Royal College of Physicians | NACAP

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

Wales primary care clinical audit 2021

(asthma and COPD data extracted from 314 general practices in Wales to capture activity up to 31 July 2021)

Data analysis and methodology report

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The Royal College of Physicians

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www.hqip.org.uk/national-programmes

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

More than 9 million people are living with a diagnosis of asthma or COPD in the UK and the NACAP aims to improve the quality of their care, services and clinical outcomes. It does this by supporting and training clinicians, empowering people living with asthma and COPD, and their carers, and informing policy. The NACAP has a track record of delivery and is critical to assessing progress against the NHS Long Term Plan. To find out more about the NACAP visit: www.rcp.ac.uk/nacap.

Wales primary clinical audit 2021 report

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Important note about 2020/21 data in this report

National denominators for the Wales primary care report include people coded for asthma and COPD within a specific time period. For the 2021 audit, this was April 2020 – July 2021. Due to the nature of this time period and it being significantly affected by the COVID-19 pandemic, as well as differences in reporting time periods and participation rates, denominators for this report do not mirror previous rounds of the audit. Analysis methodology used to calculate these denominators remained the same, therefore we feel that they represent an accurate picture of people managed/treated during this time period for their asthma and/or COPD.

However, due to aforementioned reasons, we do not recommend that comparisons between the 2021 audit period and previous rounds of the audit are made. Results for the 2020 and 2018 audits remain in the report for information only and to add context to improvement priorities but should not be used to track changes over time.

This audit report provides a glimpse of asthma and COPD care during a national pandemic, a unique period that presented significant challenges to primary care services. We hope that these results provide some insight into respiratory care during these exceptional times and provide an opportunity to reflect and identify areas for improvement.

How to use this report

1. Scope and data collection

This report presents results from analysis of asthma and chronic obstructive pulmonary disease (COPD) primary care data in Wales from the third round of the Welsh primary care audit component of the National Asthma and COPD Audit Programme (NACAP). Data were analysed from 314 (80.7%) general practices in Wales in October 2021 to capture activity up to 31 July 2021. The data relate to the care and treatment of patients with asthma and/or COPD between 1 April 2020 and 31 July 2021.

The audit builds upon the learning from the 2018/20 report (www.rcp.ac.uk/pc2020), the second to report on asthma and COPD patient care from primary care records in Wales.

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

2. Report structure

This report focuses on the data analysis and methods. Recommended improvement priorities made in response can be found in the national clinical audit report (via www.rcp.ac.uk/pc2021).

These data are presented largely in tabular form with explanatory notes where necessary. National results for previous rounds of the audit are shown in each data table (where appropriate) but as per the 'Important note about 2020/21 data in this report' on page 3, this has been included for information purposes and to add context to areas highlighted as improvement priorities. A full data analysis and data cleaning methodology can be found in Appendix A.

Participating practices can view individualised practice level results from summer 2022 via the Data Health and Care Wales (DHCW) Primary Care Information Portal. These reports will include benchmarking against national and health board results to support practices in improving the quality of patient care (http://isdapps.wales.nhs.uk/pcip). Local health board results, including cluster results, are available at www.rcp.ac.uk/pc2021.

3. Data interpretation

80.7% of Welsh practices participated. However, we advise caution when reviewing 2021 results and making assumptions about the quality of care provided nationally. This is because the audit period was significantly affected by the COVID-19 pandemic. Further data interpretation caveats are below.

Where numbers were too small to report or suppressed due to disclosure policy, 'not available*' appears in the relevant section of each table. This is to ensure the confidentiality of people included in the cohort for this report and to adhere to national and Secure Anonymised Information Linkage (SAIL) disclosure control small number suppression rules.

For the audit we have used validated codes to establish the asthma cohort (https://bmjopen.bmj.com/content/7/8/e017474) or COPD (https://bmjopen.bmj.com/content/4/7/e005540).

Recent work looking at the accuracy of asthma and COPD coding with respect to the Quality Assurance and Improvement Framework (QAIF) register has shown that use of other Read/SNOMED CT codes* (ie not necessarily included on the register) are more suggestive of the diseases with high positive predictive values. Equally, some of the codes used in the QAIF 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 QAIF register, but also including others who are not) than if all people on the asthma and COPD QAIF registers had been included. However, at practice level and for the purposes of QI, users should note that their COPD and asthma registers will show some differences that will require local patient level analysis.

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

Children aged 1–5

Younger children aged 1–5 were included in the 2017/18 and 2018/20 audits. For the 2020/21 audit this age group was removed for the following reasons:

- lack of specific guidance and standards around diagnosing asthma in children under the age of 6, and
- ensuring that the audit aligned with national guidelines and standards on when it's appropriate to make a secure diagnosis of asthma.

* 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

Participation in the audit

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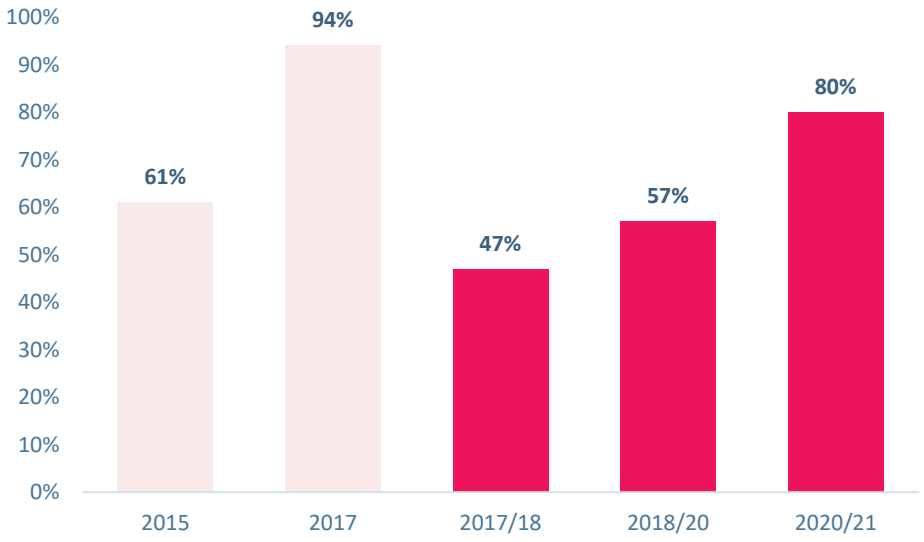
The Wales primary care audit started under the auspices of the National COPD Audit Programme in 2015. Due to the audit methodology of automatically extracting data from GP systems, an 'opt-in' approach was proposed to ensure GP practices had the opportunity to agree to their data being included. Information and recruitment campaigns then took place prior to each audit round.

Two initial rounds of audit, with successful participation rates, were conducted in 2015 and 2017 (fig 1) with data extraction from GP systems undertaken by National Wales Informatics Service (NWIS) (now Data Health and Care Wales (DHCW)). NACAP was commissioned in March 2018, and combined the existing National COPD Audit Programme with new asthma audits. Three further rounds of the audit (with data for both asthma and COPD patients) have been delivered since March 2018.

