Royal College of Physicians | NACAP

National Asthma and Chronic Obstructive Pulmonary Disease Audit Programme (NACAP)

Pulmonary rehabilitation clinical audit 2019

Clinical audit of pulmonary rehabilitation services in England, Scotland and Wales. Patients assessed between 1 June – 30 November 2019.

Clinical audit: Data analysis and methodology report

Published December 2020

In association with:

THE ASTHMA UK AND BRITISH LUNG FOUNDATION PARTNERSHIP

ARNS

British Thoracic Society

Imperial College London

PCRS

RCGP Royal College of General Practitioners

Commissioned by:

HQIP Healthcare Quality Improvement Partnership

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National Asthma and Chronic Obstructive Pulmonary Disease (COPD) Audit Programme

NACAP is a programme of work that aims to improve the quality of care, services and clinical outcomes for patients with asthma and COPD in England, Scotland and Wales. Spanning the entire patient care pathway, NACAP includes strong collaboration with asthma and COPD patients, as well as healthcare professionals, and aspires to set out a vision for a service which puts patient needs first. To find out more about the NACAP visit: **www.rcplondon.ac.uk/nacap**.

Pulmonary rehabilitation: 2019 clinical audit data and methodology report

This report was prepared by the following people, on behalf of the COPD advisory group: the full list of members can be found on the NACAP resources page here: **www.rcplondon.ac.uk/nacap-resources**.

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Contents

How to use this report

1. Scope and data collection

This report presents the results from an analysis of data derived from the pulmonary rehabilitation (PR) clinical audit component of the National Asthma and COPD Audit Programme (NACAP). This continuous audit captures the process of treatment in patients who are treated by PR services in England, Scotland and Wales for chronic obstructive pulmonary disease (COPD). The continuous audit was launched in March 2019.

This report, which is the second to use continuous data collection, presents data for 12,127 patients that were assessed between 1 June and 30 November 2019 and includes patients who:

- completed an initial assessment but were not enrolled on a PR programme, or
- enrolled and completed the PR programme, or
- enrolled but were known to have dropped out of their PR programme.

This audit works under a consent model, so only data from patients who consented to be part of the audit have been reported.

Individuals who were assessed between 1 June and 30 November 2019, but who had not completed the PR programme by the data deadline of 10 April 2020 (and therefore had an incomplete audit record), were excluded. The most likely reason that individuals would not have completed their PR programme before 10 April was because of delays between assessment and commencing PR.

The data provide information about the delivery of rehabilitation and on the quality improvement (QI) targets for PR services.

Contributing to the overarching national QI objectives of NACAP, this report aims to empower stakeholders to use audit data to facilitate improvements in the quality of care.

These clinical audit results form part of the wider combined PR clinical and organisational audit 2019 report. This full combined report includes the following outputs all of which are available at **www.rcplondon.ac.uk/nacap-PR-2019.**

2. Report structure

The data are presented largely in tabular form with explanatory notes where appropriate. These data will also be made publicly available at PR service level on the NACAP web pages (**www.rcplondon.ac.uk/nacap-PR-2019**) and **www.data.gov.uk**, in line with the government's transparency agenda. The interim report data (published in July 2020) have been presented where appropriate to provide comparison with the previous reporting period.

Details of the statistical, data collection and information governance methodologies employed are provided in **Appendix A.**

Nationally benchmarked results for participating services across England, Scotland and Wales have been provided in **Section 9** of this report. The median values for each service are presented alongside the national medians for each indicator. The indicators have been selected based on national guidelines and standards. The service results for each indicator are colour coded in accordance with whether the service falls above, within the middle two, or below the lower quartile.

Details of the methodology employed are also provided (**Appendix A**).

Alongside the publication of this report, PR services will also be provided service-level reports, presenting their own service-level data against both the national and relevant devolved nation average. These reports are provided directly to the PR service responsible for participation in the NACAP PR audits via the NACAP web tool (**www.nacap.org.uk**).

3. Report coverage

National breakdowns are given for England, Scotland and Wales, as well as 'All' figures.

NACAP follows rules on suppression of small numbers in national reporting where it may be possible to identify an individual patient in any data presented. In this report, it was deemed appropriate and safe to include small numbers in national data tables without suppression for the following reasons:

- These data are presented at national aggregate level. It is not possible to combine this national aggregate data in any way which could identify an individual.
- These data are of a sample of the eligible patients that could have been included in the audit; it is not possible to ascertain which eligible patients were included, and which were not, in the data presented here.

However, where service level aggregated data has been presented in the benchmarking table in **Section 9** of this report, small numbers (between 1–4) have been suppressed (with the corresponding percentage also removed) to ensure that the identification of individual patients is not possible.

4. Audience and links to relevant guidelines and standards

The report is intended to be read by healthcare professionals; NHS managers, chief executives and board members; as well as service commissioners, policymakers and voluntary organisations**.** We strongly advise that PR services discuss these findings between themselves, as well as with their colleagues in primary and secondary care, their commissioners and other relevant healthcare teams. A separate report has been produced for patients and the public and is available at: **www.rcplondon.ac.uk/nacap-PR-2019**. Where a certain area of care has been highlighted as a patient priority (something of particular importance to patients) by the NACAP patient panel this is shown this is shown with the patient priority icon displayed below.

References to the appropriate British Thoracic Society (BTS) Quality Standards (**Appendix C**) are provided at the beginning of each section. Copies of our dataset, our good practice repository, and all other resources can be found via our website: **www.rcplondon.ac.uk/nacap-pr-resources**.

Recommendations

National

CA1 National organisations, service providers, commissioners and patient charities should work together to optimise timely referral to and start of PR for those with both stable COPD and following an admission to hospital with an acute exacerbation of COPD (AECOPD).

For providers of pulmonary rehabilitation (PR) services

This report outlines three key national quality improvement (QI) priorities for providers of PR. They were chosen because of the strong evidence base for their effectiveness in improving patient care and outcomes.

National QI priority C1: Start PR within 90 days of receipt of referral for **85%** of patients referred for PR with stable COPD. (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standard 1b***).[1]

National QI priority C2: Perform ***all*** walk tests to accepted technical standards, including ensuring *all* patients undertake a practice walk test at their initial PR assessment.
(***BTS quality standards for pulmonary rehabilitation in adults (2014). Standards 8 and 9***).[1]

National QI priority C3: Complete PR programmes and discharge assessments for **70%** of patients enrolled for PR. (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standard 4***).[1]

CA2 Work with secondary care providers to identify *all* suitable patients for PR following an admission for AECOPD. The pathway should be integrated for all PR to start within 30 days for these patients. (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standard 3b***).[1]

For commissioners / health boards / sustainability and transformation partnerships / integrated care systems

CA3 Work with your PR services to ensure that patients are seen in a timely manner (QI priority: starting PR within 90 days of receipt of referral). (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standard 1b***).[1]

CA4 Have a local resource plan in place to facilitate and encourage your local PR services to participate in the NACAP PR audit.

CA5 Provide adequate training and awareness for all staff of national and where relevant, international guidance,[5] ie ***BTS quality standards for pulmonary rehabilitation in adults (2014)***.[1]

For providers of primary and secondary COPD care

CA6 Assess all COPD patients for suitability for referral to PR (patient-reported MRC grades 3–5). (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standard 1***).[1]

CA7 Provide all staff working with patients with COPD with information on the benefits of PR.

For people living with COPD and their families and carers

CA8 Ask for information on PR when you visit your GP / practice nurse and discuss whether a referral to your local PR service may be beneficial to you.
(***BTS quality standards for pulmonary rehabilitation in adults (2014). Standard 1***).[1]

CA9 Make sure arrangements are made to refer you to your local PR service, if you are admitted to hospital with a worsening of your COPD. (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standard 3***).[1]

Section 1: Audit participation

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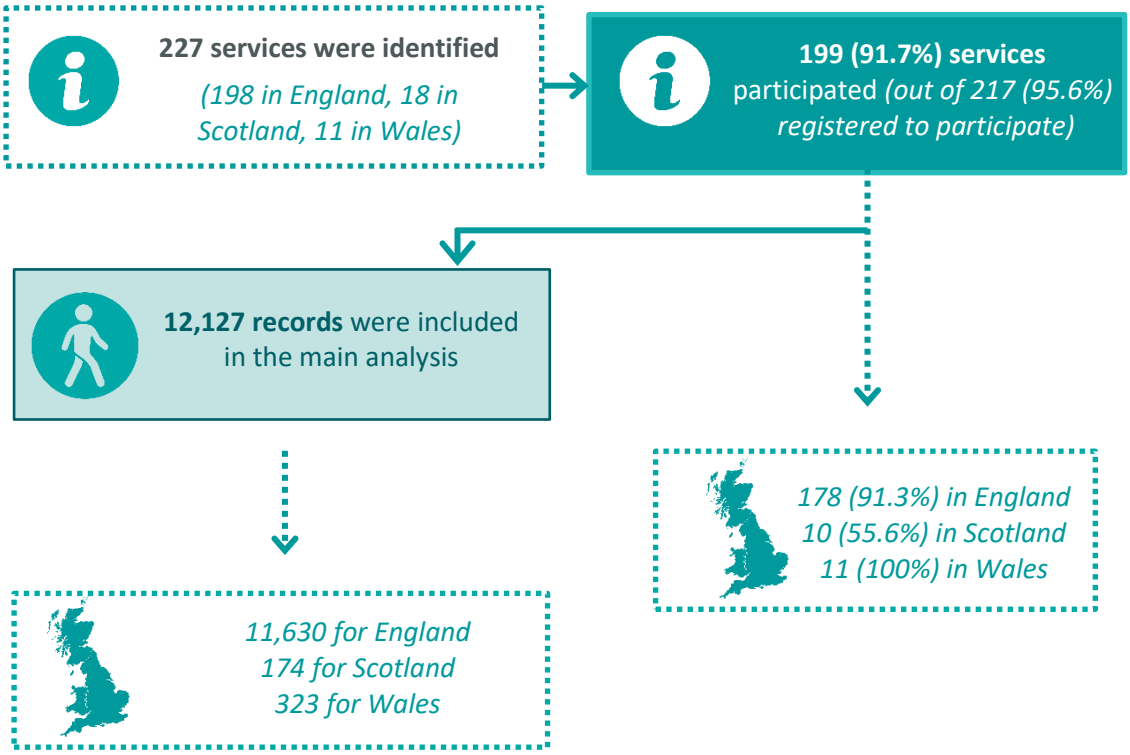
Key findings

> A high proportion (87.7%) of services are participating in the PR continuous clinical audit.
> Very few services did not register (4.4%) or registered but did not submit any data (8.0%).

1.1 Audit participation

Audit participation	Total number of PR services identified	Number of PR services registered to participate in the audit	Number of PR services which registered and participated in the audit	Number of services identified but not registered
England	198	194 (98.0%)	178 (90.4%)	4 (2.0%)
Scotland	18	12(66.6%)	10 (55.6%)	6 (33.3%)
Wales	11	11 (100.0%)	11 (100.0%)	0 (0.0%)
All	227	217 (95.6%)	199 (87.7%)	10 (4.4%)



Case ascertainment information for this period (June to November 2019) can be found in the corresponding organisational audit data analysis and methodology report on page 11.

Section 2: General information

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Key findings

- The median age at referral was 71 years (interquartile range (IQR) 64–76).
- In total, 12,127 patients were assessed for PR between 1 June and 30 November 2019.
- More males (52.8%) were assessed for PR than females (47.1%).
- The majority (82.5%) of patients assessed for PR were white British.
- Patients within the most deprived areas (quintile 1) in England (25.3%) and Wales (24.9%) represented a higher proportion of those assessed for PR. However, patients in quintile 2 represented the higher proportions of those assessed for PR in Scotland (30.0%).

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

2.1 Age

	2019				Interim
Age at assessment	**England (n=11,630)**	**Scotland (n=174)**	**Wales (n=323)**	**All (n=12,127)**	**All (n=6,056)**
Median (IQR*)	71 (64–76)	69 (61–74)	71 (63–76)	71 (64–76)	70 (64–76)

** Interquartile range*

2.2 Gender

	2019				Interim
Gender	England (n=11,630)	Scotland (n=174)	Wales (n=323)	All (n=12,127)	All (n=6,056)
Male	6,149 (52.9%)	89 (51.1%)	169 (52.3%)	6,407 (52.8%)	3,128 (51.7%)
Female	5,471 (47.0%)	85 (48.9%)	154 (47.7%)	5,710 (47.1%)	2,922 (48.2%)
Transgender	4 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.0%)	1 (0%)
Other	1 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)	2 (0%)
Not recorded/ preferred not to say	5 (0.0%)	0 (0.0%)	0 (0.0%)	5 (0.0%)	3 (0%)

2.3 Ethnicity

	2019				Interim
Ethnicity	England (n=11,630)	Scotland (n=174)	Wales (n=323)	All (n=12,127)	All -
African	16 (0.1%)	0 (0.0%)	0 (0.0%)	16 (0.1%)	Not reported
Any other Asian background	32 (0.3%)	0 (0.0%)	0 (0.0%)	32 (0.3%)	Not reported
Any other black background	21 (0.2%)	0 (0.0%)	0 (0.0%)	21 (0.2%)	Not reported
Any other ethnic group	39 (0.3%)	0 (0.0%)	0 (0.0%)	39 (0.3%)	Not reported
Any other mixed background	35 (0.3%)	0 (0.0%)	0 (0.0%)	35 (0.3%)	Not reported
Any other white background	150 (1.3%)	2 (1.1%)	1 (0.3%)	153 (1.3%)	Not reported
Bangladeshi	24 (0.2%)	0 (0.0%)	0 (0.0%)	24 (0.2%)	Not reported
Caribbean	56 (0.5%)	0 (0.0%)	0 (0.0%)	56 (0.5%)	Not reported
Chinese	6 (0.1%)	0 (0.0%)	0 (0.0%)	6 (0.0%)	Not reported
Indian	84 (0.7%)	0 (0.0%)	0 (0.0%)	84 (0.7%)	Not reported
Not stated	1,300 (11.2%)	70 (40.2%)	12 (3.7%)	1,382 (11.4%)	Not reported
Pakistani	48 (0.4%)	0 (0.0%)	0 (0.0%)	48 (0.4%)	Not reported
White and Asian	9 (0.1%)	0 (0.0%)	0 (0.0%)	9 (0.1%)	Not reported
White and black African	12 (0.1%)	0 (0.0%)	0 (0.0%)	12 (0.1%)	Not reported
White and black Caribbean	23 (0.2%)	0 (0.0%)	0 (0.0%)	23 (0.2%)	Not reported
White British	9,595 (82.5%)	102 (58.6%)	308 (95.4%)	10,005 (82.5%)	Not reported
White Irish	180 (1.5%)	0 (0.0%)	2 (0.6%)	182 (1.5%)	Not reported

2.4 Socioeconomic status

2.4.1 Index of Multiple Deprivation measures by national quintile in England, Scotland and Wales

		% of audit sample living in each quintile of English, Scottish or Welsh Index of Multiple Deprivation 2019				
Index of Multiple Deprivation		**Q1 (most deprived)**	**Q2**	**Q3**	**Q4**	**Q5 (least deprived)**
England (IMD*)	**2019 (n=11,494)**	2,910 (25.3%)	2,533 (22.0%)	2,230 (19.4%)	2,073 (18.0%)	1,748 (15.2%)
Scotland (SIMD)**	**2019 (n=170)**	15 (8.8%)	51 (30.0%)	41 (24.1%)	34 (20.0%)	29 (17.1%)
Wales (WIMD*)**	**2019 (n=317)**	79 (24.9%)	70 (22.1%)	65 (20.5%)	58 (18.3%)	45 (14.2%)

*Indices of multiple deprivation are not directly comparable between countries.**

**Index of Multiple Deprivation, England*

*** Scottish Index of Multiple Deprivation*

**** Welsh Index of Multiple Deprivation*

*https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/465791/English_Indices_of_Deprivation_2015_-_Statistical_Release.pdf

Section 3: Programme referral

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Key standards

BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 1b]: [1] Referral for PR: b. If accepted, people referred for PR are enrolled to commence within 3 months of receipt of referral.
BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 3b]: [1] Referral for PR after hospitalisation for acute exacerbations of COPD: b. People referred for PR following admission with AECOPD are enrolled within 1 month of leaving hospital.
NICE 2016 QS10 [QS5], statement 5:[2] People admitted to hospital for an acute exacerbation of COPD start a PR programme within 4 weeks of discharge.

Key findings

- Overall, the highest proportion of patients (66.8%) were referred from primary care or the community with stable COPD.
- 5.2% of patients (632) were referred after admission to hospital for an acute exacerbation of COPD (AECOPD).
- Overall, 53.9% of patients with stable COPD commenced PR within 90 days of receipt of referral. Waiting times were longest in Wales (median 154 days).
- 12.8% of patients referred after admission to hospital for an AECOPD started PR within 30 days of referral.

