Royal College of Physicians | NACAP

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

# Wales primary care clinical audit 2020

(asthma and COPD data extracted from 226 general practices in Wales to capture activity up to 31 March 2020)

# Data analysis and methodology report

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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.

**Scotland ceased to commission NACAP as of 1 March 2021.*

**Wales primary clinical audit 2020 report**
This report was prepared by the following people, on behalf of the COPD and asthma advisory groups. The full list of members can be found on the NACAP resources page here: www.rcplondon.ac.uk/nacap-resources

**Dr Katherine Hickman**, primary care clinical lead, NACAP, Care Quality Improvement Department (CQID), RCP; and GP, Low Moor Medical Practice, Bradford; and respiratory lead for Leeds and Bradford clinical commissioning groups.
**Lara Amusan**, programme manager, NACAP, CQID, RCP.
**Ms Kajal Mortier**, project manager, NACAP, CQID, RCP.
**Mr Philip Stone**, research assistant in statistics/epidemiology, National Heart & Lung Institute, Imperial College London.
**Professor Jennifer Quint**, analysis lead, NACAP, CQID, RCP; professor of respiratory epidemiology, National Heart & Lung Institute, Imperial College London; honorary respiratory consultant, Royal Brompton and Imperial NHS trusts.
**Professor C Michael Roberts**, senior clinical lead, NACAP, CQID, RCP; managing director of academic science partnership, UCLPartners, professor in medical education for clinical practice, Institute of Population Health Sciences, Queen Mary University London and deputy director of NIHR North Thames Applied Research Collaboration.

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**Royal College of Physicians**
Care Quality Improvement Department
11 St Andrews Place
Regent's Park
London NW1 4LE

Registered charity no 210508

www.rcplondon.ac.uk/nacap @NACAPaudit

# Contents

# How to use this report

## 1. Scope and data collection

This report presents results from analysis of asthma and chronic obstructive pulmonary disease (COPD) primary care data in Wales from the second round of the Welsh primary care audit component of the National Asthma and COPD Audit Programme (NACAP). Data were extracted from 226 (56.8%) general practices in Wales in October 2020 to capture activity up to 31 March 2020.*

The audit builds upon the learning from the 2017/18 report (www.rcplondon.ac.uk/primary-care-2017-18), which was the first to report on both asthma and COPD patient care and management from primary care records in Wales. The National COPD Audit Programme previously reported on only COPD patient care and management from primary care records in Wales in 2015 and 2017.

Contributing to the overarching national quality improvement (QI) objectives of the NACAP, this report aims to empower stakeholders to use audit data to facilitate improvements in the quality of care for people diagnosed with asthma and COPD.

## 2. Report structure

This report focuses on the data analysis and methods. Recommended QI priorities made in response can be found in the national report (via www.rcplondon.ac.uk/pc2020).

These data are presented largely in tabular form with explanatory notes where appropriate. Results of the 2017/18 report (via www.rcplondon.ac.uk/primary-care-2017-18) and 2015/17 report (via www.rcplondon.ac.uk/planningeverybreath) have been provided, however direct comparisons are not appropriate as the extraction timeframes are different. The next extraction is planned for a similar timeframe therefore comparative data will be available. A full data analysis and data cleaning methodology can be found in Appendix A.

Participating practices can view individualised practice level reports from 12 March 2021 via the NHS Wales Informatics Service (NWIS) Primary Care Information Portal. These reports will include benchmarking against national and health board results to support practices in improving the quality of patient care (http://isdapps.wales.nhs.uk/pcip). Local health board results, including cluster results, are available at www.rcplondon.ac.uk/pc2020.

## 3. Data interpretation

Only 56.8% of Welsh practices participated therefore caution must be taken when making assumptions about the quality of care delivered nationally. Further data interpretation caveats are below.

The denominators for both the asthma and COPD cohorts of patients are not determined by the Quality Outcomes Framework (QOF) register. Instead, and for the following reasons, the audit has defined its own list of validated codes from which to calculate the denominators. Recent work looking at the accuracy of asthma and COPD coding with respect to the QOF register has shown that use of other Read

* Questions that refer to the past 1,2 or 3 years the data is presented from the past 1,2 or 3 years from 31 March 2020.

codes[†] (ie not necessarily included on the register) are more suggestive of the diseases with high positive predictive values. Equally, some of the codes used in the QOF do not have a high sensitivity for identifying people with COPD or asthma.[1,2] Therefore, in this audit the denominator population is likely to be more accurate (potentially excluding some of the people on the QOF register, but also including others who are not), than if people on the asthma and COPD QOF registers had been included. However, at practice level and for the purposes of QI, users should note that their COPD and asthma registers will show some differences that will require local patient level analysis. For the audit we have used validated codes to identify people with asthma (https://bmjopen.bmj.com/content/7/8/e017474) or COPD (https://bmjopen.bmj.com/content/4/7/e005540).

The audit queries focus on areas that directly relate to opportunities for improving quality.[3] Where methodologies for numerator derivation do not use directly related codes, the rationale is provided. For example, in the case of COPD and asthma exacerbations, where the codes are known to be used inconsistently, similar work has shown that proxy codes, such as prescription of oral prednisolone and/or chest infection diagnosis codes, can be used to derive exacerbation rates.[4–7]

Extraction limitations highlighted a number of medical Read codes were not being used by practices, therefore results from the audit using prescription data were deemed inaccurate in reflecting what is happening in clinical practice. As such, some of the planned analyses could not take place and were therefore not included in this report. The sections affected were:

- 3.4 Identification of severe asthma and referral to specialist care
- 3.7 Exacerbation count in the past year
- 4.4 Short-acting reliever inhalers
- 4.5 Inhaled corticosteroid (ICS) devices
- 4.8 Smoking cessation
- 4.9 Use of inhaled drug therapies in the last 6 months of the audit period

Section 4.6 also needs to be interpreted with caution as prescriptions are not reliably recorded using our method of detecting Read codes. Therefore results presented may not be representative of what is happening in clinical practice and prescriptions may have been missed.

[†] Read codes are a coded thesaurus of clinical terms. They provide a standard vocabulary for clinicians to record patient findings and procedures in health and social care IT systems. https://digital.nhs.uk/article/1104/Read-Codes

# Section 1: Demographics and comorbidities

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## Navigation

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



## Key findings

### Adults with COPD

- The COPD patient cohort were made up of a similar number of males and females (49.5% and 50.5%) with the average age being 69.8 years old.
- The most common physical comorbidities were hypertension (51.1%) and obesity (32.7%).
- 34.7% were diagnosed with depression although only 12.9% had been screened or diagnosed in the past 2 years.
- 33.5% were diagnosed with anxiety although only 6% had been screened or diagnosed in the past 2 years.

### Adults with asthma

- There was a higher proportion of females (58.1%) to males (41.9%) in the adult asthma patient cohort with the average age being 52.9 years old.
- The most common physical comorbidities were atopy (46.1%), obesity (36.5%) and eczema (33.4%).
- 33.8% were diagnosed with anxiety and 31.8% with depression, however, only 9.3% had been screened or diagnosed for either condition in the past 2 years.

### Children with asthma

- There was a higher proportion of males (61.2%, 1–5 year olds) (57.2%, 6–18 year olds) to females in the children with asthma patient cohort, with the average ages being 4.2 and 12.1 years old.
- The most common physical comorbidities for both age groups were eczema (39.4%, 1–5 year olds) (49.8%, 6–18 year olds) and atopy (31.4%, 1–5 year olds) (49.7%, 6–18 year olds). Obesity was prevalent, however not as common (4.7%, 1–5 year olds) (6.0%, 6–18 year olds).
- 9.9% of 6–18 year olds were diagnosed with mild/moderate mental health problems.

## Key standards

### Comorbidities

> NICE 2016 NG56: Taking account of multimorbidity in tailoring the approach to care and how to identify people who may benefit from an approach to care that takes account of multimorbidity.[8]

> NICE 2009 CG91: *Depression in adults with a chronic physical health problem: recognition and management* recommends primary care be alert to possible depression (particularly in patients with a past history of depression or a chronic physical health problem with associated functional impairment) and consider asking patients who may have depression two screening questions.[9]

> NICE 2019 CG113: *Generalised anxiety disorder and panic disorder in adults: management* recommends primary care consider the diagnosis of generalised anxiety disorder in people presenting with anxiety or significant worry, and in people who attend primary care frequently who have a chronic physical health problem.[10]

## 1.1 Sex

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD (total)** | **n=49,062** | **n=38,286** | **n=82,696** |
| Male | 24,296 (49.5%) | 19,053 (49.8%) | 41,734 (50.5%) |
| Female | 24,766 (50.5%) | 19,233 (50.2%) | 40,959 (49.5%) |
| Unknown | 0 (0%) | 0 (0%) | <5 |
| **Adults with asthma (total)** | **n=121,327** | **n=95,147** | **-** |
| Male | 50,834 (41.9%) | 39,290 (41.3%) | - |
| Female | 70,493 (58.1%) | 55,857 (58.7%) | - |
| Unknown | 0 (0%) | 0 (0%) | - |
| **Children with asthma (1–5 years old) (total)** | **n=1,720** | **n=1,765** | **-** |
| Male | 1,053 (61.2%) | 1,091 (61.8%) | - |
| Female | 667 (38.8%) | 674 (38.2%) | - |
| Unknown | 0 (0%) | 0 (0%) | - |
| **Children with asthma (6–18 years old) (total)** | **n=18,760** | **n=15,500** | **-** |
| Male | 10,727 (57.2%) | 8,902 (57.4%) | - |
| Female | 8,033 (42.8%) | 6,598 (42.6%) | - |
| Unknown | 0 (0%) | 0 (0%) | - |

## 1.2 Age

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD (total)** | **n=49,062** | **n=38,286** | **n=82,696** |
| Mean (SD) | 69.8 (11.2) | 69.9 (11.0) | 70.7 (11.2) |
| Mean male age (SD) | 70.0 (11.0) | 70.0 (10.9) | 70.9 (11.0) |
| Mean female age (SD) | 69.6 (11.4) | 69.8 (11.2) | 70.4 (11.4) |
| **Adults with asthma (total)** | **n=121,327** | **n=95,147** | **-** |
| Mean (SD) | 52.9 (18.4) | 52.1 (18.4) | - |
| Mean male age (SD) | 52.1 (18.3) | 51.3 (18.2) | - |
| Mean female age (SD) | 53.4 (18.4) | 52.7 (18.5) | - |
| **Children with asthma (1–5 years old) (total)** | **n=1,720** | **n=1,765** | **-** |
| Mean (SD) | 4.2 (0.9) | 4.1 (1.0) | - |
| Mean male age (SD) | 4.2 (0.9) | 4.1 (1.0) | - |
| Mean female age (SD) | 4.2 (0.9) | 4.2 (1.0) | - |
| **Children with asthma (6–18 years old) (total)** | **n=18,760** | **n=15,500** | **-** |
| Mean (SD) | 12.1 (3.6) | 12 (3.5) | - |
| Mean male age (SD) | 12.0 (3.5) | 12 (3.5) | - |
| Mean female age (SD) | 12.3 (3.6) | 12 (3.6) | - |