Fig 1. Participation in the NACAP Wales primary care audit since March 2018



Light pink = primary care audit (COPD only) undertaken by the National COPD Audit Programme (2015–18)
Dark pink = primary care audit (asthma and COPD) undertaken by NACAP (2018–23)

Due to contractual issues, NWIS (now DHCW) were not able to support extraction of data for audit rounds after March 2018, therefore Informatica Systems Limited (ISL) were contracted to deliver this. However, this raised General Data Protection Regulation (GDPR) concerns around the use of a third-party organisation extracting data from GP systems and resulted in a considerable fall in participation for the 2017/18 and 2018/20 audits (fig 1).

In order to deal with the concerns raised and resolve the issue of low participation for the audit, NACAP moved to working with and accessing the data via the Secure Anonymised Information Linkage (SAIL) Databank.[†, 8] SAIL already has data sharing agreements in place with many GP practices in Wales for research and linkage purposes and their systems were already set up to perform this work quickly and easily. This also removed the need for practices to opt-in and the use of third party organisations to obtain the necessary data. This move resulted in a 80.7% participation rate for the 2021 audit.

[†] NACAP received SAIL information governance review panel (IGRP) approval for the project in September 2021.

Section 1: Demographics and multiple health conditions

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Navigation

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

Key findings

Adults with COPD

- The COPD patient cohort was made up of a similar number of men and women (49.3% and 50.7%) with the average age being 70.4 years.
- The most common other physical long-term health conditions were hypertension (52.1%), asthma (24.0%) and obesity (22.2%).
- 38.8% were diagnosed with anxiety and 39.5% were diagnosed with depression, although 8.2% had been screened or diagnosed with depression in the past 2 years.

Adults with asthma

- There was a higher proportion of women (60.3%) to men (39.7%) in the adult asthma patient cohort with the average age being 51.7 years.
- The most common other physical long-term health conditions were atopy (54.8%), eczema (38.8%) and allergic rhinitis (33.2%).
- 39.3% were diagnosed with anxiety and 35.5% with depression, with 1.4% having been screened or diagnosed for depression in the past 2 years.

Children with asthma

- There was a higher proportion of boys (56.8%) to girls (43.2%) in the children with asthma patient cohort, with the average age being 12.2 years old.
- The most common other physical long-term health conditions for both age groups were eczema (53.8%), atopy (53.3%) and hay fever (22.2%).
- 11.7% were diagnosed with mild/moderate mental health conditions.

Key standards

Multiple long-term health conditions

- NICE 2016 NG56: Taking account of multiple health conditions in tailoring the approach to care and how to identify people who may benefit from an approach to care that takes account of multiple health conditions.[9]
- NICE 2009 CG91: *Depression in adults with a chronic physical health problem: recognition and management* recommends primary care be alert to possible depression (particularly in patients with a past history of depression or a chronic physical health problem with associated functional impairment) and consider asking patients who may have depression two screening questions.[10]
- NICE 2019 CG113: *Generalised anxiety disorder and panic disorder in adults: management* recommends primary care consider the diagnosis of generalised anxiety disorder in people presenting with anxiety or significant worry, and in people who attend primary care frequently who have a chronic physical health problem.[11]

1.1 Sex

	Wales 2021	Wales 2020	Wales 2017/18
Adults with COPD (total)	**n=32,275**	**n=49,062**	**n=38,286**
Men	15,911 (49.3%)	24,296 (49.5%)	19,053 (49.8%)
Women	16,364 (50.7%)	24,766 (50.5%)	19,233 (50.2%)
Adults with asthma (total)	**n=84,583**	**n=121,327**	**n=95,147**
Men	33,542 (39.7%)	50,834 (41.9%)	39,290 (41.3%)
Women	51,041 (60.3%)	70,493 (58.1%)	55,857 (58.7%)
Children with asthma (6–18 years old) (total)	**n=10,301**	**n=18,760**	**n=15,500**
Boys	5,855 (56.8%)	10,727 (57.2%)	8,902 (57.4%)
Girls	4,446 (43.2%)	8,033 (42.8%)	6,598 (42.6%)

1.2 Age

	Wales 2021	Wales 2020	Wales 2017/18
Adults with COPD (total)	**n=32,275**	**n=49,062**	**n=38,286**
Mean (SD)	70.4 (10.5)	69.8 (11.2)	69.9 (11.0)
Mean male age (SD)	70.7 (*not available**)	70.0 (11.0)	70.0 (10.9)
Mean female age (SD)	70.1 (*not available**)	69.6 (11.4)	69.8 (11.2)
Adults with asthma (total)	**n=83,102**	**n=121,327**	**n=95,147**
Mean (SD)	51.7 (18.4)	52.9 (18.4)	52.1 (18.4)
Mean male age (SD)	50.8 (*not available**)	52.1 (18.3)	51.3 (18.2)
Mean female age (SD)	52.0 (*not available**)	53.4 (18.4)	52.7 (18.5)
Children with asthma (6–18 years old) (total)	**n=10,301**	**n=18,760**	**n=15,500**
Mean (SD)	12.2 (3.6)	12.1 (3.6)	12 (3.5)
Mean male age (SD)	11.9 (*not available**)	12.0 (3.5)	12 (3.5)
Mean female age (SD)	12.5 (*not available**)	12.3 (3.6)	12 (3.6)

Standard deviation for mean male and female ages was not available due to disclosure issues.

1.3 Other health conditions[‡]

Please note that a slightly different methodology for identifying and analysing long-term health conditions (comorbidities) was used for this report (compared with previous rounds of the audit). This, and the fact that this cohort covers the period impacted by COVID, may account for changes in results to previous audit rounds. Please see Appendix A: Audit methodology for further information.

1.3.1 Adults with COPD

	Wales 2021	Wales 2020	Wales 2017/18
Adults with COPD	**n=32,275**	**n=49,062**	**n=38,286**
Asthma	7,754 (24.0%)	558 (1.1%)	185 (0.5%)
Bronchiectasis	1,481 (4.6%)	2,211 (4.5%)	1,804 (4.7%)
Coronary heart disease	6,443 (20.0%)[§]	9,473 (19.3%)[§]	7,452 (19.5%)[§]
Diabetes	6,443 (19.9%)	9,374 (19.1%)	7,213 (18.8%)
Heart failure	2,853 (8.8%)	3,827 (7.8%)	3,078 (8.0%)
Hypertension	16,811 (52.1%)	25,067 (51.1%)	19,387 (50.6%)
Lung cancer	669 (2.1%)	778 (1.6%)	638 (1.7%)
Stroke	2,126 (6.6%)	3,098 (6.3%)	2,371 (6.2%)
Osteoporosis	4,221 (13.1%)	5,915 (12.1%)	4,926 (12.9%)
Obesity (BMI)	7,153 (22.2%)	16,055 (32.7%)	11,965 (31.3%)
Severe mental health condition (SMI): schizophrenia, bipolar disorder and other psychotic illness	3,257 (10.1%)	4,148 (8.5%)	3,213 (8.4%)
Anxiety	12,533 (38.8%)	16,426 (33.5%)	12,362 (32.3%)
Depression	12,740 (39.5%)	17,036 (34.7%)	12,425 (32.5%)
Screened for depression or been diagnosed in the past 2 years	2,646 (8.2%)	6,331 (12.9%)	7,798 (20.4%)
Learning disability	90 (0.3%)	116 (0.2%)	103 (0.3%)

[‡] Most people will have more than one additional long-term health condition.

