BRITISH THORACIC SOCIETY

Quality Standard for

Pulmonary Rehabilitation

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On behalf of the British Thoracic Society

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British Thoracic Society Quality Standard for Pulmonary Rehabilitation

The British Thoracic Society (BTS) has a long history of supporting the delivery and development of pulmonary rehabilitation in the United Kingdom. The Society published the first pulmonary rehabilitation guideline in 2013[1] which was accompanied by a statement on quality standards in 2014[2].

In 2023, a revised BTS clinical statement was published[3], which acknowledged that much of the guidance from the 2013 Guideline remains relevant, but also reflected new topics of interest and the emerging literature base.

This Quality Standard document is aligned but complementary to the BTS clinical statement and assists in the dissemination and implementation of good clinical practice points. A Quality Standard is a set of specific statements that

- act as a benchmark for the delivery of evidence based, high quality, clinically effective care.
- are developed from the best available evidence.

This document comprises Quality Standards to be used across all services providing pulmonary rehabilitation regardless of the location of the programme (community, primary or secondary care). and supersedes the previous BTS Quality Standards for Pulmonary Rehabilitation published in 2014[2].

The purpose of the document is to provide commissioners, service providers and individuals with a guide to the minimum standards of care that participants attending pulmonary rehabilitation should expect, together with measures of good practice. These standards will inform the National Respiratory Audit Programme (Pulmonary Rehabilitation workstream) and in turn form the basis for the standards for the Pulmonary Rehabilitation Services Accreditation Scheme supported by the Royal College of Physicians.

The BTS Quality Standards are intended for

- Healthcare professionals managing and providing a pulmonary rehabilitation service to support decisions about delivering high quality care based upon the best available evidence.
- Service users, to allow them and carers to understand what timely high-quality care should look like.
- Commissioners, to have a framework to confidently facilitate contracting high quality and effective programmes.
- The National Audit Programme (NRAP – Pulmonary Rehabilitation) to support national data collection and development of key performance indicators to support national benchmarking and quality improvement initiatives.
- The Pulmonary Rehabilitation Services Accreditation Scheme to support the evidence statements embedded in the scheme.

Method of Working

The British Thoracic Society convened a Pulmonary Rehabilitation Quality Standard Working Group in May 2024, with the following membership:

Name	Role/Location/Relevant affiliations
Professor Sally Singh (Co-chair)	Pulmonary and Cardiac Rehabilitation, Leicester
Professor William Man (Co-chair)	Consultant Chest Physician, London
Ms Maria Buxton	Consultant Respiratory Physiotherapist, Hertfordshire
Dr Enya Daynes	Respiratory Physiotherapist, Leicester
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Dr Claire Nolan	Senior Lecturer in Physiotherapy, London
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Dr Thomas Ward	Respiratory Specialist Registrar, Leicester
Dr Jane Watson	Consultant Respiratory Nurse, London

Members of the group submitted declaration of interest forms aligning with BTS policy. Forms are available on request from the BTS Head Office.

The draft document was submitted to the SOCC committee in December 2024. Subsequently the document was posted on the BTS website for public consultation between XXXX and XXXX.

Following feedback and further revision the document was submitted to the BTS SOCC on XXXXX 2024 for final approval. The quality standard document will be reviewed in XXXXX or following the publication of an updated statement.

How to use this quality standard?

This quality standard is made of the following elements:

- Three fundamentals of pulmonary rehabilitation that all services should have in place to deliver high-quality care.
- A set of six quality statements to help improve the quality of pulmonary rehabilitation, with information on how to measure progress i.e. quality measures.

Fundamentals of a high-quality pulmonary rehabilitation service

Pulmonary rehabilitation services should ensure that the following three fundamentals are in place, in order to deliver high-quality care and continuous quality improvement. These relate to workforce, operational policy and audit and are set out in more detail below.

Fundamental 1: Workforce

A high-quality pulmonary rehabilitation service should have a skilled, competent multidisciplinary workforce, led by a registered healthcare professional with cardio-respiratory and pulmonary rehabilitation expertise

What this means in practice

- a **local competency framework** and systems should be in place to assess, evidence, record and maintain staff competencies (evidence of all aspects of pulmonary rehabilitation, including the assessment (QS3) and exercise prescription and progression).
- **service leads** have sufficient **sessional time** for service delivery, management and leadership
- pulmonary rehabilitation **assessments and sessions** are supervised by competent staff.
- there should be a **minimum of two staff present at a supervised rehabilitation session**, one of whom should be competent to deal with the deteriorating respiratory patient (e.g. a qualified registered healthcare professional with cardio-respiratory experience or staff qualified to provide immediate or advanced life support).
- **commissioners** should ensure that pulmonary rehabilitation providers are **adequately resourced** to allow time for management, staff training and professional development.

Fundamental 2: Operational Policy

A high-quality pulmonary rehabilitation service should have a documented operational policy, which governs the delivery of its service on a day-to-day basis.