## 1.3 Comorbidities[‡]

### 1.3.1 Adults with COPD

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD** | **n=49,062** | **n=38,286** | **n=82,696** |
| Asthma | 558 (1.1%) | 185 (0.5%) | 34,622 (41.9%)[§] |
| Bronchiectasis | 2,211 (4.5%) | 1,804 (4.7%) | 3,946 (4.8%) |
| Coronary heart disease | 9,473 (19.3%)[**] | 7,452 (19.5%)[**] | 33,054 (40.0%) |
| Diabetes | 9,374 (19.1%) | 7,213 (18.8%) | 18,685 (22.6%) |
| Heart failure | 3,827 (7.8%) | 3,078 (8.0%) | 7,443 (9.0%) |
| Hypertension | 25,067 (51.1%) | 19,387 (50.6%) | 43,588 (52.7%) |
| Lung cancer | 778 (1.6%) | 638 (1.7%) | 1,921 (2.3%) |
| Painful conditions[††] | 7,028 (14.3%) | 5,269 (13.8%) | 10,450 (12.6%) |
| Stroke | 3,098 (6.3%) | 2,371 (6.2%) | 8,623 (10.4%) |
| Osteoporosis | 5,915 (12.1%) | 4,926 (12.9%) | 10,657 (12.9%) |
| Obesity (BMI) | 16,055 (32.7%) | 11,965 (31.3%) | - |
| Severe mental illness (SMI): schizophrenia, bipolar disorder and other psychotic illness | 4,148 (8.5%) | 3,213 (8.4%) | 6,448 (7.8%) |
| Anxiety | 16,426 (33.5%) | 12,362 (32.3%) | 25,180 (30.5%) |
| Screened for anxiety or been diagnosed in the past 2 years | 2,934 (6.0%) | 2,400 (6.3%) | 4,108 (5.0%) |
| Depression | 17,036 (34.7%) | 12,425 (32.5%) | 24,861 (30.1%) |
| Screened for depression or been diagnosed in the past 2 years | 6,331 (12.9%) | 7,798 (20.4%) | 14,465 (17.5%) |
| Learning disability | 116 (0.2%) | 103 (0.3%) | - |

[‡] Most people will have more than one comorbidity.

[§] Comorbid asthma in people with COPD now more accurately reflects correct diagnosis. The methodology used during the 2016/2017 round of audit produced an inaccurate picture of COPD and asthma overlap. The 2017/2018 and 2020 data analysis excludes any asthma diagnoses that were in the 2 years prior to or at any time following a patient's COPD diagnosis.

[**] Coronary heart disease codes used in 2017/2018 and 2020 are similar to those used in other national primary care audits, which gives a more consistent national picture of comorbid heart disease.

[††] Defined as patients who had a record of four or more prescription analgesia medications in the past 12 months, or four or more specified anti-epileptics in the absence of an epilepsy Read code in the past 12 months.

### 1.3.2 Adults with asthma

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma** | **n=121,327** | **n=95,147** |
| COPD | 14,637 (12.1%)[‡‡] | 10,523 (11.1%) |
| Bronchiectasis | 2,049 (1.7%) | 1,544 (1.6%) |
| Coronary heart disease | 8,082 (6.7%) | 6,156 (6.5%) |
| Diabetes | 12,863 (10.6%) | 9,639 (10.1%) |
| Heart failure | 2,831 (2.3%) | 2,117 (2.2%) |
| Hypertension | 35,247 (29.0%) | 26,727 (28.1%) |
| Lung cancer | 292 (0.2%) | 233 (0.2%) |
| Painful conditions[††] | 12,885 (10.6%) | 9,936 (10.4%) |
| Stroke | 2,694 (2.2%) | 2,002 (2.1%) |
| Osteoporosis | 6,221 (5.1%) | 4,965 (5.2%) |
| Obesity (BMI) | 44,336 (36.5%) | 33,840 (35.6%) |
| Eczema | 40,475 (33.4%) | 31,628 (33.2%) |
| Atopy | 55,893 (46.1%) | 43,439 (45.7%) |
| Nasal polyps | 2,766 (2.3%) | 2,119 (2.2%) |
| Reflux | 21,886 (18.0%) | 15,855 (16.7%) |
| Hay fever | 26,321 (21.7%) | 20,516 (21.6%) |
| Family history of asthma | 18,276 (15.1%) | 15,108 (15.9%) |
| Allergic rhinitis | 32,790 (27.0%) | 25,184 (26.5%) |
| Severe mental illness (SMI): schizophrenia, bipolar disorder and other psychotic illness | 7,757 (6.4%) | 5,860 (6.2%) |
| Anxiety | 41,059 (33.8%) | 30,928 (32.5%) |
| Screened for anxiety or been diagnosed in the past 2 years | 11,290 (9.3%) | 9,046 (9.5%) |
| Depression | 38,563 (31.8%) | 29,159 (30.7%) |
| Screened for depression or been diagnosed in the past 2 years | 11,338 (9.3%) | 10,393 (10.9%) |
| Learning disability | 903 (0.7%) | 733 (0.8%) |

[‡‡] For people with active asthma (defined as the presence of an asthma Read code in the last 3 years) a comorbidity of COPD could have been diagnosed at any time therefore more comorbid COPD diagnoses present.

### 1.3.3 Children with asthma

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Children with asthma (1–5 year olds)** | **n=1,720** | **n=1,765** |
| Obesity (BMI) | 81 (4.7%) | 73 (4.1%) |
| Eczema | 677 (39.4%) | 752 (42.6%) |
| Atopy | 540 (31.4%) | 574 (32.5%) |
| Nasal polyps | 0 (0%) | 0 (0%) |
| Reflux | 224 (13.0%) | 205 (11.6%) |
| Hay fever | 108 (6.3%) | 112 (6.4%) |
| Family history of asthma | 149 (8.7%) | 169 (9.6%) |
| Allergic rhinitis | 109 (6.3%) | 97 (5.5%) |
| Mild/moderate mental health issues | 42 (2.4%) | 64 (3.6%) |
| Learning disability | 5 (0.3%) | <5 |
| **Children with asthma (6–18 year olds)** | **n=18,760** | **n=15,500** |
| Obesity (BMI) | 1,116 (6.0%) | 1,018 (6.6%) |
| Eczema | 9,338 (49.8%) | 7,849 (50.6%) |
| Atopy | 9,316 (49.7%) | 7,746 (50.0%) |
| Nasal polyps | 14 (0.1%) | 22 (0.1%) |
| Reflux | 1,095 (5.8%) | 769 (5.0%) |
| Hay fever | 3,530 (18.8%) | 2,953 (19.1%) |
| Family history of asthma | 1,856 (9.9%) | 1,482 (9.6%) |
| Allergic rhinitis | 3,826 (20.4%) | 3,189 (20.6%) |
| Mild/moderate mental health issues | 1,861 (9.9%) | 1,665 (10.7%) |
| Learning disability | 256 (1.4%) | 201 (1.3%) |

# Section 2: Getting the diagnosis right

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## Navigation

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



## Key findings

### Adults with COPD

- Of COPD diagnoses in the past 2 years (n=9,395):
  - 11.5% had a record of the gold standard diagnostic test for COPD[§§]
  - 44.2% had a record of any spirometry code
  - 33.3% had a chest X-ray or computed tomography (CT) scan 6 months prior or within 6 months of diagnosis.

### Adults with asthma

- Of adult asthma diagnoses in the past 2 years (n=49,627):
  - 76.3% had one or more objective measurement[***] ever recorded.
  - 2.8% had a spirometry test with reversibility
  - 72.3% had a record of any peak flow test[†††]
  - 0.3% had a record of a fractional exhaled nitric oxide (FeNO) test.

[§§] Post-bronchodilator FEV1/FVC, as recorded by Read code 339m.

[***] Spirometry, peak flow with >1 reading/evidence of peak flow diary or FeNO test.

[†††] Any peak flow Read code, including Read code 339A (peak flow rate before bronchodilation) and Read code 339B (peak flow rate after bronchodilation).

### Children with asthma

- Of children aged 6 years and above with an asthma diagnosis in the past 2 years (n=8,444):
  - 67.4% had one or more objective measurement*** ever recorded
  - 0.9% had a spirometry test with reversibility
  - 66.8% had a record of any peak flow test.†††
- 0.5% had a record of a FeNO test.

## Key standards

### Diagnosing COPD

- NICE 2016 QS10 (QS1): People aged over 35 years who present with a risk factor and one or more symptoms of COPD have post-bronchodilator spirometry.[11]
- NICE 2019 NG115: At the time of their initial diagnostic evaluation, in addition to spirometry, all patients should have a chest radiograph to exclude other pathologies.[12]

### Diagnosing asthma

- NICE 2018 QS25 (QS1): People aged 5 years and over with suspected asthma have objectives tests to support diagnosis.[13]
- NICE 2017 NG80: Offer a FeNO test to adults (aged 17 and over) if a diagnosis of asthma is being considered. Regard a FeNO level of 40 parts per billion (ppb) or more as a positive test. Consider a FeNO test in children and young people (aged 5–16) if there is diagnostic uncertainty after initial assessment and they have either normal spirometry or obstructive spirometry with a negative bronchodilator reversibility test. For children under 5 with suspected asthma, treat symptoms based on observation and clinical judgement, and review the child on a regular basis. If they still have symptoms when they reach 5 years, carry out objective tests.[14]

## 2.1 Post-bronchodilator spirometry

Full assurance about the diagnosis of COPD being made with accurate spirometry can only be made in retrospect if a flow volume curve and time volume trace is seen in conjunction with correct patient demographics and key spirometric measures. However, with such a large denominator population, we have looked for the presence of Read code 339m, or any ratio code, alongside a value of between 0.2 and 0.7, to assure us that: a) the test conducted was post-bronchodilation, and b) the value is consistent with obstruction.

### 2.1.1 The percentage of people diagnosed with COPD in the past 2 years who have a post-bronchodilator FEV1/FVC or any ratio code between ≥0.2 and <0.7

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD** | **n=9,395** | **n=6,683** | **n=10,868** |
| Any spirometry ratio codes‡‡‡ ≥0.2 and <0.7 | 4,149 (44.2%) | 3,299 (49.4%) | 5,906 (54.3%) |
| Post-bronchodilator code§§§ with spirometry ratio ≥0.2 and <0.7 | 1,078 (11.5%) | 641 (9.6%) | 918 (8.5%) |
| No post-bronchodilator code | 7,997 (85.1%) | 5,879 (88.0%) | 9,660 (88.9%) |

‡‡‡ Other 339 Read codes eg 339j, 339k, 339R

§§§ Read code 339m

## 2.2 X-ray and CT scan

### 2.2.1 The percentage of people with COPD who had a chest X-ray or CT scan 6 months prior to diagnosis or within 6 months of diagnosis (for diagnoses made in the past 2 years)

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD** | **n=9,395** | **n=6,683** | **n=10,868** |
| Chest X-ray or CT scan within 6 months | 3,132 (33.3%) | 2,329 (34.8%) | 4,300 (39.6%) |

## 2.3 Any objective measurement

### 2.3.1 The percentage of people diagnosed with asthma (adults and children) in the past 2 years who have a (ever recorded) record of any objective measurement (spirometry, peak flow (>1 reading or evidence of peak flow diary) or FeNO).

