



Bristol, North Somerset and South Gloucestershire
Clinical Commissioning Groups



Bristol JSNA Chapter 2017-18

Adult Respiratory Disease

in Bristol, North Somerset and South Gloucestershire

Chapter information

Chapter title	Adult Respiratory Disease (<i>Chronic Obstructive Pulmonary Disease</i>) in Bristol, North Somerset and South Gloucestershire (BNSSG)
Chapter owner	BNSSG Respiratory Board
Chapter author(s)	Lynn Stanley, Public Health Principal Dr Viv Harrison, Consultant in Public Health
Quality reviewed by who/date	Dr Viv Harrison, Consultant in Public Health 24.11.2017
Chapter endorsed by	BNSSG Respiratory Programme Board, Nov 2017
Chapter approved by	JSNA Steering Group, Dec 2017
Current version	Final v1.2 - 18 December 2017
Linked JSNA chapters (Bristol)	Smoking, Cancer, Air Pollution, Asthma

Executive summary

Respiratory disease is a major contributor to the gap in life expectancy seen between the most and least deprived communities across BNSSG.

The premature mortality rate for respiratory disease is higher for males than for females across BNSSG. There has been an upward trend in premature mortality rates for respiratory disease in females in Bristol and North Somerset in recent years. Rates for males have been fairly stable across BNSSG.

The mortality rate for COPD (chronic obstructive pulmonary disease) varies across BNSSG. In Bristol it is significantly worse than the England rate overall, and is rising. In North Somerset and South Gloucestershire, the mortality rate for COPD remains lower than the England average.

There are 16,835 known cases of COPD amongst BNSSG. Rates of COPD are set to rise over the next 10 years which will put extra pressure on the health and social care systems.

It is estimated that around half of the total number of COPD cases across BNSSG are undiagnosed. This suggests around 17,000 more people who may have COPD. If diagnosed earlier, people with COPD can take steps to improve the outcome of their disease and prevent its progression, and healthcare providers can focus on helping people to remain well.

COPD prevalence is projected to rise by 39% by 2030, particularly in females. This would mean an estimated 23,400 patients diagnosed with COPD across BNSSG. This does not take into account the estimated undiagnosed cases.

Smoking is a key risk factor for both COPD and whilst there is a downward trend in smoking rates, it is estimated that almost 100,000 of BNSSG's total adult population (18+) still smoke.

Stopping smoking is one of the most important factors in preventing COPD, slowing progression and managing symptoms. Indicators suggest that some opportunities to offer support to patients with respiratory conditions and other Long Term Conditions to help them stop smoking may be being missed.

BNSSG as a whole is lower than the England average for diagnosis of COPD through spirometry. There is a national framework for improving the quality of diagnostic spirometry in adults: It is not apparent that this framework is being

implemented across BNSSG.

Pulmonary rehabilitation can significantly reduce hospital admissions and improve symptoms and quality of life for patients with COPD. GP practices across BNSSG refer their COPD patients for pulmonary rehab but there is much variation, and current capacity is not being fully utilised. A number of stakeholders expressed a need to improve awareness, motivation and engagement in pulmonary rehab through training and education to health care professionals and patients. Some of the known barriers to accessing pulmonary rehab might be addressed through considering alternative models including home based rehab.

12 month reviews are an important opportunity to assess a patient's condition, review their medication and discuss self-care action plans. Bristol and South Gloucestershire record less COPD 12 month reviews of respiratory function than the England average, North Somerset perform better than the England average. Bristol also records less COPD 12 month reviews of breathlessness, North Somerset and South Gloucestershire are similar to the England average. Variations in practice may warrant exploration.

A number of stakeholders shared the view that there is a need for patient education around COPD, to provide patients with the resources and tools they need to manage their condition, including stop smoking support; importance and benefits of getting their flu jab, participation in pulmonary rehab and maintaining a healthy lifestyle.

Local practice in use of self-management plans is variable, and may benefit from a standardised approach.

Recommendations

1. Address the inequalities in COPD prevalence and outcomes across BNSSG, through targeting interventions and efforts according to need.
2. Ensure respiratory patients are asked about their smoking, and support to stop (or a harm reduction approach) is offered at every opportunity.
3. Strengthen leadership and impact of smoke-free work and practice in acute settings, including strengthening support for staff to become exemplars in smoke free practice.
4. Review smoking cessation support within pathways for respiratory patients needing procedures or surgery and ensure effective and timely support.
5. Ensure availability and accessibility of effective smoking cessation support that meets the needs of patients with COPD.
6. Address unwarranted variations in respiratory disease care across BNSSG.
7. Explore ways to improve the proportion of COPD cases that are diagnosed. This could include consideration of systematic methods such as use of GRASP-COPD to interrogate practice clinical data.

8. Raise awareness of signs and symptoms of COPD through targeted localisation of national campaigns such as PHE's 'Be clear on cancer: respiratory symptoms' campaign.
9. Establish a local system to support clinicians in use of spirometry for COPD diagnosis. This could include consideration of a diagnostic hub, learning from experience of implementation in other areas, and access to telephone advice.
10. Implement the competency framework for improving the quality of diagnostic spirometry.
11. Explore opportunities to increase referrals to pulmonary rehab. This could include systematic approaches to identify eligible patients through practice data systems, and development of a single point of access.
12. Identify opportunities to raise awareness and promote referral pathways and benefits of rehab to relevant clinicians.
13. Review current provision and uptake of rehab in relation to needs across BNSSG, to inform redesign.
14. Consider and evaluate alternative models such as home based rehab, use of digital apps with rehab component to increase engagement.
15. Promote greater use and consistency of self-management approaches for respiratory patients, including self-management plans with individual action plans for COPD, and use of digital opportunities to support self-management.
16. Consider need and feasibility of opportunistic flu vaccination for respiratory patients in secondary and community care settings.

JSNA chapter report

A: What do we know?

1) Who is at risk and why?

Introduction

Respiratory disease affects 1 in 5 people and is the 3rd leading cause of death in the UK after circulatory disease and cancer (Public Health England, 2015). Respiratory disease affects the airways and the lungs. One of the most common long-term respiratory conditions is chronic obstructive pulmonary disease and will be the focus of this chapter.

Chronic Obstructive Pulmonary Disease (COPD) is a preventable condition characterised by persistent respiratory symptoms and airflow limitation, due to airway abnormalities usually caused by significant exposure to noxious particles or gases. COPD is associated with significant economic and social burden. The prevalence and burden of COPD are projected to increase over the coming decades due to continued exposure to COPD risk factors and the aging population (Global Initiative for Chronic Obstructive Lung Disease (GOLD), 2017)

In the UK, it is estimated that 3 million people have COPD, of whom 2 million are undiagnosed. Prevalence increases with age and most people are not diagnosed until they are in or beyond their 50s. There are significant geographic variations in the prevalence of COPD and it is closely associated with levels of deprivation. Unlike many other chronic diseases, the prevalence of COPD has not declined in recent years (National Institute for Health and Care Excellence (NICE), 2016)

Risk Factors for COPD

Smoking

Cigarette smokers have higher prevalence of respiratory disease than non-smokers. Risk factors for COPD include smoking history, occupational exposure to harmful fumes, dust or chemicals. COPD is predominantly caused by smoking (NICE, 2010). The absolute risk of developing COPD among continuous smokers has been estimated at least 25% (Lokke, 2006). Other types of tobacco and marijuana are also risk factors for COPD (Prescott E, 1999). People with mental health problems consume 42% of all cigarettes in England and are more likely to develop COPD because they are more likely to smoke than the rest of the population (McManus, 2010).

Urban Air Pollution

Long-term exposure to air pollution contributes to the development of respiratory disease (WHO, 2016). Those at particular risk of the consequences of exposure to

air pollution include children aged 14 and under, older people aged 65 and over, pregnant women and people with pre-existing respiratory conditions (NICE, 2015).

The contribution of outdoor air pollution to COPD is unclear but appears to be small when compared to smoking (Prescott E, 1999). There is growing evidence that indoor pollution from biomass cooking and heating in poorly ventilated dwellings is an important risk factor for COPD (GOLD, 2017).

Infections

Tuberculosis has been identified as a risk factor for COPD. HIV infection accelerates the onset of smoking-related COPD (GOLD, 2017), as do frequent lower respiratory infections during childhood (WHO, 2016).

Socio-economic deprivation

There is strong evidence that the risk of developing COPD is inversely related to socio-economic status (GOLD, 2017). Deprived populations have the highest prevalence and highest under diagnosis of COPD; estimates suggest those in routine and manual occupations represent almost half of the people with diagnosed or undiagnosed COPD in England (Department of Health, 2012).

Age

COPD largely affects people aged 35 and over. Over 50% diagnosed with COPD are below retirement age (NHS England, 2012).

COPD Mortality

The UK is among the top 20 countries for COPD mortality worldwide (age standardised mortality). In Europe, only Denmark and Hungary had higher death rates for COPD than the UK (British Lung Foundation, 2001-2010). Deaths from COPD in the UK are much higher in those aged 75+ for both males and females than in those younger than 75. Men aged 20-64 employed in skilled manual occupations in England and Wales are 14 times more likely to die from COPD than men employed in professional roles and 7 times more likely than those in managerial and technical occupations (Department of Health, 2012). Mortality is particularly high in those who are hospitalised after an exacerbation (NHS England, 2012). COPD accounts for an 8% gap for men and 12% gap for women in life expectancy in the UK (Department of Health, 2012).

COPD Morbidity

COPD is the 2nd most common cause of emergency admission in England, accounting for 1 in 8 emergency admissions (NHS England, 2012). It is also one of the most costly inpatient conditions to be treated by the NHS. 10% of emergency admissions for COPD are in those not previously diagnosed. 15% of patients who

are admitted to hospital with COPD die within 3 months. 43% of patients admitted for hospital treatment of COPD were readmitted at least once in the 3 months following discharge, representing a considerable increase from 33% in 2008 (Royal College of Physicians, 2017). COPD causes the annual loss of 24 million working days and £3.8 million in lost productivity (NHS England, 2012).

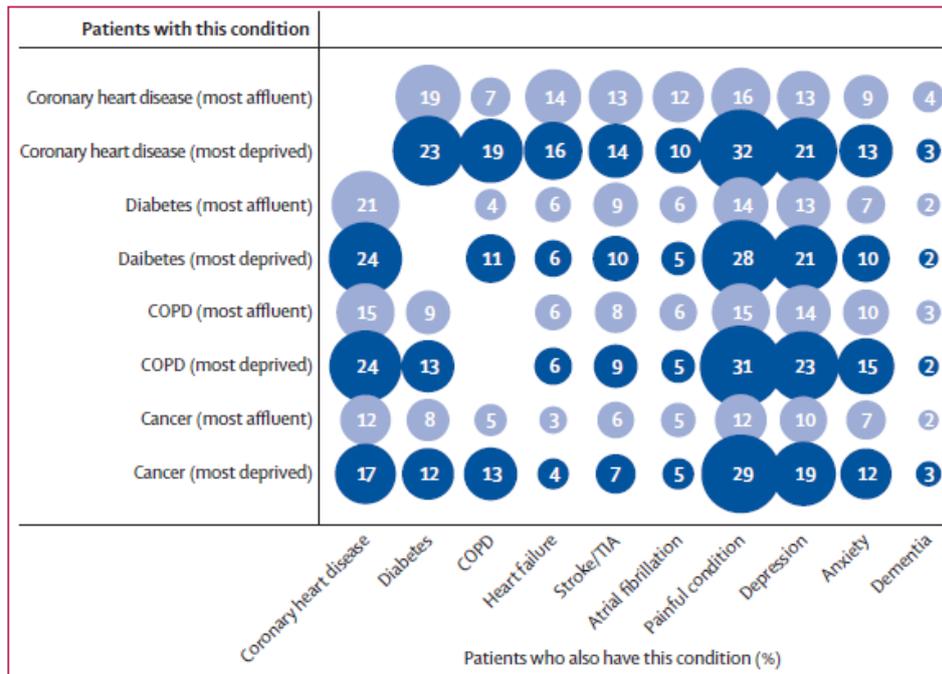
Comorbidities and COPD

People with COPD who have smoked have higher incidence of cancer and cardiovascular disease (CVD) than those who have never smoked. In people with COPD, around 33% have hypertension, 19% have coronary heart disease (CHD), 18% have depression, 11% have diabetes and 6% have heart disease (Department of Health, 2012). Smoking is a risk factor common to most of these conditions.