[§] Coronary heart disease codes used in 2017/18, 2020 and 2021 are similar to those used in other national primary care audits, which gives a more consistent national picture of heart disease.

1.3.2 Adults with asthma

	Wales 2021	Wales 2020	Wales 2017/18
Adults with asthma	**n=84,583**	**n=121,327**	**n=95,147**
COPD	4,784 (5.7%)**	14,637 (12.1%)**	10,523 (11.1%)
Bronchiectasis	1,180 (1.4%)	2,049 (1.7%)	1,544 (1.6%)
Coronary heart disease	4,977 (5.9%)	8,082 (6.7%)	6,156 (6.5%)
Diabetes	8,647 (10.2%)	12,863 (10.6%)	9,639 (10.1%)
Heart failure	1,781 (2.1%)	2,831 (2.3%)	2,117 (2.2%)
Hypertension	24,075 (28.5%)	35,247 (29.0%)	26,727 (28.1%)
Lung cancer	140 (0.2%)	292 (0.2%)	233 (0.2%)
Stroke	1,681 (2.0%)	2,694 (2.2%)	2,002 (2.1%)
Osteoporosis	4,009 (4.7%)	6,221 (5.1%)	4,965 (5.2%)
Obesity (BMI)	18,941 (22.4%)	44,336 (36.5%)	33,840 (35.6%)
Eczema	32,796 (38.8%)	40,475 (33.4%)	31,628 (33.2%)
Atopy	46,354 (54.8%)	55,893 (46.1%)	43,439 (45.7%)
Nasal polyps	2,298 (2.7%)	2,766 (2.3%)	2,119 (2.2%)
Reflux	16,966 (20.1%)	21,886 (18.0%)	15,855 (16.7%)
Hay fever	23,819 (28.2%)	26,321 (21.7%)	20,516 (21.6%)
Family history of asthma	18,206 (21.5%)	18,276 (15.1%)	15,108 (15.9%)
Allergic rhinitis	28,113 (33.2%)	32,790 (27.0%)	25,184 (26.5%)
Severe mental health condition (SMI): schizophrenia, bipolar disorder and other psychotic illness	6,514 (7.7%)	7,757 (6.4%)	5,860 (6.2%)
Anxiety	33,243 (39.3%)	41,059 (33.8%)	30,928 (32.5%)
Depression	30,026 (35.5%)	38,563 (31.8%)	29,159 (30.7%)
Screened for depression or been diagnosed in the past 2 years	1,208 (1.4%)	11,338 (9.3%)	10,393 (10.9%)
Learning disability	761 (0.9%)	903 (0.7%)	733 (0.8%)

1.3.3 Children with asthma

	Wales 2021	Wales 2020	Wales 2017/18
Children with asthma (6–18 year olds)	**n=10,301**	**n=18,760**	**n=15,500**
Obesity (BMI)	*(not available*)*	1,116 (6.0%)	1,018 (6.6%)
Eczema	5,545 (53.8%)	9,338 (49.8%)	7,849 (50.6%)
Atopy	5,487 (53.3%)	9,316 (49.7%)	7,746 (50.0%)
Nasal polyps	14 (0.1%)	14 (0.1%)	22 (0.1%)
Reflux	809 (7.9%)	1,095 (5.8%)	769 (5.0%)
Hay fever	2,083 (22.2%)	3,530 (18.8%)	2,953 (19.1%)
Family history of asthma	1,304 (12.7%)	1,856 (9.9%)	1,482 (9.6%)
Allergic rhinitis	2,227 (21.6%)	3,826 (20.4%)	3,189 (20.6%)
Mild/moderate mental health condition	1,200 (11.7%)	1,861 (9.9%)	1,665 (10.7%)
Learning disability	169 (1.6%)	256 (1.4%)	201 (1.3%)

** For people with active asthma (defined as the presence of an asthma Read code in the last 3 years) a diagnosis of COPD could have taken place at any time, which explains the higher number of COPD diagnoses.

Section 2: Getting the diagnosis right

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Navigation

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

Key findings

Adults with COPD

- Of COPD diagnoses in the past 2 years (n=5,245):
  - 1.9% had a record of the gold standard diagnostic test for COPD[††]
  - 4.0% had a record of any spirometry code
  - 6.4% had a chest X-ray or computed tomography (CT) scan 6 months prior or within 6 months of diagnosis.

Adults with asthma

- Of adult asthma diagnoses in the past 2 years (n=7,692):
  - 43.9% had one or more objective measurement[‡‡] ever recorded.
  - 4.2% had a spirometry test with reversibility
  - 41.2% had a record of any peak flow test[§§]
  - 0.4% had a record of a fractional exhaled nitric oxide (FeNO) test.

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

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

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

Children with asthma

- Of children aged 6 years and above with an asthma diagnosis in the past 2 years (n=2,461):
  - 34.0% had one or more objective measurement[‡‡] ever recorded
  - 1.4% had a spirometry test with reversibility
  - 33.4% had a record of any peak flow test.[§§]

Key standards

Diagnosing COPD

- NICE 2016 QS10 (QS1): People aged over 35 years who present with a risk factor and one or more symptoms of COPD have post-bronchodilator spirometry.[12]
- 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.[13]

Diagnosing asthma

- NICE 2018 QS25 (QS1): People aged 5 years and over with suspected asthma have objective tests to support diagnosis.[14]
- 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.[15]

2.1 Post-bronchodilator spirometry

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

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with COPD	**n=5,245**	**n=9,395**	**n=6,683**
Any spirometry ratio codes[***] ≥0.2 and <0.7	208 (4.0%)	4,149 (44.2%)	3,299 (49.4%)
Post-bronchodilator code[†††] with spirometry ratio ≥0.2 and <0.7	101 (1.9%)	1,078 (11.5%)	641 (9.6%)
No post-bronchodilator code	4,960 (94.6%)	5,879 (88.0%)	9,660 (88.9%)

[***] Other 339 Read codes eg 339j, 339k, 339R

[†††] Read code 339m

2.2 X-ray and CT scan

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

NICE recommend that as part of their diagnostic tests people with COPD, in addition to spirometry, should have a chest radiograph to exclude other pathologies.[12]

	Wales 2021	Wales 2020	Wales 2017/18
Adults with COPD	**n=5,245**	**n=9,395**	**n=6,683**
Chest X-ray or CT scan within 6 months*	334 (6.4%)	3,132 (33.3%)	2,329 (34.8%)

**Will include X-rays and CT scans requested by general practices and those conducted in hospital and reported to the patient's practice.*

2.3 Any objective measurement

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with asthma	**n=7,692**	**n=49,627**	**n=38,763**
≥1 objective measurement	3,378 (43.9%)	37,872 (76.3%)	30,735 (79.3%)
Children with asthma (6 years and above only) (total)	**n=2,461**	**n=8,444**	**n=6,767**
≥1 objective measurement	836 (34.0%)	5,688 (67.4%)	4,867 (71.9%)