Navigation

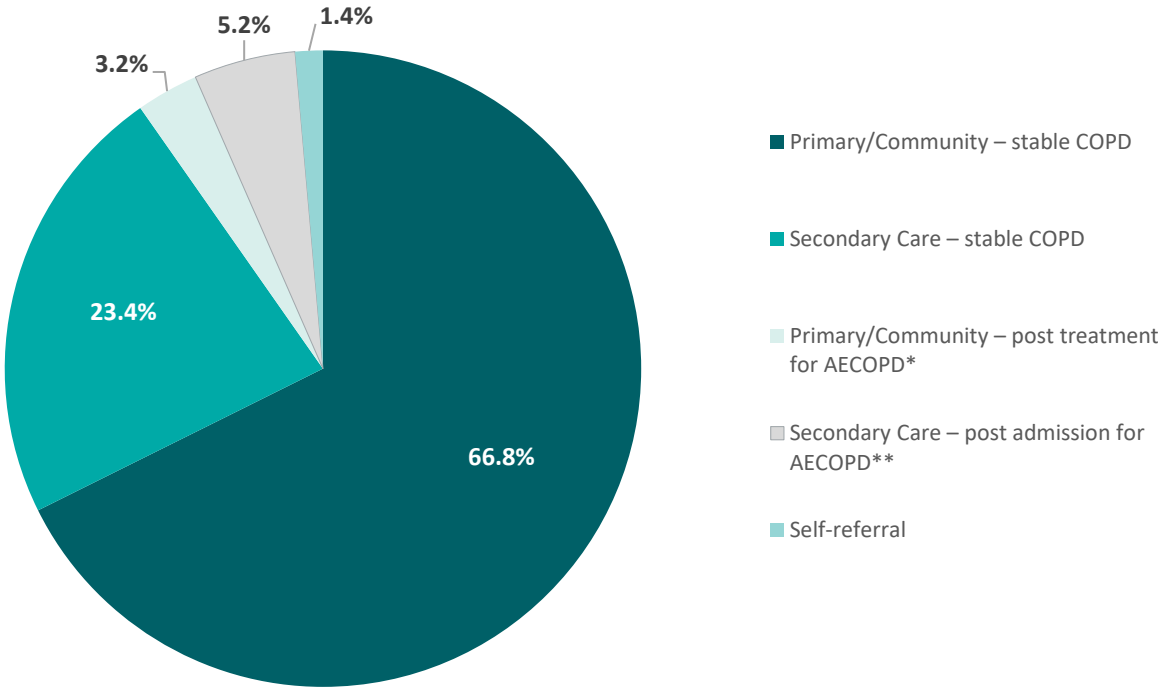
This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

3.1 Source of patient referral

	2019				Interim
Patients referred from	England (n=11,630)	Scotland (n=174)	Wales (n=323)	All (n=12,127)	All (n=6,056)
Primary/community – stable COPD*	7,866 (67.6%)	111 (63.8%)	129 (39.9%)	8,106 (66.8%)	3,933 (64.9%)
Secondary care – stable COPD	2,630 (22.6%)	30 (17.2%)	176 (54.5%)	2,836 (23.4%)	1,396 (23.1%)
Primary/community – after treatment for AECOPD**	367 (3.2%)	13 (7.5%)	4 (1.2%)	384 (3.2%)	250 (4.1%)
Secondary care – after admission for AECOPD	600 (5.2%)	18 (10.3%)	14 (4.3%)	632 (5.2%)	383 (6.3%)
Self-referral	167 (1.4%)	2 (1.1%)	0 (0.0%)	169 (1.4%)	94 (1.6%)

** Chronic obstructive pulmonary disease (COPD)*
***'Primary/community – after treatment for an acute exacerbation of COPD (AECOPD)' – includes referrals for patients treated at home or in a community location for an AECOPD, this includes referrals from primary care after an AECOPD*

Fig 3.1. Source of patient referral



3.2 Waiting times

3.2.1 Length of time from receipt of referral to start date for PR

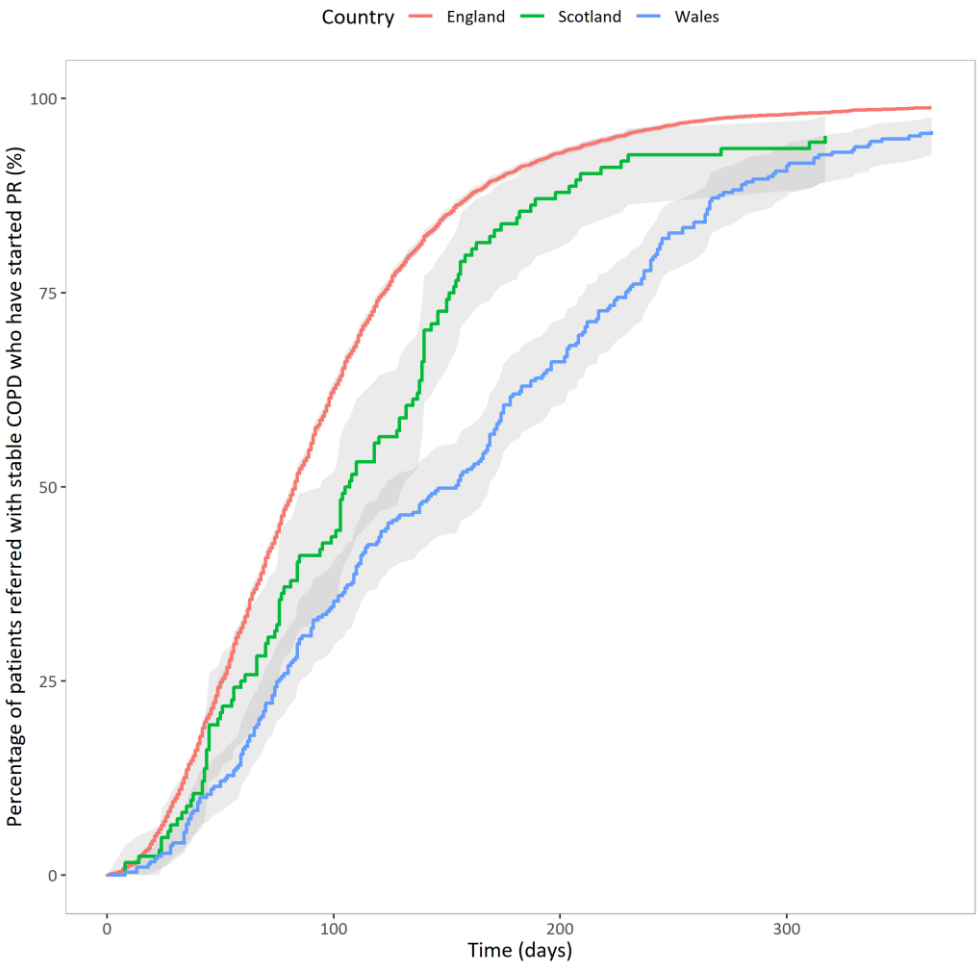
	2019				Interim
Time from referral to start date for PR (days) for patients with stable COPD	England (n=9,522)	Scotland (n=124)	Wales (n=289)	All (n=9,935)	All (n=4,817)
Median (IQR*)	83 (51–122)	106 (60–152)	154 (76–229)	84 (52–125)	78 (49–119)

** Interquartile range*

3.2.2 Did people with stable COPD start PR within 90 days of receipt of referral?

	2019				Interim
PR started within 90 days	England (n=9,522)	Scotland (n=124)	Wales (n=289)	All (n=9,935)	All (n=4,817)
Yes	5,214 (54.8%)	51 (41.1%)	89 (30.8%)	5,354 (53.9%)	2,792 (58.0%)

Fig 3.2. Waiting times for patients with stable COPD*



**Denominator for Fig 3.2 is all those patients who started pulmonary rehabilitation*

3.2.3 Length of time from initial assessment to start date for PR

	2019				Interim
Days from assessment to start date for PR (days) for patients with stable COPD	**England (n=9,596)**	**Scotland (n=137)**	**Wales (n=292)**	**All (n=10,025)**	**All (n=4,885)**
Median (IQR*)	13 (7–28)	7 (5–23)	10 (4–28)	13 (6–28)	14 (7–27)

** Interquartile range*

3.2.4 Did people with an AECOPD start PR within 30 days of referral?

	2019				Interim
PR started with 30 days of referral	**England (n=869)**	**Scotland (n=30)**	**Wales (n=15)**	**All (n=914)**	**All (n=567)**
Yes	114 (13.1%)	2 (6.7%)	1 (6.7%)	117 (12.8%)	98 (17.3%)

National QI priority C1: Start PR within 90 days of receipt of referral for **85%** of patients referred for PR with stable COPD. (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standard 1b***).[1]

Rationale

The British Thoracic Society (BTS) quality standard for PR in adults (2014) 1b states that people with stable COPD who are referred for PR should start it within 3 months of receipt of referral. This audit reported that 53.9% of patients with stable COPD started PR within 90 days of receipt of referral. Longer waiting times for PR have been linked with an increased risk of admission to hospital.[3] Therefore ensuring patients start PR within 90 days is of the utmost importance.

Tips to achieve this priority

- Incorporate a process of monitoring the data to check waiting times.
- Have a list of patients willing to attend at short notice if there is a cancellation.
- Ensure there is capacity in the class to reduce wait times into rehabilitation after assessment (rolling vs cohort programmes).

Section 4: Key clinical information at time of assessment

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Key standards:

NICE 2013 QS43 [QS1]:[4] People are asked by their healthcare practitioner if they smoke, and those who smoke are offered advice on how to stop.
BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 5]: [1] Pulmonary rehabilitation programmes include supervised, individually tailored and prescribed progressive exercise training, including both aerobic and resistance training.
BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 8]: [1] People attending pulmonary rehabilitation have the outcome of treatment assessed using as a minimum, measures of exercise capacity, dyspnoea and health status.
BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 1a]: [1] Referral for PR: a. People with COPD and self-reported exercise limitation (MRC dyspnoea 3–5) are offered PR.
BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 2]: [1] PR programmes accept and enrol patients with functional limitation due to other chronic respiratory diseases (for example bronchiectasis, interstitial lung disease (ILD) and asthma) or COPD MRC dyspnoea 2 if referred.

Key findings

Of patients assessed for PR:

- a large proportion were either ex-smokers (68.8%) or current smokers (21.7%)
- the majority had either a Medical Research Council (MRC) score 3 (35.7%) or 4 (31.1%)
- 49.7% had a measure of FEV1/FVC ratio and 61.4% had a measure of FEV1
- 35.7% had a history of cardiovascular disease and 35.6% a history of lower limb or lower back musculoskeletal disorders
- 19.9% had a history of mental illness.

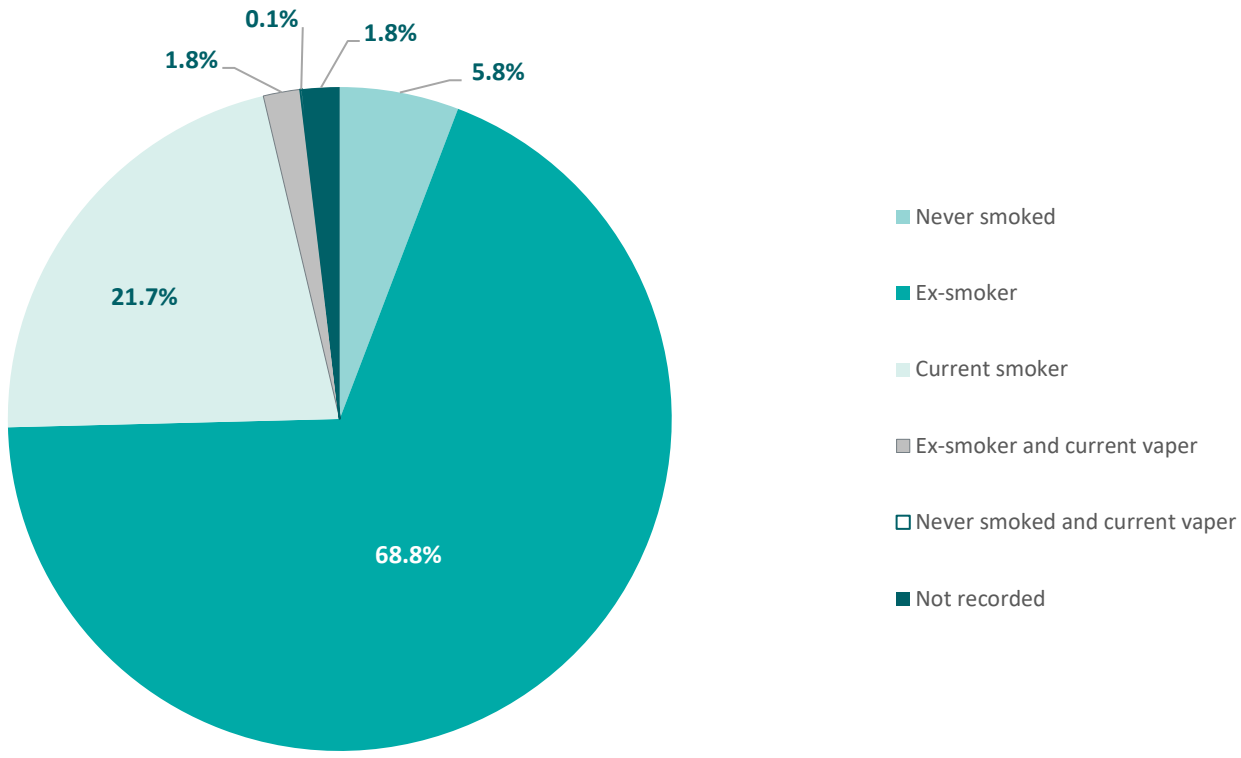
Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

4.1 Smoking status

	2019				Interim
Smoking status	England (n=11,630)	Scotland (n=174)	Wales (n=323)	All (n=12,127)	All (n=6,056)
Never smoked	687 (5.9%)	5 (2.9%)	17 (5.3%)	709 (5.8%)	327 (5.4%)
Ex-smoker	8,001 (68.8%)	116 (66.7%)	223 (69.0%)	8,340 (68.8%)	4,239 (70.0%)
Current smoker	2,507 (21.6%)	50 (28.7%)	74 (22.9%)	2,631 (21.7%)	1,256 (20.7%)
Ex-smoker and current vaper	209 (1.8%)	1 (0.6%)	8 (2.5%)	218 (1.8%)	114 (1.9%)
Never smoked and current vaper	9 (0.1%)	0 (0.0%)	0 (0.0%)	9 (0.1%)	4 (0.1%)
Not recorded	217 (1.9%)	2 (1.1.%)	1 (0.3%)	220 (1.8%)	116 (1.9%)

Fig 4.1. Smoking status



4.2 Spirometry

	2019	
Spirometry	**Number of patients with a recorded value**	**Median (IQR*) value**
FEV1% predicted		
England (n=11,630)	7,178 (61.7%)	56 (41–71)
Scotland (n=174)	39 (22.4%)	54 (46–65)
Wales (n=323)	234 (72.4%)	53 (39–65)
All (n=12,127)	7,451 (61.4%)	56 (41–71)
Interim (All = 6,056)	3,758 (62.1%)	55 (41–70)
FEV1/FCV ratio		
England (n=11,630)	5,807 (49.9%)	0.56 (0.44–0.67)
Scotland (n=174)	23 (13.2%)	0.59 (0.44–0.68)
Wales (n=323)	196 (60.7%)	0.53 (0.41–0.64)
All (n=12,127)	6,026 (49.7%)	0.56 (0.44–0.67)
Interim (All = 6,056)	3,112 (51.4%)	0.56 (0.44–0.67)

** Interquartile range*

4.3 Patient's body mass index (BMI)

	2019				Interim
BMI	**England (n=11,630)**	**Scotland (n=174)**	**Wales (n=323)**	**All (n=12,127)**	**All (n=6,056)**
Number of patients with a recorded value	7,583 (65.2%)	91 (52.3%)	191 (59.1%)	7,865 (64.9%)	3,908 (64.5%)
Median (IQR*)	27.1 (23.3–31.4)	26.5 (23.0–30.8)	27.3 (22.9–32.6)	27.1 (23.3–31.4)	27.3 (23.4–32.0)

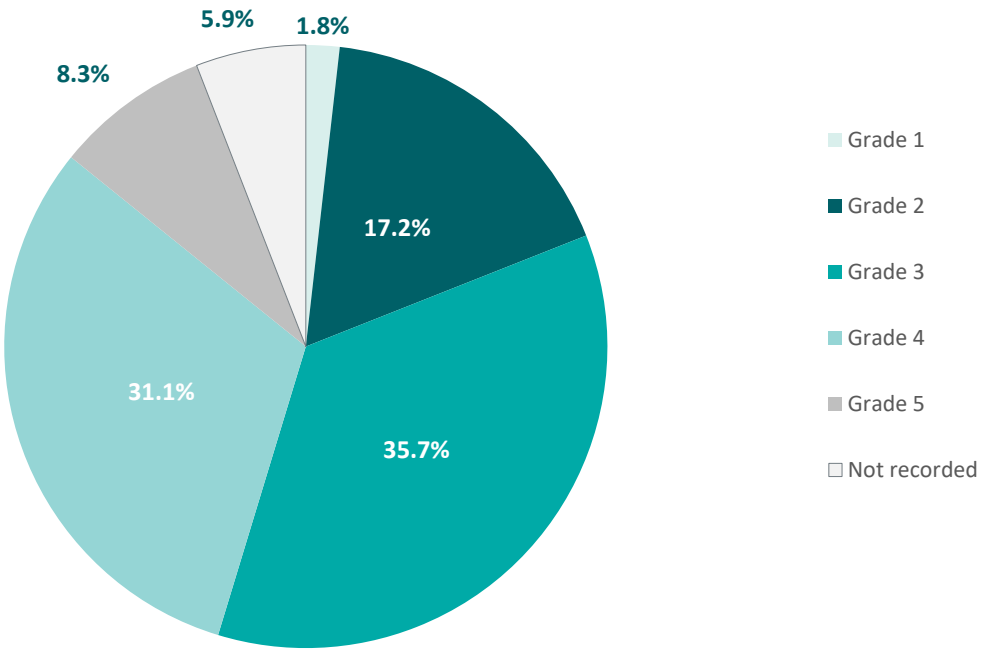
** Interquartile range*

4.4 What was the patient-reported Medical Research Council (MRC) score at assessment?

	2019				Interim
MRC score*	England (n=11,630)	Scotland (n=174)	Wales (n=323)	All (n=12,127)	All (n=6,056)
Grade 1	214 (1.8%)	6 (3.4%)	1 (0.3%)	221 (1.8%)	116 (1.9%)
Grade 2	2,030 (17.5%)	27 (15.5%)	26 (8.0%)	2,083 (17.2%)	998 (16.5%)
Grade 3	4,165 (35.8%)	61 (35.1%)	101 (31.3%)	4,327 (35.7%)	2,147 (35.5%)
Grade 4	3,570 (30.7%)	68 (39.1%)	138 (42.7%)	3,776 (31.1%)	1,908 (31.5%)
Grade 5	956 (8.2%)	3 (1.7%)	51 (15.8%)	1,010 (8.3%)	524 (8.7%)
Not recorded	695 (6.0%)	9 (5.2%)	6 (1.9%)	710 (5.9%)	363 (6.0%)

