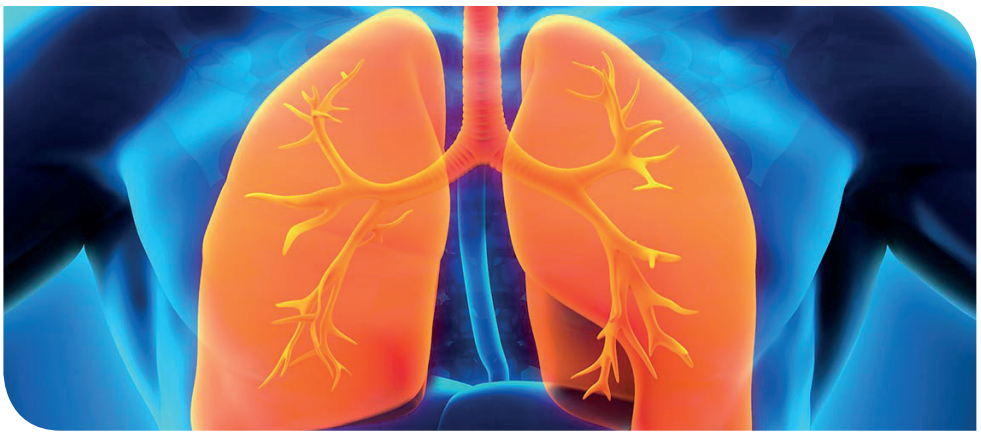
Oxford Academic Health Science Network

RESPIRATORY

Asthma & COPD Care in the Oxford AHSN Region:

Understanding & Reducing Variation



October 2016

What is the Oxford AHSN?

Oxford Academic Health Science Network is a partnership of NHS providers, commissioners, universities and life science companies to improve health and prosperity in Bedfordshire, Berkshire, Buckinghamshire, Milton Keynes and Oxfordshire. Success comes from collaborative working by the partners and stakeholders across the region.

3 Million People

Benefits of collaboration across the whole system:

- Leverage clinical and management best practice and expertise to improve outcomes
- Share clinical evidence and benchmarking
- Scale innovation adoption
- Learn from each other – clinical standards, models of care, commercial models
- Enable data sharing, operational, patient and research to improve outcomes
- Share evaluation knowledge
- Share clinical and management resources
- Improve region's attractiveness for commercial research
- Make region more attractive for inward investment and product development
- Make the region healthier

Accelerating health and economic gains by working together

Our 7 programmes and themes facilitate shared work across all partners:

- Best Care Clinical Networks
- Clinical Innovation Adoption
- Research and Development
- Wealth Creation
- Patient and Public Involvement, Engagement and Experience
- Informatics
- Patient Safety

Asthma & COPD Care in the Oxford AHSN Region: Understanding & Reducing Variation

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Acknowledgement

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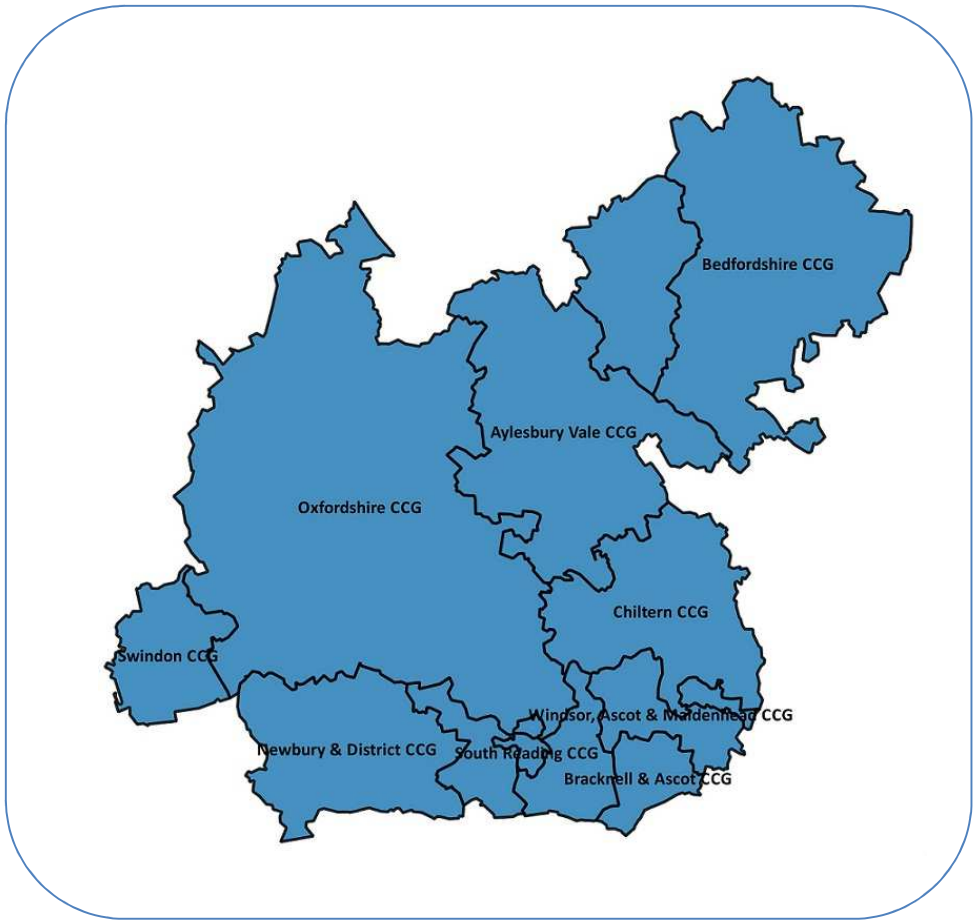

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FOREWORD

It gives us great pleasure to introduce to you the first Respiratory Variance report and with it the Oxford AHSN Respiratory Better Care Network. We have brought together data from all areas of practice from across the AHSN area to provide a view of the current state of respiratory care focussing on asthma and chronic obstructive pulmonary disease. These diseases are common and are both a major health care burden in primary, emergency and secondary care. We have attempted to understand and interpret the data presented striving to recognise how it will help the region to improve standardisation and reduce variation. To this end, we have held our first steering advisory committee, who have been critical in providing an overview of perspectives and insights into the delivery of reducing variation in the AHSN region. With the production of this report, we hope to encourage ongoing engagement and thought, and seek for your involvement throughout in planning, developing and implementing the changes to practice that arise.

The future is an exciting one for respiratory medicine. We have new and effective treatments. We are understanding how treatments can be targeted at particular patient phenotypes and we are now expecting results. This is in contrast to the therapeutic nihilism of the past 20 years. We aim to capitalise on research and data production and also contribute to it. It is into this exciting world that we launch this report and the Respiratory Network. We hope that you will challenged by the data but also invigorated by the possibilities that lie ahead to improve the care for our respiratory patients across the whole AHSN.

Richard Russell, Ian Pavord & Mona Bafadhel

The Oxford AHSN Respiratory Better Care Network Team

EXECUTIVE SUMMARY

Chronic obstructive pulmonary disease (COPD) and asthma are two of the commonest chronic respiratory conditions presenting to primary, emergency and secondary care. For a variety of reasons, both intended and unintended, there are local and regional variations in the way in which respiratory healthcare in the management of asthma and COPD are delivered and as a result in the outcomes that are achieved.

This report on variation in respiratory healthcare across the Oxford AHSN uses data collected from all facets and providers of healthcare, inclusive of primary, emergency and secondary care. This report seeks to scope and determine similarities and differences in activity and outcomes including rates of diagnosis, mortality, inhaler use in primary care, presentation and admission rates to ED and hospital. We present data both at CCG and trust level and attempt to provide a comprehensive view of the variation in respiratory healthcare for patients with COPD and asthma.

Key Findings

Across the AHSN region there are

- 2 fold variation in asthma mortality rates.
- 5 fold variation in asthma admission rates, with year on year increases.
- Variation of asthma hospital length of stay from 1 to 5 days.
- The majority of asthma ED attendances are discharged home; opportunities for education and improving disease control could be achieved here.
- There seems to be a low level of prescription of inhaled corticosteroids in asthma.
- There is variation in both the quantity and quality of annual asthma reviews varies.
- There is a 3 fold variation in COPD admission rates.
- On average 1 in 10 patients with COPD get admitted to hospital with an average length of stay of 7 days.
- The vast majority of COPD admissions are derived from ED attendance.
- Length of hospital stay for COPD is lower than national average, from BTS national audit data of 2012, but has not changed over 3 years in the area.
- Patients with COPD are diagnosed using spirometry although the quality assurance of this is unknown.
- Treatment of COPD using inhaled therapy needs to be more standardised
- There is a stark variation in the proportion of COPD Quality Outcomes Framework reaching the upper payment threshold.

Next steps

The production of this report, and the work that underpins it, will enable the Respiratory Better Care Network Team, to obtain a comprehensive review of activity and matters affecting respiratory care in the AHSN area. The report has been presented both to a steering group and to a wider body of stakeholders at the Respiratory Better Care Network Launch on the 6th of October 2016.

Stakeholders will be invited and asked to use the data from the report to help set priorities both for their own areas as well as the AHSN region as a whole. Specifically, we ask the following questions to be considered;

i) Where is there good practice?
ii) Where is the requirement for significant care needs?
iii) Where can improvements be made efficiently and cost-effectively?

The AHSN Respiratory Better Care Network Team, led by Dr Richard Russell and managed by Mr Richard Jerrett working with Stakeholders in the region will strive to implement and enable change, to better standards in asthma and COPD healthcare locally. The report will provide data and leverage to improve the chances of success in this evermore resource limited environment.

Following the launch meeting the Respiratory Better Care Network will

- Identify priority areas including hospital admissions, re-admissions and prescribing for each CCG
- Work with Hospital Trust Emergency department leads to develop and implement care pathways for asthma and COPD.
- Work with Hospital Trust Respiratory Departments, with both clinical and nursing/physiotherapy leads for asthma and COPD to improve service integration and enhance current service provision.
- Work with all healthcare providers to reduce burden of inappropriate treatment and healthcare utilisation
- Work with both primary and secondary care, in addition to the clinical care networks to increase patient access and engagement to research
- Design and implement novel decision and management algorithms, enhanced and uniform IT and development of integrated health pathways aimed at improving approaches to treatable traits.

INTRODUCTION

Published in October 2014, the Five Year Forward View set out the challenges faced by the NHS over the coming five years. It highlighted that the NHS efficiency savings are running at 1.5-2% but are required to maintain a 2% year on year saving until the end of the decade. If these savings are to be achieved, NHS commissioners and providers must work together to examine current ways of working and improve efficiency as well as the standards of care provided.

This work will best be achieved by empowering staff at every level; wards, departments, trusts and clinical commissioning groups, to recognise possible areas for improvement and to plan and deliver positive change. Within individual regions, localities and boroughs, there is variation of patient care. Some of these variations are unavoidable (such as demography, socio-economics and patient choice) whilst some variation is avoidable with deviation away from evidence based care and best possible practice. This will lead to less than optimal outcomes and less efficiency. Variation may be desirable and sometimes even necessary. Warranted variation, reflects 'patient-centeredness' and a service responsive to local health needs. Unwarranted variation, may reflect differences in the quality, equity and efficiency of care, needs to be minimised.

This report is the first produced for respiratory disease, as part of the Respiratory Better Care Network namely for patients with asthma and chronic obstructive pulmonary disease (COPD) for the Oxford AHSN. We attempt to utilise existing, readily available data to scope and describe current variations in healthcare for patients with COPD and asthma. This will facilitate discussion between local care providers and commissioners in order to improve delivery of respiratory healthcare and the development of new improvement initiatives.

The Respiratory Better Care Network

Aims

The Respiratory Clinical Network's overall goal is to improve the care of respiratory patients in our geographic area working in primary, emergency and secondary care. We will work towards this goal by identifying inequality and by applying active education and state of the art management guidelines to improve quality of care, improve outcomes and reduce inequality. Areas of excellence will be identified and good practice shared. Where there are clear needs then the data collected will be utilised to drive quality improvement.

In order to deliver this objective, within the lifetime of this network, we will

1. Identify key stakeholders within the AHSN CCG's, NHS Trusts, Charitable Organisations, Patient and Carer Representatives, Industry and Academia ***[appendix A];***

2. Perform and scope local and national databases to identify variations in hospitalisation and readmission rates;

3. Facilitate communication and increase engagement within the AHSN region; and

4. Allocate each stakeholder a lead contact and agree local and generic priorities. The former will be driven by our analysis of outcomes in the local population and the latter identified yearly by the network along with clear deliverables.

Our focus

We are focussing on improving healthcare in adults with asthma and chronic obstructive pulmonary disease (COPD); two of the most common respiratory conditions seen in primary and secondary care, which result in much of the respiratory morbidity and mortality. These chronic lung conditions are also ideally suited for a network as there will be rapid, and much needed change in diagnostic and management algorithms. These can be a challenge to implement in order to provide the best evidence-based management. Our plan is to develop and implement pathways using personalised diagnostic algorithms and where possible utilise near-patient devices, both of which are essential for risk and treatment stratification of patients. Example includes the recent NICE guidance calling for exhaled nitric oxide in all patients presenting to primary care and the streamlined improvement in diagnosis and management of both asthma and COPD. The Respiratory Best Care Network will seek to understand why and how best to overcome these difficulties, including reducing hospital admissions, improved prescribing, development of algorithms as an aid to diagnosis and management and access to research for patients. Much of the new thinking in airways disease has been driven by the network's clinical leads, putting us in an ideal position to drive progress.

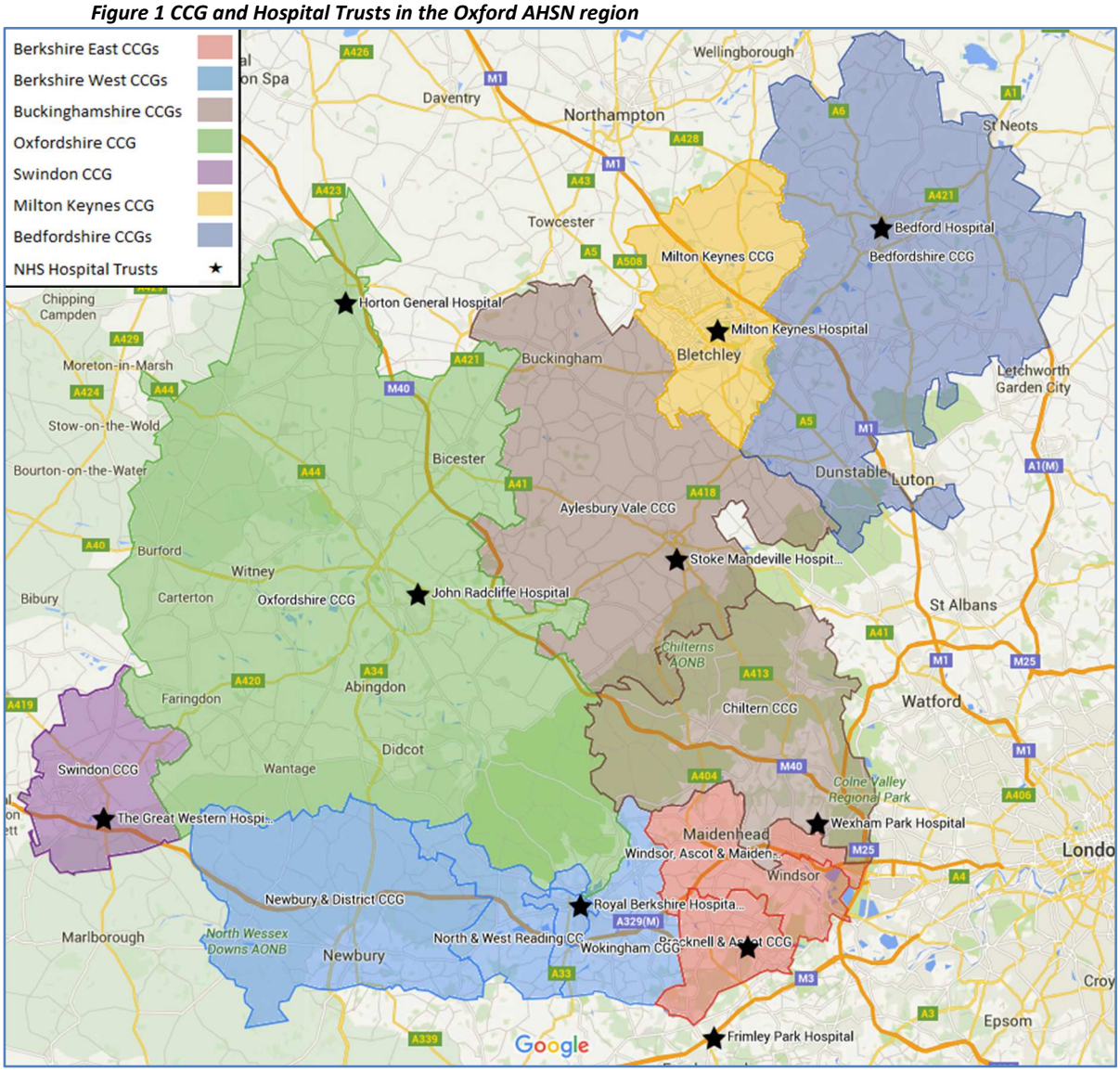
Table 1 Respiratory Better Care Network Projects: brief outline of plans

Settings	Oxford AHSN Respiratory Network Projects	Goals	Outcomes
Primary Care	1. Asthma in Primary Care	1. Report on variation of asthma management at practice level 2. Formulate improvement plans 3. Education forums	• Implement change in order to provide a uniformly high standard of asthma care.
	2. COPD in Primary Care	1. Report on use of Spirometry 2. BLF patient passport 3. Develop plans with CCGs to improve COPD care	• Reduction in morbidity • Improve quality of life for COPD patients.
Emergency Care	3. Asthma in Emergency Care	1. Report on variation in pathways & follow up care 2. Create standardised pathways	• Reduction in re-attendance at EDs for asthma by 20% • Reduction of asthma mortality in pre-hospital setting • Increase in attendance to specialist follow up clinics by 30%
	4. COPD in Emergency Care	1. Report on variation in pathways & follow up care 2. Create standardised pathways	• Standardised clinical pathway for treatment of COPD in E.Ds. • Reduction re-attendance at E.Ds.
Secondary Care	5. Asthma in Secondary Care	1. An Asthma Lead at each trust 2. Standardised pathway & follow up plans	• Reduction in mortality. • Prevention of readmissions. • Reduction in future attack rates. • Reduction in system-wide costs.
Research	6. Research Participation	1. Raise awareness of trials programme. 2. Increase recruitment to trials	• Increased recruitment into clinical trials • Improvement in the knowledge of care providers and patients. • Improved the quality of care for airways patients
Enabler	7. Engagement	1. Representation form each stakeholder organisation in the network 2. At least 3 expert patients 3. Launch Event	• A network of connections built on enduring, mutually beneficial relationships • A network able to leverage change • Able place quality improvement of respiratory services in the minds of key decision makers

CCGS & hospitals in the Oxford AHSN

The Oxford AHSN region consists of 12 CCGs commissioning caring for more than 3 million people. Inpatient respiratory care is provided by Oxford University Hospitals NHS Foundation Trust (OUH) in Oxford and at the Horton General Hospital (HGH) in Banbury, Milton Keynes University Hospital NHS Foundation Trust (MKUH), Stoke Mandeville Hospital (SMH) (Part of Buckinghamshire NHS Foundation Trust) in Aylesbury, Bedford Hospital NHS Trust, Wexham Park Hospital (WPH) (part of Frimley Park NHS Foundation Trust) in Slough, and the Royal Berkshire NHS Foundation Trust (RBH) in Reading. We have included Swindon CCG although it is not strictly part of the Oxford AHSN region.

Figure 1 CCG and Hospital Trusts in the Oxford AHSN region



Meet the Team

Clinical Lead

Richard Russell is a Consultant Respiratory Physician & Senior Clinical Researcher at the University of Oxford. His clinical and research practice are focused on COPD, asthma, and delivery of better healthcare. Richard has been instrumental in guideline and implementation change within the British Thoracic Society. He is the founding editor of the International Journal of COPD.

Clinical Co-Leads

Ian Pavord is a Professor of Respiratory Medicine at the University of Oxford and Consultant Respiratory Physician. He has a particular interest in asthma, chronic pulmonary disease and chronic cough and an internationally renowned researcher, providing expert advice to guidelines and committees in the management of asthma. His research interests have specifically led to the development of promising new treatments in asthma and he has been a leading expert in the use of inflammometry in treating patients.

Mona Bafadhel is an Associate Professor at the University of Oxford and Consultant Respiratory Physician. She has a particular interest in phenotyping patients with COPD and the management of exacerbations and has identified simple blood biomarkers, such as the peripheral blood eosinophil count, to identify a group of patients with treatment response to corticosteroids.

Project Manager

Richard Jerrett is the Project Manager at the Oxford AHSN Respiratory Better Care Network. He has been in project and programme management in and around the NHS for over ten years. Most recently Richard worked as a Quality Improvement Lead at Thames Valley Strategic Clinical Network focusing on dementia and neurology.

METHODS

Using Hospital Episode Statistics (HES) and Quality Outcomes Framework (QOF) data, the first Oxford AHSN Variation Report has analysed all available data from 2012-2015 across the Oxford AHSN region for adults with Asthma and COPD. ICD-10 codes and sub-codes used in the analysis are presented in ***appendix B***. For each of these codes HES data were analysed looking at all admissions where these conditions were either the primary diagnosis or where they were a secondary diagnosis.

Defining the at risk population

'At risk' population data, presented in ***appendix C*** were calculated for the population deemed to have the disease for each CCG were then used to calculate the rates of admission (per 100,000 population) for asthma and COPD for each of the CCGs. The total "at risk" population with asthma and COPD in the Oxford AHSN for the years 2014/2015 was 191, 221 and 41,920 respectively. This approach allows us to compare areas with both high and low disease prevalence.