2.4 Peak flow

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with asthma (total)	**n=84,583**	**n=121,327**	**n=95,147**
No peak flow codes ever	6,479 (7.7%)	8,266 (6.8%)	5,728 (6.0%)
Peak flow test (Read code 339A‡‡‡ or 339B§§§) ever	33,774 (39.9%)	43,569 (35.9%)	41,499 (43.6%)
Peak flow diary**** ever	2,165 (2.6%)	1,806 (1.5%)	1,812 (1.9%)
Any peak flow test ever††††	78,104 (92.3%)	113,061 (93.2 %)	89,419 (94.0%)
Children with asthma (6 years and above only) (total)	**n=10,301**	**n=18,760**	**n=15,500**
No peak flow codes ever	2,847 (27.6%)	4,012 (21.4%)	2,715 (17.5%)
Peak flow test (Read code 339A‡‡‡ or 339B§§§) ever	2,386 (23.2%)	4,269 (22.8%)	5,079 (32.8%)
Peak flow diary**** ever	246 (2.4%)	378 (2.0%)	302 (2.0%)
Any peak flow test ever††††	7,454 (72.4%)	14,748 (78.6%)	12,785 (82.5%)

‡‡‡ Peak flow rate before bronchodilation

§§§ Peak flow rate after bronchodilation

**** Read code 66YY

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

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with asthma (total)	**n=7,692**	**n=49,627**	**n=38,763**
No peak flow codes in the past 2 years	4,522 (58.8%)	13,732 (27.7%)	9,276 (23.9%)
Peak flow test (Read code 339A‡‡‡ or 339B§§§) in the past 2 years	620 (8.1%)	8,760 (17.7%)	9,463 (24.4%)
Peak flow diary**** in the past 2 years	173 (2.3%)	161 (0.3%)	147 (0.4%)
Any peak flow test in the past 2 years††††	3,170 (41.2%)	35,895 (72.3%)	29,487 (76.1%)
Children with asthma (6 years and above only) (total)	**n=2,461**	**n=8,444**	**n=6,767**
No peak flow codes in the past 2 years	1,639 (66.6%)	2,807 (33.2%)	1,937 (28.6%)
Peak flow test (Read code 339A‡‡‡ or 339B§§§) in the past 2 years	131 (5.3%)	1,299 (15.4%)	1,456 (21.5%)
Peak flow diary**** in the past 2 years	42 (1.7%)	71 (0.8%)	42 (0.6%)
Any peak flow test in the past 2 years††††	822 (33.4%)	5,637 (66.8%)	4,830 (71.4%)

2.5 Fractional exhaled nitric oxide (FeNO)

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with asthma (total)	**N=7,692**	**n=49,627**	**n=38,763**
FeNO test	38 (0.5%)	167 (0.3%)	8 (0.02%)
Children with asthma (6 years and above only) (total)	**n=2,461**		**n=8,444**
FeNO test	15 (0.6%)	39 (0.5%)	0 (0%)

2.6 Spirometry

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with asthma diagnosed in the past 2 years (total)	**n=7,692**	**n=49,627**	**n=38,763**
No post-bronchodilator ratio code[†††]	7496 (97.5%)	47,920 (96.6%)	37,716 (97.3%)
No pre-bronchodilator ratio code[‡‡‡‡]	7593 (98.71%)	48,908 (98.6%)	38,469 (99.2%)
Post-bronchodilator[†††] ratio is ≥0.2 and <0.7	51 (0.7%)	705 (1.4%)	403 (1.0%)
Pre-bronchodilator[‡‡‡‡] ratio is ≥0.2 and <0.7	31 (0.4%)	280 (0.6%)	112 (0.3%)
Any spirometry ratio codes ≥0.2 and <0.7	*(not available*)*	3,186 (6.4%)	2,813 (7.3%)
Children with asthma (6 years and above only) diagnosed in the past 2 years (total)	**n=2,461**	**n=8,444**	**n=6,767**
No post-bronchodilator ratio code[†††]	2450 (99.6%)	8,355 (99.0%)	6,717 (99.3%)
No pre-bronchodilator ratio code[‡‡‡‡]	2454 (99.7%)	8,391 (99.4%)	6,747 (99.7%)
Post-bronchodilator[†††] ratio is ≥0.2 and <0.7	0 (0.0%)	<5	<5
Pre-bronchodilator[‡‡‡‡] ratio is ≥0.2 and <0.7	*(not available*)*	5 (0.1%)	0 (0%)
Any spirometry ratio codes ≥0.2 and <0.7	*(not available*)*	31 (0.4%)	31 (0.5%)

Any spirometry ratio codes ≥0.2 and <0.7 and/or pre-bronchodilator ratio ≥0.2 and <0.7 were not available due to disclosure issues.

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

	Wales 2020	Wales 2020	Wales 2017/18
Adults with asthma (total)	**n=7,692**	**n=49,627**	**n=38,763**
No spirometry codes	6860 (89.2%)	38,900 (78.4%)	29,476 (76.0%)
Any FEV1/FVC code[§§§§] (+ reversibility) test in the past 2 years	146 (1.9%)	695 (1.4%)	599 (1.6%)
Any spirometry (+ reversibility) test in the past 2 years	321 (4.2%)	1,400 (2.8%)	1,377 (3.6%)
Children with asthma (6 years and above only) (total)	**n=2,461**	**n=8,444**	**n=6,767**
No spirometry codes	2382 (96.8%)	7,827 (92.7%)	6,154 (90.9%)
Any FEV1/FVC code[§§§§] (+ reversibility) test within the past 2 years	9 (0.4%)	33 (0.4%)	28 (0.4%)
Any spirometry (+ reversibility) test in the past 2 years	36 (1.5%)	74 (0.9%)	74 (1.1%)

[‡‡‡‡] Read code 339l

[§§§§] Read codes 339l, 339m and 339M

Section 3: Assessing severity and future risk

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Navigation

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

Key findings

Adults with COPD

- 55.8% had a Medical Research Council (MRC) breathlessness score recorded in the past year. Most had a score of 2 (20.5%) or 3 (16.9%).
- 4.3% of the people with stable COPD had a single oxygen saturation level of 92% or less in the past 2 years.
- 22.4% were not asked about their smoking (tobacco) status in the past year. 44.3% reported they were ex-smokers.
- 12.6% had more than two COPD exacerbations in the last year.

Adults with asthma

- 29.6% were not asked about their smoking (tobacco) status in the past year. 37.2% reported they had never smoked.
- 0.6% were asked about exposure to second-hand smoke.
- 14.2% were prescribed three or more courses of oral steroids in the past year. 0.7% were prescribed three or more courses of oral steroids in the past year AND referred to a specialist.
- 3.9% had more than two asthma attacks in the last year.

Children with asthma

- 65.2% of children were not asked about their smoking (tobacco) status in the past year. 33.1% reported they had never smoked.
- 0.2% had a record of being exposed to second-hand smoke. 98.6% were not asked about exposure to second-hand smoke.
- 7.1% were prescribed three or more courses of oral steroids in the past year. 0.1% were prescribed three or more courses of oral steroids in the past year and referred to a specialist.
- 1.1% had more than two asthma attacks in the last year.