What this means in practice

- a **documented operational policy** should be in place to govern the day-to-day delivery of the pulmonary rehabilitation programme

- the agreed operational policy should set out **core domains** such as: leadership, strategy and management; service delivery including referral management; patient-centred care; risk and safety; clinical effectiveness; staffing and quality improvement, innovation and transformation.
- the operational policy should ensure **staffing levels and working environments are safe** and that agreed procedures to deal with adverse events are followed.
- the operational policy should be **responsive to and reflective of their local population**.
- **commissioners** should ensure that pulmonary rehabilitation are **adequately resourced** to deliver a high-quality service in line with the agreed operational policy.

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Fundamental 3: Audit

A high-quality pulmonary rehabilitation service should conduct an annual audit of individual outcomes and patient experience, and regularly monitor and publish key organisational metrics.

What this means in practice

- **systems** should be in place to facilitate the **recording and audit** of individual clinical outcomes and process metrics, including: time from referral to assessment and enrolment, adherence and completion/graduation.
- **patient experience** should be assessed at least annually and feedback used for quality improvement.
- **reasons for non-uptake or non-completion** of pulmonary rehabilitation by patients, should be captured.
- pulmonary rehabilitation programmes should **benchmark** their clinical outcomes, patient reported experience measures and key organisational metrics against **national audit data.**
- systems should be in place **to regularly engage with commissioners** regarding using clinical outcomes, patient experience and key organisational metrics.
- commissioners should ensure **adequate resources** are available to facilitate service participation in local and national audits.

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Source references for the Fundamentals of a high-quality pulmonary rehabilitation service	BTS Clinical Statement on pulmonary rehabilitation.[3] Pulmonary Rehabilitation Services Accreditation Scheme Standards[20] NHS England Pulmonary Rehabilitation commissioning standards[21] NHS England Guidance for growing and developing the pulmonary rehabilitation multidisciplinary team[22]

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Quality Statements for Pulmonary Rehabilitation

The following six quality statements are designed to help improve the quality of pulmonary rehabilitation and build upon the fundamentals of high-quality service outlined above. Each one sets out an action to be implemented alongside indicators to measure performance over time. There is no specific order of priority associated with the list of quality statements.

Summary of Quality Statements

1) All individuals with symptomatic chronic respiratory disease (including COPD, Asthma, Bronchiectasis and Interstitial Lung Disease) should be offered pulmonary rehabilitation
2) Individuals referred for post-exacerbation pulmonary rehabilitation should be enrolled within 30 days of discharge from hospital after an acute exacerbation of COPD (AECOPD).
3) All individuals eligible for pulmonary rehabilitation should receive a multi-system assessment, including a validated measure of exercise capacity.
4) All eligible individuals referred for pulmonary rehabilitation should have the opportunity to access directly supervised, centre-based pulmonary rehabilitation
5) Individuals who decline or cannot undergo supervised centre-based pulmonary rehabilitation should be offered an evidence-based alternative model of delivery
6) Individuals completing PR should be provided with a co-designed individualised, structured, written plan for ongoing exercise maintenance.

Quality Statement 1 - Referral

Quality statement	All individuals with symptomatic chronic respiratory disease (including COPD, Asthma, Bronchiectasis and Interstitial Lung Disease) should be offered pulmonary rehabilitation.
Quality measure	**Structure:** • Evidence of local pulmonary rehabilitation services providing pulmonary rehabilitation for all individuals with symptomatic chronic respiratory disease (COPD, Asthma, Bronchiectasis, Interstitial Lung Disease (ILD) including those with severe respiratory disability (Medical Research Council Dyspnoea scale 5). • Evidence that pulmonary rehabilitation providers offer timely, accessible and high-quality services. **Process:** • Proportion of pulmonary rehabilitation services with publicly available information about referral pathway and eligibility criteria. •Proportion of pulmonary rehabilitation services offering pulmonary rehabilitation for symptomatic chronic respiratory disease, including those without COPD such as Asthma, Bronchiectasis, ILD. •Proportion of referred individuals with Medical Research Council Dyspnoea Scale 5 enrolled into pulmonary rehabilitation. • Proportion of accepted individuals enrolled within 90 days of receipt of referral. **Numerator 1** • Number of pulmonary rehabilitation programmes who offer pulmonary rehabilitation for symptomatic individuals with chronic respiratory disease including COPD, asthma, bronchiectasis or ILD **Denominator 1** • Number of pulmonary rehabilitation programmes nationally **Numerator 2** • Number of individuals with severe respiratory disability (Medical Research Council Dyspnoea Scale 5) accepted for pulmonary rehabilitation **Denominator 2**