For people living with COPD, co-morbid mental and psychological health differences are frequently associated with poor health outcomes, including: higher rates of exacerbation, hospitalisation, readmission and length of stay; reduced levels of medication adherence, self-management and survival rates after emergency treatment, than people without psychological co-morbidities (London Respiratory Network, 2016)

A Scottish study of multi-morbidity and comorbidity showed comorbidities of people diagnosed with COPD, coronary heart disease, diabetes and cancer were more common in people living in deprived areas (Barnett, 2012). People living in deprived areas are much more likely to have COPD, depression and painful disorders as comorbidities than other disorders (figure 1)

Figure 1. Comorbidities in the most affluent and the most deprived areas in Scotland



Source: Barnett K et al (2012), Epidemiology of multi-morbidity and implications for health care, research, and medical education: a cross-sectional study; Lancet (2012) 380: 37–43

2) What is the size of the issue across BNSSG?

2.1 Prevalence of COPD

GP practice register data show 16,835 BNSSG patients (all ages) with COPD, a prevalence of 1.7%*, lower than the England average of 1.9% (table 1) (PHE PHOF, 2017). 8,460 COPD patients in Bristol (1.7% prevalence); 4,352 in North Somerset (2.0% prevalence); 4,023 in South Gloucestershire (1.5% prevalence).

Bristol and South Gloucestershire are lower than the England average prevalence, North Somerset is higher than the England average.

Table 1. COPD Prevalence - BNSSG

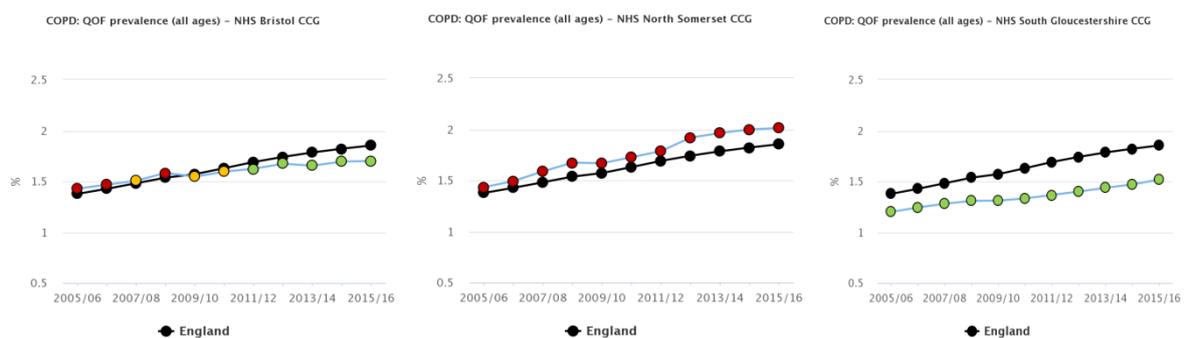
Area	Value	Lower CI	Upper CI
England	1.9	1.8	1.9
Bristol, North Somerset, South Gloucestershire	1.7*	-	-
NHS Bristol CCG	1.7	1.7	1.7
NHS North Somerset CCG	2.0	2.0	2.1
NHS South Gloucestershire CCG	1.5	1.5	1.6

Source: HSCIC (QOF)

*Aggregated form all known lower geography values

COPD prevalence across BNSSG is rising along with England as whole. In Bristol it has been lower than the England average prevalence since 2011; in North Somerset it has been higher than the England average since 2005; in South Gloucestershire it has been lower than the England average since 2005 (figure 2) (PHE PHOF, 2017).

Figure 2. COPD prevalence trend - BNSSG



Source: PHE, PHOF

Estimated versus recorded prevalence of COPD

It is estimated that only 45.8% of cases of COPD are diagnosed or recorded in Bristol; 69.5% in North Somerset and 44.6% in South Gloucestershire (table 2) (PHE PHOF, 2017).

Table 2. Estimated % of detected COPD prevalence - BNSSG

Area	Value	Lower CI	Upper CI
England	57.1	-	-
Bristol, North Somerset, South Gloucestershire	-	-	-
NHS Bristol CCG	45.8	-	-
NHS North Somerset CCG	69.4	-	-
NHS South Gloucestershi...	44.6	-	-

Source: QOF, ERPHO

These estimates are based on prevalence of COPD as recorded on practice registers, compared with modelled prevalence of COPD. The modelled prevalence was developed by Dept. of Primary Care & Social Medicine at Imperial College, (London), and takes into account age, sex, ethnicity, smoking status, rurality and deprivation score (Public Health England - Inhale, 2011).

This equates to an estimated total of 33,754 people with COPD in total in BNSSG, of which approximately 17,000 are estimated as not detected/recorded and may be undiagnosed and unmanaged (table 3).

Table 3. Estimated undiagnosed COPD – BNSSG

Area	Number diagnosed (QOF 2015/16)	Estimated % diagnosed (PHOF - 2011)	Estimated % undiagnosed	Estimated total (diagnosed and undiagnosed)	Estimated number undiagnosed
Bristol	8,460	45.8	54.2	18,472	10,012
North Somerset	4,352	69.5	30.5	6,262	1,910
South Gloucestershire	4,023	44.6	55.4	9,020	4,997
BNSSG Total	16,835			33,754	16,919

Lack of diagnosis is not confined to people with very mild disease. In the Atlas of Variation report it is estimated that in England, 50% with moderate COPD are not detected, 20% of undiagnosed are severe and 10% with COPD, who required hospital admission, had not been diagnosed (NHS England, 2012).

Using these estimates in BNSSG there are approximately 8,500 with moderate COPD, 3,400 with severe COPD and 1,700 who may require hospital admission, all of whom may currently be undiagnosed and/or unrecorded (table 4).

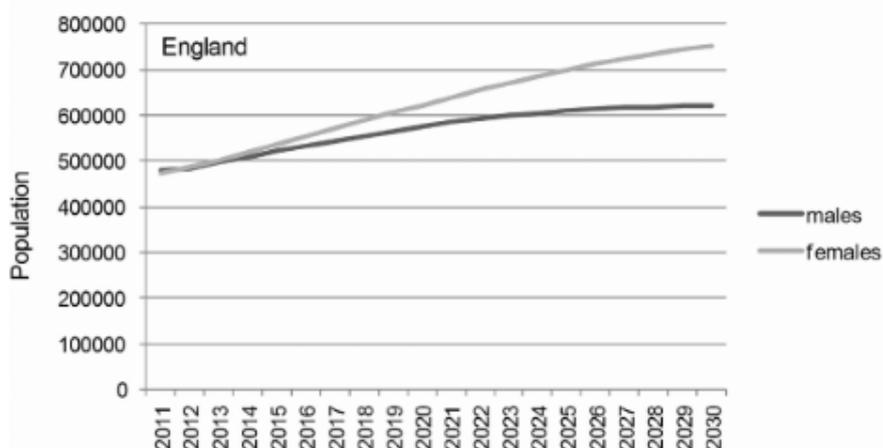
Table 4. Estimated undiagnosed COPD by severity – BNSSG

Area	Estimated number with COPD - undiagnosed	50% with moderate COPD	20% with severe COPD	10% require hospitalisation
Bristol	10,012	5,006	2,002	1,001
North Somerset	1,910	955	382	191
South Gloucestershire	4,997	2,499	999	500
BNSSG Total	16,919	8,459	3,384	1,692

Projected COPD Prevalence

Following a systematic review of models used to estimate COPD prevalence and using a Dutch COPD model, the University of Edinburgh applied data for England including age, sex, smoking status, incidence and prevalence of COPD to project future COPD prevalence. They estimated the number of people with COPD will increase by 39% in England between 2011 and 2030, particularly amongst females (figure 3) (McLean, 2016). Using the current recorded numbers of COPD patients, this equates to 23,401 people with COPD in BNSSG in 2030, 6,566 more than currently diagnosed. This does not take into account those who may not be diagnosed (table 5).

Figure 3. Projected number of people with COPD in England



Source: (McLean, 2016)

Table 5. Projected COPD prevalence by 2030 – BNSSG

Area	Currently diagnosed with COPD (QOF)	Estimated number with COPD by 2030	Difference
Bristol	8,460	11,759	3,299
North Somerset	4,352	6,049	1,697
South Gloucestershire	4,023	5,592	1,569
BNSSG Total	16,835	23,401	6,566

Smoking Prevalence

Smoking is a key risk factor for COPD. Data from the Annual Population Survey (APS) reports smoking prevalence % rates in North Somerset and South Gloucestershire are the lowest in the South West and significantly lower than the England average. In Bristol the smoking prevalence is similar to the England average (table 6) (PHE Tobacco Control Profiles, 2016).

Table 6. Smoking prevalence in adults (18+)

Smoking Prevalence in adults - current smokers (APS) 2016				Proportion - %	
Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	-	-	15.5	15.3	15.7
South West region	-	-	13.9	13.4	14.4
Isles of Scilly	-	-	*	-	-
South Gloucestershire	-	-	9.7	7.9	11.6
North Somerset	-	-	11.7	9.7	13.7
Somerset	-	-	12.3	10.3	14.3
Gloucestershire	-	-	12.5	10.7	14.4
Dorset	-	-	12.6	10.6	14.7
Devon	-	-	12.6	10.9	14.4
Bath and North East Somer...	-	-	13.6	11.8	15.3
Wiltshire	-	-	13.9	12.0	15.8
Swindon	-	-	14.9	12.8	17.0
Cornwall	-	-	15.7	13.8	17.7
Bristol	-	-	16.3	14.0	18.6

Source: PHE Tobacco Control Profiles

There are an estimated 749,104 people aged 18+ in BNSSG (Office National Statistics, 2016) and an estimated 99,835 smokers. It is estimated that 25% of continuous smokers are at risk of developing COPD (Lokke, 2006), an estimated 24,958 smokers in BNSSG at risk of developing COPD if they continue to smoke (table 7).

Table 7. Estimated at risk of developing COPD if continue to smoke

	Total 18+ population (ONS mid-year 2016 estimates)	smoking prevalence (PHOF)	Estimated smokers	Est. at risk of developing COPD (25%)
Bristol	360,612	16.3	58,780	14,695
North Somerset	168,581	11.7	19,724	4,931
South Gloucestershire	219,911	9.7	21,331	5,333
Total	749,104		99,835	24,959

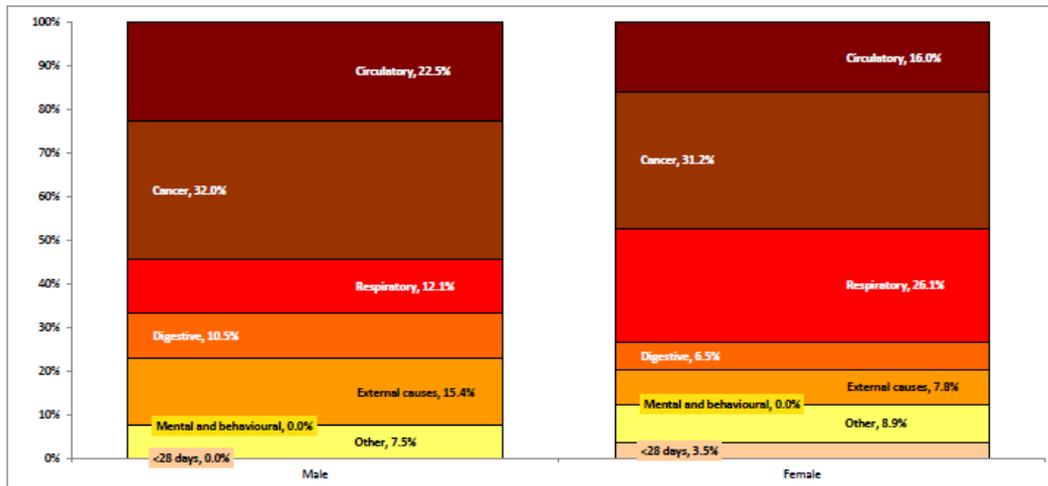
2.2 Mortality from respiratory disease

Across BNSSG deaths from respiratory disease account for much of the male and female gap in life expectancy gap between the most deprived and the least deprived areas.

In Bristol, deaths from respiratory disease account for 12.1% of the male and 26.1%

of the female gap in life expectancy between Bristol's most deprived and least deprived areas (figure 4).