Key standards

COPD

- NICE 2019 NG115: One of the primary symptoms of COPD is breathlessness. The MRC dyspnoea scale should be used to grade the breathlessness according to the level of exertion required to elicit it.[13]
- NICE 2016 QS10 (QS3): People with stable COPD and a persistent resting stable oxygen saturation level of 92% or less have their arterial blood gases measured to assess whether they need long-term oxygen therapy (LTOT).[12]
- NICE 2019 NG115: Document an up-to-date smoking history, including pack-years smoked for everyone with COPD. At every opportunity, advise and encourage every person with COPD who is still smoking (regardless of their age) to stop, and offer them help to do so. Unless contraindicated, offer nicotine replacement therapy, varenicline or bupropion as appropriate to people who want to stop smoking, combined with an appropriate support programme to optimise smoking quit rates for people with COPD.[13]
- 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.[16]

Asthma

- NICE 2018 QS25 (QS5): People with suspected severe asthma are referred to a specialist multidisciplinary severe asthma service.[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.[17]
- 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.[16]

3.1 MRC breathlessness scale scoring

Breathlessness and quality of life scores are now considered more important than degree of airflow obstruction when making decisions on therapies in COPD.[18] The MRC dyspnoea scale grades the degree of breathlessness in relation to activities. Therefore, the audit standard and expectation for best practice is for an MRC score to be recorded within the past year as part of an 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 2021	Wales 2020	Wales 2017/18
Adults with COPD	**n=32,275**	**n=49,062**	**n=38,286**
1	1,824 (5.7%)	3,137 (6.4%)	2,961 (7.7%)
2	6,618 (20.5%)	10,231 (20.9%)	8,726 (22.8%)
3	5,444 (16.9%)	6,896 (14.1%)	5,774 (15.1%)
4	3,450 (10.7%)	3,792 (7.7%)	2,917 (7.6%)
5	664 (2.1%)	530 (1.1%)	475 (1.2%)
Not recorded	14,275 (44.2%)	24,476 (49.9%)	17,433 (45.5%)

3.2 FEV1 %-predicted value measurement

Breathlessness and airflow limitation in COPD worsen over time, but classically in a pattern of slow decline.[19] The annual review can also use sudden changes in breathlessness or marked worsening of FEV1 as an indicator that another cause of breathlessness may now be present. The natural decline in FEV1 annually would usually be considerably <40 mL. Where the decline is greater, a reassessment should be considered.

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with COPD	**n=32,275**	**n=49,062**	**n=38,286**
FEV1 %-predicted value in past year	393 (1.2%)	13,587 (27.7%)	11,989 (31.3%)

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

3.3 Oxygen: management and treatment

Good clinical practice would expect referral for oxygen assessment after two recordings of pulse oximetry <92% when the patient is stable.[20,21] 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 *persistent* (2 or more) resting stable oxygen saturation level of 92% or less in the past 2 years

	Wales 2021
Adults with COPD single stable oxygen saturation level*	**n=32,275**
People with a single resting stable oxygen saturation level of 92% or less in the past 2 years	1,378 (4.3%)

**A figure for 'People with a persistent resting stable oxygen saturation (at least 2 measurements within 3 months) level of 92% or less in the past 2 years' was not available for the 2021 audit.*

Arterial blood gas measurement was removed from this query in 2021 due to it not being measured in primary care. Previous results for the query (as it historically stood including arterial blood gas) showed that:

- 11.6% of people with stable COPD had 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
- 21.9% of people with COPD had a persistent resting stable oxygen saturation (two 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.

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

	Wales 2021
Adults with asthma	**n=84,583**
Prescribed three or more courses of oral steroids in the past year	12, 023 (14.2%)
Children with asthma (6–18 year olds)	**n=10,301**
Prescribed three or more courses of oral steroids in the past year	736 (7.1%)

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

	Wales 2021
Adults with asthma	**n=84,583**
Prescribed three or more courses of oral steroids and referred to specialist care in the past year	604 (0.7%)
Children with asthma (6–18 year olds)	**n=10,301**
Prescribed three or more courses of oral steroids and referred to specialist care in the past year	9 (0.1%)

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 2021	Wales 2020	Wales 2017/18
Adults with COPD (total)	**n=32,275**	**n=49,062**	**n=38,286**
Never smoked	1,697 (5.3%)	4,262 (8.7%)	3,067 (8.0%)
Ex-smoker	14,304 (44.3%)	20,553 (41.9%)	16,579 (43.3%)
Current smoker	9,042 (28.0%)	12,997 (26.5%)	10,725 (28.0%)
Not asked about smoking	7,232 (22.4%)	11,250 (22.9%)	7,915 (20.7%)
Adults with asthma (total)	**n=84,583**	**n=121,327**	**n=95,147**
Never smoked	31,454 (37.2%)	42,576 (35.1%)	32,809 (34.5%)
Ex-smoker	18, 578 (22.0%)	27,842 (23.0%)	22,564 (23.7%)
Current smoker	9, 552 (11.3%)	15,428 (12.7%)	12,954 (16.6%)
Not asked about smoking	24,999 (29.6%)	35,481 (29.2%)	26,820 (28.2%)
Children with asthma (6–18 years old) (total)	**n=10,301**	**n=18,760**	**n=15,500**
Never smoked	3,400 (33.0%)	5,512 (29.4%)	4,970 (32.1%)
Ex-smoker	72 (0.7%)	90 (0.5%)	127 (0.8%)
Current smoker	110 (1.1%)	176 (0.9%)	217 (1.4%)
Not asked about smoking	6,719 (65.2%)	12,982 (69.2%)	10,186 (65.7%)

3.6 Exposure to second-hand smoke

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[22] 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 2021	Wales 2020	Wales 2017/18
Adults with asthma (total)	**n=84,583**	**n=121,327**	**n=95,147**
Not exposed to second-hand smoke	142 (0.2%)	72 (0.1%)	27 (0.03%)
Exposed to second-hand smoke	512 (0.6%)	816 (0.7%)	617 (0.7%)
Not asked about exposure to second-hand smoke	83, 929 (99.2%)	120,439 (99.3%)	94,503 (99.3%)
Children with asthma (6–18 years old) (total)	**n=10,301**	**n=18,760**	**n=15,500**
Not exposed to second-hand smoke	117 (1.1%)	31 (0.2%)	20 (0.1%)
Exposed to second-hand smoke	25 (0.2%)	78 (0.4%)	56 (0.4%)
Not asked about exposure to second-hand smoke	10,159 (98.6%)	18,651 (99.4%)	15,424 (99.5%)

3.7 COPD exacerbation and asthma attack count in the past year

The learning from previous data 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 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).

3.7.1 Count of COPD exacerbations and asthma attacks in past year for people with COPD and asthma (adults and children)

	Wales 2021
Adults with COPD (total)	**n=32,275**
0	14,400 (44.6%)
1	10,337 (32.0%)
2	3,469 (10.6%)
>2	4,069 (12.6%)
Adults with asthma (total)	**n=84,583**
0	70, 101 (82.9%)
1	8,581 (10.2%)
2	2,629 (3.1%)
>2	3,272 (3.9%)
Children with asthma (6–18 years old) (total)	**n=10,301**
0	9,151 (88.8%)
1	855 (8.3%)
2	187 (1.8%)
>2	108 (1.1%)

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.

Tables 4.4.1, 4.51, 4.8.1, 4.8.3, 4.9.1 and 4.9.2 in this section use prescription data. Prescriptions are not reliably recorded using our method of detecting Read codes so results presented may not be representative of what is happening in clinical practice and prescriptions may have been missed. Therefore, these results should be interpreted with caution.

