Foreword

Respiratory disease continues to be a major cause of disability and premature mortality in the United Kingdom. It affects 1 in 5 people and is the third leading cause of death in England. The annual economic burden of asthma and chronic obstructive pulmonary disease (COPD) on the NHS in the UK is estimated as £3 billion and £1.9 billion respectively. In total, lung conditions (including lung cancer) directly cost the NHS in the UK £11 billion each year.¹

It has been almost 7 years since the first edition of the Atlas of variation, and I welcome the publication of this 2nd Atlas of variation in risk factors and healthcare for respiratory disease in England, which continues to demonstrate significant inequalities in the distribution and treatment of common respiratory conditions.

Robust guidance has been published by the National Institute of Health and Care Excellence (NICE) and other bodies to support evidence-based management of COPD, asthma and many other lung conditions. However, in this updated 2nd Atlas, a stark picture is still being presented of variation in the quality of care and outcomes experienced by people with respiratory disease in different parts of England. The variation observed extends to the detection of disease where late or inaccurate diagnosis is a common occurrence, consequently engendering more frequent and expensive emergency hospital admissions.

The 2nd Atlas shows that an individual's chance of being admitted or re-admitted to hospital as an emergency; of receiving appropriate treatment; of dying from lung disease or even of being diagnosed in the first place differs according to where they live. If, after adjusting for population differences, all of the CCGs in England were to achieve the COPD mortality rates of the best-performing CCGs, around 7,700 lives would be saved each year.² Some degree of variation may be explained by population composition, levels of deprivation or disease prevalence. However, much of the variation highlighted is unwarranted and raises important questions for consideration by local commissioners. Sharing and publishing these data helps commissioners and service providers to share best practice, develop more effective services and improve outcomes for patients

This 2nd Atlas focuses attention on where improvements are needed and can be most impactful. It offers an opportunity for clinicians and commissioners to assess their data against the best geographies and consider how local improvements could be made to raise standards to those of the highest performers. It also empowers patients to ask questions about the respiratory care they receive.

The central message of the 2nd Atlas of variation in risk factors and healthcare for respiratory disease in England is that it is possible to achieve better outcomes for patients. The NHS Long Term Plan (LTP) identifies respiratory disease as a clinical priority, and highlights four key areas for action: ensuring more patients have early access to quality assured diagnostics; ensuring patients receive the right inhaler medication; the expansion of rehabilitation services and the improvement of the treatment and care of people who present with pneumonia. The indicators of this Respiratory Disease Atlas can be used in conjunction with ambitions and directions of the LTP to support healthcare professionals and commissioners to focus on the improvements needed to reduce unwarranted variation and improve outcomes for people with respiratory disease.

Mila Morran.

Professor Mike Morgan

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² Analysis by PHE using ONS Mortality extract based on applying the age-specific mortality rate of the best quintile of CCGs to the populations of all CCGs

¹ British Lung Foundation <u>The battle for breath – the economic burden of lung disease</u> [Accessed 08 August 2019]

Preface

This 2nd Atlas of variation in risk factors and healthcare for respiratory disease in England builds on 7 years of activity since the first Atlas of variation to raise awareness about the increasing and yet largely preventable toll of premature death and suffering from respiratory disease. This updated 2nd Atlas shows that in many areas of prevention, treatment and outcomes the measures for respiratory disease are simply not improving. In 2018, the Taskforce for Lung Health, a unique national collaborative partnership of 29 organisations across the lung health sector including patients, voluntary sector, health care professionals and industry published a 5-year plan for improving lung health. This plan has been endorsed across the whole respiratory community. This year respiratory disease has been recognised as one of the national clinical priorities within the NHS Long Term Plan. This 2nd Atlas will support local areas to meet these challenges and improve outcomes for people with respiratory disease.