Calculation of rates

For both asthma and COPD, admission rates for each CCG were calculated along with upper and lower 95% confidence intervals. The data were then displayed on maps using QGIS software (Quantum Geographic Information Software – www.QGIS.org). The map was shaded by quartile, with the darkest colour representing the highest rate of admission.

Funnel plots

To compare individual CCGs against the regional average, funnel plots were constructed. A template for funnel plots obtained from Public Health England was used. Funnel plots are an effective way of displaying variation across different institutions. In funnel plots an observed measure, in this case admission rate, is plotted against a measure of its precision. In such a plot, sample size (in this case population) is displayed along the x axis (see fig 2). Lines showing +/- 2 standard deviations (SD) and then +/- 3 SD are then plotted. These lines form a funnel as with smaller and smaller sample sizes the size of these confidence limits get larger and larger.

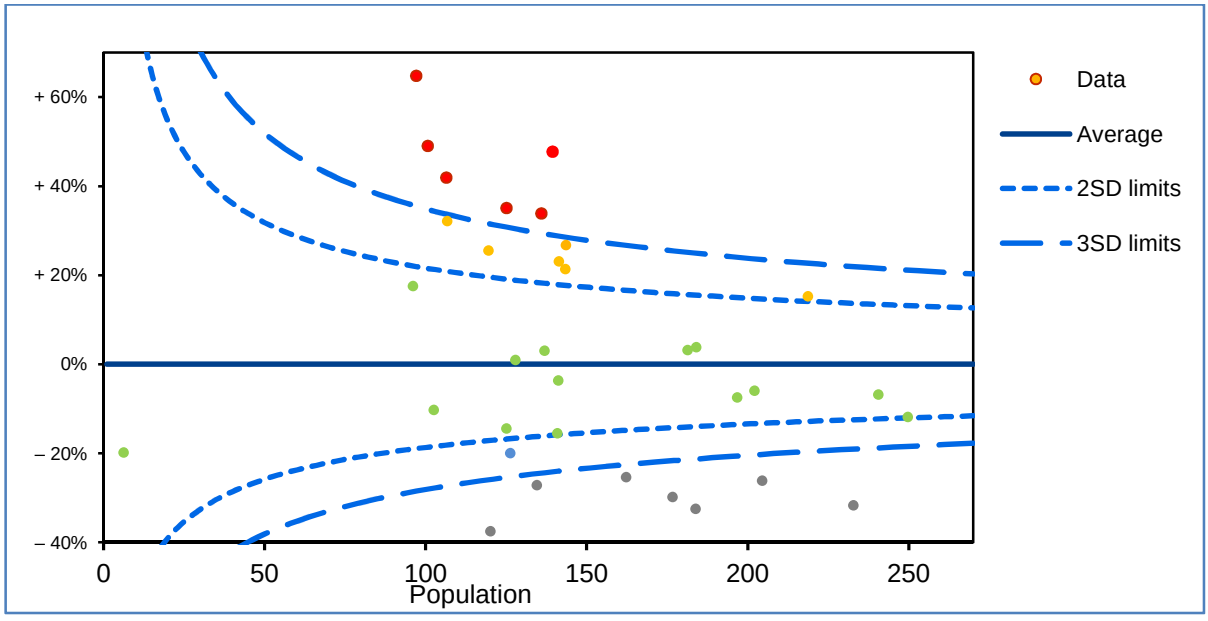


Figure 2: Example admission rate funnel plot

In the example demonstrated in figure 2, the average admission rate across the region for this condition is approximately 800 admissions per 100,000 population per year. For CCGs with smaller populations the lines showing +/- 2 SD or +/- 3 SD form a funnel. The colours are as follows:

- RED = significantly (>3 SDs) **HIGHER** admission rate versus regional average. There is a 1:1000 chance that this variation is due to chance.
- AMBER = significantly (between 2-3 SDs) **HIGHER** admission rate versus regional average. There is a 1:40 chance that this variation is due to chance.
- GREEN = consistent with regional average – lies within +/- 2 SDs of the regional average.
- BLUE = significantly (between 2-3 SDs) **LOWER** admission rate versus regional average. There is a 1:40 chance that this variation is due to chance.
- GREY = significantly (>3 SDs) **LOWER** admission rate versus regional average. There is a 1:1000 chance that this variation is due to chance.

Rates over time

To examine the changing rate over time, admission rates for these conditions were calculated for the financial years 2012/13, 2013/14 and 2014/15 and 95% confidence intervals for each of the admission rates were calculated. For differences in admission rates between years, non-overlapping 95% confidence intervals were taken to represent significant differences. Admission rates over time were then plotted with confidence intervals.

Source of admission

Using the HES database the source of individual admission was noted. The HES admission codes, used in this analysis are presented in ***appendix D***. The two most common sources of admission for both asthma and COPD were via A&E and via the patient's General Practitioner. For analysis the remaining were grouped as "other sources of admission".

Length of stay data

Within the HES database, length of stay is recorded as a whole number of days. The length of stay for patients admitted and discharged on the same calendar day is zero, whereas for patients whose admission crosses midnight is inputted as one day. Caution is required when interpreting data and studies quoting average length of stay data based on these type of data sets.

Quality Outcomes Framework Data

The QOF data has been taken from the NHS Digital (formally known as HSCIC). The QOF data tables contain both total figures (gross) as well as totals where patients who have been exception reported have been excluded from the data (net exception). In order to give a clear view, we have included charts with both net and gross figures side by side.

OXFORD AHSN RESPIRATORY BEST CARE NETWORK DATA ANALYSIS

Asthma

Asthma affects 5 million adults nationally and is commonly treated by healthcare professionals in every care setting. Asthma, is an inflammatory condition and inhaled corticosteroids (ICS) therapy is the mainstay of treatment. Asthma has a large impact on local respiratory morbidity and mortality. Patients may be affected by symptoms on a daily basis and when they worsen they may precipitate attendance to healthcare, termed exacerbations or acute lung attacks. Asthma exacerbations lead to over 50,000 hospital admissions. Asthma exacerbations leads to a direct cost to the NHS of £1 billion and an indirect cost to society, due to time off work and loss of productivity, of £6 billion with an annual spend of £800 million on pharmaceutical costs alone.

The United Kingdom remains to have one of the highest mortality rates for asthma in the European Union and almost all exacerbations leading to hospitalisation or death are preventable. The National Review of Asthma Deaths (NRAD), a confidential enquiry commissioned by the Healthcare Quality Improvement Partnership (HQIP) on behalf of the whole NHS, and led by the Royal College of Physicians was published in 2015. This report demonstrated that unnecessary and avoidable deaths occurred in approximately 90% of the population studied. Headline findings found that 45% of asthma deaths occurred at home and the median age of death was 58 years (range 4-97). Of those that died 97% were found to have excessive prescriptions of short acting bronchodilators, a BTS/SIGN definition of poor asthma control. An independent finding associated with asthma deaths was the number of short-acting bronchodilator prescriptions in the final year – with those that died having a median inhaler prescription of 10 per year; with almost 40% receiving more than 1 prescription per month. Astonishingly, 6 patients (4% of the patients that died) had received more than 50 short acting bronchodilators in the year prior to death. As of the 21st of September 2016, the BTS/SIGN Asthma guideline, no longer has short acting bronchodilators as the sole treatment of asthma ('step 1') and the recommended first line therapy for mild asthma is low dose inhaled corticosteroids.

This NRAD data and numerous other evidence and national guidelines demonstrate that ICS therapy improves outcomes in asthma including better lung function, improved control of symptoms, which is directly associated with reduced exacerbations (or lung attack risk) and thus any need of hospitalisation. National guidelines recommendations include**:** at each consultation with a healthcare practitioner that assessments of control of asthma, a comprehensive review of medication and inhaler device checks take place, in addition to seeking that every asthma patient has an asthma management plan in place and that patients admitted to hospital are seen within 4 weeks of discharge by an asthma specialist practitioner in secondary care and within 2 days in primary care, appendix ***E***.

In this section we look at the asthma at risk population and in particular scope the following:

i) Admission rates to hospital & length of stay
ii) Avoidable mortality rates
iii) Prescription rates for ICS and use of SABA
iv) Evidence of control in the at risk asthma population

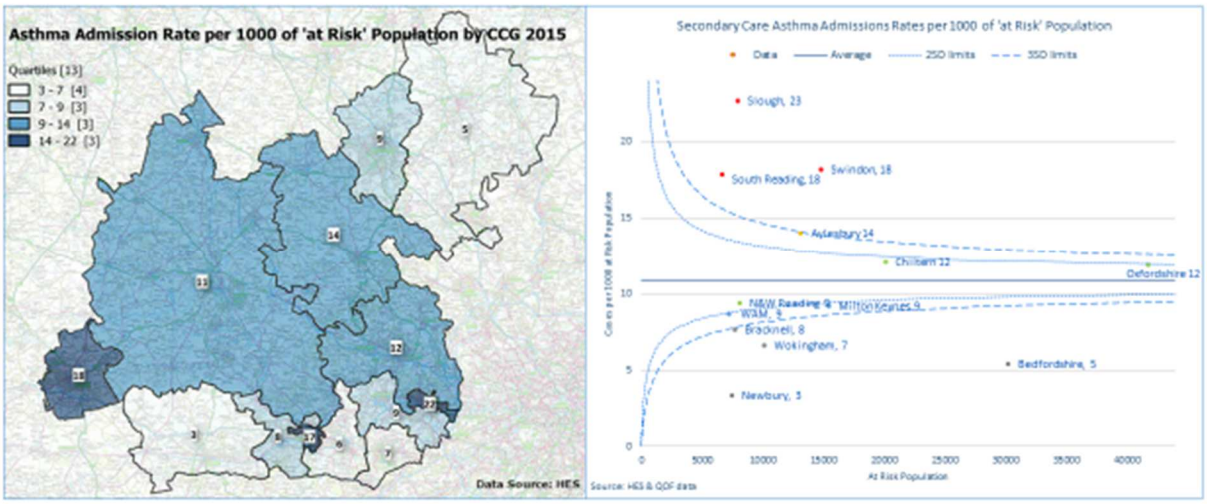
Data was retrieved from

i) Hospital Episodes Statistics
ii) GP practice prescribing data
iii) Quality Outcomes Framework

Hospital admission rates

In 2014/15 the admissions of adults (16 years +) with asthma are presented in figure 4. The regions Slough, Swindon and South Reading, were identified with having the highest quartile of admissions for the region; averaging 14-22 asthma admissions per 1000 of asthma patients, equating to approximately 2800 to 4400 admissions per year in these areas.

Figure 3 Asthma admission rates per 1000 of the asthma population



The funnel plot analysis identified that this high admission rates was >3SD than regional average. Features that could play a role for these areas include differences in socio-economic status, high ethnic diversity and a possible reduced attendance to primary care for management of asthma. Admission differences related to these factors, in addition to need to be further elucidated

There has been an overall year-on-year increase in the admission rates for asthma in the AHSN region; 9 out of 13 CCG areas have had an increased in admission rates in 2014/15 compared to 2013/14; and this is independent from an increase in the population at risk. This level of asthma admission is a significant contributor to pressure on secondary care and a cost pressure for all. Moreover, hospital admission is associated with an increase in morbidity and mortality. The data suggest that a cross-boundary approach to this issue is essential.

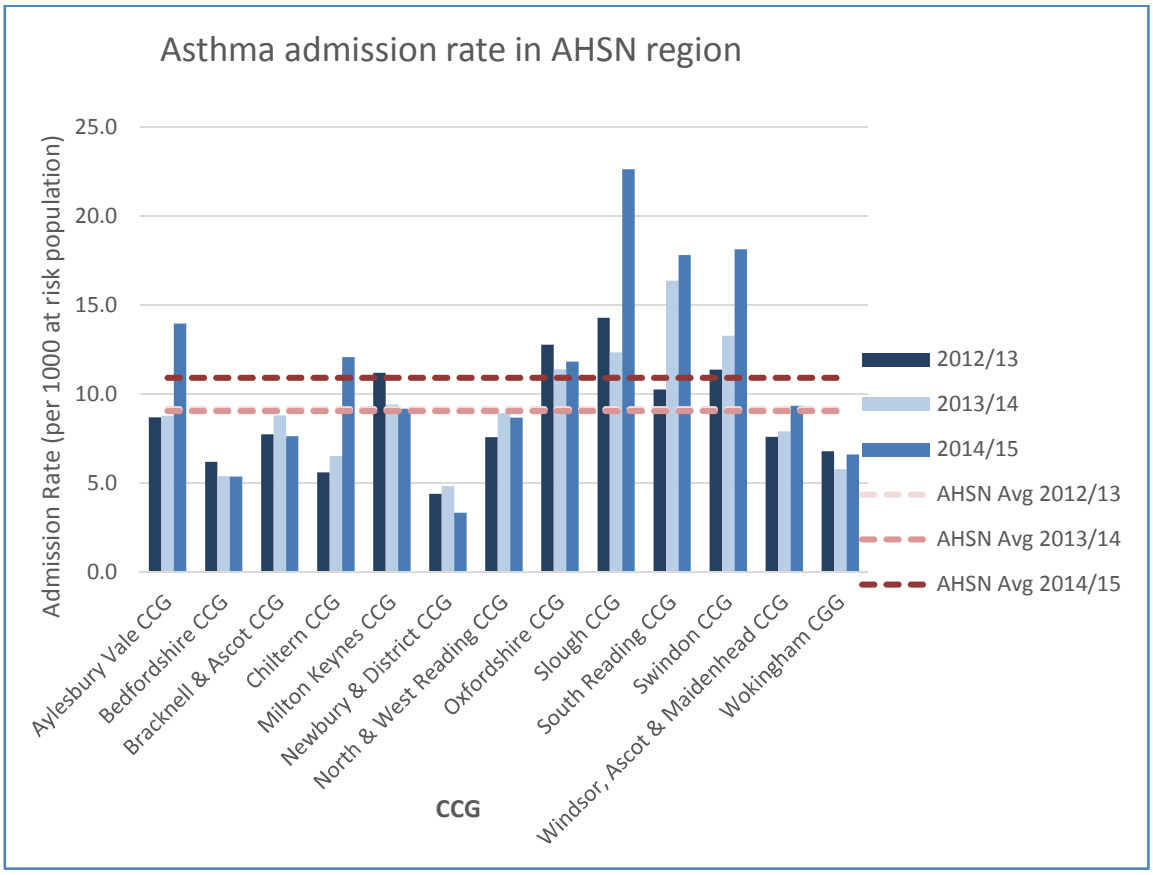


Figure 4 Admission rates for asthma by CCG from 2012-2015.

Hospital length of stay

The average length of stay across the region is 3 days (figure 5) with marginal decrease of 0.5 days for the AHSN from 2012/13 to 2014/15. This is comparable to the national average of 3 days. Despite high admission rates in Swindon the length of stay is markedly reduced. Further interrogation of admission details need to be undertaken. A reduction of 1 day in hospital length of stay across the AHSN would account for a reduction of 1673 days total (4.58 years), with an estimated direct saving of £700, 000.

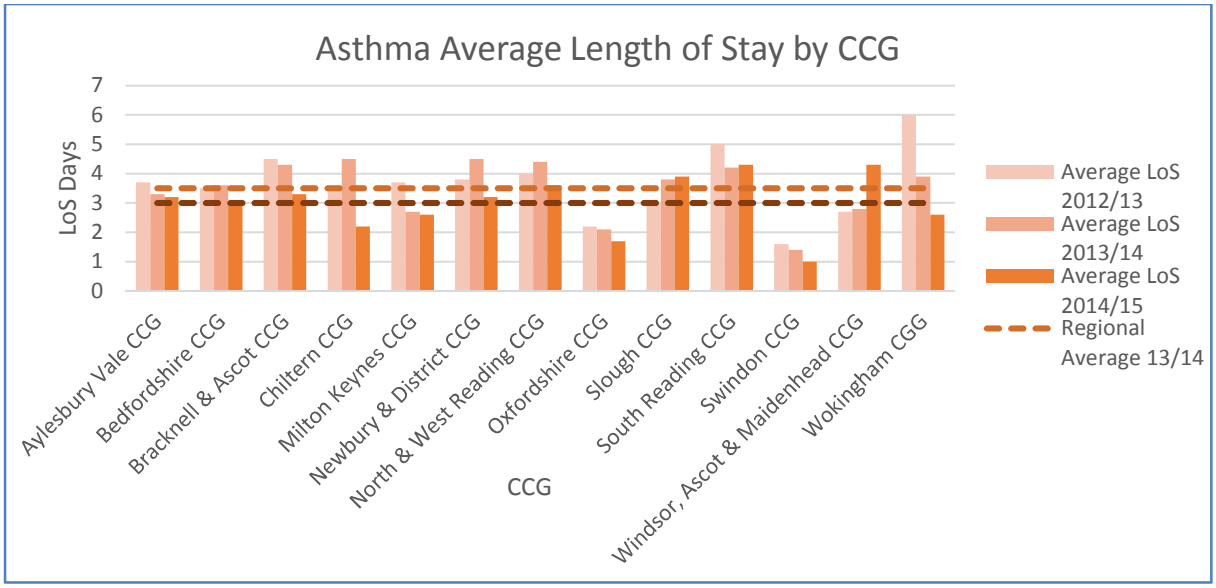
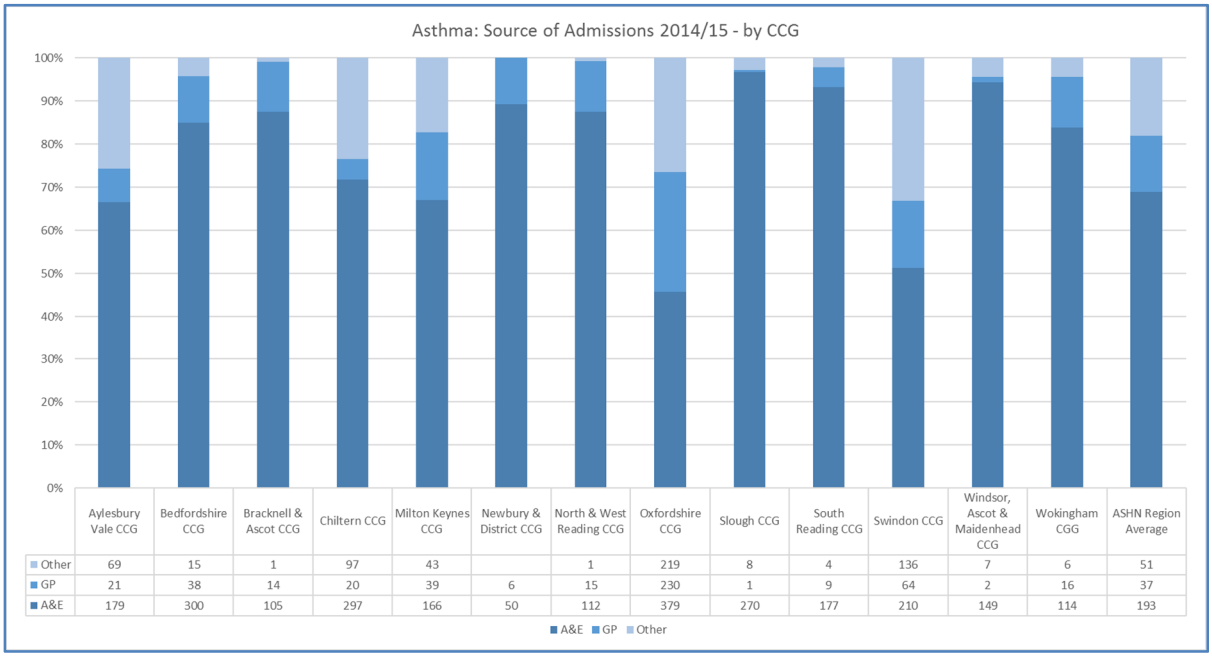


Figure 5 Average length of stay for asthma admissions by CCG.

The majority of hospital admissions are directly from Emergency Departments; with South Reading and Slough having the highest source directly from ED. This may be causing a direct impact on above average admission rates for these regions. This data may suggest that a closer working relationship between the ED and the respiratory team may prevent asthma admissions with a need to strengthen asthma management strategies in healthcare.



	Aylesbury Vale CCG	Bedfordshire CCG	Bracknell & Ascot CCG	Chiltern CCG	Milton Keynes CCG	Newbury & District CCG	North & West Reading CCG	Oxfordshire CCG	Slough CCG	South Reading CCG	Swindon CCG	Windsor, Ascot & Maidenhead CCG	Wokingham CGG	ASHN Region Average
Other	69	15	1	97	43		1	219	8	4	136	7	6	51
GP	21	38	14	20	39	6	15	230	1	9	64	2	16	37
A&E	179	300	105	297	166	50	112	379	270	177	210	149	114	193

Figure 6 Source of Asthma admissions for the region's CCGs.

Avoidable Mortality

In 2014/15 the mortality rates of asthma are presented in figure 7. There is considerable variation in asthma mortality rate although these figure must be interpreted with caution due to its relatively low incidence. The national average for asthma mortality is between 10-19/100 000 and is stable. Aylesbury Vale CCG lies within the highest quartile for asthma mortality. This does not seem to be a consequence of high admission rates or length of stay and needs further investigation.

