF VanBoven, RW Costello. Royal College of Surgeons in Ireland, Dublin, Ireland
10.1136/thoraxjnl-2017-210983.410

COPD remains a leading cause of healthcare use despite the availability of effective inhaled therapies. We examined adherence to maintenance therapy by assessing the key components of good inhaler use: habit of use and inhaler technique. The relationship between adherence patterns, specific patient characteristics and clinical outcomes at one year was examined.

We recruited 226 hospitalised patients with a diagnosis of COPD to this prospective observational study. Inhaler adherence was remotely monitored for 90 days after hospital discharge using an INCA™ audio recording device. Cluster analysis grouped patients by their adherence behaviour based on the mean rate of attempted use and critical technique errors. The clinical and psychosocial characteristics of each cluster were examined. The rate of all-cause mortality and healthcare use at 12 months was recorded. Survival analysis was used to evaluate the time to first event across adherence groups. Adherence data was available for 195 patients. We identified four patterns of Adherence behaviour: (1) Regular habit of use and good technique (28%); (2) Regular habit of use and poor technique (21%); (3) Poor habit of use and good technique (33%); (4) Poor habit of use and poor technique (19%). The overall event rate was lowest in Cluster 1, 5.46/person/year. Cluster 2 had the lowest annual rate of hospital presentation, but accounted for the majority of community prescriptions for antibiotics and steroids, mean 4.6/person/
year. In an adjusted Cox regression model, Cluster 3 had an increased risk of any adverse outcome compared to Cluster 1, Hazard Ratio 1.8 (1.1–2.9), p = 0.02. This group were notable for high anxiety scores and mild cognitive impairment. There was a stepwise increase in mortality across groups, from 11% in Cluster 1% to 33% in Cluster 4, p < 0.001. Cluster 4 was older, female, with higher co-morbidity and cognitive impairment. We have identified four clusters of adherence behaviour. There is an association between adherence patterns and clinical outcomes. Each cluster also exhibits distinct clinical and psychosocial traits which may act as drivers of their behaviour. Personalised interventions targeting these specific adherence behaviour patterns may prove a cost-effective strategy to curtail COPD-related healthcare costs.

**P269 DESCRIBING ADHERENCE DATA IN A CLINICAL EFFECTIVENESS TRIAL: THE SALFORD LUNG STUDY IN COPD (SLS COPD)**

1S Coller, 2D Browning, 3JP New, 4JM Gibson, 2LS Stephens, 3N Diar Bakery, 3J Fletcher, 1JC Crawford. 1GSK, Uxbridge, UK; 2GSK, Brentford, UK; 3Salford Royal NHS Foundation Trust, Salford, UK; 4Salford Royal NHS Foundation Trust and Manchester Academic Health Sciences Centre; The University of Manchester, Salford and Manchester, UK.

10.1136/thoraxjnl-2017-210983.411

**Background** Adherence to inhaled therapy is key to effective COPD management; poor adherence is associated with suboptimal outcomes. While adherence may be more accurately measured in traditional double-blind randomised controlled trials (RCTs) than in effectiveness trials conducted in everyday clinical practice, the latter may more closely reflect “typical” patient adherence.

**Aim** To describe adherence in SLS COPD, a 12 month open-label effectiveness RCT that evaluated initiating fluticasone furoate/vilanterol (FF/VI) vs continuing usual care (UC) in COPD patients in UK primary care.

**Methods** Adherence was estimated by proportion of days covered (PDC), based on study medication prescribing data from patients’ electronic case report forms [eCRFs]/electronic health records [EHRs] during the study and the MARS-A 9 questionnaire. Selected outcomes were descriptively analysed by PDC <80% or ≥80%.

**Results** Mean PDC during the study was similar for FF/VI and UC; the proportion of patients with PDC ≥80% was high in both groups (Table). Summary statistics showed little change in MARS-A 9 during the study and similar responses in both treatment arms. Clear relationships between PDC category and exacerbations, healthcare resource utilisation, and COPD Assessment Test were not observed.

**Conclusions** In SLS COPD, adherence estimated by PDC was high and there was no clear association between PDC and outcomes. Limitations include adherence based on patients’ self-reporting and eCRF/EHR prescribing data.

**Funding** GSK (HZC115151/NCT01551758).

Please refer to page A260 for declarations of interest in relation to abstract P269.

**Abstract P269 Table 1 Adherence by treatment group (ITT analysis)**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>FF/VI (n=1396)</th>
<th>UC (n=1403)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDC ≥80%</td>
<td>1378</td>
<td>1361</td>
</tr>
<tr>
<td>Mean (SD), n (%)</td>
<td>84.99 (22.29) 346</td>
<td>82.40 (23.11) 447</td>
</tr>
<tr>
<td>≥80%, n (%)</td>
<td>(25)</td>
<td>(33)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1032 (75)</td>
<td>914 (67)</td>
</tr>
<tr>
<td>MARS-A 9 score</td>
<td>1393</td>
<td>1402</td>
</tr>
<tr>
<td>Baseline (randomisation)</td>
<td>4.42 (0.67) 1318</td>
<td>4.44 (0.66) 1324</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>4.61 (0.56) 1315</td>
<td>4.44 (0.66) 1324</td>
</tr>
<tr>
<td>Study end, n (%)</td>
<td>0.20 (0.730)</td>
<td>0.00 (0.750)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>20.89 (9.10)</td>
<td>22.90 (9.02)</td>
</tr>
<tr>
<td>Difference (baseline – study end), n (%)</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1378</td>
<td>1361</td>
</tr>
</tbody>
</table>

**Outcomes in patients with PDC ≥80% and <80% by treatment arm (ITT analysis)**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>FF/VI (n=346)</th>
<th>UC (n=447)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS mean annual rate of moderate/severe exacerbations, n (PEA population)</td>
<td>1.68</td>
<td>1.87</td>
</tr>
<tr>
<td>Rate ratio (95% CI)</td>
<td>1.00 (0.78–1.04)</td>
<td>0.92 (0.84–1.01)</td>
</tr>
<tr>
<td>HRU</td>
<td>2.13</td>
<td>2.46</td>
</tr>
<tr>
<td>LS mean COPD-related primary care contacts, n</td>
<td>2.51</td>
<td>2.45</td>
</tr>
<tr>
<td>Rate ratio (95% CI)</td>
<td>1.03 (0.95–1.11)</td>
<td>1.03 (0.95–1.11)</td>
</tr>
<tr>
<td>LS mean COPD-related secondary care contacts, n</td>
<td>2.13</td>
<td>2.46</td>
</tr>
<tr>
<td>Rate ratio (95% CI)</td>
<td>1.03 (0.95–1.11)</td>
<td>1.03 (0.95–1.11)</td>
</tr>
<tr>
<td>CAT score, n</td>
<td>345</td>
<td>447</td>
</tr>
<tr>
<td>Baseline score, mean (SD) n at endpoint</td>
<td>22.9</td>
<td>22.4</td>
</tr>
<tr>
<td>Responder, n (%)</td>
<td>9.01</td>
<td>9.02</td>
</tr>
<tr>
<td>Non-responder, n (%)</td>
<td>372</td>
<td>415</td>
</tr>
<tr>
<td>LS mean annual rate of moderate/severe exacerbations, n (PEA population)</td>
<td>1.68</td>
<td>1.87</td>
</tr>
<tr>
<td>Rate ratio (95% CI)</td>
<td>1.00 (0.78–1.04)</td>
<td>0.92 (0.84–1.01)</td>
</tr>
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<td>HRU</td>
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<td>LS mean COPD-related secondary care contacts, n</td>
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<td>2.46</td>
</tr>
<tr>
<td>Rate ratio (95% CI)</td>
<td>1.03 (0.95–1.11)</td>
<td>1.03 (0.95–1.11)</td>
</tr>
</tbody>
</table>
| CAT, COPD Assessment Test; CI, confidence interval; HRU, healthcare resource utilisation; ITT, intent-to-treat; LS, least squares; MARS-A 9, Medication Adherence Report Scale for Asthma (modified for use in COPD); 9-item questionnaire used [omitting score for Question ‘Before doing something’]; higher MARS-A 9 scores indicate better adherence; PEA, primary effectiveness analysis; SD, standard deviation. Based on a total of 2739 patients in the ITT population with available treatment adherence data, unless otherwise stated. Determined at study end, using all prescriptions during the study treatment period. Based on last available MARS-A 9 measurement post-randomisation. Based on a total of 2223 patients in the PEA population with available treatment adherence data. Post-hoc summary analysis of CAT data by PDC category; all other summaries/analyses were prespecified. CAT responder is defined as a change from baseline of ≤–2 at endpoint (last available on-treatment measurement).
BACKGROUND

Identifying patients who respond more favourably to specific therapy allows for optimal disease management (maximising treatment benefits; minimising treatment-related risks) and better allocation of limited healthcare resources. SLS COPD, a 12 month, open-label, randomised controlled trial conducted in UK primary care, compared the clinical effectiveness and safety of initiating once-daily inhaled FF/VI 100/25 μg versus continuing usual care (UC) in patients with COPD. The trial met its primary effectiveness endpoint demonstrating an 8.4% reduction in the mean annual rate of moderate/severe exacerbations with FF/VI versus UC (95% CI: 1.1–15.2; p=0.02; primary effectiveness analysis population).

AIM

Identify patient subgroups demonstrating an enhanced response with FF/VI versus UC in SLS COPD, using a cluster analysis approach.

METHODS

This exploratory post-hoc analysis utilised a data-driven recursive partitioning algorithm (SIDESTM) to identify several candidate patient subgroups, each with the potential to demonstrate added benefit of FF/VI versus UC compared with the parent intent-to-treat (ITT) population, based on the primary effectiveness endpoint. Twenty-four distinct patient variables were considered, including baseline demographics, COPD history and disease characteristics, comorbidities, socioeconomic status and treatment adherence. Following identification of a “best” candidate subgroup, the primary effectiveness model used in the original SLS COPD study was repeated to evaluate the potential additional benefit of FF/VI versus UC in this subgroup.

RESULTS

Eight candidate subgroups were identified, defined by combinations of coronary artery disease (CAD) diagnosis, CAT™ score, age and polypharmacy. The subgroup indicating the greatest potential treatment effect of initiating FF/VI versus continuing UC comprised 1430/2799 (51%) ITT patients with no CAD diagnosis, baseline CAT score ≤ 33 and age ≥ 61 years. In this subgroup, the mean annual rate of moderate/severe exacerbations was reduced by 21.40% (95% CI: 12.79–29.17) with FF/VI versus UC, contrasting with the observed reduction of 8.4% (95% CI: 1.4–14.9) in the overall ITT population.

CONCLUSIONS

The identified patient subgroup demonstrated an enhanced response with FF/VI versus UC compared to the overall SLS COPD population. Work is ongoing to validate/confirm these findings in an alternative COPD dataset.

FUNDING

GSK (HZC115151/NCT01551758).

Please refer to page A260 for declarations of interest in relation to abstract P270.

REFERENCES


RATIONALE

Treatment with extrafine triple therapy in a single inhaler has beneficial effects compared to LAMA monotherapy on lung function and symptoms. This analysis focuses on rescue medication use (as this is associated with symptoms) and lung function responder analysis identifying clinically relevant effects.

METHODS

In this 52 week multicentre, randomised, double-blind, active-controlled study, 2691 patients with severe to very severe COPD, exacerbations history, and CAT total score ≥ 10 were randomised (2:2:1) to tiotropium, fixed triple (beclometasone/formoterol/glycopyrronium), or free triple (beclometasone/formoterol+tiotropium), Secondary endpoints included FEV1 responders at week 26 and 52 using different thresholds for response and change from baseline in average use of rescue medication.

RESULTS

Both fixed and free triple FEV1 responder percentages were significantly greater than tiotropium at weeks 26 and 52 versus the threshold used to define the response (p<0.001 for all analyses). At 26 weeks the proportion of responders were 48.0% (fixed triple) and 48.1% (free triple) for the 50 ml threshold, 36.7% and 34.8% at the higher 120 mL threshold, with similar Results at week 52. Corresponding FEV1 responder percentages for tiotropium were lower at the 50 mL threshold (35.7% and 34.8%, at weeks 26 and 52 respectively) and 120 mL threshold (25.3% and 24.8%, respectively). In terms of average percentage of days without rescue medication use over 52 weeks, all treatments showed statistically significant increases from baseline which were more marked with fixed and free triple (13.9 [95%CI: 12.15.8] and 14.8% [95%CI: 12.1;17.4] respectively) compared to 5.2% [95%CI: 3.3;7.1] for tiotropium alone (p<0.001) and no difference observed between fixed and free triple with an adjusted mean difference of −0.8% [95% CI: −4.1;2.4] (p=0.616). Average use of rescue medication with both fixed and free triple treatments over 52 weeks compared to tiotropium alone was reduced by 0.6 [95%CI: 0.4;0.7] and 0.6 [95%CI: 0.5;0.8] puffsd/day, respectively (p<0.001).

CONCLUSIONS

Extrafine triple therapy in a single inhaler provides superior clinical benefits in severe to very severe COPD patients in terms of lung function (by individual responder analysis) and rescue medication use compared with tiotropium alone.

Please refer to page A260 for declarations of interest in relation to abstract P271.
IMPROVEMENTS IN EXACERBATION RATES WITH SINGLE INHALER TRIPLE THERAPY VERSUS DUAL ICS/LABA THERAPY IN PATIENTS WITH ADVANCED CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD): SUBGROUP ANALYSES OF THE PHASE III FULFIL STUDY

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10.1136/thoraxjnl-2017-210983.414

Results from FULFIL have shown statistically significant improvements in lung function and health-related quality of life, and a reduction in exacerbation rates in once-daily fluticasone furoate/umeclidinium/vilanterol (FF/UMEVI/VI) 100 μg/62.5 μg/25 μg administered using a single ELLIPTA inhaler compared with twice-daily budesonide/formoterol (BUD/FOR) 400 μg/12 μg using the Turbuhaler® in patients with symptomatic COPD at risk of exacerbations. The safety profile of FF/UMEVI/VI reflected that of the components (Lipson, et al. Am J Respir Crit Care Med. 2017). Herein we present post-hoc subgroup analyses of exacerbation rates by prior COPD medication class, disease severity and exacerbation history during FULFIL. In the intent-to-treat (ITT; 24 weeks) population, the mean annual exacerbation rate, FF/UMEVI/VI versus BUD/FOR ratios and annual exacerbation rates reductions were calculated for subgroups: by prior COPD medication class, inhaled corticosteroid (ICS) +long-acting beta agonists (LABA); BUD/FOR; ICS +LABA + long-acting muscarinic antagonists (LAMA); LAMA; tiotropium; LAMA + LABA; by disease severity, forced expiratory volume in 1 s (FEV1) <50% predicted, no moderate/severe exacerbation; FEV1 ≥50% to <80% moderate/severe exacerbation; FEV1 ≥80% severe exacerbation; and by exacerbation history, 0/1 moderate exacerbations; ≥2 moderate exacerbations; ≥2 severe exacerbations; ≥2 severe exacerbations; and by exacerbation history, 0/1 moderate exacerbations; ≥2 moderate exacerbations; ≥2 severe exacerbations. Up to Week 24 in the ITT population, FF/UMEVI/VI versus BUD/FOR improved the mean annual exacerbation rate (range, 63%-24%) in all prior medication subgroups, except LAMA +LABA (annual exacerbation rate reduction, -44%) and improved mean annual exacerbation rates in all disease severity (range, 45%-27%) and exacerbation prior history (range, 57%-27%) subgroups (Table). Statistical significance of the FF/UMEVI/VI:BUD/FOR ratio was observed for the subgroups: prior medication class ICS +LABA (0.37; 95% confidence interval [CI] 0.20–0.71; p =0.003 and ICS +LAMA + LABA (0.53; 95% CI 0.33–0.87; p =0.012); disease severity FEV1 <50% and ≥2 moderate/severe exacerbation (0.53; 0.34–0.89; p =0.015); exacerbation history 0/1 prior moderate exacerbation (0.62; 0.44–0.87; p =0.005) and ≥1 severe exacerbation (0.43; 0.22–0.86; p =0.017) (Table). Improvements in mean annual exacerbation rates with once-daily FF/UMEVI/VI compared with twice-daily BUD/FOR were observed in all patients regardless of disease severity or exacerbation history and all prior COPD medication class subgroups except for LAMA +LABA.

Funding GSK (NCT02345161; CTT116853)

Please refer to page A260 for declarations of interest in relation to abstract P272.

