

British Thoracic Society quality standard for pulmonary rehabilitation

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ABSTRACT

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.

The British Thoracic Society (BTS) has a long history of supporting the delivery and development of pulmonary rehabilitation in the UK. 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, and reflected new topics of interest and the emerging literature base.

This quality standard document is aligned with 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, safe and 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.

BTS quality standards are intended for

- ▶ healthcare professionals managing and providing a pulmonary rehabilitation service to support decisions about delivering high-quality care based on 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 Respiratory Audit Programme (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 BTS convened a Pulmonary Rehabilitation Quality Standard Working Group in May 2024, with the following membership:



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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 first submitted to the BTS Standards of Care Committee (SOCC) in December 2024. Subsequently, the document was posted on the BTS website for public consultation between July and August 2025. Following feedback and further revision, the document was given final approval by the BTS SOCC in October 2025.

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, that is, 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 supervised group rehabilitation sessions**, one of whom should be competent to deal with the deteriorating respiratory patient (eg, 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 **resourced** to meet clinical demand and 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 programmes are **resourced** to deliver a safe, high-quality service in line with the agreed operational policy.

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 **resources** are available to facilitate service participation in local and national audits.

Source references for the fundamentals of a high-quality pulmonary rehabilitation service

British Thoracic Society clinical statement on pulmonary rehabilitation.³
 Pulmonary Rehabilitation Services Accreditation Scheme standards.⁴
 NHS England pulmonary rehabilitation commissioning standards.⁵
 NHS England guidance for growing and developing the pulmonary rehabilitation multidisciplinary team.⁶
 London Respiratory Clinical Network.⁷
 British Thoracic Society.⁸
 The Care Quality Commission—scope of registration—glossary of terms.⁹

QUALITY STATEMENTS FOR PULMONARY REHABILITATION

The following six quality statements are designed to help improve the quality of pulmonary rehabilitation and build on 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 chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis and interstitial lung disease) should be offered pulmonary rehabilitation in a timely way.
- 2) Individuals referred for postexacerbation pulmonary rehabilitation should be enrolled within 30 days of discharge from hospital after an acute exacerbation of COPD.
- 3) All individuals eligible for pulmonary rehabilitation should receive a multisystem 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 pulmonary rehabilitation should be provided with a co-developed individualised, structured, written plan for ongoing exercise maintenance.

QUALITY STATEMENT 1: REFERRAL

All individuals with symptomatic chronic respiratory disease (including chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis and interstitial lung disease) should be offered pulmonary rehabilitation in a timely way.

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, safe and high-quality services.

Process:

- 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.

(continued)

All individuals with symptomatic chronic respiratory disease (including chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis and interstitial lung disease) should be offered pulmonary rehabilitation in a timely way.

Numerator 1:

- ▶ Number of pulmonary rehabilitation programmes that offer pulmonary rehabilitation for symptomatic individuals with chronic respiratory disease including COPD, asthma, bronchiectasis and 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 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 the referral for pulmonary rehabilitation has been discussed with individuals prior to referral.

Commissioners:

- ▶ Ensure services are 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	British Thoracic Society (BTS) clinical statement on pulmonary rehabilitation. ³ BTS guideline on pulmonary rehabilitation. ¹
Other possible national data sources	National Respiratory Audit Programme: pulmonary rehabilitation workstream and COPD workstream. Quality Outcome Framework
Source references	McCarthy <i>et al.</i> ¹⁰ Lee <i>et al.</i> ¹¹ Dowman <i>et al.</i> ¹² Feng <i>et al.</i> ¹³
Rationale	▶ There is a large disparity between the number of individuals eligible for pulmonary rehabilitation and the number receiving pulmonary rehabilitation despite the strong evidence supporting pulmonary rehabilitation. ▶ The National Respiratory Audit Programme currently sets a target of enrolling all appropriate referrals within 90 days of receipt of referral. ▶ 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-related quality of life in asthma,¹² bronchiectasis¹¹ and ILD.¹²