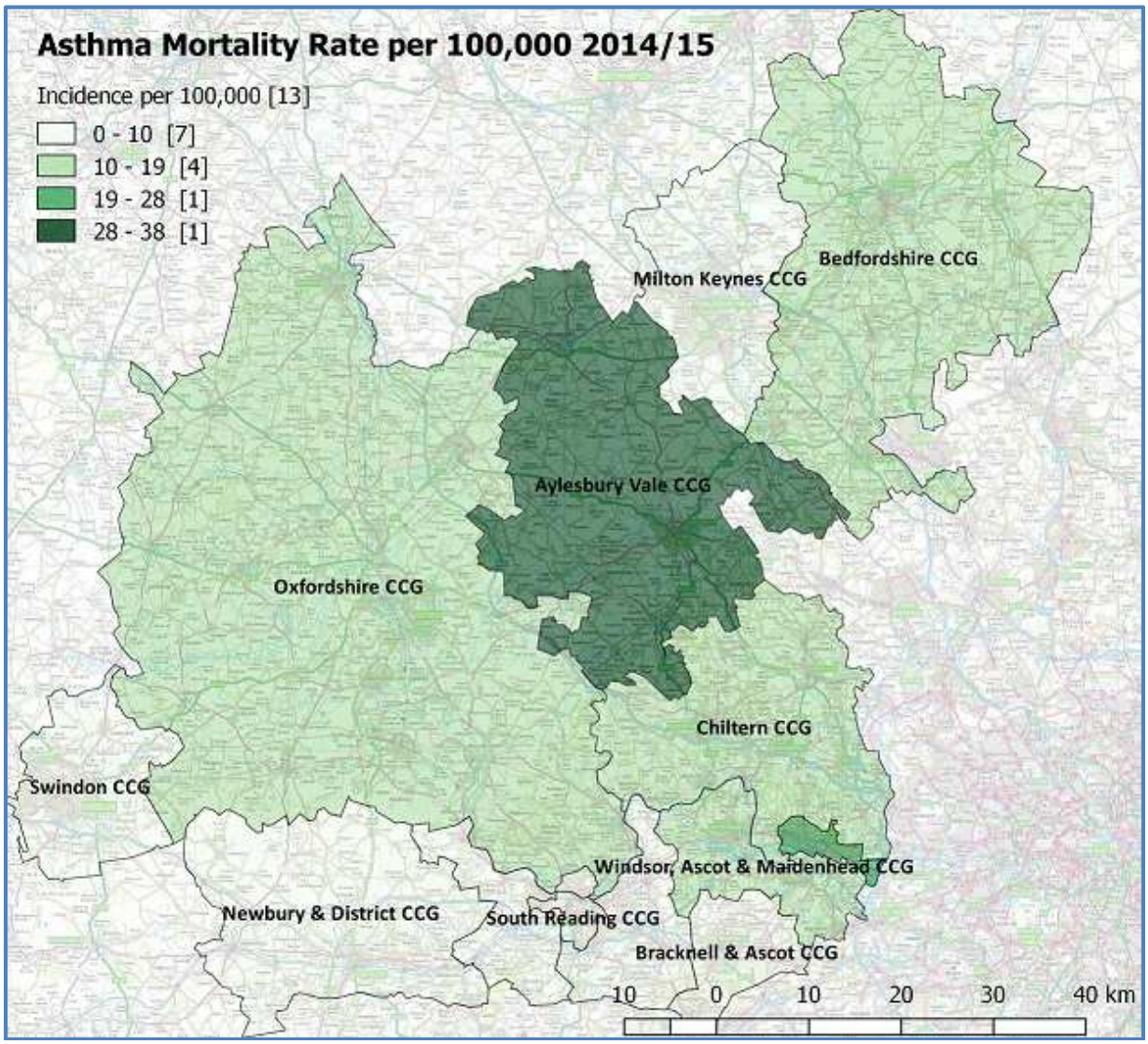


Figure 7 Map showing asthma mortality rates per 100000 of population by CCG

Evidence of control in the at risk asthma population

The RCP 3 questions are a simple method for assessing asthma control. There is significant variation in the use of this tool and also a variance in number of asthma patients who have had an annual asthma review. The data suggests that there is an urgent need to review the conduct of annual asthma reviews and possibly develop and implement an AHSN wide tool that will not only achieve an increase in QOF compliance but also improve the care of asthma patients. Ideally we should aim to surpass the QOF threshold and aim for 100%.

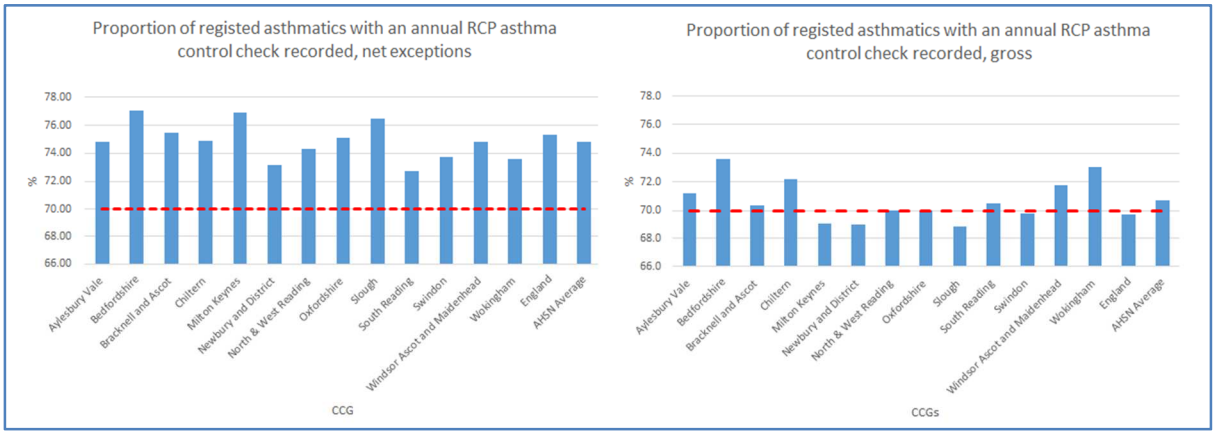


Figure 8 Chart showing CCG achievement on QOF RCP asthma control questionnaire, net exceptions (L); gross exceptions (R)

Emergency Care

The attendance of an asthmatic in ED is a sentinel and significant event. This attendance is associated with an increased risk of dying and is a clear opportunity to review and improve the disease control and management. In light of this we are focussing on the ED to improve the care of patients with asthma during an acute attack.

Data has been made available for this report only from OUH at the John Radcliffe Hospital. The Respiratory Better Care Network would like to be able to work together with ED and trusts in the region to obtain the data region-wide to assess variation. From one trust, we can report that asthma is a significant proportion of the ED workload with approximately two attendances a day. It is likely that this data is reproducible across the AHSN area and may even be a lot higher in the areas where most of the asthma admissions are derived from the ED (Oxfordshire area has the lowest admission rate for asthma from ED). A unified clear approach to the management of asthma in ED will impact both of admissions, re-admissions and length of stay.

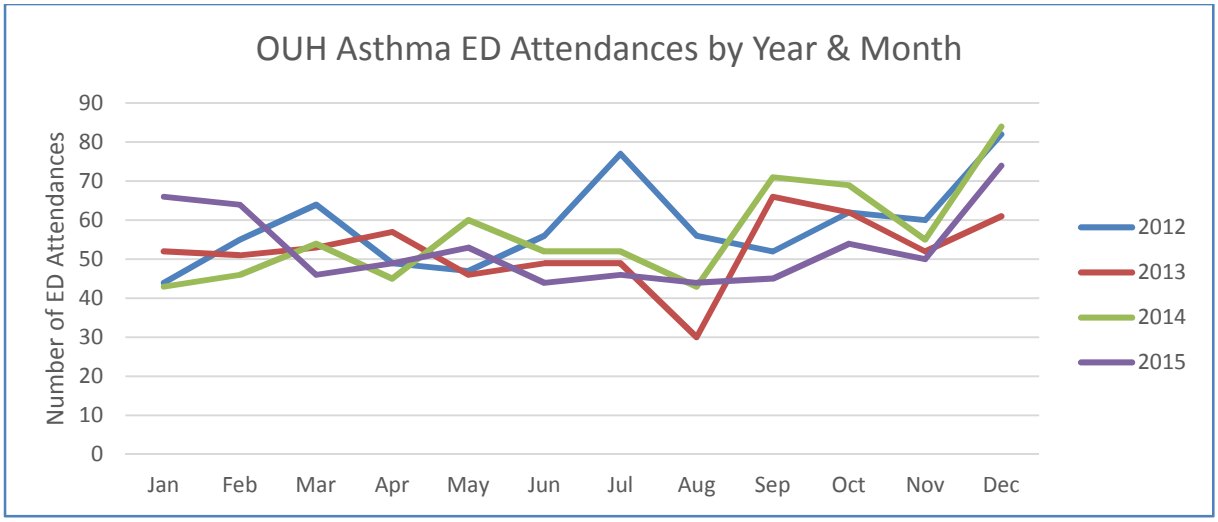
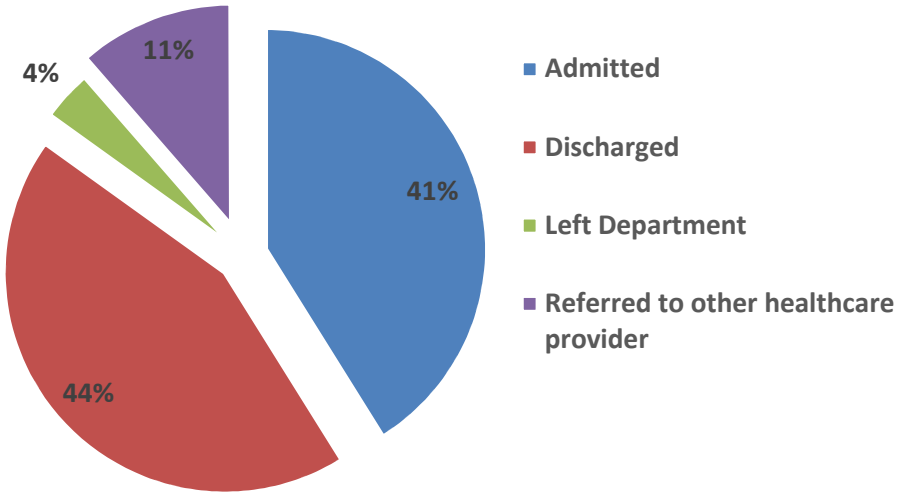


Figure 9 Asthma ED attendances to OUH

The data on ED outcomes suggests that many patients are discharged back into primary care and very few are referred on to specialist services. Whilst this may be clinically reasonable it will be essential to ensure that robust follow-up is in place and that reviews of medication, inhaler technique and lifestyle have occurred in order to reduce the risk of re-attendance or risk of mortality. National recommendations, based upon clear clinical data, should be adhered to in order to achieve the best possible outcomes. Working with stakeholders in the AHSN, we can drive to implement clear changes here. Concerns have also been raised about the care pathways used by the Ambulance service in the management of asthma patients in their homes. There is an urgent need to develop secure protocols to ensure that patients receive appropriate treatment and follow up.

Figure 10 Asthma discharge outcomes following ED attendance



Chronic obstructive pulmonary disease (COPD)

COPD has been diagnosed in 1.2 million adults in the UK, but the real prevalence of the disease is put at over 3 million and is increasing. COPD affects 2% of the total population of the UK and there are approximately 200 new cases diagnosed each year per 100 000 population. COPD, like asthma is commonly treated by healthcare professionals in every care setting, and associated with a significant health burden, costing the NHS up-to £1 billion per year. COPD is predicted to be the 3rd leading cause of death worldwide by 2020 and associated with significant morbidity and mortality in an already ageing population. COPD is a progressive irreversible condition, associated with both pulmonary and systemic inflammation. Patients have daily symptoms and the disease is often punctuated by episodes of worsening symptoms termed exacerbations or lung attacks. COPD exacerbations are the commonest cause for admission to hospital, and largely responsible for the winter bed crises. Exacerbations are associated with a mortality of 10% during the in-patient episode, 30% at 3 months and 50% at 2 years. These mortality statistics are worse than that of an acute myocardial event and have not improved. The inflammation of COPD are largely non-steroid responsive; proven effective interventions include smoking cessation, pulmonary rehabilitation, and oxygen therapy in appropriate patients. Inhaled therapy with bronchodilators and anti-inflammatories have modest effects on reducing symptoms, exacerbations and improve quality of life.

Focusing on what is effective when diagnosing and treating COPD will be crucial in this resource limited world. Key interventions include: improved diagnosis rates, smoking cessation, annual flu vaccinations, referral to pulmonary rehabilitation, and appropriate prescribing. Improvements in these areas will drive to impact on symptom burden and exacerbations with an eventual aim of reducing hospitalisation. The cost of a deliverable outcome and per QALY is greatest in pharmacological treatments of COPD.

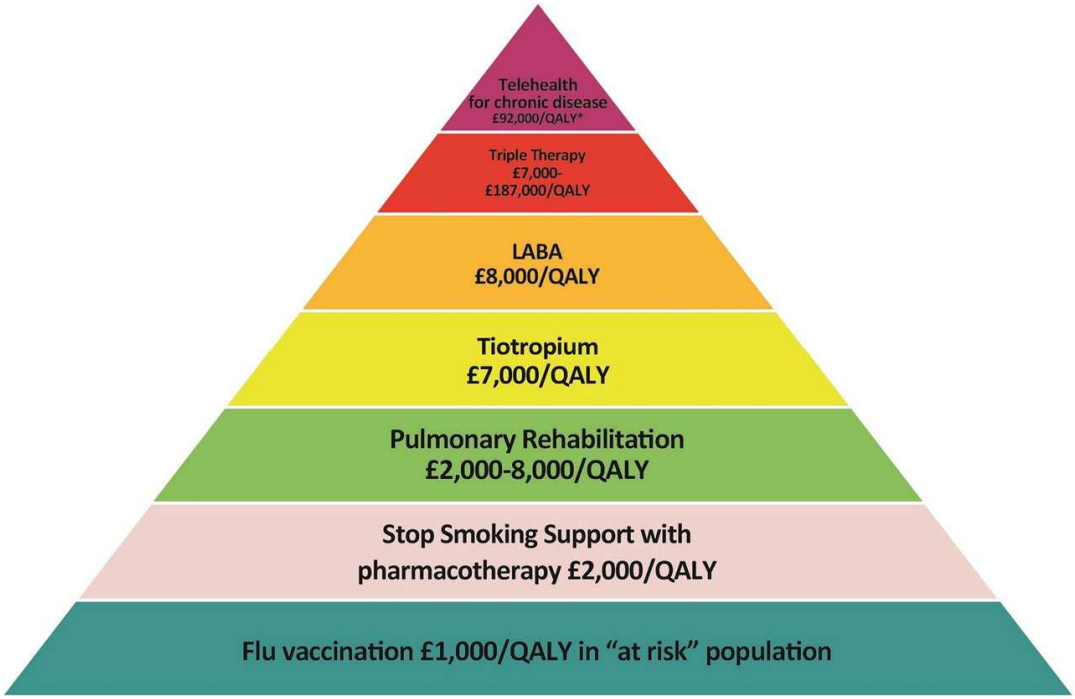


Figure 11. The COPD cost-effective pyramid model

The provision of care for COPD patients within the AHSN area is commissioned by the CCG's with contracts held by providers who then are responsible for the delivery of clinical care, pulmonary rehabilitation, smoking cessation services and oxygen prescription ***(appendix F).*** There is a diversity in the services applied and available from Hospital Trusts for patients with COPD, with a range of admission avoidance, early discharge and community respiratory teams in addition to usable integrated healthcare pathways. Understanding these and the different access point, in addition to implementing care pathways at primary care, ED care and secondary care will improve COPD management in the region.

In this section we look at the COPD at risk population and in particular scope the following:

v) Evidence of diagnosis and control
vi) Admission rates to hospital & length of stay
vii) Avoidable mortality rates
viii) Prescription rates for ICS and use of SABA

Data was retrieved from

iv) Hospital Episodes Statistics
v) GP practice prescribing data
vi) Quality Outcomes Framework

Delivery of specific quality and outcomes framework in COPD

Spirometry, performed by a trained member of staff with qualifications to interpret, is the gold standard for the diagnosis of COPD. Approximately, only 1/3rd of the COPD population in the UK have been diagnosed, with evidence that up to 15% of new diagnoses of COPD being made after a hospital admission. In the region, there is variation of COPD diagnoses confirmed by spirometry (figure 12), suggesting that there may be additional patients who have not had a spirometry confirming diagnosis or indeed who may have an incorrect diagnosis and are thus being treated in error. The data suggests that QOF has been effective in disseminating spirometry through the AHSN area with it being utilised in 80% of COPD diagnoses. However, there may be issues with the quality of spirometry and a lack of training in both performing the technique as well as in interpretation of results. An AHSN wide-strategy to disseminate quality spirometry maybe utilised to improve on current practice.

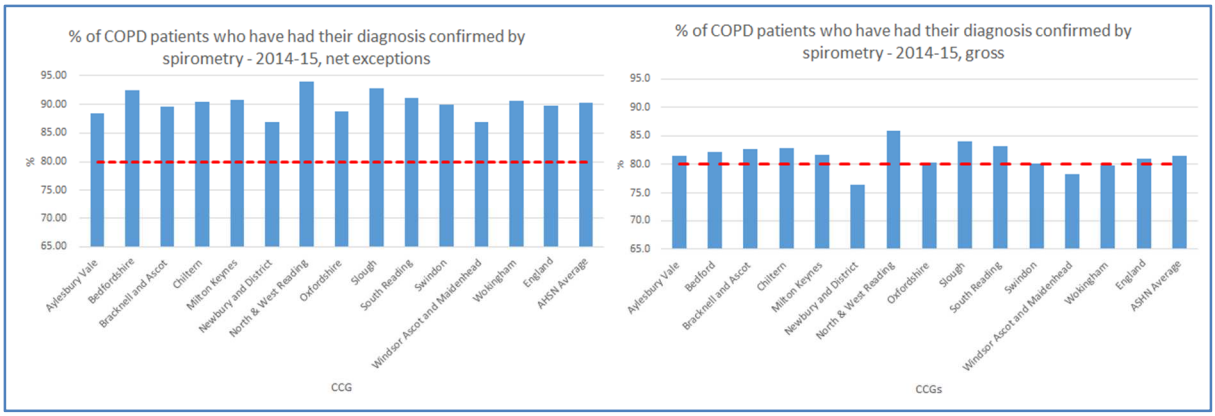


Figure 12 Proportion of patients with COPD diagnosis confirmed with spirometry; net exceptions (L), gross exceptions (R).

Patients with COPD require annual review, for inhaler check, management review and annual spirometry. There is variation in the region with regard to this quality outcome. This may impact on the monitoring of disease, appropriate referral for pulmonary rehabilitation or oxygen and lead to poor adherence with treatment. The data suggests that innovative solutions to this variation should be sought which are all the more urgent given that guidance and standards on training to perform spirometry are imminent. The AHSN area CCG's will need to respond to these changes to maintain or improve the current level of spirometry and the Respiratory Network will contribute to developing innovative solutions to this problem.

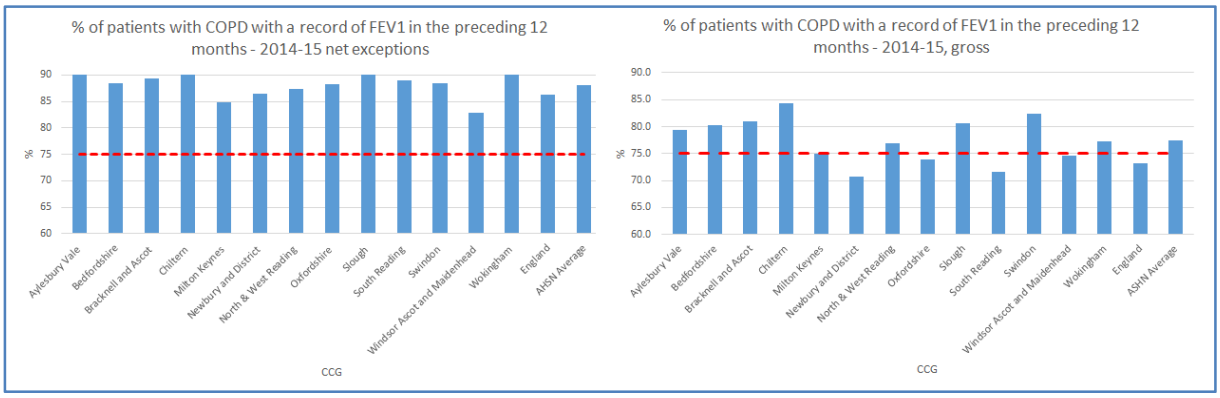


Figure 13 Patients with COPD having evidence of an FEV_1 check in the preceding 12 months; net exceptions (L), gross exceptions (R).

The most cost-effective intervention in COPD management is annual flu vaccination; the AHSN area on average successfully delivers this approximately 85% of the time. Whilst this may seem to be a high number it must be remembered that this is the most cost effective intervention in COPD. The QOF upper payment threshold was therefore placed at 95%, a tough target. Increasing the uptake and delivery of Flu vaccinations in COPD should be a clinical priority.