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma** | **n=49,627** | **n=38,763** |
| ≥1 objective measurement | 37,872 (76.3%) | 30,735 (79.3%) |
| **Children with asthma (6 years and above only) (total)** | **n=8,444** | **n=6,767** |
| ≥1 objective measurement | 5,688 (67.4%) | 4,867 (71.9%) |

## 2.4 Peak flow

### 2.4.1 The percentage of people diagnosed with asthma (adults and children) who have a record (ever) of a peak flow test (reading/and or diary records)

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma (total)** | **n=121,327** | **n=95,147** |
| No peak flow codes ever | 8,266 (6.8%) | 5,728 (6.0%) |
| Peak flow test (Read code 339A**** or 339B††††) ever | 43,569 (35.9%) | 41,499 (43.6%) |
| Peak flow diary‡‡‡‡ ever | 1,806 (1.5%) | 1,812 (1.9%) |
| Any peak flow test ever§§§§ | 113,061 (93.2 %) | 89,419 (94.0%) |
| **Children with asthma (6 years and above only) (total)** | **n=18,760** | **n=15,500** |
| No peak flow codes ever | 4,012 (21.4%) | 2,715 (17.5%) |
| Peak flow test (Read code 339A**** or 339B††††) ever | 4,269 (22.8%) | 5,079 (32.8%) |
| Peak flow diary‡‡‡‡ ever | 378 (2.0%) | 302 (2.0%) |
| Any peak flow test ever§§§§ | 14,748 (78.6%) | 12,785 (82.5%) |

**** Peak flow rate before bronchodilation

†††† Peak flow rate after bronchodilation

‡‡‡‡ Read code 66YY

§§§§ Any peak flow Read code, including 339A and 339B

### 2.4.2 The percentage of people diagnosed with asthma (adults and children) in the past 2 years who have a record of a peak flow test (reading/and or diary records)

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma (total)** | **n=49,627** | **n=38,763** |
| No peak flow codes in past 2 years | 13,732 (27.7%) | 9,276 (23.9%) |
| Peak flow test (Read code 339A[****] or 339B[††††]) in past 2 years | 8,760 (17.7%) | 9,463 (24.4%) |
| Peak flow diary[‡‡‡‡] in the past 2 years | 161 (0.3%) | 147 (0.4%) |
| Any peak flow test in past 2 years[§§§§] | 35,895 (72.3%) | 29,487 (76.1%) |
| **Children with asthma (6 years and above only) (total)** | **n=8,444** | **n=6,767** |
| No peak flow codes in past 2 years | 2,807 (33.2%) | 1,937 (28.6%) |
| Peak flow test (Read code 339A[****] or 339B[††††]) in past 2 years | 1,299 (15.4%) | 1,456 (21.5%) |
| Peak flow diary[‡‡‡‡] in the past 2 years | 71 (0.8%) | 42 (0.6%) |
| Any peak flow test in past 2 years[§§§§] | 5,637 (66.8%) | 4,830 (71.4%) |

## 2.5 Fractional exhaled nitric oxide (FeNO)

### 2.5.1 The percentage of adults and children diagnosed with asthma in the past 2 years who have a record of a fractional exhaled nitric oxide (FeNO) test

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma (total)** | **n=49,627** | **n=38,763** |
| FeNO test | 167 (0.3%) | 8 (0.02%) |
| **Children with asthma (6 years and above only) (total)** | **n=8,444** | **n=6,767** |
| FeNO test | 39 (0.5%) | 0 (0%) |

## 2.6 Spirometry

### 2.6.1 The percentage of people diagnosed with asthma (adults and children) in the past 2 years who have a pre- and/or post-bronchodilator FEV1/FVC recorded and the proportion who have an FEV1/FVC or any ratio code ≥0.2 and <0.7 (consistent with airways obstruction)

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma diagnosed in the past 2 years (total)** | **n=49,627** | **n=38,763** |
| No post-bronchodilator ratio code[§§§] | 47,920 (96.6%) | 37,716 (97.3%) |
| No pre-bronchodilator ratio code[*****] | 48,908 (98.6%) | 38,469 (99.2%) |
| Post-bronchodilator[§§§] ratio is ≥0.2 and <0.7 | 705 (1.4%) | 403 (1.0%) |
| Pre-bronchodilator[****]* ratio is ≥0.2 and <0.7 | 280 (0.6%) | 112 (0.3%) |
| **Any** spirometry ratio codes ≥0.2 and <0.7 | 3,186 (6.4%) | 2,813 (7.3%) |
| **Children with asthma (6 years and above only) diagnosed in the past 2 years (total)** | **n=8,444** | **n=6,767** |
| No post-bronchodilator ratio code[§§§] | 8,355 (99.0%) | 6,717 (99.3%) |
| No pre-bronchodilator ratio code[*****] | 8,391 (99.4%) | 6,747 (99.7%) |
| Post-bronchodilator[§§§] ratio is ≥0.2 and <0.7 | <5 | <5 |
| Pre-bronchodilator[*****] ratio is ≥0.2 and <0.7 | 5 (0.1%) | 0 (0%) |
| **Any** spirometry ratio codes ≥0.2 and <0.7 | 31 (0.4%) | 31 (0.5%) |

[*****] Read code 339l

### 2.6.2 The percentage of people diagnosed with asthma (adults and children) in the past 2 years who have a spirometry (+ reversibility) test

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma (total)** | **n=49,627** | **n=38,763** |
| No spirometry codes | 38,900 (78.4%) | 29,476 (76.0%) |
| Any FEV1/FVC code†††††† (+ reversibility) test in the past 2 years | 695 (1.4%) | 599 (1.6%) |
| Any spirometry (+ reversibility) test in the past 2 years | 1,400 (2.8%) | 1,377 (3.6%) |
| **Children with asthma (6 years and above only) (total)** | **n=8,444** | **n=6,767** |
| No spirometry codes | 7,827 (92.7%) | 6,154 (90.9%) |
| Any FEV1/FVC code†††††† (+ reversibility) test within the past 2 years | 33 (0.4%) | 28 (0.4%) |
| Any spirometry (+ reversibility) test in the past 2 years | 74 (0.9%) | 74 (1.1%) |

†††††† Read codes 339l, 339m and 339M

# Section 3: Assessing severity and future risk

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## Navigation

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



## Key findings

### Adults with COPD

- 50.1% had a Medical Research Council (MRC) score recorded in the past year. Most had a score of 2 (20.9%) or 3 (14.1%).
- Only 11.6% of the people with stable COPD and a single oxygen saturation level of 92% or less in the past 2 years had evidence of an arterial blood gas measurement or referral for home oxygen.
- 21.9% of people with stable COPD and a persistent oxygen saturation level of 92% or less in the past 2 years had evidence of an arterial blood gas measurement or referral for home oxygen.
- 22.9% were not asked about their smoking (tobacco) status in the past year. 41.9% reported they were ex-smokers.

### Adults with asthma

- 29.2% were not asked about their smoking (tobacco) status in the past year. 35.1% reported they had never smoked.
- 0.7% were asked about exposure to second-hand smoke.

### Children with asthma

- 69.2% of children aged 6 years and above were not asked about their smoking (tobacco) status in the past year. 29.4% reported they had never smoked.
- 0.5% of 1–5 year olds and 0.6% of 6–18 year olds had a record of a check of exposure to second-hand smoke.

## Key standards

### COPD

- NICE 2019 NG115: One of the primary symptoms of COPD is breathlessness. The MRC dyspnoea scale should be used to grade the breathlessness according to the level of exertion required to elicit it.[12]
- NICE 2016 QS10 (QS3): People with stable COPD and a persistent resting stable oxygen saturation level of 92% or less have their arterial blood gases measured to assess whether they need long-term oxygen therapy (LTOT).[11]
- NICE 2019 NG115: Document an up-to-date smoking history, including pack years smoked for everyone with COPD. At every opportunity, advise and encourage every person with COPD who is still smoking (regardless of their age) to stop, and offer them help to do so. Unless contraindicated, offer nicotine replacement therapy, varenicline or bupropion as appropriate to people who want to stop smoking, combined with an appropriate support programme to optimise smoking quit rates for people with COPD.[12]
- NICE 2013 QS43 (QS1): People should be asked if they smoke by their healthcare practitioner, and those who smoke should be offered advice on how to stop.[15]

### Asthma

- NICE 2018 QS25 (QS5): People with suspected severe asthma are referred to a specialist multidisciplinary severe asthma service.[13]
- BTS/SIGN 2019 [6.2.3]: People with asthma and parents/carers of children with asthma should be advised about the dangers of smoking and second-hand tobacco smoke exposure, and should be offered appropriate support to stop smoking.[16]
- NICE 2013 QS43 (QS1)**:** People should be asked if they smoke by their healthcare practitioner, and those who smoke should be offered advice on how to stop.[15]

## 3.1 MRC scoring

Breathlessness and quality of life scores are now considered more important than degree of airflow obstruction when making decisions on therapies in COPD.[17] The MRC dyspnoea scale grades the degree of breathlessness in relation to activities. Therefore, the audit standard and expectation for best practice is for an MRC score to be recorded within the past year as part of annual review.

### 3.1.1 Percentage of people with COPD with MRC scores 1, 2, 3, 4, 5‡‡‡‡‡ and 'not recorded' in the past year

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD** | **n=49,062** | **n=38,286** | **n=82,696** |
| **1** | 3,137 (6.4%) | 2,961 (7.7%) | 6,368 (7.7%) |
| **2** | 10,231 (20.9%) | 8,726 (22.8%) | 22,144 (26.8%) |
| **3** | 6,896 (14.1%) | 5,774 (15.1%) | 13,715 (16.6%) |
| **4** | 3,792 (7.7%) | 2,917 (7.6%) | 7,021 (8.5%) |
| **5** | 530 (1.1%) | 475 (1.2%) | 1,153 (1.4%) |
| **Not recorded** | 24,476 (49.9%) | 17,433 (45.5%) | 32,295 (39.1%) |

## 3.2 FEV1 %-predicted value measurement

Breathlessness and airflow limitation in COPD worsen over time, but classically in a pattern of slow decline.[18] The annual review can also use sudden changes in breathlessness or marked worsening of FEV1 as an indicator that another cause of breathlessness may now be present. The natural decline in FEV1 annually would usually be considerably <40 mL. Where the decline is greater, a reassessment of breathlessness cause should be considered.

### 3.2.1 Percentage of people with COPD who have a measure of FEV1 %-predicted value recorded in the past year

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD** | **n=49,062** | **n=38,286** | **n=82,696** |
| FEV1 %-predicted value in past year | 13,587 (27.7%) | 11,989 (31.3%) | 22,756 (27.5%) |

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

## 3.3 Oxygen: management and treatment

Good clinical practice would expect referral after two recordings of pulse oximetry <92% when the patient is stable.[19,20] However, this denominator includes those patients with one low reading, as repeated readings were rare. This suggests that there is a QI opportunity around ensuring that any person with COPD and low oxygen saturations has a follow-up check of their saturations within 3 months (ie rather than relying on just one reading).