** Grade 1 – not troubled by breathlessness or strenuous exercise*
Grade 2 – short of breath when hurrying or walking up a slight hill
Grade 3 – walks slower than contemporaries on level ground because of breathlessness or has to stop for breath
Grade 4 – stops to breathe after walking 100 metres (109 yards) or after a few minutes walking on level ground
Grade 5 – too breathless to leave the house or breathless when dressing or undressing

Fig 4.2. MRC score at assessment



4.5 Physical comorbidities

	2019				Interim
Was a history of physical illness recorded for this patient?	England (n=11,615)	Scotland (n=174)	Wales (n=323)	All (n=12,112)	All (n=6,056)
Cardiovascular disease*	4,161 (35.8%)	55 (31.6%)	110 (34.1%)	4326 (35.7%)	2158 (35.6%)
Lower limb or lower back musculoskeletal disorder**	4,125 (35.5%)	55 (31.6%)	135 (41.8%)	4315 (35.6%)	2172 (35.9%)

** Including but not limited to, angina, atrial fibrillation, myocardial infarction, stroke, peripheral vascular disease or heart failure*
*** Including but not limited to, osteoarthritis in the knee, hip or ankle, or lower back pain*

4.6 Mental health comorbidities

	2019				Interim
History of mental illness recorded	England (n=11,611)	Scotland (n=174)	Wales (n=323)	All (n=12,108)	All (n=6,056)
Mental illness	2,307 (19.9%)	29 (16.7%)	71 (22.0%)	2,407 (19.9%)	1,129 (18.6%)

4.6.1 Type of mental illness recorded

	2019				Interim
Type of mental illness recorded	England (n=2,307)	Scotland (n=29)	Wales (n=71)	All (n=2,407)	All (n=1,129)
Anxiety	1,334 (57.8%)	13 (44.8%)	44 (62.0%)	1,391 (57.8%)	675 (59.8%)
Depression	1,672 (72.5%)	20 (69.0%)	57 (80.3%)	1,749 (72.7%)	804 (71.2%)
Severe mental illness*	148 (6.4%)	7 (24.1%)	2 (2.8%)	157 (6.5%)	97 (8.6%)

** Severe mental illness includes clinically diagnosed psychosis; schizophrenia-spectrum disorders, including schizophrenia schizoaffective disorder; severe mood disorders, including bipolar disorder; personality disorders; and behavioural disorders, including eating, sleep or stress disorders.*

Fig 4.3. Types of mental illness in those with a recorded history of mental illness

Section 5: Assessment tests and questionnaires

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Key standards

BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 8]: [1] People attending PR have the outcome of treatment assessed using as a minimum, measures of exercise capacity, dyspnoea and health status.

BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 9]: [1] PR programmes conduct an annual audit of individual outcomes and progress.

Technical standard: field walking tests in chronic respiratory disease[5]

Key findings

Of patients assessed for PR:

- 41.6% completed an incremental shuttle walk test (ISWT) and 42.3% completed a 6-minute walk test (6MWT); 7.6% of patients completed neither test
- 60.6% of those completing an ISWT and 29.7% of those completing a 6MWT test performed a practice walk test at assessment.

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

5.1 Walk tests

5.1.1 Walk tests recorded at initial assessment

	2019				Interim
Test recorded at initial assessment	England (n=11,630)	Scotland (n=174)	Wales (n=323)	All (n=12,127)	All (n=6,056)
Incremental shuttle walk test (ISWT)	4,944 (42.5%)	61 (35.1%)	45 (13.9%)	5,050 (41.6%)	2418 (39.9%)
6-minute walk test (6MWT)	4,770 (41.0%)	96 (55.2%)	259 (80.2%)	5,125 (42.3%)	2622 (43.3%)
ISWT + endurance shuttle walk test (ESWT)*	1,013 (8.7%)	13 (7.5%)	0 (0.0%)	1,026 (8.5%)	549 (9.1%)
Neither ISWT or 6MWT**	903 (7.8%)	4 (2.3%)	19 (5.9%)	926 (7.6%)	467 (7.7%)

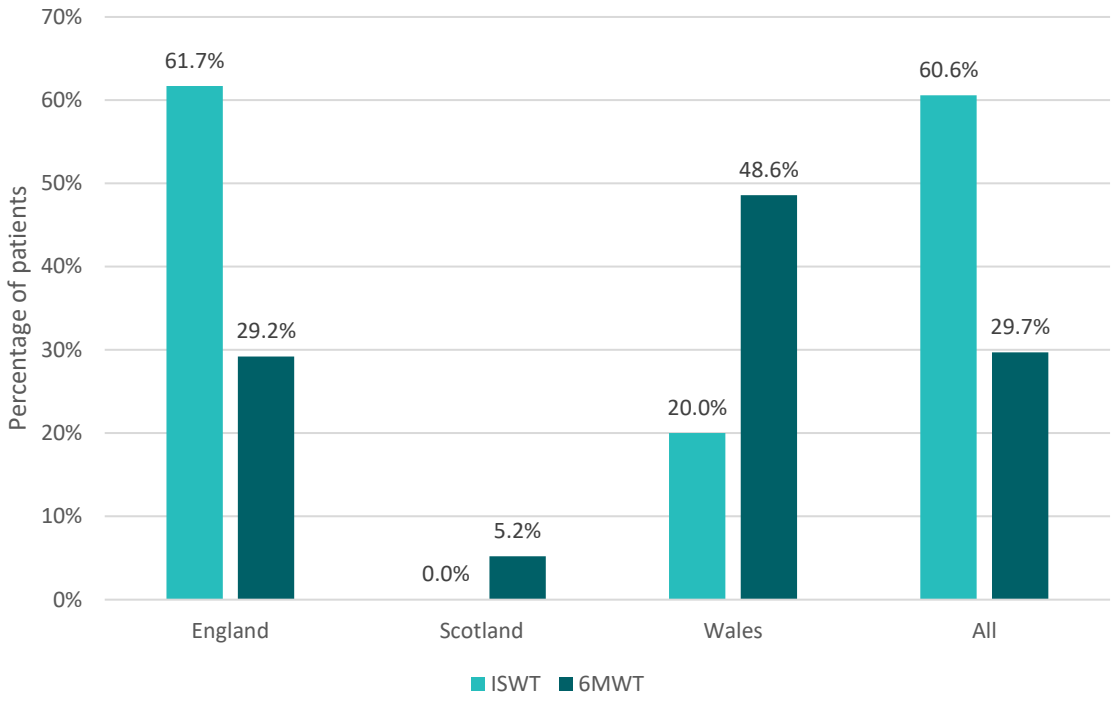
**99.5% of those who did both tests did the ISWT*
***Two people who did neither the ISWT or the 6MWT did however do the endurance test*

5.1.2 Walk test values at initial assessment

	2019				Interim
Walking test values at assessment (metres)	England (n=5,955)	Scotland (n=74)	Wales (n=45)	All (n=6,074)	All (n=2,964)
ISWT					
Median (IQR*)	190 (120–290)	180 (102–300)	180 (120–280)	190 (120–290)	200 (120–290)
Practice walk test completed, n	3,672 (61.7%)	0 (0.0%)	9 (20.0%)	3,681 (60.6%)	1,546 (52.2%)
	England (n=4,772)	**Scotland (n=96)**	**Wales (n=259)**	**All (n=5,127)**	**All (n=2,625)**
6MWT					
Median (IQR)	250 (160–330)	235 (128–300)	230 (150–300)	250 (160–330)	250 (162–330)
Practice walk test completed, n	1,394 (29.2%)	5 (5.2%)	126 (48.6%)	1,525 (29.7%)	792 (30.2%)
	England (n=1,013)	**Scotland (n=13)**	**Wales (n=0)**	**All (n=1,026)**	**All (n=551)**
ESWT					
Median (IQR)	217 (140–332)	114 (94–134)	-	216 (138–332)	220 (141–366)

** Interquartile range*

Fig 5.1. Percentage of patients who performed a practice walk test*



**No services in Scotland performed a practice test for ISWT*

National QI priority C2: Perform ***all*** walk tests to accepted technical standards, including ensuring *all* patients undertake a practice walk test at their initial PR assessment. (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standards 8 and 9***)[1]

Rationale

Accurate measurement of baseline is critical for exercise prescription and outcome assessment. However, 60.6% of patients who performed an ISWT and only 29.7% of patients who performed a 6MWT undertook a practice walk test.

Ensuring that walk tests are conducted to recommended standards, including performing a practice walk test, will ensure:

- assessments are reliable
- exercise can be accurately prescribed
- that outcome assessments following PR are unbiased.[5]

Tips to achieve this priority

- Ensure adequate assessment time for patients to complete a practice walk test.
- Ensure the order of tests and questionnaires allows adequate rest between walk tests.
- Ensure patients understand the importance of the practice walk to optimise benefits of rehabilitation.
- To support correct conducting of walk tests PR services should consider joining the pulmonary rehabilitation services accreditation scheme (**www.prsas.org/**).

5.2 Health status questionnaires

5.2.1 Health status questionnaires recorded at initial assessment

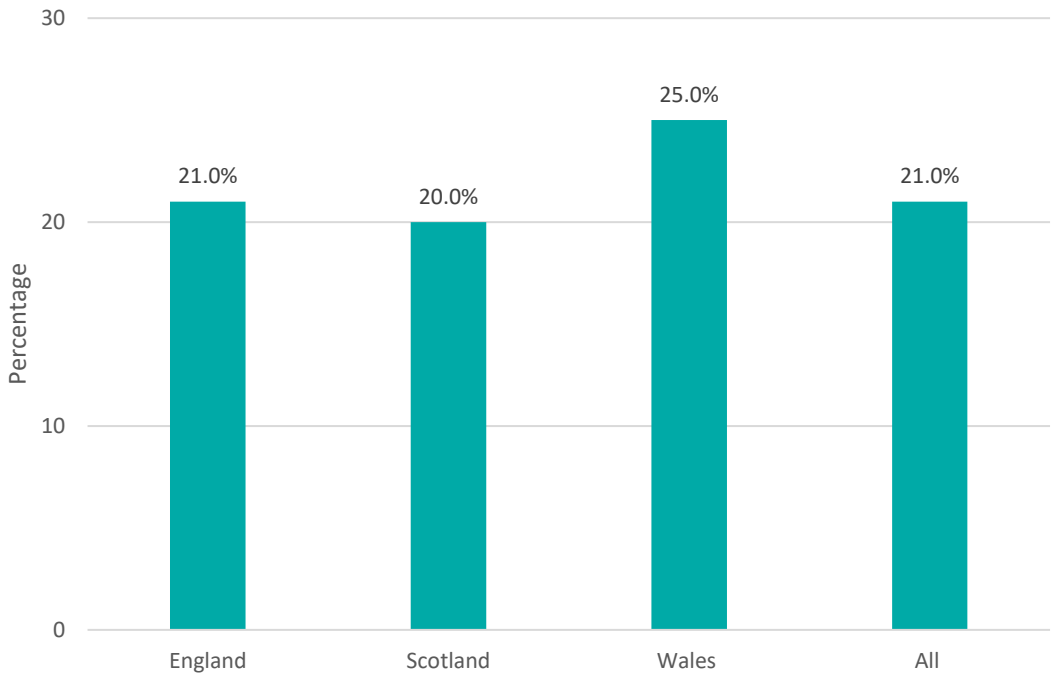
	2019				Interim
Health status questionnaire completion	**England (n=11,630)**	**Scotland (n=174)**	**Wales (n=323)**	**All (n=12,127)**	**All (n=6,056)**
COPD assessment test (CAT)	8,380 (72.1%)	92 (52.9%)	278 (86.1%)	8,750 (72.2%)	4,335 (71.6%)
Chronic respiratory questionnaire (CRQ)	3,908 (33.6%)	55 (31.6%)	38 (11.8%)	4,001 (33.0%)	2,106 (34.8%)

5.2.2 COPD assessment test (CAT) values at initial assessment

	2019				Interim
CAT*	**England (n=8,380)**	**Scotland (n=92)**	**Wales (n=278)**	**All (n=8,750)**	**All (n=4,335)**
Median (IQR)**	21 (16–27)	20 (15–25)	25 (19–30)	21 (16–27)	22 (16–27)

** COPD assessment test values: 0–40*
*** Interquartile range*

Fig 5.2. CAT values at initial assessment



5.2.3 Chronic respiratory questionnaire (CRQ) values at initial assessment

	2019				Interim
CRQ values at assessment	England (n=3,908)	Scotland (n=55)	Wales (n=38)	All (n=4,001)	All (n=2,106)
Dyspnoea average score (1.0–7.0)					
Median (IQR*)	2.6 (2.0–3.4)	2.8 (2.0–3.7)	2.5 (1.8–3.4)	2.6 (2.0–3.4)	2.6 (2.0–3.4)
Fatigue average score (1.0–7.0)					
Median (IQR)	3.2 (2.4–4.2)	3.5 (2.2–4.5)	3.0 (2.3–3.8)	3.2 (2.3–4.2)	3.2 (2.2–4.2)
Emotion average score (1.0–7.0)					
Median (IQR)	4.2 (3.1–5.4)	4.3 (3.4–6.0)	3.6 (2.8–4.9)	4.2 (3.1–5.4)	4.1 (3.2–5.3)
Mastery average score (1.0–7.0)					
Median (IQR)	4.3 (3.2–5.5)	4.5 (3.5–6.0)	3.5 (2.8–4.5)	4.3 (3.2–5.5)	4.2 (3.2–5.5)

** Interquartile range*

Section 6:
Key information relating to the programme

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Key findings

- After the initial assessment, 91.6% of patients were enrolled onto a PR programme. This shows that referrals are being appropriately made by primary and secondary care.
- The majority of patients enrolled entered into a centre-based PR programme (97.9%).
- 66.5% of PR programmes were rolling programmes.
- 1.6% of patients received home-based PR, largely supported with supervised sessions in the home.

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

6.1 Post assessment, was the patient enrolled onto a PR programme?

	2019				Interim
Post assessment, was the patient enrolled onto a PR programme?	England (n=11,630)	Scotland (n=174)	Wales (n=323)	All (n=12,127)	All (n=6,056)
Yes	10,631 (91.4%)	170 (97.7%)	307 (95.0%)	11,108 (91.6%)	5,550 (91.6%)
No – clinically unsuitable	416 (3.6%)	3 (1.7%)	3 (0.9%)	422 (3.5%)	218 (3.6%)
No – patient choice	583 (5.0%)	1 (0.6%)	13 (4.0%)	597 (4.9%)	288 (4.8%)

6.2 Where is the patient's PR programme located?

	2019				Interim
Programme location	England (n=10,631)	Scotland (n=170)	Wales (n=307)	All (n=11,108)	All (n=5,550)
Centre-based	10,397 (97.8%)	169 (99.4%)	307 (100.0%)	10,873 (97.9%)	5,451 (98.2%)
Home-based	175 (1.6%)	0 (0.0%)	0 (0.0%)	175 (1.6%)	71 (1.3%)
Both	59 (0.6%)	1 (0.6%)	0 (0.0%)	60 (0.5%)	28 (0.5%)

6.3 Type of centre-based PR

	2019				Interim
If centre-based,* what type of programme?	England (n=10,631)	Scotland (n=170)	Wales (n=307)	All (n=11,108)	All (n=5,451)
Rolling	6,932 (66.7%)	133 (78.7%)	169 (55.0%)	7,234 (66.5%)	3,600 (66.0%)
Cohort	3,465 (33.3%)	36 (21.3%)	138 (45.0%)	3,639 (33.5%)	1,851 (34.0%)

**Excludes patients who were enrolled in both centre-based and home-based*

6.4 Total number of supervised centre-based PR sessions scheduled

	2019				Interim
Total number of supervised PR sessions scheduled*	England (n=10,397)	Scotland (n=169)	Wales (n=307)	All (n=10,873)	All (n=5,451)
Median (IQR**)	12 (12–13)	12 (10–14)	14 (12–14)	12 (12–13)	12 (12–14)

**Excludes patients who were enrolled in both centre-based and home-based*
*** Interquartile range*

6.4.1 Group and individual centre-based sessions

	2019				Interim
Group and individual centre-based sessions*	England (n=10,397)	Scotland (n=169)	Wales (n=307)	All (n=10,873)	All (n=5,451)
Patients who received centre-based group sessions	9,636 (92.7%)	155 (91.7%)	301 (98.0%)	10,092 (92.8%)	5110 (93.7%)
Patients who received centre-based individual sessions	934 (9.0%)	20 (11.8%)	13 (4.2%)	967 (8.9%)	522 (9.6%)

**Some patients had group sessions and 1:1 sessions so numbers may add up to more than 100%*

6.5 Number of supervised centre-based PR sessions received

	2019				Interim
Number of supervised centre-based PR sessions received Median (IQR*)	**England (n=9,636)**	**Scotland (n=155)**	**Wales (n=307)**	**All (n=10,873)**	**All (n=5,451)**
Group sessions**	11 (7–12)	8 (5–12)	12 (8–14)	11 (7–12)	11 (7–12)
1:1 sessions***	1 (1–2)	2 (2–2)	1 (1–2)	1 (1–2)	1 (1–2)
Total	11 (6–12)	7 (4–12)	12 (8–14)	11 (6–12)	11 (6–12)

** Interquartile range*
*** Excludes patients who had both group and 1:1 sessions*
****Out of those who did at least one session*

6.6 Total number of home-based PR sessions scheduled*

A small number of patients participated in home-based PR (n=175, 1.6%). The median (IQR) range of supervised sessions scheduled in the home was 4 (4–6). All home-based PR was delivered in England.