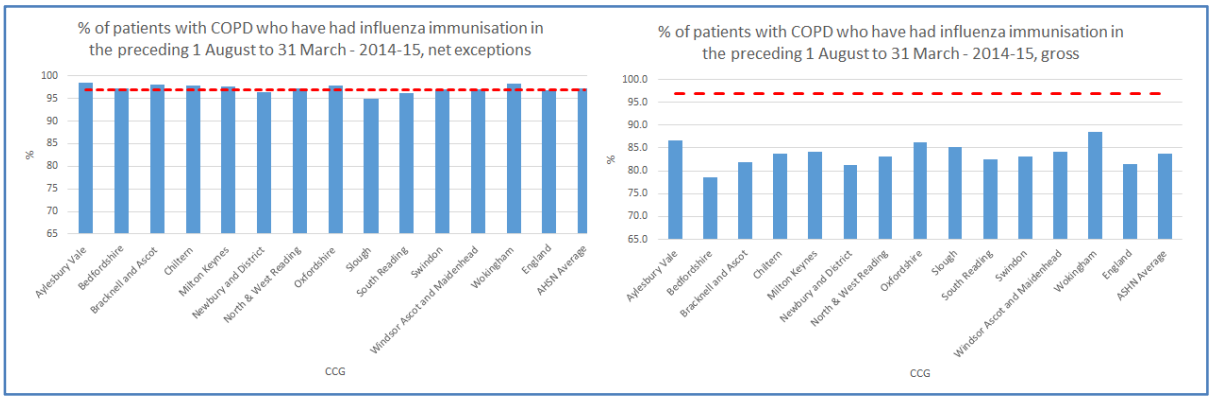


Figure 14 Flu vaccinations in patients with COPD; net exceptions (L), gross exceptions (R).

The MRC dyspnoea score ***(appendix G)*** is a measure of breathlessness based upon the impact on an individual. Together with FEV_1 and exacerbation risk is now part of the multi-dimensional assessment method to ascertain and manage risk in patients with COPD. There is significant variation and general reduction in measuring the MRC score during annual reviews, with no CCG reaching the upper payment threshold in contrast to flu vaccination. This may be related to the MRC tool not being a part of the primary care COPD template or a lack of knowledge as to its value in the assessment of COPD.

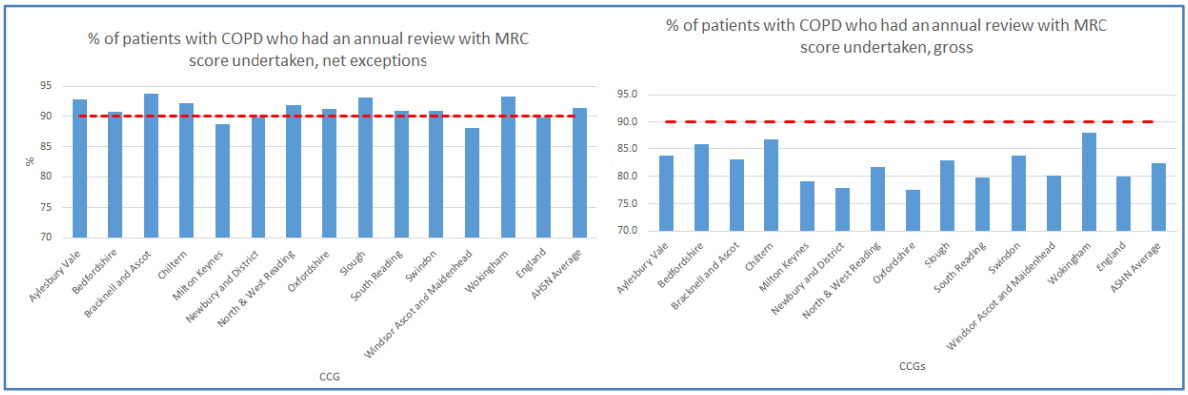


Figure 15 Proportion of COPD annual reviews with an MRC score undertaken; net exceptions (L), gross exceptions (R).

Hospital admission rates and length of stay

In 2014/15 the COPD admissions were high, with more than 75% of the region experiencing an admission rate of greater than 100 per 1000 at risk patients; or alternatively 1 in 10 patients with COPD in the AHSN get admitted to hospital. This includes admissions, first diagnosis presentations and re-admissions.

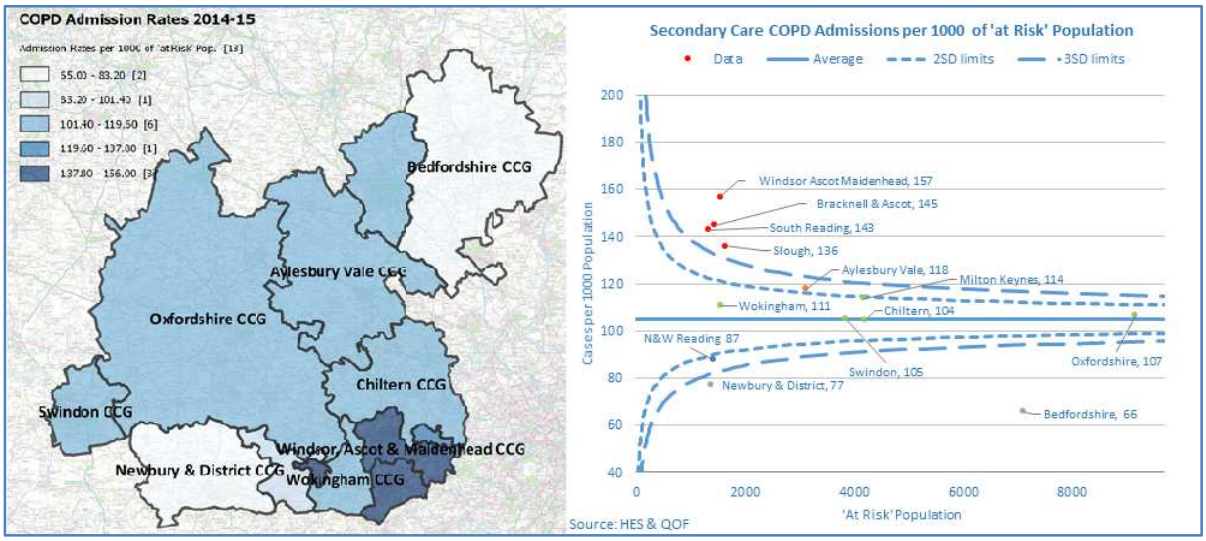


Figure 16: COPD admission rates per 1000 of 'at risk' population by CCG

The funnel plot, demonstrated that this high admission rate occurred in Windsor, Ascot and Maidenhead, Slough, South Reading and Bracknell. Features that could play a role for these areas include differences in socio-economic status, high ethnic diversity and a reduced attendance to primary care for management. The interplay between primary care and secondary care services need to be understood to dissect these admission differences.

This high admission rate, across the region, but also those with >3SD the region average rate is reflected by a year-on-year increase. Further data, regarding re-admission rates is essential in understanding whether the bulk of these increased rates are related to severity of disease, due to treatment failure, or a lack of social and network support.

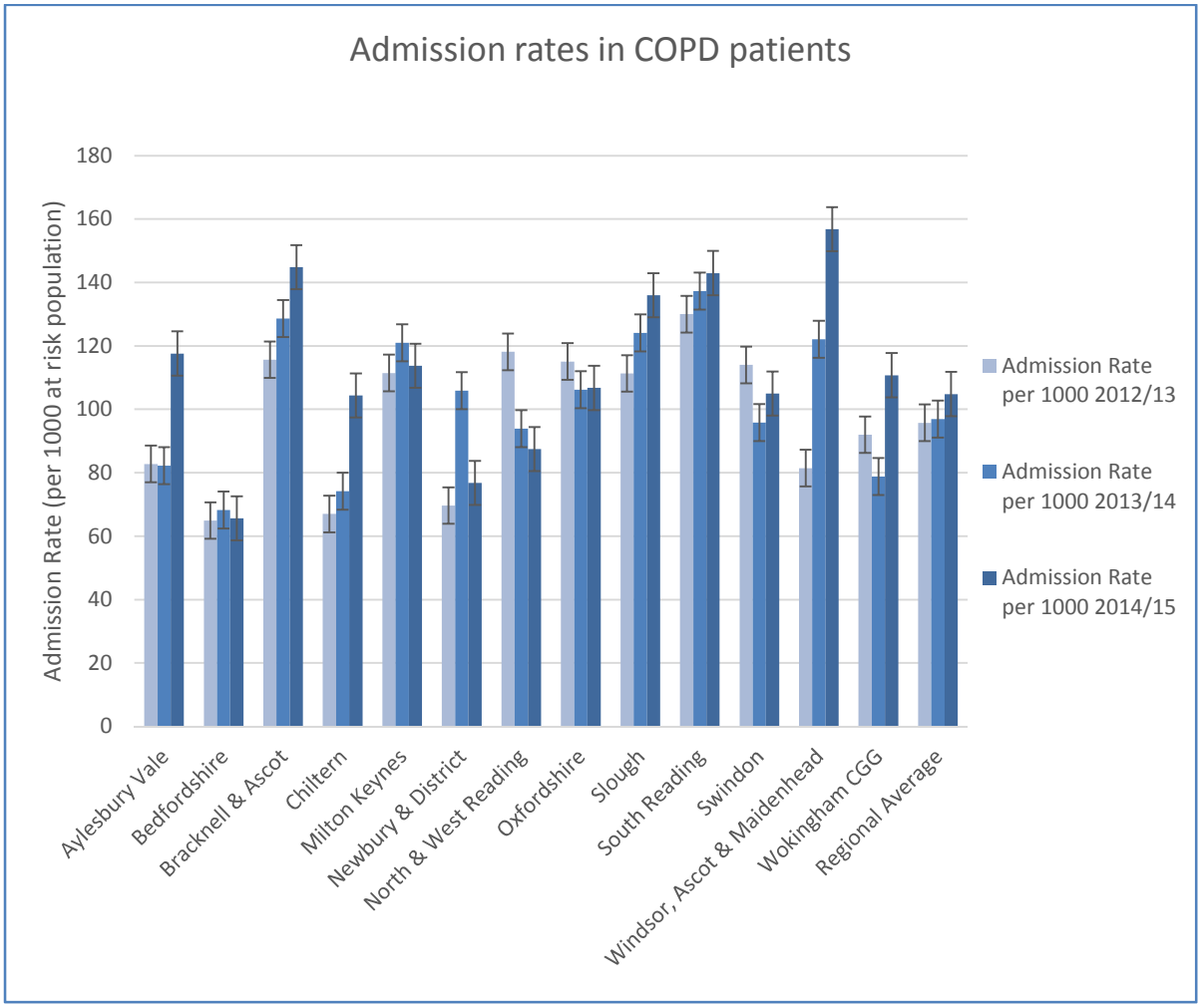


Figure 17 Admission rates in patients with COPD, 2012-2015

The average length of stay across the region is 7 days (figure 18) with very little change in impact on reducing length of stay from 2012 to 2015. This is below the national average of 8.7 days reported in the BTS COPD Audit in 2012. There is no trend demonstrating that this is reducing and is an important area for the Respiratory Better Care Network to work with primary, ED and secondary care. In the region this is at a cost of more than £8million in 2014/15 to the AHSN region (table 2).

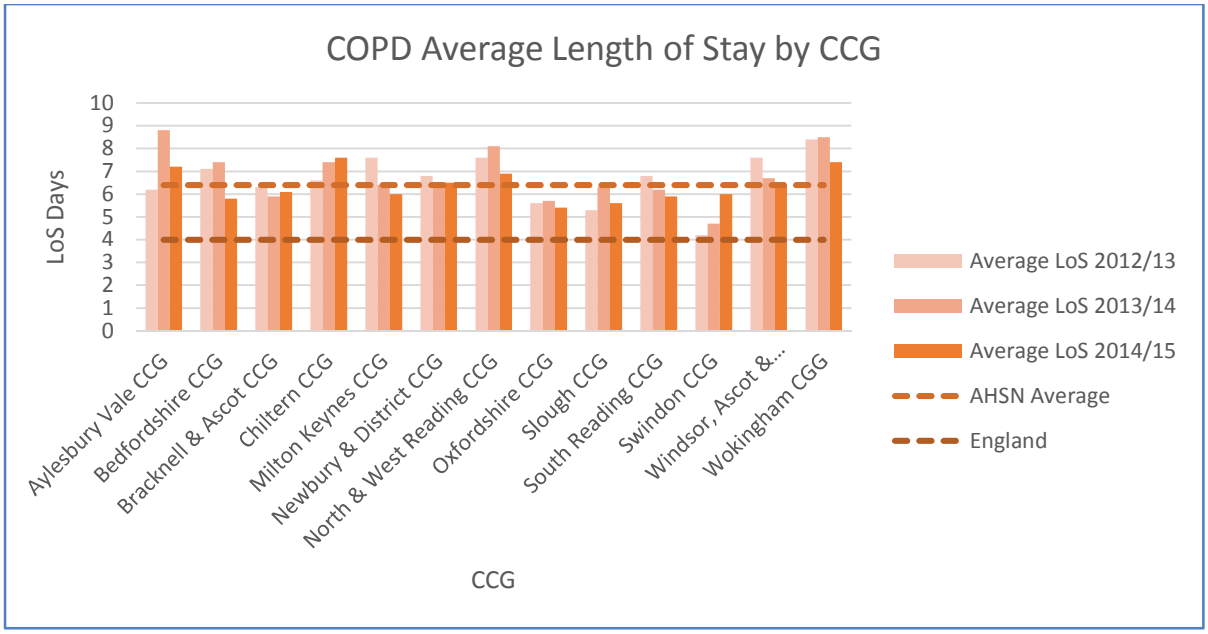


Figure 18 Length of stay of COPD admissions

Table 2 Cost and average length of stay for COPD admissions in 2014/15

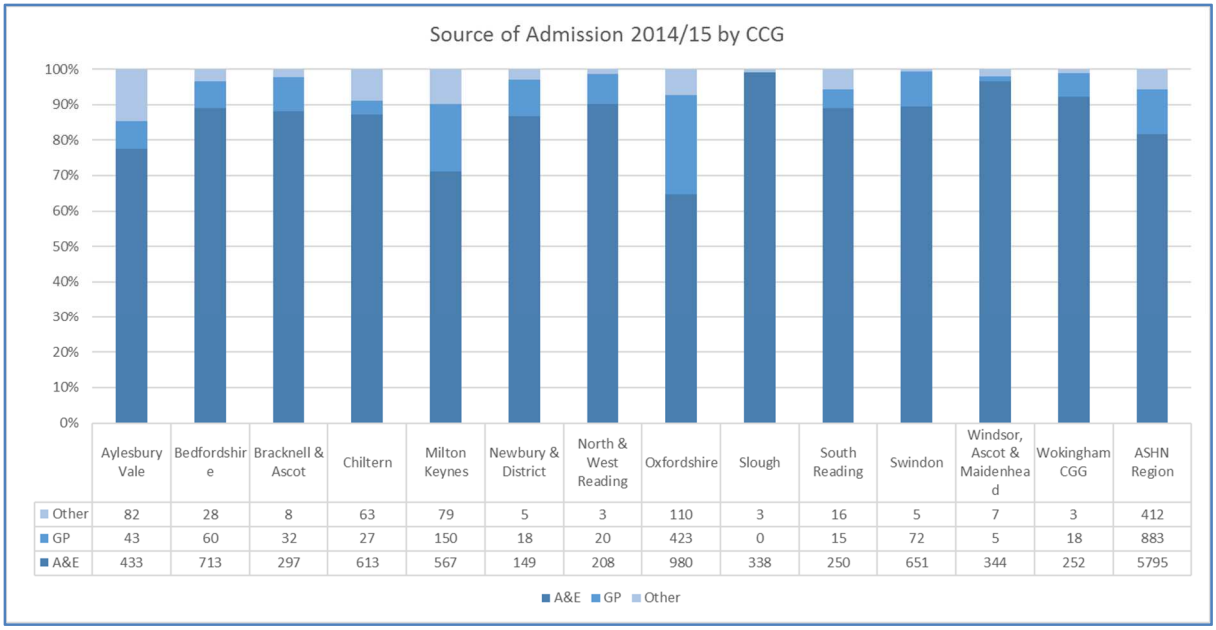
CCG Names	No. Admissions 2014/15	Average length of stay (Days)	Cost 2014/15
Aylesbury Vale CCG	367	7.2	£719,320
Bedfordshire CCG	467	5.8	£915,320
Bracknell & Ascot CCG	209	6.1	£409,640
Chiltern CCG	438	7.6	£858,480
Milton Keynes CCG	475	6	£931,000
Newbury & District CCG	106	6.5	£207,760
North & West Reading CCG	124	6.9	£243,040
Oxfordshire CCG	978	5.4	£1,916,880
Slough CCG	223	5.6	£437,080
South Reading CCG	189	5.9	£370,440
Swindon CCG	403	6	£789,880
Windsor, Ascot & Maidenhead CCG	242	6.4	£474,320
Wokingham CGG	173	7.4	£339,080
AHSN total	4394	6.4	£8,612,240

The majority of hospital admissions are directly from Emergency Departments; with Windsor Ascot and Maidenhead, South Reading and Slough having the highest source directly from ED. These are also the area with the highest admission rates. Primary care access to direct admissions are highest in Oxfordshire. This data suggests there is a variable approach to the patient with an exacerbation of

COPD with many presenting directly to hospital. This will reduce the ability to offer alternative care pathways as well as creating an enormous workload for the EDs

Figure 19 Source of COPD admissions for the region's CCGs.

COPD mortality rates



	Aylesbury Vale	Bedfordshire	Bracknell & Ascot	Chiltern	Milton Keynes	Newbury & District	North & West Reading	Oxfordshire	Slough	South Reading	Swindon	Windsor, Ascot & Maidenhead	Wokingham CGG	ASHN Region
Other	82	28	8	63	79	5	3	110	3	16	5	7	3	412
GP	43	60	32	27	150	18	20	423	0	15	72	5	18	883
A&E	433	713	297	613	567	149	208	980	338	250	651	344	252	5795

There is considerable variation in COPD mortality rates between the CCGs. There is also variation year on year within each CCG with no clear trend up or down for all. However, the AHSN regional averages demonstrate that mortality rates in COPD are not changing over time and lie at a rate of approximately 18 per 1000. These figures need to be understood in the context of the population age, the population disease severity, the population co-morbidities and the seasonal variation that is also occurring. The variation though is of concern in the CCG's with higher than average rates.

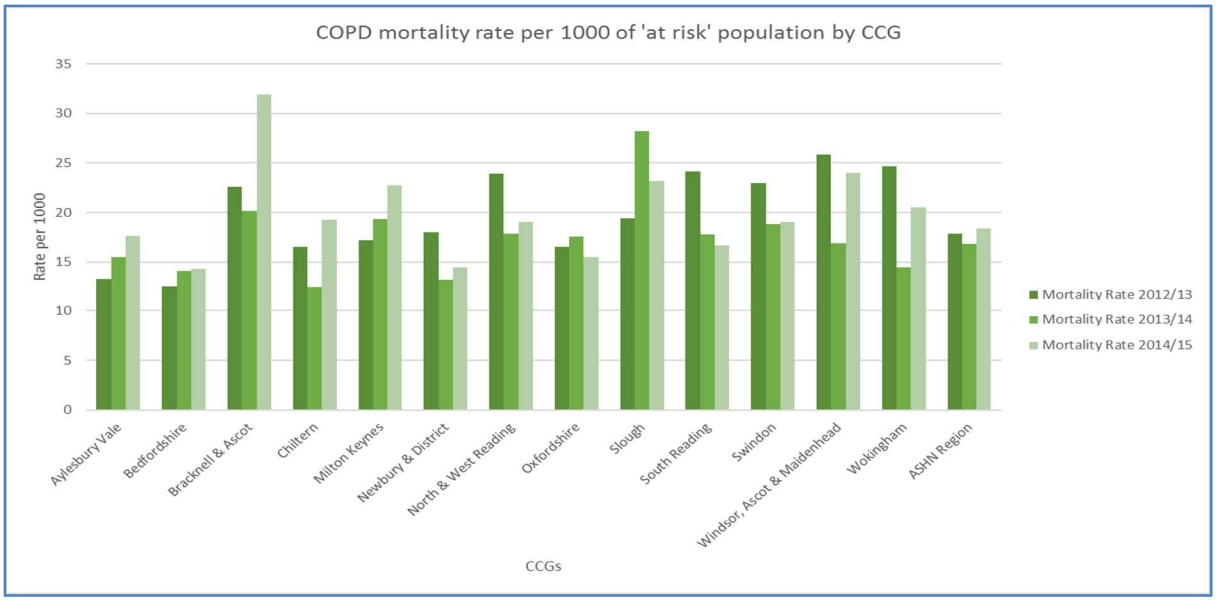


Figure 20 COPD mortality rates per 1000 of population by CCG

Emergency Care

The attendance of a patient with COPD lung attacks are important events in the patient journey. Each attendance is associated with a 10% risk of mortality, and a 40% risk of being re-admitted to hospital in the first 90 days. As with asthma, the largest majority of hospitalisations for COPD, have been access via ED. The use of care pathways, access to respiratory consults or respiratory discharge teams are a clear objective of the AHSN. Data from ED has been made available for this report only from OUH at the John Radcliffe Hospital. Again, the Respiratory Better Care Network would like to be able to work together with ED and trusts in the region to obtain the data region-wide to assess variation. We can report that there is 1 ED attendance per day admitted with an exacerbation of COPD; this rate is increasing and there is seasonal variation, although less than one might think (figure 27), with almost 80% of ED presentations being admitted to hospital.