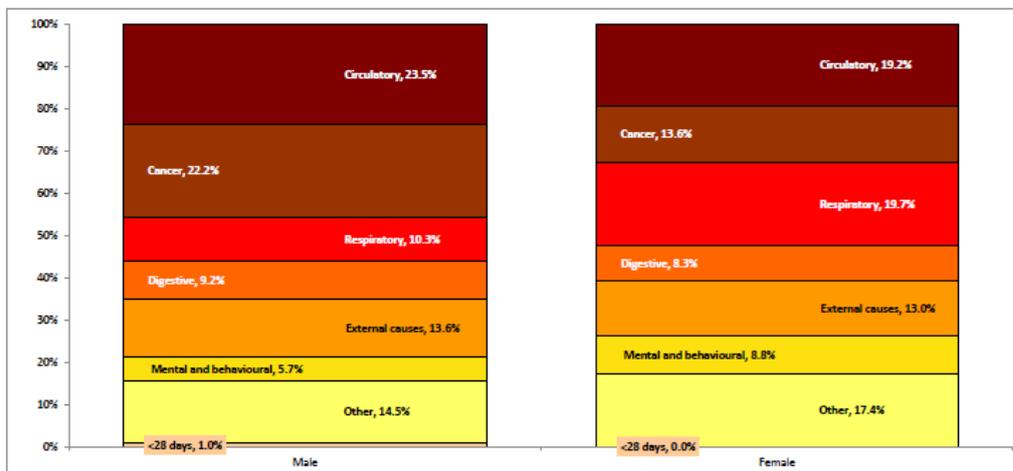
Figure 4. Life expectancy gap between Bristol's most and least deprived quintiles, by broad cause of death 2012-14



Source: Public Health England segment tool, based on ONS death registration data, mid-year population estimates and DCLG Index of Deprivation 2015

In North Somerset, deaths from respiratory disease account for 10.3% of the male and 19.7% of the female gap in life expectancy between North Somerset's most deprived and least deprived areas (figure 5).

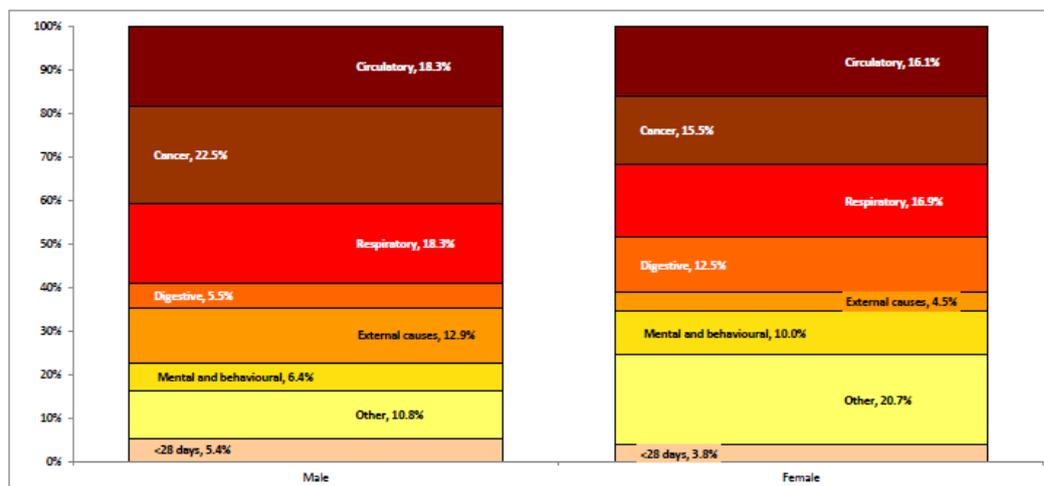
Figure 5. Life expectancy gap between North Somerset's most and least deprived quintiles, by broad cause of death 2012-14



Source: Public Health England segment tool, based on ONS death registration data, mid-year population estimates and DCLG Index of Deprivation 2015

In South Gloucestershire, deaths from respiratory disease account for 18.3% of the male and 16.9% of the female gap in life expectancy between South Gloucestershire's most deprived and least deprived areas (figure 6).

Figure 6. Life expectancy gap between South Gloucestershire's most and least deprived quintiles, by broad cause of death 2012-14



Source: Public Health England segment tool, based on ONS death registration data, mid-year population estimates and DCLG Index of Deprivation 2015

COPD Mortality

In BNSSG there were 1,164 deaths (all age) from COPD between 2013 and 2015; 568 in Bristol, 293 in North Somerset and 303 in South Gloucestershire (table 8) (PHE Public Health Profiles, 2015).

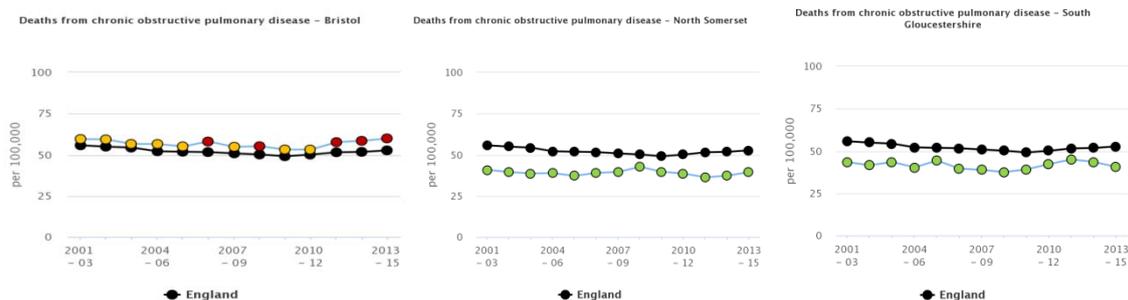
Table 8. Deaths from COPD

Area	Recent Trend	Count	Value	Directly standardised rate - per 100,000	
				95% Lower CI	95% Upper CI
England	-	77,364	52.6	52.3	53.0
South West region	-	7,692	43.1	42.1	44.1
Bristol	-	568	59.9	55.0	65.1
Plymouth	-	395	56.8	51.3	62.7
Swindon	-	273	54.7	48.4	61.7
Torbay	-	264	49.7	43.8	56.1
Cornwall	-	956	49.3*	46.2	52.5
Gloucestershire	-	915	47.7	44.7	50.9
Poole	-	245	47.1	41.3	53.4
Somerset	-	876	45.0	42.1	48.1
Bournemouth	-	229	41.1	35.9	46.9
South Gloucestershire	-	303	40.5	36.1	45.4
North Somerset	-	293	39.4	35.0	44.2

Source: PHE (based on ONS source data)

The rate of COPD death per 100,000 population is significantly worse in Bristol (denoted by red dots) and significantly better in North Somerset and South Gloucestershire (denoted by the green dots) than the England average (figure 7).

Figure 7. All age Deaths from COPD trend



Source: PHE Tobacco Control Profiles

2.3 COPD Morbidity

Emergency admissions for COPD

There were 1,923 emergency admissions in BNSSG in 2015/16; 1,047 in Bristol, 375 in North Somerset and 501 in South Gloucestershire. The rate of COPD emergency admissions per 100,000 population aged 35+ in Bristol was the highest in the South West and significantly higher than the England average. Rates in North Somerset and South Gloucestershire are significantly lower than the England average (table 9) (PHE Tobacco Control Profiles, 2016).

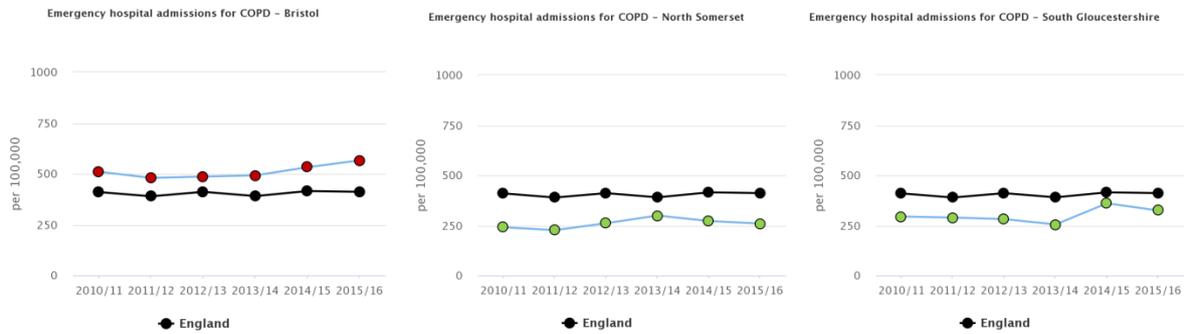
Table 9. Emergency COPD admission rate per 100,000 population aged 35+

Area	Recent Trend	Count	Value	Directly standardised rate - per 100,000	
				95% Lower CI	95% Upper CI
England	-	122,586	411	409	414
South West region	-	10,746	308	303	314
Bristol	-	1,047	566	532	602
Bournemouth	-	543	524	481	571
Plymouth	-	645	457	423	494
Swindon	-	443	420	381	461
Torbay	-	342	347	311	386
Poole	-	339	337	301	375
Somerset	-	1,278	335	317	354
South Gloucestershire	-	501	324	296	354
Gloucestershire	-	1,121	292	275	310
Dorset	-	917	273	255	291
Cornwall	-	1,012	262*	246	279
North Somerset	-	375	259	233	287
Devon	-	1,326	241	228	254
Bath and North East Somer...	-	253	236	208	268
Wiltshire	-	604	201	185	218
Isles of Scilly	-	-	*	-	-

Source: Hospital Episode Statistics (HES)

The rate per 100,000 population aged 35+ of emergency hospital admissions for COPD has risen in Bristol and South Gloucestershire over recent years (figure 8).

Figure 8. Emergency COPD admission rate per 100,000 population aged 35+ trend



Source: PHE Tobacco Control Profiles

3) What are the relevant national outcome frameworks indicators and how do we perform?

Public Health Outcomes Framework (PHOF) and Quality Outcome Framework (QOF) indicator data for respiratory disease provide comparisons between Bristol, North Somerset, South Gloucestershire and the England average. All data is 2015/16, unless otherwise stated.

3.1 PHOF Indicators

Under 75 mortality rate from respiratory disease

There were 649 cases of premature mortality from respiratory disease in BNSSG between 2013 and 2015; 326 in Bristol, 165 in North Somerset and 158 in South Gloucestershire. Directly age standardised rate per 100,000 population of 39.6 in Bristol, 26.9 in North Somerset and 22.9 in South Gloucestershire. The Bristol rate is significantly higher than the England average of 33.1 per 100,000. North Somerset and South Gloucestershire rates are significantly better than the England average (table 10).

Table 10. Premature mortality from respiratory disease BNSSG

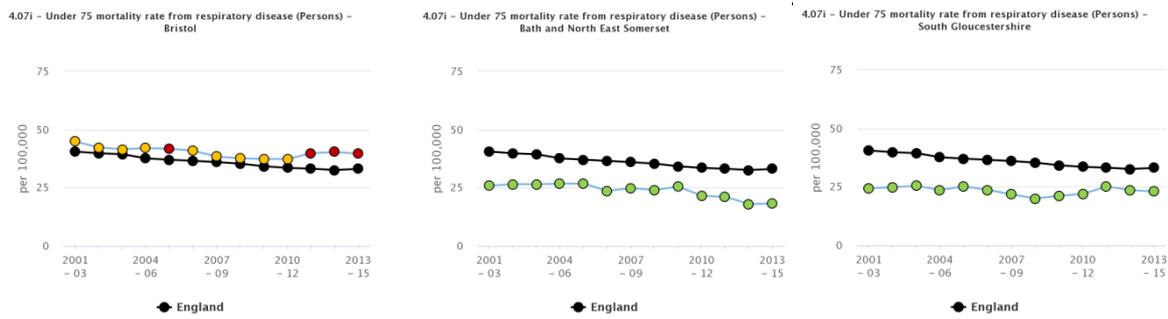
4.07i - Under 75 mortality rate from respiratory disease (Persons) 2013 - 15 Directly standardised rate - per 100,000

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	-	43,725	33.1	32.8	33.4
South West region	-	4,086	26.9	26.1	27.7
Bristol	-	326	39.6	35.4	44.2
Swindon	-	163	35.2	29.9	41.1
Torbay	-	142	33.1	27.8	39.1
Plymouth	-	204	32.2	27.9	36.9
Poole	-	128	31.3	26.1	37.2
Bournemouth	-	130	30.2	25.2	35.9
Gloucestershire	-	480	28.5	26.0	31.2
Cornwall	-	468	26.9*	24.5	29.5
North Somerset	-	165	26.9	22.9	31.3
Somerset	-	431	26.3	23.8	28.9
Wiltshire	-	322	24.5	21.9	27.4
Devon	-	574	23.9	22.0	25.9
South Gloucestershire	-	158	22.9	19.5	26.8
Dorset	-	312	22.0	19.6	24.7
Bath and North East Somer...	-	83	18.2	14.4	22.5
Isles of Scilly	-	-	*	-	-

Source: Public Health England (based on ONS source data)

The rate of premature death from respiratory disease in Bristol has been significantly higher (denoted by red dots) than the England average has since 2011-13. Rates in North Somerset and South Gloucestershire continue to be significantly better than the England average (figure 9).

