Royal College of Physicians | NACAP

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

Wales primary care clinical audit 2017/18

(adults and children with COPD and/or asthma registered at GP practices in Wales between April 2017 and September 2018)

National data report

Published March 2020

In association with:

ARNS Association of Respiratory Nurse Specialists

asthma UK | British Lung Foundation
THE ASTHMA UK AND BRITISH LUNG FOUNDATION PARTNERSHIP

British Thoracic Society

Imperial College London

PCRS Primary Care Respiratory Society UK

RCGP Royal College of General Practitioners

RCPCH Royal College of Paediatrics and Child Health
Leading the way in Children's Health

sam The Society for Acute Medicine

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Healthcare Quality Improvement Partnership

Working with:

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

Primary Care: 2017/18 annual clinical 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).

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Report at a glance

Diagnosis

COPD

of patients had a **chest X-ray or CT scan** within 6 months of their diagnosis.

QI recommendation

Ensure all patients with COPD diagnosed in the past 12 months have a record of a chest X-ray within 6 months.

Asthma

had some kind of objective test recorded. Only **24% of adults and 9% of children had a spirometry test** (isolated spirometry or PEF alone is not enough to diagnose asthma).

QI recommendation

Ensure all asthma patients have a diagnosis based on clinical assessment supported by objective tests demonstrating variable airflow obstruction or airway inflammation.

Smoking

COPD

had their **smoking status recorded** in the past year. **29% are current smokers**.

Asthma

of adults and **34% of children** (over 6 years) had their smoking status recorded in the past year. **17% of adults are current smokers**. **<0.6%** of patients have been asked about exposure to **second-hand smoke**.

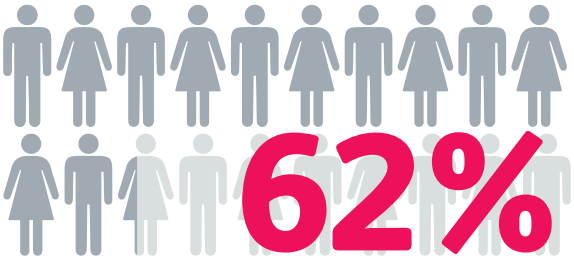
QI recommendation

Ensure smoking status is recorded for all patients and that exposure to second-hand smoke is discussed and coded.

COPD = chronic obstructive pulmonary disease
PEF = peak expiratory flow

Providing high-value care

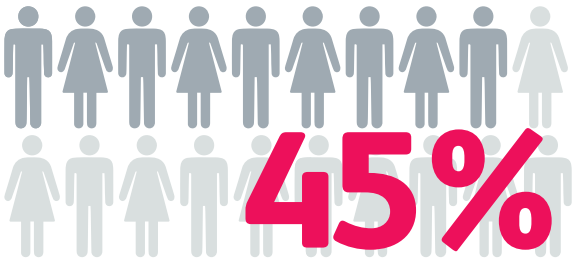
COPD



of eligible patients had a **record of a PR referral** in the past 3 years.

Asthma

of adults and **80% of children** had no evidence of a personalised asthma action plan in the past year.



of patients prescribed an inhaler had evidence of an **inhaler technique check** in the past year.

of adults and **35% of children** prescribed an inhaler had evidence of an inhaler technique check in the past year.

QI recommendation

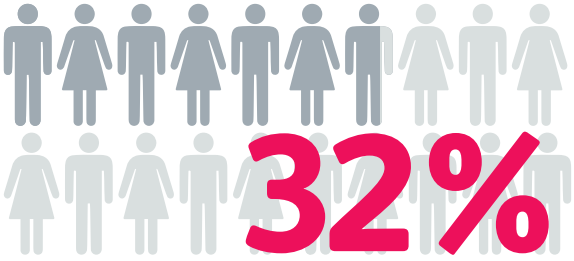
Ensure all patients have a personalised asthma action plan.

QI recommendation

Ensure inhaler technique checks are completed for all patients.

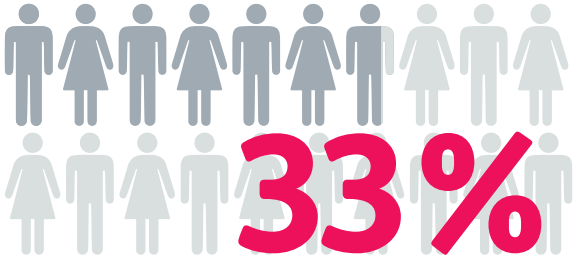
Mental health

COPD



of patients had a diagnosis of **anxiety**. **32%** had a diagnosis of **depression**.

Asthma



of patients had a diagnosis of **anxiety**. **31%** had a diagnosis of **depression. 10% of 6–18 year olds had mild/moderate mental health illness**.

QI recommendation

Ensure patients are screened for mental health conditions as part of their annual review.

PR = pulmonary rehabilitation

Foreword by Dr Katherine Hickman, primary care clinical lead

As a GP with a passion for respiratory medicine, I see a lot of patients with COPD and asthma. Respiratory care, though, is still only a small part of my day job but it remains my comfort zone. For many GPs and nurses, respiratory is not their comfort zone. A person with poorly controlled asthma unable to remember to take their inhaled corticosteroid, a patient with COPD struggling to use their new inhaler because they don't like the taste or a patient coming for interpretation of their breathing test does not fill them with a sense of excitement. In fact, for many it fills them with a sense of dread. Before I became interested in respiratory it was a sense of dread I knew only too well. A sense of not knowing where to start, not knowing which guidelines should or shouldn't be followed and not having a clue which inhaler to prescribe. Respiratory care can be a minefield.

I'm delighted that for the first time we now have data on asthma for both adults and children as well as COPD. Unfortunately, the numbers of participating practices dropped from 97% in 2017 to 47% this year. I hope that the experience of those practices who did participate was seamless. A strong communication strategy, highlighting the security and success of this current extraction makes us confident that when we do a further data extraction in 2020, we will get our figures up to previous numbers. We strongly encourage all practices to participate in this vital piece of work to present a comprehensive picture of respiratory care in Wales.

The Respiratory Health Implementation Group (RHIG) set the national strategy for addressing respiratory health across Wales, which is outlined in the Respiratory health delivery plan 2018–2020. The national approach for Wales is to reduce inappropriate variation in care by standardising the way things are done. The aim is that healthcare professionals in primary and secondary care become experts at doing the basic things that really matter, consistently well. RHIG has developed and published a host of national diagnostic, management and prescribing guidelines, National Welsh Standards and structured quality improvement, with NHS Wales self-management apps for patients. This is a digital, joined up approach and accessible to everyone in Wales.

We are definitely starting to see some improvements in the quality of care in Wales with an increase in the proportion of patients having a record of the post-bronchodilator FEV_1/FVC <0.7 gold standard diagnostic test (however, less than 10% of patients have a record of this). 62% of patients with an MRC score of 3–5 were considered for a pulmonary rehabilitation referral (including patients who were referred, patients deemed unsuitable or patients who declined a referral). Encouragingly, 79.3% of all adults diagnosed with asthma in the past 2 years had one or more objective measurement ever recorded and for children (>6 years old) there was an equally high figure of 71.9%. Interestingly, though, virtually nobody had a pre- or post-bronchodilator spirometry result in their notes or a FeNO (fractional exhaled nitric oxide) test recorded. Sadly, only 25% of patients had a record of a personal asthma action plan in their notes.

The data collected in this primary care audit reflects what basic quality care looks like. Care that all patients with COPD and asthma should be entitled to. As a practice you don't have to commit to overnight transformation in all aspects of care, but how about picking one or two elements you could work on together? I hope the quality improvement suggestions provide the basics of a framework to enable practices to start to make small but significant changes and improve the quality of respiratory care patients are receiving.

How to use this report

This report presents national and health board data from the first cycle of the National Asthma and Chronic Obstructive Pulmonary Disease (COPD) Audit Programme (NACAP) Welsh primary care audit, which were extracted in July 2019 to capture activity between April 2017 and September 2018.
Due to problems accessing data, engaging potential participating sites and agreement on methodology, there were delays in the extraction of this set of data.
Contributing to the overarching National Quality Improvement (QI) Objectives of the NACAP, this report serves to empower stakeholders to use audit data to facilitate improvements in the quality of care.

Cluster results are available in the health board reports, which are available at www.rcplondon.ac.uk/nacap-primary-care.
Participating practices can view individualised practice level reports via the NHS Wales Informatics Service (NWIS) Primary Care Information Portal with benchmarking against national and health board results to support practices in improving the quality of patient care (http://isdapps.wales.nhs.uk/pcip).
Due to NWIS receiving audit data later than anticipated, these reports will be available in summer 2020.

This first national report on asthma and COPD in Welsh primary care follows an earlier programme of work that focused solely on COPD and published reports in 2015 and 2017. The analysis methodology employed in the second cycle of COPD audit has been replicated this year. Like-for-like comparisons have, therefore, been undertaken for COPD, but are not yet possible for asthma.

For clarity, the denominators for both cohorts of patients **are not** determined by the Quality Outcomes Framework (QOF) register. Recent work looking at the accuracy of asthma and COPD coding with respect to the QOF register has shown that use of other Read codes[a] (ie not necessarily included on the register) is 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 we had simply included people on the asthma and COPD QOF registers. However, at practice level and for the purposes of quality improvement 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 or COPD (available at https://bmjopen.bmj.com/content/4/7/e005540 (COPD) and https://bmjopen.bmj.com/content/7/8/e017474 (Asthma)).

The audit queries focus on areas that directly relate to opportunities for improving quality.[3] This year's audit will also specifically focus upon the impact of mental illness on both diseases in Section 5. Supporting rationale for the queries has not been included in this report but can be found in the main queries document (available at www.rcplondon.ac.uk/projects/outputs/national-asthma-and-copd-audit-programme-nacap-primary-care-workstream-resources).

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.[4,5,6,7]
A full data analysis and cleaning methodology can be found in Appendix A.

[a] 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

Data interpretation notes

A number of caveats must be placed on the data and when interpreting the results, chief among which is the participation of only 47% of Welsh practices and the fact that 97% of participating practices come from three local health boards (LHBs) – Aneurin Bevan University Health Board, Betsi Cadwaladr University Health Board and Cardiff and Vale University Health Board. Caution must therefore be taken when making assumptions about the quality of care delivered nationally.