QUALITY STATEMENT 2: POSTHOSPITALISATION PULMONARY REHABILITATION

Individuals referred for posthospitalisation 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 acute exacerbation of chronic obstructive pulmonary disease (AECOPD). ▶ Evidence that pulmonary rehabilitation programmes can enrol individuals within 30 days of discharge from hospitalisation with AECOPD. ▶ Evidence that pulmonary rehabilitation programmes reoffer pulmonary rehabilitation to individuals who decline the initial offer of posthospitalisation pulmonary rehabilitation. Process: ▶ Proportion of all referrals for posthospitalisation pulmonary rehabilitation. ▶ Proportion of individuals accepted for posthospitalisation 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 posthospitalisation 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 enrolled for pulmonary rehabilitation within 30 days of discharge. Denominator 2: ▶ Number of individuals accepted for posthospitalisation pulmonary rehabilitation. Numerator 3: ▶ Number of pulmonary rehabilitation programmes with a formal pathway for reoffering pulmonary rehabilitation to individuals who initially decline posthospitalisation 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 posthospitalisation pulmonary rehabilitation. ▶ Ensure systems are in place to enrol individuals for posthospitalisation pulmonary rehabilitation within 30 days of discharge. Healthcare professional: ▶ Provide timely posthospitalisation pulmonary rehabilitation (within 30 days of discharge). ▶ Reoffer pulmonary rehabilitation to individuals who initially decline the offer for posthospitalisation pulmonary rehabilitation. Commissioners: ▶ Ensure there are resources to allow timely (within 30 days) enrolment of individuals for posthospitalisation pulmonary rehabilitation, and to allow reoffer of posthospitalisation 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	British Thoracic Society (BTS) guideline on pulmonary rehabilitation in adults.¹ BTS clinical statement on pulmonary rehabilitation.³ Pulmonary rehabilitation for adults with chronic respiratory disease: an official American Thoracic Society clinical practice guideline.¹⁴
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.¹ BTS clinical statement on pulmonary rehabilitation.³ Pulmonary rehabilitation for adults with chronic respiratory disease: an official American Thoracic Society clinical practice guideline.¹⁴ Jenkins <i>et al.</i>¹⁵ Güell-Rous <i>et al.</i>¹⁶ Wageck <i>et al.</i>¹⁷ Kjærgaard <i>et al.</i>¹⁸ Barker <i>et al.</i>¹⁹
Rationale	▶ The BTS guideline on pulmonary rehabilitation recommended that individuals hospitalised for AECOPD should be offered pulmonary rehabilitation at hospital discharge to commence within 30 days of discharge.¹ ▶ An updated Cochrane review demonstrated that posthospitalisation pulmonary rehabilitation was associated with reduced hospital admissions, and improved exercise capacity and health-related quality of life.¹⁵ ▶ Rehabilitation started within 30 days after hospital discharge yielded better overall results than rehabilitation started during the hospital admission.¹⁶ ▶ 'Delayed' pulmonary rehabilitation following a hospital admission is still associated with benefits and therefore pulmonary rehabilitation should be reoffered to individuals who initially decline a referral for post-hospitalisation pulmonary rehabilitation.¹⁸ ▶ 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.¹⁹ Referrers and patients should be well-informed about the benefits of pulmonary rehabilitation and local referral pathways. ▶ The growth of admission avoidance and early supported discharge services, and virtual wards (hospital-level care in a patient's home, using technology for remote monitoring and treatment from a multidisciplinary team) means that an increasing proportion of people with AECOPD are not managed as hospital inpatients. The role of 'early' pulmonary rehabilitation in these individuals is unclear due to limited evidence base, but pulmonary rehabilitation is beneficial in symptomatic individuals with COPD.

QUALITY STATEMENT 3: ASSESSMENT

All individuals eligible for pulmonary rehabilitation should receive a multisystem 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 multisystem 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) 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 multisystem 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.²⁰ ► Ensure the programme venue has facilities, equipment and space to conduct the necessary assessments. Healthcare professional: ► Healthcare professionals have relevant competencies to perform a multisystem 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 resourced to deliver a structured, multisystem, face-to-face assessment for all individuals referred for pulmonary rehabilitation. Individuals attending pulmonary rehabilitation. ► Undergo a multisystem, 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 at the initial and discharge assessments.
Relevant existing indicators	British Thoracic Society (BTS) clinical statement on pulmonary rehabilitation.³ BTS guideline on pulmonary rehabilitation in adults.¹ An official European Respiratory Society/American Thoracic Society technical standard: field walking tests in chronic respiratory disease.²⁰
Other possible national data sources	National Respiratory Audit Programme: pulmonary rehabilitation workstream and chronic obstructive pulmonary disease workstream.
Source references	Man <i>et al.</i>³ Bolton <i>et al.</i>¹ Holland <i>et al.</i>²⁰ London Respiratory Clinical Network.⁷ British Thoracic Society.⁸
Rationale	► The initial assessment provides an opportunity to perform a multisystem 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 can be used as surrogates.