The 2nd Atlas contains many new indicators and some updated from the <u>NHS Atlas of Variation in</u> <u>Healthcare for people with Respiratory Disease: 2012</u>. The updated 2nd Atlas presents 64 indicators. As well as the main groups covered within the 1st atlas of variation (COPD, asthma, pneumonia, bronchiolitis), the updated 2nd Atlas has expanded to cover other risk factors, such as air pollution and housing, more diseases, tuberculosis and lung cancer, and end of life care. The data is presented in a new format to show not only a map of geographical variation for each indicator's range of values but also, where appropriate, an accompanying map showing the statistical significance of this variation from the England value. Each indicator is also displayed using a column chart showing the geographical distribution for the most recent period of data and a box and whisker plot showing the degree of geographical variation. In each section the context is described for the indicator(s), options for action and a list of evidence–based resources to aid action. For 56 indicators, it is statistically possible to analyse trend data over time both for the England value and degree of variation.

Importantly for every indicator there is evidence of variation across England; emergency admissions for COPD varies 5.6 fold by CCG and emergency admissions for young people, aged 0-18 years; for asthma, they vary 7.5 fold by CCG. Not only do outcomes vary geographically but so do the prevalence of risk factors for respiratory disease and aspects of health service provision. It is therefore essential that health service providers and commissioners use the data underpinning the presentation in this 2nd Atlas, the online interactive Instant Atlas tool on RightCare and other resources referred to within the 2nd Atlas to understand more about their local picture to determine priorities for action. Following the 2nd Atlas publication, the data will be used to update the online Inhale profile, an <u>INteractive Health Atlas of Lung conditions in England</u>, this will enable users to explore the data alongside other datasets included in the PHE fingertips web tool.

It is important to tackle variation in respiratory disease through better prevention of disease, recognition of those at risk, better diagnosis of those with early disease and improved treatment not only to improve outcomes for individual patients but also to ensure optimal allocation and use of staff, capacity and other resources within the health system.

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Introduction

Respiratory disease a system wide priority

The burden of mortality associated with lung disease is substantial; around 1 in 7 deaths are caused by a variety of respiratory diseases¹ (Figure A1), making it the third most common cause of death.² Respiratory disease has been identified as one of the disease priority areas in the 2020-2030 NHS Long Term Plan.³ RightCare has also selected it as a focus area for 2019/20,⁴ and as part of this work is developing Asthma and Pneumonia toolkits, and Getting it Right First Time (GIRFT) has a specialist respiratory programme.⁵

Tobacco control, immunisation, antimicrobial resistance, and supporting the Clean Air Strategy are all priorities for Public Health England (PHE), as defined in the 2019/20 remit letter.⁶ The annual remit letter sets out government priorities for PHE and its role across the health and care system. 'All Our Health' is a resource for healthcare professionals to help them to maximise their impact on improving health outcomes and reducing health inequalities; these include a number of relevant prevention topics. PHE will also be updating the respiratory chapter.⁷

What is the burden of respiratory disease in England?

Respiratory disease covers a wide variety of conditions, including common chronic conditions such as asthma and chronic obstructive pulmonary disease (COPD), lung cancer, acute infections such as pneumonia, and less common diseases such as interstitial lung disease (ILD) and mesothelioma.

It is estimated that in the UK around 550,000 respiratory diagnoses are made annually, of which around half are for asthma and COPD.⁸ Morbidity and mortality due to respiratory disease are not evenly distributed within the population but instead they are concentrated within deprived and other population groups. There is also a close association between high prevalence rates of respiratory conditions and current and past high rates of smoking.



Figure A1: Underlying causes of respiratory death in England (2018)⁹

Respiratory causes as defined by the Health Resource Group Respiratory System Codes (excluding: injury, poisoning and certain other consequences of external causes (ICD 10 S00-T88))

*Includes inhaled dusts, chemicals, gases, fumes and vapours, inhaled food & vomit, drug-induced disorders etc. **Including cystic fibrosis

The economic burden of respiratory diseases is substantial; excluding intangible costs, the estimated cost to the UK is £11.1 billion per year, or 0.6% of the UK's Gross Domestic Product (GDP) in 2014. This consists of £9.9 billion of direct primary and secondary healthcare costs (including private healthcare) and £1.2 billion in indirect costs (including only value of lost labour market productivity due to the patient's illness, injury or premature death). Social care costs and state benefit payment costs are not included so this value is likely to underestimate of the true indirect costs to society.¹⁰