LHB reports have been produced for those three covering the bulk of participating practices and are available at www.rcplondon.ac.uk/nacap-primary-care. Another three LHBs (Cwm Taf Morgannwg University Health Board, Hywel Dda University Health Board and Swansea Bay University Health Board) had fewer than 10 participating practices each and the final LHB (Powys Teaching Health Board) had no participating practices and so do not have LHB reports.

Due to extraction limitations, which highlighted that a number of medical Read codes were not being used by practices, results from the audit using prescription data were deemed inaccurate in reflecting what is really 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 past 6 months of the audit period

Section 4.6 will also need to be interpreted with caution because although an inhaler has to be prescribed, inhaler technique check Read codes are still utilised, so the presence of a technique check code may indicate a prescription has been made for an inhaler.

Comorbid asthma in people with COPD now more accurately reflects correct diagnosis. The methodology used during the previous round of audits produced an inaccurate picture of COPD and asthma overlap. This current data analysis excluded any asthma diagnoses that were in the 2 years prior to a patient's COPD diagnosis. In addition, coronary heart disease codes used in this round are similar to those used in other national primary care audits, which gives a more consistent national picture of comorbid heart disease.

Section 1:
Demographics and comorbidities

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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

COPD

- The average age of the COPD patient cohort was 69.9 years old.
- There were a similar number of men and women with COPD (49.8% vs 50.2%).
- The most common physical comorbidities were hypertension (50.6%), obesity (33.6%), coronary heart disease (19.5%), diabetes (18.8%) and painful conditions (13.8%).
- Mental health problems were common in the COPD cohort:
  - 32.3% of the cohort have a current diagnosis of anxiety.
  - 32.5% have a current diagnosis of depression.
  - Despite these high rates, in the past 2 years, at most 10.9% had a record of screening for depression or anxiety.
  - 91.6% have never had a diagnosis of a severe mental illness (SMI) - Schizophrenia, bipolar disorder and other psychotic illness.

Asthma

- The average age for the adult asthma cohort was 52 years old. There was also a higher prevalence in women compared with men (58.7% vs 41.3%).
- The most common comorbidities in the adult asthma cohort were:
  - Atopy (45.7%), obesity (35.6%), eczema (33.2%), hypertension (28%) and allergic rhinitis (26.5%).
- As for COPD, anxiety and depression were also common in the asthma cohort: 32.5% and 30.7% respectively.
- The average age of children with asthma was 4 years (in the 1–5 years cohort) and 12 years (in the 6–18 years cohort). The prevalence was consistently higher among boys than girls; 61.8% vs 38.2% in the 1–5 years cohort and 57.4% vs 42.6% in the 6–18 years cohort.
- The most common comorbidities in the children's asthma cohort were:
  - For 1–5 year olds, eczema (42.6%), atopy (32.5%), reflux (11.6%) and a family history of asthma (9.6%)
  - For 6–18 year olds, eczema (50.6%), atopy (50.0%), allergic rhinitis (20.6%) and hay fever (19.1%).

1.1 Sex

	Wales 2017/18	Wales 2016/17
COPD (total)	**N=38,286**	**N=82,696**
Male	19,053 (49.8%)	41,734 (50.5%)
Female	19,233 (50.2%)	40,959 (49.5%)
Unknown	0 (0%)	3 (0.0%)
Adults with asthma (total)	**N=95,147**	**-**
Male	39,290 (41.3%)	-
Female	55,857 (58.7%)	-
Unknown	0 (0%)	-
Children with asthma (1–5 years old) (total)	**N=1,765**	**-**
Male	1,091 (61.8%)	-
Female	674 (38.2%)	-
Unknown	0 (0%)	-
Children with asthma (6–18 years old) (total)	**N=15,500**	**-**
Male	8,902 (57.4%)	-
Female	6,598 (42.6%)	-
Unknown	0 (0%)	-

1.2 Age

	Wales 2017/18	Wales 2016/17
COPD (total)	**N=38,286**	**N=82,696**
Mean (SD)	69.9 (11.0)	70.7 (11.2)
Mean male age (SD)	70.0 (10.9)	70.9 (11.0)
Mean female age (SD)	69.8 (11.2)	70.4 (11.4)
Adults with asthma (total)	**N=95,147**	**-**
Mean (SD)	52.1 (18.4)	-
Mean male age (SD)	51.3 (18.2)	-
Mean female age (SD)	52.7 (18.5)	-
Children with asthma (1–5 years old) (total)	**N=1,765**	**-**
Mean (SD)	4.1 (1.0)	-
Mean male age (SD)	4.1 (1.0)	-
Mean female age (SD)	4.2 (1.0)	-
Children with asthma (6–18 years old) (total)	**N=15,500**	**-**
Mean (SD)	12 (3.5)	-
Mean male age (SD)	12 (3.5)	-
Mean female age (SD)	12 (3.6)	-

1.3 Comorbidities

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]

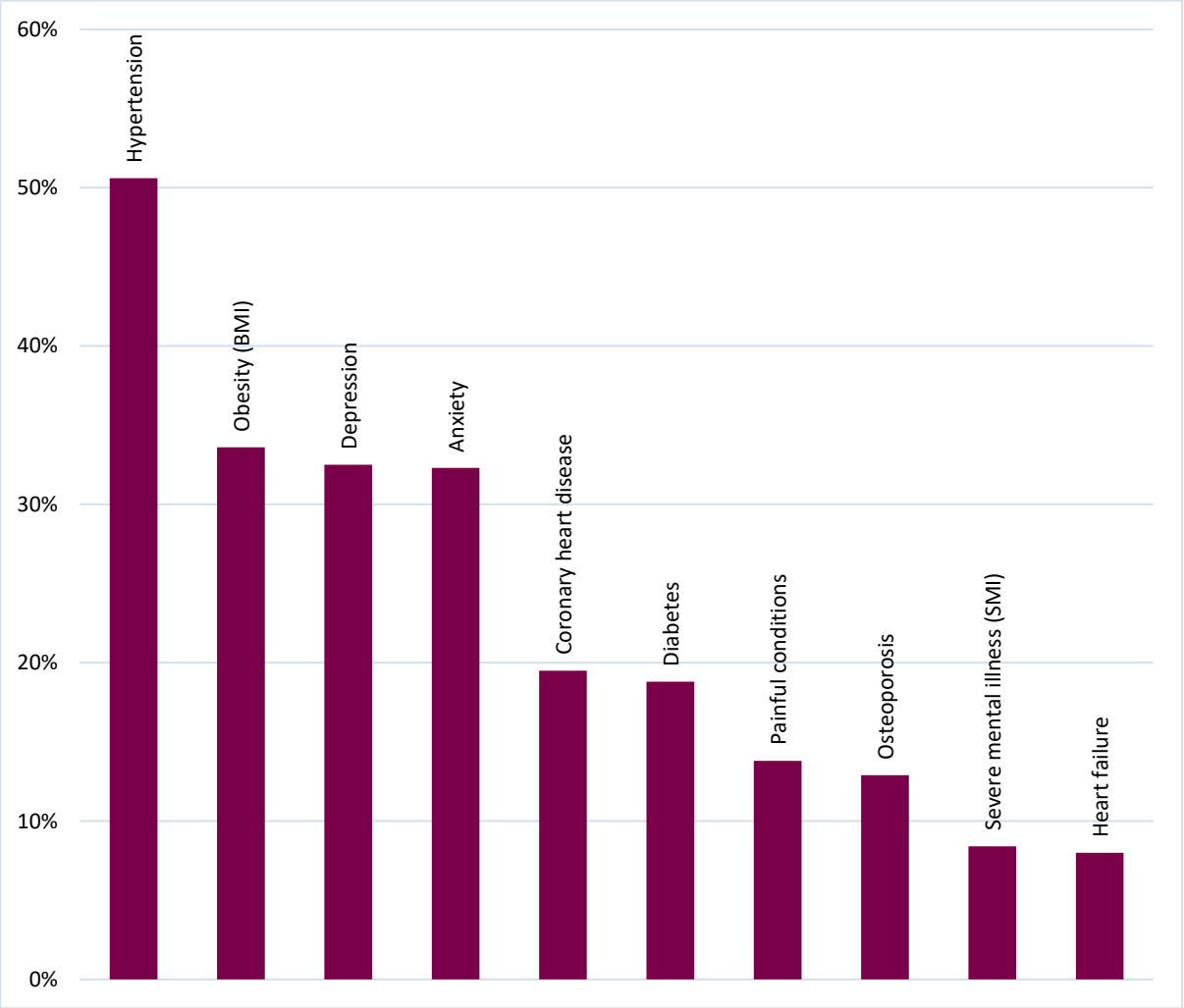
NICE 2009 CG91: *Depression in adults with a chronic physical health problem: recognition and management* recommend primary care be alert to possible depression (particularly in patients

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* recommend 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]

1.3.1 COPD

	Wales 2017/18 N=38,286	Wales 2016/17 N=82,696
Asthma	185 (0.5%)	34,622 (41.9%)
Bronchiectasis	1,804 (4.7%)	3,946 (4.8%)
Coronary heart disease	7,452 (19.5%)	33,054 (40.0%)
Diabetes	7,213 (18.8%)	18,685 (22.6%)
Heart failure	3,078 (8.0%)	7,443 (9.0%)
Hypertension	19,387 (50.6%)	43,588 (52.7%)
Lung cancer	638 (1.7%)	1,921 (2.3%)
Painful conditions[b]	5,269 (13.8%)	10,450 (12.6%)
Stroke	2,371 (6.2%)	8,623 (10.4%)
Osteoporosis	4,926 (12.9%)	10,657 (12.9%)
Obesity (BMI)	11,965 (33.6%)	-
Severe mental illness (SMI): Schizophrenia, bipolar disorder and other psychotic illness	**3,213 (8.4%)**	6,448 (7.8%)
Anxiety	12,362 (32.3%)	25,180 (30.5%)
Screened for anxiety or been diagnosed in the past 2 years	2,400 (6.3%)	4,108 (5.0%)
Depression	12,425 (32.5%)	24,861 (30.1%)
Screened for depression or been diagnosed in the past 2 years	7,798 (20.4%)	14,465 (17.5%)
Learning disability	103 (0.3%)	-

[b] 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.