Abstract P272 Table 1 Mean annual exacerbation rates by subgroup (ITT population; up to Week 24)

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>FF/UMEVI/VI</th>
<th>BUD/FOR</th>
<th>Reduction in annual exacerbation rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>rate</td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>254</td>
<td>0.36</td>
<td>253</td>
</tr>
<tr>
<td>Prior medication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICS +LABA</td>
<td>256</td>
<td>0.37</td>
<td>255</td>
</tr>
<tr>
<td>BUD +FOR</td>
<td>97</td>
<td>0.05</td>
<td>93</td>
</tr>
<tr>
<td>ICS +LABA +LAMA</td>
<td>266</td>
<td>0.30</td>
<td>259</td>
</tr>
<tr>
<td>LAMA alone</td>
<td>104</td>
<td>0.37</td>
<td>104</td>
</tr>
<tr>
<td>TIO alone</td>
<td>65</td>
<td>0.15</td>
<td>67</td>
</tr>
<tr>
<td>LAMA +LABA</td>
<td>100</td>
<td>0.38</td>
<td>83</td>
</tr>
<tr>
<td>Disease severity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1 &lt;50%, no moderate/severe exacerbations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1 ≥50%, ≤1 moderate/severe exacerbations</td>
<td>109</td>
<td>0.29</td>
<td>90</td>
</tr>
<tr>
<td>FEV1 &gt;50%–&lt;80%, &gt;1 moderate/severe exacerbations</td>
<td>296</td>
<td>0.22</td>
<td>289</td>
</tr>
<tr>
<td>Exacerbation history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0/1 moderate</td>
<td>599</td>
<td>0.23</td>
<td>609</td>
</tr>
<tr>
<td>≥2 moderate</td>
<td>308</td>
<td>0.01</td>
<td>283</td>
</tr>
<tr>
<td>≥1 severe</td>
<td>185</td>
<td>0.12</td>
<td>200</td>
</tr>
</tbody>
</table>

*Statistically significant difference for FF/UMEVI/VI:BUD/FOR ratio; CI, confidence interval; ICS, inhaled corticosteroid; ITT, intent-to-treat; LABA, long-acting beta agonists; LAMA, long-acting muscarinic antagonists; TIO, tiotropium.

ASSOCIATION OF INCIDENTAL PNEUMONIA AND EXACERBATIONS WITH EXTRAFINE TRIPLE THERAPY IN ONE SINGLE INHALER IN COPD PATIENTS: A POST-HOC ANALYSIS FROM TRILOGY AND TRINITY STUDIES

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10.1136/thoraxjnl-2017-210983.415

Rationale Efficacy and safety of extrafine fixed triple combination of beclometasone dipropionate, formoterol fumarate, and glycopyrronium bromide (BDP/FF/GB; 100/6/12.5 mcg, two actuations BID via pMDI; ‘fixed triple’) has been recently demonstrated in two phase III trials. Fixed triple has shown superiority in improving lung function and reducing moderate/severe exacerbations versus BDP/FF (Forstinar 100/6 mcg, two actuations BID via pMDI; TRILOGY – Singh et al. Lancet 2016; 388: 963–73) and versus tiotropium (18 mcg once inhalation OD via DPI; TRINITY – Vestbo et al. Lancet 2017; 389: 1919–29). Increase in pneumonia risk associated with ICS containing medications is a known class effect. The risk/benefit balance of extrafine fixed triple was evaluated by comparing variations in pneumonia and exacerbation events.

Methods Information on moderate/severe exacerbations and confirmed pneumonia was extracted from TRINITY and TRIL-OGY. A frequency plot was generated considering days in the study versus cumulative number of events.

Results In TRILOGY study, the number of recorded events was 288 exacerbations (rate: 0.448 exacerbations per patient
per year) versus 25 pneumonias (rate: 0.039 events per patient per year) with fixed triple and 333 exacerbations (0.565) versus 18 pneumonias (0.029) with Fostair (figure 1A). In TRINITY study, the number of events was 485 exacerbations (0.472) versus 30 pneumonias (0.029) with fixed triple and 369 exacerbations (0.383) versus 20 pneumonias (0.020) with tiotropium (figure 1B). Overall, treatment with fixed triple therapy reduced exacerbations by 65 events compared to Fostair (adjusted rate ratio: 0.773, p=0.005) and by 84 events compared to tiotropium (0.801, p=0.003). No fatal pneumonias occurred in TRILOGY while 5 pneumonias led to death in TRINITY (1 with fixed triple versus 4 with tiotropium). All pneumonias were classified as non-related to treatment.

Conclusions This analysis confirms that, in two independent populations of COPD patients treated with an ICS containing extrafine fixed triple combination, the number of incident pneumonia remains very small compared to that of moderate/severe exacerbations. The benefit observed in reducing the absolute number of exacerbations outweighs the increase observed in absolute number of pneumonias, thus confirming the positive risk benefit balance of extrafine fixed triple in severe/very severe COPD patients.

Please refer to page A260 for declarations of interest in relation to abstract P273.
ELLIPTA inhaler was rated higher than RESPIMAT in all case-of-use questionnaire items (p≤0.001). The incidence of on-treatment AEs was similar in both groups (UMEC/VI, n=59 [25%]; TIO/OLO, n=71 [31%]).

Conclusions In this first, direct, once-daily LAMA/LABA comparison, a greater likelihood of improvements in lung function was demonstrated with UMEC/VI vs TIO/OLO. The ELLIPTA inhaler was preferred to RESPIMAT. Both LAMA/LABAs were well tolerated.

Funding GSK (204990 [NCT02799784])

Please refer to page A261 for declarations of interest in relation to abstract P275.

Abstract P275 Table 1

<table>
<thead>
<tr>
<th></th>
<th>N UMEC/VI</th>
<th>N TIO/OLO</th>
<th>Difference/ OR (95% CI) UMEC/VI vs TIO/OLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trough FEV1, mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>231 189 (13)</td>
<td>224 141 (13)</td>
<td>+48 (25.71)*</td>
</tr>
<tr>
<td>Week 8</td>
<td>225 180 (13)</td>
<td>224 128 (13)</td>
<td>+52 (28.77)*</td>
</tr>
<tr>
<td>Trough FEV1 responders, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>234 162 (69)</td>
<td>227 116 (51)</td>
<td>OR: 2.09 (1.39, 3.14)*</td>
</tr>
<tr>
<td>Week 8</td>
<td>234 154 (66)</td>
<td>229 109 (48)</td>
<td>OR: 2.05 (1.34, 3.14)*</td>
</tr>
<tr>
<td>IC, mL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>223 164 (17)</td>
<td>215 112 (18)</td>
<td>+52 (16.88)**</td>
</tr>
<tr>
<td>Week 8</td>
<td>212 169 (17)</td>
<td>212 122 (17)</td>
<td>+47 (14.81)**</td>
</tr>
<tr>
<td>Rescue medication use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Weeks 1–8), puffs/day</td>
<td>(0.08)</td>
<td>(0.08)</td>
<td>0.14**</td>
</tr>
</tbody>
</table>

All data are presented as LS mean (SE) change from baseline, unless otherwise stated; p<0.001; p<0.01; *Defined as a change from baseline in trough FEV1 of >100 mL; CI, confidence interval; FEV1, forced expiratory volume in 1 s; IC, inspiratory capacity; ITT, intent-to-treat; LS, least squares; OR, odds ratio; SE, standard error; TIO/LOL, tiotropium/olodaterol 5/5 mcg; UMEC/VII, umeclidinium/vilanterol 62.5/25 mcg.

Cardiovascular Safety of Extrafine Single Inhailer Triple Combination of Beclomethasone Dipropionate, Formoterol Fumurate, and Glycopyrronium Bromide in COPD: Results of Safety Analysis from the Trilogy and Trinity Studies

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Poster sessions

P276

Cardiovascular Safety of Extrafine Single Inhailer Triple Combination of Beclomethasone Dipropionate, Formoterol Fumurate, and Glycopyrronium Bromide in COPD: Results of Safety Analysis from the Trilogy and Trinity Studies

Rationale COPD often co-exists with other chronic diseases that can contribute to patients’ health status and prognosis. In particular, patients with COPD are at greater risk of cardiovascular disease compared with age and sex-matched controls. Methods Two 52 week multi-centre, randomised, double-blind, active-controlled studies recruited patients with symptomatic COPD, severe to very severe airflow limitation, and an exacerbation history. In TRILOGY, patients were randomised (1:1) to an extrafine fixed triple combination of beclomethasone dipropionate, formoterol fumurate, and glycopyrronium bromide (BDP/FF/GB; 100/6/12.5 mcg, two actuations twice daily [BID] via pressurised metered dose inhaler [pMDI]; ‘fixed triple’) or an extrafine fixed combination of BDP/FF (100/6 mcg, two actuations BID via pMDI; Fostair) (Singh et al. Lancet 2016; 388: 963–73). In TRINITY patients were randomised 2:2:1 to BDP/FF/GB, tiotropium (18 mcg once daily via single-dose dry powder inhaler [SDDPI]), or BDP/FF+tio- tropium: free triple (Vestbo et al. Lancet 2017; 389: 1919–29). In this analysis, we evaluated the occurrence of Major Adverse Cardiovascular Events (MACEs). MACEs included acute myocardial infarction, stroke, cardiovascular death, arrhythmias, and heart failure.

Results MACE incidence and rate in the two BDP/FF/GB groups was similar to the BDP/FF and tiotropium groups (Table 1). The majority of reported MACEs were severe in intensity, with a slightly higher percentage of fatal events in the Tiotropium only group. Importantly, in patients with relevant concomitant cardiovascular diseases, the trend was similar to that seen in the overall populations. None of the other subgroup analyses (by age, spacer use and gender) highlighted relevant differences in the safety profiles compared with the overall population.

Conclusions These Results provide further reassurance that the additional clinical benefits of this extrafine fixed triple compared to standard treatment are not associated with a greater impact on the cardiovascular safety in severe to very severe COPD patients, further supporting its positive benefit/risk ratio. Importantly, the presence of concomitant cardiac comorbidities did not influence the rate of cardiovascular events.

Please refer to page A261 for declarations of interest in relation to abstract P276.

Abstract P276 Table 1

<table>
<thead>
<tr>
<th></th>
<th>BDP/FF/GB (Fixed Triple) (n=680)</th>
<th>BDP/FF/GB (Fixed Tiotropium Triple) (n=1076)</th>
<th>BDP/FF (Free Triple) (n=537)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment-emergent MACEs, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=687)</td>
<td>(n=1077)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute Myocardial infarction</td>
<td>1 (0.1%)</td>
<td>6 (0.9%)</td>
<td>2 (0.2%)</td>
</tr>
<tr>
<td>Acute Ischaemic stroke</td>
<td>2 (0.3%)</td>
<td>2 (0.2%)</td>
<td>4 (0.4%)</td>
</tr>
<tr>
<td>Arrhythmias</td>
<td>3 (0.4%)</td>
<td>3 (0.4%)</td>
<td>6 (0.6%)</td>
</tr>
<tr>
<td>Cardiovascular death</td>
<td>3 (0.4%)</td>
<td>3 (0.4%)</td>
<td>6 (0.6%)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Stroke</td>
<td>2 (0.3%)</td>
<td>2 (0.2%)</td>
<td>4 (0.4%)</td>
</tr>
<tr>
<td>Unknown cause of death</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Any fatal MACE</td>
<td>4 (0.6%)</td>
<td>5 (0.7%)</td>
<td>10 (1.1%)</td>
</tr>
<tr>
<td>MACE rate per 1000 patient years</td>
<td>24.9</td>
<td>25.6</td>
<td>19.5</td>
</tr>
</tbody>
</table>

10.1136/thoraxjnl-2017-210983.418

10.1136/thoraxjnl-2017-210983.419
Poster sessions

We investigated if serial domiciliary measures of spirometry were sensitive at detecting subtle effects of beta-2 blockade associated with bisoprolol. This was a sub-study of NCT01656005 where domiciliary diary data were available on n=17 patients with GOLD B/C COPD comprising domiciliary FEV1,(am/pm), heart rate, oxygen saturation, salbutamol use, and global symptom score. Patients received a two week run in (baseline) on inhaled corticosteroid (ICS) and long acting beta-2 agonist (LABA): beclometasone/formoterol 100/6 µg. 2 puffs BID. Thereafter they were placed on triple therapy with the addition of a long acting muscarinic receptor antagonist (LAMA) as Tiotropium 18 µg OD; with concomitant weekly dose titration of bisoprolol as: 1.25 mg-2.5 mg-5 mg. After a further week of bisoprolol 5 mg, they were stepped back down to dual therapy (ICS/LABA) and continued this for one week. Mean age was 64 years, mean FEV1,52% predicted, mean FEV1/FVC ratio of 0.46, mean 50 pack year smoking history, and 7% mean FEV1 reversibility to salbutamol 400 µg. Compared to a baseline am FEV1; of 1.38 L (95% CI 1.14–1.61 L), both ICS/LABA/LAMA and ICS/LABA in conjunction with bisoprolol showed statistical significant mean falls in amounting to 100 ml (95% CI 1.03–1.53 L) and 120 ml respectively 1.26 L (95% CI 1.01–1.51 L); equalising and exceeding the MCID of 100 ml respectively. Bisoprolol produced a significant heart reduction of 11 beats/min (95% CI 74–85 bpm) to 69 bpm (95% CI 64–73 bpm) and 69 bpm (95% CI 65–73 bpm) for ICS/LABA/LAMA and ICS/LABA respectively. There was no change in salbutamol use, symptom score or oxygen saturation, pre and post bisoprolol, irrespective of triple or dual therapy. In the context of dual or triple therapy, bisoprolol was associated with subtle but significant falls in domiciliary FEV1, which were disconnected from symptoms, reliever use and oxygen saturation.

Methods A number of VHCs with facemask (n=3 devices/group) were evaluated using an anatomical face-model and upper airway commensurate with that of a 4 year old child. Each VHC was prepared to manufacturer instructions, then evaluated by breathing simulator (ASLS000), mimicking a short coordination delay of 2 s followed by tidal breathing (tidal volume (Vt)=155 mL, I:E ratio=1:2, rate=25 cycles). The facemask was attached to ADAM-III small child model. The airway was coupled directly to the breathing simulator via a filter below its exit to capture drug particles that would penetrate as far as the carina in a real patient. 5-actuations of fluticasone propionate (50 µg, FP) were delivered at 30 s intervals. FP recovered from various locations in the aerosol pathway was subsequently assayed by HPLC-UV spectrophotometry.

Results Distribution of recovered FP from each type of VHC is summarised in Table 1.

Conclusions Significantly more FP was delivered to the model ‘carina’ from the AC Plus VHC with child mask (p<0.001), the increased mass counterbalanced by decreased retention of medication within the VHC. It is important that clinicians are aware that large differences in delivery efficiency may exist when a facemask is present.

P279 PRIMING OF A NON-CONDUCTING VALVED HOLDING CHAMBER (VHC) MAY RESULT IN INCONSISTENT MEDICATION DELIVERY

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10.1136/thoraxjnl-2017-210983.421

Introduction and Objectives Priming VHCs with several actuations of medication before use may be an established practice to prepare the spacer before use. However this practice can have a significant influence on subsequent medication delivery. The present study set out to test the hypothesis that priming is not effective, or better than the use of anti-static materials.

Methods The following VHCs, each with mouthpiece as patient interface (n=5 devices/group) were evaluated: Aero-Chamber Plus Flow-Vu Antistatic VHC (AC +PVAVHC); AeroChamber Plus; Volumatic®; Able Spacer 2®; Anti-Static Compact Space Chamber plus®. Each VHC was connected via a filter holder to a vacuum source operated at 28.3 L/min, evaluated with a pMDI (Flovent 125 µg, FP) and the Emitted Mass of FP (EMFP) determined by HPLC-UV assay. The following sequence of testing was conducted: 1) Test VHC immediately after removal from packaging (no pre-treatment) and evaluate EMFP following one actuation. 2) Supply two more actuations into the same VHC and evaluate EMFP.

Abstract P278 Table 1 FP (mean µg±SD) recovered from VHCs indicated for small child use, simulating a 2 s coordination delay followed by tidal breathing

<table>
<thead>
<tr>
<th>Retention Location</th>
<th>AeroChamber Plus Flow-Vu</th>
<th>Pocket-Chamber</th>
<th>Vortex Compact Space Chamber</th>
<th>Anti-Static Chamber</th>
<th>A2A Spacer</th>
<th>Volumatic Spacer</th>
<th>Able Spacer2</th>
<th>Optichamber Diamond*</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHC</td>
<td>17.5±1.6</td>
<td>36.6±0.2</td>
<td>39.7</td>
<td>36.1±3.6</td>
<td>28.3±2.8</td>
<td>33.6±1.9</td>
<td>13.2±1.6</td>
<td>22.7±2.7</td>
</tr>
<tr>
<td>Facemask</td>
<td>1.4±0.2</td>
<td>1.9±0.8</td>
<td>1.2±0.2</td>
<td>0.0±0.0</td>
<td>0.2±0.1</td>
<td>0.1±0.1</td>
<td>0.0±0.0</td>
<td>3.4±0.8</td>
</tr>
<tr>
<td>Airway</td>
<td>1.1±0.2</td>
<td>0.4±0.2</td>
<td>0.6±0.3</td>
<td>0.1±0.1</td>
<td>0.4±0.1</td>
<td>0.0±0.0</td>
<td>0.2±0.0</td>
<td>0.7±0.1</td>
</tr>
<tr>
<td>Filter at ‘Carina’</td>
<td>10.1±1.0</td>
<td>4.0±1.7</td>
<td>2.3±1.5</td>
<td>2.1±0.8</td>
<td>4.1±0.9</td>
<td>1.5±0.8</td>
<td>5.1±0.9</td>
<td>5.1±0.9</td>
</tr>
</tbody>
</table>

(representing 3 actuations of priming). 3) Deliver 17 more actuations into the same VHC and evaluate EMFP (representing priming of 20 actuations). 4) Clean VHC, then repeat part (1) (representing pre-conditioning by washing as an alternative to priming).