In addition to premature mortality, respiratory disease can impair quality of life through symptoms such as breathlessness, cough, fatigue, pain, and through the psychological impact of the disease and/or symptoms leading to anxiety and depression.^{11,12} Respiratory disease can also reduce an individual's ability to work, with consequent social and financial implications. Disability adjusted life years (DALYs) are a combined measure of years of life lost to early death and number of years lived with disability caused by, for example respiratory disease. The global burden of disease study estimates that respiratory disease leads to 13% of all DALYs lost in England;¹³ COPD, lung cancer and lower respiratory infections rank 2nd, 5th and 6th in terms of the proportion contribution to total years of life lost (YLL) in England (Table A1).¹⁴

Ranking	Disease	Percentage contribution to total YLL
1	Ischaemic heart disease	12.7 (12.5-12.9)
2	Lung cancer	7.4 (7.3-7.5)
3	Alzheimer's disease	5.7 (5.7-5.8)
4	Stroke	5.6 (5.6-5.8)
5	COPD	5.5 (5.3-5.9)
6	Lower respiratory infection	4.3 (4.2-4.4)
7	Colorectal cancer	3.5 (3.4-3.6)
8	Breast cancer	3.0 (3.0-3.1)
9	Cirrhosis	2.6 (2.5-2.7)
10	Self-harm	2.5 (2.4-2.5)

Table A1: Top 10 causes of years of life lost (YLLs) in England (2017)¹⁴

While respiratory mortality in Europe has been decreasing overall for the last 40 years, the UK still has much higher mortality rates due to respiratory disease in comparison to other countries in Europe. The UK has 61% higher mortality compared to the average rate of the 28 countries in the EU (Figure A2).¹⁵

The NHS long term plan³ published in January 2019 recognised both the high burden and the substantial socioeconomic and other inequalities in respiratory disease. The need to tackle risk factors (such as smoking and poor air quality), promotion of early diagnosis and low access to pulmonary rehabilitation were emphasised. Concern around increasing respiratory hospital admissions and correct use of inhaled asthma medications were particularly highlighted.



Figure A2: Age-standardised mortality rate for respiratory disease (ICD10: J00-J99) by European Countries (2016)¹⁵

What is variation and why does it matter?

Variation is simply differences between comparison groups. The reasons for variation in respiratory health are multiple which will be discussed below, but when we look at variation, specifically in healthcare, there are many reasons for variation; some is desirable, where fully informed patient choice is the driving factor, and some is justified, where variation is appropriate in response to need. However, variation is unwarranted where it:

'cannot be explained by type or severity of illness or by patient preference.'16

While interest is primarily focused on variation in treatment activities, we also need to consider variation in preventative activities such as vaccination or smoking cessation services.

Wennberg¹⁷ suggests 3 categories of unwarranted variation:

Effective care: '...interventions for which the benefits far outweigh the risks; in this case the "right" rate of treatment is 100% of patients defined by evidence-based guidelines to be in need, and unwarranted variation is generally a matter of under-use.' For example, flu vaccination among those with chronic respiratory conditions. However, it is important in England, to acknowledge patient choice and the right to refuse intervention even where the evidence base for effectiveness is strong and therefore the "right" rate may never be 100%.

Preference-sensitive care: '...when more than one generally accepted treatment option is available, such as elective surgery; here, the right rate should depend on informed patient choice, but treatment rates can vary extensively due to differences in professional opinion.' For example, differences in treatment of lung cancer.

Supply-sensitive care: '...comprises clinical activities such as doctor visits, diagnostic tests, and hospital admissions, for which the frequency of use relates to the capacity and performance of the local healthcare system.' For example, pulmonary rehabilitation. However, as Wennberg notes, higher rates of use of supply-sensitive care do not necessarily correlate with better outcomes.

Patients may also be concerned about unwarranted variation by different risk factors or care and the subsequent impact upon their health outcomes. Box A1: Why does unwarranted variation matter to patients with respiratory disease?lists the reasons why unwarranted variation in respiratory disease matters to patients.