**Excluding those who were enrolled in both centre-based and home-based*

6.6.1 Method of home-based PR sessions*

The majority of the home-based PR sessions were supervised in person (n=136 (77.7%)). Other home-based contact included:

- telephone calls (n=70 (40.0%))
- technology-based PR (video conferencing) (n=4 (2.3%))
- other digital communication (n=3 (1.7%)).

**Services could select multiple options and therefore results can be more than 100%.*

No services offered group-based video conferencing sessions. These home-based programmes were all based in England.

6.7 Number of home-based PR sessions received*

The median (IQR) number of home-based supervised sessions received was 3 (2–4); phone supervision was 2 (1–4), technology- based 1 (1–1) and other digital communication was 3 (2–8). No services selected videoconferencing – group sessions.

**Out of those who did at least one session*

Section 7:
Key information at discharge

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Key standards

BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 4]: [1]
PR programmes are of at least 6 weeks duration and include a minimum of twice-weekly supervised sessions.

BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 7]: [1] People completing PR are provided with an individualised structured, written plan for ongoing exercise maintenance.

Key findings

Of patients assessed for PR between 1 June and 30 November 2019, and enrolled:

- 66.7% had a discharge assessment
- for those with a history of cardiovascular disease (OR = 0.81 (95% CI = 0.74–0.89)) and depression (OR = 0.73 (95% CI = 0.63–0.83)) there was reduced likelihood of completing a discharge assessment
- those in the most deprived areas of England, Scotland and Wales were less likely to attend their discharge assessment compared with those in the least deprived areas
- 81.0% of patients received an individualised discharge plan.

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

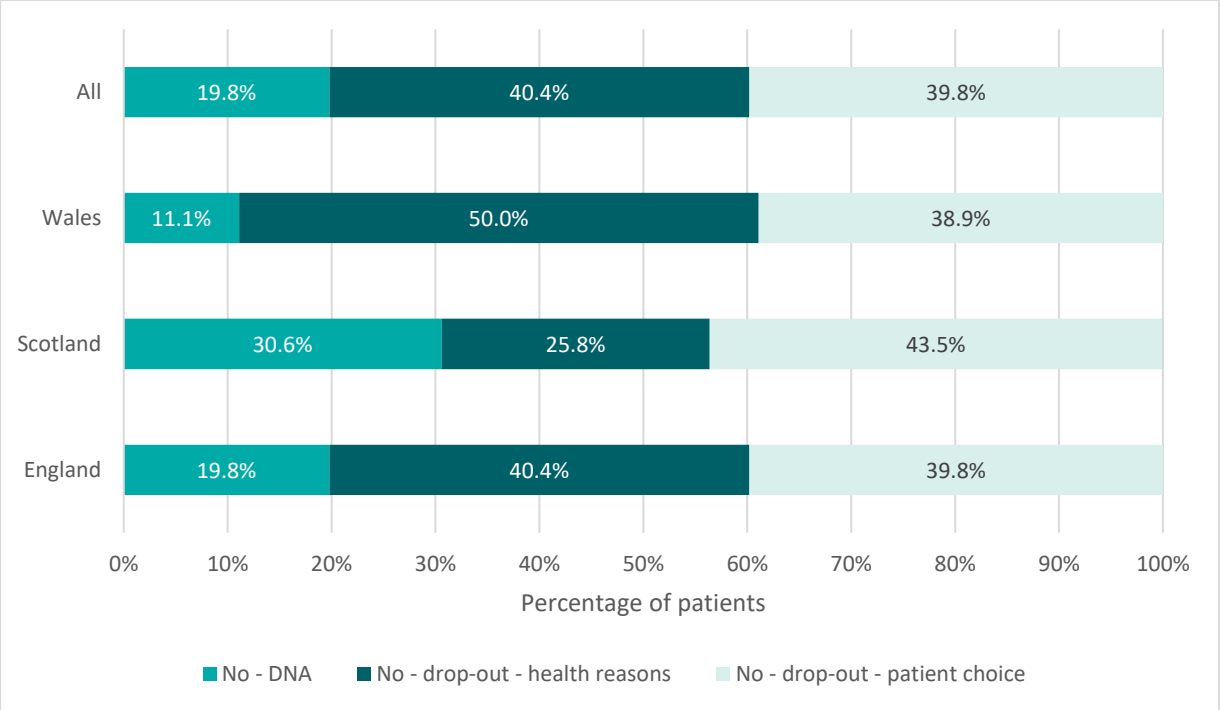
7.1 Discharge assessment

7.1.1 Discharge assessment performed

	2019				Interim
Discharge assessment performed	England (n=10,631)	Scotland (n=170)	Wales (n=307)	All (n=11,108)	All (n=5,550)
Yes	7,063 (66.4%)	108 (63.5%)	235 (76.5%)	7,406 (66.7%)	3,848 (69.3%)
No	3,568 (33.6%)	62 (36.5%)	72 (23.5%)	3,702 (33.3%)	1,702 (30.7%)
Completion ratio*	2.0:1	1.7:1	3.3:1	2.0:1	2.3:1

**Ratio of patients who started PR to those completing a discharge assessment*

Fig 7.1. Reason for not performing a discharge assessment



7.1.2 Discharge assessment by programme type: rolling and cohort

	2019				Interim
Discharge assessment by programme type	England (n=6,932)	Scotland (n=133)	Wales (n=169)	All (n=7,234)	All (n=3,600)
Discharge assessment performed: rolling programmes					
Yes	4,486 (64.7%)	86 (64.7%)	117 (69.2%)	4,689 (64.8%)	2,423 (67.3%)
	England (n=3,465)	Scotland (n=36)	Wales (n=138)	All (n=3,639)	All (n=1,851)
Discharge assessment performed: cohort programmes					
Yes	2,449 (70.7%)	22 (61.1%)	118 (85.5%)	2,589 (71.1%)	1,371 (74.1%)

For home-based programmes, a smaller proportion of patients completed a discharge assessment compared with either cohort- or centre-based rolling programmes (n=90, 51.4%). These were all completed in England. For patients who received a hybrid model of home- and centre-based sessions, 63.3% (n=38) completed a discharge assessment. This model was only delivered in England.

7.1.3 Likelihood of completing a discharge assessment based on demographic characteristics

	2019			
Variable	**Unadjusted odds ratio***	**Unadjusted odds ratio 95% confidence interval**	**Adjusted odds ratio****	**Adjusted odds ratio 95% confidence interval**
Female	0.86	0.80–0.94	0.91	0.84–0.99
Quintile of Index of Multiple Deprivation, England (IMD) / Welsh Index of Multiple Deprivation (WIMD) / Scotland (SIMD)				
1 (most deprived)	1	-	1	-
2	1.26	1.12–1.43	1.19	1.05–1.34
3	1.47	1.29–1.68	1.28	1.12–1.46
4	1.64	1.43–1.88	1.40	1.21–1.61
5 (least deprived)	2.03	1.75–2.37	1.65	1.41–1.93
Age				
35–44	0.39	0.26–0.59	0.50	0.32–0.76
45–54	0.42	0.35–0.49	0.54	0.45–0.65
55–64	0.62	0.56–0.69	0.73	0.65–0.82
65–74	1	-	1	-
75–84	1.01	0.91–1.12	0.96	0.86–1.07
85+	1.00	0.81–1.24	0.93	0.75–1.16
Comorbidities				
Cardiovascular history	0.86	0.79–0.94	0.81	0.74–0.89
Musculoskeletal history	0.82	0.75–0.89	0.88	0.80–0.97
Serious mental illness	0.30	0.21–0.43	0.42	0.29–0.62
Anxiety	0.59	0.52–0.67	0.87	0.75–1.01
Depression	0.53	0.47–0.60	0.73	0.63–0.83
CAT score at initial visit				
0–10	2.01	1.66–2.43	1.70	1.40–2.06
11–20	1.63	1.45–1.82	1.45	1.29–1.62
21–30	1	-	1	-
31–40	0.63	0.55–0.73	0.74	0.64–0.87

**Centre remains as a random intercept to account for clustering*
***Adjusted for all other variables in the model*

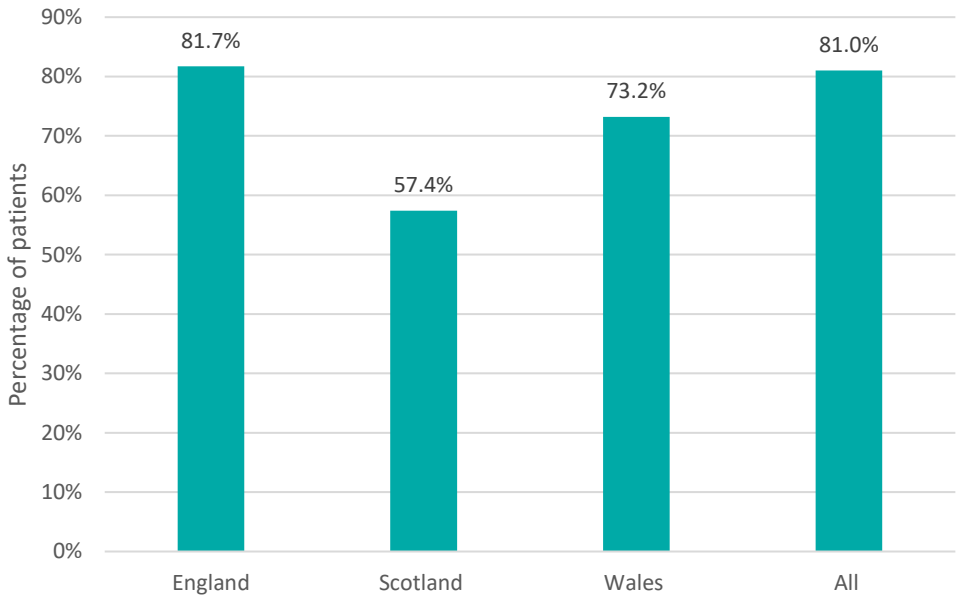
In the unadjusted analyses, those with a higher IMD score, a higher age (except for those aged 85+) and a lower CAT score were more likely to attend their discharge assessment in both the adjusted and unadjusted analyses. Those with a cardiovascular disease history, musculoskeletal disease history, serious mental illness, or depression, were less likely to attend their discharge assessment in the both unadjusted and adjusted analyses, and those with anxiety were less likely to attend their discharge assessment in the unadjusted analysis but this result was not significant in the adjusted analysis. However, after adjusting for all other variables, only a history of cardiovascular disease and depression remained statistically significant. Female patients were less likely to attend a discharge assessment in both the unadjusted and adjusted analysis.

7.1.4 Number of patients receiving an individualised discharge plan*

	2019				Interim
Patients receiving individualised discharge plan	**England (n=7,063)**	**Scotland (n=108)**	**Wales (n=235)**	**All (n=7,406)**	**All (n=3,848)**
Yes	5,768 (81.7%)	62 (57.4%)	172 (73.2%)	6,002 (81.0%)	3,052 (79.3%)

**Of those patients who had a discharge assessment*

Fig 7.2. If discharge assessment performed, percentage of patients receiving an individualised written discharge exercise plan

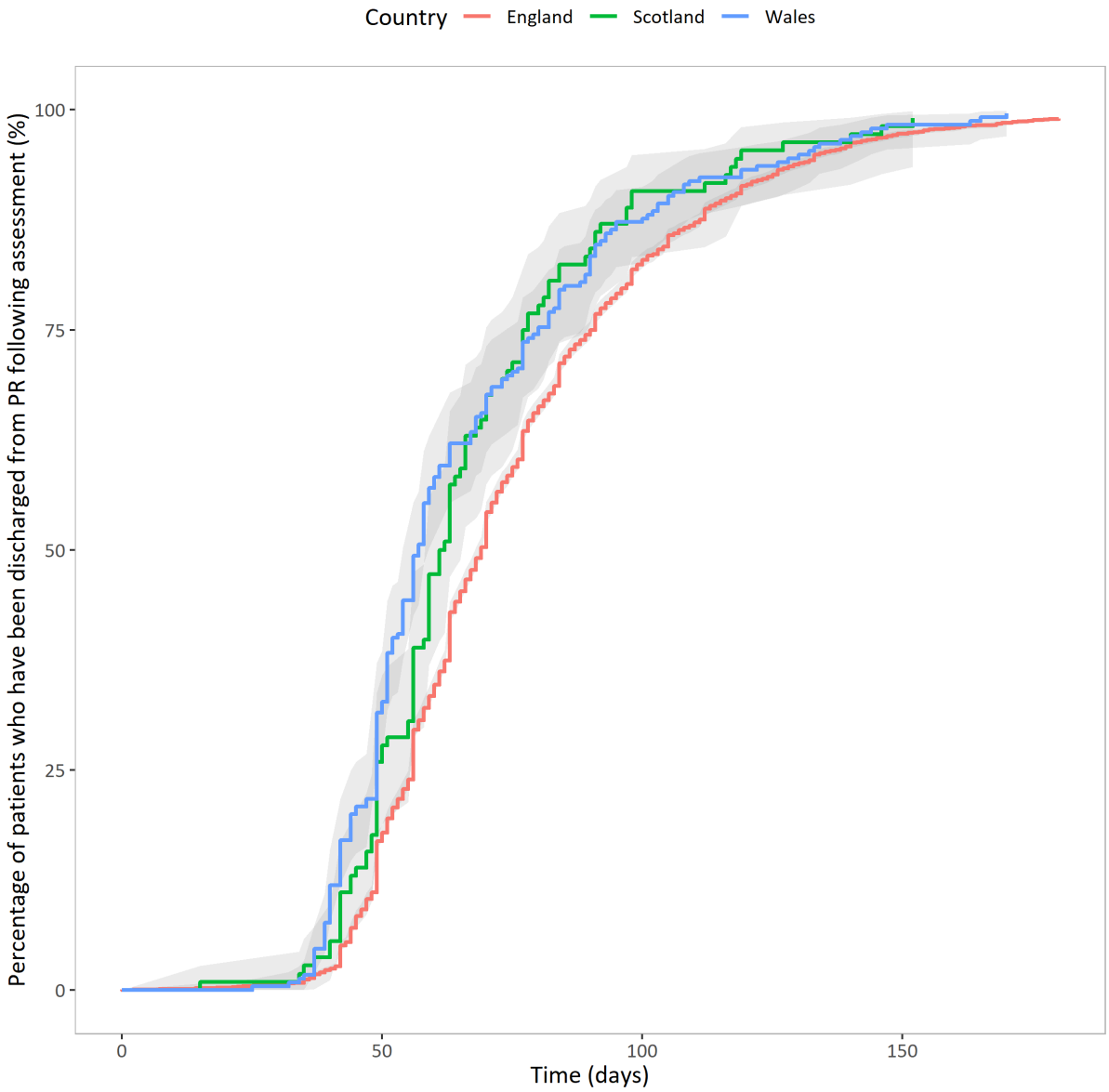


7.1.5 Days from initial assessment to discharge assessment*

	2019				Interim
Days from initial assessment to discharge assessment	**England (n=7,063)**	**Scotland (n=108)**	**Wales (n=235)**	**All (n=7,406)**	**All (n=3,848)**
Median (IQR)**	69 (56–91)	62 (49–77)	57 (49–80)	69 (56–90)	69 (56–86)

** Refer to Table 3.2.1 for the referral to start time for PR to understand where the blocks may be*
*** Interquartile range*

Fig 7.3. Percentage of patients who have been discharged from PR following assessment*



**Denominator for Fig 7.3 is all those patients discharged from pulmonary rehabilitation.*

National QI priority C3: Complete PR programmes and discharge assessments for **70%** of patients enrolled for PR. (***BTS quality standards for pulmonary rehabilitation in adults (2014). Standards 4***)[1]

Rationale

There are substantial patient-centred benefits of completing PR, namely a marked improvement in exercise capacity and health status. There is also an association between PR completion and lower hospital admission rates at 180 days.[3]

Tips to achieve this priority

- Incorporate a process to contact patients who have stopped attending to encourage reengagement and completion.
- Involve patients who have previously completed a rehabilitation programme to encourage participation and support completion.
- Ensure the patient receives clear information about the rehabilitation programme and the required commitment.