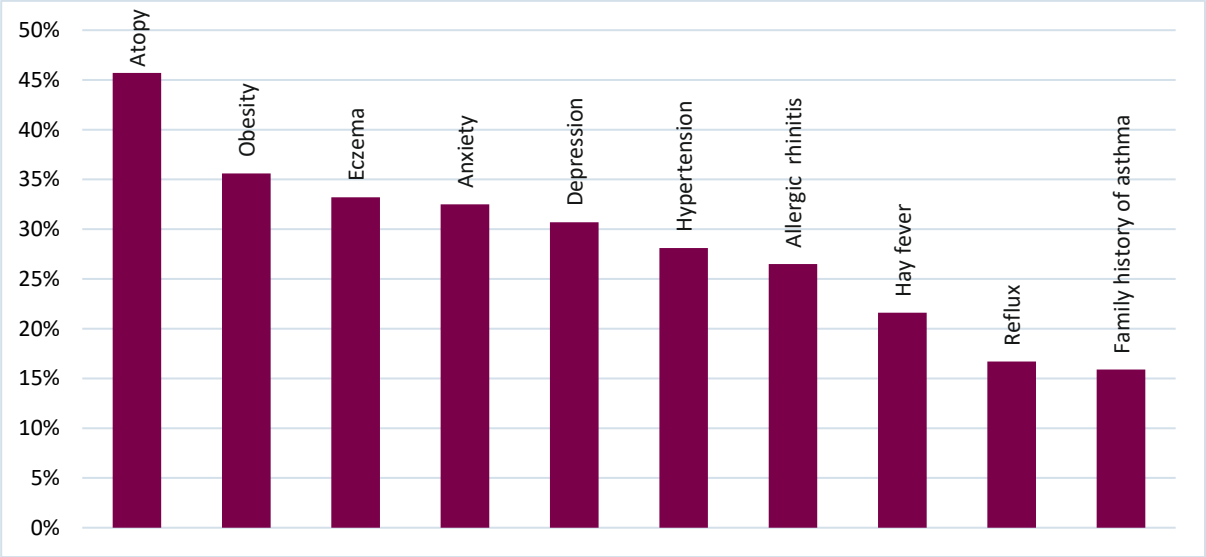
The 10 most prevalent comorbidities in people with COPD

1.3.2 Adults with asthma

	Wales 2017/18 N=95,147
COPD	10,523 (11.1%)
Bronchiectasis	1,544 (1.6%)
Coronary heart disease	6,156 (6.5%)
Diabetes	9,639 (10.1%)
Heart failure	2,117 (2.2%)
Hypertension	26,727 (28.1%)
Lung cancer	233 (0.2%)
Painful conditions[c]	9,936 (10.4%)
Stroke	2,002 (2.1%)
Osteoporosis	4,965 (5.2%)
Obesity (BMI)	33,840 (35.6%)
Eczema	31,628 (33.2%)
Atopy	43,439 (45.7%)
Nasal polyps	2,119 (2.2%)

[c] 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.

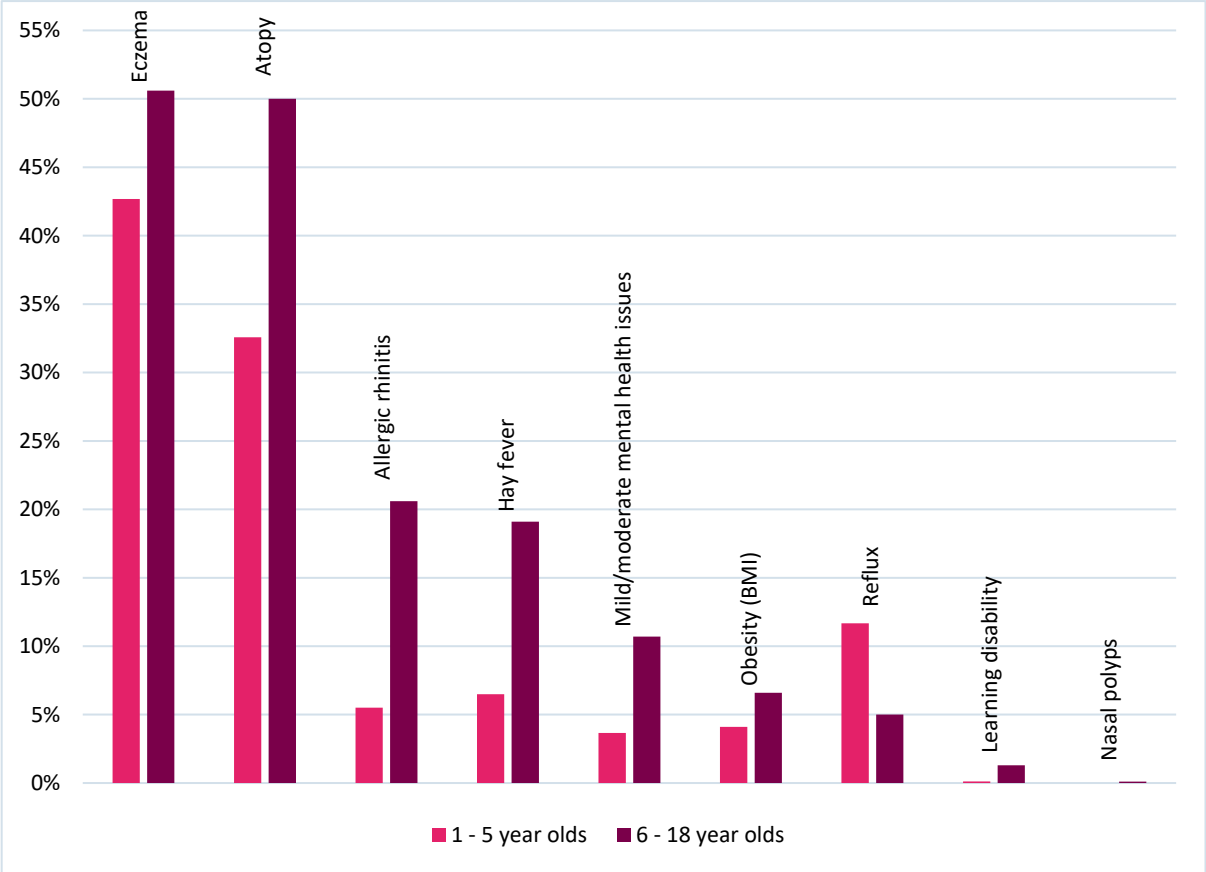
	Wales 2017/18 N=95,147
Reflux	15,855 (16.7%)
Hay fever	20,516 (21.6%)
Family history of asthma	15,108 (15.9%)
Allergic rhinitis	25,184 (26.5%)
Severe mental illness (SMI): Schizophrenia, bipolar disorder and other psychotic illness	5,860 (6.2%)
Anxiety	30,928 (32.5%)
Screened for anxiety or been diagnosed in the past 2 years	9,046 (9.5%)
Depression	29,159 (30.7%)
Screened for depression or been diagnosed in the past 2 years	10,393 (10.9%)
Learning disability	733 (0.8%)



The 10 most prevalent comorbidities in adults with asthma

1.3.3 Children with asthma

	Wales 2017/18	
	1–5 year olds N=1,765	6–18 year olds N=15,500
Obesity (BMI)	73 (4.1%)	1,018 (6.6%)
Eczema	752 (42.6%)	7,849 (50.6%)
Atopy	574 (32.5%)	7,746 (50.0%)
Nasal polyps	0 (0%)	22 (0.1%)
Reflux	205 (11.6%)	769 (5.0%)
Hay fever	112 (6.4%)	2,953 (19.1%)
Family history of asthma	169 (9.6%)	1,482 (9.6%)
Allergic rhinitis	97 (5.5%)	3,189 (20.6%)
Mild/moderate mental health issues	64 (3.6%)	1,665 (10.7%)
Learning disability	2 (0.1%)	201 (1.3%)



The most prevalent comorbidities in children with asthma

Discussion and quality improvement recommendations

Asthma

> Obesity was the second highest comorbidity after atopy. Studies have shown that people with asthma who are also obese have poor asthma control and more severe asthma. They are more likely to have a worse quality of life, more daily symptoms, and more exacerbations as well as use more rescue medications.[11]

COPD and comorbidities

> Identify patients with COPD on your register who have a BMI of >30. Invite them for a lifestyle discussion and assessment of their weight and diet. Refer to local weight management services.

> High dose corticosteroids in patients with diabetes and COPD have an increased risk of diabetes-related hospitalisations.[12] Our data showed that nearly 19% of COPD patients also had diabetes. Identify patients with COPD who have had two or more courses of prednisolone in the past year and/or are on high dose steroid inhalers and test their HbA1c in order to identify their diabetic or pre-diabetic status.

Depending on the result:

- refer for appropriate management
- review the need for high dose steroid inhalers and
- ensure the lowest possible dose of prednisolone is used in exacerbations.

Asthma and comorbidities

Identify patients with asthma on your register who have a BMI of >30. Invite them for a lifestyle discussion and assessment of their weight and diet. Refer to local weight management services.

Section 2:
Getting the diagnosis right

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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.

Diagnosing COPD

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 chronic obstructive pulmonary disease (COPD) have post-bronchodilator spirometry.*[13]

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.*[14]

Key findings

- The proportion of patients diagnosed within the past 2 years and who had a record of the gold standard diagnostic test for COPD (post-bronchodilator FEV_1/FVC, as recorded by Read code 339m) was 9.6% (up from 8.5% in 2017).
- 49.4% of patients diagnosed in the past 2 years had a record of any spirometry code, a reduction from 54.3% in the previous audit.
- Of the cohort of patients diagnosed in the past 2 years, 34.8% had a chest X-ray or CT scan within 6 months of their diagnosis.

2.1 Post-bronchodilator spirometry

The percentage of people diagnosed with COPD in the past 2 years who have a post-bronchodilator FEV_1/FVC or any ratio code between ≥0.2 and <0.7

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.

	Wales 2017/18 N=6,683	Wales 2016/17 N=10,868
Any spirometry ratio codes* ≥0.2 and <0.7	3,299 (49.4%)	5,906 (54.3%)
Post-bronchodilator code** with spirometry ratio ≥0.2 and <0.7	641 (9.6%)	918 (8.5%)
No post-bronchodilator code	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

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 2017/18 N=6,683	Wales 2016/17 N=10,868
Chest X-ray or CT scan within 6 months	2,329 (34.8%)	4,300 (39.6%)

Diagnosing asthma

Key standards – diagnosing asthma

NICE 2018 QS25 (QS1): *People aged 5 years and over with suspected asthma have objectives tests to support diagnosis.*[15]

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.*[16]

Key findings

- 79.3% of all adults diagnosed with asthma in the past 2 years had one or more objective measurements ever recorded (spirometry, peak flow (>1 reading or evidence of peak flow diary) or fractional exhaled nitric oxide (FeNO)). 71.9% of children had evidence of at least one objective measurement.
- However, only 3.6% of adults and 1.1% of children had evidence of a spirometry test with reversibility.
- Approximately 75% of patients diagnosed with asthma (adults and children) in the past 2 years have a record of a peak flow test (reading/and or diary records).
- Only 0.2% adults and 0% of children had evidence of FeNO testing.