### 3.3.1 Percentage of people with stable COPD and either a *single* or *persistent* stable oxygen saturation level of 92% or less in the past 2 years who have evidence of an arterial blood gas measurement or referral for home oxygen assessment

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD single stable oxygen saturation level** | **n=3,198** | **n=3,372** | **n=6,734** |
| People with stable COPD and a single oxygen saturation level of 92% or less in the past 2 years and arterial blood gas measurement or referral for home oxygen assessment | 371 (11.6%) | 437 (13.0%) | 747 (11.1%) |
| **Adults with COPD Persistent stable oxygen saturation level** | **n=599** | **n=726** | **-** |
| People with a persistent resting stable oxygen saturation (2 measurements within 3 months) level of 92% or less in the past 2 years and arterial blood gas measurement or referral for home oxygen assessment | 131 (21.9%) | 177 (24.4%) | - |

## 3.4 Identification of severe asthma and referral to specialist care

### 3.4.1 Percentage of people with asthma prescribed three or more courses of oral steroids in the past year

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

### 3.4.2 Percentage of people with asthma prescribed three or more courses of oral steroids and referred to specialist care in the past year

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

## 3.5 Smoking

### 3.5.1 Percentage and status of people with COPD and asthma (adults and children) who were asked about tobacco smoking in the past year

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD (total)** | **n=49,062** | **n=38,286** | **n=82,696** |
| Never smoked | 4,262 (8.7%) | 3,067 (8.0%) | 7,574 (9.2%) |
| Ex-smoker | 20,553 (41.9%) | 16,579 (43.3%) | 34,551 (41.8%) |
| Current smoker | 12,997 (26.5%) | 10,725 (28.0%) | 21,924 (26.5%) |
| Not asked about smoking | 11,250 (22.9%) | 7,915 (20.7%) | 18,647 (22.6%) |
| **Adults with asthma (total)** | **n=121,327** | **n=95,147** | **-** |
| Never smoked | 42,576 (35.1%) | 32,809 (34.5%) | - |
| Ex-smoker | 27,842 (23.0%) | 22,564 (23.7%) | - |
| Current smoker | 15,428 (12.7%) | 12,954 (16.6%) | - |
| Not asked about smoking | 35,481 (29.2%) | 26,820 (28.2%) | - |
| **Children with asthma (6–18 years old) (total)** | **n=18,760** | **n=15,500** | **-** |
| Never smoked | 5,512 (29.4%) | 4,970 (32.1%) | - |
| Ex-smoker | 90 (0.5%) | 127 (0.8%) | - |
| Current smoker | 176 (0.9%) | 217 (1.4%) | - |
| Not asked about smoking | 12,982 (69.2%) | 10,186 (65.7%) | - |

## 3.6 Exposure to second-hand smoke (SHS)

Second-hand smoke (SHS) exposure causes 22,000 new cases of wheeze and asthma in children each year in the UK. Every day in the UK 26 children are admitted to hospital and 822 are seen by a GP as a direct result of exposure to SHS. Childhood SHS exposure costs the NHS in England £9.7 million[21] in additional primary care consultation and asthma treatment costs. Figures for Wales are not available.

### 3.6.1 Percentage of adults and children with asthma who were exposed to second-hand smoke in the past year

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma (total)** | **n=121,327** | **n=95,147** |
| Not exposed to second-hand smoke | 72 (0.1%) | 27 (0.03%) |
| Exposed to second-hand smoke | 816 (0.7%) | 617 (0.7%) |
| Not asked about exposure to second-hand smoke | 120,439 (99.3%) | 94,503 (99.3%) |
| **Children with asthma (1–5 years old) (total)** | **n=1,720** | **n=1,765** |
| Not exposed to second-hand smoke | <5 | <5 |
| Exposed to second-hand smoke | 6 (0.4%) | 9 (0.5%) |
| Not asked about exposure to second-hand smoke | 1,712 (99.5%) | 1,753 (99.3%) |
| **Children with asthma (6–18 years old) (total)** | **n=18,760** | **n=15,500** |
| Not exposed to second-hand smoke | 31 (0.2%) | 20 (0.1%) |
| Exposed to second-hand smoke | 78 (0.4%) | 56 (0.4%) |
| Not asked about exposure to second-hand smoke | 18,651 (99.4%) | 15,424 (99.5%) |

## 3.7 COPD exacerbation and asthma attack count in the past year

The learning from previous extractions is that exacerbation Read codes (eg 66Yf in COPD) are not reliably used. Therefore, in order to ensure that we were able to provide a more comprehensive and accurate breakdown of exacerbation rates at a population level, we have used a validated modelling method with high reliability for asthma and COPD.[1,4,5,6] Lower respiratory tract infection (LRTI) codes and concurrent respiratory antibiotic and oral prednisolone codes are used in this model (for more information, please refer to the methodology in Appendix A).

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

# Section 4: Providing high-value care

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## Navigation

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



## Key findings

### Adults with COPD

- 40,137 adults with COPD had any MRC score in the past 3 years.
  - 36.6% of these people were referred for PR.
- 17,064 adults with COPD had an MRC score 3–5 in the past 3 years.
  - 56.4% of these people were referred for PR.
- 36.6% of people with any MRC score  referred for PR in the past 3 years.
- 44.4% of people were prescribed an inhaler and had an inhaler technique check in the past year.
- 68.5% received an influenza vaccination in the preceding autumn and winter months (1 August to 31 March).

### Adults with asthma

- Only 25.9% had a PAAP in the past year.
- 54.5% had a record of being asked the RCP three questions.[22]
- 48.4% were prescribed an inhaler and had an inhaler technique check in the past year.
- 54.0% received an influenza vaccination in the preceding autumn and winter months (1 August to 31 March).

### Children with asthma

- Only 16.1% of 1–5 year olds and 24.3% of 6–18 year olds had a PAAP in the past year.
- 32.4% of 1–5 year olds and 46.5% of 6–18 year olds had a record of being asked the RCP three questions.
- 28.2% of 1–5 year olds and 42.8% of 6–18 year olds were prescribed an inhaler and had an inhaler technique check in the past year.
- 44.8% of 1–5 year olds and 49.1% of 6–18 year olds received an influenza vaccination in the preceding autumn and winter months (1 August to 31 March).

## Key standards

### COPD

- NICE 2019 NG115: Make PR available to all appropriate people with COPD, including people who have had a recent hospitalisation for an acute exacerbation. Offer PR to all people who view themselves as functionally disabled by COPD (usually MRC grade 3 and above).[12]
- NICE 2016 QS10 (QS2): People with COPD who are prescribed an inhaler have their inhaler technique assessed when starting treatment and then regularly during treatment.[11]
- BTS Quality statement 1: People with COPD and self-reported exercise limitation (MRC dyspnoea 3–5) are offered PR.[23]

### Asthma

- NICE 2017 NG80: Offer an asthma self-management programme, comprising a written personalised action plan and education, to adults, young people and children aged over 5 and over with a diagnosis of asthma (and their families or carers if appropriate).[14]
- NICE 2018 QS25 (QS3): People with asthma have their asthma control monitored at every asthma review. If suboptimal asthma control is identified, the person should have an assessment to identify possible reasons for this, including adherence and inhaler technique, before their treatment is adjusted.[13]

## 4.1 Pulmonary rehabilitation (PR)

### 4.1.1 Percentage of adults with COPD with MRC scores 3–5 and any MRC score who have been referred for PR in the past 3 years

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD (MRC score 3–5)** | **n=17,064** | **n=13,635** | **n=15,190** |
| Referred for PR | 9,619 (56.4%) | 8,497 (62.3%) | 7,621 (50.2%) |
| **Adults with COPD (any MRC score)** | **n=40,137** | **n=32,709** | **n=47,974** |
| Referred for PR | 14,671 (36.6%) | 12,793 (39.1%) | 10,179 (21.2%) |

## 4.2 Personalised asthma action plans

### 4.2.1 Percentage of people (adults and children) with asthma who have had a PAAP anytime in the past year

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma** | **n=121,327** | **n=95,147** |
| PAAP anytime in the past year | 31,379 (25.9%) | 23,931 (25.2%) |
| **Children with asthma (1–5 year olds)** | **n=1,720** | **n=1,765** |
| PAAP anytime in the past year | 276 (16.1%) | 298 (16.9%) |
| **Children with asthma (6–18 year olds)** | **n=18,760** | **n=15,500** |
| PAAP anytime in the past year | 4,553 (24.3%) | 3,555 (22.9%) |

## 4.3 RCP three asthma questions[22]

### 4.3.1 Percentage of people (adults and children) with asthma who have a record of the RCP three questions being asked in the past year

The RCP three questions:

- In the last month:
  - have you had difficulty sleeping because of your asthma symptoms (including cough)?
  - have you had your usual asthma symptoms during the day (cough, wheeze, chest tightness, or breathlessness)?
  - has your asthma interfered with your usual activities (eg housework, work/school, etc)?

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma** | **n=121,327** | **n=95,147** |
| RCP three questions asked in the past year | 66,086 (54.5%) | 55,002 (57.8%) |
| **Children with asthma (1–5 years old)** | **n=1,720** | **n=1,765** |
| RCP three questions asked in the past year | 557 (32.4%) | 634 (35.9%) |
| **Children with asthma (6–18 years old)** | **n=18,760** | **n=15,500** |
| RCP three questions asked in the past year | 8,717 (46.5%) | 7,404 (47.8%) |

## 4.4 Short-acting reliever inhalers

Regular use of short-acting beta agonist (SABA) more than twice per week, which equals four puffs, is considered poor control. Extrapolating this, more than 208 puffs of salbutamol in a year signifies excess. Each salbutamol inhaler contains 200 puffs of SABA and in theory any usage beyond two devices per year of SABA suggests a need for better control.

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

## 4.5 Inhaled corticosteroid inhalers devices

ICSs are the mainstay of asthma therapy. Regular use of low dose ICS should result in good asthma control for the vast majority of people with asthma. NICE NG80 *Asthma in adults and children* did not find any evidence for intermittent therapy of ICS and continued to recommend daily therapy for the prevention of asthma symptoms and attacks. The Asthma Audit Development Project (AADP) pragmatically defined that less than 50% of expected use was considered to be sub-therapeutic asthma preventer treatment.

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

## 4.6 Inhaler technique

### 4.6.1 Percentage of people with COPD and asthma (adults and children) who have been prescribed an inhaler AND who have evidence of an inhaler technique check in the past year

Prescriptions are not reliably recorded using our method of detecting Read codes. Therefore results presented may not be representative of what is happening in clinical practice and prescriptions may have been missed. Therefore these results should be interpreted with caution.

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD** | **n=35,761** | **n=29,482** | **n=75,923** |
| Prescribed inhaler and inhaler technique check in past year | 15,892 (44.4%) | 13,159 (44.6%) | 35,572 (46.9%) |
| **Adults with asthma** | **n=101,827** | **n=77,829** | **-** |
| Prescribed inhaler and inhaler technique check in past year | 49,246 (48.4%) | 38,199 (49.1%) | - |
| **Children with asthma (1–5 year olds)** | **n=1,410** | **n=1,391** | **-** |
| Prescribed inhaler and inhaler technique check in past year | 397 (28.2%) | 393 (28.3%) | - |
| **Children with asthma (6–18 year olds)** | **n=13,881** | **n=10,777** | **-** |
| Prescribed inhaler and inhaler technique check in past year | 5,942 (42.8%) | 4,610 (42.8%) | - |

## 4.7 Influenza immunisation

Neither BTS/SIGN asthma 2016 or NICE asthma 2017 make a recommendation for the use of influenza vaccine in people with asthma. However, current guidance recommends influenza vaccination for people with long-term respiratory disease that includes asthma as an 'at risk' group.[24] People with chronic respiratory illness who are infected with the influenza virus have more serious illness and are at higher risk of mortality.[25]

Despite the fact that the vaccine has variable effectiveness according to season and current health status when given, it is safe and the highest-value intervention for the treatment of COPD.[25] The results below use a denominator of 'all people with COPD or asthma' and do not exclude those with exception codes.