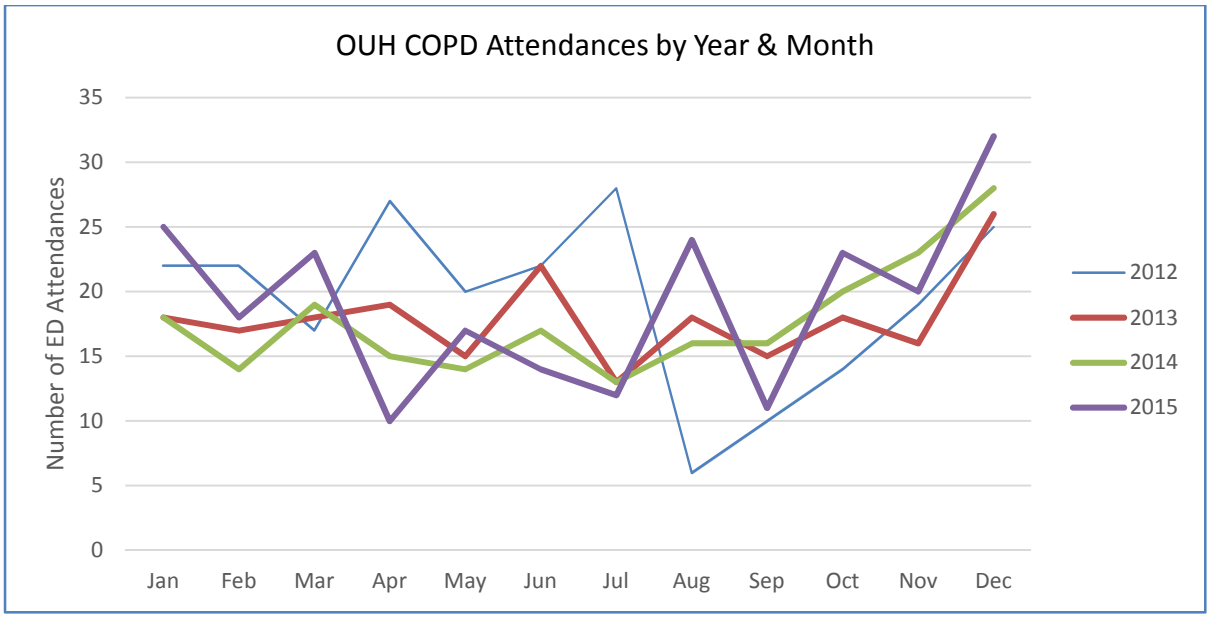


Figure 21 COPD ED attendances to OUH

The data on ED outcomes clearly demonstrates that the vast majority of patients presenting are admitted to hospital. Of those not admitted many patients are discharged back into primary care and very few are referred on to specialist services. Whilst this may be clinically reasonable it will be essential to ensure that robust follow-up is in place and that reviews of medication, inhaler technique and lifestyle have occurred in order to reduce the risk of re-attendance or risk of mortality. National recommendations, based upon clear clinical data, should be adhered to in order to achieve the best possible outcomes. Working with stakeholders in the AHSN, we can drive to implement clear changes here.

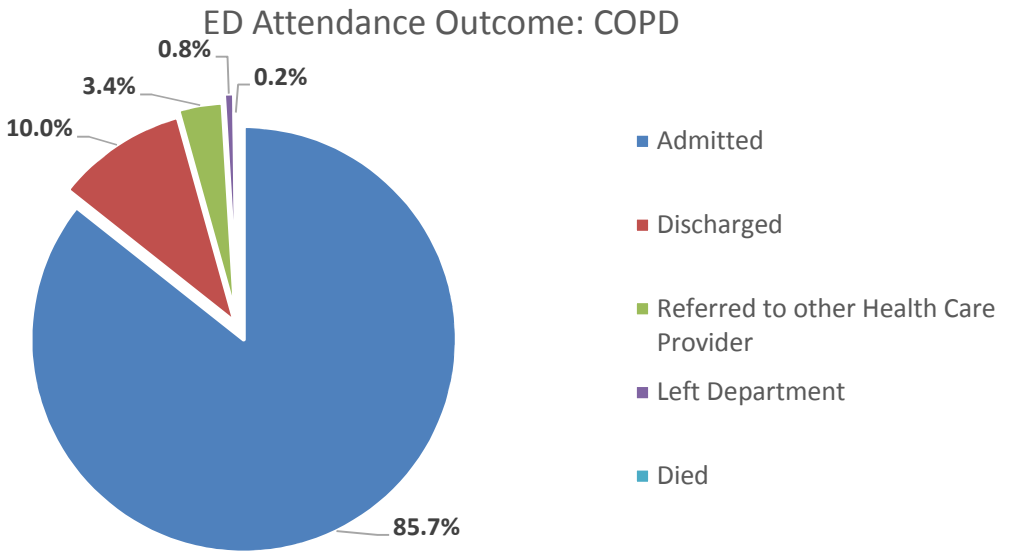


Figure 22 COPD outcome following ED attendance

Respiratory Prescribing Habits

Pharmacological treatment of COPD is used to improve symptoms and reduce risk of exacerbations; with bronchodilators having benefit in both improving symptoms and reduction of exacerbation rates above ICS/LABA combinations which have an increased risk of pneumonia. Several recent post-hoc analyses have confirmed that the peripheral blood eosinophil count may have utility in identifying ICS responsiveness in COPD. The AHSN Respiratory Better Care Network clinical leads, have been instrumental in these probable guideline changing findings, after studying this in detail in their own clinical research programmes. High prescribing of SABA in asthma has been shown to be a predictor of mortality from the NRAD report and there is a body of evidence demonstrating the efficacy of ICS therapy, with data demonstrating that ICS prescription in primary care leads to a reduction in morbidity, mortality and also a reduction in cost to the healthcare economy. This has in part driven the changes in the recent BTS/SIGN guidance.

Prescribing of ICS

For patients 'at risk' with asthma and COPD, it would seem that prescriptions for inhaled corticosteroids (ICS) in the AHSN are approximately 50% (figure 23); which if we consider the asthma population alone, would be significantly lower than warranted. Further work will need to be conducted at CCG's and practice level to determine, high dose prescribing in the COPD population and inadequate ICS prescribing in asthma.

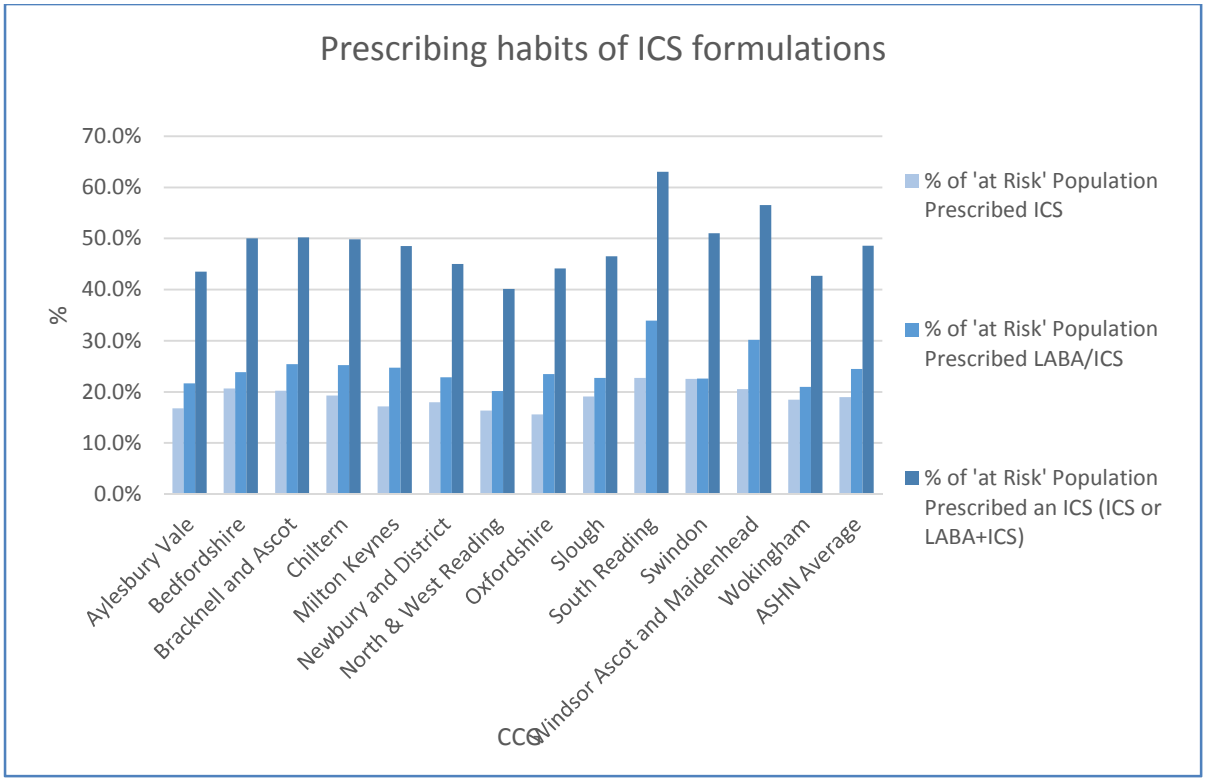


Figure 23 Chart showing the variation in the prescription of inhaled corticosteroids (ICS); long acting bronchodilators (LABA)

Prescribing of long acting bronchodilators

Mono- and dual bronchodilators (in single or combined preparations) have been demonstrated to improve lung function, quality of life and reduce exacerbations of COPD, with a favourable safety profile. In asthma, bronchodilators should not be prescribed without ICS, as this is associated with mortality.

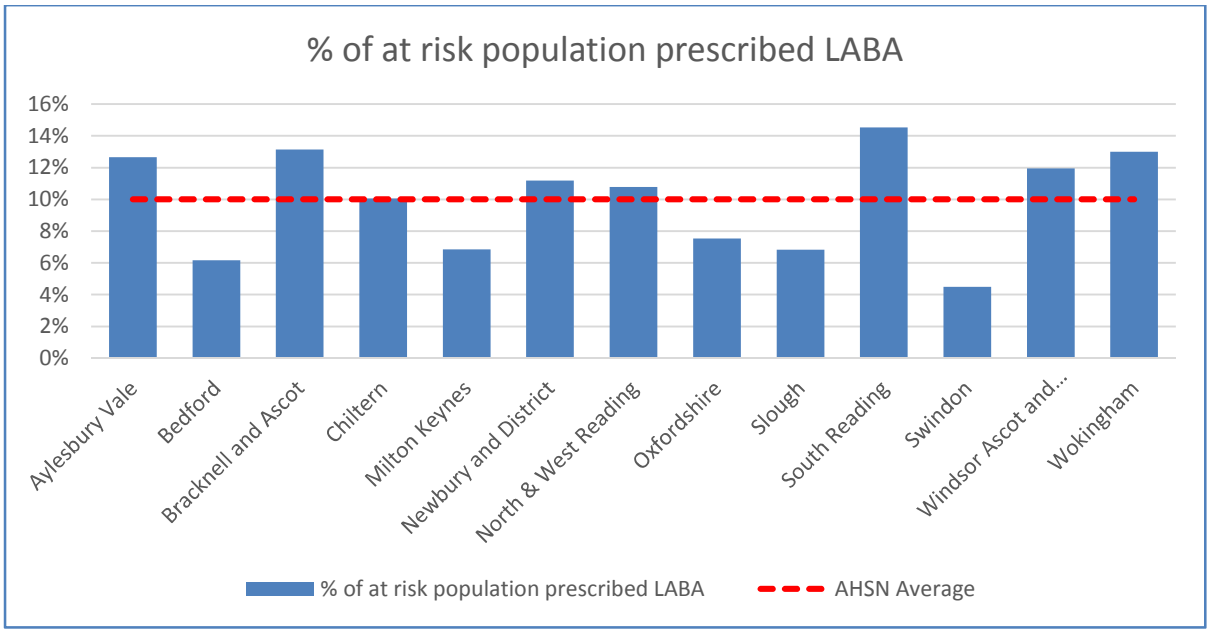


Figure 24 Single agent prescription of long acting beta agonist.

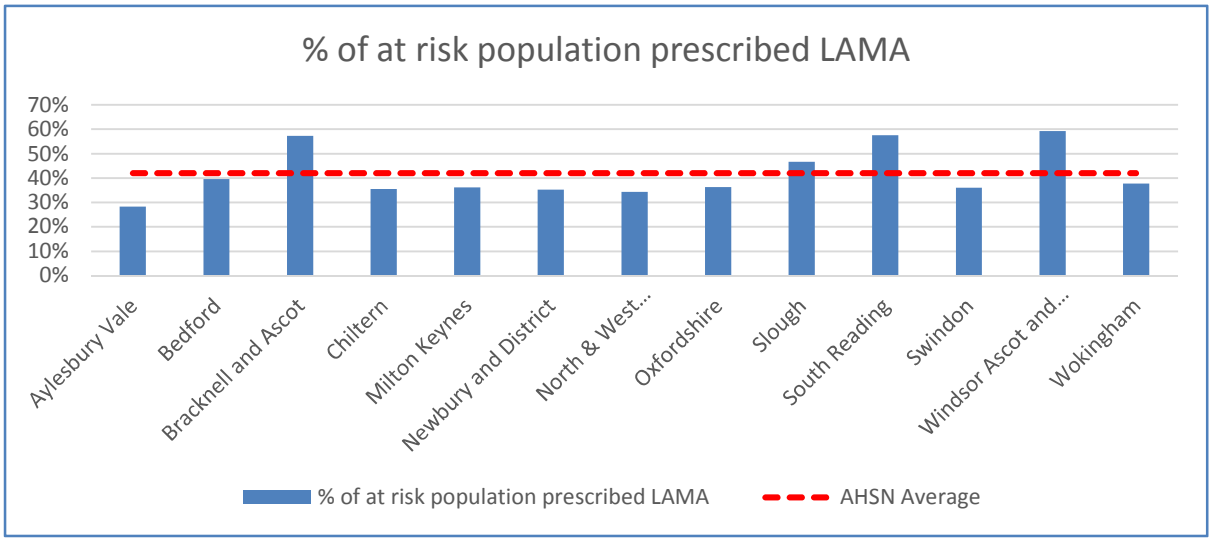


Figure 25 Single agent prescription of long acting muscarinic antagonist

Prescribing short acting bronchodilators also demonstrated variation, within individual GP practices, however this data is subject to high levels of variability due to diagnostic uncertainty ***(appendix H).***

Active and adaptive management plans to diagnose and treat asthma patients, or trigger alert to referrals for high SABA prescribing, in addition to case-finding maybe an effective method at impacting on exacerbations, hospitalisations and mortality in asthma. The use of current data held by both individual practices and CCG medicines management teams could help improve the current situation and thus reduce the burden of poorly controlled asthma and inappropriately treated COPD. An AHSN area wide unified approach would be welcomed by the CCG's and GP's. We will be working with CCG medicine management teams to further understand prescribing habits and develop algorithms which will enable area wide comparisons to be performed as well as CCG/practice level analysis. We strongly believe that the implementation of an adaptive management plan to diagnose and treat COPD patients maybe an effective method at impacting on exacerbations ***(appendix I).*** The variation seen in prescription for asthma and COPD across the AHSN region suggest that there is the potential for a unified treatment approach innovatively using nationally accepted treatment algorithms.

RESEARCH

The AHSN has a remit and desire to not only improve the quality of respiratory care through guideline implementation and the spread of best practice, but also through increasing research access of patients and via the involvement of care providers in the area in research. Evidence demonstrates that healthcare is improved in research active centres. The AHSN Respiratory Network, inclusive of currently active clinical academics, and practitioners both in primary, emergency and secondary care with remarkable academic experience in addition to engagement with the Clinical Research Network is in an excellent position to develop, engage and deliver clinical research excellence, driving guideline change.

The list of currently active research studies centred in asthma and COPD presented in ***appendix I.***

CONCLUSIONS

This is the first report of the Respiratory Better Care Network and has brought together data from a wide variety of sources. The data clearly demonstrates that variation exists, both between CCGs and within CCGs. There will be many reasons for this variation although we have tried to control the data for variation of population size and the number of diagnosed patients.

The data demonstrates that there needs to be a much more joined up approach to the management of airways disease. Effective interventions and treatments are available. At present acute lung attacks, both in asthma and COPD, are presenting primarily to the ED and thus opportunities for improving care may be utilised at this and subsequent opportunities. For example, in asthma lung attacks, patients are being discharged to primary care. Opportunities for specialist input, and clear management clinical pathways to prevent further admissions, or improve long term disease control would be valuable here.

We suspect that few reading this report will be surprised at the findings and we hope that they will encourage a renewed engagement with the improvement of care for those with asthma and COPD. The data gives us insights into where we should focus our effort and thus obtain the best outcomes without resulting in large costs. Understanding current practice and integrated approaches within the region will seek to improve Respiratory Healthcare and impact on key outcome deliverables such as re-admissions, mortality and prescribing. At the Respiratory Better Care Network we seek to achieve this working with colleagues within the Region.

Current and future work

The AHSN team has met with CCG steering committees as well as long term condition leads for half of the AHSN area, with plans to complete these meetings over the next two months. The aim of these meetings are to introduce the work of the AHSN and disseminate the results of this report, in addition to sending to all primary care respiratory leads, CCG long term conditions leads, providers of community respiratory care, ED clinical leads, ED clinical Managers, secondary care asthma and COPD leads. The Respiratory Better Care Network will hold the 1st launch event on the 6th of October.

The AHSN team has met with an Advisory Group in order to sense check the Variance Report and to gain their insights into the use of the data and which areas should be set as priorities. The advisory group felt that increasing flu vaccination uptake should be a high priority and that looking ahead to the more effective delivery of quality assured spirometry would be useful. The group felt that CCG's were keen on collaborative working and that a unified approach across care boundaries as well as CCG borders would be welcome by all.

The Network will work with stakeholders to review this data and to propose improvements to the provision of care for asthma and COPD in primary care, the ED and secondary care. It is hoped that this will lead to the formation of an AHSN area wide guideline development group who will develop, ratify and disseminate.

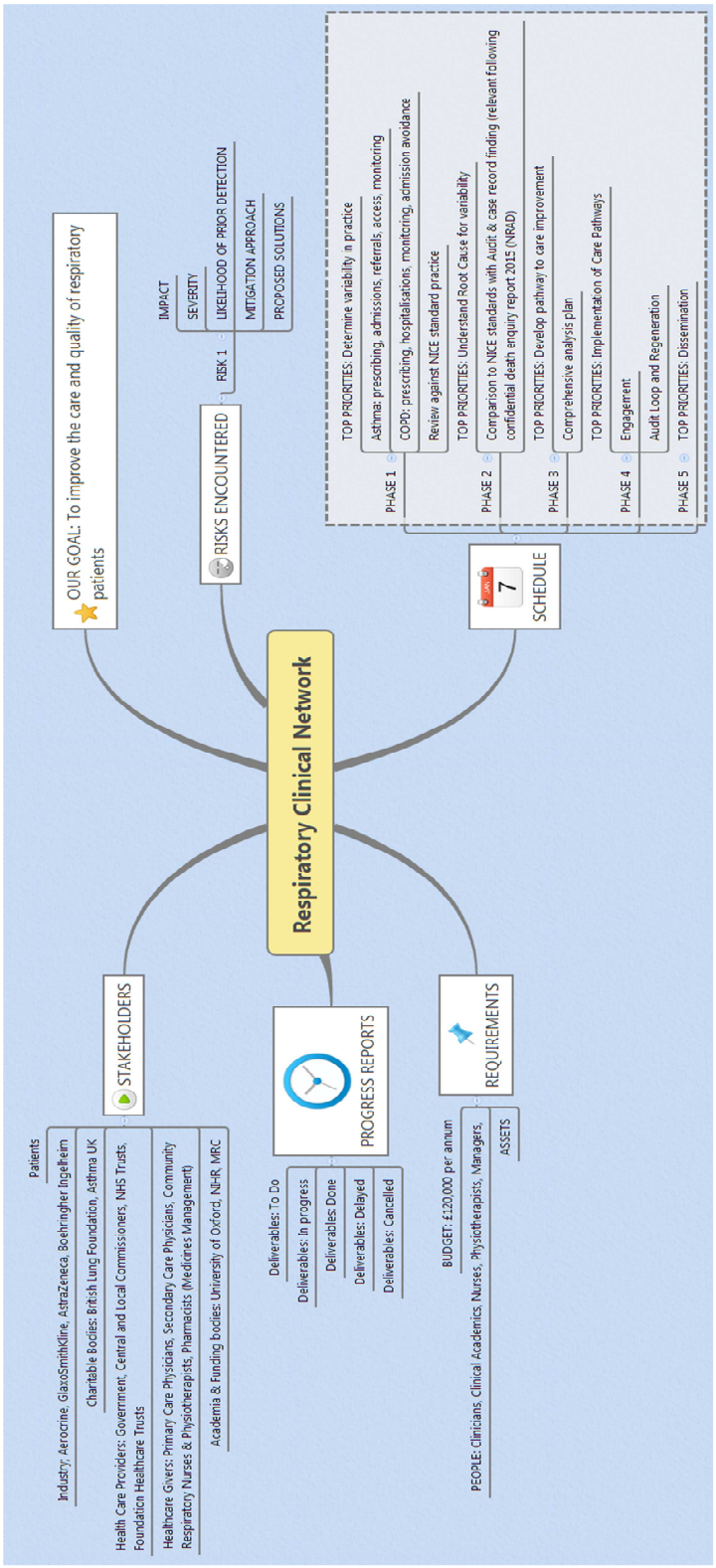
The AHSN teams approach is to listen, learn and disseminate best practice. To this end we will be developing:

- Asthma integrated care pathways for EDs to facilitate improved transfers of care both within secondary care (appropriate referral and review by asthma specialists) and back to primary care (with robust follow up and appropriate adjustments to treatment).
- Develop drug treatment protocols for asthma to increase the rate of prescription of ICS in asthma.

- Develop near patient diagnostic tools to be utilised in both asthma and COPD in order to clarify the diagnosis of asthma and COPD as well as to provide treatment that will be effective.
- There is an urgent need to develop a communication network across the region in order to share information and enable discussion in a real time manner between the many respiratory interested healthcare professionals and care providers that exist. The AHSN team will investigate how this might be achieved and develop an IT platform to support this.