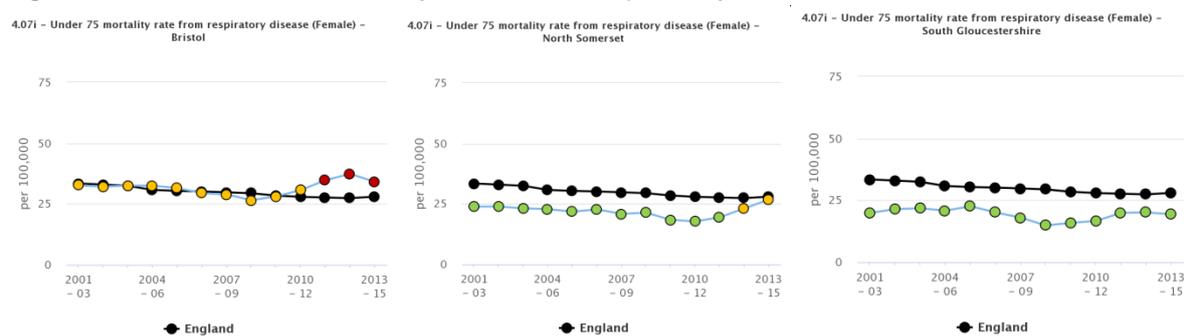
Figure 9. Premature mortality rate from respiratory disease trend



Source: PHOF

The premature mortality rate from respiratory disease across BNSSG is higher for males than females. The rate for females has seen an upward trend in Bristol and North Somerset in recent years. In South Gloucestershire, rates have been more stable (figure 10). For males the rates have been fairly stable in recent years across BNSSG.

Figure 10. Premature mortality rate from respiratory disease for females trend



Source: PHOF

3.2 QOF Indicators

SMOK002: smoking status recorded for patients with certain conditions

(including COPD). In BNSSG 92.5%* of patients with long term conditions had smoking status recorded in the last 12 months, which is significantly worse than the England average of 94.2% (table 11).

Table 11. Smoking status recorded in the last 12 months (certain conditions) BNSSG 2015/16

Area	Value	Lower CI	Upper CI
England	94.2	94.2	94.2
Bristol, North Somerset, South Gloucestershire	92.5*	-	-
NHS Bristol CCG	91.3	91.1	91.5
NHS North Somerset CCG	93.6	93.4	93.8
NHS South Gloucestershire	93.5	93.3	93.7

Source: QOF

* aggregated from all known lower geography values

SMOK005: smoking cessation support offered to those with certain conditions (including COPD) who smoke.

In BNSSG 95.1%* of patients with long term conditions who smoke were offered treatment and support to stop smoking. This is better than the England average of 94.3% (table 12).

Table 12. Smoking cessation treatment offered (certain conditions) BNSSG 2015/16

Area	Value	Lower CI	Upper CI
England	94.3	94.3	94.4
Bristol, North Somerset, South Gloucestershire	95.1*	-	-
NHS Bristol CCG	94.7	94.4	95.0
NHS North Somerset CCG	95.7	95.2	96.1
NHS South Gloucestershire	95.6	95.1	96.0

Source: QOF

* aggregated from all known lower geography values

Management of COPD

COPD002: % of patients with COPD where diagnosis is confirmed by spirometry.

NICE guidelines recommend diagnosis of COPD via spirometry in order to ensure early and accurate diagnosis (NICE, 2016). In BNSSG 78.6%* of COPD patients were diagnosed by spirometry, significantly worse than England average of 81% (table 13). There is much variation across GP practices: in Bristol 41.4% to 93.3%; in North Somerset 70.1% to 92.4%; in South Gloucestershire 57.8% to 92.9%.

Table 13. % of patients with COPD – diagnosis confirmed by spirometry BNSSG 2015/16

Area	Value	Lower CI	Upper CI
England	81.0	80.9	81.1
Bristol, North Somerset, South Gloucestershire	78.6*	-	-
NHS Bristol CCG	78.3	76.9	79.7
NHS North Somerset CCG	80.6	78.7	82.3
NHS South Gloucestershire	77.0	75.0	78.9

Source: QOF

* aggregated from all known lower geography values

COPD003: assessed using MRC dyspnoea score (assessment of breathlessness) in last 12 months.

In BNSSG 78.3%* of COPD patients were assessed for breathlessness, similar to the England average of 79.3%, apart from Bristol who is significantly worse than the England average (table 14). There is much variation across GP practices: in Bristol 55.7% to 98.2%; in North Somerset 59.9% to 90.9%; in South Gloucestershire 63.4% to 94.7%.

Table 14. Assessment of breathlessness in last 12 months

Area	Value	Lower CI	Upper CI
England	79.3	79.2	79.4
Bristol, North Somerset, South Gloucestershire	78.3*	-	-
NHS Bristol CCG	77.2	76.3	78.1
NHS North Somerset CCG	80.4	79.2	81.5
NHS South Gloucestershire	78.4	77.1	79.6

Source: QOF

* aggregated from all known lower geography values

COPD04: Record of FEV1 in last 12 months

In patients with COPD the lungs deteriorate over time. It is therefore important to monitor respiratory function (FEV1) in order to identify patients who might benefit from pulmonary rehab or oxygen therapy. NICE guidelines recommend that FEV1 and inhaler technique should be assessed at least annually for patients with COPD, in order to identify increasing severity of disease (NICE, 2010).

In BNSSG 70.3%* of COPD patients had a record of FEV1 in the last 12 months, which is similar to the England average 72.1%. Bristol and South Gloucestershire are significantly worse than the England average, North Somerset is significantly better than the England average (table 15). There is much variation across GP practices: in Bristol 42.4% to 94.6%; in North Somerset 53.1% to 89.6%; in South Gloucestershire 35.3% to 88.0%.

Table 15. Monitoring respiratory function (FEV1) at 12 months BNSSG 2015/16

Area	Value	Lower CI	Upper CI
England	72.1	72.0	72.2
Bristol, North Somerset, South Gloucestershire	71.1*	-	-
NHS Bristol CCG	70.3	69.3	71.3
NHS North Somerset CCG	75.2	73.9	76.5
NHS South Gloucestershire	68.2	66.8	69.6

Source: QOF

* aggregated from all known lower geography values

COPD007: Influenza immunisation given in preceding 1 August to 31 March.

In BNSSG 81%* of patients with COPD were given a flu vaccination between 1 August 2015 and 31 March 2016. This is similar to the England average of 79.9% (table 16).

Table 16. % of patients with COPD who have had influenza immunisation BNSSG 2015/16

Area	Value	Lower CI	Upper CI
England	79.9	79.8	80.0
Bristol, North Somerset, South Gloucestershire	81.0*	-	-
NHS Bristol CCG	79.4	78.5	80.2
NHS North Somerset CCG	81.5	80.3	82.7
NHS South Gloucestershire	83.8	82.7	85.0

Source: QOF

* aggregated from all known lower geography values

3.3 NHS Rightcare

NHS Rightcare Commissioning for Value Pack is a quality improvement tool to identify areas where there may be unwarranted variations in care for long term conditions (NHS Rightcare, 2017). Table 17 shows how Bristol, North Somerset and South Gloucestershire compare to each of their 10 most similar (peer group) CCGs. It identifies opportunities for improvement in: diagnosis by spirometry across BNSSG; reported to estimated COPD in Bristol and South Gloucestershire; premature mortality for COPD in North Somerset; COPD patients with recorded FEV1, 12 month reviews and non-elective spend in South Gloucestershire.

Table 17. Opportunities for quality improvement and spend differences in order to drive local action to reduce inequalities in access to services and reduce variation in outcomes. 2015/16 data, unless otherwise stated.

COPD pathway	Compared to best/lowest 5 of 10 similar CCGs based on demographics		
	Bristol CCG	North Somerset (NS) CCG	South Glos. (SG) CCG
Reported to estimated COPD	worse	Better	worse
COPD pt Diagnosed spirometry %	worse	Worse	worse
COPD pt with record of FEV1 %	better	Better	worse
COPD pt with 12 month review %	better		worse
non-elective spend	better	Better	worse
<75 mortality COPD (2012-14)	better	Worse	better

Better or worse only used where statistically significant at the 95% confidence interval. Source: (NHS Rightcare, 2017)

Table 18. shows the significant areas for improvement when comparing Bristol, North Somerset and South Gloucestershire to the best 5 in each of its peer groups. The values shown in the quantified opportunity column indicate the difference between the CCGs and the average of the best 5 peers. e.g. to equal the average of the best 5 of its peers Bristol would need to report (diagnose) 3,039 more COPD cases, approximately a third of the estimated undiagnosed cases of COPD in Bristol.

South Gloucestershire would need to report (diagnose) 1,885 more COPD cases, approximately 40% of the estimated undiagnosed cases of COPD in South Gloucestershire.

Table 18. Improvement Opportunities* if the CCG performed at the average of the best/ lowest 5 of 10 similar CCGs. 2015/16 data, unless otherwise stated.

Improvement Opportunities* if the CCG performed at the average of the best/ lowest 5 of 10 similar CCGs. A quantified unit is only shown when the opportunity is statistically significant at the 95% confidence interval, January 2017			
Respiratory	Bristol CCG	North Somerset CCG	South Gloucestershire CCG
Respiratory –rate of bed days	4,530	-	1,955
Reported to estimated prevalence of COPD	3,039	-	1,885
% of COPD patients with a record of FEV1	-	142	304
% of COPD patients with review (12 months)	108	148	125
% of COPD patients with a diagnosis confirmed by spirometry	166	63	81

* the difference between the CCG and the average of the lowest 5 of the 10 similar CCGs. Source: (NHS Rightcare, 2017)

3.4 National Audit Programmes

National COPD audit programme (RCP) pulmonary rehabilitation, organisational and secondary care audits are due to take place in 2017.

All providers have recently participated in the National BTS Pulmonary Rehabilitation Audit and are currently awaiting publication of results.

4) What is the evidence of what works (including cost effectiveness)?

A summary of the evidence is included in this section, with a focus on prevention and early intervention.

COPD

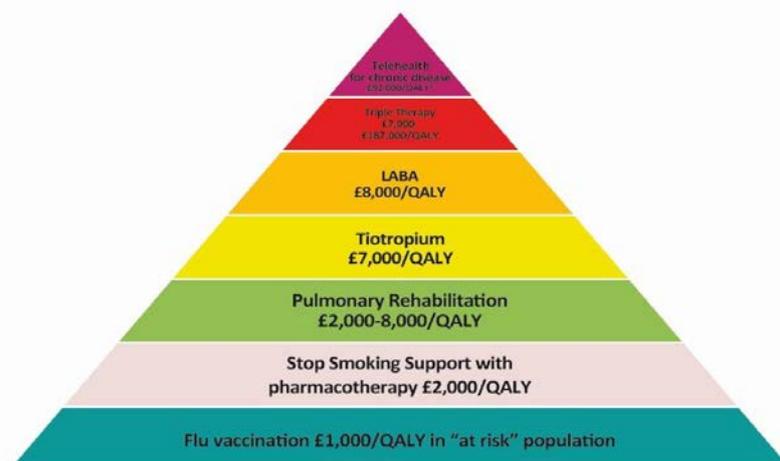
The Global Initiative for Chronic Obstructive Lung Disease (GOLD, 2017) reviewed evidence supporting prevention and maintenance therapy and recommended the following:

- smoking cessation is key
- pharmacological treatments should be individualised
- inhaler techniques should be assessed regularly
- influenza (flu) and pneumococcal (pneumonia) vaccinations decrease lower respiratory tract infections;
- pulmonary rehabilitation (rehab) improves symptoms and quality of life.

The NHS London Respiratory Network produced a value pyramid for COPD interventions, based on cost per Quality Adjusted Life Year (QALY) (London Respiratory Network, 2014). A QALY is a measure of the state of health of a person (or group) in which the benefits in terms of length of life, are adjusted to reflect quality of life. QALYs are calculated by estimating the years of life remaining for a patient following a particular treatment or intervention and weighting each year with a quality-of-life score (on a 0 to 1 scale).