Box A1: Why does unwarranted variation matter to patients with respiratory disease?

- preventable disease
- late or inaccurate diagnosis
- deteriorating lung function
- inability to work or play
- diminished quality of life
- preventable exacerbations
- emergency admissions or readmissions to hospital
- premature death

This atlas focuses on variation between different geographical regions, primarily across all clinical commissioning groups (CCGs) within England, but variation can also refer to different points in time, different diseases or different groups of people. When geographical variation is identified, it may be important to explore these other types of variation to understand the reasons for the differences. There are also a wide range of indicators which can be used to examine variation, including risk factor or disease prevalence, disease incidence, access, spending, quality and outcomes. Indicators in this atlas cover different health services (primary, secondary, tertiary, and community), and aspects of the whole patient care pathway, including prevention, diagnosis, treatment and, for the first time, end of life care.

Comparison of statistically significant variation of the value in CCGs is made against the England value. However using the England average or even best performing CCGs may not be the best comparison to make. Comparing to CCGs with similar demographic characteristics or similar rates of respiratory disease may be more appropriate. Additionally, as a country we should ideally be benchmarking England's performance against other countries to ensure we identify exemplars of respiratory care across the world.

How is respiratory disease distributed within the population?

The burden and adverse impact of respiratory disease is not spread evenly across the population in England, but instead is concentrated in certain population groups. This disparity in health status is known as health inequality:

'Avoidable and unfair differences in health status between groups of people or communities.'¹⁸

Figure A3 shows the Dahlgren and Whitehead determinants of health 'rainbow';¹⁹ it demonstrates how health determinants are a complex mixture of many different layers of influence. While many of the differences seen in respiratory health can be explained by distribution of risk factor exposure in different populations, it is important to note that exposure to risk factors in one layer is not independent of factors in other layers. These include smoking, diet, physical activity, age, sex, genetic factors, education, occupation, community, culture and peer group influences.

Even for CCGs which have relatively good respiratory health outcomes compared to the England average, it is vitally important they also act on the findings of the atlas. There will be respiratory health inequalities within these areas by socioeconomic deprivation level, and there are many other population groups in whom the risk of respiratory disease is greater, including individuals with serious mental illness,²⁰ those who are homeless,²¹ prison populations²² and those with substance use disorders.²² Therefore local healthcare systems will need to consider how services can effectively reach these vulnerable groups.





Socioeconomic deprivation

An excess risk of premature mortality from respiratory disease is evident in communities living in areas of greater socio-economic deprivation. Figure A4 shows that there is a significant positive association between under 75 mortality rates due to respiratory disease and CCG deprivation score; 69% of the variation in mortality rate between CCGs can be explained by the deprivation score. The premature mortality rate due to respiratory disease in those CCG areas with higher deprivation scores is around 2-3 times higher than those with the lowest deprivation scores. However, differences in mortality rate cannot be entirely explained by deprivation score, suggesting that there are other important influences.





The trend of respiratory mortality can be seen even more starkly where small area deprivation data is used; the avoidable mortality rate for respiratory disease in the most deprived decile is 6.5 times higher for men, and 8.4 times higher in women, compared to the least deprived decile (Figure A5). This inequality gap has stayed the same for men but increased by 12.6% for women since 2014 (Figure A6).²⁴ Men consistently have a higher rate of respiratory disease than women.





Figure A6: Ratio of avoidable mortality in respiratory disease (excluding lung cancer) of most deprived to least deprived deciles between 2001 and 2017²⁴



NB. The Office for National Statistics (ONS) has revised and updated the definition of avoidable mortality and changes have been implemented for data years 2014 to 2017. The effect of this change on the overall respiratory diseases data for England was small; however, caution is advised when comparing data for 2001 to 2013 and 2014 to 2017.²⁴

Many of the respiratory risk factors are associated with deprivation. For example Figure A7 shows that there is a significant positive association of between smoking rates and CCG deprivation score in England; 44% of the differences in smoking prevalence can be explained by CCG deprivation score.