Key findings

Adults with COPD

- 18,066 adults with COPD had any MRC score in the past 3 years.
  - 39.8% of these people were referred for PR.
- 9,601 adults with COPD had an MRC score 3–5 in the past 3 years.
  - 5.6% of these people were referred for PR.
- 28.2% of people were prescribed an inhaler and had an inhaler technique check in the past year.
- 78.5% received an influenza vaccination in the preceding autumn and winter months (1 August to 31 March).

Adults with asthma

- Only 25.0% had a PAAP in the past year.
- 47.0% had a record of being asked the RCP three questions.[23]
- 25.1% were prescribed an inhaler and had an inhaler technique check in the past year.
- 62.0% received an influenza vaccination in the preceding autumn and winter months (1 August to 31 March).

Children with asthma

- Only 22.9% had a PAAP in the past year.
- 41.2% had a record of being asked the RCP three questions.
- 24.9% were prescribed an inhaler and had an inhaler technique check in the past year.
- 50.8% received an influenza vaccination in the preceding autumn and winter months (1 August to 31 March).

Key standards

COPD

- NICE 2019 NG115: Make PR available to all appropriate people with COPD, including people who have had a recent hospitalisation for an acute exacerbation. Offer PR to all people who view themselves as functionally disabled by COPD (usually MRC grade 3 and above).[13]
- NICE 2016 QS10 (QS2): People with COPD who are prescribed an inhaler have their inhaler technique assessed when starting treatment and then regularly during treatment.[12]
- BTS quality statement 1: People with COPD and self-reported exercise limitation (MRC dyspnoea 3–5) are offered PR.[24]

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 5 and over with a diagnosis of asthma (and their families or carers if appropriate).[15]
- 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.[14]

4.1 Pulmonary rehabilitation (PR)

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with COPD (MRC score 3–5)	**n=9,601**	**n=17,064**	**n=13,635**
Referred for PR	523 (5.6%)	9,619 (56.4%)	8,497 (62.3%)
Adults with COPD (any MRC score)	**n=18,066**	**n=40,137**	**n=32,709**
Referred for PR	7,192 (39.8%)	14,671 (36.6%)	12,793 (39.1%)

** Where there are multiple MRC scores recorded, the most recent is used.*

The data show that referral to PR for COPD patients with an MRC score of 3–5 was low. The possible reasons for this were:

- lower referral rates of more severe patients during the COVID-impacted period
- patient preference not to be referred during a global pandemic, and
- general practices having to provide more reactive care during COVID (ie having to move away from proactive routine care).

4.2 Personalised asthma action plans

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with asthma	**n=84,583**	**n=121,327**	**n=95,147**
PAAP anytime in the past year	21,039 (24.9%)	31,379 (25.9%)	23,931 (25.2%)
Children with asthma (6–18 year olds)	**n=10,301**	**n=18,760**	**n=15,500**
PAAP anytime in the past year	2,363 (22.9%)	4,553 (24.3%)	3,555 (22.9%)

4.3 RCP three asthma questions[23]

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

The RCP three questions:

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with asthma	**n=84,583**	**n=121,327**	**n=95,147**
RCP three questions asked in the past year	39,639 (46.9%)	66,086 (54.5%)	55,002 (57.8%)
Children with asthma (6–18 years old)	**n=10,301**	**n=18,760**	**n=15,500**
RCP three questions asked in the past year	4,248 (41.2%)	8,717 (46.5%)	7,404 (47.8%)

4.4 Short-acting reliever inhalers

All people with asthma should have one prescription of a short-acting beta agonist (SABA) inhaler. Well controlled asthma should not require use of a SABA inhaler and regular use of SABA, two puffs more than twice per week, which equals four puffs, is considered poor control.

4.4.1 Percentage of people (adults and children) with asthma who had evidence of a prescription for short-acting relieve inhalers in the past 12 months

	Wales 2021
Adults with asthma	**n=84,583**
Evidence of a prescription* for short-acting reliever inhalers in the past 12 months	2,604 (3.1%)
Children with asthma (6–18 year olds)	**n=10,301**
Evidence of a prescription* for short-acting reliever inhalers in the past 12 months	211 (2.1%)

Repeat prescriptions were not available via the SAIL Databank so data on if there is evidence of at least one prescription for short-acting reliever inhalers has been provided in this table.

4.5 Inhaled corticosteroid (ICS) inhaler devices

ICSs are the mainstay of asthma therapy. Regular use of low dose ICS should result in good asthma control for the vast majority of people with asthma. NICE NG80 *Asthma in adults and children*[15] did not find any evidence for intermittent therapy of ICS and continued to recommend daily therapy for the prevention of asthma symptoms and attacks. The Asthma Audit Development Project (AADP) pragmatically defined that less than 50% of expected use was considered to be sub-therapeutic asthma preventer treatment.

4.5.1 Percentage of people (adults and children) with asthma who were prescribed fewer than six ICS devices in the past 12 months

	Wales 2021
Adults with asthma	**n=84,583**
Prescribed fewer than six ICS devices in the past 12 months	5,686 (6.7%)
Children with asthma (6-18 year olds)	**n=10,301**
Prescribed fewer than six ICS devices in the past 12 months	1,476 (14.3%)

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

	Wales 2021	Wales 2020	Wales 2017/18
Adults with COPD	**n=21,808**	**n=35,761**	**n=29,482**
Prescribed inhaler and inhaler technique check in past year	6,139 (28.2%)	15,892 (44.4%)	13,159 (44.6%)
Adults with asthma	**n=71,350**	**n=101,827**	**n=77,829**
Prescribed inhaler and inhaler technique check in past year	19,431 (27.2%)	49,246 (48.4%)	38,199 (49.1%)
Children with asthma (6–18 year olds)	**n=8,550**	**n=13,881**	**n=10,777**
Prescribed inhaler and inhaler technique check in past year	2,127 (24.9%)	5,942 (42.8%)	4,610 (42.8%)

4.7 Influenza immunisation

Neither BTS/SIGN asthma 2016 or NICE asthma 2017 guidelines 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.[25] People with chronic respiratory illness who are infected with the influenza virus have more serious illness and are at higher risk of mortality.[26]

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.[26] 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 2021	Wales 2020	Wales 2017/18
Adults with COPD	**n=32,275**	**n=49,062**	**n=38,286**
Immunisation in the preceding 1 August to 31 March	25,338 (78.5%)	33,605 (68.5%)	27,923 (72.9%)
Adults with asthma	**n=84,583**	**n=121,327**	**n=95,147**
Immunisation in the preceding 1 August to 31 March	52,280 (61.8%)	65,534 (54.0%)	54,240 (57.0%)
Children with asthma (6–18 year olds)	**n=10,301**	**n=18,760**	**n=15,500**
Immunisation in the preceding 1 August to 31 March	5,228 (50.8%)	9,201 (49.1%)	6,719 (43.4%)

4.8 Smoking cessation

This question looks at a cohort of self-reported smokers. Tobacco dependency is known to relapse, so reassessing smoking status and offering therapy should happen for people with tobacco smoking histories and especially those who have relapsed in recent years. Therefore, anyone who had been recorded as a smoker at any point in the past 2 years (in addition to those with a current smoker code) was included in the denominator for analysis. 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.[27,28] People aged over 18 with asthma were considered to have been 'treated' if they had both pharmacotherapy and behavioural intervention codes. Licensing of stop smoking drugs is different for people below the age of 18 and delivery of stop smoking treatment was therefore measured separately by behavioural support and drug codes.