Section 8: Discharge tests

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Key standards

BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 8]:[1] People attending PR have the outcome of treatment assessed using as a minimum, measures of exercise capacity, dyspnoea and health status.

BTS quality standards for pulmonary rehabilitation in adults (2014) [Standard 9]: [1] PR programmes conduct an annual audit of individual outcomes and progress.

Key findings

Of patients completing a discharge assessment:

- for those with an MRC score reported at initial and discharge assessment, 39.5% reported an improved score
- 70.5% who performed the 6-minute walk test (6MWT) achieved improvements in exercise capacity and 60.4% who performed the incremental shuttle walk test (ISWT) achieved improvements
- 55.5% who completed the CAT achieved improvements in health status and 58.5% who completed the dyspnoea domain of the CRQ achieved improvements.

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

8.1 What was the patient-reported MRC score at discharge?

	2019				Interim
MRC score*	England (n=7,063)	Scotland (n=108)	Wales (n=235)	All (n=7,406)	All (n=3,848)
Grade 1	344 (4.9%)	5 (4.6%)	3 (1.3%)	352 (4.8%)	192 (5.0%)
Grade 2	1,918 (27.2%)	21 (19.4%)	47 (20.0%)	1,986 (26.8%)	983 (25.5%)
Grade 3	2,204 (31.2%)	36 (33.3%)	81 (34.5%)	2,321 (31.3%)	1,112 (28.9%)
Grade 4	977 (13.8%)	9 (8.3%)	55 (23.4%)	1,041 (14.1%)	566 (14.7%)
Grade 5	160 (2.3%)	0 (0.0%)	3 (1.3%)	163 (2.2%)	70 (1.8%)
Not recorded	1,460 (20.7%)	37 (34.3%)	46 (19.6%)	1,543 (20.8%)	925 (24.0%)

**N = people who received a discharge assessment*

8.1.1 MRC dyspnoea score at assessment and at discharge

The answers in the table below have been calculated using the answers to 7.1 (MRC score at discharge) and 3.5 (MRC score at initial assessment).

MRC grade was known at both initial and discharge assessments for 5,863 patients. In 2,315 (39.5%) patients, the MRC grade improved (green shading), in 3,147 (53.7%) it stayed the same (orange shading) and in 345 (5.9%) it was worse (red shading).

Score at discharge (top) Score at initial assessment (left)	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Not recorded
Grade 1	69	25	9	3	0	18
Grade 2	170	877	130	22	3	253
Grade 3	77	818	1,334	112	7	488
Grade 4	30	218	729	749	34	374
Grade 5	2	34	91	146	118	75
Not recorded	4	14	28	9	1	335

8.2 Walk tests

8.2.1 Walk tests recorded at discharge assessment

	2019				Interim
Test recorded at discharge assessment	England (n=6,909)	Scotland (n=107)	Wales (n=228)	All (n=7,244)	All (n=3,761)
Incremental shuttle walk test (ISWT)	3,164 (45.8%)	33 (30.8%)	43 (18.9%)	3,240 (44.7%)	1,591 (42.3%)
6-minute walk test (6MWT)	2,809 (40.7%)	56 (52.3%)	180 (78.9%)	3,045 (42.0%)	1,673 (44.5%)
Incremental shuttle walk test (ISWT) + Endurance shuttle walk test (ESWT)	642 (9.3%)	0 (0.0%)	0 (0.0%)	642 (8.9%)	363 (9.7%)
None	294 (4.3%)	18 (16.8%)	5 (2.2%)	317 (4.4%)	134 (3.6%)

8.2.2 Difference in walk test values between initial assessment and discharge assessment

	2019				Interim
Median difference (IQR)*,**	England (n=6,909)	Scotland (n=107)	Wales (n=228)	All (n=7,244)	All (n=3,761)
ISWT (m) (n=3,882)	50 (10–90)	50 (20–90)	70 (10–110)	50 (10–90)	50 (10–90)
6MWT (m) (n=3,045)	52 (20–100)	40 (10–70)	40 (20–80)	50 (20–100)	50 (20–92)
ESWT (secs) (n=670)	198 (58–508)	104 (25–372)	NA (NA–NA)	196 (57–507)	225 (73–564)

** Interquartile range; N = people who received any test (including those who received ESWT but not ISWT or 6MWT).*
***It is important to note that the data in this table only refers to those who received a discharge assessment and performed a walk test at discharge.*

8.3 Difference between initial assessment and discharge assessment in walk test values: tests meeting MCID

The scientific evidence provides thresholds for changes in these outcome measures that are judged important by patients (termed the minimal clinically important difference (MCID)).[5,6] For the ISWT the MCID is 35 metres[†] and for the 6MWT the MCID is 30 metres. For the ESWT the scientific evidence for the MCID is less clear and is therefore not reported in this audit.

8.3.1 ISWT and 6MWT scores meeting MCID

	2019				Interim
ISWT and 6MWT meeting MCID	England (n=3,806)	Scotland (n=33)	Wales (n=43)	All (n=3,882)	All (n=1,952)
ISWT					
Yes	2,297 (60.4%)	20 (60.6%)	26 (60.5%)	2,343 (60.4%)	1,043 (53.4%)
	(n=2,809)	(n=56)	(n=180)	(n=3,045)	(n=1,675)
6MWT					
Yes	1,995 (71.0%)	38 (67.9%)	114 (63.3%)	2,147 (70.5%)	1,126 (67.2%)

[†] Although some evidence now suggests that this is actually 35–36 metres (**Thorax. 2019 Oct;74(10):994–95**)

8.3.2 Likelihood of meeting MCID on walking tests based on demographic characteristics

	2019			
Variable	Unadjusted odds ratio*	Unadjusted odds ratio 95% confidence interval	Adjusted odds ratio*	Adjusted odds ratio 95% confidence interval
Female	1.02	0.92–1.13	0.98	0.89–1.09
Quintile of Index of Multiple Deprivation, England (IMD) / Welsh Index of Multiple Deprivation (WIMD) / Scotland (SIMD)				
1	1	-	1	-
2	0.92	0.79–1.09	0.95	0.80–1.11
3	1.06	0.89–1.25	1.10	0.93–1.30
4	0.83	0.70–0.98	0.87	0.73–1.03
5	0.75	0.62–0.89	0.80	0.67–0.96
Age				
35–44	0.54	0.28–1.03	0.48	0.25–0.93
45–54	1.29	0.99–1.68	1.20	0.92–1.57
55–64	1.18	1.01–1.37	1.12	0.97–1.31
65–74	1	-	1	-
75–84	0.87	0.77–0.98	0.89	0.78–1.00
85+	0.74	0.57–0.94	0.77	0.60–0.98
Comorbidities				
Cardiovascular history	0.94	0.84–1.05	0.96	0.86–1.08
Musculoskeletal history	1.03	0.92–1.15	1.02	0.91–1.14
Serious mental illness	0.74	0.41–1.34	0.67	0.37–1.22
Anxiety	1.20	1.00–1.45	1.09	0.89–1.34
Depression	1.20	1.02–1.42	1.08	0.90–1.31
CAT score at initial visit				
0–10	0.78	0.64–0.95	0.82	0.67–1.00
11–20	0.96	0.84–1.10	1.00	0.88–1.15
21–30	1	-	1	-
31–40	1.21	0.97–1.51	1.17	0.94–1.46

**Centre remains as a random intercept to account for clustering*
***Adjusted for all other variables in the model*

In the unadjusted analysis, higher IMD quintile, higher age, anxiety, depression and a lower CAT score were all independently associated with a decreased likelihood for meeting the MCID for exercise. After adjusting for all variables in the model, only lower CAT score, being in the highest and lowest age brackets, and being in the highest IMD quintile was associated with a decrease in likelihood in achieving the MCID for exercise. It is worth noting that the analysis does not include those who did not receive a discharge assessment, and so variables associated with an increased likelihood of meeting the MCID may in fact also be associated with an increased likelihood of not completing a discharge assessment.

8.4 Health status questionnaires

8.4.1 Health status questionnaires recorded at discharge assessment

	2019				Interim
Health status questionnaire recorded at discharge assessment	England (n=6,572)	Scotland (n=73)	Wales (n=230)	All (n=6,875)	All (n=2,708)
COPD assessment test (CAT)	5,085 (96.5%)	61 (96.8%)	217 (98.2%)	5,363 (96.6%)	2,708 (95.7%)
CRQ	**(n=2,633)**	**(n=34)**	**(n=32)**	**(n=2,699)**	**(n=1,425)**
Chronic respiratory questionnaire (CRQ)	2,569 (97.6%)	31 (91.2%)	32 (100.0%)	2,632 (97.5%)	1,425 (97.6%)

8.4.2 Difference in health status questionnaire values between initial assessment and discharge assessment

	2019				Interim
Mean difference (95% CI*)	England (n=6,572)	Scotland (n=73)	Wales (n=230)	All (n=6,875)	All (n=2,708)
CAT values (n=5,363)	–2 (–6–1)	–2 (–6–0)	–3 (–7–1)	–2 (–6–1)	–2 (–6–1)
CRQ	**(n=2,569)**	**(n=31)**	**(n=32)**	**(n=2,632)**	**(n=1,425)**
CRQ – Dyspnoea (n=2,632)	0.8 (0.0–1.6)	0.8 (–0.1–1.6)	0.6 (0.2–1.5)	0.8 (0.0–1.6)	0.8 (0.0–1.6)
CRQ – Fatigue (n=2,632)	0.5 (0.0–1.5)	0.5 (0.0–1.4)	0.6 (0.2–1.2)	0.5 (0.0–1.5)	0.7 (0.0–1.5)
CRQ – Emotion (n=2,632)	0.5 (0.0–1.2)	0.4 (0.0–1.2)	0.3 (–0.3–1.3)	0.5 (0.0–1.2)	0.6 (0.0–1.3)
CRQ – Mastery (n=2,632)	0.5 (0.0–1.2)	0.2 (–0.6–1.0)	0.9 (0.0–1.5)	0.5 (0.0–1.2)	0.5 (0.0–1.5)

** 95% confidence interval*

8.5 Difference between initial assessment and discharge assessment in health status questionnaire values: change data in relation to MCID

The scientific literature provides thresholds for changes in these health status outcome measures that are judged important by patients (termed the MCID).[7, 8] For the CAT the MCID is a reduction in 2 points and for the CRQ the MCID is an increase in 0.5 points for each domain.

8.5.1 Health status questionnaire scores meeting MCID

	2019				Interim
Meeting MCID	**England (n=5,085)**	**Scotland (n=61)**	**Wales (n=217)**	**All (n=5,363)**	**All (n=2,708)**
CAT values	2,818 (55.4%)	35 (57.4%)	126 (58.1%)	2,979 (55.5%)	1,571 (58.0%)
CRQ	**(n=2,569)**	**(n=31)**	**(n=32)**	**(n=2,632)**	**(n=1,425)**
Dyspnoea values	1,506 (58.6%)	17 (54.8%)	17 (53.1%)	1,540 (58.5%)	835 (58.6%)
Fatigue values	1,494 (58.2%)	16 (51.6%)	22 (68.8%)	1,532 (58.2%)	841 (59.0%)
Emotion values	1,305 (50.8%)	14 (45.2%)	14 (43.8%)	1,333 (50.6%)	765 (53.7%)
Mastery values	1,388 (54.0%)	15 (48.4%)	18 (56.2%)	1,421 (54.0%)	830 (58.2%)

8.5.2 Likelihood of meeting MCID on a health status questionnaire based on demographic characteristics

	2019			
Variable	Unadjusted odds ratio*	Unadjusted odds ratio 95% confidence interval	Adjusted odds ratio**	Adjusted odds ratio 95% confidence interval
Female	1.02	0.91–1.14	0.96	0.85–1.08
Quintile of Index of Multiple Deprivation, England (IMD) / Welsh Index of Multiple Deprivation (WIMD) / Scotland (SIMD)				
1	1	-	1	-
2	1.05	0.88–1.26	1.13	0.94–1.37
3	0.92	0.76–1.10	1.06	0.87–1.28
4	0.79	0.65–0.95	0.92	0.76–1.12
5	0.86	0.70–1.04	1.04	0.84–1.28
Age				
35–44	1.58	0.72–3.49	1.21	0.52–2.79
45–54	1.67	1.23–2.26	1.36	0.99–1.87
55–64	1.11	0.94–1.30	0.91	0.77–1.07
65–74	1	-	1	-
75–84	0.95	0.84–1.08	0.99	0.87–1.13
85+	0.95	0.73–1.25	0.98	0.75–1.30
Comorbidities				
Cardiovascular history	0.97	0.86–1.09	0.95	0.84–1.08
Musculoskeletal history	1.20	1.06–1.36	1.12	0.98–1.27
Serious mental illness	0.70	0.37–1.31	0.53	0.28–1.01
Anxiety	1.31	1.07–1.61	1.20	0.95–1.51
Depression	1.14	0.95–1.36	0.86	0.70–1.06
CAT score at initial visit				
0–10	0.23	0.19–0.29	0.23	0.19–0.29
11–20	0.49	0.42–0.56	0.48	0.42–0.56
21–30	1	-	1	-
31–40	2.22	1.70–2.90	2.24	1.71–2.93

**Centre remains as a random intercept to account for clustering*
***Adjusted for all other variables in the model*

Analyses show the association between each variable and the likelihood of meeting at least one MCID at discharge assessment. In the unadjusted analyses, a history of musculoskeletal disease and anxiety were associated with an increased likelihood of meeting the MCID for health status, however this association was no longer present when adjusted for all other variables. After adjusting for all other variables, a higher CAT score at initial assessment was strongly associated with an increased likelihood of meeting the MCID, and history of severe mental illness was borderline associated. This may be because those with more serious disease and disease history find PR of greater benefit with regards to their perceived health status than those with milder disease and disease history. It is worth noting that the analysis does not include those who did not receive a discharge assessment, and so variables associated with an increased likelihood of meeting the MCID may in fact also be associated with an increased likelihood of not completing a discharge assessment.

Section 9:
Benchmarked key indicators

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9.1 Benchmarking of key indicators for participating services

The process and outcome performance indicators identified in the dashboard (**Table 2**) have been chosen as they:

- are objective and easily recordable
- map to accepted quality standards (**Appendix C**)
- have been discriminatory in the current audit cycle
- can be quantitatively compared with national data.

Table 1. Rationale for each process and outcome measure

Benchmarking dashboard performance indicator	Rationale
Process items	
Start date offered within 90 days of receipt of referral (if known)	> Poor current performance nationally. > Maps to **QS1**.[1] > Improvement is likely to enhance patient outcomes, particularly PR uptake rates.
Patients undertaking practice walk test (for incremental shuttle walk test (ISWT) or 6-minute walk test (6MWT))	> Poor current performance nationally. > Maps to **QS8**. [1] > Performance of practice tests linked to better uptake and outcome in sub-analysis of 2015 audit.[3,4] > Likely to improve clinical outcomes through more accurate exercise prescription.
Patients enrolled for PR who go on to have a discharge assessment	> Substantial numbers of patients currently do not complete PR. > Improvement in completion rates would extend benefits of PR to larger numbers of patients. > Could reduce subsequent hospitalisation rates as suggested by 2015 outcomes report.[3] > Causes of non-completion are multifactorial and therefore will prompt quality improvement activity across the system.
Patients with a discharge assessment who receive a written discharge exercise plan	> Poor current performance nationally. > Maps to **QS7**. [1] > Improvement will increase the likelihood of benefits of PR being maintained in longer term.
Outcome items	
Patients experience an improvement in exercise capacity (evidenced by achieving the minimal clinically important differences (MCID) for ISWT or 6MWT)	> Key patient-centred measure of outcome. > May identify services where care processes are suboptimal. > Maps to **QS8.** [1]
Patients experience an improvement in health status (**evidenced by achieving at least one health status MCID**)	> Key patient-centred measure of outcome. > May identify services where care processes are suboptimal. > Maps to **QS8.** [1]

Table 2 shows the median, lower quartile and upper quartile for the key indicators that have been presented in the unadjusted benchmarking of services (Table 3). The values presented in Table 2 have been derived by the method shown visually in the box and whisker plot (Fig 1). More specifically, to create the 'box', data for each key indicator were ordered numerically from smallest (whisker; P0), to largest (whisker; P100) to find the median (P50), the middle point of the values, the data is divided into two halves. These two halves are then divided in half again, to identify the lower quartile (P25) and the upper quartile (P75).

Table 2. The median and interquartile ranges for each key indicator

	Process items				Outcome items	
Median and interquartile ranges %‡	**Start date within 90 days of receipt of referral***	**Patients undertaking practice walk test**	**Patients enrolled for PR who go on to have a discharge assessment**	**Patients with a discharge assessment who receive a written discharge exercise plan**	**Improvement in exercise capacity**	**Improvement in health status**
Lower quartile	**26**	**0**	**57**	**64**	**54**	**54**
Median	**55**	**16**	**70**	**97**	**64**	**69**
Upper quartile	**80**	**93**	**79**	**100**	**77**	**88**

** This metric is only reported for non-AECOPD patients. Data is not directly comparable to the 2017 snapshot audit, as data was reported for all patients in 2017.*[9]

The colours refer to the quartile in which each result lies:

Red = Result equal to or below lower quartile for that indicator

Amber = Result above lower quartile but below upper quartile for that indicator

Green = Result equal to or above upper quartile for that indicator

<5 = Sample size too small for meaningful interpretation (<5 records)

‡ The cut-points for the third and fifth indicator suggest excessive clustering at the extremes.