	• Number of individuals with severe respiratory disability (Medical Research Council Dyspnoea Scale 5) referred for pulmonary rehabilitation **Numerator 3** • Number of accepted individuals commencing within 90 days of receipt of referral **Denominator 3** • Number of individuals referred for pulmonary rehabilitation who are accepted for treatment
Description of what the quality statement means for each audience	**Service Provider:** • Ensure local referrers are aware of inclusion and exclusion criteria and how to refer for pulmonary rehabilitation • Ensure individuals with severe respiratory disability are not excluded from pulmonary rehabilitation • Provide a timely service so that all appropriate referrals are enrolled within 90 days of receipt of referral **Healthcare Professional:** • Ensure pulmonary rehabilitation is offered to all eligible individuals. • Ensure that referral for pulmonary rehabilitation has been discussed with individuals prior to referral. **Commissioners:** • Ensure services are adequately resourced to meet the pulmonary rehabilitation demand for symptomatic individuals with COPD, asthma, bronchiectasis and ILD. • Ensure that pulmonary rehabilitation services have the resources to enrol individuals within 90 days of receipt of referral. **People with symptomatic chronic respiratory disease**: • Are offered pulmonary rehabilitation if clinically indicated and are provided with information about services in their area including location of sites, class dates and travel information.
Relevant existing indicators	BTS Clinical Statement on Pulmonary Rehabilitation (2023)[3]

	BTS Guideline on Pulmonary Rehabilitation (2013)[1]
Other possible national data sources	National Respiratory Audit Programme: Pulmonary Rehabilitation workstream and COPD workstream Quality Outcome Framework
Source references	McCarthy B et al. Pulmonary rehabilitation for chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2015;**2015**(11):ED000107[4] Lee AL, Hill CJ, McDonald CF, et al. Pulmonary rehabilitation in individuals with non-cystic fibrosis bronchiectasis: a systematic review. Arch Phys Med Rehabil 2017;98:774–82.[5] Dowman L, Hill CJ, May A, et al. Pulmonary rehabilitation for interstitial lung disease. Cochrane Database Syst Rev 2021;2:CD006322.[6] Feng Z, Wang J, Xie Y, et al. Effects of exercise-based pulmonary rehabilitation on adults with asthma: a systematic review and meta-analysis. Respir Res 2021;22:33.[7]
Rationale	• There is a large disparity between the number of individuals eligible for pulmonary rehabilitation and the number receiving Pulmonary Rehabilitation. • Referrers (and potential service-users) need to be educated about the benefits of pulmonary rehabilitation, eligibility criteria and local referral pathways. • Pulmonary rehabilitation services need to provide equity of access, including for those with severe respiratory disability (Medical Research Council Dyspnoea Scale 5). • Systematic reviews have demonstrated that exercise training, compared with control interventions, significantly improves exercise capacity and health elated quality of life in Asthma[7], Bronchiectasis[5] and Interstitial lung disease[6].

137 **Quality Statement 2 - Post-hospitalisation pulmonary rehabilitation**

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Quality statement	Individuals referred for post-hospitalisation pulmonary rehabilitation should be enrolled within 30 days of discharge
Quality measure	**Structure:** • Evidence of local pathways for referring individuals to pulmonary rehabilitation after hospitalisation with AECOPD. • Evidence that pulmonary rehabilitation programmes can enrol individuals within 30 days of referral after hospitalisation with AECOPD. • Evidence that pulmonary rehabilitation programmes reoffer pulmonary rehabilitation to individuals who decline the initial offer of post-hospitalisation pulmonary rehabilitation. **Process:** • Proportion of all referrals for post-hospitalisation pulmonary rehabilitation. • Proportion of individuals accepted for post-hospitalisation pulmonary rehabilitation are enrolled within 30 days of discharge. • Proportion of pulmonary rehabilitation programmes with a formal pathway for reoffering pulmonary rehabilitation to individuals who initially decline post-hospitalisation pulmonary rehabilitation **Numerator 1** • Number of referrals for pulmonary rehabilitation after hospitalisation for an AECOPD **Denominator 1** • Number of all referrals for pulmonary rehabilitation **Numerator 2**

	• Number of individuals accepted for post-hospitalisation pulmonary rehabilitation enrolled within 30 days of referral **Denominator 2** • Number of individuals accepted for post-hospitalisation pulmonary rehabilitation **Numerator 3** Number of pulmonary rehabilitation programmes with a formal pathway for reoffering pulmonary rehabilitation to individuals who initially decline post-hospitalisation pulmonary rehabilitation **Denominator 3** • Number of pulmonary rehabilitation programmes nationally
Description of what the quality statement means for each audience	**Service Provider:** • Liaise closely with acute hospital teams to establish smooth referral pathways for post-hospitalisation pulmonary rehabilitation. • Ensure systems are in place to enrol individuals for post-hospitalisation pulmonary rehabilitation within 30 days of referral. **Healthcare Professional:** • Provide timely post-hospitalisation pulmonary rehabilitation (within 30 days of referral). • Reoffer pulmonary rehabilitation to individuals who initially decline offer for post-hospitalisation pulmonary rehabilitation. **Commissioners:** • Ensure there are sufficient resources to allow timely (within 30 days) enrolment of individuals for post-hospitalisation pulmonary rehabilitation, and to allow re-offer of post-hospitalisation pulmonary rehabilitation to individuals who initially decline offer.