2.3 Any objective measurement

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 2017/18
Adults with asthma	**N=38,763**
≥1 objective measurement	30,735 (79.3%)
Children with asthma (6 years and above only) (total)	**N=6,767**
≥1 objective measurement	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 2017/18
Adults with asthma (total)	**N=95,147**
No peak flow codes ever	5,728 (6.0%)
Peak flow test (Read code 339A* or 339B**) ever	41,499 (43.6%)
Peak flow diary*** ever	1,812 (1.9%)
Any peak flow test ever****	89,419 (94.0%)
Children with asthma (6 years and above only) (total)	**N=15,500**
No peak flow codes ever	2,715 (17.5%)
Peak flow test (Read code 339A* or 339B**) ever	5,079 (32.8%)
Peak flow diary*** ever	302 (2.0%)
Any peak flow test ever****	12,785 (82.5%)

** Read code 339A – Peak flow rate before bronchodilation; ** Read code 339B – 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 2017/18
Adults with asthma (total)	**N=38,763**
No peak flow codes in past 2 years	9,276 (23.9%)
Peak flow test (Read code 339A* or 339B**) in past 2 years	9,463 (24.4%)
Peak flow diary*** in the past 2 years	147 (0.4%)
Any peak flow test in past 2 years****	29,487 (76.1%)
Children with asthma (6 years and above only) (total)	**N=6,767**
No peak flow codes in past 2 years	1,937 (28.6%)
Peak flow test (Read code 339A* or 339B**) in past 2 years	1,456 (21.5%)
Peak flow diary*** in the past 2 years	42 (0.6%)
Any peak flow test in past 2 years****	4,830 (71.4%)

** Read code 339A – Peak flow rate before bronchodilation; ** Read code 339B – Peak flow rate after bronchodilation; *** Read code 66YY; **** Any peak flow Read code, including 339A and 339B*

2.5 Fractional exhaled nitric oxide (FeNO)

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 2017/18
Adults with asthma (total)	**N=38,763**
FeNO test	8 (0.02%)
Children with asthma (6 years and above only) (total)	**N=6,767**
FeNO test	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 2017/18
Adults with asthma diagnosed in the past 2 years (total)	**N=38,763**
No post-bronchodilator ratio code*	37,716 (97.3%)
No pre-bronchodilator ratio code**	38,469 (99.2%)
Post-bronchodilator* ratio is ≥0.2 and <0.7	403 (1.0%)
Pre-bronchodilator** ratio is ≥0.2 and <0.7	112 (0.3%)
Any spirometry ratio codes ≥0.2 and <0.7	2,813 (7.3%)
Children with asthma (6 years and above only) diagnosed in the past 2 years (total)	**N=6,767**
No post-bronchodilator ratio code*	6,717 (99.3%)
No pre-bronchodilator ratio code**	6,747 (99.7%)

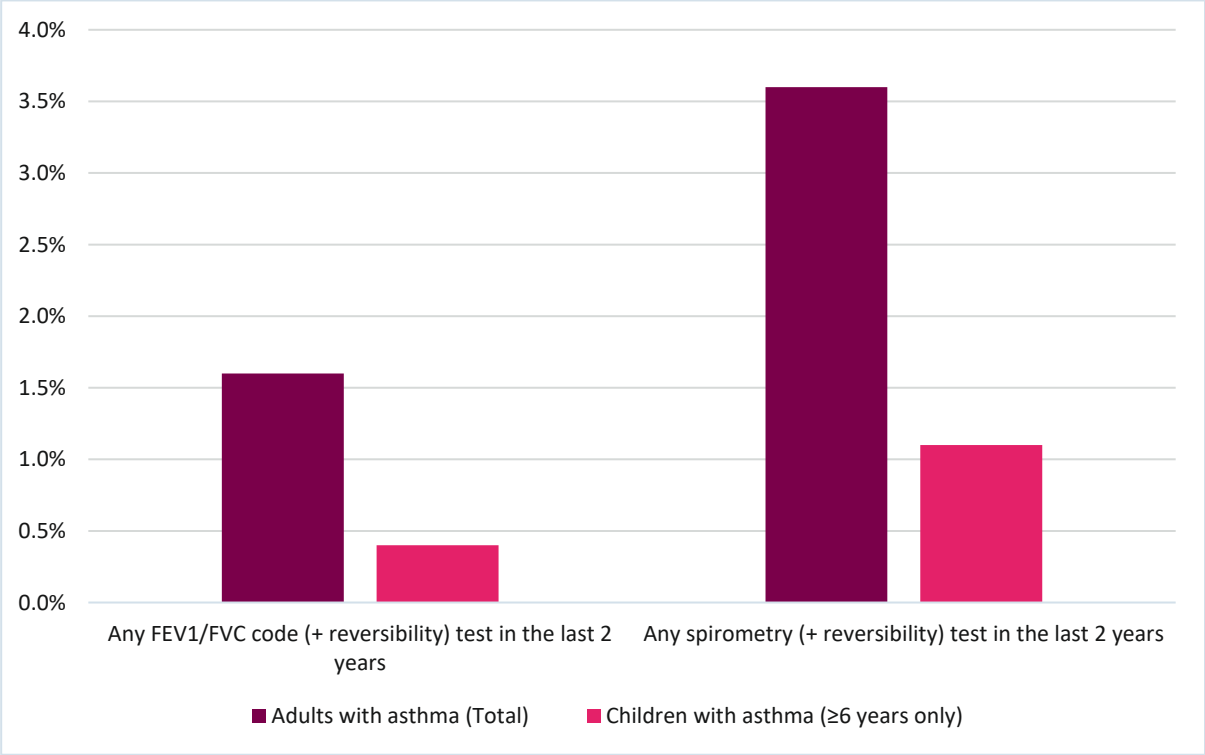
Post-bronchodilator* ratio is ≥0.2 and <0.7	2 (0.03%)
Pre-bronchodilator** ratio is ≥0.2 and <0.7	0 (0%)
Any spirometry ratio codes ≥0.2 and <0.7	31 (0.5%)

** Read code 339m; ** 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 2017/18
Adults with asthma (total)	**N=38,763**
No spirometry codes	29,476 (76.0%)
Any FEV_1/FVC code* (+ reversibility) test in the past 2 years	599 (1.6%)
Any spirometry (+ reversibility) test in the past 2 years	1,377 (3.6%)
Children with asthma (6 years and above only) (total)	**N=6,767**
No spirometry codes	6,154 (90.9%)
Any FEV_1/FVC code* (+ reversibility) test within the past 2 years	28 (0.4%)
Any spirometry (+ reversibility) test in the past 2 years	74 (1.1%)

** Read codes 339l, 339m and 339M*



The proportion of asthma patients in Wales with the gold standard and any type of spirometry Read codes (Wales)

Discussion

Diagnosing COPD

In order to make an accurate diagnosis of COPD, a confirmatory post-bronchodilator spirometry demonstrating an FEV_1/FVC ratio of <0.7 must be performed.[13] A thorough history and examination is an essential part of the diagnosis because patients may not present with COPD per se. Typically they present with breathlessness, a symptom associated with a multitude of other conditions. The clinician will only be able to decide as to which test is best suited for their patients by listening to

what they are saying and unpicking their history. Misdiagnosing patients may lead to poorer outcomes because of adverse effects of inappropriate medication or incorrect treatment.[17]

Diagnosing asthma

A defining feature of asthma is variable airflow obstruction caused by airway bronchoconstriction but unfortunately there is no single diagnostic test. Demonstrating this variable airflow obstruction can be a challenge as airway physiology may be normal when an individual with asthma is asymptomatic.[18] This is reflected in estimates for the negative predictive value of spirometry in adults and children which varies between 18 and 54%, indicating that more than half of patients who have a negative result (non-obstructive spirometry) will have asthma.[19] Primary care is ideally placed to repeat objective testing, such as peak expiratory flow and spirometry with reversibility, over time and demonstrate variable airflow obstruction.

Quality improvement recommendations

COPD

- Identify all patients with COPD who have been diagnosed in the past year and have no record of a chest X-ray within 6 months of diagnosis. This may simply be a missing Read code, however patients without a chest X-ray should be sent for one.
- Design a diagnostic template for COPD to form the first page of the annual review template. This should include evidence of a confirmatory post-bronchodilator spirometry demonstrating an FEV_1/FVC ratio of <0.7. An alert can be put in place so that before any further detail is entered the clinician is asked to confirm whether or not COPD has been accurately diagnosed.

Asthma

- Design a diagnostic template for asthma to form the first page of the annual review template. This should include evidence of objective testing confirming the diagnosis of asthma. An alert can be put in place so that before any further detail is entered the clinician is asked to confirm whether or not asthma has been accurately diagnosed.
- As part of this diagnostic template, ensure that the patient's best PEF is recorded. Add this PEF reading to prescription notes as a way to alert paramedics of the reading, especially if the patient doesn't have a personalised asthma action plan to hand.

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.

COPD

Key standards – COPD

NICE 2019 NG115: *One of the primary symptoms of COPD is breathlessness. The Medical Research Council (MRC) dyspnoea scale should be used to grade the breathlessness according to the level of exertion required to elicit it.* [14]

NICE 2016 QS10 (QS3): *People with stable chronic obstructive pulmonary disease (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).*[20]

Key findings

- Almost 55% of audited patients had an MRC score recorded in the past year.
- The majority of patients with a score had either MRC score 2 (22.8%) or 3 (15.1%), reflecting a similar distribution of breathlessness to that found in the last audit.
- Only 24.4% of people with a stable resting oxygen saturation (two measurements within 3 months) of 92% or less in the past 2 years had an arterial blood gas measurement recorded or a referral for home oxygen assessment.