The NICE accepted cost-effectiveness 'threshold', over which treatments are less likely to be recommended for use in the NHS is £20,000 per QALY (NICE Local Government Briefing, 2013). The value pyramid shows the most valuable interventions for COPD are flu vaccinations in the 'at risk' population, followed by smoking cessation and pulmonary rehabilitation (figure 11).

Figure 11. Value pyramid for COPD interventions



Source: London Respiratory Network (2014), COPD Value Pyramid

Smoking cessation

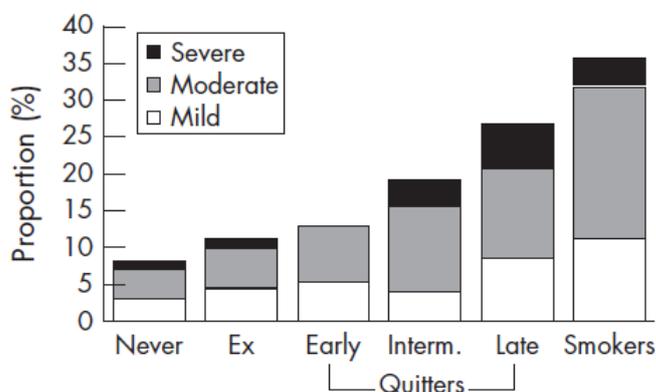
Smoking Cessation is a significant factor in preventing COPD. For every 1% increase in prevalence of smoking in COPD populations there is a 1% increase in COPD admission rates (Purdy, 2011). It is important that patients diagnosed with COPD are monitored for smoking prevalence and those still smoking are offered support to stop at every opportunity. Quitting smoking in the early stages of COPD has been shown to halve the rate of decline in lung function (British Thoracic Society & Primary Care Respiratory Society UK, 2012).

NICE guidance for COPD diagnosis and management states that encouraging patients with COPD to stop smoking is one of the most important components of their management. All COPD patients still smoking, regardless of age, should be encouraged to stop, and offered help to do so, at every opportunity (NICE, 2010).

A 25 year follow up study of over 8000 adults (aged 30 to 60) indicated that after 25 years of smoking, at least 25% of smokers without initial disease will have clinically significant COPD (moderate, severe or very severe) and that 30-40% of smokers will have any COPD (mild to very severe) (Lokke, 2006).

Figure 12 shows the incidence rates for COPD from this study. The highest incidence was seen in continuous smokers, which, was 35.5% for all stages of COPD over the 25 year period. The incidence for never smokers was 7.8% (and similar for ex-smokers). Among continuous smokers, 24.3% developed clinically significant COPD (stage 2 or worse). The quitters shown are defined as follows: Early = those who quit within 5 years of follow up; Intermediate = quit between 5 and 15 years, and Late = quit between 15 and 25 years. None of the early quitters followed up at 25 years developed severe COPD. Among those who quit later, COPD incidence was higher, and there were higher proportions of moderate and severe COPD than those who quit earlier.

Figure 12. Calculated cumulative incidence for COPD according to stages (mild, moderate, severe), men and women combined.



Source: Lokke A et al. (2006), Developing COPD: a 25 year follow up study of the general population

A meta-analysis of smoking cessation interventions for people with COPD concluded them to be more effective when they included action planning, prompts for self-recording, advice on weight control, use of social support, and linking of the disease with smoking (Bartlett, 2014).

A Cochrane systematic review into smoking cessation for people with COPD, found high quality evidence from a collection of 4 studies (1,540 participants) that smokers with COPD who receive a combination of high-intensity behavioural treatment (more than one counselling session of more than 10 minutes, at least one face to face) and pharmacotherapy (medication), are more than twice as likely to quit as people with COPD who receive high-intensity behavioural support alone. The review also found some evidence that high-intensity behavioural treatment increased abstinence rates (6 months or longer) when compared with usual care (no treatment) or low intensity (simple advice) behavioural treatment. The review concluded: a combination of behavioural treatment and pharmacotherapy is effective in helping smokers with COPD to quit smoking; no convincing evidence for preferring any particular form of behavioural or pharmacological treatment (van Eerd, 2016).

Diagnosis and Spirometry

If diagnosed earlier, people with COPD can take steps to improve the outcome of their disease and prevent its progression. Evidence from global clinical trials shows the rate of decline in lung function is faster in the earlier stages of the disease - when people are less likely to have a diagnosis. (Department of Health, 2012).

NICE guidance (NICE, 2010) recommends:

- a diagnosis of COPD should be considered in patients over 35 who have a risk factor such as smoking and who present with exertional breathlessness, chronic cough, regular sputum production, frequent winter bronchitis or wheeze
- All health professionals involved in the care of people with COPD should have access to spirometry and be competent in the interpretation of the results.
- Spirometry should be performed at the time of diagnosis and to reconsider the diagnosis, if patients show an exceptionally good response to treatment.
- Spirometry services should be supported by quality control processes

The All Party Parliamentary Group (APPG) Report on inquiry into Respiratory Deaths 2014 called for a system to assess and certify the competence of all healthcare professionals undertaking and interpreting diagnostic spirometry. In response to this report a new competency framework was published in September 2016, with the aim of driving up standards in diagnostic spirometry (British Thoracic Society, n.d.). In the

framework it states that, to be of clinical value, diagnostic spirometry has to be performed to a high standard. If it is not, there is a significant risk that the diagnosis will be incorrect and patients may receive inappropriate and potentially harmful treatment as a result, or be denied appropriate treatments that could potentially improve their condition. Diagnostic spirometry must be quality-assured. Spirometry training, accreditation and a spirometry register is available (Association for Respiratory Technology and Physiology, n.d.). The British Thoracic Society report says 'there is evidence that spirometry is still under-utilised, and that the quality of spirometry measurement in primary care is inconsistent.'

Vaccinations

NICE guidance for COPD diagnosis and management states that pneumococcal (pneumonia) vaccination and annual influenza (flu) vaccination should be offered to all patients with COPD as recommended by the Chief Medical Officer (NICE, 2010).

The GOLD evidence review highlighted above states that influenza vaccination can reduce serious illness (such as lower respiratory tract infections requiring hospitalisation) and death in COPD patients (Global Initiative for Chronic Obstructive Lung Disease (GOLD), 2017).

Despite the guidance, very few randomised controlled trials have evaluated the effect of influenza vaccination in people with COPD. A Cochrane systematic review of the evidence for effectiveness of flu vaccination in COPD patients concluded, from the limited number of studies performed, that inactivated vaccine reduces exacerbations. The size of effect was similar to that seen in large observational studies, and was due to a reduction in exacerbations occurring three or more weeks after vaccination, and due to influenza (Poole, 2006).

People with COPD are at increased risk of pneumonia, and pneumococcal vaccine is recommended for all patients aged 65+ and younger COPD patients with significant comorbid conditions such as chronic heart or lung disease (GOLD, 2017). A Cochrane systematic review of the efficacy of pneumococcal vaccines for preventing pneumonia in those with COPD concluded that people who were vaccinated were less likely to experience a COPD exacerbation; 8 people with COPD would have to be vaccinated to prevent one person from having an acute exacerbation (which may lead to a hospital admission) (Walters, 2017)

Preventing progression of COPD

Prevention of progression can be achieved through evidence based treatments, prompt and effective management of exacerbations and offer of interventions such as smoking cessation. Key actions include: Identify and treat exacerbations promptly; promote regular physical activity; offer pulmonary rehab where appropriate and review regularly; support self-management so that those with COPD know how to manage their symptoms and take appropriate preventative action (Department of

Health, 2012), and offer support to stop smoking at every opportunity.

Pulmonary Rehabilitation

Pulmonary rehabilitation is a structured evidence based programme recommended for COPD patients with an MRC (breathlessness) score greater than 3 (Department of Health, 2012). Pulmonary rehab is a cost effective way of reducing hospital admissions, improving exercise capacity and improving health-related quality of life. It is substantially below the NICE threshold for cost effectiveness, at only £2000-8000 per Quality Adjusted Life Year (QALY) (Department of Health, 2012).

NICE recommends pulmonary rehabilitation should be made available to all appropriate people with COPD including those who have had a recent hospitalisation for an acute exacerbation (NICE, 2010).

A Cochrane review of 20 studies involving 1,477 participants with COPD compared the impact of pulmonary rehabilitation after exacerbation on hospital readmissions and patient outcomes. The review (Puhan, 2016) reported:

- evidence of high quality shows moderate to large effects on health-related quality of life and exercise capacity
- moderate-quality evidence for reduction in hospital readmissions with diverse results across the studies (pooled odds ratio (OR) 0.44, 95% confidence interval (CI) 0.21 to 0.91)
- low-quality evidence for reduction in mortality.

Evidence from nine trials (432 patients), shows pulmonary rehabilitation significantly reduced admissions (OR = 0.22; 95% CI 0.08 to 0.58) and mortality (OR = 0.28; 95% CI 0.10 to 0.84) in patients who had recently experienced an exacerbation (Puhan, 2011).

Pulmonary rehab should be considered part of integrated patient management and usually includes a range of healthcare professionals. The London Respiratory Network suggests optimum benefits are achieved from programmes lasting 6 to 8 weeks (there is no evidence that extending to 12 weeks or longer provides any advantages). Supervised and individualised exercise training twice weekly is recommended. Pulmonary rehab is appropriate for most patients with COPD, though the evidence for pulmonary rehab is especially strong in patients with moderate to severe disease.

The National COPD Audit suggests there is significant under referral of eligible patients for pulmonary rehab. Only 25% of those eligible for pulmonary rehab registered, and half completed the programme (RCP National COPD Audit, 2015).

Barriers to access to pulmonary rehab may include geography, culture, finances, transport and other logistics. Pulmonary rehab should be conducted at a range of

sites including in the community and patients homes, as well as hospital settings (London Respiratory Network, 2016).

A systematic review into the barriers and enablers of referral, uptake, attendance and completion of pulmonary rehab in COPD (Cox, 2017) shows the most frequently represented reason were:

- Environment - waiting time, burden of illness, travel, transport and health system resources (most frequent - 37%)
- Knowledge - clinician knowledge of referral process, patient understanding of rehab content
- Beliefs about consequences - beliefs regarding role and safety of exercise, expectations of rehab outcomes

Engagement in PR can be poorer for those with more complex needs, including depression and continued smoking. There is some evidence supporting the role of psychology in overcoming barriers to engagement with PR and maximising its benefits (London Respiratory Network, 2016).

A meta-analysis of the effectiveness of psychological interventions for anxiety and depression in COPD concluded that whilst effective psychological interventions such as CBT may assist people with COPD in reducing psychological burden, there remains a need for well-designed studies to provide substantive evidence on the use of interventions in this population (Smith, 2014).

A systematic review of interventions to improve uptake and completion of pulmonary rehabilitation in COPD shows that there is insufficient evidence to guide clinical practice on interventions for improving patient uptake and completion of pulmonary rehab in COPD (Jones, 2017).

Home based pulmonary rehab

A randomised controlled trial assessed whether home based pulmonary, delivered using minimal resources, had equivalent outcomes to centre-based pulmonary rehab. Patients with stable COPD were randomly assigned to receive 8 weeks of pulmonary rehab by either the standard centre-based model or a new home based model including one home based visit and 7 once weekly telephone calls from a physiotherapist. The primary outcome change was 6 min walk distance. The home based rehabilitation produce short term clinical outcomes that were equivalent to centre-based pulmonary rehab. Neither model was effective at maintaining gains at 12 months. The review concluded that home-based pulmonary rehab could be considered for people with COPD who cannot access centre-based pulmonary rehab (Holland, 2016).

Managing exacerbations

There is good evidence that prompt treatment of exacerbations results in less lung damage, faster recovery and fewer admissions to hospital. People should be able to access clinical help early in the course of an exacerbation and, as recommended in the NICE clinical guideline for COPD, should be given a course of antibiotic and corticosteroid tablets to keep at home for use as part of a self-management strategy (Department of Health, 2012).

Reducing readmission to hospital after an exacerbation

The RCP's National COPD Audit Programme; secondary care outcomes report makes the following recommendations to reduce readmission to hospital after an exacerbation (Royal College of Physicians, 2017):

- early review of every discharged case by a suitable primary care team member, to identify issues that may place the patient at increased risk of readmission and to ensure high value interventions have been addressed.
- primary care teams devote resource to identifying, reviewing and enhancing the management of those COPD patients on their lists who are deemed at particular risk of hospital admission.