	People hospitalised for an AECOPD: • Are offered pulmonary rehabilitation on discharge and enrolled within 30 days.
Relevant existing indicators	BTS Guideline on Pulmonary Rehabilitation in Adults 2013[1] BTS Clinical Statement on Pulmonary Rehabilitation 2023[3] Pulmonary Rehabilitation for Adults with Chronic Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline[8]
Other possible national data sources	National Respiratory Audit Programme: Pulmonary Rehabilitation workstream and COPD workstream NHS England Best Practice Tariffs for COPD
Source references	BTS Guideline on Pulmonary Rehabilitation in Adults, 2013[1] BTS Clinical Statement on Pulmonary Rehabilitation 2023[3] Pulmonary Rehabilitation for Adults with Chronic Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline[8] Jenkins AR, Burtin C, Camp PG, Lindenauer P, Carlin B, Alison JA, Rochester C, Holland AE. Do pulmonary rehabilitation programmes improve outcomes in patients with COPD posthospital discharge for exacerbation: a systematic review and meta-analysis. Thorax. 2024 Apr 15;79(5):438-447[9] Güell-Rous M-R, Morante-Vélez F, Flotats-Farré G, et al. Timing of pulmonary rehabilitation in readmitted patients with severe chronic obstructive pulmonary disease: a randomized clinical trial. COPD 2021;18:26–34[10] Wageck B, Cox NS, Lee JYT, et al. Characteristics of pulmonary rehabilitation programs following an exacerbation of chronic obstructive pulmonary disease: a systematic review. J Cardiopulm Rehabil Prev 2021;41:78–87[11] Kjærgaard JL, Juhl CB, Lange P, et al. Early pulmonary rehabilitation after acute exacerbation of COPD: a randomised controlled trial. ERJ Open Res 2020;6:00173-2019[12] Barker RE, Kon SS, Clarke SF, Wenneberg J, Nolan CM, Patel S, Walsh JA, Polgar O, Maddocks M, Farquhar M, Hopkinson NS, Bell D, Wedzicha JA, Man WD. COPD

	discharge bundle and pulmonary rehabilitation referral and uptake following hospitalisation for acute exacerbation of COPD. Thorax. 2021 Mar 2;76(8):829–31[13]
Rationale	• The BTS Guideline on PR recommended that individuals hospitalised for AECOPD should be offered PR at hospital discharge to commence within 30 days of discharge[1]. • An updated Cochrane review demonstrated that post-hospitalisation pulmonary rehabilitation was associated with reduced hospital admissions, and improved exercise capacity and health related quality of life[9]. • Rehabilitation started within 30 days after hospitalisation yielded better overall results than rehabilitation started during the hospital admission[10]. • 'Delayed' PR following a hospital admission is still associated with benefits and therefore PR should be reoffered to individuals who initially decline a referral for post-hospitalisation PR [12]. • People hospitalised for AECOPD are more likely to be referred for and enrol for pulmonary rehabilitation when approached by practitioners involved with pulmonary rehabilitation delivery[13]. Referrers and patients should be well-informed about the benefits of pulmonary rehabilitation and local referral pathways.

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142 **Quality Statement 3 - Assessment**

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Quality statement	All individuals eligible for pulmonary rehabilitation should receive a multi-system assessment, including a validated measure of exercise capacity.
Quality measure	**Structure:** Evidence of individuals receiving a multisystem assessment, including a validated measure of exercise capacity. **Process:** • Proportion of individuals receiving a multi-system assessment including a validated measurement of exercise capacity. • Proportion of individuals who undergo core outcomes assessments (exercise capacity, breathlessness, health-related quality of life, lower limb muscle strength and patient knowledge or mastery) at the start and after completion of a pulmonary rehabilitation programme. **Numerator 1** • Number of individuals receiving a multisystem assessment including a validated measure of exercise capacity. **Denominator 1** • Number of individuals attending initial assessment for pulmonary rehabilitation **Numerator 2:** • Number of individuals undergoing core outcomes assessments (exercise capacity, breathlessness, health related quality of life, lower limb muscle strength and patient knowledge) at the start and after completion of a pulmonary rehabilitation programme. **Denominator 2:** • Number of individuals attending the initial assessment for pulmonary rehabilitation