Appendices

Appendix A: Respiratory Better Clinical Network Stakeholder Map, Application Aims and Objectives



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Job Title		Consultant Respiratory Physician (RR) & Senior Clinical Researcher
Contact Address		Respiratory Medicine Unit, NDMRB, Old Road Campus Oxford
Contact Details	Telephone	PA 01865 612893
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1. Engagement

The Respiratory Clinical Network's (RCN) overall goal is to improve the care of respiratory patients in primary and secondary care. We will do this by identifying inequality and by applying active education and state of the art management guidelines to minimize this. In order to deliver this objective, within the lifetime of this network, we will: 1) perform a scoping exercise to identify key stakeholders *[see appendix 1]*; 2) use local and national databases to identify variations in hospitalization and readmission rates; 3) facilitate communication and increase engagement by holding bi-annual stakeholder meetings; and 4) allocate each stakeholder a lead contact and agree local and generic priorities. The former will be driven by our analysis of outcomes in the local population and the latter identified yearly by the network along with clear deliverables. Each stakeholder meeting will be analysed, reported and minutes recorded, with regular assessment of risk and delivery.

2. Strength of Future Plans and Delivery of Past Projects

This is the first bid for a RCN. We believe we are in a strong position to establish an effective network, as we have a track record of delivery of joined up care, demonstrated by the South Central Oxygen Network and the Respiratory Practitioners Networks. In addition, respiratory teams in East Berks, West Berks, South Bucks and Oxford have already developed local initiatives reducing hospital admissions and improving patient care. The proposed RCN will build upon these existing productive relationships, engaging with the individual stakeholders with the aim of understanding what has worked well and implement it across the network. We will determine whether this results in a more unified health practice across the region.

Our RCN will focus on asthma, and chronic obstructive pulmonary disease (COPD) as these conditions are common in primary and secondary care and result in much of the local respiratory morbidity and mortality. These conditions are also ideally suited for a network a there has been recent rapid change in diagnostic and management algorithms, which present challenges for the implementation of best evidence-based management. Our plan is to develop and implement pathways using near-patient devices (NiOX® & HemoCue®) *[see appendix 2],* the use of which is essential for risk and treatment stratification of patients. Recent NICE guidelines have called for exhaled nitric oxide in all patients presenting to primary care. This has not yet been implemented locally. We will seek to understand why and how best to overcome these difficulties. There are a number of new treatments in the late stages of clinical trial development whose effect can be significant in the correct patient population. We suspect (and aim to document) inequality in access to clinical studies for patients across the region, with many hundreds of patients each year enrolled in clinical trials and observational studies in Oxford and only a handful in all other Trusts in the region. This is a major concern as there is evidence that research active hospitals have better outcomes. We will ensure that suitable patients have equitable access. A final strength of our network is the team. Much of the new thinking in airways disease has been driven by the applicants, putting us in an ideal position to drive progress. We have experience in addressing research questions that improve practice, implementation and delivery of difficult asthma and COPD services; and are represented on national and international guideline committees.

3. Outcome Objectives

Asthma and COPD are common chronic lung conditions associated with a significant impact on the health and wealth of the Nation. These conditions affect patients daily, are associated with acute worsening, these a common cause of hospitalisation and death. There is acknowledged to be significant variability in outcomes between and within regions and increasing concerns about a stalling in progress against key outcomes such as hospitalization rates and readmission rates. There are NICE quality standards, directed in the diagnosis, care and management of both asthma and COPD, in addition to national guidance from the

British Thoracic Society (BTS). We will use these best practices to primarily understand and reduce regional variability to ultimately improve and provide best practice.

We have set the following objectives over the 5-year term *[detailed below]*.

1. Discovery & scope of current practice
2. Identify areas for improvement
3. Improve access to research for respiratory patients
4. Development and implementation of pathways using near-patient devices and information Technology software

We will measure these objectives using the following:

i) Patient satisfaction surveys
ii) Stakeholder and user satisfaction
iii) Improved activity, as measured by continual audit loops
iv) Research participation levels
v) Improvements in outcome and reduced cost: reduction in hospitalisation, reduction in preventable deaths, reduction in unnecessary prescriptions.

In order to mitigate risk we will develop a risk register with our stakeholders which will be regularly reviewed, updated and acted upon.

Asthma Care

The recent confidential national review of asthma deaths (NRAD 2015) showed that the UK still has one of the highest mortality rates in the EU. 90% of all asthma deaths in the UK are preventable as are hospitalisations. The NRAD review committee identified simple measures such as evaluation of the short acting beta-agonist/inhaled corticosteroid ratio in patients managed in primary care and timely specialist review in patients admitted with asthma attacks. In our region it is unclear if NRAD recommendations have been i) disseminated and understood; ii) already performed; and iii) implemented. Exhaled nitric oxide (FeNO) has been approved by NICE [http://www.nice.org.uk/guidance/dg12] to diagnose and manage asthma. This can be an aid to diagnosis and determine adherence, asthma control and medicine management. We will look at the use and delivery of this near-patient device in the area.

COPD Care

COPD care annually costs the NHS £1billion; with approximately £500 million being spent on exacerbations alone. Approximately 1 in 8 hospitalised events are related to an exacerbation of COPD and re-admission rates vary across the region. They are largely responsible for the Winter bed crises. There are effective treatments: pulmonary rehabilitation and smoking cessation improve quality of life and decrease hospitalisation but up-take is poor nationally. Pharmacotherapy with 'triple inhaled therapy' may not be beneficial to all, and rates of pneumonia have been shown to increase with inhaled corticosteroid use. It is therefore important that the drug treatment of COPD is targeted to those who will get greatest benefit.

4. Engagement with other Oxford AHSN Clinical Networks, Programmes and Themes, and with Strategic Clinical Networks

We will be seeking key collaboration and engagement with the Acute Ambulatory and the Paediatric Networks. This will be valuable where acute respiratory illness is both important in children and the acute setting. Other networks and programmes that we will engage with include: the Patient Safety Academy, Pharmacy and Medicine Management, PPIEE, Informatics and Medical Technologies and Research & Development. Utilisation plans will include annual invitations to each theme/network to our RCN meetings.

Respiratory Clinical Network Objectives

To use these best practices to primarily understand and reduce regional variability to improve and provide best practice in Respiratory Health

We have set the following objectives over the 5 year term

1. Discovery & scope of current practice
    i. Incidence of asthma and COPD

ii. Occurrence of annual reviews relating to Asthma personal management plan/Spirometry/medicine management
iii. Hospitalisation episodes
iv. Discharges & Readmission rates/Specialty follow-up
v. Mortality

2. Identify areas for improvement
    i. From audit and scope data from point 1 (i-v) we will seek to identify areas of improvement and reappraise this with integration pathway and re-audit
    ii. We will liaise with Stakeholders to determine which interventions will get priority (local and regional)

3. Improve access to research for respiratory patients
    i. This will support both improvement and implementation

4. Development and implementation of pathways using near-patient devices and Information Technology software
    i. Near-patient testing (NiOx and HemoCue) will be utilized to improve outcomes
    ii. Integrated IT, with design specifically to identify and reduce risk

Appendix B: ICD-10 Codes Used

Asthma:

ICD10	Sub-codes included	Description
J45	J45.0, J45.1, J45.8, J45.9	Asthma
J46		Status asthmaticus
J82		Pulmonary eosinophilia, not elsewhere classified

COPD:

ICD10	Sub-codes included	Description
J41	J41.0, J41.1, J41.8	Simple and mucopurulent chronic bronchitis
J42		Unspecified chronic bronchitis
J43	J43.0, J43.1, J43.2, J43.8, J43.9	Emphysema
J44	J44.0, J44.1, J44.8, J44.9	Other chronic obstructive pulmonary disease

Exacerbations:

ICD10	Sub-codes included	Description
A37	A37.0, A37.1, A37.8, A37.9	Whooping cough
B01.2		Varicella pneumonia
B05.2		Measles complicated by pneumonia
B20.6		HIV disease resulting in Pneumocystis carinii pneumonia
B25.0		Cytomegaloviral pneumonitis
B96.0		Mycoplasma pneumoniae as cause dis class oth chaps
J04.1		Acute tracheitis
J04.2		Acute laryngotracheitis
J09		Influenza due to other identified influenza virus
J10	J10.0, J10.1, J10.8	Influenza due to identified influenza virus
J11	J11.0, J11.1, J11.8	Influenza, virus not identified
J12	J12.1, J12.2, J12.8, J12.9	Adenoviral pneumonia
J13	J13.X	Pneumonia due to Streptococcus pneumoniae
J14	J14.X	Pneumonia due to Haemophilus influenzae
J15	J15.0, J15.1, J15.2, J15.3, J15.4, J15.5, J15.6, J15.7, J15.8, J15.9	Bacterial pneumonia, not elsewhere classified
J16	J16.0, J16.8	Pneumonia due to other infectious organisms NEC
J17	J17.0, J17.1, J17.2, J17.3, J17.8	Pneumonia in diseases classified elsewhere
J18	J18.0, J18.1, J18.2, J18.8, J18.9	Pneumonia, organism unspecified
J20	J20.0, J20.1, J20.2, J20.3, J20.4, J20.5, J20.6, J20.7, J20.8, J20.9	Acute bronchitis
J21	J21.0, J21.8, J21.9	Acute bronchiolitis
J22	J22.X	Unspecified acute lower respiratory infection
J44.0		Chronic obstructive pulmonary disease with acute lower respiratory infection
J85.1		Abscess of lung with pneumonia
U04	U04.9	Severe acute respiratory syndrome [SARS]
J06.9		Acute upper respiratory infection, unspecified
J96	J96.0, J96.1, J96.9	Respiratory failure, not elsewhere classified
R09.2		Respiratory arrest

Appendix C: Proportion of asthma and COPD patients at risk

Asthma >16 years of age:

CCG Codes	CCG Names	Registered with diagnosis of Asthma on QOF 2012/13	Registered with diagnosis of Asthma on QOF 2013/14	Registered with diagnosis of Asthma on QOF 2014/15
10Y	Aylesbury Vale CCG	12,567	12086	13187
06F	Bedfordshire CCG	27,668	29214	30238
10G	Bracknell & Ascot CCG	7,498	7729	7744
10H	Chiltern CCG	17,926	19549	20151
04F	Milton Keynes CCG	13,674	14900	15477
10M	Newbury & District CCG	7,301	7488	7515
10N	North & West Reading CCG	7,133	7175	7275
10Q	Oxfordshire CCG	38,363	40390	41800
10T	Slough CCG	7,428	7783	7998
10W	South Reading CCG	6,544	6598	6687
12D	Swindon CCG	13,735	14402	14834
11C	Windsor, Ascot & Maidenhead CCG	7,771	7986	8147
11D	Wokingham CCG	9,289	9874	10168
	ASHN Region Total	176,897	185,174	191,221

COPD >40 years of age:

CCG Codes	CCG Names	Registered with diagnosis of COPD on QOF 2012/13	Registered with diagnosis of COPD on QOF 2013/14	Registered with diagnosis of COPD on QOF 2014/15
10Y	Aylesbury Vale CCG	2,936	3027	3121
06F	Bedfordshire CCG	6,393	6740	7119
10G	Bracknell & Ascot CCG	1,418	1392	1443
10H	Chiltern CCG	3,940	4097	4197
04F	Milton Keynes CCG	3,840	3985	4176
10M	Newbury & District CCG	1,335	1360	1380
10N	North & West Reading CCG	1,253	1288	1418
10Q	Oxfordshire CCG	8,411	8780	9161
10T	Slough CCG	1,545	1596	1640
10W	South Reading CCG	1,200	1238	1322
12D	Swindon CCG	3,658	3715	3838
11C	Windsor, Ascot & Maidenhead CCG	1,510	1540	1543
11D	Wokingham CGG	1,500	1522	1562
	ASHN Region Total	**38,939**	**40,280**	**41,920**

Appendix D: Source codes of admission

Code	Grouping	Admission Method Description
28	ED	Accident and emergency department of another provider where the patient had not been admitted
21	ED	Accident and emergency or dental casualty department of the Health Care Provider
2D	ED	Other emergency admission
2B	ED	Transfer of an admitted patient from another hospital provider in an emergency
23	GP	Bed bureau
22	GP	GENERAL PRACTITIONER: after a request for immediate admission has been made direct to a Hospital Provider, i.e. not through a Bed bureau, by a GENERAL PRACTITIONER or deputy
12	Other	Booked
24	Other	Consultant Clinic, of this or another Health Care Provider
13	Other	Planned
82	Other	Transfer of any admitted PATIENT from other Hospital Provider other than in an emergency

Appendix E: BTS/SIGN summary characteristics for the management of adult asthma

	Primary Care	Secondary Care
Asthma control	✓	
Spirometry/PEF	✓	
Exacerbation history	✓	
Inhaler check	✓	
Adherence check	✓	
SABA reliance	✓	
Written self-management plan	✓	✓
Specialist review in hospital		✓
Follow-up following acute attack – in hospital or out-of-hours	✓ (within 2 days of discharge)	✓ (within 4 weeks of discharge)
Difficult asthma – needs to be seen by specialist MDT		✓

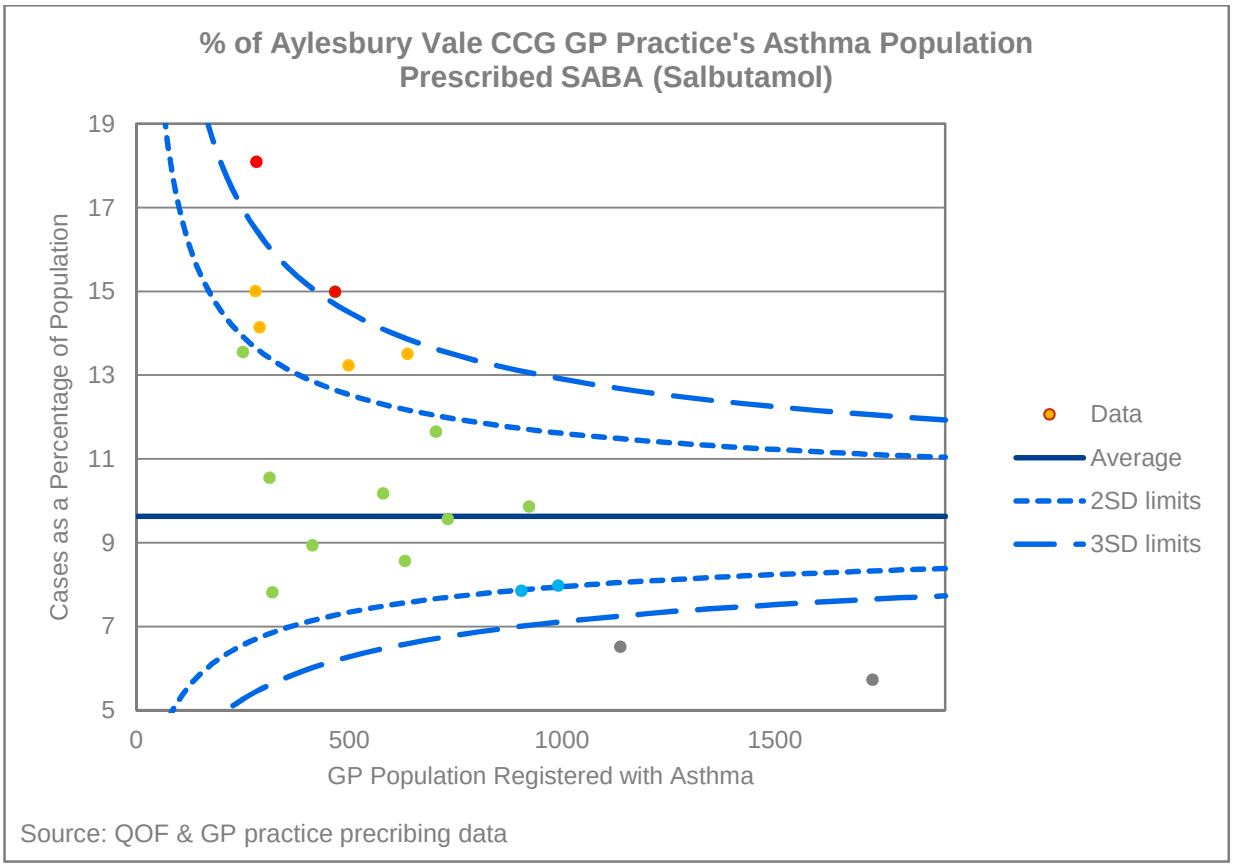
Appendix F Commissioned COPD services

Area	Commissioning Organisation	Pulmonary Rehabilitation Service
Bedfordshire	Bedfordshire CCG	Service: Bedfordshire Integrated COPD Service Contract: The Luton & Dunstable Hospital NHS Foundation Trust & Bedford Hospital NHS Trust
Berkshire East	Bracknell & Ascot CCG	Service: Pulmonary Rehabilitation & Respiratory Physiotherapy Contract: Frimley Park NHS Foundation Trust
	Slough CCG	
	Windsor, Ascot & Maidenhead CCG	
Berkshire West	Newbury & District CCG	Service: Breathe - West Berkshire Contract: Berkshire Healthcare Foundation Trust
	North & West Reading CCG	
	South Reading CCG	
	Wokingham CCG	
Buckinghamshire	Aylesbury Vale CCG	Service: Bucks Integrated Respiratory Service Contract: Bucks Healthcare NHS Trust
	Chiltern CCG	
	Milton Keynes CCG	Service: Milton Keynes Long Term Conditions Team Contract: Central and North West London NHS Foundation Trust (CNWL)
Oxfordshire	Oxfordshire CCG	Service: Pulmonary Rehabilitation Service Contract: Oxford Health NHS Foundation Trust
Wiltshire	Swindon CCG	Service: Healthy Lives Contract: SEQOL

Appendix G: MRC Dyspnoea Scale

MRC Dyspnoea Scale	
1.	Not troubled by breathless except on strenuous exercise
2.	Short of breath when hurrying on a level or when walking up a slight hill
3.	Walks slower than most people on the level, stops after a mile or so, or stops after 15 minutes walking at own pace
4.	Stops for breath after walking 100 yards, or after a few minutes on level ground
5.	Too breathless to leave the house, or breathless when dressing/undressing

Adapted from Fletcher CM. The clinical diagnosis of pulmonary emphysema—an experimental study. Proc R Soc Med 1952;45:577–584.



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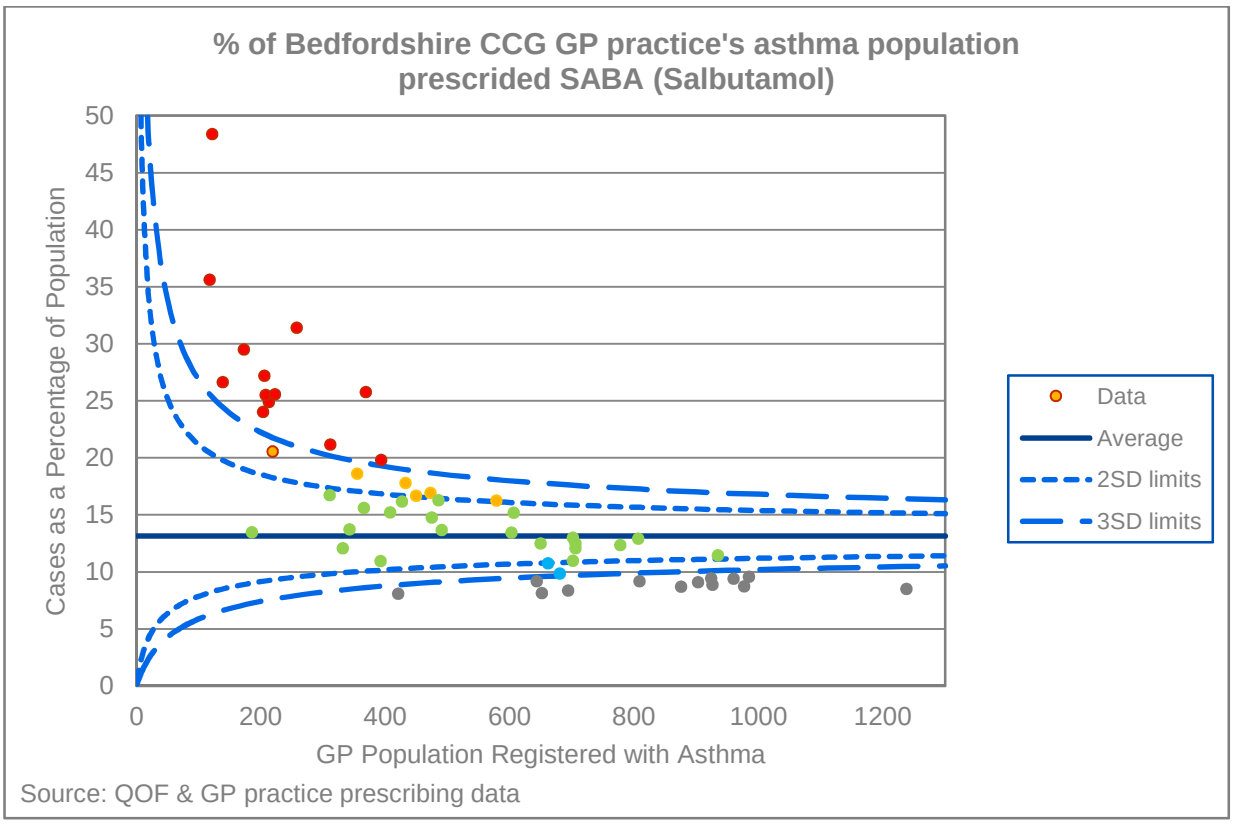
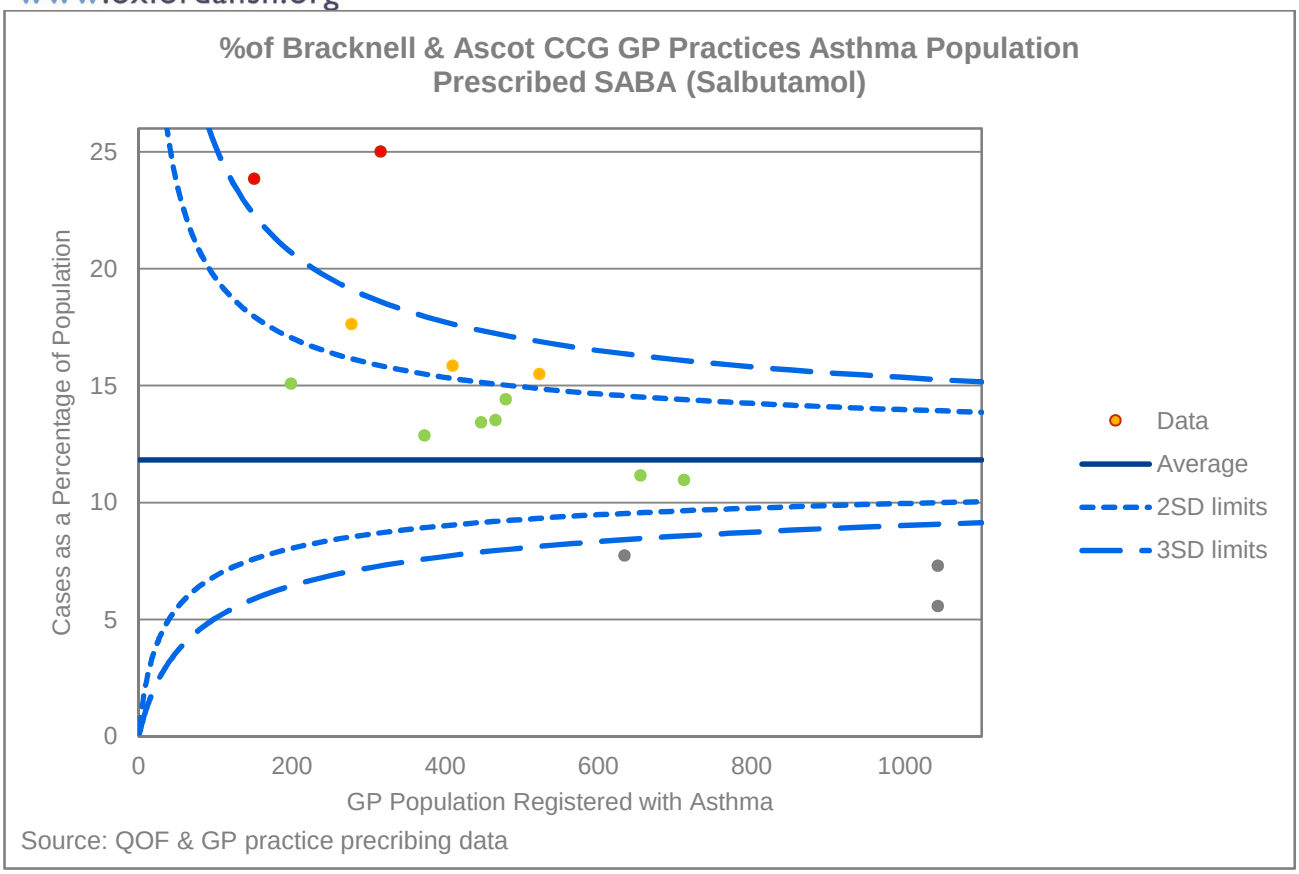