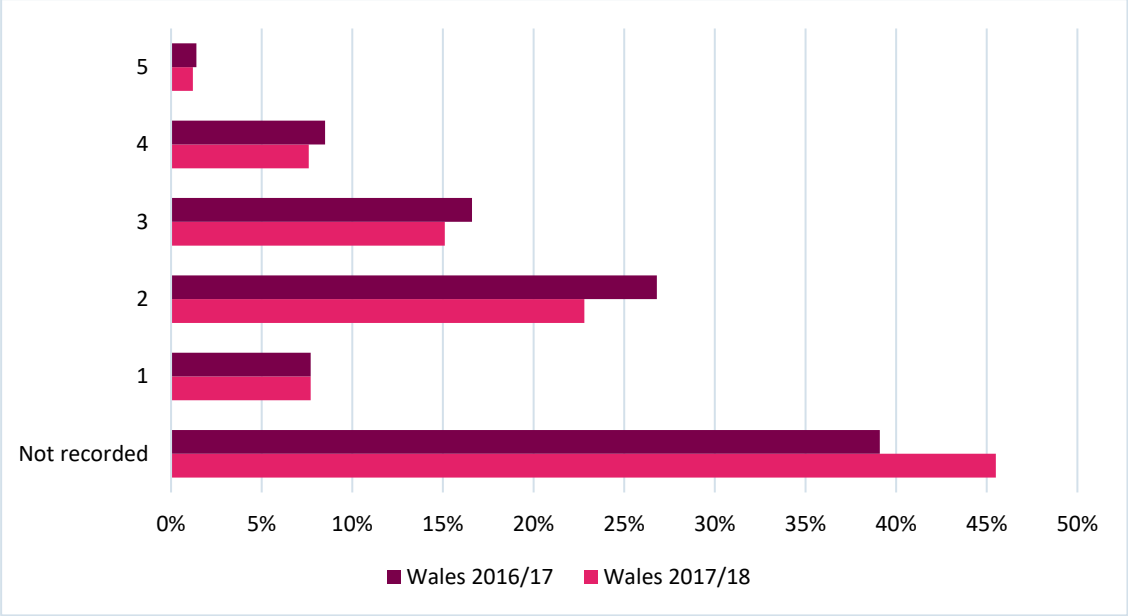
3.1 MRC scoring

Breathlessness and quality of life scores are now considered more important than degree of airflow obstruction when making decisions on therapies in COPD.[21] 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 2017/18 N=38,286	Wales 2016/17 N=82,696
1	2,961 (7.7%)	6,368 (7.7%)
2	8,726 (22.8%)	22,144 (26.8%)
3	5,774 (15.1%)	13,715 (16.6%)
4	2,917 (7.6%)	7,021 (8.5%)
5	475 (1.2%)	1,153 (1.4%)
Not recorded	17,433 (45.5%)	32,295 (39.1%)

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



The proportion of patients with each MRC score, or 'not recorded' in the past year (Wales)

3.2 FEV_1 %-predicted value measurement

Breathlessness and airflow limitation in COPD worsen over time, but classically in a pattern of slow decline.[22] The annual review can also use sudden changes in breathlessness or marked worsening of FEV_1 as an indicator that another cause of breathlessness may now be present. The natural decline in FEV_1 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 FEV_1 %-predicted value recorded in the past year

	Wales 2017/18 N=38,286	Wales 2016/17 N=82,696
FEV_1 %-predicted value in past year	11,989 (31.3%)	22,756 (27.5%)

3.3 Oxygen: management and treatment

Good clinical practice would expect referral after two recordings of pulse oximetry <92% when the patient is stable.[23,24] 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 2017/18	Wales 2016/17
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	437 (13.0%)	747 (11.1%)
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	177 (24.4%)	-

Asthma

Key standards – asthma

NICE 2018 QS25 (QS5): *People with suspected severe asthma are referred to a specialist multidisciplinary severe asthma service.*[15]

Key findings

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

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.

COPD and asthma

Key standards – COPD and asthma

NICE 2019 NG115: *Document and 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.*14

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.*[25]

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.*[26]

Key findings

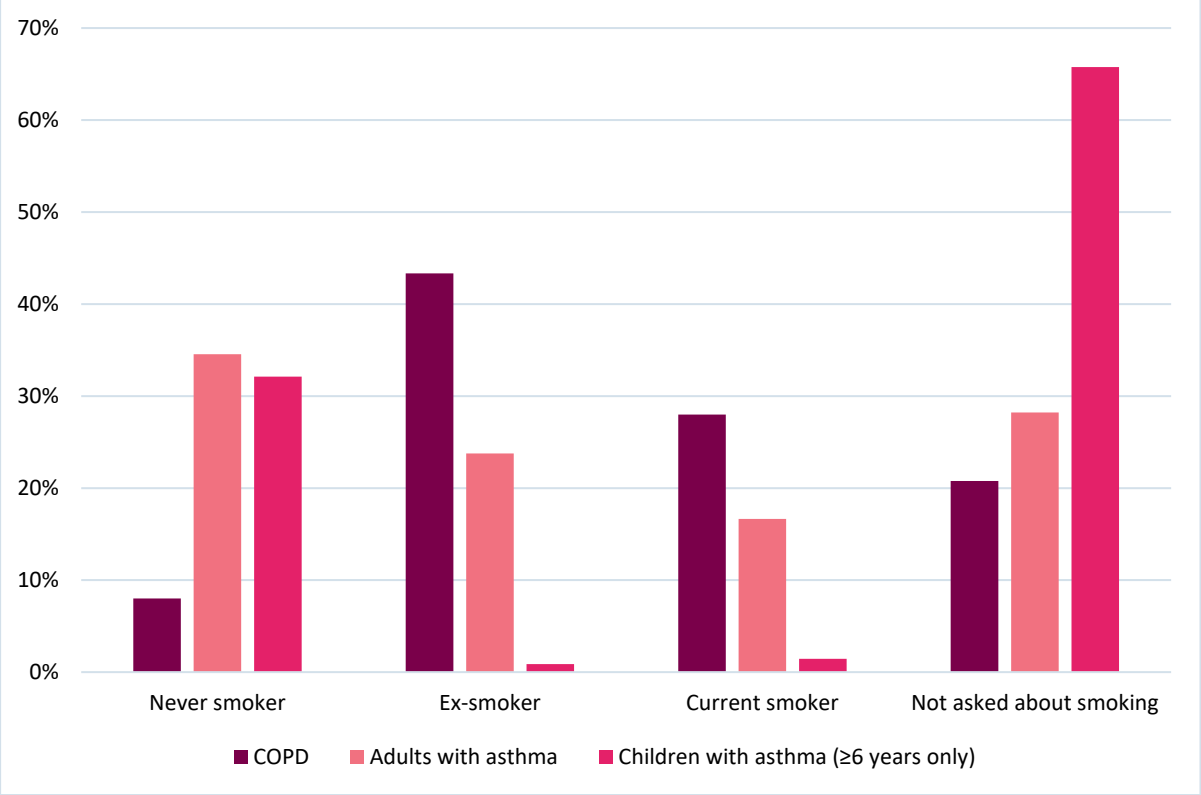
- 20.7% of the COPD cohort had no record of their smoking status in the past year. A further 28.8% were self-reported current smokers.
- 28.2% of the adult asthma cohort had no record of their smoking status in the past year. A further 16.6% were self-reported current smokers.
- 65.7% of children with asthma over the age of 6 had no record of their smoking status.
- Less than 1.0% of all people with asthma (adults and children) had a record of being asked about exposure to second-hand smoke.

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 2017/18	Wales 2016/17
COPD (total)	**N=38,286**	**N=82,696**
Never smoker	3,067 (8.0%)	7,574 (9.2%)
Ex-smoker	16,579 (43.3%)	34,551 (41.8%)
Current smoker	10,725 (28.0%)	21,924 (26.5%)
Not asked about smoking	7,915 (20.7%)	18,647 (22.6%)
Adults with asthma (total)	**N=95,147**	**-**
Never smoker	32,809 (34.5%)	-
Ex-smoker	22,564 (23.7%)	-
Current smoker	12,954 (16.6%)	-
Not asked about smoking	26,820 (28.2%)	-

	Wales 2017/18	Wales 2016/17
Children with asthma (6 -18 years old) (total)	**N=15,500**	**-**
Never smoker	4,970 (32.1%)	-
Ex-smoker	127 (0.8%)	-
Current smoker	217 (1.4%)	-
Not asked about smoking	10,186 (65.7%)	-



Smoking status (in the past year) in the Wales population, according to primary care records

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[27] 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 2017/18
Adults with asthma (total)	**N=95,147**
Not exposed to second-hand smoke	27 (0.03%)
Exposed to second-hand smoke	617 (0.7%)
Not asked about exposure to second-hand smoke	94,503 (99.3%)
Children with asthma (1–5 years old) (total)	**N=1,765**
Not exposed to second-hand smoke	3 (0.2%)
Exposed to second-hand smoke	9 (0.5%)
Not asked about exposure to second-hand smoke	1,753 (99.3%)
Children with asthma (6–18 years old) (total)	**N=15,500**
Not exposed to second-hand smoke	20 (0.1%)
Exposed to second-hand smoke	56 (0.4%)
Not asked about exposure to second-hand smoke	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.

Discussion

- In the UK around 2 million children are estimated to be regularly exposed to second-hand smoke (SHS) in the home. In the UK, between 6.5%–20% of children are reported to be exposed to SHS in cars. Children are particularly vulnerable to the effects of SHS exposure, which has been linked to an increased risk of lower respiratory tract infections, asthma, wheezing, middle ear infections, sudden unexpected death in infancy and invasive meningococcal disease. These disorders generate over 300,000 GP consultations and about 9,500 hospital admissions every year, costing the NHS about £23.3 million.[28]
- This does not necessarily mean that these conversations aren't happening and parents aren't being asked about their children's exposure to SHS, but currently it is not being recorded.

Quality improvement recommendations

COPD

- Ensure that patient exacerbations are recorded using the appropriate Read code (eg 66Yf).
- In order to assess whether or not a patient is eligible to be referred for pulmonary rehabilitation (PR) we first need to assess their breathlessness status. The simplest way to do this is to use the MRC score. If this is not recorded, is the patient potentially being denied a referral to PR? As part of the COPD annual review recall letter include the MRC scale and ask

patients to score themselves. Print off a laminated copy of the scale and stick it to your desk so that it is a prompt when the patient sits down to tell you their score and a reminder, as their clinician, to ask them for it.