### 4.7.1 Percentage of people with COPD and asthma (adults and children) who have had the influenza immunisation in the preceding 1 August to 31 March

| | Wales 2020 | Wales 2017/18 | Wales 2015/17 |
|---|---|---|---|
| **Adults with COPD** | **n=49,062** | **n=38,286** | **n=82,696** |
| Immunisation in the preceding 1 August to 31 March | 33,605 (68.5%) | 27,923 (72.9%) | 54,602 (66.0%) |
| **Adults with asthma** | **n=121,327** | **n=95,147** | **-** |
| Immunisation in the preceding 1 August to 31 March | 65,534 (54.0%) | 54,240 (57.0%) | - |
| **Children with asthma (1–5 year olds)** | **n=1,720** | **n=1,765** | **-** |
| Immunisation in the preceding 1 August to 31 March | 770 (44.8%) | 1,014 (57.5%) | - |
| **Children with asthma (6–18 year olds)** | **n=18,760** | **n=15,500** | **-** |
| Immunisation in the preceding 1 August to 31 March | 9,201 (49.1%) | 6,719 (43.4%) | - |

## 4.8 Smoking cessation

This question looks at a cohort of self-reported smokers. Tobacco dependency is known to relapse, so reassessing smoking status and offering therapy should happen in those with tobacco smoking histories and especially those who have relapsed in recent years. Therefore, people who had combinations of any non-smoker and current smoker codes in the past 2 years were included in the denominator for analysis (ie in addition to those who simply had current smoker codes recorded). The best way of treating tobacco dependency is with a combination of behavioural therapy and drug therapy, and so codes for both elements of care needed to be present to be included in the COPD numerator.[26,27] People aged over 18 with asthma will be considered to have been 'treated' if they have both pharmacotherapy and behavioural intervention codes. Licensing of stop smoking drugs is different below aged 18 and delivery of stop smoking treatment was therefore measured separately by behavioural support and drug codes.

### 4.8.1 Percentage of people with COPD and asthma (adults) who were recorded as a current smoker at any time in the past 2 years who have received or had a referral to a behavioural change intervention (BCI) AND had a stop smoking drug prescribed in the past year

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

### 4.8.2 Percentage of children with asthma who were recorded as a current smoker at any time in the past 2 years who have received or had a referral to a behavioural change intervention (BCI) OR had a stop smoking drug prescribed in the past year

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

## 4.9 Use of inhaled drug therapies

Inhaled pharmacotherapy, when prescribed and dispensed according to guidelines and when used appropriately, can prevent exacerbations, ease breathlessness, allow people to be more active and improve quality of life.[28,29] Peer-reviewed reports and the first cycle of this audit, however, still show that there is some overuse and misuse of inhaled pharmacotherapy.[28–30]

### 4.9.1 COPD and asthma (adults and children) patients issued a prescription for inhaled drug therapy in the last 6 months of the audit period

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

### 4.9.2 Types of inhaled drug therapy prescribed to COPD and asthma (adult and children) patients in the last 6 months of the audit period

Data for this item was not able to be extracted accurately as the majority of prescription Read codes are no longer in use. The extraction mechanism available to the audit was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

# Section 5: Ensuring equal and equitable care in people with a mental health diagnosis

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## Navigation

This section contains three sections. If viewing this report on a computer, you can select the table that you wish to see from the list below.



## Key findings

### Adults with COPD

- 8.5% of the cohort had a serious mental health diagnosis with 39.0% reporting anxiety and/or depression.
- People with COPD and a serious mental health diagnosis had a lower prevalence:
  - Of post-bronchodilator spirometry in the past 2 years, 9.4% compared with 12.4%.
  - Of people with an MRC score 3–5 being referred to PR, 54.3% compared with 57.2%.

### Adults with asthma

- 6.4% of the cohort had a serious mental health diagnosis with 38.6% reporting anxiety and/or depression.
- People with asthma and a serious mental health diagnosis had:
  - A similar prevalence of recording of peak flow, 92.5% compared with 93.0%.
  - A slightly lower prevalence of being asked the RCP three questions, 51.3% compared with 55.6%.

### Children with asthma

- 2.4% of 1–5 year olds and 9.4% of 6–18 year olds had a mild/moderate mental health diagnosis.
- 0.3% of 1–5 year olds and 1.4% of 6–18 year olds reported learning disabilities.
- 1–5 year olds with a mild/moderate mental health diagnosis had a slightly higher prevalence of being asked the RCP three questions, 35.7% compared with 32.3%.
- 6–18 year olds with a mild/moderate mental health diagnosis had:
  - a higher prevalence of recording of peak flow, 82.3% compared with 78.2%.
  - a slightly lower prevalence of being asked the RCP three questions, 44.4% compared with 46.6%.

## Key standards

- NICE 2016 NG56: Taking account of multimorbidity in tailoring the approach to care and how to identify people who may benefit from an approach to care that takes account of multimorbidity.[8]
- NICE 2009 CG91: *Depression in adults with a chronic physical health problem: recognition and management* recommends primary care be alert to possible depression (particularly in patients with a past history of depression or a chronic physical health problem with associated functional impairment) and consider asking patients who may have depression two screening questions.[9]
- NICE 2019 CG113: *Generalised anxiety disorder and panic disorder in adults: management* recommends primary care consider the diagnosis of generalised anxiety disorder in people presenting with anxiety or significant worry, and in people who attend primary care frequently who have a chronic physical health problem.[10]

## 5.1 Serious mental health diagnosis, anxiety and depression in people with COPD

### 5.1.1 Percentage of people with COPD who have a mental health diagnosis

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with COPD** | **n=49,062** | **n=38,286** |
| No mental health diagnosis | 25,773 (52.5%) | 20,788 (54.3%) |
| Anxiety and/or depression | 19,141 (39.0%) | 14,285 (37.1%) |
| Serious mental health diagnosis | 4,148 (8.5%) | 3,213 (8.4%) |

### 5.1.2 Percentage of people with COPD who have a record of key elements of COPD care

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with COPD** | **n=49,062** | **n=38,286** |
| *Post-bronchodilator FEV1/FVC ratio of <0.7 (patients diagnosed in the past 2 years)* | *n=1,078* | *n=641* |
| No mental health diagnosis | 611/4,929 (12.4%) | 363/3,675 (9.9%) |
| Anxiety and/or depression | 392/3,669 (10.7%) | 229/2,416 (9.5%) |
| Serious mental health diagnosis | 75/797 (9.4%) | 49/592 (8.3%) |
| *People referred for pulmonary rehabilitation (MRC score of 3–5)* | *n=9,619* | *n=8,497* |
| No mental health diagnosis | 4,781/8,352 (57.2%) | 4,293/6,823 (62.9%) |
| Anxiety and/or depression | 3,934/7,047 (55.8%) | 3,408/5,519 (61.8%) |
| Serious mental health diagnosis | 904/1,665 (54.3%) | 796/1,293 (62.6%) |

## 5.2 Serious mental illness, anxiety and depression in adults with asthma

### 5.2.1 Percentage of adults with asthma who have a mental health diagnosis

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma** | **n=121,327** | **n=95,147** |
| No mental health diagnosis | 66,792 (55.1%) | 53,488 (56.2%) |
| Anxiety and/or depression | 46,778 (38.6%) | 35,799 (37.6%) |
| Serious mental health diagnosis | 7,757 (6.4%) | 5,860 (6.2%) |

### 5.2.2 Percentage of adults diagnosed with asthma who have a record of key elements of asthma care

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Adults with asthma** | **n=121,327** | **n=95,147** |
| *Peak flow record* | *n=113,061* | *n=89,419* |
| No mental health diagnosis | 62,098/66,792 (93.0%) | 50,212/53,488 (93.9%) |
| Anxiety and/or depression | 43,788/46,778 (93.6%) | 33,778/35,799 (94.4%) |
| Serious mental health diagnosis | 7,175/7,757 (92.5%) | 5,429/5,860 (92.7%) |
| *RCP three questions* | *n=66,086* | *n=55,002* |
| No mental health diagnosis | 37,129/66,792 (55.6%) | 31,486/53,488 (58.9%) |
| Anxiety and/or depression | 24,978/46,778 (53.4%) | 20,343/35,799 (56.8%) |
| Serious mental health diagnosis | 3,979/7,757 (51.3%) | 3,173/5,860 (54.2%) |

## 5.3 Mild and moderate mental health diagnosis and learning disability in children with asthma

### 5.3.1 Percentage of children with asthma with mild and moderate mental health diagnosis

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Children with asthma (1–5 year olds)** | **n=1,720** | **n=1,765** |
| No mental health diagnosis or learning disability | 1,673 (97.3%) | 1,699 (96.3%) |
| Mild/moderate mental health diagnosis | 42 (2.4%) | 64 (3.6%) |
| Learning disability | 5 (0.3%) | <5 |
| **Children with asthma (6–18 year olds)** | **n=18,760** | **n=15,500** |
| No mental health diagnosis or learning disability | 16,733 (89.2%) | 13,718 (88.5%) |
| Mild/moderate mental health diagnosis | 1,771 (9.4%) | 1,581 (10.2%) |
| Learning disability | 256 (1.4%) | 201 (1.3%) |

### 5.3.2 Percentage of children diagnosed with asthma who have a record of key elements of asthma care

| | Wales 2020 | Wales 2017/18 |
|---|---|---|
| **Children with asthma (1–5 year olds)** | **n=1,720** | **n=1,765** |
| *RCP three questions* | *n=557* | *n=634* |
| No mental health diagnosis or learning disability | 540/1,673 (32.3%) | 609/1,699 (35.8%) |
| Mild/moderate mental health diagnosis | 15/42 (35.7%) | 25/64 (39.1%) |
| Learning disability | <5 | <5 |
| **Children with asthma (6–18 year olds)** | **n=18,760** | **n=15,500** |
| *Peak flow record* | *n=14,748* | *n=12,785* |
| No mental health diagnosis or learning disability | 13,089/16,733 (78.2%) | 11,267/13,718 (82.1%) |
| Mild/moderate mental health diagnosis | 1,458/1,771 (82.3%) | 1,352/1,581 (85.5%) |
| Learning disability | 201/256 (78.5%) | 166/201 (82.6%) |
| *RCP three questions* | *n=8,717* | *n=7,404* |
| No mental health diagnosis or learning disability | 7,801/16,733 (46.6%) | 6,601/13,718 (48.1%) |
| Mild/moderate mental health diagnosis | 787/1,771 (44.4%) | 710/1,581 (44.9%) |
| Learning disability | 129/256 (50.4%) | 93/201 (46.3%) |

# Section 6: Summary of key indicators

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The tables below depict the unadjusted key indicators of the local health boards (LHBs) with at least 10 or more participating practices. These key indicators have been selected based on the recommended QI priorities found in the clinical audit report (www.rcplondon.ac.uk/pc2020). The relevant QI priorities have been provided beneath each of the tables for convenience. Powys Teaching University Local Health Board has therefore been excluded from these tables having only two participating practices.