Source: QOF & GP practice prescribing data



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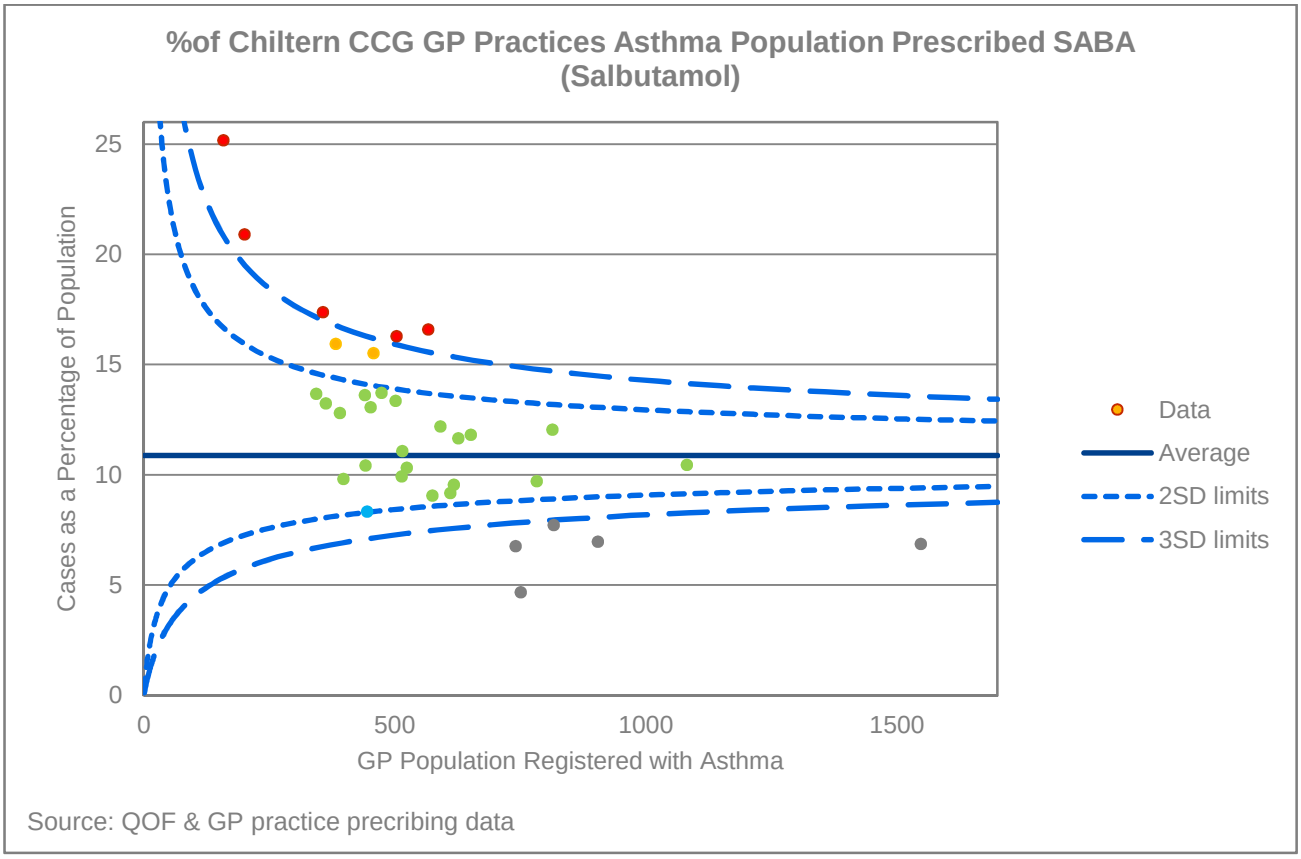

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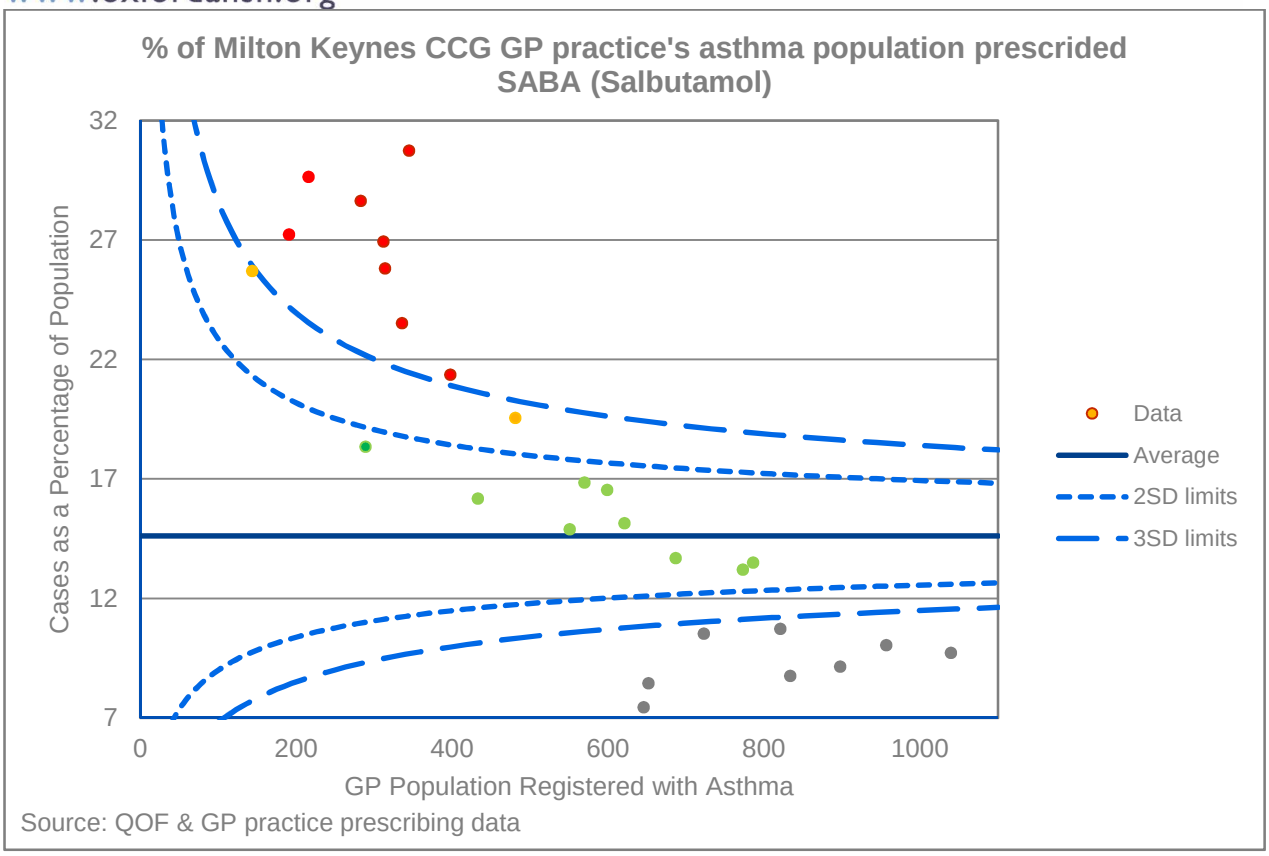

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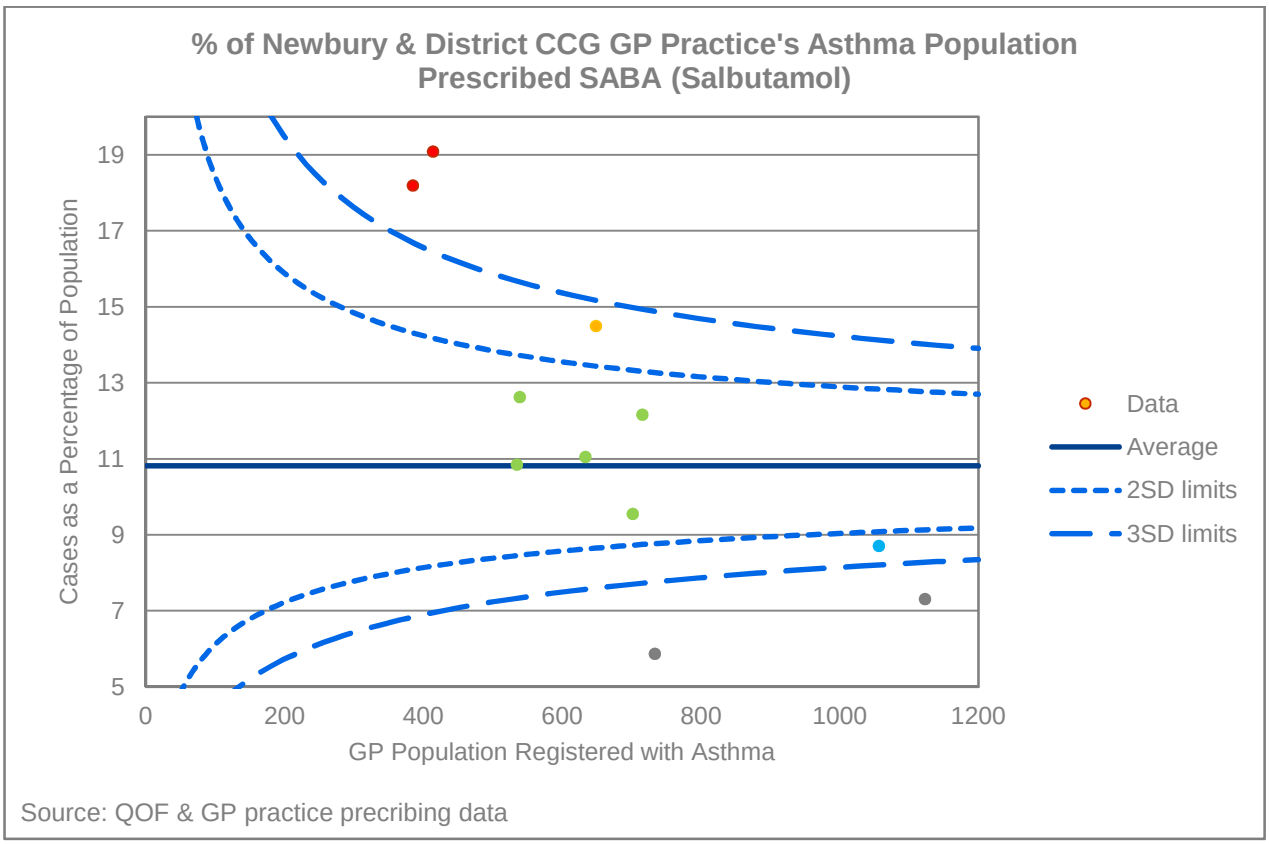

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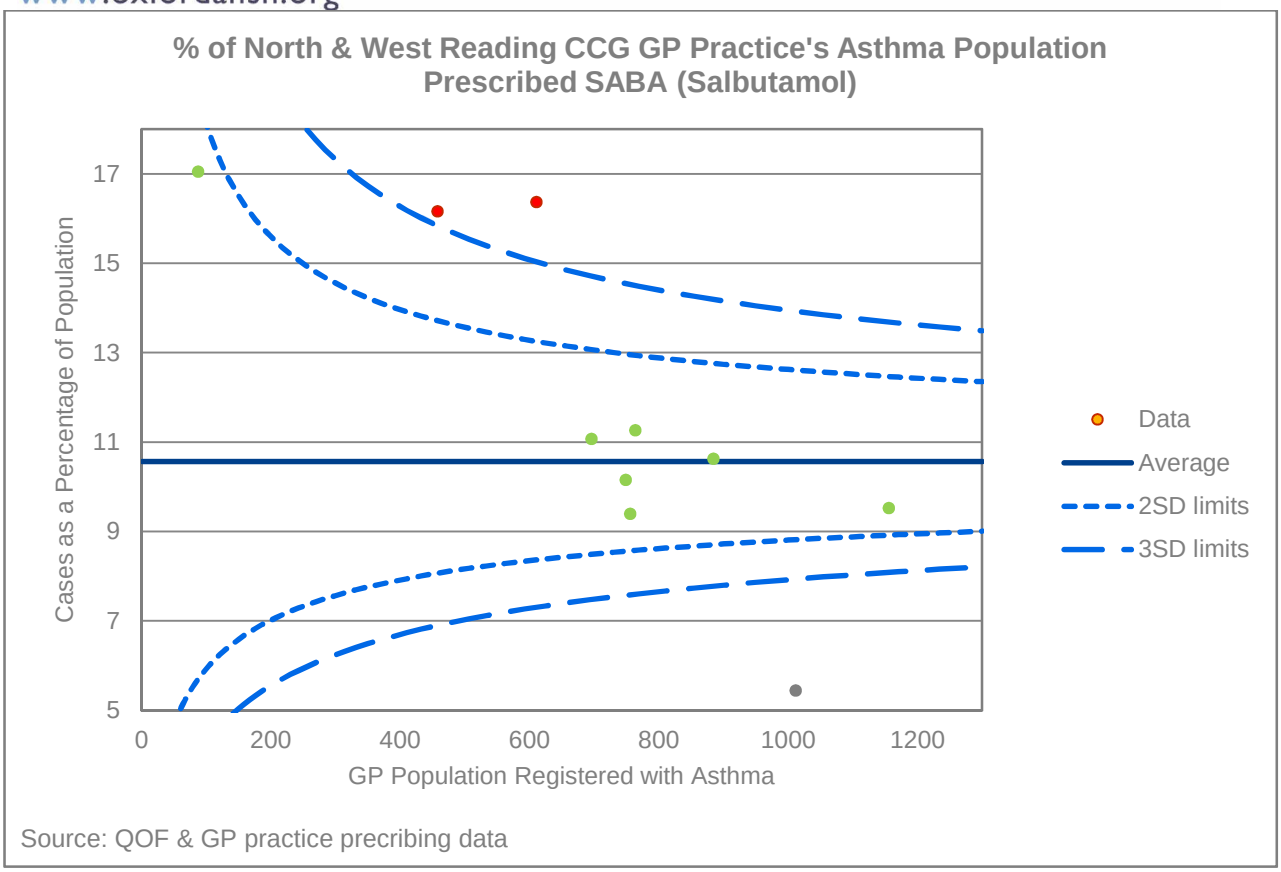

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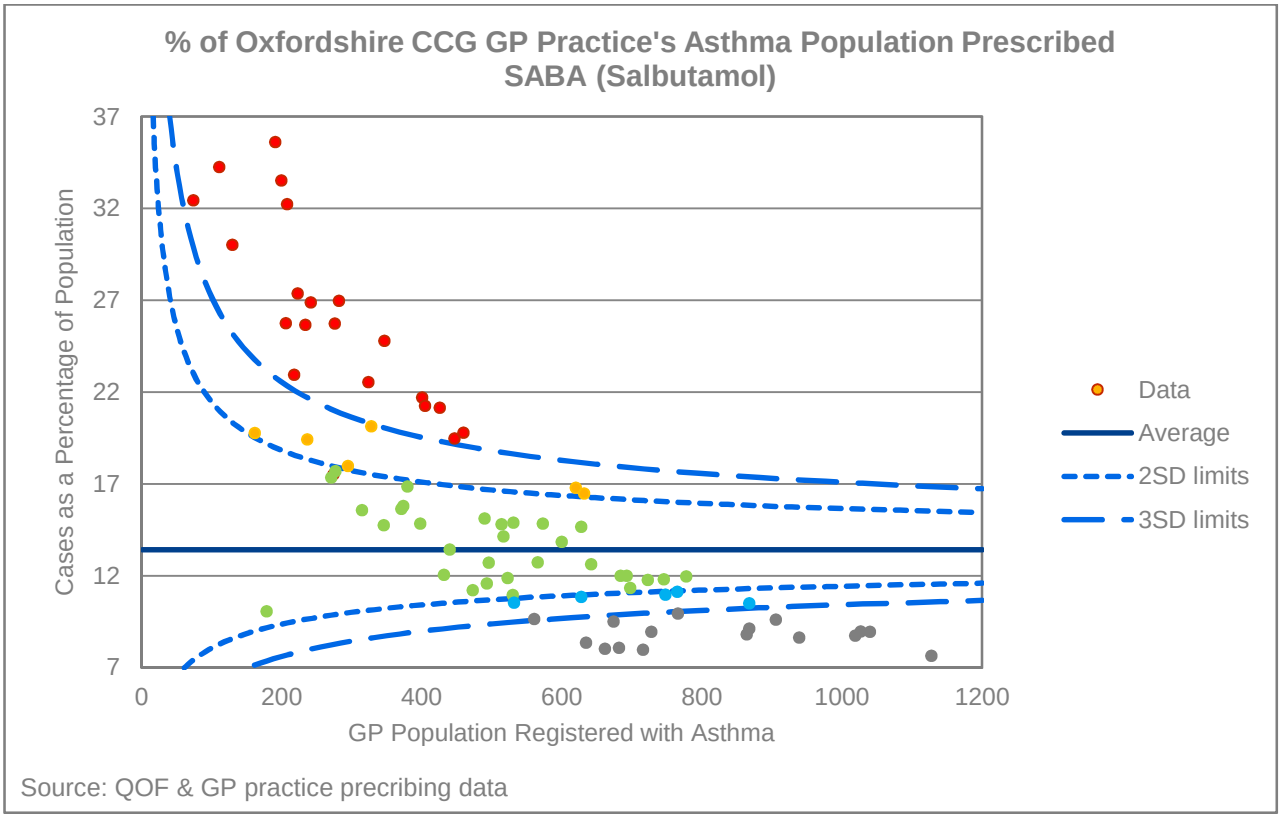