QUALITY STATEMENT 4: THE PULMONARY REHABILITATION PROGRAMME

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 British Thoracic Society (BTS) pulmonary rehabilitation guideline. ▶ Evidence that centre-based pulmonary rehabilitation programmes are of a minimum 6-week 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 programmes with progression plans. ▶ Proportion of pulmonary rehabilitation services delivering a comprehensive structured programme of education. ▶ Proportion of centre-based pulmonary rehabilitation programmes that are of a minimum 6-week 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 (by a healthcare professional) 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 cardiorespiratory disease other than chronic obstructive pulmonary disease. 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 resistance training programme. ▶ Offered a structured comprehensive programme of education.
Relevant existing indicators	BTS guideline on pulmonary rehabilitation.¹ BTS clinical statement on pulmonary rehabilitation.³

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All eligible individuals referred for pulmonary rehabilitation should have the opportunity to access directly supervised, centre-based pulmonary rehabilitation.

Other possible national data sources	National Respiratory Audit Programme (pulmonary rehabilitation workstream).
Source references	BTS guideline on pulmonary rehabilitation in adults.¹ BTS clinical statement on pulmonary rehabilitation.³ McCarthy <i>et al.</i>¹⁰ ACSM's guidelines for exercise testing and prescription, 11th edition.²¹ Roberts <i>et al.</i>²² London Respiratory Clinical Network.⁷ British Thoracic Society.⁸
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 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 a 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^{23 24} but can be performed unsupervised for practical reasons.

QUALITY STATEMENT 5: ALTERNATIVE MODELS
Individuals who decline or are 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 include core components outlined in the British Thoracic Society (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.

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Individuals who decline or are unable to undergo supervised centre-based pulmonary rehabilitation should be offered an evidence-based alternative delivery model.	
Relevant existing indicators	BTS guideline on pulmonary rehabilitation. ¹ BTS clinical statement on pulmonary rehabilitation. ³
Other possible national data sources	None identified.
Source references	BTS guideline on pulmonary rehabilitation. ¹ BTS clinical statement on pulmonary rehabilitation. ³ The National Institute for Health and Care Excellence (NICE) digital technologies to deliver pulmonary rehabilitation programmes for adults with chronic obstructive pulmonary disease (COPD): early value assessment. ²⁴
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 education programme are core components of pulmonary rehabilitation, regardless of their mode of delivery. ▶ The evidence for alternative models of delivery comes from trials that have included regular remote supervision with a healthcare professional to maximise adherence 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 National Health Service, 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.²⁵
SPACE (S – Self-management; P – Programme of Activity; A – Activity; C – Coping; E – Education)	

QUALITY STATEMENT 6: MAINTENANCE

Individuals completing pulmonary rehabilitation should be provided with a co-developed 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 pulmonary rehabilitation programmes incorporate education and advice around the importance of regular exercise and physical activity. Process: ▶ Proportion of individuals completing pulmonary rehabilitation who are provided with an individualised, structured, co-developed written plan for ongoing exercise maintenance. ▶ Proportion of pulmonary rehabilitation 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-developed written plan for ongoing 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.

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Individuals completing pulmonary rehabilitation should be provided with a co-developed individualised, structured, written plan for ongoing exercise maintenance.

Description of what the quality statement means for each audience	Service provider: ▶ Ensure system is in place to provide an individualised, structured, co-developed written plan for ongoing exercise maintenance to all those completing pulmonary rehabilitation. ▶ Ensure the 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-develop an individualised, structured, written plan for ongoing 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-developed written plan for ongoing exercise. ▶ Ensure that commissioned services incorporate the importance of regular exercise and physical activity within the education programme. People completing pulmonary rehabilitation: ▶ Work with a healthcare professional to co-develop an individualised, structured, written plan for ongoing exercise.
Relevant existing indicators	BTS clinical statement on pulmonary rehabilitation.³ BTS guideline on pulmonary rehabilitation.¹ National Respiratory Audit Programme.²⁶
Other possible national data sources	
Source references	BTS clinical statement on pulmonary rehabilitation.³ BTS guideline on pulmonary rehabilitation.¹ Demeyer <i>et al.</i>²⁷
Rationale	▶ The beneficial effects of pulmonary rehabilitation decline over 1 year. ▶ The evidence for formal maintenance programmes after pulmonary rehabilitation 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-developed 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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