However, differences in risk factor prevalence are not the only reason for health inequalities. In 1971 Tudor Hart defined the Inverse Care Law, which states that 'the availability of good medical care tends to vary inversely with the need for it in the population served.'²⁶ The inverse care law has been shown in many different settings, including for COPD and lung cancer care.^{27,28,29} For example a data linkage study found significant socioeconomic inequalities in lung cancer survival, and identified that these findings could be statistically explained by inequities in receipt of cancer treatment.²⁹ Unwarranted variation in healthcare is therefore likely to disadvantage those in the most deprived areas or in certain groups, exacerbating health inequalities. While this is not seen for all healthcare uptake and quality indicators, it is apparent for some.

Many cancer patients are diagnosed through an emergency route. Although some emergency cases are unavoidably related to the nature of the clinical presentation, others may be related to patient characteristics such as socioeconomic status. Although emergency presentation is decreasing overall, differences associated with age, gender and deprivation are still seen.³⁰ The degree of variation is different between cancer types, however deprived groups are consistently at greater risk of emergency presentation for most cancers,³¹ for example, the proportion of people presenting for the first time, as an emergency for lung cancer, in the most deprived deprivation quintile was 34%. In comparison 29% were from the least deprived quintile. Emergency presentations for lung cancer patients are proportionally higher than smoking related and laryngeal cancer for which the most and least deprived quintile were 13% and 7% respectively.³²

The geographical distribution of deprivation across England, recorded as the Index of Multiple Deprivation is shown in Map A1. Figure A8 suggests a relationship between increasing deprivation score of CCGs and decreasing influenza immunisation uptake among individuals with COPD, with increasing deprivation accounting for about a 3rd of the variation. Figure A9 displays the variation in emergency hospital admissions for asthma by variation in the Index of Multiple Deprivation (2015) across England. Again, factors related to deprivation account for about a 3rd of the variation. The deprivation related variation may be due to lower use of, or access to prevention and maintenance healthcare services which results in more emergency admissions. This cohort of the population may also have higher exposure to external agents such as pollutants, irritants and biological allergens, linking respiratory health with risk factors.

As has been demonstrated, an association of increasing deprivation with higher exposure to risk factors and potentially variations in healthcare provision, uptake and quality may lead to a concentration of poorer respiratory health outcomes in these areas. Map A1: Variation in the Index of Multiple Deprivation (IMD) population weighted average score by CCG (2015)



Figure A8: Association between COPD patients receiving influenza immunisation (2017/18) and deprivation score (IMD 2015) by CCG^{23,33}



Figure A9: Association between emergency hospital admissions from asthma in adults (2017) and depivation score (IMD 2015) by CCG^{23,34}



Disadvantaged groups

In addition to the adverse outcomes seen for respiratory disease amongst people living in the most deprived areas, there are some specific groups in society who have poorer respiratory health generally or at greater risk of specific respiratory conditions. Groups may include those with serious mental illness, those who are homeless or who live in poor quality housing, individuals who are in prison, those with learning or physical disabilities, specific ethnic groups and those who work in particular industries. For example, hospital admission risk for asthma was found to be twice as high for adults of ethnic minority background in East London, possibly due to differences in cultural, social or psychological factors.³⁵

As another example, individuals with serious mental illness (SMI) often also have much poorer physical health than other people in society, and have on average 10 to 20 years reduction in life expectancy.³⁶ Among under 75s, those who are in contact with mental health services have 4.7 times the rate of death from respiratory disease compared with those in the general population (Table A2).²⁰ Individuals with SMI have an increased rate of asthma (1.2 times) and COPD (2.1 times), and this pattern is sustained even when deprivation is adjusted for.²⁰

Table A2: Increased mortality rate by disease, people aged under 75 years in contact with mental health services compared with the general population in England (2014/15)²⁰

Disease type	Mortality rate - times higher	Mortality rate – more deaths per 100,000 population
Liver	5	84
Respiratory	4.7	147
Cardiovascular	3.3	198
Cancer	2	142