The RCP suggests commissioners ensure integrated COPD pathways and services are widely available, and are incorporated into Sustainability and Transformation Plans (STPs) to encourage the development of whole system, seamless integrated care. The evidence base for developing integrated primary/secondary approaches to COPD includes early/supported discharge and admission avoidance services. Such services are not only associated with shorter length of stay in hospital, but may also reduce readmission rates (Royal College of Physicians, 2017).

Patient education and self-management

Self-management plans help individuals recognise and initiate early treatment for exacerbations, which can reduce their impact. A Cochrane systematic review of the evidence reported that people with COPD given an individualised action plan with a short educational component had fewer emergency department visits and hospital stays related to breathing problems over a year. For every 19 people given an action plan, one person would avoid a hospital stay for an exacerbation (Howcroft, 2016).

A Cochrane systematic review of 29 studies (3189 participants) to evaluate whether self-management interventions in COPD lead to improved health outcomes and reduced healthcare utilisation (Zwerink, 2014), concluded:

- a statistically relevant effect of self-management health related quality of life (moderate quality evidence)
- a reduction in respiratory related hospital admissions (odds ratio 0.57, 95% CI 0.43 to 0.75) (moderate quality evidence)

A Cochrane Review of 7 randomised controlled trials (1550 participants) concluded that COPD exacerbation action plans with a single short educational component along with ongoing support, but without a comprehensive self-management programme, reduces in-hospital healthcare utilisation and increases treatment of COPD exacerbations. When compared with usual care:

- an action plan with phone call follow-up significantly reduced the combined rate of hospitalisations and emergency department visits for COPD over 12 months in one study with 743 participants (rate ratio, 0.59, 95% CI 0.44 to 0.79) – high quality evidence. But the rate of hospitalisations alone in this study did not achieve statistical significance.
- Over 12 months, action plans significantly decreased the likelihood of hospital admissions (odds ratio 0.69, 95% CI 0.49 to 0.97).

In summary:

Stopping Smoking is one of the most important factors in preventing COPD. Advising and supporting people to stop smoking at every opportunity will contribute towards slowing down the predicted rise in COPD prevalence. In those already diagnosed with COPD, stopping smoking will slow progression and improve management of symptoms.

Diagnosis and Spirometry - If diagnosed earlier, people with COPD can take steps to improve the outcome of their disease and prevent its progression.

Vaccinations - Flu vaccination can reduce exacerbations, serious illness requiring hospitalisation and death in COPD patients. Pneumonia vaccination can reduce the likelihood of experiencing a COPD exacerbation.

Pulmonary Rehabilitation improves symptoms and health-related quality of life in those diagnosed with COPD and can significantly reduce hospital admissions and COPD mortality.

Managing COPD Exacerbations - prompt identification and treatment of exacerbations results in less lung damage, faster recovery and fewer admissions to hospital.

Early/supported discharge and admission avoidance services for COPD are associated with shorter length of stay in hospital and can also reduce readmission rates.

Patient education and self-management plans for COPD patients – individualised action plans and patient education can lead to fewer emergency department visits and hospital stays related to breathing problems.

5) What services/assets do we have to prevent and meet this need?

5.1 Prevention

Air Pollution

In Bristol, a mayoral air pollution working group has been set up to develop an Air Quality Action Plan (AQAP) and strategy. A feasibility study into creating a Clean Air Zone for the Bristol area is due to begin in 2017, following a successful government funding bid. The aim is to improve air quality in and around Bristol, creating a healthier and cleaner city. Draft NICE guidelines on air quality have been circulated for consultation, to which the mayoral group has responded. The new guidelines are due for publication in 2017.

Smoking Cessation

Bristol

Stop smoking support in Bristol is delivered by GP practices, secondary care, Pharmacies, Healthy Living Centres and some voluntary and community groups. The services offer behaviour change support and stop smoking medication such as nicotine replacement therapy. Some community providers also offer free electronic cigarette vouchers to groups where smoking prevalence is high.

North Somerset

Support to stop smoking is provided by over 250 trained advisers in pharmacies, doctor's surgeries and community venues across the area. One to one sessions are provided by health trainers at the Town Hall, Weston-Super-Mare weekdays between 9am and 5pm. Drop in sessions are provided at the café at Tesco Weston-Super-Mare on Wednesday evenings between 6.15pm and 7.45pm.

South Gloucestershire

Trained stop smoking advisers are based at GP surgeries, pharmacies and at community venues including Kingswood (Thursdays, 3-7pm) and Patchway (Tuesdays 4-7pm).

5.2 Primary Care Services

Across BNSSG, people with COPD are diagnosed and managed by GP practices including:

- Recording on disease registers
- Assessment of breathlessness and other symptoms
- Influenza and pneumococcal vaccination
- Smoking status recording and offer of stop smoking support and treatment
- COPD annual reviews

- Spirometry and peak flow
- Medication reviews including inhaler technique and treatment adherence
- Self-care action plans
- Post exacerbation follow up
- Provision of winter standby medications
- Referral to pulmonary rehab
- Referral for home oxygen
- Referral to other provider services including acute trust and community provider, where required

See sections 2 and 3 for indicators reflecting pathways for respiratory care in primary care.

5.3 Secondary Care – Acute Trusts

University Hospitals Bristol NHS Trust

Respiratory medicines services are provided by a multi-disciplinary respiratory team including 12 respiratory consultants, specialist respiratory nurses and physiotherapists. Services provided include:

- 22 beds (minimum) in **respiratory specialist care wards**
- **respiratory outpatient clinics** at Bristol Royal Infirmary (BRI) and South Bristol Community Hospital including COPD and Oxygen clinics
- 10 **specialist clinics** including ‘difficult asthma’
- **Respiratory Hot clinic** providing a rapid-access admission avoidance clinic, Monday to Friday, respiratory outpatients at BRI
- **Oxygen assessment centre** for those patients who may benefit from oxygen at home. .
- **Respiratory Measurement service** providing respiratory function testing at the BRI

Further information about these services can be found at:

<http://www.uhbristol.nhs.uk/patients-and-visitors/your-hospitals/bristol-royal-infirmary/what-we-do/respiratory-medicine/>

North Bristol NHS Trust (NBT)

A multi-disciplinary respiratory team including 10 respiratory consultants, specialist respiratory nurses and physiotherapists and a pharmacist provide:

- 32 bed **acute lung unit**
- **Respiratory outpatient clinics** at Southmead , Clevedon, Cossham , North Bristol Lung Centre, Thornbury

- **8 specialist clinics** including 'difficult asthma', lung disease, lung infection, Lung cancer and complex airways disease
- **Respiratory day case** for follow up and monitoring at Southmead, Thornbury, Clevedon, Cossham; provided on Tuesdays and Fridays
- **Respiratory Hot clinic** - a service available to GPs and Community Matrons on referral, for adult patients threatening admission with a respiratory problem. Patients are discharged from the clinic with a management plan drawn up by a Respiratory Consultant. This service is provided Monday to Friday between 10am and 5pm. A recent audit showed 72% of referrals were successfully treated in the community following attendance at the clinic and avoided the need for hospitalisation. (Thorax 2008; 63: supplement VII A13)' (North Bristol NHS Trust website, 2017)
- **Respiratory physiology** service - performs breathing tests to aid in the diagnosis of lung disease. The Service is provided Monday-Friday for both in and outpatients
- **Early Supported Discharge** for COPD - is run by a team of specialist respiratory clinicians to help prevent COPD patients remaining in hospital longer than needed. The team of nurses and therapists will visit the patients as required during the period of their exacerbation to assess their progress, provide treatment, advice and support in their own home. The team has direct contact with the hospital respiratory consultants for any further specialist advice. Patients will be discharged back to the care of their GP afterwards, usually within 7-10 days. It is a 7 day service including all Bank Holidays.
- **Pulmonary Rehabilitation - Lung Exercise & Education Programme (LEEP)** -The pulmonary reahabilitation service provided by the Respiratory Specialist team is for people with long term lung conditions, whose breathing is causing them difficulty when moving around or carrying out daily activities. It is a 6 week pulmonary rehabilitation course, based at Cossham Hospital. 2 hour sessions of supervised exercise and education are held twice weekly. A refresher course is available for people who have been through LEEP but still need some support.
- **Home Oxygen Assessment and Review Service** –North Bristol NHS Trust Respiratory Specialist Team and Sirona Care & Health Community Respiratory Team provide an integrated Home Oxygen and Assessment and Review Service for individuals registered with a South Gloucestershire GP. Referrals are jointly triaged by secondary care and community team and then allocated to either service considering patient location and preference. NBT Respiratory Specialist Team also provides an oxygen service to individuals across the BNSSG and provides ongoing care to patients who have home oxygen. Patients are reviewed either in their own home or within a clinic environment according to National Guidelines.

Further information about these services can be found at: <https://www.nbt.nhs.uk/our->

Weston Area Health NHS Trust

Thoracic Medicine Department - investigates, diagnoses and treats: Chronic Obstructive Pulmonary Disease (COPD), Asthma, Pneumonia and other lung infections; unexplained cough and unexplained shortness of Breath.

- **Outpatient Clinics** - held in general outpatient department at Weston and at Burnham on sea hospital. Appointments on referral from a GP or other doctor.
- **Thoracic surgery** - carried out in the Regional Centre at Bristol Royal Infirmary. One of the Thoracic Surgeons visits Weston twice a month, on Tuesday morning, attending a multidisciplinary meeting to discuss all new surgical cases, and holding an outpatient clinic alongside the Thoracic Medicine Clinic.

5.4 Community Care

Bristol

Bristol Community Health provides community respiratory services including:

- Prevention of admission to acute hospital (admission avoidance)
- Home Oxygen assessment and review service
- Pulmonary rehabilitation in the community
- Early Supported Discharge from hospital

South Gloucestershire

Sirona Care and Health's Community Respiratory Specialist Team (CRST) work in collaboration with North Bristol NHS Trust Respiratory Specialist Team (RST) to provide services to people in South Gloucestershire with chronic obstructive pulmonary disease (COPD) including:

- Prevention of admission to acute hospital
- Home Oxygen Assessment and Review service
- Pulmonary rehabilitation in the community

North Somerset

Whilst North Somerset does not have a specific respiratory service, they have pulmonary rehab and oxygen services provided by North Somerset Community Partnership.

5.4.1 Admission Avoidance and Early Supportive Discharge (ESD)

Bristol

Admission avoidance and early supportive discharge services are provided by Bristol Community Health and run by specialist respiratory clinicians to help prevent COPD patients from having to attend hospital or remain in hospital for longer than needed. The team of nurses and therapists visit patients at home during the period of their COPD exacerbation, and work alongside other community teams (e.g. Rapid Response Team¹) if necessary to enable patients to remain at home or come home early from hospital. Both admission avoidance and ESD services are provided 7 days a week, Monday-Friday: 8am-8pm and Saturday-Sunday and Bank Holidays: 9am-5pm.

Admission avoidance applies to all patients registered with a GP practice in the Bristol CCG area. Early supportive discharge provided by Bristol Community Health is for UHBristol patients only. Early supportive discharge is also provided by North Bristol Trust for all individuals admitted to NBT or seen via HOT clinic with COPD across the BNSSG network (see Acute Trust section above).

South Gloucestershire

Sirona Care and Health provides an admission avoidance service for South Gloucestershire patients. The team of nurses and therapists visit patients at home during the period of their COPD exacerbation, and work alongside other community teams (e.g. Community Matrons, Community Rehabilitation and GP services) if necessary to enable patients to remain at home. They interface with secondary care Hot Clinic for specialist advice and support. Early supported discharge services are currently provided by North Bristol NHS Trust's respiratory specialist team and Sirona is planning to enhance the existing service by contributing to the early supportive discharge service for South Gloucestershire patients in the future.

North Somerset

North Somerset Community Partnership have admission avoidance and discharge to assess services, although they are not specific to respiratory conditions.

¹ *Rapid Response is a multi-disciplinary team of nurses, physiotherapists, occupational therapists and support workers. Their remit is to reduce hospital admissions by caring for people who became clinically unwell at home and who historically would have been admitted to hospital.

5.4.2 Home Oxygen Assessment and Review Services

Bristol

Bristol Community Health administers referrals for home oxygen services for the whole of Bristol and provides ongoing care to patients who have home oxygen. Patients are reviewed either in their own home or within a clinic environment close to home.

North Somerset

North Somerset Community Partnership's team of specialist respiratory nurses and physiotherapists provide home oxygen assessments and ongoing support.

South Gloucestershire

Sirona Care & Health Community Respiratory Specialist Team and North Bristol NHS Trust Respiratory Specialist Team provide an integrated Home Oxygen and Assessment and Review Service. Referrals are jointly triaged by community and secondary care and then allocated to either service considering patient preference and where possible ensuring care close to home.