## Table 1. Summary of key indicators by LHBs for adults with COPD

| | 1. Patients with a record of the gold standard diagnostic test§§§§§ for COPD in the past 2 years | | 4. Patients with COPD with an MRC score 3–5 who have been referred to PR in the past 3 years | | 6. Patients with COPD who have been prescribed an inhaler and have evidence of an inhaler technique check in the past year | |
|---|---|---|---|---|---|---|
| **Wales (total)** | **1,078** | **11.5%** | **9,619** | **56.4%** | **15,892** | **44.4%** |
| Aneurin Bevan University Local Health Board | 238 | 6.4% | 2,817 | 54.6% | 5,378 | 47.6% |
| Betsi Cadwaladr University Local Health Board | <5 | - | 520 | 50.9% | 1,052 | 41.3% |
| Cardiff and Vale University Local Health Board | 294 | 17.4% | 1,800 | 53.3% | 2,754 | 41.7% |
| Cwm Taf Morgannwg University Local Health Board | 303 | 16.7% | 2,904 | 64.6% | 3,851 | 45.1% |
| Hywel Dda University Local Health Board | 119 | 19.3% | 457 | 46.4% | 1,074 | 44.3% |
| Swansea Bay University Local Health Board | 116 | 12.6% | 1,105 | 56.1% | 1,740 | 40.9% |

**QI priority 1:** Record post-bronchodilator spirometry ratio <0.7 for 40% or more of people on the COPD register by November 2021. Ensure they have an accurate record in their notes including a spirometry trace, correct ratio and appropriate SNOMED code.
**QI priority 4:** Refer 70% or more of people with an Medical Research Council (MRC) score 3–5 to pulmonary rehabilitation (PR) and evidence this with the appropriate SNOMED code in their notes by November 2021.
**QI priority 6:** Evidence inhaler technique check in the last year for 70% or more of people with asthma and/or COPD with the appropriate SNOMED code in their notes by November 2021.

§§§§§ Post-bronchodilator FEV1/FVC, as recorded by Read code 339m.

## Table 2. Summary key indicators by LHBs for adults with asthma

| | 2. Adults diagnosed with asthma in the past 2 years who have a record of any objective measurement****** | | 5. Adults with asthma who have had a PAAP anytime in the past year | | 6. Adults with asthma who have been prescribed an inhaler and have evidence of an inhaler technique check in the past year | |
|---|---|---|---|---|---|---|
| **Wales (total)** | **37,872** | **76.3%** | **31,379** | **25.9%** | **49,246** | **48.4%** |
| Aneurin Bevan University Local Health Board | 11,724 | 74.9% | 12,335 | 32.5% | 16,468 | 52.0% |
| Betsi Cadwaladr University Local Health Board | 2,578 | 78.5% | 2,904 | 36.3% | 2,824 | 42.7% |
| Cardiff and Vale University Local Health Board | 8,709 | 78.3% | 6,235 | 22.1% | 11,315 | 48.1% |
| Cwm Taf Morgannwg University Local Health Board | 8,073 | 78.8% | 6,077 | 24.4% | 10,682 | 49.9% |
| Hywel Dda University Local Health Board | 2,496 | 70.6% | 1,745 | 22.9% | 3,026 | 47.1% |
| Swansea Bay University Local Health Board | 4,160 | 73.9% | 1,882 | 13.2% | 4,794 | 40.4% |

**QI priority 2:** Evidence and code appropriately objective variability for 80% or more of people diagnosed with asthma as demonstrated by at least one of the following by November 2021:

- Spirometric evidence of a significant FEV1 response to a short-acting beta-agonist (SABA) or after a trial of treatment with inhaled corticosteroids (ICS)
- Oral corticosteroids (OCS) or prescription for ICS using medication codes in conjunction with significant reversibility
- Evidence of significantly variable peak expiratory flow rate (PEFR)
- Positive fractional exhaled nitric oxide (FeNO) result

**QI priority 5:** Provide 50% or more of people with asthma a personalised asthma action plan (PAAP) and evidence this with the appropriate SNOMED code in their notes by November 2021.

**QI priority 6:** Evidence inhaler technique check in the last year for 70% or more of people with asthma and/or COPD with the appropriate SNOMED code in their notes by November 2021.

****** Spirometry, peak flow (>1 reading or evidence of peak flow diary) or FeNO

## Table 3. Summary of key indicators by LHBs for children and young people with asthma

| | 2. Children diagnosed with asthma in the past 2 years who have a record of any objective measurement****** | | 3. Children with asthma who were not asked about exposure to second-hand smoke in the past year | | | | 5. Children with asthma who have had a PAAP anytime in the past year | | | | 6. Children with asthma who have been prescribed an inhaler and have evidence of an inhaler technique check in the past year | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6–18 year olds | | 1–5 year olds | | 6–18 year olds | | 1–5 year olds | | 6–18 year olds | | 1–5 year olds | | 6–18 year olds | |
| **Wales (total)** | **5,688** | **67.4%** | **1,712** | **99.5%** | **18,651** | **99.4%** | **276** | **16.1%** | **4,553** | **24.3%** | **397** | **28.2%** | **5,942** | **42.8%** |
| Aneurin Bevan University Local Health Board | 1,880 | 67.1% | 525 | 99.6% | 5,962 | 99.0% | 123 | 23.3% | 1,805 | 30.0% | 124 | 28.8% | 2,000 | 45.7% |
| Betsi Cadwaladr University Local Health Board | 339 | 66.3% | 106 | 99.1% | 1,145 | 100% | 21 | 19.6% | 357 | 31.2% | 17 | 20.5% | 276 | 32.3% |
| Cardiff and Vale University Local Health Board | 1,367 | 69.2% | 392 | 99.2% | 4,648 | 99.3% | 59 | 14.9% | 996 | 21.3% | 96 | 29.0% | 1,518 | 43.9% |
| Cwm Taf Morgannwg University Local Health Board | 1,188 | 68.2% | 420 | 100% | 3,801 | 99.8% | 42 | 10% | 894 | 23.5% | 118 | 34.7% | 1,314 | 45.5% |
| Hywel Dda University Local Health Board | 278 | 60.6% | 97 | 99.0% | 973 | 100% | 8 | 8.2% | 224 | 23.0% | 15 | 18.1% | 296 | 40.9% |
| Swansea Bay University Local Health Board | 615 | 66.0% | 166 | 99.4% | 2,068 | 99.3% | 22 | 13.2% | 254 | 12.2% | 26 | 19.0% | 525 | 33.9% |

**QI priority 2:** Evidence and code appropriately objective variability for 80% or more of people diagnosed with asthma as demonstrated by at least one of the following by November 2021:

- Spirometric evidence of a significant FEV1 response to a short-acting beta-agonist (SABA) or after a trial of treatment with inhaled corticosteroids (ICS)
- Oral corticosteroids (OCS) or prescription for ICS using medication codes in conjunction with significant reversibility
- Evidence of significantly variable peak expiratory flow rate (PEFR)
- Positive fractional exhaled nitric oxide (FeNO) result

**QI priority 3:** Ask 20% or more parents about second-hand smoke exposure and provide very brief advice (VBA) at their children's asthma review. Evidence with the appropriate SNOMED code in their child's notes by November 2021.

**QI priority 5:** Provide 50% or more of people with asthma a personalised asthma action plan (PAAP) and evidence this with the appropriate SNOMED code in their notes by November 2021.

**QI priority 6:** Evidence inhaler technique check in the last year for 70% or more of people with asthma and/or COPD with the appropriate SNOMED code in their notes by November 2021.

# Appendix A: Audit methodology

This audit uses data extracted from general practices in Wales in October 2020 to cover activity up to 31 March 2020.

Data were extracted directly from general practice electronic systems by Informatica Systems Limited (ISL), for all practices that opted in. After some basic processing by ISL, cleaning and analysis were conducted by Imperial College London.

This audit includes 226/398 practices, 56.8% of all practices in Wales shown in Table A1. For a full list of all participating practices see Appendix B.

### Table A1. Number of participating practices, per local health board

| Local health board (LHB) | Number participating | Total number of practices | Percentage participating |
|---|---|---|---|
| Aneurin Bevan University Local Health Board | 69 | 74 | 93.2% |
| Betsi Cadwaladr University Local Health Board | 17 | 99 | 17.2% |
| Cardiff and Vale University Local Health Board | 53 | 61 | 86.9% |
| Cwm Taf Morgannwg University Local Health Board | 40 | 51 | 78.4% |
| Hywel Dda University Local Health Board | 17 | 48 | 35.4% |
| Powys Teaching University Local Health Board | 2 | 16 | 12.5% |
| Swansea Bay University Local Health Board | 28 | 49 | 57.1% |
| **Wales (total)** | **226** | **398** | **56.8%** |

## Recruitment

The audit operates on an opt-in basis and all general practices in Wales are eligible to participate. The NACAP programme team worked with the Welsh Government in the production and dissemination of letters advertising recruitment. These letters were written on behalf of the LHB directors of primary care and sent in September 2020 to all practice partners and managers. In order for practices to opt in, an email was to be sent to their LHB primary care lead saying they wished to take part, and the lead then emailed the Welsh Government with the list of participants from across the LHB. This list was sent to the NACAP programme team. As the audit uses an extraction methodology, once the practices have opted in, no subsequent effort is involved.

A third-party organisation (ISL) is contracted to extract the data which raised some concerns with practices in relation to GDPR. This has resulted in a reduced participation rate of 56.8%.

## Development of patient priorities for this report

Since March 2018, NACAP has been working with Asthma UK and British Lung Foundation (AUK-BLF) and the Royal College of Paediatrics and Children Health &Us (RCPCH &Us) to ensure that a patient voice is clear throughout its work. Part of this work has been the identification of patient priorities which highlight areas of care and service provision which are particular important to patients and their carers

and are then highlighted alongside the corresponding data in the NACAP audit reports. More information about these organisations and how these priorities were identified is given below.

### Royal College of Paediatrics and Child Health &Us (RCPCH &Us)

The NACAP team has worked in collaboration with the Royal College of Paediatrics and Child Health & Us (RCPCH &Us) to develop the current children and young people (CYP) patient priorities. RCPCH &Us is part of The Royal College of Paediatrics and Child Health (RCPCH) and they work across the UK to support children, young people and families to have their voice heard in improving child health policy and practice. RCPCH &Us has been working with young patients, siblings and families as part of NACAP, so that their voices can inform and influence asthma care now and in the future. Asthma voice and participation sessions have taken place across England and Wales in clinics, schools, and on projects. Online surveys have also taken place and the feedback was collated and shared with the NACAP team. RCPCH &Us are thankful to all the children, young people and families who have taken part.

### Asthma UK and the British Lung Foundation

The NACAP team has also worked with the British Lung Foundation (BLF) to develop the current adult patient priorities which have fed into the adult asthma, COPD and pulmonary rehabilitation audits. Following the launch, NACAP worked with the BLF to launch an online 'patient priorities' survey for adults (and their families/carers) living with asthma and COPD. It received over 500 responses which were collated, summarised and presented at two focus groups held by the BLF. From these, four priorities were nominated, with them being confirmed as priorities for the adult components of NACAP in May 2020.

Since then, the BLF have merged with Asthma UK. Together, they are the UK's leading lung charity and they work to ensure that people can 'breathe clean air with healthy lungs'. The charity works with a wide range of adults affected by asthma and COPD and have supported NACAP in recruiting a patient panel of around 20 people. This panel has contributed their thoughts and experience regularly through face to face and remote consultation and attendance at the NACAP advisory group and Board meetings. This work is making sure that lived patient experiences inform and shape all aspects of this important initiative. Asthma UK and the British Lung Foundation are thankful to everyone who has given their time and energy to support this work.

## Information governance

The data extraction led by ISL, took place automatically using Audit+ software which is already installed on the majority of GP systems in Wales. No patient identifiers were collected for this audit, as data does not leave the practice. Therefore patient consent nor Section 251 approval was required. However, a patient information sheet and poster was provided to practices for local use in 'fair processing' activities.