Results The behaviour of EMFP (mean ±SD) with VHC type is summarised in figure 1.

Conclusions Clinicians should be aware that priming of VHCs results in inconsistent medication delivery, and is wasteful of medication.

P280 HOW DO WE CHOOSE INHALERS? PATIENT AND PHYSICIAN PERSPECTIVES ON ENVIRONMENTAL, FINANCIAL AND EASE-OF-USE FACTORS

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Introduction Inhaled therapy is widely used as mainstay treatment in chronic respiratory conditions, however the environmental impact of inhalers is rarely considered when prescribing inhalers. A recent BTS position statement “encourages all prescribers and patients to consider switching pMDIs to non-propellant devices whenever they are likely to be equally effective.” (1) Little is known about Patients’ or Physicians’ perspectives on making such a switch.

Methods A survey was carried out to assess the importance of three factors to consider, if changing to a different but equally effective inhaler – cost, carbon footprint and ease-of-use. Information about the typical costs and carbon footprints of inhalers was provided. 50 patients already using regular inhalers were randomly recruited via Respiratory Clinics at a district general hospital and Pulmonary Rehabilitation sessions. Responses were rated on a 5-point scale from not important to very important. The same survey was also completed by 50 medical professionals who regularly prescribe inhalers.

Results 80% of patients surveyed rated the ease-of-use as important or very important consideration when changing inhalers. The ‘cost’ and ‘carbon footprint’ of the inhaler were equally important to patients (3.4 out of 5); only 14% of patients indicated that carbon footprint was of no importance to them.

Abstract P280 Table 1 Comparison of the importance given by patients and physicians to consideration of cost, carbon footprint and ease-of-use when changing inhalers

<table>
<thead>
<tr>
<th>Importance Ranking</th>
<th>Score</th>
<th>Patient</th>
<th>Physician</th>
<th>Patient</th>
<th>Physician</th>
<th>Patient</th>
<th>Physician</th>
<th>Patient</th>
<th>Physician</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not important</td>
<td>1</td>
<td>12%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>8%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slightly important</td>
<td>2</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>18%</td>
<td>0%</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately important</td>
<td>3</td>
<td>32%</td>
<td>16%</td>
<td>34%</td>
<td>22%</td>
<td>12%</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important</td>
<td>4</td>
<td>22%</td>
<td>44%</td>
<td>16%</td>
<td>30%</td>
<td>16%</td>
<td>12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very important</td>
<td>5</td>
<td>26%</td>
<td>18%</td>
<td>28%</td>
<td>16%</td>
<td>64%</td>
<td>84%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important &amp; Very Important</td>
<td>4 &amp; 5</td>
<td>48%</td>
<td>62%</td>
<td>44%</td>
<td>46%</td>
<td>80%</td>
<td>96%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average (mean score out of 5)</td>
<td></td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
<td>3.2</td>
<td>4.3</td>
<td>4.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Physicians rated ease-of-use even higher than patients, with 96% deeming this as an important or very important factor. Physicians rated carbon footprint slightly less importantly (3.2) than cost (3.4) and also lower than patients rated carbon footprint. 14% of physicians thought that carbon footprint was of no importance.

Conclusions Patients and Physicians agree that ease-of-use is the most important factor when choosing a new inhaler. This appears to contradict the fact that overall patients make fewer errors using DPIs(2), while the majority of inhalers prescribed in the UK are pMDIs(3). The data suggests that patients rate carbon footprint more importantly than physicians. The carbon footprint of inhalers is an important factor for the majority of patients, which should encourage physicians to discuss this consideration with patients prior to commencing or changing inhalers.
**Innovation in service design**

**M1** ASSERTIVE OUTREACH FOR PERSISTENT FREQUENT ATTENDERS WITH COPD IN THE COMMUNITY: REDUCING ATTENDANCE BY MEETING THEIR UNMET PSYCHOLOGICAL NEEDS

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10.1136/thoraxjnl-2017-210983.423

**Introduction and Objectives** Co-morbid mental health problems in COPD can result in maladaptive and inappropriate utilisation of healthcare services (e.g., panic attacks cause attendance at A and E and acute hospital admission). Research evidence shows that COPD patients with co-morbid mental health problems have a higher rate of persistent A and E attendance and unplanned hospital admissions and on average incur an additional 80%–102% of medical treatment cost (Makek & Norris, 2008). Conventional models of mental health service provisions (e.g., Improving Access to Psychological Therapies (IAPT), secondary care mental health services) have proved ineffective in accessing and treating this subgroup of COPD patients. As such, there is a financial incentive for health services to develop more person-centred and cost-effective service models to address this issue. The current study investigates the effect of an Assertive Outreach Model of psychological interventions as applied to COPD patients with histories of frequent attendances to A and E and unplanned short-term hospital admissions. Attendance behaviours, depression and anxiety symptoms, and treatment costs were investigated.

**Methods** 19 COPD patients with persistently high attendance behaviours (i.e., three or more A and E attendances and/or two or more unplanned hospital admissions in a 12 month period) were identified from cross-referencing data from Electronic Patients Record (EPR) and the clinical knowledge of the community COPD team. They were then proactively engaged in an assertive outreach model within two weeks of identification, and offered four to 12 sessions of community-based psychological intervention during a 24 month period.

**Results** Compared to their 12 month pre-intervention baseline, a total reduction of 40% (n=56) A and E attendances and 33% (n=32) short-term inpatient admissions was seen which amounts to approximately £30 000 of cost savings on treatment per year. 16% (n=6) and 21% (n=8) of patients reported a significant reduction in their depression and anxiety.

**Conclusions** An Assertive Outreach model of psychological intervention for COPD and co-morbid mental health problems providing responsive community-based treatment is highly effective in reducing attendance behaviours, achieving cost-savings, and by implication improving quality of life. However, it does not significantly improve patients’ mental health symptoms which is likely due to the complex and multiple needs of this patient group.

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**M2** ADULT INTEGRATED RESPIRATORY CARE; STAFFING, POPULATIONS SERVED AND PATHWAYS OF CARE IN THE UK IN 2017


10.1136/thoraxjnl-2017-210983.424

**Introduction and objectives** NHS England has defined integrated care as services that are patient centred, coordinated and tailored to the needs and preferences of the individual, their carers and family. An integrated care service also is one that has moved away from episodic care to a more holistic approach to health. The aims of the British Thoracic Society (BTS) Models of Care Committee (MoCC) are to identify current integrated respiratory services, gain a better understanding of the models and components of integrated respiratory care and to share learning.

**Methods** An electronic survey was designed to determine workforce involvement, populations served and interventions offered by respiratory integrated services. This was emailed directly to all BTS members and via a link to Primary Care Respiratory Society-UK, Association of Chartered Physiotherapists in Respiratory Care and Association of Respiratory Nurse Specialists members.

**Results** 113 clinicians participated in the survey: 64 nurses, 29 consultants, 14 physiotherapists and 6 others. 59/113 (52%) reported working in an integrated service.

44 adult integrated respiratory care services were identified: Scotland (1), Northern Ireland (2), North of England (10), Midlands/East of England (12), London (10), South of England (9).

- 75% teams were consultant-led, 54% nurse-led and 27% physiotherapist-led
- All teams included nurses, 93% physiotherapists and 90% consultants
- 95% accepted patients with COPD, 72% bronchiectasis, 68% asthma, 61% interstitial lung disease
- A wide range of services were offered; see Table 1
- 65% described care co-ordination involving primary, secondary and community care
- 45% reported using a shared care record
- 50% offered a 7 day service.

**Conclusion** With at least 44 services across the UK in 2017, adult integrated respiratory care is already an established model of care, in particular, but not only for COPD in the UK. Leadership and delivery is largely by a respiratory nurse specialist, physiotherapist and consultant workforce. While a wide and varying range of services are offered, the majority focus on chronic disease management, pulmonary rehabilitation, oxygen therapy and advanced disease care. The Results from this survey will be used by the BTS MoCC to create a directory of integrated respiratory services as a resource for the respiratory community.
Methods

Our acute hospital’s spend on inhaled therapy is high, and was rising year on year. It is recognised that ‘stockpiling’ of inhaled therapy occurs, and that patients often don’t bring in their inhalers when admitted acutely. In October 2016 we drew up guidelines for our hospital pharmacists aiming to support them in safely deferring dispensing inhalers, allowing time for patients to arrange for inhalers to be brought in from home. We developed a flow chart, with posters displayed on the medical wards as reminders. In addition we encouraged pharmacists not to dispense a new type of inhalers, allowing time for patients to arrange for inhalers to be brought in from home. We developed a flow chart, with posters displayed on the medical wards as reminders. In addition we encouraged pharmacists not to dispense a new type of inhaler unless the patient had been assessed as able to use it by the Respiratory Nurse Specialist. From April 2016 we also started actively changing patients from high cost to lower cost devices, matching the local CCG prescribing incentive scheme for 2016–2017.

Results

Following the ‘Defer Dispensing’ programme there was a 28% reduction in spend on inhaled therapy and a 6.5% reduction in the number of items dispensed, (See Table). Using 2016–2017 figures the average cost of inhalers dispensed was £14.21, giving a saving of £10,757 related to reduced number of items dispensed. In the first 3 months of this year (2017–2018) there has been an additional 23% cost reduction compared to previous year’s equivalent time period and a 5.2% reduction in number of items dispensed.

Conclusion

There is scope to impact on respiratory pharmacy spend in acute trusts. This was achieved both by swapping to lower cost preparations, with ongoing benefit to the local health economy, plus a reduction in the number of items dispensed. We believe that there is potential for further savings by making dispensing of inhaled therapy a more robust process.

Abstract M2 Table 1

<table>
<thead>
<tr>
<th>Service offered</th>
<th>Response percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Disease Management</td>
<td>95%</td>
</tr>
<tr>
<td>Home visits</td>
<td>93%</td>
</tr>
<tr>
<td>Supported Discharge</td>
<td>88%</td>
</tr>
<tr>
<td>Telephone Review</td>
<td>86%</td>
</tr>
<tr>
<td>Admission Avoidance</td>
<td>81%</td>
</tr>
<tr>
<td>Multi-Disciplinary Team meetings</td>
<td>81%</td>
</tr>
<tr>
<td>Pulmonary Rehabilitation</td>
<td>88%</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>79%</td>
</tr>
<tr>
<td>Oxygen Assessment, Prescription and Review</td>
<td>79%</td>
</tr>
<tr>
<td>Breathlessness Support</td>
<td>75%</td>
</tr>
<tr>
<td>Anxiety Management</td>
<td>77%</td>
</tr>
<tr>
<td>Palliative Care</td>
<td>54%</td>
</tr>
<tr>
<td>End of Life Care</td>
<td>54%</td>
</tr>
<tr>
<td>Spirometry</td>
<td>88%</td>
</tr>
<tr>
<td>Case Finding</td>
<td>25%</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>15%</td>
</tr>
<tr>
<td>Smoking Cessation</td>
<td>52%</td>
</tr>
<tr>
<td>Management of Co-morbidities</td>
<td>61%</td>
</tr>
<tr>
<td>Medicines Reviews</td>
<td>65%</td>
</tr>
<tr>
<td>Intravenous Medication Services</td>
<td>6%</td>
</tr>
<tr>
<td>Diet and Nutritional Support</td>
<td>36%</td>
</tr>
<tr>
<td>Occupational Therapy</td>
<td>15%</td>
</tr>
<tr>
<td>Speech and Language Therapy</td>
<td>6%</td>
</tr>
<tr>
<td>Multi-professional Clinics</td>
<td>52%</td>
</tr>
<tr>
<td>Virtual Clinics</td>
<td>34%</td>
</tr>
<tr>
<td>Education of Generalists</td>
<td>68%</td>
</tr>
</tbody>
</table>

Abstract M3 Table 1

<table>
<thead>
<tr>
<th>Financial year</th>
<th>Spend on inhaled therapy</th>
<th>Change from previous year</th>
<th>Number of items dispensed</th>
<th>Change from previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014–2015</td>
<td>£1 91 460</td>
<td></td>
<td>11 233</td>
<td></td>
</tr>
<tr>
<td>2015–2016</td>
<td>£1 98 624</td>
<td>+£7 164</td>
<td>11 671</td>
<td>+438</td>
</tr>
<tr>
<td>2016–2017</td>
<td>£1 55 123</td>
<td>−£43 501</td>
<td>10 914</td>
<td>−757</td>
</tr>
</tbody>
</table>

M4 MEETING THE PSYCHOLOGICAL NEEDS OF COPD PATIENTS AND ENHANCING SELF-EFFICACY: INTEGRATING CLINICAL PSYCHOLOGY IN A COMMUNITY RESPIRATORY SERVICE

CSI Chan, L Graham, D Roots, M Hudson, S Sunak. Homerton University Hospital NHS Foundation Trust, London, UK

10.1136/thoraxjnl-2017-210983.426

Introduction and Objectives

An average of 40% of Chronic Obstructive Pulmonary Disease (COPD) patients suffer from clinical depression and anxiety disorders, at least twice as much as reported by the general population. In COPD patients, comorbid mental health problems significantly predict more frequent symptom exacerbation, inpatient admissions, poorer functional status and quality of life due to reduced self-care. Typically up to 50% of treated COPD patients reported improvements of depression and anxiety symptoms after psychological therapy. However, conventional mental health services (e.g., Improving Access to Psychological Therapies services) have experienced challenges in engaging, assessing, and treating this patient group. The current study explores the clinical outcomes of a psychology service integrated into the existing COPD management frameworks and pulmonary rehabilitation programs in the London Borough of City and Hackney; in particular its impact on patients’ access to psychological therapy, changes in mental health symptoms, quality of life and patient experiences of COPD.

Methods

Self-reported experience of mental health symptoms was measured by the Hospital Anxiety and Depression Scale (HADS). Changes in patient experiences including their perceived control and adjustment pre- and post-psychological interventions was measured by the COPD Patients-reported Experience Measure (COPD-PREME9).

Results

In the 12 months between April 2016 and March 2017, the integrated psychology service received referral for 122 and offered interventions for 108 COPD patients, a significant improvement from that reported by the local IAPT service. 52 out of 108 patients who completed treatment required home-based psychological interventions due to their physical needs and were unsuitable for IAPT services. 44% reported a significant improvement in their symptoms of...
anxiety and 38% with depression, comparable to the average recovery rate (41.6%) of physically healthy patients in London IAPT services during the same period. Overall 80% of patients showed significant improvement in their experience of their COPD, including their perceived control and adjustment to the condition.

Conclusions An integrated clinical psychology service offers significant advantage to traditional mental health services in improving service access, symptoms reduction, and improvement in self-reported quality of life of COPD patients.

VIRTUAL CLINICS FOR CHRONIC LUNG DISEASE–BREATHLESSNESS RAPID EVALUATION, ASSESSMENT, TREATMENT AND HEALTH EDUCATION (BREATHE); A NOVEL APPROACH TO BREATHLESSNESS IN STOCKPORT

J Cornwallis, S Purackee, A Ahmed, R Hassan, G Ng-Man-Kwong. Pennine Lung Service, Royal Oldham Hospital, Manchester, UK

10.1136/thoraxjnl-2017-210983.428

Introduction and Aims The virtual clinic (VC) was designed to identify and review patients with COPD diagnosis and/or FEV1 ≥50% predicted and/or on high dose inhaled corticosteroids (ICS) to recommend interventions to optimise care. Our study piloted VCs across 2 patient groups in primary care (PC) and under the care of our local integrated respiratory care service (IRCS). The aims were to identify patients who would benefit from national guideline based interventions such as modification of inhaler therapies, pulmonary rehabilitation (PR) and/or additional specialist advice.

Results VCs were undertaken in six PC health centres with GP and/or practice nurse and for IRCS group respectively. In total 161 patients were reviewed (PC group 94/161 (68%) and IRCS 67/161). Mean age 63 years (range 38–96), male 67/161 (42%), mean% predicted FEV1 51% (range 11–117). Overall 98/161 (60%) had potential change in inhaler therapy identified, PC 55/94 (59%) and IRCS 43/67 (64%) respectively (p=0.47 NS). 40/161 (25%) had recommendation to stop or wean ICS (PC 28/94 (30%) and IRCS 12/67 (18%, p=0.08 NS), 47/161 (29%) recommended referral for PR (PC 38/94 (40%) vs IRCS 9/67 (13%), p<0.01). For the PC group 22/94 (23%) were referred to IRCS and 3/94 (4%) were removed from COPD register. 8/161 (5%) were identified as potentially requiring HRCT investigation, 7/94 (7%) in the PC group.