Description of what the quality statement means for each audience	**Service Provider:** • Ensure assessments are multi-system and face-to-face, including as a minimum, a validated measurement of exercise capacity, and core outcomes of breathlessness, health-related quality of life, lower limb muscle strength and patient knowledge. • Ensure that outcome measures are conducted in line with recommended guidance and technical standards[14]. • Ensure the programme venue has facilities, equipment and space to conduct the necessary assessments. **Healthcare Professional:** • Healthcare professionals have relevant competencies to perform a multi-system assessment. • Healthcare professionals understand that an initial validated measurement of exercise capacity and lower limb muscle strength provides the basis for individualised aerobic and resistance exercise prescription. **Commissioners:** • Ensure the pulmonary rehabilitation programme encompasses a face-to-face initial and discharge assessment in addition to the programme, irrespective of the programme model. • Ensure the pulmonary rehabilitation programme is adequately resourced to deliver a structured, multi-system, face-to-face assessments including as a minimum exercise capacity, breathlessness, health-related quality of life, lower limb muscle strength and patient knowledge. **Individuals attending pulmonary rehabilitation.** • Undergo a multi-system, face-to-face assessment including as a minimum a validated measurement of exercise capacity, and core outcomes of breathlessness, health-related quality of life, lower limb

	muscle strength and patient knowledge or mastery at the initial and discharge assessments.
Relevant existing indicators	BTS Clinical Statement on Pulmonary Rehabilitation 2023[3] BTS Guideline on Pulmonary Rehabilitation in Adults 2013[1] An official European Respiratory Society/American Thoracic Society technical standard: field walking tests in chronic respiratory disease 2014[14]
Other possible national data sources	National Respiratory Audit Programme: Pulmonary Rehabilitation workstream and COPD workstream
Source references	BTS Clinical Statement on Pulmonary Rehabilitation (*Man, William, et al. "British thoracic society clinical statement on pulmonary rehabilitation." Thorax 78.Suppl 5 (2023): s2-s15*)[3] BTS Guideline for Pulmonary Rehabilitation in Adults (*Bolton, Charlotte E., et al. "British Thoracic Society guideline on pulmonary rehabilitation in adults: accredited by NICE." Thorax 68.Suppl 2 (2013): ii1-ii30*)[1] Holland AE, Spruit MA, Troosters T, Puhan MA, Pepin V, Saey D, McCormack MC, Carlin BW, Sciurba FC, Pitta F, Wanger J, MacIntyre N, Kaminsky DA, Culver BH, Revill SM, Hernandes NA, Andrianopoulos V, Camillo CA, Mitchell KE, Lee AL, Hill CJ, Singh SJ. An official European Respiratory Society/American Thoracic Society technical standard: field walking tests in chronic respiratory disease. Eur Respir J. 2014 Dec;44(6):1428-46.[14]
Rationale	• The initial assessment provides an opportunity perform a multi-system assessment to determine suitability and safety for pulmonary rehabilitation and facilitate exercise prescription. • The initial assessment can help identify individuals who might benefit from cost-effective interventions (vaccination, smoking cessation) or those with treatable traits (cardiovascular disease, hypoxaemia, unintentional weight loss, frailty, anxiety, and depression). • Core outcomes document the efficacy of the different components of pulmonary rehabilitation. These include exercise capacity, breathlessness, health-related quality of life and lower limb muscle strength. As yet, there are no validated outcomes

	to assess the “education” component of pulmonary rehabilitation and therefore measures of patient knowledge or patient mastery can be used as surrogates.

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147 **Quality Statement 4 - The Pulmonary Rehabilitation Programme**

Quality statement	All eligible individuals referred for pulmonary rehabilitation should have the opportunity to access directly supervised, centre-based pulmonary rehabilitation
Quality measure	**Structure:** • Evidence that directly supervised, centre-based pulmonary rehabilitation is the primary offer for eligible individuals referred for pulmonary rehabilitation. • Evidence that pulmonary rehabilitation services deliver individually prescribed aerobic and resistance training with progression plans. • Evidence that pulmonary rehabilitation services deliver a comprehensive structured programme of education in line with content set out in the BTS Pulmonary Rehabilitation Guideline. • Evidence that centre-based pulmonary rehabilitation programmes are a minimum six weeks duration with twice-weekly supervised sessions. **Process:** • Proportion of pulmonary rehabilitation services that provide directly supervised, centre-based pulmonary rehabilitation as their primary offer. • Proportion of individuals enrolling in directly supervised, centre-based Pulmonary Rehabilitation. • Proportion of pulmonary rehabilitation programmes delivering individually prescribed aerobic and resistance exercise programme with progression plans. • Proportion of pulmonary rehabilitation services delivering a comprehensive structured programme of education. • Proportion of centre-based pulmonary rehabilitation programmes that are a minimum six weeks duration with twice-weekly supervised sessions

	Numerator 1: • Number of pulmonary rehabilitation programmes that provide directly supervised, centre-based Pulmonary Rehabilitation as their primary offer **Denominator 1:** • Number of pulmonary rehabilitation programmes nationally **Numerator 2:** • Number of individuals enrolled on a directly supervised, centre based Pulmonary Rehabilitation programme **Denominator 2:** • Number of individuals undergoing initial assessment for pulmonary rehabilitation **Numerator 3:** Number of Pulmonary Rehabilitation programmes delivering individually prescribed and progressed aerobic and resistance exercise training **Denominator 3:** • Number of pulmonary rehabilitation programmes nationally **Numerator 4:** Number of pulmonary rehabilitation programmes delivering a comprehensive structured education programme as part of all pulmonary rehabilitation delivery models **Denominator 4:** • Number of pulmonary rehabilitation programmes nationally **Numerator 5:** • Number of pulmonary rehabilitation programmes offering a programme of at least 6 weeks duration and at least twice weekly supervised sessions (excluding initial and end of programme assessments) **Denominator 5:** • Number of pulmonary rehabilitation programmes nationally