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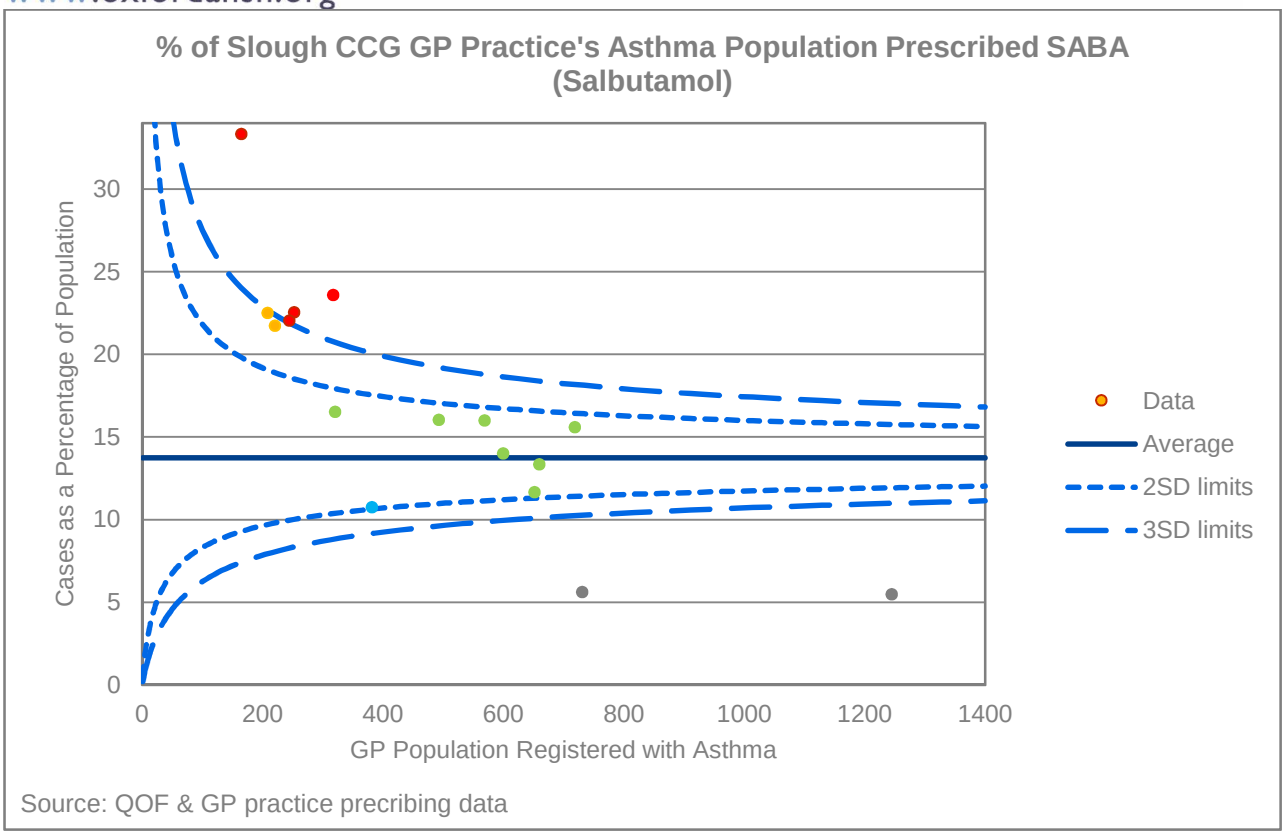

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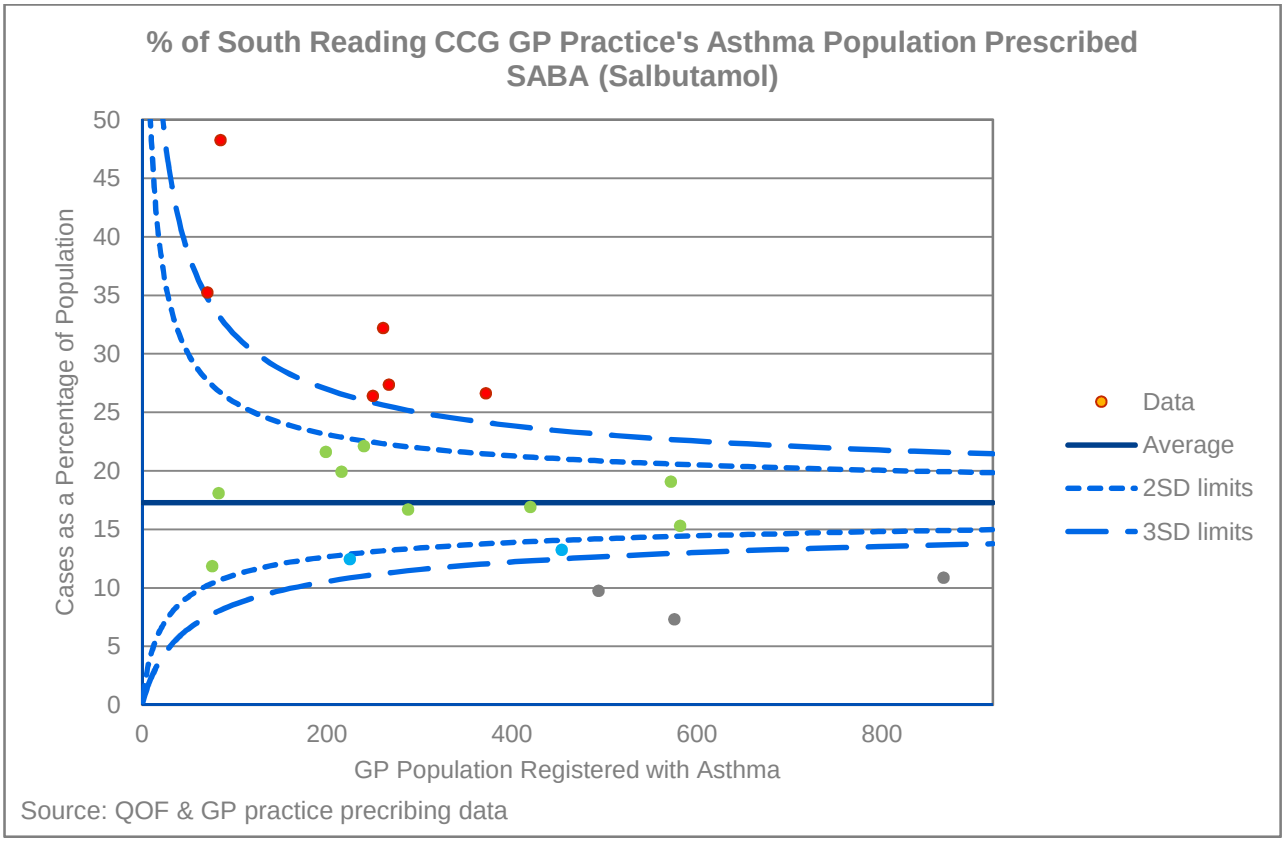

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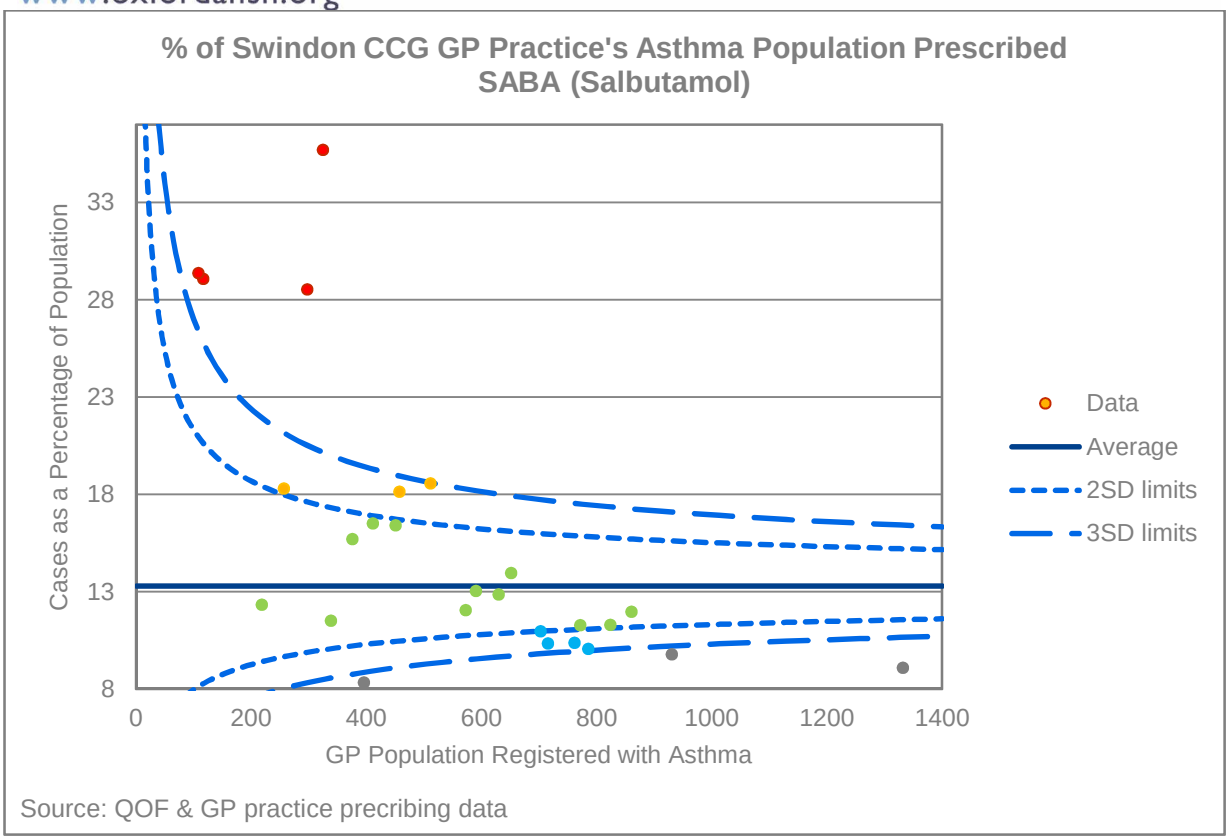

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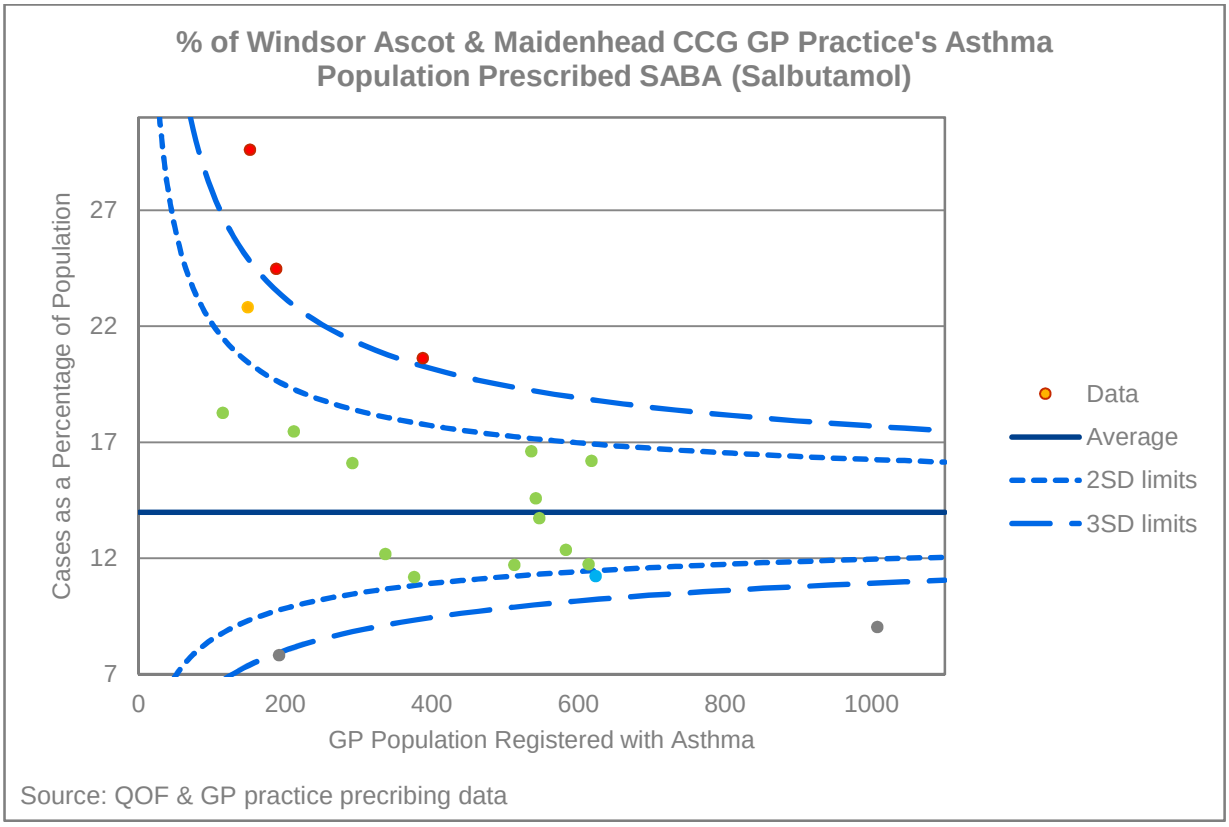

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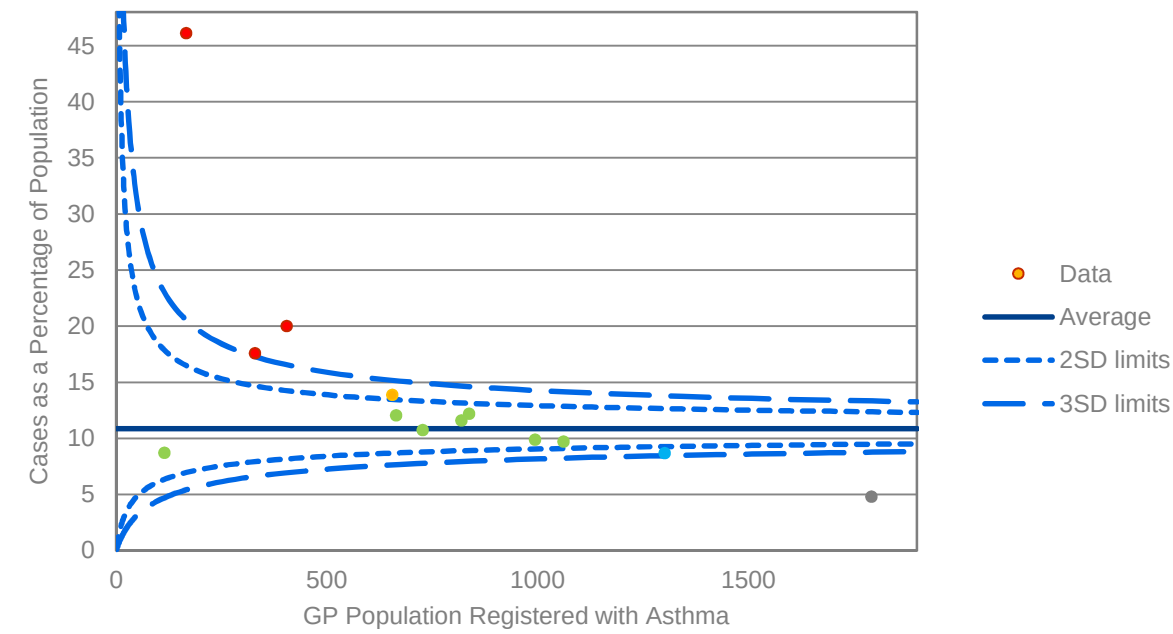

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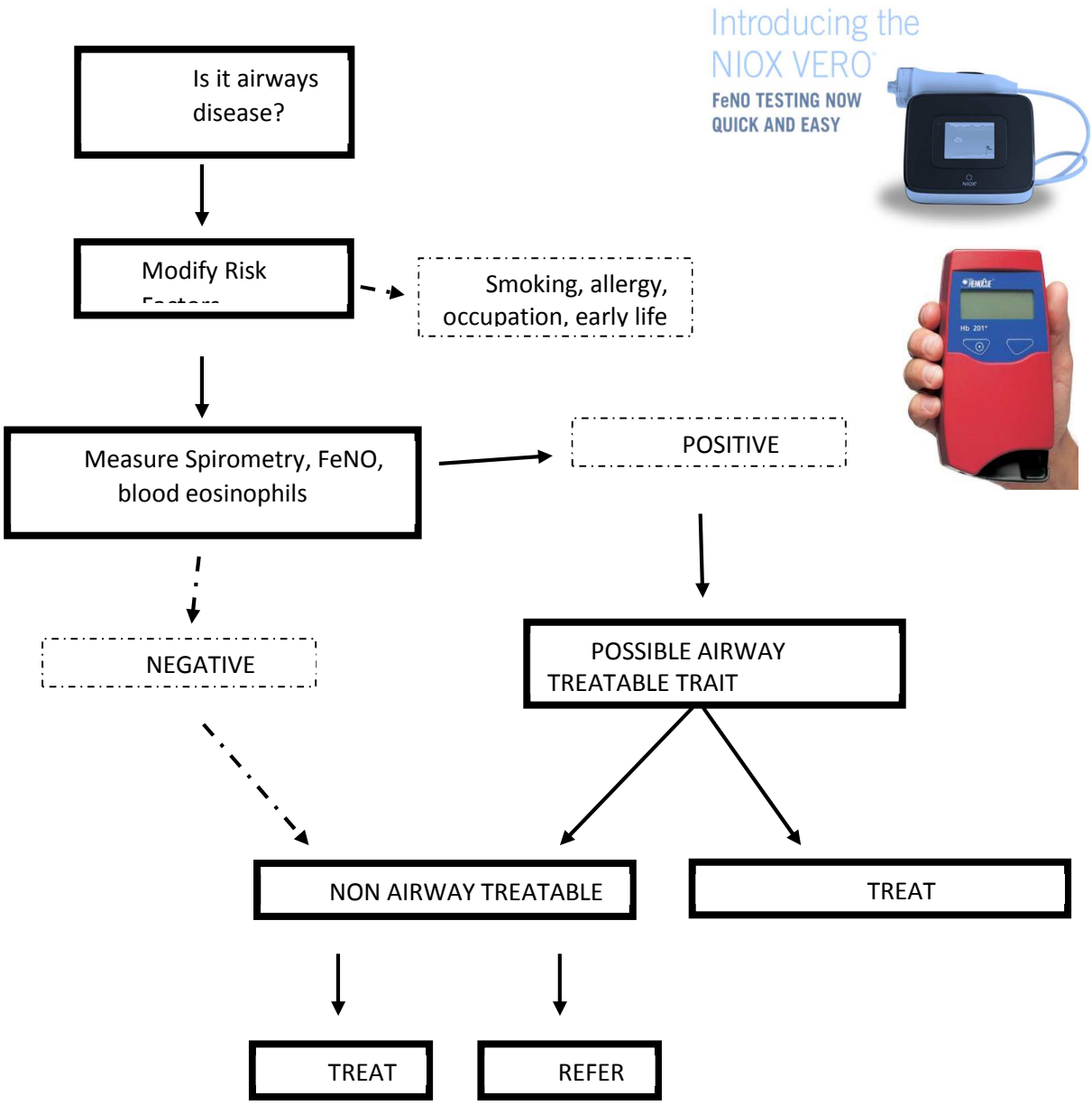
Appendix I: Near patient testing algorithm in management of asthma and COPD



Appendix J: Asthma and COPD clinical research studies in AHSN region

Trial Name	Brightling 111
Condition	Chronic Obstructive Pulmonary Disease, Asthma
Chief Investigator	Prof. Ian Pavord
Plain English summary	An open study to measure imaging biomarkers and inflammatory cells, mediators and biomarkers from blood, urine and airway samples from healthy volunteers, asthma patients and COPD patients in stable

Trial Name	SoMOSA – Study of mechanisms of action on Omalizumab in severe asthma
Condition	Asthma
Chief Investigator	Prof I Pavord, University of Oxford
Plain English summary	Identify biomarkers in patients taking Xolair (omalizumab) routinely as part of their normal care.

Trial Name	Liberty Asthma Expedition
Condition	Asthma
Chief Investigator	Prof I Pavord. University of Oxford
Plain English summary	Evaluate the long-term safety and tolerability of dupilumab in patients with asthma who participated in a previous dupilumab asthma study.

Trial Name	RASP
Condition	Asthma
Chief Investigator	Prof Ian Pavord
Plain English summary	This study explores if a composite biomarker strategy predicts exacerbation risk in patients with asthma on high dose inhaled corticosteroid (+/-long-acting beta agonist) treatment and to evaluate the utility of this composite score to facilitate personalised biomarker specific titration of corticosteroid therapy in this population.

Trial Name	The Effect of OC000459 on Eosinophilic Airway Inflammation and Asthma Control in Subjects with Refractory Eosinophilic Asthma: A Randomised, Double-blind, Placebo Controlled Trial
Condition	Asthma
Chief Investigator	Prof. Ian Pavord, University of Oxford
Plain English summary	Evaluate the effect of a CRTH2 antagonist in severe refractory eosinophilic asthma

Trial Name	A Randomised, Double-blind, Chronic Dosing (56 week) Placebo-controlled, Parallel Group, Multicentre, Phase III Study to Evaluate the Efficacy and Safety of 2 Doses of Benralizumab (MEDI-563) in Patients with Moderate to Very Severe Chronic Obstructive Pulmonary Disease (COPD) with a History of COPD Exacerbations (GALATHEA)
Condition	Chronic Obstructive Pulmonary Disease
Chief Investigator	Prof Mona Bafadhel University of Oxford
Plain English summary	To assess if IL5Ralpha blocker (Benralizumab) improves outcomes (symptoms and exacerbations) in eosinophilic COPD.

Trial Name	Studying the different characteristics of chronic obstructive pulmonary disease in primary care using near-patient testing and relating this to treatment responses during an acute exacerbation. Studying Acute exaceRbations and Responses (COPD STARR)
Condition	Chronic Obstructive Pulmonary Disease
Chief Investigator	Prof Mona Bafadhel University of Oxford
Plain English summary	To study characteristics of patients with a COPD exacerbation in primary care

Trial Name	The hospitalised acute wheezy adult with airways disease: studying the different characteristics and treatment responses. Adults With AiRways Disease: The AWARD study
Condition	Chronic Obstructive Pulmonary Disease
Chief Investigator	Dr Richard Russell
Plain English summary	To study characteristics of the acute wheezy adult in ED

Trial Name	Short title: Novel START (Novel Symbicort Turbuhaler Asthma Reliever Therapy)
Condition	Asthma
Chief Investigator	Prof Ian Pavord
Plain English summary	This study is interested in investigating the effects of three different inhaler regimens in patients with asthma. The three regimens we are investigating are:

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