Asthma

- Ensure that asthma attacks are recorded using the appropriate Read code (eg H33z0 or H33z1).
- Ensure that exposure to second-hand smoke is coded in every child and young person's (CYP) notes (eg 137I0 or 13WF1–13WF4) and that it becomes a routine question as part of the asthma template. Highlight in the asthma recall letter that questions will be asked about smoking in the house or car and that these are non-judgemental and routine questions. Any parents or family members who are struggling to quit can be signposted to local smoking cessation clinics or offered support at the surgery. Encourage staff to undertake online training on how to talk to parents and family about SHS www.ncsct.co.uk/publication_Public-Health-Wales-training-and-assessment-programme.php

COPD and asthma

Very brief advice (VBA) is a simple and powerful approach designed to be used opportunistically in less than 30 seconds in almost any consultation with a smoker. VBA can be a powerful tool and its use as an intervention should be taken as seriously as prescribing a medicine.[29] Asking patients about their smoking status is everybody's job. Commit as a practice to ensure that all staff who have contact with patients undertake online VBA training www.ncsct.co.uk/publication_Public-Health-Wales-training-and-assessment-programme.php

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.

COPD only

Key standards – COPD

NICE 2019 NG115: *Make pulmonary rehabilitation available to all appropriate people with COPD, including people who have had a recent hospitalisation for an acute exacerbation. Offer pulmonary rehabilitation to all people who view themselves as functionally disabled by COPD (usually MRC grade 3 and above).*[14]

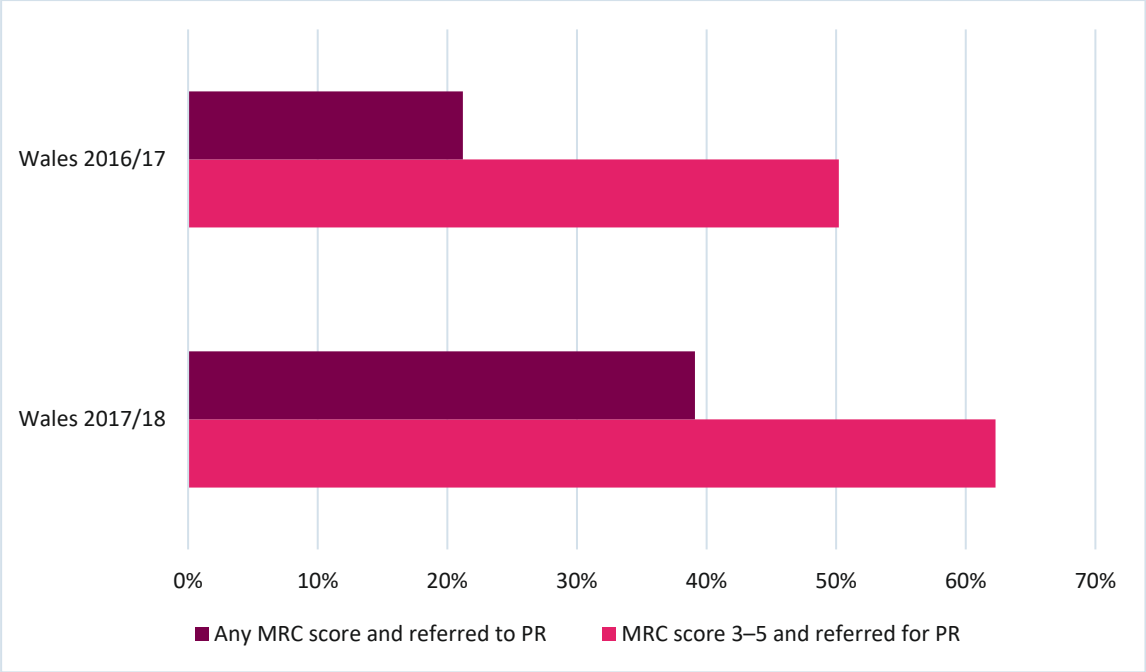
Key findings

- 62.3% of patients with an MRC score of 3–5 had a record of being offered a PR referral (including people who refused a referral) in the past 3 years, an increase from 50.2% in 2017.
- This was reduced to 39.1% when patients with any MRC score were included in the denominator, an increase from 21.2% in 2017.

4.1 Pulmonary rehabilitation (PR)

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

	Wales 2017/18	Wales 2016/17
MRC score 3–5 and referred for PR	8,497/13,635 (62.3%)	7,621/15,190 (50.2%)
Any MRC score and referred for PR	12,793/32,709 (39.1%)	10,179/47,974 (21.2%)



Patients with COPD who have been referred for PR (Wales), from primary care records

Asthma

Key standards – 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).*[16]

Key findings

- 75% of the adult asthma cohort had no evidence of a PAAP.
- 83% of 1–5 year olds and 77% of 6–18 year olds had no evidence of a PAAP.
- 57.8% of adults, 35.9% of children aged 1–5 and 47.8% of children aged 6–18 had evidence of being asked the RCP three questions during the past year.

4.2 Personalised asthma action plans (PAAP)

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

	Wales 2017/18
Adults with asthma	23,931/95,147 (25.2%)
Children with asthma (1–5 year olds)	298/1,765 (16.9%)
Children with asthma (6–18 year olds)	3,555/15,500 (22.9%)

4.3 RCP three asthma questions

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

	Wales 2017/18
Adults with asthma	55,002/95,147 (57.8%)
Children with asthma (1–5 years old)	634/1,765 (35.9%)
Children with asthma (6–18 years old)	7,404/15,500 (47.8%)

4.4 Short-acting reliever inhalers

The '12 SABA' equals excess rule determines risk of death and the RCP Asthma Audit Development Project (AADP) concluded that an audit standard should reflect the usage that signifies poor control. Currently regular use of 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 provider was not able to access codes from the more widely used NHS Dictionary of Medicines and Devices.

4.5 Inhaled corticosteroid inhalers (ICS) devices

Inhaled corticosteroids is 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 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.

COPD and asthma

Key standards – COPD and asthma

NICE 2016 QS10 (QS2): *People with chronic obstructive pulmonary disease (COPD) who are prescribed an inhaler have their inhaler technique assessed when starting treatment and then regularly during treatment.*[13]

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.*[15]

NICE 2019 NG115: *Document and 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.*[14]

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.*[25]

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.*[26]

Key findings

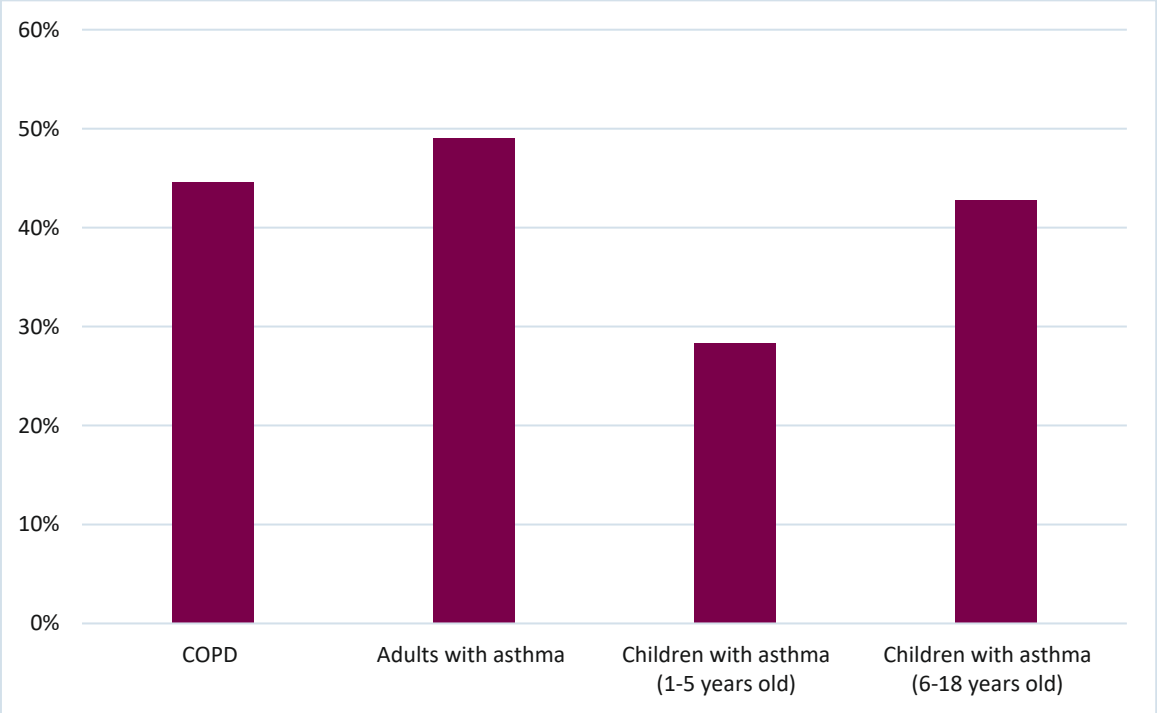
- An inhaler technique check was recorded in the past year for:
  - 44.6% of people with COPD
  - 49.1% of adults with asthma
  - 28.3% of children aged 1–5 years and 42.8% aged 6–18 years.
- 72.9% of people with COPD had a record of having the influenza vaccine in the preceding winter period.
- 57.0% of adults, 57.5% of children aged 1–5 and 43.4% of children aged 6–18 had a record of having the influenza vaccine in the preceding winter period.

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

These results should be interpreted with caution due to similar issues with prescription Read codes described above. Inhaler technique check Read codes are still utilised, so the presence of a technique check code may indicate a prescription has been made for an inhaler.

	Wales 2017/18	Wales 2016/17
COPD	13,159/29,482 (44.6%)	35,572/75,923 (46.9%)
Adults with asthma	38,199/77,829 (49.1%)	-
Children with asthma (1–5 years old)	393/1,391 (28.3%)	-
Children with asthma (6–18 years old)	4,610/10,777 (42.8%)	-



The percentage of patients with evidence of an inhaler check in the past year (Wales)

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.[30] People with chronic respiratory illness who are infected with the influenza virus have more serious illness and are at higher risk of mortality.[31]

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.[31] 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 2017/18	Wales 2016/17
COPD	27,923/38,286 (72.9%)	54,602/82,696 (66.0%)
Adults with asthma	54,240/95,147 (57.0%)	-
Children with asthma (1–5 years old)	1,014/1,765 (57.5%)	-
Children with asthma (6–18 years old)	6,719/15,500 (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.[32,33] 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.[34,35] Peer-reviewed reports and the first cycle of this audit, however, still show that there is some overuse and misuse of inhaled pharmacotherapy.[34,35,36]

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.