Fig 1. Box and whisker plot

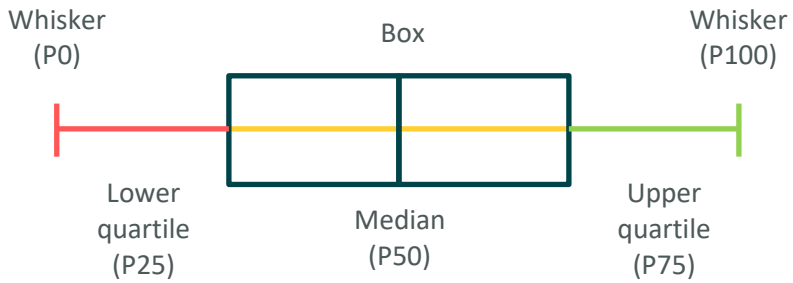

Table 3. Unadjusted benchmarking of key indicators for participating services in England, Scotland and Wales

This benchmarking data is provided for patients that were assessed between 1 June and 30 November 2019. The data represents in total over 12,127 patients. This table provides service data for four process and two outcome performance indicators that map onto the BTS quality standards.[1]

Process

- Start date within 90 days of receipt of referral
- Patients undertaking practice walk test
- Patients enrolled for PR who go on to have a discharge assessment
- Patients with a discharge assessment who received a written individualised exercise plan

Outcomes

- Improvement in exercise capacity
- Improvement in health status

These outcomes have been selected based on previous data reports and allow a comparison with the national medians and performance.

For some services the number of patients entered is very low and makes interpretation at a local level difficult. Services with less than five data points to analyse have been included in the table in name only, their data has been supressed as per the NACAP policy for supressing small numbers if there is a risk of individual patients being identified.

Table 3. Benchmarked key indicators for pulmonary rehabilitations services 1 June – 30 November 2019

			Process items								Outcome items			
Trust / health board name	Service name	Case audited	Start date within 90 days of receipt of referral*		Patients undertaking practice walk test		Patients enrolled for PR who go on to have a discharge assessment		Patients with a discharge assessment who received a written individualised exercise plan		Improvement in exercise capacity		Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)	
National QI aim			85%		100%		70%		-		-		-	
National result		12,127	5,354	54%	5,206	46%	7,406	67%	6,002	81%	4,490	65%	4,572	68%
England														
Airedale NHS Foundation Trust	Airedale, Wharfedale and Craven Pulmonary Rehabilitation Service	72	13	23%	<5	-	55	79%	22	40%	37	70%	29	53%
Anglian Community Enterprise Community Interest Company (ACE CIC)	ACE Pulmonary Rehabilitation Service	56	31	67%	50	89%	42	76%	42	100%	15	38%	37	88%
Atrium Health Ltd	Atrium Coventry and Warwickshire Pulmonary Rehabilitation Service	35	28	85%	<5	-	23	70%	23	100%	14	61%	17	89%
Barnet, Enfield and Haringey Mental Health NHS Trust	Enfield Respiratory Service	18	<5	-	<5	-	13	72%	8	62%	11	85%	10	83%
Barts Health NHS Trust	Tower Hamlets Pulmonary Rehabilitation Service	35	13	57%	23	79%	12	38%	11	92%	7	58%	<5	-
Bedford Hospital NHS Trust	Bedford Hospital Pulmonary Rehabilitation	167	123	88%	<5	-	73	49%	73	100%	45	69%	36	49%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Berkshire Healthcare NHS Foundation Trust	Berkshire West Cardiac and Respiratory Specialist Services	90	7	11%	61	68%	68	78%	68	100%	34	50%	42	63%
Birmingham Community Healthcare NHS Foundation Trust	BCHC Community Respiratory Service	100	38	44%	100	100%	69	75%	69	100%	37	54%	64	93%
Blackpool Teaching Hospitals NHS Foundation Trust	Pulmonary Rehabilitation Service Fylde and Wyre	66	41	66%	0	0%	47	72%	46	98%	36	80%	N/A	N/A
BOC Healthcare LTD	Blackpool Pulmonary Rehabilitation Service	29	19	83%	0	0%	22	76%	<5	-	14	64%	11	52%
BOC Healthcare LTD	Bradford Pulmonary Rehabilitation Service	160	66	55%	<5	-	66	54%	66	100%	48	74%	37	57%
BOC Healthcare LTD	East Staffordshire Pulmonary Rehabilitation Service	10	8	80%	10	100%	7	70%	5	71%	6	86%	<5	-
BOC Healthcare LTD	Hounslow Community Respiratory Team	24	14	67%	<5	-	18	75%	18	100%	14	82%	12	67%
BOC Healthcare LTD	Newcastle Healthy Lungs Programme	18	14	100%	13	76%	13	81%	0	0%	11	85%	9	75%
BOC Healthcare LTD	Nottingham West Pulmonary Rehabilitation	10	6	60%	0	0%	8	80%	0	0%	7	88%	7	88%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
BOC Healthcare LTD	Somerset Pulmonary Rehabilitation Service	42	13	37%	0	0%	36	95%	21	58%	27	75%	20	56%
BOC Healthcare LTD	South East Staffordshire Pulmonary Rehabilitation Service	36	33	97%	34	94%	20	59%	15	75%	15	79%	15	79%
BOC Healthcare LTD	The North Lincolnshire Respiratory Service	17	15	88%	0	0%	14	82%	5	36%	14	100%	8	57%
BOC Healthcare LTD	West Norfolk BOC Pulmonary Rehabilitation Service	90	30	46%	36	49%	43	63%	0	0%	25	61%	19	44%
Bristol Community Health	Bristol Community Respiratory Service	116	29	35%	55	54%	77	74%	76	99%	53	74%	9	100%
Bromley Healthcare	Bromley Pulmonary Rehabilitation	102	60	60%	69	68%	70	69%	70	100%	39	59%	57	84%
Buckinghamshire Healthcare NHS Trust	Buckinghamshire Pulmonary Rehabilitation Services	153	23	19%	<5	-	125	88%	0	0%	71	63%	72	58%
Calderdale and Huddersfield NHS Foundation Trust	Calderdale Pulmonary Rehabilitation Service	62	27	50%	42	75%	48	89%	47	98%	24	51%	34	92%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Cambridgeshire and Peterborough NHS Foundation Trust	Huntingdon Pulmonary Rehabilitation	24	13	65%	0	0%	20	87%	7	35%	13	68%	16	80%
Cambridgeshire Community Services NHS Trust	Luton Community Respiratory Service	33	24	92%	0	0%	23	70%	0	0%	18	78%	16	70%
Care Plus Group	Hope Street Specialist Service	102	62	63%	0	0%	61	60%	61	100%	39	64%	33	56%
Central and North West London NHS Foundation Trust	Camden COPD and Home Oxygen Service	48	40	95%	44	96%	33	72%	25	76%	20	61%	12	36%
Central and North West London NHS Foundation Trust	Milton Keynes Community Pulmonary Rehabilitation Service	71	17	27%	<5	-	55	77%	55	100%	37	74%	35	66%
Central London Community Healthcare NHS Trust	Barnet COPD Respiratory Service	50	47	94%	48	98%	32	64%	32	100%	23	72%	13	41%
Central London Community Healthcare NHS Trust	Harrow COPD Respiratory Service	66	52	81%	61	94%	45	70%	44	98%	31	69%	29	64%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Central London Community Healthcare NHS Trust	Merton Pulmonary Rehabilitation Service	54	49	98%	50	96%	28	55%	22	79%	17	61%	22	85%
Central London Community Healthcare NHS Trust	West Hertfordshire Community Respiratory Service	118	62	58%	94	97%	67	60%	67	100%	41	64%	37	56%
Chelsea and Westminster Hospital NHS Foundation Trust	Chelsea and Westminster Hospital Pulmonary Rehabilitation	<5	<5	100%	0	0%	<5	100%	<5	100%	<5	100%	<5	100%
Cheshire and Wirral Partnership NHS Foundation Trust	Cheshire and Wirral Partnership Respiratory Service	27	6	23%	8	32%	16	62%	16	100%	10	77%	14	88%
City Health Care Partnership CIC	East Riding Pulmonary Rehabilitation Programme	28	<5	-	<5	-	16	59%	0	0%	8	62%	7	54%
City Health Care Partnership CIC	Hull Pulmonary Rehabilitation Team	<5	<5	100%	0	0%	<5	-	<5	100%	<5	100%	0	0%
Cornwall Partnership NHS Foundation Trust	Integrated Community Respiratory Team East Cornwall (ICRTEC)	35	10	33%	22	63%	24	71%	24	100%	20	83%	22	92%
County Durham and Darlington NHS Foundation Trust	Darlington Pulmonary Rehabilitation	10	8	80%	0	0%	7	70%	6	86%	<5	-	<5	-

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
County Durham and Darlington NHS Foundation Trust	Durham Dales Easington and Sedgefield (DDES) Pulmonary Rehabilitation Programme	74	54	76%	0	0%	56	76%	45	80%	26	51%	23	46%
County Durham and Darlington NHS Foundation Trust	North Durham Pulmonary Rehabilitation	36	18	90%	<5	-	26	72%	0	0%	18	69%	14	54%
Croydon Health Services NHS Trust	Croydon Pulmonary Rehabilitation Programme	56	35	81%	23	45%	19	39%	14	74%	10	56%	14	74%
CSH Surrey	North West Surrey Respiratory Care Team	37	<5	-	37	100%	31	84%	26	84%	24	80%	27	87%
Derbyshire Community Health Services NHS Foundation Trust	North Derbyshire Community Respiratory Service	57	5	11%	0	0%	38	72%	38	100%	29	78%	35	92%
Doncaster And Bassetlaw Teaching Hospitals NHS Foundation Trust	Doncaster Pulmonary Rehabilitation Services	85	67	86%	0	0%	47	56%	47	100%	36	80%	39	87%
Dorset County Hospital NHS Foundation Trust	Dorset Pulmonary Rehabilitation service	53	39	87%	37	74%	34	69%	30	88%	24	75%	15	44%
Dorset Healthcare University NHS Foundation Trust	Dorset Healthcare Pulmonary Rehabilitation Programme	226	80	62%	117	84%	84	63%	17	20%	45	69%	60	71%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
East Cheshire NHS Trust	East Cheshire Pulmonary Rehabilitation Service	31	24	86%	0	0%	15	52%	10	67%	10	67%	6	40%
East Lancashire Hospitals NHS Trust	ELHT Pulmonary Rehabilitation Service	57	17	40%	<5	-	24	44%	12	50%	18	82%	N/A	N/A
East Suffolk and North Essex NHS Foundation Trust	East Suffolk Pulmonary Rehabilitation Service	104	55	67%	56	54%	70	74%	64	91%	42	60%	41	59%
East Sussex Healthcare NHS Trust	Regional East Sussex Pulmonary Service (RESPS)	123	57	56%	121	98%	81	69%	81	100%	36	45%	41	51%
Epsom and St Helier University Hospitals NHS Trust	Surrey Downs Health and Care Pulmonary Rehabilitation Service	42	6	17%	42	100%	33	79%	28	85%	15	52%	18	58%
First Community Health and Care CIC	First Community Health and Care Surrey Community Respiratory Service	35	14	61%	29	100%	18	69%	18	100%	10	56%	8	50%
Frimley Health NHS Foundation Trust	AIR Service	79	47	72%	55	75%	58	82%	58	100%	42	78%	46	84%
Gateshead Health NHS Foundation Trust	Gateshead Acute Pulmonary Rehabilitation Service	36	12	80%	0	0%	13	62%	0	0%	7	58%	<5	-

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
George Eliot Hospital NHS Trust	George Eliot Hospital Pulmonary Rehabilitation – Physiotherapy	30	13	48%	0	0%	27	93%	18	67%	16	59%	21	91%
Gloucestershire Care Services NHS Trust	Gloucestershire Respiratory Service	64	18	31%	8	13%	48	76%	0	0%	27	59%	39	87%
Guy's and St Thomas' NHS Foundation Trust	St Thomas' Hospital Pulmonary Rehabilitation programme	113	43	52%	64	67%	40	47%	36	90%	15	38%	15	38%
Harrogate and District NHS Foundation Trust	Harrogate Respiratory and Cardiac Physiotherapy	44	27	71%	0	0%	26	68%	26	100%	18	69%	14	54%
Hertfordshire Community NHS Trust	Hertfordshire Community Pulmonary Rehab Service	233	126	67%	64	28%	144	65%	144	100%	64	53%	82	59%
Homerton University Hospital NHS Foundation Trust	Homerton Adult Cardiorespiratory Enhanced and Responsive service (ACERs)	50	17	39%	47	96%	19	41%	18	95%	8	42%	7	54%
Hounslow and Richmond Community Healthcare NHS Trust	Richmond Respiratory Care Team	36	30	86%	36	100%	27	75%	27	100%	18	67%	15	62%
Imperial College Healthcare NHS Trust	Central and West London Pulmonary Rehabilitation Service	76	18	30%	72	95%	40	56%	38	95%	19	48%	34	87%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Imperial College Healthcare NHS Trust	Hammersmith & Fulham Cardio-Respiratory Service	49	16	43%	46	98%	23	59%	22	96%	13	59%	21	95%
Isle of Wight NHS Trust	St Mary's Hospital Pulmonary Rehabilitation Programme	16	<5	-	0	0%	14	88%	0	0%	14	100%	7	50%
Kent Community Health NHS Foundation Trust	Kent Community Health Pulmonary Rehabilitation Team	226	39	21%	215	98%	175	81%	175	100%	117	70%	101	58%
Kettering General Hospital NHS Foundation Trust	Rocket Team Kettering General Hospital	215	131	64%	97	93%	101	48%	101	100%	40	89%	54	61%
King's College Hospital NHS Foundation Trust	King's College Hospital Pulmonary Rehabilitation Team	90	16	21%	0	0%	37	49%	37	100%	23	62%	16	53%
Lancashire Care NHS Foundation Trust	Blackburn with Darwen Pulmonary Rehabilitation Team	25	14	74%	<5	-	19	76%	19	100%	9	47%	12	67%
Lancashire Care NHS Foundation Trust	Central Lancashire Pulmonary Rehabilitation Service	76	34	49%	43	62%	53	74%	53	100%	34	72%	41	89%

			Process items								Outcome items			
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National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Leeds Community Healthcare NHS Trust	Leeds Community Healthcare, Community Respiratory Service	52	23	52%	0	0%	38	75%	25	66%	26	70%	20	59%
Leicestershire Partnership NHS Trust	Leicestershire Partnership Pulmonary Rehabilitation Team	55	22	49%	48	98%	33	66%	32	97%	20	69%	25	78%
Lewisham and Greenwich NHS Trust	Lewisham LEEP Pulmonary Rehabilitation Programme	68	34	61%	48	75%	32	55%	<5	-	21	68%	14	45%
Lincolnshire Community Health Services NHS Trust	Lincolnshire Community Health Services Pulmonary Rehabilitation Service	77	8	11%	23	30%	62	81%	60	97%	29	48%	51	89%
Liverpool Heart and Chest Hospital NHS Foundation Trust	Knowsley Community Respiratory Service	91	45	62%	50	64%	31	42%	24	77%	23	82%	23	82%
Liverpool Heart and Chest Hospital NHS Foundation Trust	The Breathe Programme	200	159	89%	0	0%	128	70%	103	80%	22	43%	N/A	N/A
Liverpool University Hospitals NHS Foundation Trust	Aintree Pulmonary Rehabilitation Programme	10	10	100%	5	50%	7	70%	<5	-	7	100%	<5	-
Livewell Southwest	Livewell SW Community Respiratory Service	66	34	52%	0	0%	57	86%	52	91%	48	84%	38	69%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Locala Community Partnerships CIC	Greater Huddersfield Pulmonary Rehabilitation Service	17	10	62%	0	0%	13	76%	11	85%	6	46%	9	100%
London North West University Healthcare NHS Trust	Brent Pulmonary Rehabilitation Service	37	7	22%	37	100%	22	61%	22	100%	19	86%	17	81%
Luton and Dunstable University Hospital NHS Foundation Trust	Luton and Dunstable Hospital Pulmonary Rehabilitation Service	122	43	47%	106	95%	78	70%	78	100%	44	56%	44	56%
Maidstone and Tunbridge Wells NHS Trust	West Kent Pulmonary Rehabilitation Service	73	5	7%	68	96%	43	63%	41	95%	20	47%	18	42%
Manchester University NHS Foundation Trust	Manchester Community Respiratory Service	69	43	83%	<5	-	36	65%	17	47%	24	69%	17	53%
Manchester University NHS Foundation Trust	Manchester Integrated Lung Service – Central site	50	13	36%	0	0%	21	51%	0	0%	18	86%	8	53%
Manchester University NHS Foundation Trust	Manchester Royal Infirmary Pulmonary Rehabilitation Service	8	8	100%	<5	-	<5	-	0	0%	<5	-	<5	100%
Medway Community Healthcare	Medway Community Respiratory Team	106	69	65%	106	100%	80	75%	80	100%	59	77%	70	89%
Mersey Care NHS Foundation Trust	Sefton Community Respiratory Service	52	23	62%	0	0%	35	67%	35	100%	25	71%	20	57%