Description of what the quality statement means for each audience	**Service provider:** • Ensure that the programme delivers directly supervised, centre-based pulmonary rehabilitation that includes core components outlined in the BTS Clinical Statement on Pulmonary Rehabilitation. • Ensure there is suitable access to facilities to deliver directly supervised, centre-based pulmonary rehabilitation. • Ensure that the programme provides individually prescribed and progressed programme of aerobic and resistance exercise. • Ensure that the programme provides a comprehensive structured education programme. This should be adapted for individuals with cardio-respiratory disease other than COPD. **Healthcare professionals:** • Ensure directly supervised, centre based pulmonary rehabilitation is the primary offer for individuals referred for pulmonary rehabilitation. • Provide individually prescribed and progressed aerobic and resistance exercise training. **Commissioners:** • Commission pulmonary rehabilitation services that incorporate the core components outlined in the BTS Clinical Statement on Pulmonary Rehabilitation, and are equipped to deliver directly supervised centre-based pulmonary rehabilitation as the primary offer. **Individuals referred to pulmonary rehabilitation are:** • Offered directly supervised, centre-based pulmonary rehabilitation to all people referred. • Receive an individualised written aerobic and strength programme. • Offered a structured comprehensive programme of education.

Relevant existing indicators	BTS Guideline on Pulmonary Rehabilitation 2013[1] BTS Clinical Statement on Pulmonary Rehabilitation 2023[3]
Other possible national data sources	National Respiratory Audit Programme (Pulmonary Rehabilitation Workstream)
Source references	BTS Guideline on Pulmonary Rehabilitation in Adults, 2013[1] BTS Clinical statement on Pulmonary Rehabilitation, 2023[3] McCarthy B, Casey D, Devane D, et al. Pulmonary rehabilitation for chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2015;2015:CD003793[4] ACSM's Guidelines for Exercise Testing and Prescription, 11th edition Roberts, N., Kidd, L., Kirkwood, K., et al A systematic review of the content and delivery of education in pulmonary rehabilitation programmes 2018[15]
Rationale	• Directly supervised, centre-based pulmonary rehabilitation is the preferred delivery model as it is supported by a convincing evidence base. • Large body of evidence demonstrating that aerobic and resistance training result in clinically meaningful improvements in whole body endurance and strength respectively. • Exercise prescription and progression should follow FITT (Frequency, Intensity, Time, and Type) principles of exercise training. • A structured and comprehensive programme of education is an integral and essential component of pulmonary rehabilitation. • The education should be delivered by professionals competent in the relevant subject areas. • The BTS Pulmonary Rehabilitation Guideline provides a list of recommended education topics. • The optimal duration of pulmonary rehabilitation programmes has not been established but benefits

	are observed for programmes with duration of at least 6 weeks. • Published pulmonary rehabilitation studies have included a minimum of twice weekly supervised sessions. Based on results from UK trials, a third prescribed session per week is recommended[16 17] but can be performed unsupervised for practical reasons.

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156 **Quality statement 5 - Alternative Models**

Quality statement 5	Individuals who decline or unable to undergo supervised centre-based pulmonary rehabilitation should be offered an evidence-based alternative delivery model
Quality measure	**Structure:** Evidence of local arrangements to ensure all individuals who are eligible for pulmonary rehabilitation but are unable to attend a directly supervised, centre-based programme are offered an alternative, evidence-based pulmonary rehabilitation model **Process:** • Proportion of pulmonary rehabilitation programmes that offer an evidence-based alternative delivery model for those unable to attend a directly supervised, centre-based programme. • Proportion of people enrolling in an alternative delivery model of pulmonary rehabilitation. **Numerator 1:** • Number of pulmonary rehabilitation programmes that provide an evidence-based alternative delivery model of Pulmonary Rehabilitation for those who decline or who cannot undergo supervised, centre-based pulmonary rehabilitation **Denominator 1:** • Number of pulmonary rehabilitation programmes nationally **Numerator 2:** • Number of individuals enrolled in an evidence based alternative delivery model of Pulmonary Rehabilitation **Denominator 2:** • Number of individuals accepted for pulmonary rehabilitation
Description of what the quality statement means for each audience	**Service providers** • Provide a menu of alternative pulmonary rehabilitation delivery models for individuals who