Discussion

Asthma

- For a variable condition such as asthma, the hallmark of self-management is the provision of an action plan with advice on recognising and responding to deterioration in control.[37] Self-management, including provision of a personalised asthma action plan (PAAP) and supported by regular medical review almost halves the risk of hospitalisation, significantly reduces emergency department attendances and unscheduled consultations and improves markers of asthma control and quality of life.[38]
- The National Review of Asthma Deaths (NRAD) (https://www.rcplondon.ac.uk/projects/outputs/why-asthma-still-kills) highlighted that 77% of those who died had no evidence in their medical records of being provided with a PAAP detailing how their medication was to be taken, how to recognise danger signals and when to call for help.[39]

COPD and asthma

- Smoking cessation reduces the decline of lung function and exacerbation rates. Equally, asthma and active cigarette smoking interact to cause more severe symptoms, accelerated decline in lung function, and impaired short-term therapeutic response to corticosteroids.[40]

Quality improvement recommendations

COPD

- Recording of MRC status has improved significantly from the last audit and it is important that we use this improvement to also increase referral rates for PR. Entering an MRC score of 3 or above should prompt a referral for PR. Many patients are put off when they hear the term ‘rehab’ or the clinician talks about ‘exercise’ or ‘breathlessness’. Rather than attempting to ‘sell’ PR to a patient, try simplifying the message: After entering an MRC score of 3 or above you could say to the patient ‘I am going to refer you to see an expert to help you breathe better’.

Asthma

- In order to increase the use of PAAPs, consider sending out your practice’s chosen PAAP as part of the recall for the patient’s asthma review. Ask the patient to read through the document, fill out any details they can prior to their appointment and get them to bring any questions with them to their review so it can be filled in together.

Asthma and COPD

- An inhaler shouldn’t be prescribed without knowing the person receiving it can use it. Set up a protocol for whenever a patient is prescribed a new inhaler. This may involve referring the patient to a nurse or healthcare assistant trained in inhaler technique or to your community or practice pharmacist. Commit to at least one member of the practice working through the UK Inhaler Group standards and competencies to enable them to work with patients to optimise technique and maximise the benefit of the medication.[41]

Section 5:
2018 Focus topic – ensuring equal and equitable care in people with mental illnesses

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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.

Serious mental illness (SMI), anxiety and depression in adults with COPD

Key standards – mental illness

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 recommend 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 recommend 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]

Key findings

- 8.4% of the cohort had a severe mental illness (SMI)
- 37.1% of the cohort had anxiety and/or depression
- People with SMI (relative to those without mental illness) had:
  - Lower prevalence of post-bronchodilator spirometry demonstrating airway obstruction for patients diagnosed in the past 2 years (8.3% compared with 9.9%)
  - Similar prevalence of referral for pulmonary rehabilitation (MRC score 3–5) (61.6% compared with 62.9%).
- People with anxiety and/or depression (relative to those without) had:
  - Similar rates of post-bronchodilator spirometry demonstrating airway obstruction for patients diagnosed in the past 2 years (9.5% compared with 9.9%)

- Similar rates of referral for pulmonary rehabilitation (MRC score 3–5) (61.8% compared with 62.9%)

5.1 Serious mental illness, anxiety and depression in people with COPD

	Wales 2017/18 N=38,286
No mental illness	**20,788 (54.3%)**
Anxiety and/or depression	**14,285 (37.1%)**
Serious mental illness	**3,213 (8.4%)**

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

	Wales 2017/18 N=38,286
Post-bronchodilator FEV_1/FVC ratio of <0.7 (patients diagnosed in the past 2 years N=6,683)	
No mental illness	**363 (9.9%)**
Anxiety and/or depression	**229 (9.5%)**
SMI	**49 (8.3%)**
People referred for pulmonary rehabilitation (MRC score of 3 – 5)	
No mental illness	**4,293 (62.9%)**
Anxiety and/or depression	**3,408 (61.8%)**
Serious mental illness	**796 (62.6%)**

Serious mental illness (SMI), anxiety and depression in adults with asthma

Key standards – mental illness

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 recommend 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 recommend 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]

Key findings

- 6.2% of the cohort had a severe mental illness (SMI)
- 37.6% of the cohort had anxiety and depression
- People with SMI (relative to those without mental illness) had:
  - Similar recording of peak flow in their notes (92.7% compared with 93.9%)

  - Slightly lower prevalence of being asked the RCP three questions (54.2% compared with 58.9%)
- People with anxiety and/or depression (relative to those without) had:
  - Slightly higher recording of peak flow in their notes (94.4% compared with 93.9%)
  - Slightly lower incidence of being asked the RCP three questions (56.8% compared with 58.9%)

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

	Wales 2017/18 N=95,147
No mental illness	**53,488 (56.2%)**
Anxiety and/or depression	**35,799 (37.6%)**
Serious mental illness	**5,860 (6.2%)**

Please note: all subsequent analyses in this section use the above numbers as denominators for their respective sections unless otherwise specified and provided. Additionally, where the results are less than five, exact figures and percentages have been suppressed and replaced with '<5', in line with the Office for National Statistics confidentiality guidance.[42]

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

	Wales 2017/18 N=95,147
Peak flow record	
No mental illness	**50,212 (93.9%)**
Anxiety and/or depression	**33,778 (94.4%)**
Serious mental illness	**5,429 (92.7%)**
RCP three questions	
No mental illness	**31,486 (58.9%)**
Anxiety and/or depression	**20,343 (56.8%)**
Serious mental illness	**3,173 (54.2%)**
Fewer than three short-acting reliever inhalers	
No mental illness	**52,501 (98.2%)**
Anxiety and/or depression	**35,014 (97.8%)**
Serious mental illness	**5,707 (97.4%)**
More than two prescriptions for oral corticosteroids	
No mental illness	**2,354 (4.4%)**
Anxiety and/or depression	**2,204 (6.2%)**
Serious mental illness	**443 (7.6%)**

Mild and moderate mental illness and learning disabilities in children with asthma

Key findings

- 3.6% of 1–5 year olds had mild/moderate mental health illness and 0.1% had a learning disability
- 10.2% of 6–18 year olds had mild/moderate mental health illness and 1.3 % had a learning disability
- Children aged 6–18 years with mild/moderate mental health illness (relative to those without) had:
  - slightly higher recording of peak flow in their notes (85.5% compared with 82.1%)
  - slightly lower prevalence of being asked the RCP three questions (46.3% compared with 48.1%)
- Children aged 6–18 years with learning disability (relative to those without) had:
  - similar recording of peak flow in their notes (82.6% compared with 82.1%)
  - slightly lower incidence of being asked the RCP three questions (46.3% compared with 48.1%)
- Children aged 1–5 years with mild/moderate mental health illness (relative to those without) had:
  - slightly higher incidence of being asked the RCP three questions (39.1% compared with 35.8%).

5.3 Mild and moderate mental illness and learning disability in children with asthma

	Wales 2017/18
Total (1–5 years old)	**N=1,765**
No mental illness or learning disability	1,699 (96.3%)
Mild/moderate mental health	64 (3.6%)
Learning disability	<5
Total (6–18 years old)	**N=15,500**
No mental illness or learning disability	13,718 (88.5%)
Mild/moderate mental health	1,581 (10.2%)
Learning disability	201 (1.3%)

Please note: all subsequent analyses in this section use the above numbers as denominators for their respective sections unless otherwise specified and provided. Additionally, where the results are less than five, exact figures and percentages have been suppressed and replaced with '<5', in line with the Office for National Statistics confidentiality guidance.[43]

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

	Children 1–5 years old N=1,765	Children 6–18 years old N=15,500
Peak flow record		
No mental illness or learning disability	-	11,267 (82.1%)
Mild/moderate mental health	-	1,352 (85.5%)
Learning disability	-	166 (82.6%)
RCP three questions		
No mental illness or learning disability	609 (35.8%)	6,601 (48.1%)
Mild/moderate mental health	25 (39.1%)	710 (44.9%)
Learning disability	0 (0%)	93 (46.3%)
Short-acting reliever inhalers		
No mental illness or learning disability	1,698 (99.9%)	13,568 (98.9%)
Mild/moderate mental health	64 (100%)	1,556 (98.4%)
Learning disability	<5	200 (99.5%)
Oral corticosteroids		
No mental illness or learning disability	84 (4.9%)	151 (1.1%)
Mild/moderate mental health	<5	21 (1.3%)
Learning disability	0 (0%)	<5

Discussion

It can be challenging to identify and treat anxiety and depression in patients with COPD. Under-recognised and untreated symptoms of depression and anxiety have deleterious effects on physical functioning and social interaction which can increase fatigue and healthcare utilisation. Barriers to adequate treatment of depression or anxiety in COPD patients may include:[44]

- patient reluctance to disclose symptoms
- lack of standardised diagnosis approach for anxiety and depression
- short consultation time
- low physician confidence in assessing patients for depression or anxiety
- poor communication links between primary care and community mental health teams
- inadequate resources for providing mental health treatment.

Quality improvement recommendations

COPD

- Ensure depression screening is part of the annual COPD review. Although there are no screening tools specifically validated in COPD, tools such as the Geriatric Depression Scale[45] and the Hospital Anxiety and Depression Scale[46] have been validated for use in patients with somatic conditions. Consider adding the Whooley Questions to the recall letter so patients know that they will be routinely asked about their mood at review:
  - During the past month, have you often been bothered by feeling down, depressed or hopeless?
  - During the past month, have you often been bothered by little interest or pleasure in doing things?

Asthma

- As part of all asthma reviews introduce simple screening questions to identify patients with anxiety which may be contributing to their symptoms. For patients demonstrating anxiety, separate to their asthma, ensure they are appropriately managed and signposted to local mental health support services. Examples include:
  - Over the past 2 weeks, have you felt nervous, anxious or on edge? Have you felt unable to stop or control worrying? Do you find yourself avoiding places or activities and does this cause you problems?
  - Do you find yourself avoiding social situations or activities? Are you fearful or embarrassed in social situations?[47]

Section 6:
Summary of key indicators

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Table 1 depicts the unadjusted key indicators of the three local health boards (each with at least 10 participating practices). These results are from three local health boards (LHBs) – Aneurin Bevan University Health Board, Betsi Cadwaladr University Health Board and Cardiff and Vale University Health Board which each had 10 or more practices participating in the primary care audit.