Conclusion Virtual Clinics as part of an Integrated Respiratory Care Service can generate important treatment optimisations including inhaler modification in nearly two thirds (trial of ICS cessation in 25%) and PR referral in one third of reviews (significantly in the PC group). VCs confer patient benefit, support medicines management, PC training and education (including quality assurance) and effective and efficient use of specialist time.
Background Electronic clinician-to-clinician advice service (E-consultation) is a telehealth modality that enables the primary care clinicians to seek advice from specialists through a shared electronic system (Systm one). This is a mode of non-face-to-face consult and for less complex cases this service potentially reduces unnecessary clinic referrals and provides an efficient specialist input thus improving patient care. This was first piloted in NHS Yorkshire and Humber in 2012. In agreement with clinical commissioning group (CCG), our trust implemented this in March 2015 and we have evaluated the impact of this service.

Method We retrospectively reviewed all patients who had an e-consultation (March 2015 – January 2017). Patient demographics and clinical information were retrieved from systm one. The referral to clinician response time, content of the referrals, the outcome of the e-consultations and the cost analysis based on nationally agreed tariff (Respiratory treatment code- 340, £23 per e-consultation) was evaluated.

Results 324 patients (63+/-16 years, males- 54%) had an e-consultation. Clinicians completed these referrals in 3 days (IQR=1–7 days, range=0–32 days). The content of the e-consultations were classified under five domains- investigations (n=91, 28%), radiology (n=114, 35%), medications (n=32, 10%), miscellaneous (n=6, 2%) and mixed (n=81, 25%). 63% (n=204) of the referrals were initiated by the general practitioner, 25% (n=81)- practice nurses and 12% (n=39)- trainees. 32% (n=105) of the e-consultations were recommended for a formal clinic review. Since implementation, this service has generated over £70000 to the trust.

Discussion and conclusions This novel service is available for routine, non-urgent specialist advice only and is easy to access. This new approach does not seem to have a significant burden to our other ongoing clinical activities. It provides an opportunity to screen potential formal referrals and identifies the need for specific investigations prior to treatment. However a third of all e-consultations were recommended for a clinic review. Further discussion with the CCG is ongoing to improve the service by having a criteria led referrals and to promote training and awareness of this service.

REFERENCES
1. L.A. Care Health Plan 2012.
QUALITY IMPROVEMENT PROJECT: CAN WE IMPROVE RECORDING OF TARGET OXYGEN SATURATIONS AND PRESCRIBING ON A RESPIRATORY WARD IN ACCORDANCE TO NEW BRITISH THORACIC SOCIETY (BTS) OXYGEN GUIDELINES?

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Introduction The BTS advises target oxygen saturations of ≥94% for all adult patients excepting those at risk of hypercapnic respiratory failure – where oxygen should be restricted to achieve saturations of 88%–92%1. In the 2015 BTS audit however, although 14% of all UK inpatients received oxygen, only half of these patients had a prescription and 30% had oxygen delivered inappropriately.

Method and Objective We aimed to improve oxygen prescribing and setting of target saturations on drug charts with appropriately delivered and monitored oxygen therapy. Our main outcome measure was that “In 90% of cases, oxygen saturations recorded on nursing observation charts will match prescription on drug chart”. 15 patient records were sampled weekly from an acute respiratory ward over three months. Process measures were: i) Is oxygen prescribed on the drug chart? ii) Are target saturations recorded on the drug chart? 48 hour antibiotics review was the balancing measure. Five PDSA interventions took place; a) an educational announcement b) poster c) weekly email showing ward performance d) pharmacist prescription reviewing target ranges and e) displaying target saturations at patient bedsides.

Results Eleven cycles of data were collected. Of 165 medical case notes reviewed, the three most common respiratory conditions were COPD-35%, pneumonia-21% and lung cancer-11%. 22% had no respiratory condition as presenting complaint or previous history. On admission, 20% were hypercapnic on arterial blood gas. At baseline, only 46% of drug charts had completed oxygen prescriptions and 66% target saturations. Following PDSA interventions this peaked to 100%. Our outcome measure, do oxygen saturations on observation charts match target saturations on drug charts, improved to nearly 90% from initial baseline 53% (figure 1).

Conclusion This QIP has shown that simple interventions can improve oxygen prescribing and appropriate delivery, although our target of 90% is yet to be achieved. The PDSA intervention with the most positive effect on the outcome measure was sharing our improvements via email to the entire ward team. We aim to sustain these Results beyond this project with further PDSA interventions and implement these practices in other acute and general medical wards within the hospital.
**Abstract M9 Figure 1** Do oxygen saturations on observations chart match target saturations on drug chart?

**M10 DEMONSTRATING THE POTENTIAL ROLE OF COMMUNITY PHARMACISTS IN IMPROVING CARE OF COPD PATIENTS**


10.1136/thoraxjnl-2017-210983.432

**Introduction and Objectives** Although there is some realisation of the potential for community pharmacists to help patients manage their conditions, finding ways to demonstrate this potential to health professionals in different roles and sectors is not easy. We conducted a semi-quantitative analysis of support offered to COPD patients within normal limits of practice in community pharmacies, with the intention of sharing our findings as widely as possible. These findings subsequently formed the basis of an infographic that can be distributed in a variety of scenarios.

**Methods** The study, in NW London, involved 18 pharmacies. Over a 4 week period in February-March 2015, pharmacists undertook consultations in the pharmacy with consenting patients who were receiving medicines prescribed for COPD. Patients were asked questions from a semi-structured questionnaire. Information was collected and action taken to provide high value interventions and referral, where appropriate. The collected data were analysed and key findings identified for sharing in an infographic.

**Results** At the consultation, of 135 patients, 56% were provided with inhaler training, 65% were offered Medicines Use Reviews, 17% received guidance regarding rescue packs, 28% were referred to GPs and 82% of smokers (n=39) were referred to stop smoking services. 84% of patients had received prior flu vaccination. Areas of clinical concern identified included poor inhaler technique, poor familiarity with pulmonary rehabilitation services, higher than expected ICS use and medication or other issues requiring referral to GPs (28%). The ratio of men to women (1:0.7) was consistent with published data, but the ethnicity of patients did not match the pattern expected in the locality on the basis of Public Health and census information.

**Conclusions** The analysis yielded evidence of how community pharmacists can both assist in the management of individual patients with COPD, and provide a snapshot of support in a locality. Summarising this evidence as an infographic that can be distributed digitally, and at professional and educational meetings, may hasten recognition of the potential usefulness of this type of support and the value of community pharmacies as a resource. The approach will be applied to other conditions, subject to evaluation of effectiveness.

**M11 THE USE OF ASTHMA CARE BUNDLE PROFORMAS CAN IMPROVE QUALITY OF CARE IN ACUTE ASTHMA ADMISSIONS**

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10.1136/thoraxjnl-2017-210983.433

**Introduction** Despite the introduction of dedicated asthma services and targeted therapies, asthma exacerbations remain a common cause of hospital admission with significant utilisation of health care resources.

**Aim** To determine whether asthma care bundle proformas contribute to improved quality of care in adult patients admitted to Glenfield Hospital with an asthma exacerbation

**Method** Data collected at Glenfield hospital as part of the national BTS Adult Asthma audit in 2011 and 2012, prior to the introduction of asthma care bundles, was compared to data collected using a similar methodology in 2016, when both admission and discharge bundles had been introduced. The Results were analysed using Chi-squared Testing.

**Results** Asthma Care bundles were used in 64.4% of asthma admissions audited in 2016. When compared to 2011 and 2012, prior to the introduction of care bundles, there was a statistically significant increase in the proportion of patients having a documented peak flow on admission from 73.1% in 2011/2012 to 94.4% in 2016 (p=0.001). There was also an improvement in the frequency of inhaler technique assessment on discharge with an increase from 52.5% in 2011/2012 to
A UK SURVEY ON THE EXPERIENCES AND VIEWS OF RESPIRATORY NURSES (RNS) ON THEIR ROLE IN DELIVERING COGNITIVE BEHAVIOURAL THERAPY (CBT) FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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Background COPD is a progressive, irreversible condition. Anxiety and depression are two common, yet least treated co-morbidities, in COPD. RNs frequently encounter patients with distressing symptoms hence are ideally placed to address these. CBT delivered by RNs reduces symptoms of anxiety, depression, improves quality of life and is cost-effective.1 A UK-wide Delphi survey conducted with RNs in 2016–2017 identified that the topic of psychological interventions, including CBT, was ranked in the top five areas of care for future research.2

Aim To explore views of RNs on the importance of screening/providing integrated psychological treatment into routine care and the feasibility of undertaking education and training in CBT.

Method A UK-wide electronic survey was conducted to gather respiratory nurses views on the importance of addressing psychological well-being, current practice, feasibility of education and training in CBT from a personal and organisational perspective. The Results were collated and analysed.

Results Ninety-six responses were received.

The majority (58%) of respondents had 10 years’ experience in respiratory care and represented a diverse spread of regions across the UK. The Results are presented in Table 1.

Conclusions There is a clear recognition from RNs of the importance of screening respiratory patients for symptoms of anxiety/depression and undertake further education to deliver psychological treatment such as CBT. RNs with skills to address both physical and psychological symptoms of COPD may be more beneficial and acceptable to patients.

REFERENCES


Abstract M12 Table 1 Survey results

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>92%</td>
<td>RNs stated they should screen for symptoms of anxiety and depression.</td>
</tr>
<tr>
<td>78%</td>
<td>RNs stated they should help manage symptoms of anxiety and depression.</td>
</tr>
<tr>
<td>70%</td>
<td>RNs surveyed currently screen for symptoms of anxiety and depression.</td>
</tr>
<tr>
<td>51%</td>
<td>Those who screen refer to psychological services.</td>
</tr>
<tr>
<td>91%</td>
<td>RNs felt that they should be trained to identify psychological difficulties.</td>
</tr>
<tr>
<td>77%</td>
<td>RNs agreed they should be trained in CBT.</td>
</tr>
<tr>
<td>63%</td>
<td>RNs felt that support from management would be given to access training.</td>
</tr>
<tr>
<td>65%</td>
<td>RNs felt support to deliver CBT would be provided.</td>
</tr>
<tr>
<td>55%</td>
<td>RNs felt they would have capacity to deliver this service and 23% were unsure.</td>
</tr>
</tbody>
</table>

THE ROLE OF CLINICAL PSYCHOLOGY AND THE NUMBER OF HOSPITAL BED DAYS REQUIRED BY SEVERE ASTHMA PATIENTS

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Introduction Psychological difficulties can impact on disease severity through symptom under-reporting, medication adherence, clinic attendance, and patients having an active role in their care.1 When physical illness deteriorates, the emotional burden increases and disease management can be compromised.2 Psychological therapy can contribute to improved self-management, general adjustment, and the development of effective coping strategies potentially reducing the number of emergency hospital bed days.

Objectives To ascertain whether improving the emotional health of patients through psychological therapy, can reduce the number of bed days occupied by severe asthma patients.

Method The participants were patients within the Severe Asthma Service who were referred for psychological input. Following assessment and therapy completion, the number of hospital bed days were examined in the 12 months preceding this input, and compared to the number of bed days for up to 12 months following therapy.

Results The mean average number of hospital bed days in the 12 months preceding psychological therapy was 37.3 days compared to 11.5 days for a period of up to 12 months post-therapy. This demonstrates that post-psychological therapy, the number of required hospital bed days for exacerbations relating to severe asthma, reduced by approximately two thirds.

Conclusion The Results suggest that the number of patients who meet planned admissions has increased, and the number of emergency admissions between planned admissions has decreased. This demonstrates that clinical psychology can be effective in improving not only the psychological health of patients, but also the physical health of patients. The number of bed days post-psychological therapy was for a period of up to 12 months, however, the Results remain positive and encouraging and demonstrate the effectiveness of psychological therapy in the management of chronic illness.
REFERENCES

M14 UNDERSTANDING AND IMPROVING PARTICIPANTS’ EXPERIENCE OF HEALTH RESEARCH; PATIENT EVALUATION OF RESEARCH PARTICIPATION IN A DEDICATED RESPIRATORY BIOMEDICAL RESEARCH UNIT (BRU) CLINICAL RESEARCH FACILITY (CRF)

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Background It is increasingly recognised that incorporating patients’ views in trial development improves feasibility, satisfaction and efficiency in health research. To date, there is little research on the impact of institutional organisational factors on patients’ research experiences.

Aims To examine how organisational factors in our respiratory CRF impact on the research experience for patients, and to understand the factors influencing recruitment, retention and satisfaction. Through understanding these, we hope to incorporate patients’ views into trial implementation at our site, and suggest elements that may be transferable to other centres.

Methods A researcher independent from the CRF conducted semi-structured interviews. Patients were invited to participate on completion of one of three projects, selected to encompass different trial designs and include features previously proposed as controversial or challenging aspects of participation. A purposive, non-stratified cohort was used. Interviews were recorded, transcribed and analysed by constant comparative approach.

Results 25 subjects were interviewed; 17 with COPD, 4 OSA and 4 healthy volunteers. 16% had received their diagnosis within a week of parent-trial enrolment. 20% work fulltime. Patient satisfaction was high, although those newly diagnosed at parent-trial enrolment tended towards lower satisfaction and perceived their role differently. Factors motivating recruitment and retention were numerous and interlocked. Only four patients participated expecting direct health benefits. Communication, appointment flexibility and respect for time outweighed the effects of pain, fatigue and anxiety in patient retention. Social benefits of participation and feeling like a team player were important. The dedicated research facility made patients feel safer and the project was valued. Payment for participation was controversial. Reimbursement of expenses was necessary for our predominantly retired population. Transport provision was vital to breathless patients. Participation negatively impacted health perception for some.

Conclusions An appreciation of how participants perceive their role may aid targeting recruitment strategies. Staff must recognise that valuing patients’ time and making them feel like an integral team-player improves satisfaction and retention. Researchers should consider transport provision, appointment flexibility, physical environment and reimbursing expenses when resourcing trials. Healthcare professionals should be sensitive to the impact of trial participation on health-perception, particularly for those with progressive disease.

M15 PATIENT SATISFACTION IN A TERTIARY COUGH SERVICE

1J Haines, ¹H Badii, ¹B Al-Shekkly, ¹JA Smith. ¹North West Lung Centre, University Hospital of South Manchester, Manchester, UK; ²Division of Infection, Immunity and Respiratory Medicine, University of Manchester, Manchester, UK

10.1136/thoraxjnl-2017-210983.437

Abstract M15 Figure 1
Introduction Patient satisfaction surveys (PSS) can help identify ways of improving practice and facilitate better quality care. Patient opinion in health services research is integral but data from chronic cough populations is unknown. **Aim** To identify patient satisfaction in our tertiary cough service. **Methods** We devised a PSS containing 19 structured questions. Patients attending review consultations in two consecutive clinics were asked to consider completing the anonymous PSS. **Results** Fifty-two PSS were completed; an 84% response rate. Of those 43 had full responses for analysis (79% female, 58% ≥ 55 years in age). Patient satisfaction was extremely high (figure 1); 70% thought the care received was excellent and 95% were likely to recommend the service to friends and family. Improvement suggestions related to parking and appointment management. However 44% felt clinic locality was inconvenient, but the majority (63%) of those were not interested in Skype review consultations; response was unrelated to age. **Conclusion** To our knowledge, this is the first reported patient satisfaction data in chronic cough patients. Despite the refractory nature of the condition, patient satisfaction is extremely high. As a quarter of our service’s patients travel ≥25 miles, the inconvenience of clinic accessibility is not surprising. Nonetheless, patients appear to value face to face consultations and further patient consultation is required before utilising tele-health.

**M16** **THEIR POINT OF VIEW: PATIENT EXPERIENCE OF A DGH PLEURAL SERVICE**

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10.1136/thoraxjnl-2017-210983.438

Pleural disease constitutes a significant part of the workload on the respiratory unit but little information is recorded of the patient experience. We sought to record the experiences of our patients and look for ways to improve upon them. **Method** We provided a brief questionnaire to in-patients and day attenders using our pleural service and recorded breathlessness, pain and anxiety on a visual analogue scale. A follow up questionnaire was collected within two weeks to record post procedure dyspnoea and time to improvement. We recorded pre-procedure questionnaires in 29 patients and 24 pre and post procedure in total from patients undergoing a mixture of procedures. Twelve had intercostal chest drains, eleven underwent therapeutic aspiration and six had diagnostic aspiration. **Results** We found that patients undergoing intercostal drain insertion reported the greatest improvement in dyspnoea on visual analogue scale (65.8% reduction), compared with 38% reduction in patients undergoing therapeutic aspiration. Excluding the diagnostic aspiration cohort, 85% of patients reported an improvement of their breathlessness over minutes or hours. Pain scores were similar between the therapeutic aspiration and chest drain group with 45% and 50% of patients reporting moderate to severe pain. We found the therapeutic aspiration group tended to report greater pre-procedure anxiety than the chest drain group. 63% of patients in the therapeutic aspiration cohort reported moderate or severe pre-procedure anxiety, compared with only moderate or minor anxiety reported in the chest drain group. Fear of pain was particularly common in the therapeutic aspiration group. All patients reported feeling adequately prepared for the procedure. Despite this, when later asked how we could improve their experience four patients felt they would have liked more information about their procedure. **Conclusion** Our study demonstrates that chest drain insertion is superior for dyspnoea relief and causes similar discomfort levels to therapeutic aspiration. Anxiety is common, but worse in the therapeutic aspiration group. A desire for more information on pleural procedures was identified. **Outcome** We have introduced a patient information leaflet and have reviewed our anaesthetic and analgesia practice, and plan to repeat our questionnaire.