	decline or cannot undergo directly supervised, centre-based pulmonary rehabilitation. **Healthcare professionals** Offer individuals, who decline or cannot undergo centre-based pulmonary rehabilitation, an evidence-based alternative pulmonary rehabilitation model. Ensure alternative delivery models includes core components outlined in the BTS Clinical Statement on Pulmonary Rehabilitation[3]. **Commissioners**: Ensure that commissioned pulmonary rehabilitation services are able to deliver both directly supervised, centre-based pulmonary rehabilitation and alternative evidence-based models of pulmonary rehabilitation delivery.
Relevant existing indicators	BTS Guideline on Pulmonary Rehabilitation 2013[1] BTS Clinical Statement on Pulmonary Rehabilitation 2023[3]
Other possible national data sources	None identified.
Source references	BTS Guideline on Pulmonary Rehabilitation 2013[1] BTS Clinical Statement on Pulmonary Rehabilitation 2023[3] NICE Digital technologies to deliver pulmonary rehabilitation programmes for adults with COPD: early value assessment[18]
Rationale	• For individuals who decline or cannot undergo directly supervised, centre-based pulmonary rehabilitation, providers should offer an alternative model of delivery. • Any alternative model should have a supporting evidence base. These include video telerehabilitation and home-based pulmonary rehabilitation supported by manual or a digital app.

	• A directly supervised, validated exercise test, individualised aerobic and resistance exercise prescription and progression, and a structured educationsprogramme are core components of pulmonary rehabilitation, regardless of their mode of delivery. • The evidence for alternative models of delivery come from trials that have included regular remote supervision with a healthcare professional to maximise compliance and progress exercise intensity. Alternative models of delivery should incorporate regular remote or direct supervision. • The NICE early value assessment of digital technologies in pulmonary rehabilitation recommends that myCOPD and SPACE for COPD can be used in the NHS, while more evidence is generated, to deliver pulmonary rehabilitation for adults with COPD who cannot have or do not want face-to-face pulmonary rehabilitation.[18]

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Quality statement 6 - Maintenance

Quality statement 6 Maintenance	Individuals completing PR should be provided with a co-designed individualised, structured, written plan for ongoing exercise maintenance.
Quality measure	**Structure:** • Evidence of local arrangements to ensure that all people completing pulmonary rehabilitation are provided with an individualised, structured written plan for ongoing exercise maintenance. • Evidence that the written exercise plan has been developed by rehabilitation staff together with individuals completing the programme. • Evidence that PR programmes incorporate education and advice around the importance of regular exercise and physical activity. **Process:** • Proportion of individuals completing pulmonary rehabilitation are provided with an individualised, structured, co-designed written plan for on-going exercise maintenance. • Proportion of PR programmes with an education programme that includes education and advice around the importance of regular exercise and physical activity. **Numerator 1:** • The number of individuals completing pulmonary rehabilitation provided with an individualised, structured, co-designed written plan for on-going exercise maintenance **Denominator 1:** • The number of individuals completing pulmonary rehabilitation **Numerator 2:** • The number of pulmonary rehabilitation programmes with an education programme that promotes the importance of regular exercise and physical activity. **Denominator 2:**

	• The number of pulmonary rehabilitation programmes nationally
Description of what the quality statement means for each audience	**Service provider:** • Ensure system is in place to provide an individualised, structured, co-designed written plan for on-going exercise maintenance to all those completing pulmonary rehabilitation. • Ensure education programme incorporates self-management education and advice around the importance of regular exercise and physical activity. **Healthcare professional:** • Work with individuals undergoing pulmonary rehabilitation to co-design an individualised, structured, written plan for on-going exercise. • Ensure that the importance of regular exercise and physical activity is incorporated within the education programme. **Commissioners:** • Ensure that commissioned services provide people completing pulmonary rehabilitation with an individualised, structured, co-designed written plan for on-going exercise. • Ensure that commissioned services incorporate the importance of regular exercise and physical activity within the education programme. **People completing pulmonary rehabilitation:** • Work with healthcare professional to co-design an individualised, structured, written plan for on-going exercise.
Relevant existing indicators	BTS Clinical Statement on pulmonary rehabilitation[3] BTS Guideline on pulmonary rehabilitation [1] National Respiratory Audit Programme
Other possible national data sources	
Source references	BTS Clinical Statement on pulmonary rehabilitation.[3] BTS Guideline on pulmonary rehabilitation. [1]

	Demeyer H, Mohan D, Burtin C, et al. Objectively measured physical activity in patients with COPD: recommendations from an international task force on physical activity. Chronic Obstr Pulm Dis 2021;8:528–50.[19]
Rationale	• The beneficial effects of PR decline over 1 year. • The evidence for formal maintenance programmes after PR is inconsistent. • People should be supported to continue with their exercise plan after discharge from pulmonary rehabilitation. • All participants should be provided with an individualised structured, co-designed written plan for ongoing exercise maintenance. • Reduced physical activity is associated with poor prognosis in chronic respiratory disease. • Physical activity counselling should be a core component of pulmonary rehabilitation education

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Contributorship statement

All authors contributed equally to the development of the statement.