Identifiable data were pseudonymised at source by the Audit+ module, as follows:

- NHS number was replaced by study ID (a sequence of 10 letters and numbers).
- Postcode was transformed to Lower layer Super Output Area (LSOA) and WIMD index.
- Date of birth was transformed to patient age.
- Date of death (if recorded) was transformed to age at death.

The pseudonymised data were held transiently by Informatica before being transferred by Secure File Transfer Protocol to Imperial College London for cleaning and analysis.

The audit was approved in Wales by the Data Quality System (DQS) Governance Group (chaired by GPC Wales), which oversees the use of Audit+ and all data derived from it. Further detail on the fair processing information can be found on the primary care resources webpage (www.rcplondon.ac.uk/nacap-pc-resources).

## Cohort definitions

The audit cohort was defined on the presence of specific Read codes in the patient record. Patients with COPD were defined as those over 35 years old with any COPD code ever, without a subsequent COPD resolved code. Patients with asthma were defined as those with any asthma code in the past 3 years without a subsequent asthma resolved code.

Both the audit queries and final Read code list are available on the audit website (www.rcplondon.ac.uk/nacap-pc-resources).

## Analysis and cleaning methodology

Imperial College London employed the methodology below when analysing the data supplied by Informatica. Where the audit states 'in the past year', values presented are for the previous 15 months to account for the fact that yearly review appointments may be slightly further than 12 months apart. The exception to this rule is for variables involving prescriptions where the previous 12 months were examined.

## Data cleaning

- Any patients that had the same identifier as another patient were removed.
- Any event in a patient's record with an invalid or unknown date was removed.
- Patients under 1 year old and patients over 120 years old were removed.
- Patients with unknown gender (n=5) were removed due to there being so few.
- Events in the patient record that occurred after the extraction date were removed.
- A range of 50 cm to 220 cm was considered plausible for height and values above or below this were removed.
- A range of 2 kg to 300 kg was considered plausible for weight and values above or below this were removed.
- A range of 10 to 80 kg/$m^2$ was considered plausible for BMI and values above or below this were removed.
- FEV1/FVC ratio values were divided by 100 if over 1 and subsequent invalid values (any values less than 0.2 or over 1.0) were removed.

# Section 1: Patient demographics

## 1.3 Comorbidities

Comorbidities of allergic rhinitis, anxiety, bronchiectasis, coronary heart disease, depression, diabetes, eczema, family history of asthma, hay fever, heart failure, hypertension, learning disability, lung cancer, mild/moderate mental health issues (children only), nasal polyps, osteoporosis, reflux, severe mental illness and stroke were defined as any code ever for the disease without a subsequent disease resolved code (where applicable).

A comorbidity of COPD for asthma patients was defined as that patient being present in the COPD cohort. A comorbidity of asthma for COPD patients was defined as a first asthma code (without a subsequent resolved code) that was more than two years before their COPD diagnosis.

### Body mass index

- For adults, the most recent height, weight or BMI measurement must be from at least 15 years of age. For children, height and weight measurements must be within 6 months of each other.
- Where a GP-recorded BMI value existed, this was favoured over one calculated using height and weight values.
- BMI values were excluded if the value was more than 5 years old for adults and more than 1 year old for children.
- Adults were defined as obese if they had a BMI score of 30 or more, or if they had an obesity code more recently than a BMI value. Children were defined as obese if they had a BMI centile code of 98 or more, or if they had a BMI that placed them in the 98th centile or above on standard child BMI charts.

### Depression and anxiety

- Depression and anxiety screening were considered done if the patient had either a screening or screening declined code in their patient record.

### Painful conditions

- Painful conditions were defined as prescriptions for four or more pain or epilepsy medications (in the absence of an epilepsy diagnosis) in the past 12 months.

# Section 3: Assessing severity and future risk

## 3.5 Smoking

- Smoking status was defined as the most recent smoking status value. Never smokers were recoded as ex-smokers if they ever had a smoking code in the record.

## 3.6 Exposure to second-hand smoke

- Second-hand smoke exposure was defined as the presence ever of a second-hand smoke code.

### 3.7 Exacerbation count in the past year

- GP-recorded asthma exacerbations were defined as the greater value of either the most recent GP exacerbation count code (from the past 15 months) or the number of exacerbation codes in the past 12 months. Exacerbation codes within 14 days of each other were counted as just one exacerbation.
- Validated asthma exacerbations were defined as number of oral corticosteroid (OCS) prescriptions in the past 12 months. OCS prescriptions on the asthma annual review day were excluded. OCS prescriptions within 14 days of each other were counted as just one exacerbation.
- GP-recorded COPD exacerbations were defined as the greater value of either the most recent GP exacerbation count code (from the past 15 months) or the number of exacerbation codes in the past 12 months. Exacerbation codes within 14 days of each other were counted as just one exacerbation.
- Validated COPD exacerbations were defined as the number of oral corticosteroid and antibiotic prescriptions on the same day, exacerbation codes, and LRTI codes in the past 12 months. Any of the mentioned codes occurring within 14 days of each other were counted as just one exacerbation.

## Section 4: Providing high-value care

### 4.1 Pulmonary rehabilitation

- A patient was considered referred to pulmonary rehabilitation if they had a code indication referral, refusal or unsuitability.

### 4.6 Inhaler technique

- Inhaler technique check was considered performed if a patient had an inhaler prescription in the past year with an inhaler technique code on or following the date of prescription.

### 4.9 Use of inhaled drug therapies in the last 6 months of the audit period

- Past 6 months defined as the 365.25/2 days prior to extraction date.
- The inhaled therapy regimen was defined as the maximum combination of drugs received in the past 90 days. Specific therapy type (including triple therapy, LABA and LAMA combination) at individual level was generated as follows:
  - Patients are considered to be on triple therapy if they ever have a LABA + ICS and LAMA prescription on the same day.
  - Patients are considered to be on LABA and LAMA combination therapy if they aren't on triple therapy (as defined in 'a' above) and ever have a LABA and LAMA prescription on the same day.
  - Patients who do not meet either definition 'a' or 'b' above are considered to be on whichever therapy is their most recent prescription. If multiple prescriptions are the most recent, the rank for choice is: ICS, LABA, LABA + ICS, LAMA.

## Section 5: Ensuring equal and equitable care in people with mental health diagnosis

### COPD

- Post-bronchodilator FEV1/FVC ration of <0.7 was the same variable as used for 'Post-bronchodilator code with spirometry ratio ≥0.2 and <0.7' in query 2.1.
- Number of exacerbations in the last year was recoded to a binary variable of '0' or '1 or more exacerbations'.

- People referred to pulmonary rehabilitation was the same variable as used for 'MRC score 3–5 and referred for PR' in query 4.1.

## Asthma

- Peak flow record was the same variable as used for 'Any peak flow test ever' in query 2.4.
- RCP three questions was the same variable as used in query 4.3.
- SABA inhalers were calculated in the opposite way to the variable used in query 4.4. The variable was recoded so that a value of 1 or 'yes' would represent the outcome of interest.
- OCS prescriptions were calculated in the opposite way to the variable used in query 3.4.1. The variable was recoded so that a value of 1 or 'yes' would represent the outcome of interest.

# Appendix B: Participating clusters and practices

| Health Board name | Cluster name | Practice name |
|---|---|---|
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Aberbeeg Medical Practice |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Blaina Medical Practice |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Brynmawr Medical Practice |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Cwm Calon |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Cwm Health Centre |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Glan Rhyd Surgery |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Glan yr Afon Surgery |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Glyn Ebwy Surgery |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Pen-y-Cae Surgery |
| Aneurin Bevan University Local Health Board | Blaenau Gwent | Tredegar Health Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | Aber Medical Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | Avicenna Medical Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | Bryntirion Surgery |
| Aneurin Bevan University Local Health Board | Caerphilly | Court House Medical Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | Meddygfa Cwm Rhymni Practice |
| Aneurin Bevan University Local Health Board | Caerphilly | Meddygfa Gelligaer Surgery |
| Aneurin Bevan University Local Health Board | Caerphilly | Nantgarw Road Medical Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | Nelson Surgery |
| Aneurin Bevan University Local Health Board | Caerphilly | North Celynen Practice |
| Aneurin Bevan University Local Health Board | Caerphilly | Oakfield Surgery |
| Aneurin Bevan University Local Health Board | Caerphilly | Pengam Health Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | Pontllanfraith Health Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | Risca Surgery |
| Aneurin Bevan University Local Health Board | Caerphilly | South Street Surgery |
| Aneurin Bevan University Local Health Board | Caerphilly | St. Luke's Surgery |
| Aneurin Bevan University Local Health Board | Caerphilly | Sunnybank Health Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | The Lawn Medical Practice |
| Aneurin Bevan University Local Health Board | Caerphilly | The Village Surgery |

| Health Board name | Cluster name | Practice name |
|---|---|---|
| Aneurin Bevan University Local Health Board | Caerphilly | Tonyfelin Medical Centre |
| Aneurin Bevan University Local Health Board | Caerphilly | Ty Bryn Surgery |
| Aneurin Bevan University Local Health Board | Caerphilly | Wellspring Medical Centre |
| Aneurin Bevan University Local Health Board | Monmouthshire | Castle Gate Medical Practice |
| Aneurin Bevan University Local Health Board | Monmouthshire | Dixton Surgery |
| Aneurin Bevan University Local Health Board | Monmouthshire | Gray Hill Surgery |
| Aneurin Bevan University Local Health Board | Monmouthshire | Hereford Road Surgery |
| Aneurin Bevan University Local Health Board | Monmouthshire | Mount Pleasant Practice |
| Aneurin Bevan University Local Health Board | Monmouthshire | Old Station Surgery |
| Aneurin Bevan University Local Health Board | Monmouthshire | The Medical Centre Usk |
| Aneurin Bevan University Local Health Board | Monmouthshire | Town Gate Practice |
| Aneurin Bevan University Local Health Board | Monmouthshire | Tudor Gate Surgery |
| Aneurin Bevan University Local Health Board | Monmouthshire | Usk Surgery |
| Aneurin Bevan University Local Health Board | Monmouthshire | Vauxhall Surgery |
| Aneurin Bevan University Local Health Board | Monmouthshire | Wye Dean Practice, Tintern Surgery |
| Aneurin Bevan University Local Health Board | Monmouthshire | Wye Valley Practice |
| Aneurin Bevan University Local Health Board | Newport | Beechwood Primary Care |
| Aneurin Bevan University Local Health Board | Newport | Bellevue Surgery |
| Aneurin Bevan University Local Health Board | Newport | Bryngwyn Surgery |
| Aneurin Bevan University Local Health Board | Newport | Isca Medical Centre |
| Aneurin Bevan University Local Health Board | Newport | Lliswerry Medical Centre |
| Aneurin Bevan University Local Health Board | Newport | Malpas Brook Health Centre |
| Aneurin Bevan University Local Health Board | Newport | Park Surgery |
| Aneurin Bevan University Local Health Board | Newport | Richmond Clinic |
| Aneurin Bevan University Local Health Board | Newport | Ringland Medical Practice |
| Aneurin Bevan University Local Health Board | Newport | St Brides Medical Centre |
| Aneurin Bevan University Local Health Board | Newport | St David’s Clinic |
| Aneurin Bevan University Local Health Board | Newport | St Julians Medical Centre |
| Aneurin Bevan University Local Health Board | Newport | St Paul’s Clinic |