**M17** **PATIENT & CARER KNOWLEDGE OF PERSONALISED ASTHMA ACTION PLANS (PAAP)**

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10.1136/thoraxjnl-2017-210983.439

**Introduction** The National Review of Asthma Deaths (NRAD) and British Thoracic Society (BTS) guidance highlight the importance of patients with asthma having a PAAP. From ongoing local audit we know that over 90% of our clinic population are provided with a PAAP which is updated on at least a yearly basis. However, we do not have data to inform us if the patients/carers use their plan appropriately. **Method** A survey was conducted in a tertiary paediatric asthma clinic. The questionnaires were provided to parents and young adolescents with asthma whilst they were waiting for their appointment. There were specific yes/no and multiple choice questions as follows: location of paper plan, frequency of use, contacts and entities with access to plan, impression of unscheduled healthcare reduction and a direct question asking if digitalizing a personalised asthma plan would be useful. **Results** 55 questionnaires were completed. All but 1 patient were able to identify that they had a PAAP. The majority of individuals considered their PAAP useful (90%) and they all found it easy to follow. 67% of patients looked at their PAAP at least a monthly basis. 19 patients had not shared their PAAPs with other carers, whilst PAAPs had been shared with schools (30), grandparents (13) and childminder (2). Patients/carers perceived that knowledge of their PAAPs had helped to reduce unscheduled healthcare attendance (89%) and symptoms (49%); with 47% perceiving it had helped increase their peak expiratory flow rate (PEFR). 95% of all patients would prefer a PAAP in an electronic format. **Conclusion** In tertiary paediatric asthma clinic patients and their carers have good knowledge of their PAAP, use them regularly and share them with other care givers. They perceive that they do help improve asthma control and reduce exacerbations. Families would prefer their PAAP in an electronic format.
EXPLORING THE EXPERIENCES OF YOUNG PEOPLE TRANSITIONING FROM PAEDIATRIC TO ADULT ASTHMA SERVICES: A QUALITATIVE STUDY

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Introduction Adolescence presents many challenges for young people (YP) with chronic medical conditions, including the transition from paediatric to adult healthcare services. Improving provision for this age group is a National Health Service priority. Qualitative research is important to understand the priorities of YP and their families; data are available for YP with a variety of chronic childhood conditions, but lacking for asthmatics. This study explored the experiences of YP transitioning from paediatric to adult asthma services, identifying aspects of the process which could be improved.

Methods An interpretive, phenomenological approach was employed to identify emerging themes from individual semi-structured interviews, conducted between May-June 2017. Patients aged 16–19 years were eligible if they had transitioned from paediatric services in the previous 2 years. Parents and specialist asthma nurses were also included, facilitating triangulation of data. Interviews were transcribed verbatim and a coding-tree developed, using an inductive approach, with organisation of key issues into theme and sub-themes, illustrated by representative quotes.

Results Interviews were conducted with 5 YP (mean age 17.4 years), 4 parents and 2 asthma nurses. Four key themes emerged, with consistency between YP and their parents; developing new relationships, emergency admissions, increasing responsibility and long-term management (see Table 1). YP described positive, personal relationships with the adult team, accessibility of hospital staff, and greater involvement in discussions and decision making. Families also appreciated the direct communication style, and new treatment options available in the adult-setting. Emergency care, particularly the unfamiliar A and E environment, was the major source of anxiety for all participants.

Conclusion Despite expressing negative initial feelings, YP and their families talked positively about their new asthma team and the transition process. Increased opportunities to meet the adult team, while still in the paediatric setting would be appreciated and help establish a trusting relationship. Families appreciated the continuity of care provided by the asthma nurses from both teams. Information regarding the transition process, as well as the adult healthcare setting, may also help alleviate concerns. Additionally, a red-flag system in A and E could highlight priority patients, and instil confidence that the provision of acute care would be appropriate and timely.

DIFFERENCES IN PATIENT AND PHYSICIAN VIEWPOINTS OF THE MANAGEMENT OF IDIOPATHIC PULMONARY FIBROSIS (IPF)

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Introduction A majority of patients with IPF do not receive antifibrotic therapy with pirfenidone or nintedanib. We investigated viewpoints about IPF care and treatment amongst patients, and amongst physicians with a ‘watch and wait’ approach (WWP) or a proactive approach (PP).
Methods Participants from Europe and Canada took part in an online survey. Responses were collected from patients with IPF, and from physicians responsible for initiation of IPF treatment who had consulted with ≥5 patients with IPF within 3 months. A mixture of WWP (monitor for ≥4 months post-diagnosis in ≥50% of patients before initiating antifibrotic) and PP (initiate antifibrotic <4 months post-diagnosis in majority of patients) were recruited.

Results 43 patients and 254 physicians were surveyed between September and October 2016. Only 56% of patients felt that they received enough information at diagnosis: 58% were advised that IPF is progressive; 44% discussed prognosis; and 49% were told about treatment options. Although the majority of patients (93%) preferred to receive information from their physician, most patients sought additional information about IPF (86%), treatment (81%), and/or prognosis (76%). Most patients (86%) felt that the ability of antifibrotic treatments to slow IPF progression was more important than side-effect profiles. Overall, 86% of patients who had received antifibrotic therapy felt confident in managing side effects. WWP were less likely to discuss IPF prognosis than PP even when asked specifically by patients (Table). 62% and 38% of patients with ‘mild’ IPF were treated with an antifibrotic <4 months post-diagnosis by PP and WWP respectively. WWP were more concerned about treatment side effects than PP (28% vs 17%, respectively); PP were more concerned about disease progression than WWP (83% vs 72%, respectively).

Conclusions We identified a disparity between the information patients want at diagnosis and the information they receive from physicians. Furthermore, Results suggest that PP may be more confident with the benefit-risk profile of antifibrotic treatment than WWP. A belief in effective treatment options may aid conversation with patients regarding their IPF diagnosis, thereby enabling patients to make informed treatment decisions.

Abstract M19 Table 1 Differences between physicians regarding disease prognosis and treatment decisions

<table>
<thead>
<tr>
<th></th>
<th>WWP n=118</th>
<th>PP n=136</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mention typical IPF prognosis at diagnosis</td>
<td>47%</td>
<td>59%</td>
<td>0.001*</td>
</tr>
<tr>
<td>Will avoid discussing typical prognosis/life expectancy even when patient asks</td>
<td>51%</td>
<td>33%*</td>
<td>0.001*</td>
</tr>
<tr>
<td>Comfortable discussing IPF prognosis</td>
<td>21%</td>
<td>34%*</td>
<td>0.001*</td>
</tr>
<tr>
<td>Strongly believe they can make a big difference in IPF patients’ lives post-diagnosis</td>
<td>29%</td>
<td>45%*</td>
<td>0.001*</td>
</tr>
<tr>
<td>Agree that antifibrotic therapies significantly slow the progression of IPF</td>
<td>36%</td>
<td>51%*</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

Reasons for not treating patients with ‘mild’ IPF with an antifibrotic:

<table>
<thead>
<tr>
<th>Reason</th>
<th>WWP</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient is asymptomatic/has few symptoms</td>
<td>66%</td>
<td>36%*</td>
</tr>
<tr>
<td>Patient has stable disease</td>
<td>65%</td>
<td>33%*</td>
</tr>
<tr>
<td>Patient has good lung function</td>
<td>58%</td>
<td>38%*</td>
</tr>
<tr>
<td>Patient has a good quality of life</td>
<td>53%</td>
<td>27%</td>
</tr>
<tr>
<td>Patient has IPF that is progressing slowly</td>
<td>53%</td>
<td>26%*</td>
</tr>
</tbody>
</table>

*p<0.05 for PP vs WWP.

REFERENCE
Background Pirfenidone and Nintedanib have been approved by NICE with the aim of attenuating progression and extending the prognosis for patients with IPF. There are no indications as to which should be used first line.

Aim Because neither Pirfenidone nor Nintedanib are intended to be curative, to investigate the effects of either drug on patients’ quality of life, and to evaluate the patients’ perspectives on their use in the management of IPF as a whole.

Method 15 patients were monitored over an 8 month period, and a patient story was compiled. Forced vital capacity was monitored as an indicator of the drugs clinical efficacy (a rate of decline that did not exceed 10% in 12 months). Then the patients’ perspective on how treatment(s) affected their quality of life was evaluated; this included physical wellbeing, psychological wellbeing and any adversities associated with the drug(s). Weight was also monitored. Results were obtained through use of patient notes and verbal feedback during appointments.

Results In no case did a patient’s FVC decline greater than 10% in a 12 month period, suggesting Pirfenidone and Nintedanib were clinically effective in all cases. It was inconclusive what impact the drugs had on physical wellbeing, however both drugs improved patients’ psychological wellbeing. Pirfenidone was associated with profound weight loss, anorexia, rash, constipation, nausea, dyspepsia, migraine, cough, hypersomnia and altered taste. All patients receiving Pirfenidone experienced at least one side effect. All eight patients discontinued treatment due to adversities. Nintedanib was associated with diarrhoea, impaired liver function, weight loss, fatigue, anorexia, arrhythmia and epistaxis. 6 out of 13 patients discontinued treatment due to adversities, however other patients reported no adversities whatsoever.

Conclusions Although both drugs were considered clinically effective, Nintedanib was tolerated in the majority without impairing quality of life, indicating the benefits have the potential to outweigh its risks. However because 100% of patients discontinued Pirfenidone due to adverse effects, the question regarding whether the benefits outweigh its adversities ideally needs to be re-addressed on a larger scale. This study is therefore in favour of Nintedanib being used first line should larger studies reflect a similar outcome.

Abstract M21 Table 1 Treatment regimen of each patient involved in the study (this includes note of treatments that were discontinued).

<table>
<thead>
<tr>
<th>Reference</th>
<th>Gender</th>
<th>Treatment</th>
<th>Pulmonary Rehabilitation</th>
<th>Application for Transplant</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>♂</td>
<td>Pirfenidone</td>
<td>Rejected</td>
<td>Rejected</td>
</tr>
<tr>
<td>B</td>
<td>♂</td>
<td>Nintedanib</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>C</td>
<td>♂</td>
<td>Pirfenidone</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>D</td>
<td>♂</td>
<td>Nintedanib</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>E</td>
<td>♂</td>
<td>Pirfenidone</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>F</td>
<td>♂</td>
<td>Nintedanib</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>G</td>
<td>♂</td>
<td>Pirfenidone</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>H</td>
<td>♂</td>
<td>Nintedanib</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>I</td>
<td>♂</td>
<td>Pirfenidone</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>J</td>
<td>♂</td>
<td>Nintedanib</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>K</td>
<td>♂</td>
<td>Pirfenidone</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>L</td>
<td>♂</td>
<td>Nintedanib</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>M</td>
<td>♂</td>
<td>Pirfenidone</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>N</td>
<td>♂</td>
<td>Nintedanib</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
<tr>
<td>O</td>
<td>♂</td>
<td>Pirfenidone</td>
<td>Accepted</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Conclusions Telephoning patients prior to clinic was associated with a substantial reduction in DNAs, and identified individuals that could benefit from a targeted intervention around concordance. The health economics of the intervention need further evaluation.
**REFERENCE**


**M23** INTEGRATED RESPIRATORY CARE TRAINING FROM THE TRAINEE’S PERSPECTIVE: MIND THE GAP

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Introduction Postgraduate education needs to incorporate more training in community based settings for the ‘5 Year Forward View’ to become a reality. A BTS members survey in 2013 found 62% of respondents agreed integrated respiratory physicians added value, and a subsequent report identified that embedding integrated care into training would be key.1,2 We surveyed the views of respiratory registrars to understand the current national training opportunities available in integrated respiratory care.

Methods The BTS Models of Care committee designed and distributed a questionnaire to trainee members in May 2017. Results 81 trainees responded (43% male; 87% working full time). The sample was representative with responses from all but one region. 80% of trainees participating were ST5. 60% had not received any integrated respiratory care training and of those that had (figure 1); 29% described a single training episode (talk or clinic), 21% attended a one day session, 42% described regular training episodes, e.g., MDT and 2% had organised a placement themselves in an integrated care team for 1 week. 90% of trainees felt it would be beneficial to have more integrated care experience. Key themes identified included a lack of clear definition of integrated care and an appreciation of the increasing relevance of this training.

Challenges identified include lack of training opportunities and incorporation into an already full curriculum.

Conclusions Despite 90% of respondents wanting more experience and 77% considering, in part, some integrated respiratory work in their consultant job plan, only 40% had received any formal training of which 50% had only 1 day. This may be due in part to the ‘poor definition’ of integrated care which appears to be a persistent common theme. One of the future tasks of the BTS Models of Care Committee will be to provide guidance in developing and delivering programmes of training in Integrated care for Respiratory trainees.

REFERENCES


**M24** DO ANTIFIBROTICS IMPACT ON LUNG TRANSPLANTATION OUTCOMES IN IDIOPATHIC PULMONARY FIBROSIS?

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10.1136/thoraxjnl-2017-210983.446

Introduction Antifibrotics slow progression of forced vital capacity (FVC) in patients with moderate Idiopathic Pulmonary Fibrosis (IPF) (FVC 50%–80%).1,2 Lung transplantation (LTX) is also a management option in a small cohort of patients who meet stringent eligibility criteria. With increased
use of antifibrotics, questions remain about their safety in IPF patients undergoing LTx.

Methods All patients with multidisciplinary team (MDT) diagnosis of IPF that underwent lung transplantation from April 2013 to April 2017 were recruited from a single tertiary centre for ILD and lung transplantation. Retrospective data was obtained from medical notes. Statistical analysis was performed using chi squared test for categorical values and unpaired t-test.

Results 22 IPF patients (male 81.8%, female 18.2%) with mean age of 61.9 (+/-4.9) underwent single (n=16) and double (n=6) LTx. 15 (68%) received antifibrotics during the pre-transplantation period (pirfenidone n=14, nintedanib n=1) and 7 did not. Two patients actually had rheumatoid arthritis associated lung disease and were on immunosuppressant. Average waiting time for LTx was 7.0 months (+/-4.7 months). All patients on antifibrotics were on full dose, although 3 of them had a transient dose interruption at the start of their treatment with antifibrotics. Eight (36%) patients had complications post LTx, of which 4 died (antifibrotics, n=2) after the LTx due to multiple complications. 14 patients (64%) did not have complications at 3 months (antifibrotics n=10). There was no statistical significance between post-operative complication and age (p=0.6), gender (p=0.53) or antifibrotics use (p=0.67).

Conclusion Our data showed similar findings to a recent Belgian study that antifibrotics use prior to LTx does not impact on LTx outcomes or complications.

REFERENCES

Abstract M25 Table 1  Demographics of patient cohorts commencing anti-fibrotic therapy

<table>
<thead>
<tr>
<th></th>
<th>Whole Group</th>
<th>Tolerant cohort</th>
<th>Intolerant cohort</th>
<th>P-value</th>
<th>Intolerant weight loss cohort</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients (n)</td>
<td>137</td>
<td>84</td>
<td>53</td>
<td></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Mean age (SD), years</td>
<td>72.3 (7.64)</td>
<td>70.3 (7.63)</td>
<td>75.2 (6.62)</td>
<td>0.0003*</td>
<td>77.9 (5.34)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Mean starting FVC</td>
<td>73.7 (15.3)</td>
<td>73.1 (15.0)</td>
<td>74.5 (15.5)</td>
<td>0.61</td>
<td>70 (11.5)</td>
<td>0.31</td>
</tr>
<tr>
<td>% Predicted (SD)</td>
<td>27 : 72</td>
<td>25 : 73</td>
<td>30 : 70</td>
<td>0.55</td>
<td>29 : 71</td>
<td>0.75</td>
</tr>
<tr>
<td>Gender F:M%</td>
<td>25</td>
<td>12</td>
<td>13</td>
<td>0.17</td>
<td>1 (from intolerant cohort)</td>
<td>0.69</td>
</tr>
<tr>
<td>Mortality at 12 months (no. of patients)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
and nintedanib are licensed treatments but are only available at specialised centres. We have previously shown that patients whose local hospital was a prescribing centre (PC) were more likely to be receiving AFDs than those whose local hospital was not a prescribing centre (NPC).