NBT provides a Home Oxygen Assessment and Review service for patients across BNSSG according to patient location and preference.

5.4.3 Pulmonary Rehabilitation

Bristol

The pulmonary rehabilitation service provided by Bristol Community Health is for people with long term lung conditions, whose breathing is causing them difficulty when moving around or carrying out daily activities. The programme combines a personalised activity plan with education and advice to help people feel more in control of their condition. Referrals are accepted from health care professionals; patients with a diagnosed long term lung condition can also self-refer. 2 hour sessions are provided twice a week (between Monday and Friday, 9am and 5pm) for 12 weeks in groups of up to 16 people.

A rolling programme of pulmonary rehab classes are offered at the following locations, where there is high prevalence of COPD:

- Greenway Centre, Southmead (North Bristol)
- Henbury Leisure Centre (North)
- Brunel Fitness Centre, Speedwell (East)

- St Pauls Fitness Centre, Lawrence Hill (inner city)
- Easton Leisure Centre (inner city)
- Ashton Park School, Southville (South)
- The Park, Knowle West (South)
- South Bristol Sports Centre, Hengrove (South)

Patients can repeat the pulmonary rehabilitation programme 18 months after completing the course if appropriate. Bristol Community Health supports fitness trainers in a number of gyms in Bristol so they can help people who have been through pulmonary rehabilitation to get them back to fitness. There is also a volunteer programme involving four ex patients who provide peer support through the programme. Bristol Community Health runs a 4 week rolling MDT Fatigue Management programme at St Peters Hospice, which includes education and a chair based exercise session for people who are not well enough to attend the Pulmonary rehabilitation programme.

The London Respiratory Network suggests admissions can be avoided if patients are fast tracked to pulmonary rehabilitation post-exacerbation. In Bristol these patients are considered urgent and Bristol Community Health aim to have them in pulmonary rehab within a month. Some are seen at home if they can't attend a group.

Bristol Community Health reports that most patients have stopped smoking by the time they access pulmonary rehab, but those who haven't are signposted to support to stop services in the community.

Bristol Community Health estimates that 50% of COPD patients have an MRC score of 3 or more and are thus eligible for the rehab programme.

The pulmonary rehab service in Bristol has capacity for 900 patients to attend in a year. In 2015/16, 890 Bristol residents (878 with a Bristol GP) with COPD were referred for pulmonary rehab. Almost 50% were from GP practices (table 19).

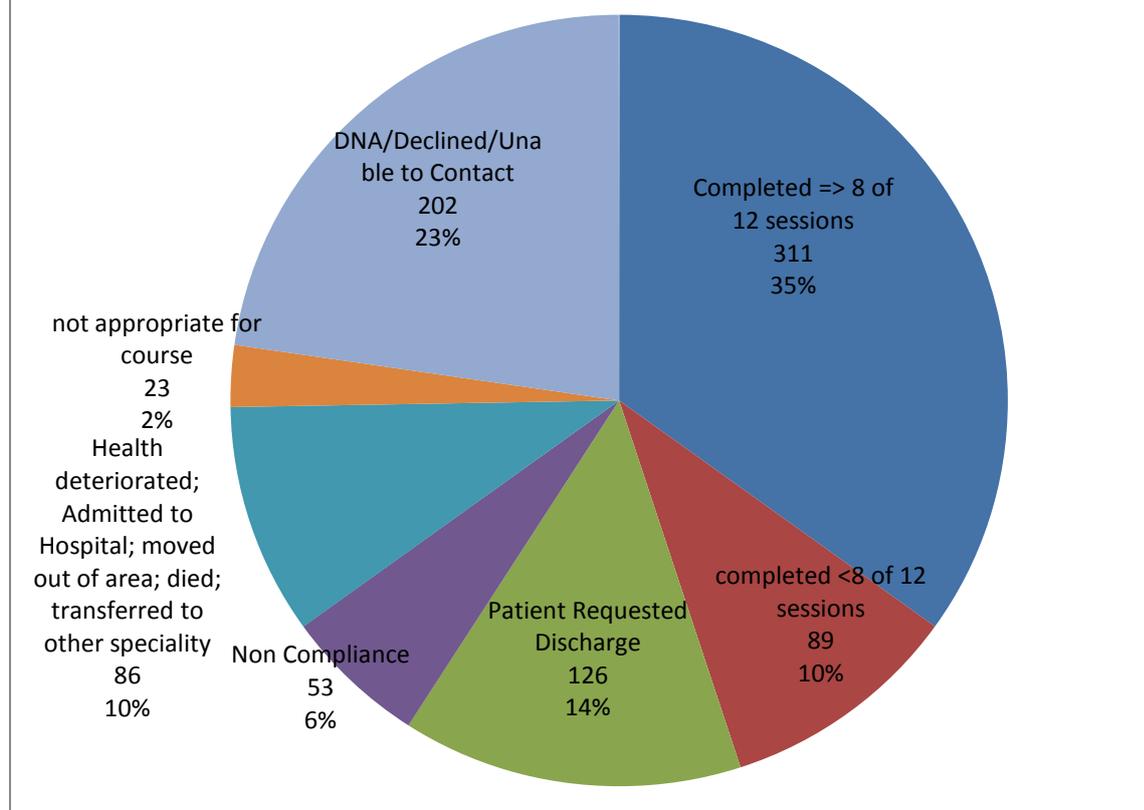
Table 19. Referral sources for Pulmonary Rehab in Bristol 2015/16

Referral Source	Number
Self-Referral	23
Hospital	306
Bristol Community Health	122
GP Practice	438

Source: Bristol Community Health

Of the 890 referred, 331 (35%) completed 8 or more sessions; 89 (10%) completed less than 8 sessions and 202 (23%) could not be contacted, declined or did not attend (figure 13).

Figure 13. Referred for Pulmonary Rehab in Bristol 2015/16



Numbers of patients referred to pulmonary rehab over 1 year by locality are shown in table 20. These referrals represent around 10% of the known registered COPD patients. Factors such as experience within practices regarding pulmonary rehab, and location and accessibility of programmes are likely to influence referrals rates as well as differences in severity (MRC scores). These referral numbers are only those referred over 1 year and do not take account of numbers previously referred or attended rehab.

Table 20. Referrals to pulmonary rehab in Bristol by locality

Source: Bristol Community Health	All ages list size 2015/16 (QOF)	COPD register 2015/16 (QOF)	COPD Prevalence % (QOF)	Referred for PR in 2015/16	referred for PR in 2015/6, as % of COPD pts on register	% referred for PR -range
East	87,504	1,346	1.54	160	11.89	8.09 - 18.72
Inner City	62,048	848	1.37	90	10.61	6.70 - 15.63
North West Inner	98,176	632	0.64	56	8.86	0 - 12.50
North West Outer	90,256	1,857	2.06	173	9.32	1.23 - 15.14
South	159,565	3,777	2.37	399	10.56	3.03 - 19.65
Bristol	497,549	8,460	1.7	878	10.38	

Reported barriers for COPD patients in accessing pulmonary rehab are similar to those identified in the National COPD Audit programme and include lack of understanding of benefits, motivation, transport, and classes delivered during the day which does not suit those of working age.

There are plans to address some of these barriers, including:

- a service in the community (Wellspring Healthy Living Centre) with out of hours options
- patients referred for pulmonary rehab will be invited to an assessment clinic where the benefits will be explained and options provided for accessing pulmonary rehab.

North Somerset

Pulmonary rehab is provided by North Somerset Community Partnership. The service is for adults with a chronic lung disease who feel limited by breathlessness. There are no age limits but there are exclusion criteria and patients need to have their own transport. Exclusion criteria: unstable cardiac conditions; severe cognitive deficit; cancer with poor prognosis; psychiatric disease affecting memory, behaviour, compliance.

Pulmonary rehab is provided at two bases, Weston Super Mare and Clevedon. The programme runs for six weeks with two sessions a week for up to 18 people at one time. People attend for two hours; approximately one hour of exercise and one hour of advice, education and discussion. Topics might include:

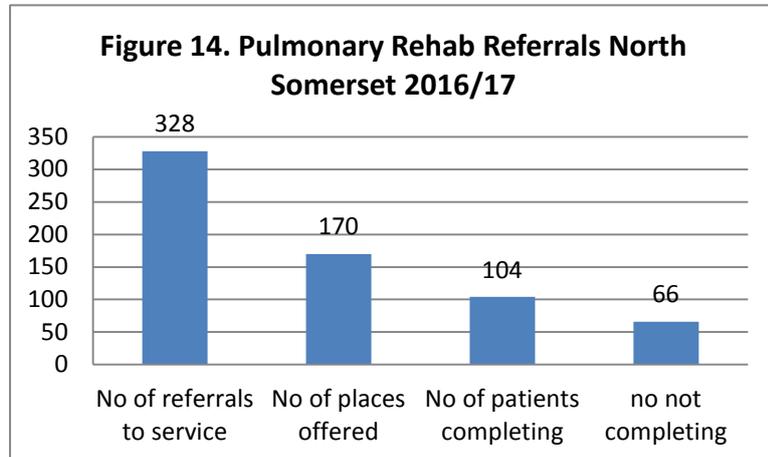
- breathing techniques to use when recovering your breath, or during physical activity or if feeling anxious
- why exercise is so important for people with lung conditions
- how to manage stress
- healthy eating
- how to use inhalers and other medicines
- what to do when unwell

All patients receive a comprehensive assessment before being accepted onto the programme as well as a pre-discharge review. The pulmonary rehab service work with colleagues in the home oxygen team and provide mobile oxygen assessments as part of the programme. They also work with AWP to provide Psychology input if needed prior to programme start and two lectures during pulmonary rehab programme, run by a health psychologist.

Further information can be found at:

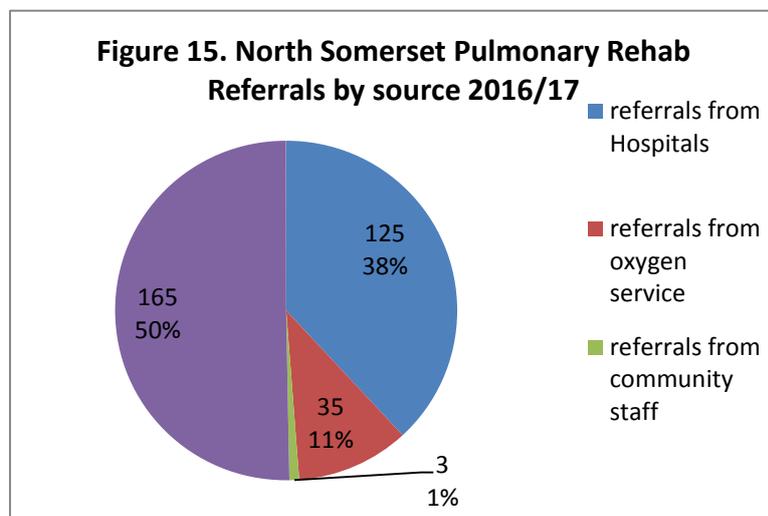
<https://www.nscphhealth.co.uk/services/pulmonary-rehabilitation>

The pulmonary rehab service in North Somerset has capacity for 234 patients to attend in a year. In 2016/17, 328 patients with COPD were referred for pulmonary rehab in North Somerset and 170 (52%) of them were offered places. 104 completed pulmonary rehab, 61% of those offered a place and 32% of those referred (figure 14).



Source: North Somerset Community Partnership

Half of the referrals for pulmonary rehab in North Somerset were by GP practices, 38% by hospitals and 11% by the oxygen service (figure 15).



Source: North Somerset Community Partnership

GP practice register data shows that there are 4,352 patients (all ages) with COPD in North Somerset. The 328 patients who were referred for pulmonary rehab in 2016/17, represents 7.5% of the known registered COPD patients.