			Process items								Outcome items			
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National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Mid Cheshire Hospitals NHS Foundation Trust	Central Cheshire Integrated Care Partnership Pulmonary Rehabilitation Service	50	<5	-	0	0%	42	86%	29	69%	29	71%	16	57%
Mid Yorkshire Hospitals NHS Trust	Mid Yorkshire Therapy Services – Community Pulmonary Rehabilitation	114	78	78%	111	100%	63	57%	63	100%	45	73%	52	85%
Midlands Partnership NHS Foundation Trust	Midland Partnership South Respiratory Team	50	39	93%	15	30%	39	81%	38	97%	24	63%	35	95%
Midlands Partnership NHS Foundation Trust	Midlands Partnership – North Staffordshire and Stoke On Trent Pulmonary Rehabilitation Team	223	71	37%	18	8%	126	59%	125	99%	106	85%	113	90%
Norfolk and Norwich University Hospitals NHS Foundation Trust	Norfolk and Norwich Pulmonary Rehabilitation Service	17	5	33%	11	65%	11	65%	7	64%	<5	100%	<5	-
Norfolk Community Health and Care NHS Trust	Norfolk Community Pulmonary Rehabilitation Service	54	25	50%	0	0%	54	100%	0	0%	32	63%	41	76%
North Bristol NHS Trust	North Bristol Lung Exercise and Education Programme (LEEP)	78	28	44%	0	0%	41	55%	41	100%	34	83%	36	90%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
North Cumbria Integrated Care NHS Foundation Trust	Community COPD Team Carlisle	64	17	38%	63	98%	40	65%	35	88%	15	38%	33	82%
North Cumbria Integrated Care NHS Foundation Trust	North Cumbria Hospitals Pulmonary Rehabilitation Programme	13	<5	100%	5	100%	<5	-	<5	100%	<5	-	<5	100%
North Cumbria Integrated Care NHS Foundation Trust	Solway Community Respiratory Team	<5	0	0%	<5	100%	<5	-	<5	100%	<5	100%	<5	100%
North Cumbria Integrated Care NHS Foundation Trust	West Cumbria Community Respiratory Team	51	11	27%	49	98%	20	40%	20	100%	11	58%	17	89%
North East London NHS Foundation Trust	Havering Respiratory Team	80	55	87%	70	93%	42	54%	42	100%	28	68%	20	48%
North East London NHS Foundation Trust	Redbridge Respiratory Service	33	<5	-	0	0%	13	72%	12	92%	<5	-	7	54%
North East London NHS Foundation Trust	Respiratory Services - Barking and Dagenham	46	25	62%	9	21%	20	50%	6	30%	12	60%	10	56%
North East London NHS Foundation Trust	Waltham Forest Pulmonary Rehabilitation Service	79	47	72%	<5	-	29	43%	29	100%	9	31%	12	43%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
North Somerset Community Partnership Community Interest Company	North Somerset Pulmonary Rehabilitation	68	12	18%	0	0%	50	74%	50	100%	35	74%	45	92%
North Tees and Hartlepool NHS Foundation Trust	North Tees and Hartlepool Pulmonary Rehabilitation Service	90	18	26%	0	0%	36	45%	36	100%	19	63%	19	58%
North West Anglia NHS Foundation Trust	Peterborough Pulmonary Rehabilitation Service	24	20	83%	<5	-	14	58%	14	100%	12	86%	11	79%
North West Boroughs Healthcare NHS Foundation Trust	St. Helens Pulmonary Rehabilitation Service	68	43	75%	5	7%	32	49%	31	97%	15	48%	17	53%
Northampton General Hospital NHS Trust	Restart Team – Northampton General Hospital	64	15	38%	0	0%	44	70%	44	100%	31	72%	23	55%
Northern Devon Healthcare NHS Trust	North Devon Pulmonary Rehabilitation Service	42	10	31%	<5	-	33	80%	30	91%	15	45%	15	45%
Northumbria Healthcare NHS Foundation Trust	Northumbria Healthcare Pulmonary Rehabilitation Service	132	70	85%	102	95%	54	53%	53	98%	44	81%	47	87%
Nottingham Citycare Partnership	Nottingham Integrated Respiratory Service	116	61	54%	107	92%	81	70%	77	95%	41	53%	39	49%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Nottinghamshire Healthcare NHS Foundation Trust	Mansfield and Ashfield Respiratory Service	34	20	69%	0	0%	26	79%	26	100%	20	80%	18	75%
Nottinghamshire Healthcare NHS Foundation Trust	Newark and Sherwood Pulmonary Rehabilitation Service	39	15	42%	0	0%	26	68%	26	100%	16	80%	21	84%
Nottinghamshire Healthcare NHS Foundation Trust	Nottingham North and East Adult Community Services	10	7	70%	9	90%	<5	-	<5	100%	<5	-	<5	100%
Nottinghamshire Healthcare NHS Foundation Trust	Rushcliffe Cardiorespiratory service	45	10	27%	38	90%	28	74%	28	100%	17	63%	21	75%
Oxford Health NHS Foundation Trust	Oxfordshire Pulmonary Rehabilitation Service	161	22	15%	0	0%	136	84%	6	4%	84	65%	74	57%
Oxleas NHS Foundation Trust	Greenwich Pulmonary Rehabilitation Team	51	22	79%	34	97%	22	76%	21	95%	14	64%	N/A	N/A
Pennine Acute Hospitals NHS Trust	Acute Respiratory Assessment Service (ARAS) COPD support team – North Manchester	89	38	49%	<5	-	41	51%	38	93%	35	88%	24	62%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Pennine Acute Hospitals NHS Trust	Enhanced Respiratory Service (ERS) – Rochdale Infirmary	6	0	0%	0	0%	6	100%	6	100%	<5	-	N/A	N/A
Pennine Acute Hospitals NHS Trust	Pennine Lung Service	94	32	37%	34	37%	56	60%	53	95%	39	72%	27	55%
Pennine Acute Hospitals NHS Trust	Pennine Pulmonary Rehabilitation – Fairfield Hospital	46	8	18%	<5	-	26	57%	0	0%	26	100%	12	46%
Pennine Care NHS Foundation Trust	Trafford Pulmonary Rehabilitation Service	63	13	25%	<5	-	48	81%	41	85%	36	75%	37	84%
Provide	Provide – Cambridgeshire Pulmonary Rehabilitation	10	7	70%	0	0%	10	100%	0	0%	<5	-	6	60%
Provide	Provide – Mid-Essex Pulmonary Rehabilitation	55	37	84%	51	93%	50	91%	32	64%	23	47%	21	47%
Royal Berkshire NHS Foundation Trust	Royal Berkshire Hospital Pulmonary Rehabilitation Service	12	<5	-	11	100%	8	73%	8	100%	5	62%	6	75%
Royal Brompton & Harefield NHS Foundation Trust	Harefield Hospital Pulmonary Rehabilitation	127	97	95%	125	98%	93	74%	93	100%	52	57%	89	96%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Royal Brompton & Harefield NHS Foundation Trust	Royal Brompton Pulmonary Rehabilitation Service	<5	0	0%	<5	100%	<5	100%	0	0%	0	0%	0	0%
Royal Devon and Exeter NHS Foundation Trust	Royal Devon and Exeter Pulmonary Rehabilitation/Physiotherapy Service	11	10	91%	0	0%	10	91%	10	100%	5	50%	8	89%
Royal Surrey County Hospital NHS Foundation Trust	Royal Surrey Pulmonary Rehabilitation Programme	51	35	80%	51	100%	39	80%	39	100%	31	82%	20	57%
Royal United Hospitals Bath NHS Foundation Trust	RUH Respiratory Outpatient Department	<5	0	0%	0	0%	<5	100%	0	0%	0	0%	N/A	N/A
Salford Royal NHS Foundation Trust	Salford's Breathing Better Pulmonary Rehabilitation Programme	40	20	91%	0	0%	35	88%	35	100%	24	69%	33	94%
Salisbury NHS Foundation Trust	Salisbury Lung Exercise and Education Programme (LEEP)	14	<5	-	14	100%	14	100%	14	100%	6	43%	12	86%
Sandwell and West Birmingham Hospitals NHS Trust	Sandwell and West Birmingham Community Respiratory Service	95	52	68%	87	93%	41	46%	40	98%	15	37%	32	80%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Sheffield Teaching Hospitals NHS Foundation Trust	Sheffield Community Pulmonary Rehabilitation Service	151	81	74%	7	5%	77	55%	77	100%	36	52%	27	48%
Shropshire Community Health NHS Trust	Shropshire Pulmonary Rehabilitation	59	8	16%	<5	-	47	81%	44	94%	27	59%	40	89%
Sirona Care & Health	South Gloucestershire Pulmonary Rehabilitation	29	26	90%	<5	-	22	76%	17	77%	9	45%	20	91%
Solent NHS Trust	Hampshire Pulmonary Rehabilitation Programme	24	<5	-	0	0%	17	85%	8	47%	8	47%	8	47%
Solent NHS Trust	Portsmouth Pulmonary Rehabilitation Programme	28	<5	-	0	0%	13	72%	10	77%	7	54%	7	58%
Solent NHS Trust	Southampton Integrated COPD Team	177	106	87%	101	68%	83	60%	81	98%	56	76%	42	57%
South Tees Hospitals NHS Foundation Trust	South Tees Pulmonary Rehabilitation Service	104	48	71%	<5	-	59	58%	25	42%	35	60%	19	35%
South Tyneside and Sunderland NHS Foundation Trust	South Tyneside Pulmonary Rehabilitation Programme (Acute)	37	25	83%	0	0%	17	57%	17	100%	9	60%	13	76%
South Tyneside and Sunderland NHS Foundation Trust	Sunderland Community Pulmonary Rehabilitation Programme	20	11	79%	0	0%	8	53%	<5	-	<5	100%	<5	-

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
South Warwickshire NHS Foundation Trust	South Warwickshire Physiotherapy Services	7	0	0%	0	0%	7	100%	7	100%	6	86%	N/A	N/A
South West Yorkshire Partnership NHS Foundation Trust	South West Yorkshire Cardiac and Pulmonary Rehabilitation Service	121	55	58%	102	98%	78	76%	76	97%	53	79%	59	80%
Southend University Hospital NHS Foundation Trust	South East Essex Pulmonary Rehabilitation Service	177	130	93%	0	0%	125	72%	125	100%	98	78%	79	64%
Southern Health NHS Foundation Trust	West Hampshire Community Integrated Respiratory Service	107	54	57%	58	56%	69	65%	69	100%	47	76%	31	48%
Southport and Ormskirk Hospital NHS Trust	West Lancashire Pulmonary Rehabilitation	9	9	100%	0	0%	<5	-	<5	100%	<5	100%	<5	100%
St George's University Hospitals NHS Foundation Trust	Wandsworth Pulmonary Rehabilitation Service	78	43	61%	74	100%	41	54%	9	22%	21	60%	15	41%
Stockport NHS Foundation Trust	Stockport Pulmonary & Heart Failure Rehabilitation Service	41	18	50%	0	0%	26	65%	26	100%	15	62%	14	67%
Sussex Community NHS Foundation Trust	COPD Coastal Service	20	0	0%	20	100%	14	70%	14	100%	8	57%	12	100%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Sussex Community NHS Foundation Trust	Crawley Horsham and Mid Sussex COPD Adult Community Services	45	19	61%	39	98%	18	56%	18	100%	10	56%	13	81%
Sussex Community NHS Foundation Trust	Sussex Community Respiratory Service Brighton and Hove	56	32	94%	37	92%	20	57%	20	100%	10	50%	17	89%
Sussex Community NHS Foundation Trust	The High Weald Lewis and Haven Community Respiratory Service	32	19	61%	32	100%	27	87%	7	26%	12	52%	25	96%
Tameside and Glossop Integrated Care NHS Foundation Trust	Tameside and Glossop Pulmonary Rehabilitation	35	8	36%	14	54%	16	67%	16	100%	11	69%	10	83%
The Dudley Group NHS Foundation Trust	Dudley Pulmonary Rehabilitation Programme	155	124	93%	109	71%	114	75%	114	100%	52	46%	96	86%
The Newcastle Upon Tyne Hospitals NHS Foundation Trust	The Newcastle Hospitals Respiratory Services	31	15	58%	6	20%	18	62%	18	100%	12	71%	15	83%
The Rotherham NHS Foundation Trust	Rotherham Breathing Space	140	67	55%	140	100%	89	64%	76	85%	52	58%	54	61%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
The Royal Bournemouth And Christchurch Hospitals NHS Foundation Trust	The Bournemouth Hospital's Pulmonary Rehabilitation Service	8	<5	-	8	100%	<5	-	<5	100%	<5	100%	<5	-
The Royal Marsden NHS Foundation Trust	Sutton Community Respiratory Service	71	65	98%	68	97%	57	81%	57	100%	36	63%	51	89%
The Royal Wolverhampton NHS Trust	Wolverhampton Pulmonary Rehabilitation Service	40	33	89%	0	0%	28	70%	0	0%	22	79%	24	86%
Torbay and South Devon NHS Foundation Trust	Torbay and South Devon Pulmonary Rehabilitation Programme	25	11	50%	0	0%	15	60%	15	100%	7	64%	9	75%
University Hospital Southampton NHS Foundation Trust	University Hospital Southampton Pulmonary Rehabilitation Programme	10	6	86%	5	50%	<5	-	<5	100%	0	0%	<5	100%
University Hospitals Birmingham NHS Foundation Trust	Solihull Community Respiratory Team	60	22	71%	34	85%	18	47%	18	100%	15	83%	14	88%
University Hospitals Birmingham NHS Foundation Trust	University Hospitals Birmingham HGS Pulmonary Rehabilitation Programme	147	34	32%	121	98%	56	50%	56	100%	41	73%	54	98%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
University Hospitals of Derby and Burton NHS Foundation Trust	Derby and Burton ImpACT+	92	10	12%	<5	-	64	71%	60	94%	40	62%	53	91%
University Hospitals of Leicester NHS Trust	Glenfield and Leicester Hospitals Pulmonary Rehabilitation Programme	192	37	32%	127	91%	75	55%	69	92%	29	45%	52	85%
Virgin Care Ltd	Surrey Heath Respiratory Care Team	19	<5	-	19	100%	13	72%	13	100%	6	55%	12	92%
Virgin Care Ltd	Virgin Care Community Respiratory Service – Bath and North East Somerset	62	16	33%	0	0%	28	47%	21	75%	19	68%	18	67%
Warrington and Halton Hospitals NHS Foundation Trust	The Warrington & Halton Pulmonary Rehabilitation Service	100	56	71%	<5	-	73	73%	73	100%	36	49%	37	51%
West Suffolk NHS Foundation Trust	West Suffolk Pulmonary Rehabilitation Service	88	23	28%	30	38%	65	78%	36	55%	37	69%	41	63%
Western Sussex Hospitals NHS Foundation Trust	St Richards Hospital Pulmonary Rehabilitation	84	32	44%	81	100%	59	78%	59	100%	51	88%	53	90%
Western Sussex Hospitals NHS Foundation Trust	Worthing & Southlands Pulmonary Rehabilitation Programme	55	19	38%	53	98%	38	73%	38	100%	16	44%	33	92%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Whittington Health NHS Trust	Whittington Health Pulmonary Rehabilitation	70	59	100%	63	91%	41	64%	16	39%	33	80%	33	85%
Wiltshire Health and Care	Wiltshire Community Respiratory Team	39	7	19%	23	62%	29	76%	29	100%	17	63%	11	41%
Wirral University Teaching Hospital NHS Foundation Trust	Wirral COPD, Pulmonary Rehabilitation & Oxygen Service	164	51	38%	<5	-	87	57%	86	99%	58	69%	36	44%
Worcestershire Acute Hospitals NHS Trust	Worcestershire COPD Team	132	30	29%	108	89%	78	68%	73	94%	46	63%	42	55%
Wrightington, Wigan and Leigh NHS Foundation Trust	Wrightington Wigan & Leigh tier 2 Respiratory Services	7	<5	-	0	0%	7	100%	7	100%	5	71%	<5	-
Wye Valley NHS Trust	Herefordshire Pulmonary Rehabilitation Programme	23	0	0%	0	0%	18	78%	14	78%	7	47%	10	59%
York Teaching Hospital NHS Foundation Trust	York and Selby Pulmonary Rehabilitation	33	<5	-	0	0%	28	85%	0	0%	16	57%	21	84%
Your Healthcare	Your Healthcare Pulmonary Rehabilitation Service	5	5	100%	5	100%	5	100%	5	100%	<5	-	5	100%