| Health Board name | Cluster name | Practice name |
|---|---|---|
| Aneurin Bevan University Local Health Board | Newport | The Rogerstone Practice |
| Aneurin Bevan University Local Health Board | Newport | The Rugby Surgery |
| Aneurin Bevan University Local Health Board | Newport | Underwood Health Centre |
| Aneurin Bevan University Local Health Board | Newport | Westfield Medical Centre |
| Aneurin Bevan University Local Health Board | Torfaen | Abersychan Group Practice |
| Aneurin Bevan University Local Health Board | Torfaen | Blaenavon Medical Practice |
| Aneurin Bevan University Local Health Board | Torfaen | Churchwood Surgery |
| Aneurin Bevan University Local Health Board | Torfaen | Cwmbran Village Surgery |
| Aneurin Bevan University Local Health Board | Torfaen | Llanyravon Surgery |
| Aneurin Bevan University Local Health Board | Torfaen | Nant Dowlais Health Centre |
| Aneurin Bevan University Local Health Board | Torfaen | New Chapel Street Surgery |
| Aneurin Bevan University Local Health Board | Torfaen | Oak Street Surgery |
| Betsi Cadwaladr University Local Health Board | Anglesey | Coed Y Glyn Surgery |
| Betsi Cadwaladr University Local Health Board | Anglesey | Gerafon Surgery |
| Betsi Cadwaladr University Local Health Board | Anglesey | Llanfairpwll Health Centre |
| Betsi Cadwaladr University Local Health Board | Conwy | Gwrych Medical Centre |
| Betsi Cadwaladr University Local Health Board | Conwy | Llys Meddyg Surgery |
| Betsi Cadwaladr University Local Health Board | Conwy | Meddygfa Betws y Coed |
| Betsi Cadwaladr University Local Health Board | Conwy | Meddygfa Gwydir |
| Betsi Cadwaladr University Local Health Board | Conwy | Uwchaled Medical Practice |
| Betsi Cadwaladr University Local Health Board | Denbighshire | Pen-y-Bont Surgery |
| Betsi Cadwaladr University Local Health Board | Flintshire | Roseneath Medical Practice |
| Betsi Cadwaladr University Local Health Board | Flintshire | The Quay Surgery |
| Betsi Cadwaladr University Local Health Board | Gwynedd | Bron Meirion |
| Betsi Cadwaladr University Local Health Board | Gwynedd | Canolfan Goffa Ffestiniog |
| Betsi Cadwaladr University Local Health Board | Gwynedd | Llanberis Surgery |
| Betsi Cadwaladr University Local Health Board | Gwynedd | Meddygfa Bala Surgery |
| Betsi Cadwaladr University Local Health Board | Gwynedd | Treflan Surgery |
| Betsi Cadwaladr University Local Health Board | Wrexham | Overton Medical Practice |

| Health Board name | Cluster name | Practice name |
|---|---|---|
| Cardiff and Vale University Local Health Board | Cardiff | Birchgrove Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Bishops Road Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Brynderwen Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Caerau Lane Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Cathays Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | City Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Clare Road Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Clifton Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Cloughmore Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Corporation Road Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Crwys Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Danescourt Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Ely Bridge Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Fairwater Health Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Four Elms Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Grange Medical Practice |
| Cardiff and Vale University Local Health Board | Cardiff | Grangetown Health Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Kings Road Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Llandaff Fields Medical Practice |
| Cardiff and Vale University Local Health Board | Cardiff | Llandaff North Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Llandaff Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Llanishen Court Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Meddygfa Albany Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Meddygfa Lansdowne Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | North Cardiff Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | North Road Medical Practice |
| Cardiff and Vale University Local Health Board | Cardiff | Pontprennau Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Radyr Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Roath House Surgery |

| Health Board name | Cluster name | Practice name |
|---|---|---|
| Cardiff and Vale University Local Health Board | Cardiff | Roathwell Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Rumney Primary Care Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Saltmead Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | St Davids Court Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | St Isan Road Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Taff Riverside Practice |
| Cardiff and Vale University Local Health Board | Cardiff | Westway Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Whitchurch Medical Centre |
| Cardiff and Vale University Local Health Board | Cardiff | Willowbrook Surgery |
| Cardiff and Vale University Local Health Board | Cardiff | Woodlands Medical Centre |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Albert Road Surgery |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Court Road Surgery |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Cowbridge & Vale Medical Practice |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Dinas Powys Medical Centre |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Highlight Park Medical Practice |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Llantwit Major & Coastal Vale Medical Practice |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Penarth Healthcare Partnership |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Redlands Surgery |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Sully Surgery |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | The Practice Of Health |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Vale Group Practice |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Waterfront Surgery |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | West Quay Medical Centre |
| Cardiff and Vale University Local Health Board | Vale of Glamorgan | Western Vale Family Practice |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Bridgend Group Practice |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Bron y Garn Surgery |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Heathbridge House |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Llynfi Surgery |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | New Street Surgery |

| Health Board name | Cluster name | Practice name |
|---|---|---|
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Oak Tree Surgery |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Ogmore Vale Surgery |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Pencoed Medical Centre |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Riversdale House |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | The New Surgery |
| Cwm Taf Morgannwg University Local Health Board | Bridgend | Tynycoed Surgery |
| Cwm Taf Morgannwg University Local Health Board | Merthyr Tydfil | Morlais Medical Practice |
| Cwm Taf Morgannwg University Local Health Board | Merthyr Tydfil | Pontcae Medical Practice |
| Cwm Taf Morgannwg University Local Health Board | Merthyr Tydfil | Practice 1 Keir Hardie Health Park |
| Cwm Taf Morgannwg University Local Health Board | Merthyr Tydfil | Practice 2 Keir Hardie Health Park |
| Cwm Taf Morgannwg University Local Health Board | Merthyr Tydfil | Practice 3 Keir Hardie Health Park |
| Cwm Taf Morgannwg University Local Health Board | Merthyr Tydfil | Treharris Primary Care Centre |
| Cwm Taf Morgannwg University Local Health Board | Merthyr Tydfil | Troed y Fan Medical Practice |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Abercwmboi Medical Centre |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Abercynon Medical Centre |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Ashgrove Surgery |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Cwm Gwrydd Medical Centre |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Cwmaman Surgery |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | De Winton Field Practice |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Eglwysbach Medical Practice |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Ferndale Medical Centre |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Foundry Town Clinic |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Hirwaun Medical Centre |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Llwynypia Surgery |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | New Tynewydd Surgery |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Old School Surgery |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Parc Canol Group Practice |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Penrhiwceiber Medical Centre |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Penygraig Surgery |

| Health Board name | Cluster name | Practice name |
|---|---|---|
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Rhos House Surgery |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | St Johns Medical Practice |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | St. David's Surgery |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Taff Vale Practice |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Taffs Well Medical Centre |
| Cwm Taf Morgannwg University Local Health Board | Rhondda Cynon Taf | Talbot Green Group Practice |
| Hywel Dda University Local Health Board | Carmarthenshire | Ashgrove Medical Centre |
| Hywel Dda University Local Health Board | Carmarthenshire | Coach & Horses Surgery |
| Hywel Dda University Local Health Board | Carmarthenshire | Furnace House Surgery |
| Hywel Dda University Local Health Board | Carmarthenshire | Llanfair Surgery |
| Hywel Dda University Local Health Board | Carmarthenshire | Meddygfa Minafon |
| Hywel Dda University Local Health Board | Carmarthenshire | Meddygfa Tywi |
| Hywel Dda University Local Health Board | Carmarthenshire | Meddygfa Tywyn Bach |
| Hywel Dda University Local Health Board | Carmarthenshire | Meddygfa'r Sarn |
| Hywel Dda University Local Health Board | Carmarthenshire | Meddygfa'r Tymbl |
| Hywel Dda University Local Health Board | Carmarthenshire | Morfa Lane Surgery |
| Hywel Dda University Local Health Board | Carmarthenshire | St Peter's Surgery |
| Hywel Dda University Local Health Board | Ceredigion | Borth Medical Practice |
| Hywel Dda University Local Health Board | Ceredigion | Bro Pedr Medical Group |
| Hywel Dda University Local Health Board | Ceredigion | Church Surgery |
| Hywel Dda University Local Health Board | Ceredigion | Meddygfa Padarn Surgery |
| Hywel Dda University Local Health Board | Ceredigion | Tregaron Surgery |
| Hywel Dda University Local Health Board | Pembrokeshire | Tenby Surgery |
| Powys Teaching University Local Health Board | Powys | Presteigne Medical Practice |
| Powys Teaching University Local Health Board | Powys | Rhayader Group Practice |
| Swansea Bay University Local Health Board | Neath Port Talbot | Afan Valley Group Practice |
| Swansea Bay University Local Health Board | Neath Port Talbot | Alfred Street Primary Care Centre |
| Swansea Bay University Local Health Board | Neath Port Talbot | Amman Tawe Partnership |
| Swansea Bay University Local Health Board | Neath Port Talbot | Briton Ferry Health Centre |

| Health Board name | Cluster name | Practice name |
|---|---|---|
| Swansea Bay University Local Health Board | Neath Port Talbot | Castle Surgery |
| Swansea Bay University Local Health Board | Neath Port Talbot | Cwmafan Health Centre |
| Swansea Bay University Local Health Board | Neath Port Talbot | Dulais Valley Primary Care Centre |
| Swansea Bay University Local Health Board | Neath Port Talbot | Dyfed Road Health Centre |
| Swansea Bay University Local Health Board | Neath Port Talbot | Mount Surgery |
| Swansea Bay University Local Health Board | Neath Port Talbot | Pontardawe Health Centre |
| Swansea Bay University Local Health Board | Neath Port Talbot | Rosedale Medical Practice |
| Swansea Bay University Local Health Board | Neath Port Talbot | Skewen Medical Centre |
| Swansea Bay University Local Health Board | Neath Port Talbot | Tabernacle Surgery |
| Swansea Bay University Local Health Board | Neath Port Talbot | Vale of Neath Practice |
| Swansea Bay University Local Health Board | Neath Port Talbot | Waterside Medical Practice |
| Swansea Bay University Local Health Board | Swansea | Cheriton Medical Centre |
| Swansea Bay University Local Health Board | Swansea | Cwmfelin Medical Centre |
| Swansea Bay University Local Health Board | Swansea | Estuary Group Practice |
| Swansea Bay University Local Health Board | Swansea | Gower Medical Practice |
| Swansea Bay University Local Health Board | Swansea | Kings Road Surgery |
| Swansea Bay University Local Health Board | Swansea | Manselton Surgery |
| Swansea Bay University Local Health Board | Swansea | Mountain View Health Centre |
| Swansea Bay University Local Health Board | Swansea | Nicholl St Medical Centre |
| Swansea Bay University Local Health Board | Swansea | Princess Street Surgery |
| Swansea Bay University Local Health Board | Swansea | Sketty & Killay Medical Centres |
| Swansea Bay University Local Health Board | Swansea | Talybont Surgery |
| Swansea Bay University Local Health Board | Swansea | The Grove Medical Centre |
| Swansea Bay University Local Health Board | Swansea | The Mumbles Medical Practice |

# Appendix C: References


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**National Asthma and COPD Audit Programme (NACAP)**

Royal College of Physicians
11 St Andrews Place
Regent's Park
London NW1 4LE

+44 (020) 3075 1526
nacap@rcplondon.ac.uk
**www.rcplondon.ac.uk/nacap**

@NACAPaudit

Royal College of Physicians | NACAP