SMI may affect both risk factors (for example, smoking) and also interaction with health services. The PHE briefing on severe mental illness (SMI) and physical health inequalities concluded that there is 'increasing evidence that disparities in healthcare provision contribute to poor physical health outcomes' among those with SMI. These patients show higher prevalence of asthma and COPD as well as other chronic conditions including obesity, diabetes, cardiovascular disease and hypertension all of which are considered preventable.²⁰

People with SMI show a smoking prevalence that is around 2.5 times higher than the general population³⁷ with 1 in 3 cigarettes consumed smoked by this population group.³⁸ An assessment of smoking status is an important part of annual physical health checks in people with SMI and smoking cessation should be offered for all smokers. On average 72% of people on the SMI GP register have their smoking status recorded, however for some areas this is less than 20% of people with SMI with smoking assessment in the last 12 months.³⁹ In order to rectify the inequalities seen between the general population and disadvantaged groups measures must address the variation in risk factors, such as smoking, and health service provision.

What are the sources of variation?

Variation in respiratory health outcomes is due to complex interactions of many different factors, of which healthcare is only one aspect.

Data quality

When variation in an indicator for health or healthcare is found it is always important to first exclude data quality issues as a cause. Local differences in completeness, accuracy of information and coding practices are just some of the elements which can lead to variation in data.

Random variation

Differences between areas can occur through chance, even where no true difference exists. However, the larger the difference between 2 areas, the less likely that this is to have occurred by chance. Confidence intervals can provide an estimation of what variation we might expect through chance. Statistical tests can be applied, as in this atlas, to test the significance of differences to identify those less likely to be due to chance.

Risk factors

Individuals have different risks of developing respiratory disease, due to their lifestyle and exposure to risk factors. Risk factors may be more common in different populations or regions.

Unmodifiable risk factors

These include age, sex, and genetic susceptibility. The variations in age structure in different parts of the country are demonstrated in Map A2 and Map A3. Given the variation in proportions of the population who are under 19 years and over 75 years we would anticipate variations in the rate of diseases which are common in childhood (for example, asthma and bronchiolitis) or in older age (for example, COPD and lung cancer).

Modifiable risk factors

There are clear links between both behavioural/lifestyle and wider environmental risk factors and the likelihood of developing certain respiratory diseases. These risk factors are often a complex mixture of many different influences.

Smoking is the largest single risk factor for respiratory disease; 37% of deaths from respiratory disease and 22% of admissions due to respiratory disease (excluding cancer) were estimated to be attributable to smoking.⁴⁰ Specific disease-related deaths are even more highly correlated, with 79% of deaths (aged >35yrs) from cancers of the trachea, lung and bronchus, and 85% of deaths (aged >35yrs) from 'chronic obstructive lung disease' attributable to smoking.⁴¹ Men who are current smokers have 23 times the risk of lung cancer compared to those who have never smoked.⁴¹ It is therefore unsurprising that geographical variations in certain respiratory diseases are highly correlated with smoking rates.

The environment in which individuals live and work also impacts on the risk of developing respiratory disease. Occupational or general environmental exposure to air pollution, toxins, second-hand cigarette smoke, allergens or ionising radiation may vary within local populations and across geographical regions.

For example, radon exposure is geographically varied, it is the largest source of radiation exposure and is estimated to cause 1,100 lung cancer deaths per year in the UK, although the majority of these are in conjunction with smoking.⁴² Established methods allow radon exposure to be assessed and managed. Housing conditions can also affect respiratory disease; there is evidence that damp and mould is associated with asthma development.^{43,44}

A wide variety of lung diseases can be associated with occupational exposure including conditions with a long latency period (for example, lung cancer, mesothelioma, COPD, pneumoconiosis) and the more acute allergic respiratory diseases, including occupational asthma. Map A4 displays the latest period (2015 to 2017), during which CCG values for registration of newly diagnosed mesothelioma ranged from 2.1 to 11.9 ASR per 100,000, which is a 5.6-fold difference between CCGs. There were 7,064 new mesothelioma registrations in 2015 to 2017.