			Process items								Outcome items			
Trust / health board name	Service name	Case audited	Start date within 90 days of receipt of referral*		Patients undertaking practice walk test		Patients enrolled for PR who go on to have a discharge assessment		Patients with a discharge assessment who received a written individualised exercise plan		Improvement in exercise capacity		Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Scotland														
NHS Dumfries and Galloway	Dumfries and Galloway Pulmonary Rehabilitation Service	39	<5	-	0	0%	32	82%	25	78%	23	74%	21	68%
NHS Forth Valley	Forth Valley Pulmonary Rehabilitation Service	<5	0	0%	0	0%	<5	100%	0	0%	<5	-	<5	100%
NHS Grampian	Aberdeen City Health and Social Care Partnership pulmonary rehabilitation	34	23	92%	0	0%	21	62%	0	0%	12	57%	N/A	N/A
NHS Grampian	Aberdeenshire Health and Social Care Partnership pulmonary rehabilitation	13	<5	-	5	38%	5	38%	<5	-	<5	-	<5	-
NHS Grampian	Moray Health and Social Care Partnership pulmonary rehabilitation	15	11	92%	0	0%	5	36%	0	0%	<5	-	N/A	N/A
NHS Greater Glasgow, Clyde	Greater Glasgow and Clyde Pulmonary Rehabilitation Service	<5	0	0%	0	0%	<5	100%	<5	100%	<5	100%	<5	100%
NHS Highland	Raigmore Pulmonary Rehabilitation Service	10	<5	-	0	0%	<5	-	<5	-	<5	-	<5	100%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
NHS Lanarkshire	Lanarkshire Self-Management and Pulmonary Rehabilitation	7	<5	-	0	0%	<5	-	<5	-	<5	-	<5	100%
NHS Lothian	Lothian Community Pulmonary Rehabilitation Service	19	<5	-	0	0%	14	88%	14	100%	N/A	N/A	6	75%
NHS Tayside	Perth and Kinross Pulmonary Rehabilitation Service	34	5	19%	0	0%	20	59%	16	80%	12	67%	17	85%
Wales														
Aneurin Bevan University Local Health Board	Newport Pulmonary Rehabilitation	11	6	55%	0	0%	11	100%	0	0%	8	73%	11	100%
Aneurin Bevan University Local Health Board	Ysbyty Aneurin Bevan Pulmonary Rehabilitation	<5	<5	100%	0	0%	<5	100%	0	0%	0	0%	<5	-
Betsi Cadwaladr University Local Health Board	BCUHB – Centre Pulmonary Rehabilitation Service	51	10	20%	51	100%	37	73%	37	100%	21	57%	27	73%
Betsi Cadwaladr University Local Health Board	BCUHB – East Pulmonary Rehabilitation Service	63	7	12%	51	84%	46	73%	45	98%	30	68%	30	65%

			Process items								Outcome items			
Trust / health board name	**Service name**	**Case audited**	**Start date within 90 days of receipt of referral***		**Patients undertaking practice walk test**		**Patients enrolled for PR who go on to have a discharge assessment**		**Patients with a discharge assessment who received a written individualised exercise plan**		**Improvement in exercise capacity**		**Improvement in health status (based on meeting MCID for the CAT *OR* CRQ tests)**	
National QI aim			**85%**		**100%**		**70%**		-		-		-	
National result		**12,127**	**5,354**	**54%**	**5,206**	**46%**	**7,406**	**67%**	**6,002**	**81%**	**4,490**	**65%**	**4,572**	**68%**
Betsi Cadwaladr University Local Health Board	BCUHB – West Pulmonary Rehabilitation Service	30	15	52%	24	92%	23	79%	23	100%	11	50%	5	24%
Cardiff & Vale University Local Health Board	University Hospital Llandough Pulmonary Rehabilitation Service	40	<5	-	0	0%	40	100%	0	0%	21	57%	25	62%
Cwm Taf Morgannwg University Local Health Board	Cwm Taf UHB Pulmonary Rehabilitation Service	38	21	95%	0	0%	11	42%	<5	-	10	91%	7	78%
Hywel Dda University Local Health Board	Carmarthenshire Pulmonary Rehabilitation Programme	15	<5	-	0	0%	10	67%	10	100%	8	80%	6	67%
Hywel Dda University Local Health Board	Pembrokeshire Pulmonary Rehabilitation Programme	9	0	0%	8	89%	8	89%	8	100%	6	75%	<5	-
Powys Teaching Local Health Board	Powys Pulmonary Rehabilitation Service	11	<5	-	<5	-	11	100%	10	91%	9	82%	10	91%
Swansea Bay Local Health Board	Swansea Bay University Health Board Pulmonary Rehabilitation Service	53	22	47%	0	0%	36	72%	35	97%	16	53%	18	55%

** This metric is only reported for non-AECOPD patients. Data is not directly comparable to the 2017 snapshot audit, as data was reported for all patients in 2017.*[9]

9.2 Non-participating services in England, Scotland and Wales

Trust / health board / organisation	Service
BOC LTD	North East Hampshire and Farnham (NEH&F) Pulmonary Rehabilitation Service
Bolton NHS Foundation Trust	Bolton Pulmonary Rehabilitation Programme
Cornwall Partnership NHS Foundation Trust	Mid, West, North Cornwall Pulmonary Rehabilitation Programme
Cross Plain Health Centre	Sarum Community Based Pulmonary Rehabilitation Team
East London NHS Foundation Trust	East London Pulmonary Rehabilitation Service
Essex Partnership University NHS Foundation Trust	EPUT Pulmonary Rehabilitation Programme
James Paget University Hospitals NHS Foundation Trust	BEET: Breathing, Exercise, Education Training
London North West University Healthcare NHS Trust	Ealing Pulmonary Rehabilitation service
Mid Yorkshire Hospitals NHS Trust	North Kirklees Pulmonary Rehabilitation Programme
Milton Keynes University Hospital NHS Foundation Trust	Milton Keynes Hospital Pulmonary Rehabilitation Programme
NHS Ayrshire and Arran	Ayrshire and Arran Pulmonary Rehabilitation Service
NHS Borders	Borders Pulmonary Rehabilitation
NHS Fife	Integrated Care Team
NHS Highland	East Caithness Pulmonary Rehabilitation Service
NHS Highland	Lochaber Pulmonary Rehabilitation Service
NHS Tayside	Dundee Pulmonary Rehabilitation Service
NHS Tayside	Angus Pulmonary Rehabilitation Service
NHS Western Isles	Western Isles Pulmonary rehabilitation
North East London NHS Foundation Trust	Integrated Respiratory Service - Basildon - Brentwood and Thurrock
Nottinghamshire Healthcare NHS Foundation Trust	Bassetlaw Pulmonary Rehabilitation Service
Papworth Hospital NHS Foundation Trust	Papworth Hospital Pulmonary Rehabilitation Programme

Trust / health board / organisation	Service
Respiricare Limited	Swale Pulmonary Rehabilitation
Respiricare Limited	Bexley CCG Pulmonary Rehabilitation
Swindon Borough Council (Unitary)	Swindon Healthy Lives Pulmonary Rehabilitation Programme
University Hospitals of Morecambe Bay NHS Foundation Trust	Furness Pulmonary Rehabilitation Service
University Hospitals of Morecambe Bay NHS Foundation Trust	North Lancashire Pulmonary Rehabilitation
University Hospitals of Morecambe Bay NHS Foundation Trust	South Lakes Community Respiratory Service
Walsall Healthcare NHS Trust	Walsall Pulmonary Rehabilitation Service

Appendix A: Methodology

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NACAP's pulmonary rehabilitation (PR) continuous clinical audit is built upon the learning from the National COPD Audit Programme snapshot clinical audit.[5] The structure of the dataset is similar to that used in 2017, however, it has been considerably streamlined to account for the change in methodology from snapshot (in 2017) to continuous audit which commenced in March 2019. This is the second report since the start of continuous data collection and presents the results of the cohort of patients assessed between 1 June and 30 November 2019.

All PR services in England, Scotland and Wales that treated patients with COPD (n=227) were eligible to participate in the clinical audit. A total of 199 services (87.7%) participated in this period of the audit. A full list of participating services, including those services that did not enter any data for the audit period are listed in **Section 9**.

The clinical audit operates on a patient consent model; eligible patients were required to provide written consent (using the forms available on the audit website **www.rcplondon.ac.uk/projects/outputs/national-asthma-and-copd-audit-programme-nacap-pulmonary-rehabilitation-workstream**) prior to their data being included in the audit. Data from patients that did not provide consent was not included in the audit.
Participating PR services were required to enter clinical data into a secure online web tool. A total of 6,056 patient records have been included in this report.

Recruitment

There was a single recruitment process for both the PR clinical and organisational audits, which began in 2018, using the following channels:

- partner and stakeholder channels (such as the British Thoracic Society's eBulletin, the British Lung Foundation's BreatheEasy networks, the Primary Care Respiratory Society UK's membership bulletin, and the Association of Respiratory Nurse Specialist's newsletter)
- Twitter and the audit's own newsletter
- communication with services that participated in the 2017 audit.

To identify new services, or services where the management had changed, a Freedom of Information request was sent to all CCGs, asking them for the names and contact details of the PR services used by their healthcare providers. Where identified, these services were sent an approaching email asking them to participate in the audits.

The reasons provided to participate were as follows:

- The status of the audit as part of NHS Quality Accounts, and as a National Clinical Audit, meaning all providers of NHS care in England and Wales were required to participate.
- To build on previous audit results and facilitate local improvement.

Services were asked to complete a registration form, nominating an 'audit lead' and adding any other team members that would form part of the audit team. It was made clear to prospective participants that the 'audit lead' role took ultimate responsibility of the data entered for the service.

Once a service had submitted their registration form, they were then sent a Caldicott Guardian letter and form to complete. Only after the Caldicott Guardian form was received by the audit team at the RCP was the service considered 'fully registered', and at that point, they were registered on the web tool.

A total of 227 PR services have been identified as currently eligible to participate in the NACAP PR audit, and we believe this to be a comprehensive picture of services in England, Scotland and Wales, but we cannot rule out the possibility that PR services exist that were not identified, and therefore did not participate in the audit. A total of 217 (95.6%) services are registered to participate in the clinical audit, with 199 (87.7%) submitting data for this report. Reasons for non-participation included:

- lack of local resource to complete the data collection and entry; and
- no eligible patients during the audit period (ie services ran cohort (rather than rolling) programmes, and all their assessments took place prior to the audit period starting).

Information governance and patient consent

The audit involved the collection of patient-identifiable data for the purpose of linkage with data from other sources (such as Hospital Episode Statistics and Office for National Statistics data for readmission and mortality data), and the audit operated on a patient consent model on advisement from the Health Research Authority's Confidentiality Advisory Group (CAG 2-03(PR3)/2014). The rationale for this was the comparative low acuity of the patient cohort, combined with the fact that the patient interaction with their PR service is prolonged, both of which meant that seeking consent was viable. In addition, the 2015 and 2017 audits found that requesting patient consent proved to have no significant impact on the number of patients included (81% of patients approached gave consent).

To support the process, a patient consent form, patient information leaflet as well as guidance for the staff involved, were made available on the project (**www.rcplondon.ac.uk/nacap-pr-resources**) and web tool webpages (beyond participants' logins). The forms and guidance were updated following the launch of NACAP in March 2018 and feedback from the 2015 and 2017 audits, in order to make the language clearer and to incorporate comments from external groups. The patient information leaflets and consent form were ratified by NHS Digital Data Access Request Service (Information Governance section), the British Lung Foundation's patient think tank, as well as the Royal College of Physicians' Ethics Committee.

Participating services were asked to approach all eligible patients for written consent. It was recommended this be done at their initial assessment and made clear that no data whatsoever should be entered onto the web tool until the patient had provided consent. Any delay in obtaining consent risked the patient dropping out of their PR programme before consent was obtained, in which case their data could not be used.

Audit question development and pilot

To ensure PR care was audited against accepted standards, audit questions were mapped to the British Thoracic Society (BTS) PR quality standards. A specific effort was made to ensure that each question could be mapped to a quality standard, and conversely that each quality standard was represented within the audit datasets.

The audit datasets were based on the 2017 equivalents. They were developed iteratively by the audit programme team and clinical lead, in consultation with the workstream group, in particular the representatives from the British Thoracic Society.

The datasets and web tool were then tested (in a pilot) in November 2018. The pilot services were asked to contribute feedback on the web tool, the audit questions and help notes. These findings were discussed by the team and the workstream group, and the datasets were finalised.
The clinical audit questions included demographic data about the patients being included, and also questions on:

- the patient's referral process,
- their assessment and assessment performance,
- time from referral to start of PR, and
- their discharge and discharge performance.

The clinical datasets are available to download in full from our website:
www.rcplondon.ac.uk/nacap-pr-resources

Data entry

Services were required to enter data via the audit programme's bespoke web tool, created by Crown Informatics Ltd (available at **www.copdaudit.org**).

Documentation to support participation in the audit was posted on the PR audit website and web tool, including audit instructions, data collection sheets, datasets with help notes, patient consent documentation, and copies of newsletters.

Regular email updates and newsletters were sent to participants throughout the data collection period, with reminders of timelines and any answers to frequently asked questions.
Towards the end of the clinical data entry period, reminders were sent to the services that had not entered many cases. Additionally, large numbers of draft records were queried.

Data storage, security, and transfer

Data were collected on the audit's bespoke web tool. These data were stored and processed at a secure data centre, owned by Aimes Grid Services, located in Liverpool, UK. It operates to ISO 27001 certification (2015). The servers are owned and operated by Crown Informatics Ltd and are held in a secure locked rack, accessible to named individuals. All access is logged, managed and supervised.

This data centre provides N3 aggregation in collaboration with NHS Digital. Data is stored in secured databases (software by IBM) and encrypted on disc (AES256 standard) and additionally in the database where required. Backups are encrypted at AES256, held in dual copies, and stored securely.

Crown Informatics Ltd operate secure SSL at 256 bit, using SHA256 (SHA2) signatures and 4096 bit certificates. Crown Informatics Ltd's certificate is an 'OV' certified by a respected global certifier (Starfield/GoDaddy). In addition, 'Qualsys' using 'SSL Labs' have given the audit site an 'A' rating.

At the end of the data collection period, the data was extracted from the web tool by the central audit team, using an 'extract' provision developed by Crown. It was then transferred securely (using the RCP Mimecast system) to the team at Imperial College London for analysis. The extract function did not include patient identifiers.

Technical and email support

The audit programme team at the RCP provided a helpdesk every working day during office hours, available on both telephone and email, so that participants could come directly to the team with any questions they had.

Data cleaning and analysis methodology

The data were analysed at Imperial College London (National Heart & Lung Institute) in R version 3.6.2. The patient's Index of Multiple Deprivation[6] quintile was linked using the patient's lower layer super output area (LSOA). The dataset contained 12,207 records, all of which were assessed between 01/06/2019 and 30/11/2019. There were no data inconsistencies, assessment date/start date/discharge date order issues, or invalid NHS numbers. After duplicate records were removed (n=80), 12,127 records remained suitable for analysis. New variables were created as follows:

- 'Days from referral to start date' created by subtracting the referral date from the start date
- 'Days from initial assessment to start date' created by subtracting the initial assessment date from the start date
- 'Days from start date to discharge date' created by subtracting the start date from the discharge date
- 'Start date offered within 90 days for non-AECOPD patients' created by categorising non-AECOPD patients into <90 days and >=90 days from referral to start date
- 'Start date offered within 30 days for AECOPD patients' created by categorising AECOPD patients into <30 days and >=30 days from referral to start date
- Difference in test values (ISWT, 6MWT, ESWT, CAT, CRQ domains) were calculated by subtracting the initial test result from the discharge test result
- MCID variables for ISWT, 6MWT, CAT, and CRQ domains were then created by categorising the test value difference variables into those who achieved the MCID and those who didn't, with MCID achieved defined as: >=48 for ISWT, >=30 for 6MWT, <= -2 for CAT, >=0.5 for CRQ domains.

Summary statistics for patient N and % were created using the 'table' and 'prop.table' commands. Medians and interquartile ranges were calculated using the 'quantile' command. Odds ratio

calculations and logistic regression was carried out using the 'glmer' command from the 'lme4' package in R. Kaplan-Meier curves were created using the 'survfit' command from the 'survival' package and the 'plot_survfit' command from the 'survsup' package in R.

Appendix B: Definitions

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- **Service** means a pulmonary rehabilitation service with a shared pool of staff and central administration where referrals are received. A provider may run one or more services, and a service may operate at several sites.
- **Programme** means the course of classes that the patient is referred to.
- **Site** means the physical location where the pulmonary rehabilitation services are provided, eg a hospital gym or church hall.
- **Date of assessment** is the date the patient attends an appointment to be assessed before beginning pulmonary rehabilitation sessions. If there was no separate assessment appointment, please enter the date of the first appointment/session.
- **Date of first pulmonary rehabilitation session** is the first session that the patient attends with the pulmonary rehabilitation service.

Appendix C: BTS Quality Standards for Pulmonary Rehabilitation in Adults (2014)

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No.	Quality statement
1	Referral for pulmonary rehabilitation: a. People with COPD and self-reported exercise limitation (MRC dyspnoea 3–5) are offered pulmonary rehabilitation. b. If accepted, people referred for pulmonary rehabilitation are enrolled to commence within 3 months of receipt of referral.
2	Pulmonary rehabilitation programmes accept and enrol patients with functional limitation due to other chronic respiratory diseases (for example bronchiectasis, ILD and asthma) or COPD MRC dyspnoea 2 if referred.
3	Referral for pulmonary rehabilitation after hospitalisation for acute exacerbations of COPD: a. People admitted to hospital with acute exacerbation of COPD (AECOPD) are referred for pulmonary rehabilitation at discharge. b. People referred for pulmonary rehabilitation following admission with AECOPD are enrolled within 1 month of leaving hospital.
4	Pulmonary rehabilitation programmes are of at least 6 weeks duration and include a minimum of twice-weekly supervised sessions.
5	Pulmonary rehabilitation programmes include supervised, individually tailored and prescribed, progressive exercise training including both aerobic and resistance training.
6	Pulmonary rehabilitation programmes include a defined, structured education programme.
7	People completing pulmonary rehabilitation are provided with an individualised structured, written plan for ongoing exercise maintenance.
8	People attending pulmonary rehabilitation have the outcome of treatment assessed using as a minimum, measures of exercise capacity, dyspnoea and health status.
9	Pulmonary rehabilitation programmes conduct an annual audit of individual outcomes and progress.
10	Pulmonary rehabilitation programmes produce an agreed standard operating procedure.

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