4.8.1 Percentage of adults with COPD and asthma 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

	Wales 2021
Adults with COPD	**n=26,276**
Current smokers received/referred to a BCI AND had a stop smoking drug prescribed in past year	1,331 (5.1%)
Adults with asthma	**n=32,790**
Current smokers received/referred to a BCI AND had a stop smoking drug prescribed in past year	863 (2.6%)

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

	Wales 2021
Children with asthma (6–18 year olds)	**n=205**
Current smokers received/referred to a BCI OR had a stop smoking drug prescribed in past year	5 (2.4%)

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.[29,30] Peer-reviewed reports and the first cycle of this audit, however, still show that there is some overuse and misuse of inhaled pharmacotherapy.[29-31]

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

	Wales 2021
Adults with COPD	**n=32,275**
Issued a prescription for inhaled drug therapy in the last 6 months	19,025 (59.0)
Adults with asthma	**n=84,583**
Issued a prescription for inhaled drug therapy in the last 6 months	62,514 (73.9%)
Children with asthma (6–18 year olds)	**n=10.301**
Issued a prescription for inhaled drug therapy in the last 6 months	6,664 (64.7%)

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

	Wales 2021
Adults with COPD (total)	**n=19,025**
ICS alone	419 (2.2%)
LABA alone	255 (1.3%)
LABA + ICS	4,827 (25.4%)
LAMA alone	1,989 (10.5%)
LABA + LAMA	7,400 (38.9%)
Triple therapy (ICS + LABA + LAMA)	4,135 (21.7%)
Adults with asthma (total)	**n=62,514**
ICS alone	18,138 (29.0)
LABA alone	77 (0.1%)
LABA + ICS or MART* inhaler	35,466 (56.7%)
LTRA alone	1,164 (1.9%)
LTRA + ICS	461 (0.7%)
LTRA + LABA + ICS	7,208 (11.5%)
Children with asthma (6–18 years old) (total)**	**n=6,664**
ICS alone	3,950 (59.3%)
LABA alone	*Small numbers*
LABA + ICS or MART inhaler	*1,234 (18.5%)*
LTRA alone	Suppressed
LTRA + ICS	633 (9.5%)
LTRA + LABA + ICS	624 (9.4%)

**Maintenance and reliever therapy*

*** Due to disclosure issues percentages were not available for this section of the table*

Section 6: Summary of key indicators

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Table 1 depicts the unadjusted key indicators of the local health boards (LHBs) with at least 10 or more participating practices. These key indicators have been selected based on the recommended improvement priorities found in the clinical audit report (www.rcp.ac.uk/pc2021). Relevant improvement priorities are provided beneath each of the tables for convenience. With only seven participating practices, Powys Teaching University Local Health Board has been excluded from these tables. Where numbers were too small report or suppressed due to disclosure issues, '*' has been placed in tables to comply with small number suppression rules.

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

	1. Patients with a record of the gold standard diagnostic test†††††† for COPD in the past 2 years		4. Patients with COPD with an MRC score 3–5 who have been referred to PR in the past 3 years		6. Patients with COPD who have been prescribed an inhaler and have evidence of an inhaler technique check in the past year	
Wales (total)	**Denominator (N) = 5,245**	**Numerator (n) = 101 (1.9%)**	**N=9,601**	**n=523 (5.6%)**	**N=21,808**	**n=6,139 (28.2%)**
Aneurin Bevan University Local Health Board	905	*(not available*)*	1,357	*(not available*)*	3,513	928 (26.4%)
Betsi Cadwaladr University Local Health Board	989	*(not available*)*	1,793	*(not available*)*	4,087	974 (23.8%)
Cardiff and Vale University Local Health Board	807	*(not available*)*	1,451	*(not available*)*	3,065	974 (31.6%)
Cwm Taf Morgannwg University Local Health Board	639	*(not available*)*	1,183	*(not available*)*	2,559	968 (25.8%)
Hywel Dda University Local Health Board	677	*(not available*)*	1,010	*(not available*)*	2,715	661 (30.1%)
Swansea Bay University Local Health Board	1,128	*(not available*)*	2,383	208 (8.7%)	5,229	1,484 (28.4%)

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

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

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

	2. Adults diagnosed with asthma in the past 2 years who have a record of any objective measurement‡‡‡‡‡		5. Adults with asthma who have had a PAAP anytime in the past year		6. Adults with asthma who have been prescribed an inhaler and have evidence of an inhaler technique check in the past year	
Wales (total)	**N=7,692**	**n=3,378 (43.9%)**	**N=84,583**	**n=21,039 (25.0%)**	**N=84,583**	**n=18,138 (25.1%)**
Aneurin Bevan University Local Health Board	1,260	531 (42.1%)	15,938	7,894 (28.9%)	13,764	3,949 (28.7%)
Betsi Cadwaladr University Local Health Board	1,474	601 (40.8%)	15,372	3,600 (23.4%)	12,928	3,132 (24.2%)
Cardiff and Vale University Local Health Board	1,337	515 (38.5%)	15,648	3,444 (22.0%)	13,760	3,570 (25.9%)
Cwm Taf Morgannwg University Local Health Board	893	352 (39.5%)	9,405	1,424 (15.1%)	7,996	1,860 (23.3%)
Hywel Dda University Local Health Board	1,177	584 (49.6%)	10,502	2,842 (27.1%)	8,894	3,108 (34.9%)
Swansea Bay University Local Health Board	1,380	698 (50.6%)	15,699	4,515 (28.8%)	12,420	3,103 (25.0%)

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

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

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

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

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

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

	2. Children diagnosed with asthma in the past 2 years who have a record of any objective measurement‡‡‡‡‡		3. Children with asthma who were not asked about exposure to second-hand smoke in the past year		5. Children with asthma who have had a PAAP anytime in the past year		6. Children with asthma who have been prescribed an inhaler and have evidence of an inhaler technique check in the past year	
	6–18 year olds		6–18 year olds		6–18 year olds		6–18 year olds	
Wales (total)	**N=2,461**	**n=836 (34.0%)**	**N=10,301**	**n=10,159 (1.3%)**	**N=10,301**	**n=2,363 (22.9%)**	**N=8,550**	**n=2,127 (24.9%)**
Aneurin Bevan University Local Health Board	440	142 (32.3%)	*(not available*)*	*(not available*)*	2017	534 (26.5%)	1685	439 (26.1%)
Betsi Cadwaladr University Local Health Board	461	145 (31.5%)	*(not available*)*	*(not available*)*	1869	405 (21.7%)	1558	338 (21.7%)
Cardiff and Vale University Local Health Board	515	197 (38.3%)	*(not available*)*	*(not available*)*	2243	480 (21.4%)	1908	503 (26.4%)
Cwm Taf Morgannwg University Local Health Board	266	*(not available*)*	*(not available*)*	*(not available*)*	1071	141 (13.2%)	943	201 (21.3%)
Hywel Dda University Local Health Board	312	115 (36.9%)	*(not available*)*	*(not available*)*	1103	298 (27.0%)	917	298 (32.5%)
Swansea Bay University Local Health Board	423	156 (36.9%)	*(not available*)*	*(not available*)*	1797	447 (24.9%)	1386	285 (20.6%)

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

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

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

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

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

Appendix A: Audit methodology

This audit uses data extracted from general practices in Wales in October 2021 to cover activity up to 31 July 2021.