REFERENCES

1. Bolton CE, Bevan-Smith EF, Blakey JD, et al. British Thoracic Society guideline on pulmonary rehabilitation in adults. Thorax 2013;**68 Suppl 2**:ii1-30.
2. British Thoracic Society Quality Standards for Pulmonary Rehabilitation in Adults 2014. https://www.brit-thoracic.org.uk/document-library/quality-standards/pulmonary-rehabilitation/bts-quality-standards-for-pulmonary-rehabilitation-in-adults/.
3. Man W, Chaplin E, Daynes E, et al. British Thoracic Society Clinical Statement on pulmonary rehabilitation. Thorax 2023;**78**(Suppl 4):s2-s15.
4. McCarthy B, Casey D, Devane D, et al. Pulmonary rehabilitation for chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2015;**2**(2):CD003793.
5. Lee AL, Hill CJ, McDonald CF, et al. Pulmonary Rehabilitation in Individuals With Non-Cystic Fibrosis Bronchiectasis: A Systematic Review. Arch Phys Med Rehabil 2017;**98**(4):774-82 e1.
6. Dowman L, Hill CJ, May A, et al. Pulmonary rehabilitation for interstitial lung disease. Cochrane Database Syst Rev 2021;**2**(2):Cd006322.
7. Feng Z, Wang J, Xie Y, et al. Effects of exercise-based pulmonary rehabilitation on adults with asthma: a systematic review and meta-analysis. Respir Res 2021;**22**(1):33.
8. Rochester CL, Alison JA, Carlin B, et al. Pulmonary Rehabilitation for Adults with Chronic Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline. Am J Respir Crit Care Med 2023;**208**(4):e7-e26.
9. Jenkins AR, Burtin C, Camp PG, et al. Do pulmonary rehabilitation programmes improve outcomes in patients with COPD posthospital discharge for exacerbation: a systematic review and meta-analysis. Thorax 2024;**79**(5):438-47.
10. Guell-Rous MR, Morante-Velez F, Flotats-Farre G, et al. Timing of Pulmonary Rehabilitation in Readmitted Patients with Severe Chronic Obstructive Pulmonary Disease: A Randomized Clinical Trial. COPD 2021;**18**(1):26-34.
11. Wageck B, Cox NS, Lee JYT, et al. Characteristics of Pulmonary Rehabilitation Programs Following an Exacerbation of Chronic Obstructive Pulmonary Disease: A SYSTEMATIC REVIEW. J Cardiopulm Rehabil Prev 2021;**41**(2):78-87.
12. Kjaergaard JL, Juhl CB, Lange P, et al. Early pulmonary rehabilitation after acute exacerbation of COPD: a randomised controlled trial. ERJ Open Res 2020;**6**(1).
13. Barker RE, Kon SS, Clarke SF, et al. COPD discharge bundle and pulmonary rehabilitation referral and uptake following hospitalisation for acute exacerbation of COPD. Thorax 2021;**76**(8):829-31.
14. Holland AE, Spruit MA, Troosters T, et al. An official European Respiratory Society/American Thoracic Society technical standard: field walking tests in chronic respiratory disease. Eur Respir J 2014;**44**(6):1428-46.
15. Roberts NJ, Kidd L, Kirkwood K, et al. A systematic review of the content and delivery of education in pulmonary rehabilitation programmes. Respir Med 2018;**145**:161-81.
16. Griffiths TL, Burr ML, Campbell IA, et al. Results at 1 year of outpatient multidisciplinary pulmonary rehabilitation: a randomised controlled trial. Lancet 2000;**355**(9201):362-8.
17. Griffiths TL, Phillips CJ, Davies S, et al. Cost effectiveness of an outpatient multidisciplinary pulmonary rehabilitation programme. Thorax 2001;**56**(10):779-84.
18. National Institute for Health and Care Excellence. Digital Technologies to deliver pulmonary rehabilitationm programmes for adults with COPD: early value assessment. Secondary National Institute for Health and Care Excellence. Digital Technologies to deliver pulmonary rehabilitationm programmes for adults with COPD: early value assessment 2024. https://www.nice.org.uk/guidance/hte18.

19. Demeyer H, Mohan D, Burtin C, et al. Objectively Measured Physical Activity in Patients with COPD: Recommendations from an International Task Force on Physical Activity. Chronic Obstr Pulm Dis 2021;**8**(4):528-50.
20. Pulmonary Rehabilitation Services Accreditation Scheme. Secondary Pulmonary Rehabilitation Services Accreditation Scheme. https://www.prsas.org/standards.
21. NHS England Pulmonary rehabilitation commissioning standards. Secondary NHS England Pulmonary rehabilitation commissioning standards 2024. https://www.england.nhs.uk/long-read/pulmonary-rehabilitation-commissioning-standards/.
22. NHS England Guidance for growing and de-veloping the pulmonary rehabilitation multi-disciplinary team. Secondary NHS England Guidance for growing and de-veloping the pulmonary rehabilitation multi-disciplinary team 2024. https://www.england.nhs.uk/long-read/pulmonary-rehabilitation-workforce/.