The Health and Safety Executive (HSE) have estimated that there are 20,000 new diagnoses of breathing or lung problems caused or made worse by work and 12,000 lung disease deaths a year thought to be linked to past exposures at work.⁴⁵ However, there has been a shift from diseases associated with high dose exposures of mineral dusts (especially coal and asbestos) to higher levels of occupational asthma and other airway diseases thought to be connected to lower dose exposures to allergens and irritants (for example, enzymes, cleaning agents).⁴⁶

Map A2: Variation in percentage of people aged 19 years and under by CCG (2017)



Map A3: Variation in percentage of people aged 75 years and over by CCG (2017)



Map A4: Variation in registrations of newly diagnosed cases of mesothelioma by CCG (2015-2017)

Age-standardised rate per 100,000 population

Optimum value: Low



Healthcare variation

Healthcare variation may be due to differences in preventative (for example, immunisation), primary, community, secondary and tertiary services and how they are commissioned. It is appropriate that respiratory health service provision and therefore total spend varies across the country and within communities, as the total burden of respiratory disease varies widely (equity). However, all patients, regardless of where they live, should receive respiratory health care of equal quality. There are many frameworks for measuring healthcare quality, but Maxwell (1984) developed a 6-strand model which is summarised in Figure A10.⁴⁷ Where these 6 dimensions of quality are not met patient outcomes can suffer as a result. Access to services and their importance to need is particularly relevant in relation to geographical variation; this may be access to early diagnosis, treatment, rehabilitation or end of life care. However, even where services exist, the extent to which best practice is implemented in different settings can vary widely (effectiveness).

Figure A10: Maxwell's dimensions of health care quality⁴⁷



Respiratory workforce

There are a wide variety of professionals who provide care for patients with respiratory disease in the UK (Box A2). Workforce issues including scarcity and poor training can lead to reductions in availability and/or quality of services. There are reported threats for the future of the respiratory workforce; recent reports have highlighted significant problems in recruitment of consultants (50% of institutions advertising posts reported difficulties appointing, and 40% had a vacancy at the time of the British Thoracic Society Respiratory Medicine Workforce Review 2018),⁴⁸ and specialist registrars.⁴⁸ A 2016 survey of respiratory nurses indicated almost half planned to retire or were eligible for retirement within the next 10 years.⁴⁹

Figure A11 shows that variation exists in the number of consultants practicing per patient population in different areas of England. The consultant to patient population ratio is 2.4 times higher in Thames Valley compared with South London. Some of the lower numbers of consultants are seen in subregions which experience the highest mortality and hospital admissions for respiratory disease.

Box A2: Key professional groups involved in respiratory healthcare				
Primary and community care	General practitioners	Community pharmacists		
	Practice nurses			
Secondary care	Respiratory specialist nurse	Occupational Therapists		
	Hospital pharmacist	Respiratory physiologists		
	Respiratory Consultants and Respiratory Specialist Registrars	Psychologists		
	Thoracic surgeons	Healthcare scientists		
	Radiologists	Oncologists		
	Radiographers	Other medical and nursing staff		
	Physiotherapists			
End of life care	Palliative care consultants	Palliative care nurses		



Figure A11: Population per full time equivalent respiratory consultant by NHS sub-region (2017/18)⁵⁰

Patient choice

Finally, patient choice is an important aspect of variation, but choice is heavily influenced by personal, social and cultural factors as well as the interactions with healthcare professionals and providers. Shared decision making is a collaborative process between the patient and clinician which ensures that 'individuals are supported to make decisions that are right for them'.⁵¹ The National Institute of Health and Care Excellence (NICE) states that within shared decision making it is important that:

"care or treatment options are fully explored, along with their risks and benefits different choices available to the patient are discussed a decision is reached together with a health and social care professional"⁵²

How should we respond to variation? The RightCare approach

Figure A12: RightCare Model⁵³



Diagnose

RightCare's model of 'diagnose, develop, deliver' (Figure A12) outlines how local areas should respond to variation.