Table 1: Unadjusted summary of key indicators for local health boards in Wales

Medians	COPD: People diagnosed with COPD in the past 2 years who have a post-bronchodilator FEV_1/FVC <0.7		COPD: People with COPD who are breathless (MRC score 3–5) and have been referred to PR in the past 3 years		Asthma: People diagnosed with asthma in the past 2 years who have a record of any objective diagnostic measurement		Asthma: People with asthma who have been prescribed fewer than 6 ICS devices in the past 12 months	
LHB	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Aneurin Bevan	182	11	2,259	64	9,335	81	8,582	31
Betsi Cadwaladr	103	4	3,345	59	13,722	77	14,838	35
Cardiff & Vale	259	16	2,230	66	10,163	77	11,432	33

Appendix A: Audit methodology

The methodology for the National Asthma and COPD Audit Programme's primary care audit builds upon the learning from the 2017 primary care audit. This audit uses data extracted from general practices in Wales in July 2019 to cover 1 April 2017 – 30 September 2018.

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 **191/410** practices, 45.6% of all practices in Wales.

Number of participating practices, per local health board (LHB)

Local health board (LHB)	Number participating	Total number of practices	Percentage participating
Aneurin Bevan	44	76	57.9%
Betsi Cadwaladr	81	105	77.1%
Cardiff & Vale	54	62	87.1%
Cwm Taf Morgannwg	9	54	16.7%
Hywel Dda	1	48	2.1%
Powys	0	16	0%
Swansea Bay	2	49	4.1%
Wales	**191**	**410**	**45.6%**

Recruitment

The audit operated on an opt-in basis and all general practices in Wales were eligible to participate in the audit. The programme team worked with the Welsh Government's Major Health Conditions Policy team 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 early April 2018 to all practice partners and managers. This letter highlighted that this audit was a continuation of the primary care audit carried out in 2017 as part of the National COPD Audit Programme and the timelines associated with this iteration of the audit. 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 NWIS with the list of participants from across the LHB. As the audit used an extraction methodology, once the practices had opted in, no subsequent effort was involved. The recruitment period ended in May 2018.

Following this initial round of recruitment, a third-party organisation was contracted to extract the data which necessitated another letter to practices (sent in December 2018) to allow them to change their registration status if they wished. A number of practices withdrew their registration at this time, citing GDPR concerns. This reduced the overall participation rate from 97% to 47%. After negotiation with Welsh Government and HQIP, it was decided to continue the extraction with this smaller cohort of practices.

Information governance

No patient identifiers were collected for this audit, and identifiable data were pseudonymised at source, 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 data extraction, led by Informatica, took place automatically using Audit+, software already installed on the vast majority of general practice systems in Wales. The pseudonymised data were held transiently by Informatica before being transferred by Secure File Transfer Protocol to Imperial College London for cleaning and analysis.

As patient identifiable information was not transferred for the purpose of this audit, practices did not need to gain patient consent, nor was Section 251 approval required (the audit exited from the approval granted for the first round of primary care audit). However, a patient information sheet and poster was provided to practices for local use in 'fair processing' activities.

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.

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/projects/outputs/national-asthma-and-copd-audit-programme-nacap-primary-care-workstream-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=3) 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 (BMI)

- 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 illness

COPD

- Post-bronchodilator FEV_1/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

Aneurin Bevan University Health Board		
Cluster	**Practice(s)**	
Blaenau Gwent East	Blaina Medical Practice	Brynmawr Well Being Centre
	Cwm Calon	Six Bells Medical Centre
Blaenau Gwent West	Cwm Health Centre	Glyn Ebwy Surgery
	Health Centre (Tredegar)	Pen-y-Cae Surgery
Caerphilly East	Avicenna Medical Centre	North Celynen (Crumlin)
	Pontllanfraith Health Centre	Wellspring Medical Centre
Caerphilly North	Bryntirion Surgery	Markham Medical Centre
	Meddygfa Gelligaer Surgery	Nelson Surgery
	South Street Surgery	
Caerphilly South	Court House Medical Centre	Lansbury Surgery
	Tonyfelin Medical Centre	
Monmouthshire North	Castle Gate Medical Practice (Monmouth)	Dixton Road Surgery
	Hereford Road Surgery	The Medical Centre (Usk)
	Tudor Gate Surgery	Wye Valley Practice
Monmouthshire South	Gray Hill Surgery	Town Gate Practice
	Wyedean Practice	Vauxhall Surgery
Newport East	Lliswerry Medical Centre	Ringland Health Centre
	The Rugby Surgery	
Newport North	Isca Medical Centre	Malpas Brook Health Centre
	Richmond Clinic	St Julians Medical Centre
	The Rogerstone Practice	Westfield Medical Centre
Newport West	Bellevue Surgery	St. Brides Medical Centre
	St David's Clinic	St. Paul's Clinic
Betsi Cadwaladr University Local Health Board		
Cluster	**Practice(s)**	
Anglesey	Cambria Surgery	Canolfan Iechyd Amlwch
	Coed Y Glyn Surgery	Gerafon Surgery
	Meddygfa Star Surgery	Meddygfa Victoria
	Parc Glas Surgery	The Health Centre (Llanfairpwll)
	The Health Centre (Ynys Mon)	The Surgery (Gwalchmai)
	The Surgery (Holyhead)	
Arfon	Bodnant	Bron Derw Medical Centre
	Corwen House	Glanfa
	Llys Meddyg (Penygroes)	Liverpool House
	Market Street Surgery	Yr Hen Orsaf Medical Centre
Central and South Denbighshire	Beech House Surgery	Berllan Surgery
	Plas Meddyg	The Clinic (Ruthin)

Conwy East	Cadwgan Surgery	Kinmel Bay Medical Centre
	Rhoslan	Rysseldene Surgery
	The Gwrych Medical Centre	
Conwy West	Bodreinallt	Craig Y Don Medical Practice
	Llys Meddyg (Conwy)	Lonfa
	Meddygfa (Betwy y Coed)	Meddygfa Gyffin
	Mostyn House Medical Practice	Plas Menai Surgery
	The Medical Centre (Penrhyn Bay)	The Surgery (Llanwrst)
	Uwchaled Medical Practice	West Shore Surgery
Deeside Hawarden and Saltney	Marches Medical Practice	Queensferry Medical Practice
	St Mark's Dee View Surgery	Shotton Lane Surgery
	The Stables Medical Practice	
Dwyfor	Meddygfa Rhydbach	Porthmadog Health Centre
	The Health Centre (Criccieth)	Treflan
	Ty Doctor	
Holywell and Flint	Allt Goch Medical Centre	Panton Surgery
	Pendre Surgery (Holywell)	Pennant Surgery
	The Laurels Surgery	
Meirionnydd	Bron Meirion	Caerffynnon
	Canolfan Goffa Ffestiniog	Meddygfa (Bala)
	Minfor Surgery	Tywyn Health Centre
Mold Buckley and Caergwle	Caergwrle Medical Practice	Hope Family Medical Centre
	Roseneath Medical Practice	
North Denbighshire	Clarence Medical Centre	Healthy Prestatyn Iach (Ffordd Pendyffryn)
	Kings House Surgery	Lakeside Medical Centre
	Park House Surgery	
South Wrexham	Castle Health Care	Ruabon Medical Centre
	The Health Centre (Beech Avenue)	The Surgery (Gardden Road)
	The Surgery (Overton On Dee)	
West and North Wrexham	Alyn Family Doctors	Bryn Darland Surgery
	Caritas Health Partnership	Forge Road Surgery
	Pen Y Maes Health Centre	
Wrexham Town	Beechley Medical Centre	Borras Park Surgery
	Caia Park Surgery	Hillcrest Medical Centre (Wrexham)
	Plas Y Bryn Medical Centre	Strathmore Medical Practice
	The Surgery (Wrexham)	
Cardiff and Vale University Local Health Board		
Cluster	**Practice(s)**	
Cardiff East	Brynderwen Surgery	Rumney Primary Care Centre
	Willowbrook Surgery	
Cardiff North	Birchgrove Surgery	Crwys Medical Centre
	Llanishen Court Surgery	North Cardiff Medical Centre
	Roath House Surgery	St Isan Road Surgery

	The Penylan Surgery	The Pontprennau Medical Centre
Cardiff South East	Cathays Surgery	Clifton Surgery
	Cloughmore Surgery	Four Elms Medical Centre
	Meddygfa Albany Surgery	North Road Medical Practice
	Roathwell Surgery	The City Surgery
Cardiff South West	Ely Bridge Surgery	Greenmount Surgery
	Kings Road Surgery (Cardiff)	Riverside HC Canton
	The Surgery St Davids Crt	The Taff Riverside Practice
	The Caerau Lane Surgery	Westway Surgery
	Woodlands Medical Centre	
Cardiff West	Bishops Road Medical Centre	Danescourt Surgery
	Fairwater Health Centre	Llandaff North Medical Centre
	Llandaff Surgery	Meddygfa Llwyncelyn Practice
	Radyr Medical Centre	Whitchurch Village Practice
Central Vale	Court Road Surgery	Highlight Park Medical Practice
	Ravenscourt Surgery	Sully Surgery
	The Practice Of Health	The Waterfront Medical Centre
	West Quay Medical Centre	
City and Cardiff South	Clare Road Medical Centre	Grange Medical Practice
	Grangetown Health Centre	Saltmead Medical Centre
Eastern Vale	Albert Road Surgery	Dinas Powys MC
	Penarth Healthcare Partnership	Redlands Surgery
Western Vale	Eryl Surgery	Llantwit Major and Coastal Vale Medical Practice
	Western Vale Family Practice	
Cwm Taf Morgannwg University Local Health Board		
Cluster	**Practice(s)**	
Bridgend East Network	Riversdale House	
North Cynon	Abercwmboi Medical Centre	Cwmaman Surgery
North Rhondda	New Tynewydd Surgery	The Maerdy Ferndale Mgp
South Rhondda	De Winton Field Practice (Dr G Williams and Partners)	The Surgery (Penygraig)
South Taf Ely	Parc Canol Group Practice	The Health Centre (Taffs Well)
Hywel Dda University Local Health Board		
Cluster	**Practice(s)**	
North Ceredigion	Tregaron Surgery	
Swansea Bay University Local Health Board		
Cluster	**Practice(s)**	
Afan	Afan Valley Group Practice	Cwmavon Health Centre (Dr Huw Browning)

Appendix C: References

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