**Objectives** We set out to test the hypothesis that this indicates differences in ability to travel or to seek specialist care which might be reflected in differences in indices of multiple deprivation (IMD).

**Methods** We obtained a full list of patients who received AFDs since 2013 and obtained their postcodes from hospital databases. We additionally obtained markers of socio-economic status based on the IMD score obtained from government websites. Data were recorded in January 2016 and July 2017 and compared with non-parametric statistics.

**Results** The number of patients per 100 000 population in each postcode area started on AFDs increased from a median (range) of 3.04 (0.15–15.86) in 2016 to 8.81 (1.16–33.87) in 2017 (p=4x10^{-4}). In both 2016 (p=0.0119) and 2017 (p=0.0089), there were more patients on AFDs per postcode area where the local hospital was a PC compared to a NPC. Looking at the distribution of IMD in 2017, there was a small difference (p=0.057) that did not appear fully to explain the difference in AFD prescriptions between PC and NPC.

**Conclusions** The NHS constitution requires equality in access to therapy regardless of where the patient lives. Although AFD prescriptions have increased significantly between 2016 and 2017, we have again demonstrated inequality of access to AFDs depending on patient location. These differences do not appear fully explained by differences in indices of multiple deprivation.


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M27  
**EFFECT OF PIRFENIDONE ON BREATHLESSNESS AS MEASURED BY THE UCSD-SOBQ SCORE IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS (IPF) WITH MODERATE LUNG FUNCTION IMPAIRMENT**

1MK Glassberg, 2M Wijnenbeek, 3F Gilberg, 4U Petzinger, 5K-U Kirchgaessler, 6C Albera. 1University of Miami Health System, Florida, US; 3Erasmus University Medical Centre, Rotterdam, Netherlands; 4F. Hoffman-La Roche Ltd, Basel, Switzerland; 5Accovion GmbH, Eschborn, Germany; 6University of Turin, Turin, Italy

10.1136/thoraxjnl-2017-210983.449

**Introduction** Treatment of IPF with pirfenidone slows disease progression as measured by changes in forced vital capacity (FVC), independent of baseline FVC values. In a previous analysis of patients with limited vs more advanced lung function impairment, increases in University of California, San Diego Shortness of Breath Questionnaire (UCSD-SOBQ) scores were more pronounced in patients with Gender Age Physiol-ogy index (GAP) stage II/III vs GAP stage I and in patients with baseline FVC <80% vs FVC ≥80%.1 We examined the effect of pirfenidone on UCSD-SOBQ in these subpopulations.

**Methods** 1247 patients in ASCEND (NCT01366209) and CAPACITY (NCT00287716; NCT00287729) were randomised to pirfenidone 2403 mg/d or placebo. Patients were stratified by GAP stage I vs stage II/III and by baseline% predicted FVC. The effect of pirfenidone on UCSD-SOBQ score was assessed by continuous and categorical changes from baseline over 12 months, and by multiples of the minimal clinically important difference of 5 points for UCSD-SOBQ.

**Results** Pirfenidone-treated patients with GAP stage II/III had higher UCSD-SOBQ scores after 12 months than those with GAP stage I (median increase from baseline: 9.4 vs 5.0; similar Results occurred with placebo (12.5 vs 4.3). GAP stage II/III patients treated with pirfenidone had less increase in median UCSD-SOBQ score at 12 months compared with those receiving placebo (9.4 vs 12.5; median difference 3.5, 95% CI −6.2−21; p=0.0161) with the curves diverging after 3 months (figure 1). Evaluation of categorical change for patients with GAP stage II/III demonstrated that pirfenidone reduced the proportion of patients with UCSD-SOBQ score increases of ≥15 points (45.6% vs 38.4%; p=0.0449) and ≥20 points (37.7% vs 28.6%; p=0.0089) at 12 months compared with placebo; increases of ≥5 points were similar between treatment groups. Results in patients with% FVC ≤80% were comparable to GAP stage II/III.

**Conclusions** In patients with IPF with moderate lung function impairment, pirfenidone reduced the progression of breathlessness compared with placebo. Patients receiving pirfenidone showed less change from baseline in UCSD-SOBQ score and a lower proportion of patients had more pronounced increases in UCSD-SOBQ scores at 12 months.

**Introduction**

Idiopathic pulmonary fibrosis (IPF) is characterised by a progressive loss of lung function. Intervention with an anti-fibrotic, such as pirfenidone, as early as possible in the disease course may be the most appropriate strategy to preserve lung capacity. In this analysis, data from the pivotal CAPACITY (004/006; NCT00287716/NCT00287729) trials and subsequent RECAP (012; NCT00662038) rollover trial were used to investigate the impact of deferring pirfenidone treatment on annual decline in lung function (forced vital capacity [FVC]) in patients with IPF.

**Methods**

The annual rate of lung function (FVC; mL) decline was calculated for all treated patients who completed CAPACITY and RECAP. Weeks 0–120 included all patients randomised in CAPACITY to pirfenidone 2,403 mg/day or placebo. Weeks 72–120 included data for the transition period, when patients either continued pirfenidone or switched to pirfenidone in RECAP. After Week 120, only data for patients in RECAP were included. Patients randomised to pirfenidone in CAPACITY were compared with those who received placebo in CAPACITY before initiating pirfenidone in RECAP.

**Results**

From Week 0 to 120, the annual rate of lung function decline (FVC) was $-142.0$ mL (n=345) in patients who received pirfenidone in CAPACITY and $-182.3$ mL (n=347) in those who received placebo. During the transition period (Weeks 72–120), these values were $-155.2$ mL (n=236) and $-151.9$ mL (n=249) in patients who continued and switched to pirfenidone, respectively. In RECAP (≥Week 120), the annual rate of lung function decline in patients who received pirfenidone in both trials was $-145.3$ mL (n=219) and $-140.9$ mL (n=218) in those who switched from placebo to pirfenidone.

**Conclusions**

These data show that loss of lung function during CAPACITY was not recovered during RECAP. Therefore, failure to initiate pirfenidone treatment in IPF as early as possible may lead to an irrecoverable loss of lung volume during the period without treatment.

**Funding**

F. Hoffmann-La Roche, Ltd./Genentech, Inc.

---

**REFERENCE**

FVC decline ≥10% pred in INPULSIS had higher mortality in INPULSIS-ON than patients with FVC decline <10% pred. Conclusion Independent of FVC decline in the first year, most patients had FVC decline <10% pred with continued nintedanib for a second year. FVC decline ≥10% pred over 1 year did not predict subsequent FVC decline, but was associated with higher mortality.

Please refer to page A261 for declarations of interest in relation to abstract M29.

Abstract M29 Table 1

<table>
<thead>
<tr>
<th>Absolute decline in FVC from baseline to week 52 of INPULSIS in patients treated with nintedanib (first year of treatment)</th>
<th>Outcome in the first year of INPULSIS-ON (second year of treatment)*</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10% predicted (n=383)</td>
<td>Absolute decline in FVC &lt;10% predicted¹</td>
<td>301  (78.6)</td>
</tr>
<tr>
<td></td>
<td>Absolute decline in FVC &lt;10% predicted¹</td>
<td>64  (16.7)</td>
</tr>
<tr>
<td></td>
<td>Death</td>
<td>18  (4.7)</td>
</tr>
<tr>
<td>≥10% predicted (n=47)</td>
<td>Absolute decline in FVC &lt;10% predicted¹</td>
<td>31  (66.0)</td>
</tr>
<tr>
<td></td>
<td>Absolute decline in FVC &lt;10% predicted¹</td>
<td>8  (17.0)</td>
</tr>
<tr>
<td></td>
<td>Death</td>
<td>8  (17.0)</td>
</tr>
</tbody>
</table>

¹Patients who discontinued INPULSIS-ON without having an absolute decline in FVC ≥10% predicted or having died were counted in the category "absolute decline in FVC <10% predicted". Includes patients with an increase, no decline, or an absolute decline in FVC >0% but <10% predicted in the first year of INPULSIS-ON.

M30

EFFECT OF DOSE REDUCTIONS AND/OR INTERRUPTIONS ON THE EFFICACY OF NINTEDA NIB IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS (IPF): SUBGROUP ANALYSIS OF THE INPULSIS TRIALS

1TM Maher, 2Y Inoue, 3AH Case, 4W Sakamoto, 5S Stowasser, 6WA Wayts. National Institute for Health Research Biomedical Research Unit, Royal Brompton and Harefield NHS Foundation Trust, and National Heart and Lung Institute, Imperial College, London, UK; 2Clinical Research Centre, National Hospital Organisation Kinki-Chuo Chest Medical Centre, Osaka, Japan; 3Piedmont Healthcare, Atlanta, Georgia, US; 4Nippon Boehringer Ingelheim Co. Ltd, Tokyo, Japan; 5Boehringer Ingelheim Pharma GmbH and Co. KG, Ingelheim am Rhein, Germany; 6Department of Respiratory Medicine, University Hospitals Leuven, Leuven, Belgium

10.1136/thoraxjnl-2017-210983.452

Introduction and Aim The efficacy and safety of nintedanib in patients with IPF were assessed in two replicate Phase III placebo-controlled INPULSIS trials. In both trials, nintedanib reduced disease progression by reducing decline in FVC. The recommended dose of nintedanib was 150 mg bid, but dose reductions to 100 mg bid and treatment interruptions were allowed for the management of adverse events. Following dose reduction, the dose could be re-escalated to 150 mg bid. We assessed whether dose reductions and/or treatment interruptions influenced the effect of nintedanib on reducing FVC decline.

Methods We assessed change from baseline in FVC (mL) at week 52 in subgroups of patients by their last dose (150 mg bid or 100 mg bid) and whether they had experienced a dose reduction and/or treatment interruption using pooled data from both INPULSIS trials. Patients who prematurely discontinued trial medication but had an FVC value at week 52 were included in the analysis. Analyses were descriptive and based on observed cases.

Results A total of 864 patients were included in the analysis (519 treated with nintedanib, 345 with placebo). Most (75%) patients did not have a dose reduction or treatment interruption. Mean (SD) changes from baseline in FVC at week 52 in subgroups by dose are shown in the Table. In patients who took nintedanib 150 mg bid as their last dose, absolute mean changes from baseline in FVC at week 52 were −118 mL and −90 mL in patients who did and did not have any prior dose reduction and/or treatment interruption, respectively. In patients who took nintedanib 100 mg bid as their last dose, mean change from baseline in FVC at week 52 was −74 mL. These changes were consistent with the decline in FVC observed in the whole nintedanib group (−89 mL).

Conclusion Pooled data from the INPULSIS trials show that decline in FVC was similar in patients treated with nintedanib irrespective of whether they had dose reductions and/or treatment interruptions. These Results suggest that the dosing regimen used in the INPULSIS trials was effective at reducing disease progression in patients with IPF.

Please refer to page A261 for declarations of interest in relation to abstract M30.

Abstract M30 Table 1

<table>
<thead>
<tr>
<th>Absolute change from baseline in FVC at week 52 by dose subgroups in INPULSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>All patients</td>
</tr>
<tr>
<td>Patients who did not have a dose reduction or treatment interruption</td>
</tr>
<tr>
<td>Patients who took 150 mg bid as last dose and had ≤1 dose reduction and/or treatment interruption</td>
</tr>
<tr>
<td>Patients who took 100 mg bid as last dose after ≥1 dose reduction and/or treatment interruption</td>
</tr>
</tbody>
</table>

M31

SAFETY OF COMBINED PIRFENIDONE AND NINTE DANIB IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS

1KR Flaherty, 2CD Fell, 3JT Huggins, 4H Nunes, 5R Sussman, 6C Valenzuela, 7U Petzinger, 8IL Stauffer, 9F Gilberg, 10M Bengus, 11M Wijnenbek, 12University of Michigan, Ann Arbor, US; 13University of Calgary, Calgary, Canada; 14Medical University of South Carolina, Charleston, US; 15Hôpital Avicenne, Paris, France; 16Atlantic Health System, Overlook Medical Centre, Summit, US; 17Hospital Universitario de La Princesa, Instituto de Investigación Princesa, Madrid, Spain; 18Clinipace-Accovion GmbH, Eschborn, Germany; 19Genentech Inc., South San Francisco, US; 20F. Hoffman-La Roche Ltd, Basel, Switzerland; 21Erasmus University Medical Centre, Rotterdam, The Netherlands

10.1136/thoraxjnl-2017-210983.453

Background Safety data on combined pirfenidone and nintedanib use are limited.

Methods A single-arm, open-label study (NCT02598193) assessed safety and tolerability of 24 weeks’ pirfenidone (1602–2403 mg/day) and nintedanib (200–300 mg/day) in patients with idiopathic pulmonary fibrosis (IPF) with forced vital capacity (FVC) ≥50% and diffusing capacity of the lung for carbon monoxide (DLco) ≥30%. Before initiating nintedanib, patients had received pirfenidone for ≥16 weeks and tolerated a stable dose.
EFFECT OF PIRFENIDONE ON ALL-CAUSE MORTALITY

The pivotal trials of the two approved therapies in IPF, pirfenidone and nintedanib, assessed patients with protocol-defined mild to moderate disease. The effect of pirfenidone in patients with more severe lung function impairment warrants further investigation. Pooled Results from ASCEND and CAPACITY studies (NCT01366209, NCT00287729 and NCT00287716) showed a significant reduction at 12 months in the risk of ACM (hazard ratio [HR], 0.52; 95% CI, 0.31, 0.87)1 and in decline of percent predicted FVC (%FVC; 14.8% vs. 26.3% patients with ≥10% decline in %FVC or death, p<0.0001)2 for patients treated with pirfenidone vs. placebo. We present pooled subgroup analyses from ASCEND and CAPACITY for patients with low baseline %FVC (<50%) and/or low percent predicted diffusing capacity for carbon monoxide (%DLCO <35%) to further inform on treatment effect of pirfenidone in patients with more severe lung function impairment.

Methods ACM was compared using the log-rank test, and HR was estimated using Cox regression. The categorical change in %FVC was summarised with the percent of patients with ≥10% absolute decline or death, and treatment comparison was performed using the rank ANCOVA method. Annual rate of FVC decline was estimated using the mixed-effects model. Results 170 patients (90 pirfenidone, 80 placebo) had low %DLCO (n=157) or %FVC (n=13) at baseline. Treatment with pirfenidone was associated with a 72% reduction in risk of ACM over 12 months vs. placebo (4 vs. 12 deaths; HR, 0.28; 95% CI, 0.09, 0.86; p=0.018; Table). There was a 56% relative reduction in the proportion of patients with a ≥10% absolute decline in %FVC or death at 12 months vs. placebo (18.9% vs. 42.5%; p=0.0038). The annual rates of FVC decline were 150 and 278 mL in the pirfenidone and placebo arms, respectively (p=0.003).

Conclusions Treatment with pirfenidone resulted in clinically meaningful benefits for ACM and FVC decline in patients with baseline %FVC <50% and/or %DLCO <35%. These data suggest that patients with more severe lung function impairment can also benefit from pirfenidone therapy.

REFERENCES

M32 EFFECT OF PIRFENIDONE ON ALL-CAUSE MORTALITY (ACM) AND FORCED VITAL CAPACITY (FVC) IN IDIOPATHIC PULMONARY FIBROSIS (IPF) PATIENTS WITH LOW FVC AND/OR LOW DLCO: ANALYSIS OF POOLED DATA FROM ASCEND AND CAPACITY

1SD Nathan, 1U Costabel, 3C Albera, 4KU Kirchgaessler, 5W Chou, 6PW Noble. 1Inova Fairfax Hospital, Falls Church, US; 2Ruhrlandklinik, University of Duisburg-Essen, Essen, Germany; 3University of Turin, Turin, Italy; 4F. Hoffmann-La Roche Ltd., Basel, Switzerland; 5Genentech Inc., South San Francisco, US; 6Cedars-Sinai Medical Centre, Los Angeles, US

10.1136/thoraxjnl-2017-210983.454
LONG-TERM EFFICACY OF NINTEDANIB IS MAINTAINED IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS (IPF) IRRESPECTIVE OF DOSE: SUBGROUP ANALYSIS OF INPULSIS-ON

Introduction and Aim
In the INPULSIS trials, nintedanib reduced the annual rate of decline in FVC versus placebo in patients with IPF (−113.6 versus −223.5 mL/year). Patients completing the 52 week treatment period could receive open-label nintedanib in an extension trial (INPULSIS-ON). Patients receiving nintedanib or placebo 150 mg bid at the end of INPULSIS received nintedanib 150 mg bid in INPULSIS-ON; patients receiving nintedanib or placebo 100 mg bid at the end of INPULSIS received nintedanib 100 mg bid or 150 mg bid in INPULSIS-ON, based on patient/investigator discussions. Dose reduction from 150 mg bid to 100 mg bid was allowed to manage adverse events; re-escalation to 150 mg bid was permitted. Our objective was to assess whether dose influenced the effect of nintedanib on FVC decline in INPULSIS-ON.