Data were accessed within the Secure Anonymised Information Linkage (SAIL) Databank, a Trusted Research Environment (TRE) which houses anonymised health records for the Welsh population, for all practices that had an existing data sharing agreement with SAIL. After the data were processed and provisioned to the project schema by SAIL, cleaning and analysis were conducted collaboratively by Imperial College London and Swansea University within the secure SAIL Gateway research environment.

This audit includes 314/389 practices, 80.7% of all practices in Wales shown in Table A1. Welsh GP practice numbers were obtained from https://gov.wales/general-practice-workforce-31-december-2020-30-june-2021.

Table A1. Number of participating practices per local health board

Local health board (LHB)	Number participating	Total number of practices	Percentage participating
Aneurin Bevan Local Health Board	54	73	73.8%
Betsi Cadwaladr Local Health Board	74	100	74.0%
Cardiff and Vale Local Health Board	50	58	86.2%
Cwm Taf Morgannwg Local Health Board	29	34*	85.3%
Hywel Dda University Local Health Board	38	45	84.4%
Powys Teaching Local Health Board	7	16	43.8%
Swansea Bay Local Health Board	62	63*	98.4%
Wales (total)	**314**	**389**	**80.7%**

**Due to differences in SAIL cluster to LHB allocation (to Welsh Governments), for the purposes of this report Bridgend East, North and West cluster data have been allocated to Swansea Bay Local Health Board, not Cwm Taf Morgannwg Local Health Board.*

Recruitment

Previously, the audit has operated on an opt-in basis, with all general practices in Wales eligible to participate. Due to data for this audit being accessed through SAIL and its existing data sharing agreements with general practices, this opt in recruitment methodology was no longer needed. Information letters were sent to local health board (LHB) leads and practices to ensure they knew of this latest round of audit. Direction to audit guidance and patient information were provided within those letters so practices signed up to SAIL could provide their asthma and COPD patients with the necessary information if requested. The NACAP team worked with the Welsh Government in the production and dissemination of the information letters and these were sent to practices in September 2021. Practices signed up to SAIL were given the opportunity to opt out of the practice level reports if they wished.

Development of patient priorities for this report

Since March 2018, NACAP has been working with Asthma + Lung UK and the Royal College of Paediatrics and Child Health &Us (RCPCH &Us) to ensure that a patient voice is clear throughout our work. Part of this work has been the identification of patient priorities which highlight areas of care and service provision which are particularly important to patients and their carers and are then highlighted

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

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

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

Asthma + Lung UK

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

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

Information governance

General practice data for use within SAIL Databank is extracted using Audit+ (software already installed on the majority of GP systems in Wales) and the identifiable portion of the information (only the patient demographics, no clinical data) is sent directly to Digital Health and Care Wales (DHCW) to be anonymised, while the clinical information (without any demographic information) is securely sent to SAIL. Records are assigned an Anonymous Linking Field (ALF) within DHCW in order to link all records on an individual together. Although all data in SAIL is anonymised, SAIL enacts additional safeguards (such as aggregation) to ensure that individuals cannot be identified via research generating small numbers of cases.

As the data extraction process is directly managed by DHCW and only anonymised data is sent to SAIL, neither patient consent nor Section 251 approval was required. A patient information sheet and poster is provided to practices for local use in 'fair processing' activities.

All identifiers used in data within SAIL (the ALF as mentioned above) are encrypted on load to SAIL's DB2 database, and are project encrypted before being provisioned to a project schema within SAIL. The anonymised data were held on a DB2 database within SAIL Databank, accessed by Swansea University and Imperial College London analysts for cleaning and analysis.

All outputs from the analysis undertaken were approved as part of the SAIL Databank disclosure control review process which conforms to Digital Economy Act processing environment standards and ensures no results of certain sensitivity, overt granularity in potentially disclosive areas, or potential identification through small number disclosure or variable combination is permitted out of the SAIL environment for publication.

The audit was given specific permission to access the required data by the SAIL information governance review group (IGRP) under project 1317 and approved in Wales by the Data Quality System (DQS) Governance Group (chaired by GPC Wales), which oversees the use of Audit+ and all data derived from it. Further detail on the fair processing information can be found on the primary care resources webpage (www.rcp.ac.uk/projects/outputs/support-service-teams-primary-care).

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 aged 6 and over 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.rcp.ac.uk/projects/outputs/support-service-teams-primary-care).

Analysis and cleaning methodology

Imperial College London in collaboration with Swansea University employed the methodology below when analysing the data accessed within SAIL. 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

All cohorts and data tables were constructed via running SQL queries in Eclipse interfacing with a DB2 database. Data was extracted into .csv files within the research environment from the GP (WLGP) tables in order for them to be analysed in STATA.

Patient populations were defined for use in each cohort (asthma or COPD) by including data for all patients that had any events more recent than the 01/04/2020 that also included any of the relevant event codes selected by Imperial College London. Prior to cohort creation, all patients with records containing an invalid or undetermined event date, an unidentifiable gender code, who moved practice during the follow up period or were born before 1 January 1921 were excluded from the study to prevent inaccurate entries and to ensure continuous follow up throughout the study period. After the

initial establishment of the cohorts, the first ever asthma/COPD diagnosis date for patients within the cohort was established and joined into the tables for future use.

After establishment of the initial cohorts for each condition, sub-cohorts were created within the asthma cohort for adults over the age of 18 with asthma, and children between the ages of 6 and 18 with asthma. In both cases, any patients found to have a subsequent asthma resolved code were removed from the cohort. A refined COPD cohort was also established which removed all individuals with a subsequent resolved code. Data on other health conditions were then linked for all patients within each of these cohorts and flags produced to show presence/absence of a condition relating to the study. BMI data for each cohort was also produced and inserted into new tables.
The refined cohorts used in studying other health conditions were then used in establishing data for audit queries requested by the study. Prior to queries involving FENO and spirometry, values were cleaned in order to ensure uniformity before anomalous results were removed. For FENO 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. For spirometry, any ratio codes under 0.2 and over 0.7 were removed. Additionally, for the child asthma cohort, further breakdown was also required for children aged 6–11 and 12–18 for several audits, and as such, the cohort was divided up to allow for this.

Section 1: Patient demographics

1.3 Multiple health conditions

Multiple health conditions 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 conditions (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).

An additional health condition of COPD for asthma patients was defined as that patient being present in the COPD cohort. An additional health condition of asthma for COPD patients was defined as a first asthma code (without a subsequent resolved code) that was more than 2 years before their COPD diagnosis.

Body mass index

> Adults were defined as obese if they had a BMI score of 30 or more.

Depression and anxiety

> Depression screening was considered done if the patient had either a screening or screening declined code in their patient record.

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.
> The most recent MRC score was used to determine the presence of any or a MRC score of 3–5.

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.

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