The information contained within this atlas is a starting point for CCGs to examine their local outcomes and quality of their respiratory services, and to benchmark themselves against other CCGs and the national average. However, to understand what the variation means and whether it is unwarranted variation, further work will be necessary. It is important not simply to just rely on comparison with the national average, but instead to consider what the appropriate figure is based on local need. RightCare highlights that in many cases comparisons between similar CCG areas rather than the national average may be more appropriate. For example, an area with a high prevalence of COPD may expect to see higher rates of hospital admissions per 1,000 population, compared to an area with a low prevalence of COPD. However, there may be cause for concern if they compare themselves to a CCG with a similar prevalence of COPD whose admission rates are substantially lower than theirs.

Furthermore, an outcome which is significantly better than the England average should not be cause for complacency, but instead provide opportunities to identify the local underserved populations who are still at risk of poor health outcomes. For example, a low overall rate of smoking prevalence may prompt increased targeting of stop smoking support services to certain populations who still have high smoking rates, such as those with serious mental illness (SMI) or those in prison. Furthermore, Figure A2 demonstrated that mortality rates in the UK are higher than in several European countries, therefore looking for good practice overseas may also be appropriate.

Where there is concern identified, further analysis of the data and consultation with stakeholders will usually be required to answer the following questions:

- what are the reasons for the variation?
- is this warranted or unwarranted variation?
- is this concentrated within certain groups or is it equal across the whole population? (Consider undertaking a health equity audit)

The information discussed earlier in the introduction will assist in answering these questions. In addition to information within this atlas, a wealth of supporting data and resources can also be obtained (see Box A3).

Box A3: Additional respiratory data and resources

- Public Health England (PHE) Fingertips public health profiles⁵⁴
- RightCare focus packs⁵⁵
- RightCare equality and health inequality packs⁵⁶
- RightCare where to look packs57
- RightCare long term conditions packs⁵⁸
- Royal College of Physicians national asthma and COPD audit programme,⁵⁹ and British Thoracic Society National Audits⁶⁰
- Respiratory Futures resources⁶¹
- NHS Business Services Authority's Respiratory Prescribing Dashboard⁶²

Develop

Once unwarranted variation has been identified and the causes explored, developing local solutions should be a key priority. RightCare products, such as the COPD pathway or long-term conditions scenarios, and other national guidelines (such as NICE guidance), should be combined with local knowledge to highlight particularly relevant areas for focus. Within this atlas, options for action are provided within the text accompanying the different indicators. Local knowledge will help to identify and refine appropriate action within the local context. There are also numerous examples of good practice to refer to within the case studies that accompany relevant chapters.

It is important to have a broad focus and to consider the whole pathway from prevention, through diagnosis, treatment, referral and rehabilitation, to end of life care, when seeking to develop successful interventions. For example, the development of an intervention to reduce COPD admissions may include a review of diagnostic pathways, stop smoking provision, hospital-at-home services, pulmonary rehabilitation capacity, protocols for admission of patients with COPD from Accident and Emergency, and end of life care planning.

Questions for consideration when developing responses to respiratory variation could include:

- are preventative services effective and available, including stop smoking services?
- are there sufficient trained staff and facilities?
- are local protocols for diagnosis, referral and treatment evidence based and consistent with best practice guidance?
- are referral pathways for diagnosis, treatment and rehabilitation efficient and functioning well?
- are services accessible for all patients?

- what would help patients to find it easier to access services?
- are local community-based services able to cater for respiratory patients and are they effective at preventing admission and/or promoting earlier discharge?
- are rehabilitation services effective and available?
- do palliative and end of life care services include patients with respiratory disease?

Deliver

Respiratory health delivery is hugely complex; much of respiratory disease is managed in primary care, however even within secondary care it is often acutely managed by accident and emergency, acute medicine and general medicine rather than specialist respiratory services. Furthermore, the offer of community services will look different in each area. Therefore, when considering delivery and implementation of change, a wide range of stakeholders from different disciplines and organisations will need to be included. This will look different in every CCG and region.

With large numbers of potentially effective options for action, having transparent and robust mechanisms for prioritisation within respiratory care is essential. Programme budgeting and marginal analysis is one common approach for selecting the most effective services locally. Service reviews and audits together with input from local patients, clinicians, and commissioners, will help to understand where the barriers are and what changes need to be made. However, ensuring the changes are implemented sustainably is vital, and any interventions must be effectively monitored and evaluated.

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