Methods
The annual rate of decline in FVC over 96 weeks in INPULSIS-ON was assessed in subgroups of patients by whether they were treated with nintedanib 150 mg bid only, 100 mg bid only, or both 150 mg bid and 100 mg bid. All available FVC measurements collected at time points between baseline and week 96 were used to calculate FVC decline. These analyses were descriptive and based on a data snapshot in October 2015.

Results
A total of 734 patients received nintedanib in INPULSIS-ON: 436 patients (59.4%) received nintedanib 150 mg bid, 53 patients (7.2%) received nintedanib 100 mg bid, and 245 patients (33.4%) received both doses. The annual rates of decline in FVC over 96 weeks were −116.4 (8.9) mL/year, −79.0 (30.1) mL/year, and −126.2 (11.4) mL/year in patients treated with nintedanib 150 mg bid, 100 mg bid, or both doses, respectively, and were consistent with the annual rate of decline in FVC over 96 weeks in all patients treated with nintedanib (−117.8 [6.8] mL/year).

Conclusion
Data from INPULSIS-ON demonstrated that the annual rate of decline in FVC was similar in patients treated with nintedanib 150 mg bid, 100 mg bid, or both doses. The long-term efficacy of nintedanib in reducing disease progression was maintained in patients with IPF who required dose adjustments to manage adverse events.

Please refer to page A262 for declarations of interest in relation to abstract M33.
conditions”; and MedDRA preferred terms “sudden death”, “cardiac death” and “sudden cardiac death”.

Results At baseline, 1107 (89.9%) patients (656 nintedanib, 451 placebo) had higher CV risk and 124 (10.1%) patients (67 nintedanib, 57 placebo) had lower CV risk. In patients with higher CV risk, incidence rates (95% CI) of MACE were 3.88 (2.58, 5.84) and 3.49 (2.10, 5.79) per 100 patient–years in the nintedanib and placebo groups, respectively. In patients with lower CV risk, incidence rates (95% CI) of MACE were 4.78 (1.54, 14.82) and 5.37 (1.73, 16.65) per 100 patient–years in the nintedanib and placebo groups, respectively.

Conclusion In pooled data from the TOMORROW and INPULSIS trials, the incidence of MACE was similar between the nintedanib and placebo groups in patients with higher CV risk at baseline and in patients with lower CV risk at baseline. Please refer to page A262 for declarations of interest in relation to abstract M34.
Declarations of Interest

S96 ESTABLISHING THE TRUE INCIDENCE OF HOSPITALISED COMMUNITY ACQUIRED PNEUMONIA (CAP) IN THE UK: A HOSPITAL EPISODE STATISTICS (HES) ANALYSIS

This research was sponsored by Pfizer.

J Campling, D Jones, G Ellsbur, C Czudek, and H Madhava are employees of Pfizer and have no conflicts of interest to declare.

M Slack has received personal fees from GSK, Pfizer, AstraZeneca and Sanofi Pasteur as a speaker at international meetings and as a member of advisory boards (outside the scope of the submitted work). She has also worked as a contractor for Pfizer. HES analyses were done by Harvey Walsh Health Informatics, and medical writing support was provided by Richard Watt at Sudler, both of which were funded by Pfizer.

S93 EFFECT OF LUMACAFTOR/IVACAFTOR ON TOTAL, BRONCHIECTASIS, AND AIR TRAPPING COMPUTED TOMOGRAPHY (CT) SCORES IN CHILDREN HOMOZYGOUS FOR F508DEL-CFTR: EXPLORATORY IMAGING SUBSTUDY

AS Brody reports personal fees from Vertex Pharmaceuticals during the conduct of the study.

S Nagle reports personal consulting fees from Vertex Pharmaceuticals during the conduct of the study; non-financial support from GE Healthcare (institution/department support).

C Hug, G Marigowda, D Waltz, L Wang are employees of Vertex Pharmaceuticals and may hold stock and/or stock options in the company.

J Goldin reports ‘other’ conflicts – Founder of MedQIA during the conduct of the study.

F Ratjen reports grants and personal fees from Vertex Pharmaceuticals, personal consulting fees from Novartis, Bayer, Roche, Genetech, and Prostestostasis.

S96 AN OPEN-LABEL EXTENSION (EXT) STUDY OF LUMACAFTOR/IVACAFTOR (LUM/IVA) THERAPY IN PATIENTS AGED 6 TO 11 YEARS WITH CYSTIC FIBROSIS (CF) HOMOZYGOUS FOR F508DEL-CFTR

M Chilvers and P Black have nothing to disclose.

S Tian, G Marigowda, M Bsharat, C Hug are employees of Vertex Pharmaceuticals and may hold stock and/or stock options in the company.

M Solomon reports involvement in clinical trials with Vertex Pharmaceuticals. (sponsored the clinical trial, no money directly to PI)

M Rosenfeld reports that her institution has received funding from Vertex Pharmaceuticals for research on which she is an investigator. She also has served as a consultant for Vertex Pharmaceuticals.

G Sawicki reports personal fees from Vertex Pharmaceuticals outside the submitted work. (advisory boards)

J Hoppe reports grant funding from the Cystic Fibrosis Foundation outside the submitted work.

P19 IMPACT OF MONTH OF INITIATION OF OMALIZUMAB ON TREATMENT OF SEVERE ALLERGIC ASTHMA, A SUB-ANALYSIS OF THE APEX II STUDY

R Niven has received an unrestricted grant of £10,000 from Novartis in 2010 towards development of clinical services at the University Hospital of South Manchester. He has run preceptorship programmes in 2015 and 2106. These programmes have resulted in payment to the University Hospital of South Manchester for amounts not exceeding £10,000. Dr Niven has also performed lecturing at Pharmacologically sponsored meetings for the following pharmaceutical companies in the last 3 years:- Astra Zeneca (<£1,000), Boehringer Ingelheim (<£2,000), Boston scientific (<£5,000) Chiesi (<£1,000), Novartis < £10,000, Napp (<£2,000), Teva (<£2,000). Dr Niven has sat on advisory boards for the following companies in the last 3 years, (Astra Zeneca, Boehringer Ingelheim, Boston scientific, Chiesi, GSK, Novartis Vectura and Teva), receiving reimbursement not exceeding £5,000 per company. Dr Niven has received sponsorship support to attend international academic meetings from Astra Zeneca, Boehringer ingelheim, Novartis, GSK, Chiesi and TEVA. Dr Niven, (or any members of his family) has no shares or any pecuniary interest in any pharmaceutical industry and has no share holdings or dividends and is not a paid consultant for any company.

D Saralaya has no conflicts of interest pertaining to this abstract.

R Chaudhuri has been a member of advisory board meetings for Novartis, AstraZeneca, GSK and Teva, been invited to international conferences by Novartis, Boehringer, AstraZeneca and Napp and received educational research grants from Novartis and Aerocrine.

M Masoli attended a Novartis advisory board meeting.

I Clifton has received honoraria from Novartis, and GSK. He has received travel grants to attend educational meetings from Novartis, GSK, Gilead and AstraZeneca.

AH Mansur has received personal and institutional payments for speaking, participation in advisory board meetings and other education activities from several pharmaceutical companies that include AZ, GSK, BI, Novartis, Teva, NAPP, Chiesi.

S Hollywood Employee at Novartis. This study was funded by Novartis, who participated in the study design, interpretation of data, and review and approval of the abstract.

S Mclain-Smith employee of pH Associates; carried out data analysis and provided medical writing support.

A Menzies-Gow has attended advisory boards for GlaxoSmithKline, Novartis, AstraZeneca, Boehringer Ingelheim, and Teva. He has received speaker fees from Novartis, AstraZeneca, Vectura, Boehringer Ingelheim, and Teva. He has received clinical trial funding from AstraZeneca and has participated in research with Hoffmann La Roche, GlaxoSmithKline, and Boehringer Ingelheim, for which his institution has
Declarations of Interest

been remunerated. He has attended international conferences with Napp and AstraZeneca and has consultancy agreements with AstraZeneca and Vectura.

**P69**

FUNCTIONALITY, RELIABILITY, AND PERFORMANCE OF AN ACCESSORIZED PRE-FILLED SYRINGE WITH HOME-ADMINISTERED SUBCUTANEOUS BENRALIZUMAB FOR ADULT PATIENTS WITH SEVERE ASTHMA

10.1136/thoraxjnl-2017-210983.464

AH Mansur: Received speaker fees and payment (including gifts or other consideration or ‘in kind’ compensation) through attending advisory board meeting to various companies including Novartis, Roche, AstraZeneca, NAPP, Bi; Received educational grants for service development from Novartis pharmaceuticals; Participated in Phase IIb and III clinical trials with AstraZeneca, Novartis, Roche;

GT Ferguson: Received consultancy fees from AstraZeneca, Boehringer Ingelheim, and Pearl Therapeutics; Served on board or advisory committee for AstraZeneca, Pearl Therapeutics, and Novartis; Received research support from AstraZeneca, Boehringer Ingelheim, Pearl Therapeutics, Sunovion, Novartis, and Theravance;

JS Jacobs: Speaker/Teacher for Shire, Teva; Clinical Investigator for CSL Behring, Genentech, Regeneron, Sanofi, Shire, and Teva; Acted on Advisory committee for CSL Behring, Pharming Group, and Regeneron; Served as Independent Contractor for Genentech, CSL Behring, Regeneron, and Teva;

J Hebert: Consultant: Novartis, Merck, Teva, CSL Behring, Baxter, Shire; Conference Speaker: Merck, Novartis, Shire, Meda, CSL Behring; Investigator in clinical trials: Merck, Novartis, Stallergenex, GSK, Boehringer Ingelheim, CSL Behring, DBV;

C Clawson: Employee of MedImmune; Holds stock in AstraZeneca;

W Tao: Employee of AstraZeneca;

Y Wu: Employee of AstraZeneca;

M Goldman: Employee of AstraZeneca.

**P26**

HOW DOES THE SALFORD LUNG STUDY IN COPD (SLS COPD) PATIENT POPULATION FIT INTO THE GOLD 2017 CLASSIFICATION GRID?

10.1136/thoraxjnl-2017-210983.461

J Vestbo: Honoraria from GSK, AstraZeneca, BL, Chiesi, and Novartis for consulting/presenting;

I Boucou: Employment and stock ownership (GSK);

L Frith: Employment and stock ownership (GSK);

N Dior Bakerly: Employing organisation provided IT support to automated data collection method for the SLS COPD trial. NDB received financial support to attend meeting in the form of non-restricting educational grants from GSK, Novartis, Astra Zeneca, and BI;

S Collier: Employment and stock ownership (GSK);

DA Leather: Employment and stock ownership (GSK);

JM Gibson: Employing organisation provided IT support for automated data capture collected during SLS COPD;

A Woodcock: Honoraria from GSK, Chiesi and Zambon.

**P27**

DEPRIVATION IN THE COPD SALFORD LUNG STUDY (SLS) IS ASSOCIATED WITH HIGHER HEALTHCARE COSTS BUT DOES NOT MODERATE THE MAIN OUTCOMES

10.1136/thoraxjnl-2017-210983.462

R Jones: Personal fees from AstraZeneca, Boehringer-Ingelheim, Chiesi, Cipla, GSK, Novartis and Pfizer;

A Nicholls: GSK employee, holds GSK shares;

D Browning: GSK employee;

N Dior Bakerly: Employing organisation provided IT support to automated data collection method for the SLS COPD and Asthma trials. NDB received financial support to attend meeting in the form of non-restricting educational grants from GSK, Novartis, Astra Zeneca and BI;

A Woodcock: Honoraria (GSK, Chiesi and Zambon);

J Vestbo: Honoraria from GSK, AstraZeneca, BL, Chiesi and Novartis for consulting/presenting;

D Leather: GSK employee, holds GSK shares.

**P63**

ESTABLISHING THE COST OF HOSPITALISED COMMUNITY ACQUIRED PNEUMONIA (CAP) IN THE UK: A HOSPITAL EPISODE STATISTICS (HES) ANALYSIS

10.1136/thoraxjnl-2017-210983.463

This research was sponsored by Pfizer.

J Campling, D Jones, G Ellsbury, C Czudek, and H Madhava are employees of Pfizer and have no conflicts of interest to declare.

M Slack has received personal fees from GSK, Pfizer, AstraZeneca and Sanofi Pasteur as a speaker at international meetings and as a member of advisory boards (outside the scope of the submitted work). She has also worked as a contractor for Pfizer. HES analyses were done by Harvey Walsh Health Informatics, and medical writing support was provided by Richard Watt at Sudler, both of which were funded by Pfizer.

**P198**

FENO AND BLOOD EOSINOPHILS AS BIOMARKERS IN PREDICTING ASTHMA EXACERBATIONS

10.1136/thoraxjnl-2017-210983.465

S Rastogi: Employee of AstraZeneca;

S Bosnic-Anticevich: Consultancy/lectures/advisory panels: AstraZeneca, GSK, TEVA, Boehringer Ingelheim, MEDA/MYLAN/Mundipharma;

I Pavord: Speaker’s honoraria for speaking at sponsored meetings from Astra Zeneca, Boehringer Ingelheim, Aerocrine, Almirall, Novartis, and GSK. He has received honoraria for attending advisory panels with Almirall, Genentech, Regeneron, Astra Zeneca, Boehringer Ingelheim, GSK, MSD, Schering-Plough, Novartis, Dey, Napp and Respivert. He has received sponsorship to attend international scientific meetings from Boehringer Ingelheim, GSK, Astra Zeneca and Napp.

A258

N Roche: Grants and personal fees from Boehringer Ingelheim, grants and personal fees from Novartis, personal fees from Teva, personal fees from GSK, personal fees from AstraZeneca, personal fees from Chiesi, personal fees from Mundipharma, personal fees from Cipla, grants and personal fees from Pfizer, personal fees from Sanofi, personal fees from Sandoz, personal fees from 3M, personal fees from Zambon, outside the submitted work.

D Halpin: Personal fees and non-financial support from Boehringer Ingelheim, personal fees from GSK, personal fees from AstraZeneca, personal fees from Pfizer, personal fees and non-financial support from Novartis, personal fees from Chiesi Pharmaceuticals & personal fees from Sandoz.

OS Usmani: Industry-academic funding from Boehringer Ingelheim, Chiesi, Edmond Pharma, GlaxoSmithKline, Mundipharma International, and has received consultancy or speaker fees from AstraZeneca, Boehringer Ingelheim, Chiesi, Cipla, Edmond Pharma, GlaxoSmithKline, Napp, Novartis, Mundipharma International, Pearl Therapeutics, Roche, Sandoz, Takeda, Vectura and Zentiva.

G Brusselle: Honoraria for lectures from AstraZeneca, Boehringer Ingelheim, Chiesi, GlaxoSmithKline, MSD, Novartis, Pfizer and UCB; he is a member of advisory boards for AstraZeneca, Boehringer Ingelheim, GlaxoSmithKline and Novartis.

S Wan Yau Ming: Employee of OPRI; OPRI did the analyses under contract and with funding from AstraZeneca.

S Halim: Employee of AstraZeneca

G Gopalan: Employee of AstraZeneca

D Price: Board Membership with Aerocrine, Amgen, AstraZeneca, Boehringer Ingelheim, Chiesi, Mylan, Mundipharma, Napp, Novartis, and Teva Pharmaceuticals; consultancy agreements with Almirall, Amgen, AstraZeneca, Boehringer Ingelheim, Chiesi, GlaxoSmithKline, Mylan, Mundipharma, Napp, Novartis, Pfizer, Teva Pharmaceuticals, and Theravance; grants and unrestricted funding for investigator-initiated studies (conducted through Observational and Pragmatic Research Institute Pte Ltd) from Aerocrine, AKL Research and Development Ltd, AstraZeneca, Boehringer Ingelheim, British Lung Foundation, Chiesi, Mylan, Mundipharma, Napp, Novartis, Pfizer, Respiratory Effectiveness Group, Teva Pharmaceuticals, Theravance, UK National Health Service, Vertex Pharmaceuticals; personal fees from Aerocrine, AstraZeneca, Boehringer Ingelheim, Chiesi, Cipla, GlaxoSmithKline, Kyorin, Mylan, Merck, Mundipharma, Novartis, Pfizer, Skypharma, and Teva Pharmaceuticals; payment for manuscript preparation from Mundipharma and Teva Pharmaceuticals; payment for the development of educational materials from Mundipharma and Novartis; payment for travel/accommodation/meeting expenses from Aerocrine, AstraZeneca, Boehringer Ingelheim, Mundipharma, Napp, Novartis, and Teva Pharmaceuticals; funding for patient enrolment or completion of research from Chiesi, Novartis, Teva Pharmaceuticals, and Zentiva; stock/stock options from AKL Research and Development Ltd which produces pharmaceuticals; owns 74% of the social enterprise Optimum Patient Care Ltd, UK and 74% of Observational and Pragmatic Research Institute Pte Ltd, Singapore; and is peer reviewer for grant committees of the Efficacy and Mechanism Evaluation programme, and Health Technology Assessment.

Declarations of Interest

P254 FEASIBILITY OF ULTRASHORT ECHO TIME (UTE) MRI TO EVALUATE THE EFFECT OF LUMACAFTOR/IVACAFTOR THERAPY IN CHILDREN WITH CYSTIC FIBROSIS (CF) HOMOZYGOUS FOR F508DEL

S Nagle reports personal consulting fees from Vertex Pharmaceuticals during the conduct of the study; non-financial support from GE Healthcare (institution/department support).

AS Brody reports personal fees from Vertex Pharmaceuticals during the conduct of the study.

J Woods reports personal consulting fees from Vertex Pharmaceuticals during the conduct of the study.

KM Johnson reports personal consulting fees Vertex Pharmaceuticals during the conduct of the study.

L Wang, G Marigowda, D Walcz, C Hug are employees of Vertex Pharmaceuticals and may hold stock and/or stock options in the company.

J Goldin reports ‘other’ conflicts – Founder of MedQIA during the conduct of the study.

F Ratjen reports grants and personal fees from Vertex Pharmaceuticals during the conduct of the study.

G Sawicki reports personal fees from Vertex Pharmaceuticals outside the submitted work. (advisory boards)

MW Konstan, E McKone, RB Moss reports personal consulting fees from Vertex Pharmaceuticals and institutional grant funding from Vertex Pharmaceuticals during the conduct of the study.

B Lubarsky and E Suthoff are employees of Vertex Pharmaceuticals and may hold stock and/or stock options in the company.

S Millar and D Pasta are employees of ICON Clinical Research, which was paid by Vertex Pharmaceuticals for providing analytical services on this project and which is paid by various pharmaceutical, biotechnology, and device companies for providing clinical research services.

N Mayer-Hamblett and CH Goss report institutional grant funding from Vertex Pharmaceuticals during the conduct of the study.

W Morgan reports grants from NIH/NHLBI, grants from NIH/NIAID, grants from Cystic Fibrosis Foundation, personal fees from Cystic Fibrosis Foundation, personal fees from University of Arizona, personal fees from American College of Chest Physicians, personal fees from American Thoracic Society, personal fees from Elsevier outside the submitted work.

P255 RATE OF LUNG FUNCTION DECLINE IN PATIENTS WITH CYSTIC FIBROSIS (CF) HAVING A RESIDUAL FUNCTION GENE MUTATION

G Sawicki reports personal fees from Vertex Pharmaceuticals outside the submitted work. (advisory boards)

MW Konstan, E McKone, RB Moss reports personal consulting fees from Vertex Pharmaceuticals and institutional grant funding from Vertex Pharmaceuticals during the conduct of the study.

B Lubarsky and E Suthoff are employees of Vertex Pharmaceuticals and may hold stock and/or stock options in the company.

S Millar and D Pasta are employees of ICON Clinical Research, which was paid by Vertex Pharmaceuticals for providing analytical services on this project and which is paid by various pharmaceutical, biotechnology, and device companies for providing clinical research services.

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W Morgan reports grants from NIH/NHLBI, grants from NIH/NIAID, grants from Cystic Fibrosis Foundation, personal fees from Cystic Fibrosis Foundation, personal fees from University of Arizona, personal fees from American College of Chest Physicians, personal fees from American Thoracic Society, personal fees from Elsevier outside the submitted work.
Declarations of Interest

P269  DESCRIBING ADHERENCE DATA IN A CLINICAL EFFECTIVENESS TRIAL: THE SALFORD LUNG STUDY IN COPD (SLS COPD)

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S Collier: Employment and stock ownership (GSK)
D Browning: Employment and stock ownership (GSK)
JP New: During the SLS COPD study, JPN received research funding towards post via NorthWest EHealth, Salford, UK
JM Gibson: Employing organisation provided IT support for automated data capture collected during SLS COPD
L Stephens: Employment and stock ownership (GSK)
N Diar Bakerly: NDB employing organisation provided IT support to automated data collection method for the SLS COPD trial. NDB received financial support to attend meetings in the form of non-restricting educational grants from GSK, Novartis, AZ, and BI.
J Fletcher: Employment and stock ownership (GSK)
J Crawford: Employment and stock ownership (GSK)

P270  IDENTIFICATION OF RESPONDER GROUPS TO FLUTICASONE FUROATE/VILANTEROL (FF/VI) IN THE SALFORD LUNG STUDY IN COPD (SLS COPD) USING A CLUSTER ANALYSIS MODEL

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A Nicholls: Employment and stock ownership (GSK)
N Diar Bakerly: Employing organisation provided IT support to automated data collection method for the SLS COPD trial. NDB received financial support to attend meeting in the form of non-restricting educational grants from GSK, Novartis, Astra Zeneca and BI
S Collier: Employment and stock ownership (GSK)
H Dickinson: Employment and stock ownership (GSK)
D Leather: Employment and stock ownership (GSK)
I Boucot: Employment and stock ownership (GSK)

P271  EFFECT OF EXTRAFINE SINGLE INHALER TRIPLE THERAPY ON LUNG FUNCTION AND USE OF RESCUE MEDICATION: RESULTS FROM THE TRINITY STUDY

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The research was funded by Chiesi Farmaceutici S.p.A.
M Scuri, I Montagna, C Francisco, G Cohuet, S Vezzoli, A Muraro and S Petruzzelli are employees of Chiesi Farmaceutici S.p.A.
J Vestbo has received honoraria from AstraZeneca, Boehringer-Ingelheim, Chiesi, GSK and Novartis.
D Singh has received honoraria from Apellis, AstraZeneca, Boehringer Ingelheim, Chiesi, Cipla, Genentech, GlaxoSmithKline, Glenmark, Johnson and Johnson, Menarini, Mundipharma, Novartis, Peptinnovate, Pfizer, Pulmatrix, Skypharma, Teva, Theravance and Verona.
M Corradi has received honoraria from Chiesi.
A Papi reports grants, personal fees, and/or reimbursement of travel expenses from AstraZeneca, Chiesi, Boehringer Ingelheim, GlaxoSmithKline, Menarini, Merck Sharp & Dohme, Mundipharma, Novartis, Teva, Sanofi, Zambon.

P272  IMPROVEMENTS IN EXACERBATION RATES WITH SINGLE INHALER TRIPLE THERAPY VERSUS DUAL ICS/LABA THERAPY IN PATIENTS WITH ADVANCED CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD): SUBGROUP ANALYSES OF THE PHASE III FULFIL STUDY

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N Brearley employee of GSK and holds stock options/shares
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C-Q Zhu employee of GSK and holds stock options/shares
GJ Criner received grants from US NIH and the Department of Defense, consulting from AstraZeneca, Boehringer Ingelheim, Holaira, Mereo, Third Pole, PnumRx, Pulmonx, Pearl, Amirall, CSA Medical, Broncus, AVISA, Lungpacer and GlaxoSmithKline; and contracted clinical trials from AstraZeneca, Avisa, Mereo, Boehringer Ingelheim, Broncus, GlaxoSmithKline, Lungpacer, Novartis, Pulmonx, PnumRx/BTG, and Yungjin
M Dransfield received grants from US NIH and the Department of Defense, consulting from AstraZeneca, Boehringer Ingelheim, Boston Scientific, Genentech, and GlaxoSmithKline; and contracted clinical trials from AstraZeneca, Boehringer Ingelheim, Boston Scientific, GlaxoSmithKline, Novartis, Pulmonx, PnumRx/BTG, and Yungjin
D Halpin received personal fees from GSK; personal fees and non-financial support from AstraZeneca; personal fees and non-financial support from Boehringer Ingelheim; personal fees and non-financial support from Novartis; personal fees from Pfizer; personal fees from Chiesi
DA Lomas received grants, honoraria, and consultancy fees from GSK and chaired the GSK Respiratory Therapy Area Board from 2012–2015
DA Lipson employee of GSK and holds stock options/shares

P273  ASSOCIATION OF INCIDENT PNEUMONIA AND EXACERBATIONS WITH EXTRAFINE TRIPLE THERAPY IN ONE SINGLE INHALER IN COPD PATIENTS: A POST-HOC ANALYSIS FROM TRILOGY AND TRINITY STUDIES

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J Vestbo has received honoraria from AstraZeneca, Boehringer-Ingelheim, Chiesi, GSK and Novartis.
D Singh has received honoraria from Apellis, AstraZeneca, Boehringer Ingelheim, Chiesi, Cipla, Genentech, GlaxoSmithKline, Glenmark, Johnson and Johnson, Menarini, Mundipharma, Novartis, Peptinnovate, Pfizer, Pulmatrix, Skypharma, Teva, Theravance and Verona.
M Corradi has received honoraria from Chiesi.
A Papi reports grants, personal fees, and/or reimbursement of travel expenses from Astrazeneca, Chiesi, Boehringer Ingelheim, GlaxoSmithKline, Menarini, Merck Sharp & Dohme, Mundipharma, Novartis, Teva, Sanofi, Zambon.

P275 COMPARING CLINICALLY RELEVANT IMPROVEMENT WITH UMECLIDINIUM/VILANTEROL AND TIOTRIPIUM/ OLODATEROL IN SYMPTOMATIC COPD: A RANDOMISED NON-INFERIORITY CROSSOVER TRIAL

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This study (204990 [NCT02799784]) was funded by GSK.
C Compton, AR Sousa, D Lipson, I Naya and S Patel are employees of GSK and hold stocks/shares in GSK.
L Tombs is a contingent worker on assignment at GSK.
G Feldman has no disclosures to declare.
B Alcázar Navarrete declares the following conflicts of interest: personal fees and non-financial support from Boehringer Ingelheim, Chiesi and GSK; grants, personal fees and non-financial support from Novartis AG and Laboratorios Menarini; and personal fees from Astra-Zeneca and Gebro. In addition, Dr. Alcázar Navarrete has a patent (P201730724) pending.

P276 CARDIOVASCULAR SAFETY OF EXTRAFINE SINGLE INHALER TRIPLE COMBINATION OF BECLOMETASONE DIPROPIONATE, FORMOTEROL FUMARATE, AND GLYCOPYRRONIUM BROMIDE IN COPD: RESULTS OF SAFETY ANALYSIS FROM THE TRILOGY AND TRINITY STUDIES

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J Vestbo has received honoraria from AstraZeneca, Boehringer-Ingelheim, Chiesi, GSK and Novartis.
D Singh has received honoraria from Apellis, AstraZeneca, Boehringer Ingelheim, Chiesi, Cipla, Genentech, GlaxoSmithKline, Glenmark, Johnson and Johnson, Menarini, Mundipharma, Novartis, Peptinnovate, Pfizer, Pulmatrix, Skypharma, Teva, Theraveance and Verona.
M Corradi has received honoraria from Chiesi.
A Papi reports grants, personal fees, and/or reimbursement of travel expenses from Astrazeneca, Chiesi, Boehringer Ingelheim, GlaxoSmithKline, Menarini, Merck Sharp & Dohme, Mundipharma, Novartis, Teva, Sanofi, Zambon.

M29 FVC DECLINE OVER 1 YEAR PREDICTS MORTALITY BUT NOT SUBSEQUENT FVC DECLINE IN PATIENTS WITH IPF

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L Richeldi reports grants and personal fees from Boehringer Ingelheim, during the conduct of the study; grants and personal fees from InterMune, personal fees from Medimmune, personal fees from Biogen-Idec, personal fees from Sanofi-Aventis, personal fees from Roche, personal fees from Takeda, personal fees from ImmuneWorks, personal fees from Shionogi, outside the submitted work.
M Kolb reports grants and personal fees from Boehringer Ingelheim, during the conduct of the study; grants and personal fees from Roche, grants and personal fees from Boehringer Ingelheim, personal fees from GSK, personal fees from Gilead, grants from Actelion, grants from Respicert, personal fees from Astra Zeneca, personal fees from Prometic, personal fees from Genoa, grants from Canadian Institute for Health Research, grants from Canadian Pulmonary Fibrosis Foundation, outside the submitted work.
A Azuma reports personal fees from Boehringer Ingelheim, outside the submitted work.
W Stansen, M Quresma and S Stowasser are employees of Boehringer Ingelheim.
B Crestani reports personal fees and non-financial support from astra-zeneca, grants, personal fees and non-financial support from boehringer ingelheim, non-financial support from cardif, non-financial support from lvi, personal fees and non-financial support from apelis, grants from medImmune, personal fees and non-financial support from sanofi, outside the submitted work.

M30 EFFECT OF DOSE REDUCTIONS AND/OR INTERRUPTIONS ON THE EFFICACY OF NINTEDANIB IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS (IPF): SUBGROUP ANALYSIS OF THE INPULSIS TRIALS

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T Maher reports that he is an investigator in an ongoing phase 2b study from Gilead, grants and personal fees from GSK, grants from Novartis, personal fees from Boehringer Ingelheim, personal fees from GSK, personal fees from InterMune, personal fees from Lanthio, non-financial support from Takeda, personal fees from Sanofi Aventis, grants and non-financial support from UCB, personal fees from Astra Zeneca, personal fees from Roche, personal fees from Bayer, personal fees from Biogen Idec, personal fees from Cipla, personal fees from DOsa, personal fees from ProMetic, personal fees from Galapagos, outside the submitted work.
Y Inoue personal fees from Boehringer Ingelheim, personal fees from Shionogi & Co., Ltd, personal fees from Asahi Kasei, personal fees from Novartis, personal fees from Nobel Pharma, outside the submitted work.
AH Case reports personal fees from Boehringer Ingelheim, outside the submitted work.
Declarations of Interest

W Sakamoto and S Stowasser are employees of Boehringer Ingelheim.
WA Wuys reports grants from Boehringer Ingelheim, grants from Roche, outside the submitted work.

B Crestani reports personal fees and non-financial support from astra-zeneca, grants, personal fees and non-financial support from boehringer ingelheim, non-financial support from cardif, non-financial support from lvl, personal fees and non-financial support from apelis, grants from medImmune, personal fees and non-financial support from sanofi, outside the submitted work.

M Kolb reports grants and personal fees from Boehringer Ingelheim, during the conduct of the study; grants and personal fees from Roche, grants and personal fees from Boehringer Ingelheim, personal fees from GSK, personal fees from Gilead, grants from Actelion, grants from Respivert, personal fees from Astra Zeneca, personal fees from Prometic, personal fees from Genoa, grants from Canadian Institute for Health Research, grants from Canadian Pulmonary Fibrosis Foundation, outside the submitted work.

B Wallaert: No conflict of interest

M Quaresma and W Stansen are employees of Boehringer Ingelheim.

L Richeldi reports grants and personal fees from Boehringer Ingelheim, during the conduct of the study; grants and personal fees from InterMune, personal fees from MedImmune, personal fees from Biogen-Idec, personal fees from Sanofi-Aventis, personal fees from Roche, personal fees from Takeda, personal fees from ImmuneWorks, personal fees from Shionogi, outside the submitted work.

I Noth reports grants and personal fees from Boehringer Ingelheim, grants and personal fees from Genentech, personal fees from ImmuneWorks, personal fees from Sanofi, outside the submitted work.

M Wijsenbeek reports an unrestricted research grant and speaker and advisory board fees from InterMune/Hoffman-La Roche, an unrestricted research grant and speaker and advisory board fees from Boehringer Ingelheim, speaker and advisory board fees from Galapagos, outside the submitted work.

M Kolb reports grants and personal fees from Boehringer Ingelheim, during the conduct of the study; grants and personal fees from Roche, personal fees from GSK, personal fees from Gilead, grants from Actelion, grants from Respivert, personal fees from Astra Zeneca, personal fees from Prometic, personal fees from Genoa, grants from Canadian Institute for Health Research, grants from Canadian Pulmonary Fibrosis Foundation, outside the submitted work.

F Bonella reports grants and non-financial support from Boehringer Ingelheim, grants and non-financial support from Roche, outside the submitted work.

L Moros and Dr Wachtlin are employees of Boehringer Ingelheim.

TJ Corte reports an unrestricted educational grant, speaker and advisory board fees from Boehringer Ingelheim, an unrestricted educational grant, speaker and advisory board fees from Roche, advisory board fees from Astra Zeneca, an unrestricted educational grant from Actelion, an unrestricted education grant from Bayer, an unrestricted educational grant from BMS, an unrestricted educational grant from Sanofi, outside the submitted work.
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Symptomatic treatment of patients with severe COPD (FEV₁ <50% predicted normal) and a history of repeated exacerbations, who have significant symptoms despite regular therapy with long-acting bronchodilators.

Fostair® NEXThaler 100/6 can be used with the AeroChamber Plus® spacer. In adult asthma where use of an inhaled corticosteroid/long-acting beta₂-agonist (ICS/LABA) combination is appropriate: patients not adequately controlled on ICS and ‘as needed’ (prn) short-acting beta₂-agonist, or patients already adequately controlled on both ICS and LABA. ICS/LABA combination is appropriate patients not adequately controlled on ICS and ‘as needed’ (prn) short-acting beta₂-agonist, or patients already adequately controlled on both ICS and LABA.

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Warnings and precautions:
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