South Gloucestershire

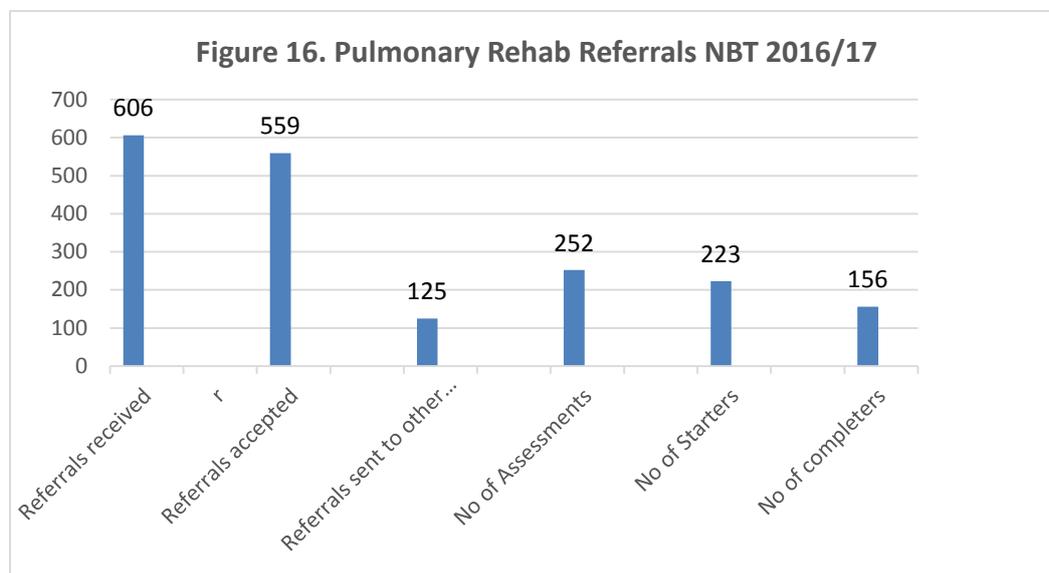
There are two providers for pulmonary rehabilitation within South Gloucestershire: North Bristol Trust's Lung Exercise and Education (LEEP) programme and Sirona Care and Health Pulmonary Rehabilitation. These are run at Cossham hospital and Bradley Stoke Leisure Centre respectively, additional venues may be provided based on need.

North Bristol Trust's Lung Exercise and Education (LEEP) programme

Referrals are accepted for patients registered with GP's across BNSSG but predominantly South Gloucestershire. It is a rolling programme to enable management of the waiting list and ensure group capacity is maximised. 2 hour sessions are provided twice a week for 6 weeks. 2 sessions are run back to back with up to 18 patients per session. There are recognised volunteers made up of ex-patients and 'LEEP Buddies' who provide peer support through the programme.

Referrals to the LEEP service average 50 per month. In 2016/17 606 referrals were received and 431 were triaged to LEEP. 252 were assessed and 223 started the programme. 156 completed the programme, 70% of those who started and 26% of those referred (figure 16).

Of all referrals on average 24% are from primary care. LEEP have recently introduced self-referrals and await figures on this.



Source: North Bristol Trust Respiratory Team

GP practice register data shows that there are 4,023 patients (all ages) with COPD in South Gloucestershire. The 606 patients referred to the NBT LEEP service represents 15% of the known registered COPD patients in South Gloucestershire (assuming that all 606 were South Gloucestershire patients).

Following an audit in 2010, opt-in sessions are held every other week allowing the 'selling' the benefits of pulmonary rehabilitation. This is a session which allows patients to engage with the provider and make an informed choice regarding PR participation and gain commitment to the programme. Whilst referrals are made by Healthcare professionals these sessions allow the time to engage in discussion about PR. This has seen a reduction in non-attended assessments and improved engagement to the course.

Patients can repeat the Pulmonary Rehabilitation 12 months after completing the course if appropriate.

As in Bristol individuals who are admitted in to hospital with an exacerbation of their COPD are fast tracked in to the PR programme in line with the National Quality standards. Some of the barriers to starting PR have been identified as transport issues, work/childcare commitments and motivation. LEEP (NBT) and Sirona care and health are working together to try and address the low referral rate seen within primary care.

Sirona Care and Health Pulmonary Rehabilitation

The South Gloucestershire pulmonary rehabilitation service provided by Sirona care and Health began in October 2016. Referrals to the services are mainly from hospitals with an average of 25 referrals a month between October 2016 and July 2017. It is anticipated that the service will receive in the region of 300 referrals in its first full year. Data regarding completion is being collected and will be available in future.

GP practice register data shows that there are 4,023 patients (all ages) with COPD in South Gloucestershire. The 300 patients referred to the Sirona Care pulmonary rehabilitation service represents 7.5% of the known registered COPD patients in South Gloucestershire.

5.4.4 Better Breathing Classes

Better Breathing classes are offered to those in Bristol who have completed pulmonary rehabilitation. These are for people with respiratory conditions who already have experience of exercising under medical supervision with the pulmonary rehabilitation team. Better breathing classes are held at 9 community locations in Bristol (Monday to Friday) provided by trained exercise professionals. All participants must be referred by a medical professional. If pulmonary rehabilitation has been completed less than 3 months ago, the pulmonary rehabilitation team can refer people to the better breathing classes, otherwise referral is via GP or practice nurse. More information can be found here: <https://www.bristol.gov.uk/social-care-health/pulmonary-rehabilitation>

5.4.5 Breathe Easy Support groups

Breathe Easy Bristol support groups are run by people with COPD for people with COPD.

Bristol - Southmead (North) and Knowle (South) Bristol, once a month. Across the two groups there are approximately 30 regular attendees of 60 who are registered. The pulmonary rehab teams refer people to them.

North Somerset – Weston Super Mare, 3rd Wednesday of every month.

South Gloucestershire – none listed on BLF website.

More information available at: <https://www.blf.org.uk/support-in-your-area>

6) What is on the horizon?

- Growth in population, ageing population and estimated rises in COPD prevalence (see section 2) will put additional demands on health and social care services.
- An update to NICE guidance COPD in over 16s, diagnosis and management (CG101), is due in November 2018.
- National COPD audits are due to take place in 2017

7) Local views

Views were sought from stakeholders through one to one interviews with primary, community and acute care providers; focus groups with service users and survey with clinicians. A summary of these views is provided below.

i) Health professionals

Flu Vaccination

There are opportunities for flu vaccines to be given to respiratory patients who engage with acute and community respiratory services, in order to maximise uptake and reduce multiple patient appointments. These could include respiratory outpatient clinics, particularly for those who attend regular outpatient appointments and have less contact with their GP practice, and at pulmonary rehabilitation sessions.

Smoking Cessation

Patients with respiratory disease who are referred to UH Bristol for further investigations may require surgery or a procedure. Those who smoke are required to stop smoking for at least 2 weeks before they have their surgery or procedure and are referred to LiveWell Bristol for advice on how to access stop smoking support. The patient will be offered another hospital appointment in 6 months' time, and if at 6 months they have not stopped smoking they will once again be referred for support to stop. It is felt this system results in wasted time and appointments and can impact on outcomes for patients, and could be reviewed, including to explore ways of motivating and supporting patients to stop smoking earlier; introduce feedback mechanisms on actions taken and progress made in stopping smoking; reduce waiting times for future appointments; avoid wasted appointments; bring forward surgery or procedures to improve outcomes.

A clinician at UHBristol commented that whilst much of the progress made, around the Smokefree agenda has been championed by the respiratory team, high level leadership could greatly improve the impact of this work, including a greater emphasis on supporting staff to become exemplars in the adoption of smoke free policy and practice throughout the Trust

A practice nurse commented that people with COPD who continue to smoke often need intensive support to stop smoking. Whilst smoking cessation support is offered to patients with COPD, the health care assistants who provide the support do not have specialist knowledge of COPD and the complex needs of these patients. Previous specialist stop smoking groups for COPD in Bristol were effective at supporting these complex patients.

Self-care and education for respiratory patients

Patients newly diagnosed with COPD can lack understanding of their condition and how to self-manage. It is important they receive education in what the condition is, the importance of stopping smoking, staying physically active, getting flu jabs and being aware of what triggers their symptoms and exacerbations, including weather and air pollution. It was suggested by a community health provider that a standard package of education for patients newly diagnosed with COPD is made widely available, which empowers patients to self-manage their COPD. This could be through the development of an early intervention education programme, whereby respiratory specialists and expert patients develop a train the trainer course to be delivered to non-specialist educators working in the community.

It was also suggested a structured education programme for people newly diagnosed with COPD, similar to that for diabetes patients be introduced. A similar programme for COPD could provide much needed education for patients about their condition and the benefits of stopping smoking and pulmonary rehab, which could increase engagement and improve outcomes for patients

There is interest in an online digital app called myCOPD which is designed to empower patients to manage their COPD. The app includes symptom scoring tools, inhaler techniques, mindfulness tools, weather and air pollution level information and pulmonary rehab exercises which are comparable to those delivered in face to face PR programmes. The app also includes tools for use in primary care to help GP practices manage COPD patients at an individual and population level. More information is available on the NHS England Innovation Accelerator web page: <https://www.england.nhs.uk/ourwork/innovation/nia/case-studies/simon-bourne/>

The myCOPD app has been introduced in Portsmouth, in collaboration with the Wessex Academic Health Science Network, and is reported to show similar results to face to face pulmonary rehab. Bristol CCG are currently exploring learning from other areas.

A standardised approach to self-care plans in primary care has been proposed, as self-care plans for COPD patients vary both in quality and quantity. Much depends on the time available and the skills and motivation of clinicians and patients to complete them.

Pulmonary Rehabilitation

There is a shared view amongst community and acute care providers across the BNSSG that more education and training is required for both health care professionals and patients in order to increase uptake and completion rates of pulmonary rehab. This includes using motivational interviewing techniques to increase patient motivation and encourage long term behaviour change, and 'selling' the benefits of pulmonary rehab to make it an appealing proposition that patients are willing to engage in. Whilst referrals are made by healthcare professionals, there is

not necessarily time to engage in much discussion about pulmonary rehab to increase engagement. Inclusion within a package of education for COPD patients could be explored.

People with moderate or severe COPD are eligible for pulmonary rehab currently delivered by Bristol Community Health. There is nothing available for patients with mild COPD, or prior to engagement in pulmonary rehab for those who are not ready or able to participate in the structured pulmonary rehab programme. Opportunities with leisure centres could be explored e.g. lower tier or entry level exercise focussed alternative to pulmonary rehab without reliance on health care professionals to make referrals.

Encouragement and opportunities for patients to continue with exercise after completing pulmonary rehab is needed, as patients who attend pulmonary rehab at South Bristol Community Hospital often do not continue with exercise afterwards.

An assessment route and triage for pulmonary rehab with a single point of access has been suggested, accessible by social care as well as health care.

The online digital app, myCOPD (mentioned above) includes pulmonary rehab exercises which patients can do at home. This could be beneficial for those unable or unwilling to engage in face to face pulmonary rehab and for those not yet eligible.

Referral rates to pulmonary rehab vary across BNSSG practices, and uptake could be improved. It is felt some patients see it as an exercise programme and are therefore put off, and perhaps a different, less medicalised approach might encourage better engagement. The name 'pulmonary rehab' can be off putting for some people, as it is not well understood and sounds 'medical'.

Where referred patients don't engage with rehab the provider reports that back to the referring practice. When the patient has their next 12 month review pulmonary rehab will be offered again. It has been suggested if there were a COPD education programme which included information about pulmonary rehab, this might improve earlier uptake and outcomes for patients.

COPD diagnosis

Views were expressed within acute, community and primary care providers that more training and education is required to improve accuracy and timeliness of diagnosis of COPD across BNSSG.

Good quality spirometry testing for COPD should always be used in conjunction with history taking, other physical assessment, blood tests and imaging to exclude or confirm respiratory disease. It was suggested that consideration be given to introducing BNSSG-wide diagnostic hubs, utilising existing resources and including skilled and experienced respiratory clinicians and multi-disciplinary teams and good quality diagnostic equipment and methods.

Spirometry testing is carried out in most GP practices in Bristol, by GPs, nurses and health care assistants. Whilst QOF provides quantitative data on spirometry, the lack of quality assurance is a concern expressed by respiratory health care professionals. The national assessment and accreditation programme, including spirometry training for clinical staff, costs £600-800 for nurses and GPs and practices are expected to self-fund. Training for health care assistants is £120 and could be considered as an option. It is not known whether practices in Bristol are participating in this training and accreditation, although cost may be a factor. This has been raised as a concern and is being addressed by a BNSSG wide workstream, including proposals for a respiratory nurse to review spirometry practice.

In Lambeth and Southwark, a diagnostic spirometry hub has been established which aims to ensure accurate diagnosis of COPD and provides hands-on teaching experience for practice nurses (Bristol CCG, learning from other areas exercise).

Where GPs are unsure about spirometry results or there is diagnostic uncertainty, it would be helpful to have access to specialist clinical advice via an email address or telephone number. This could help GPs avoid over investigation and unnecessary referral to secondary care.

A telephone advice line for clinicians is available in Lambeth and Southwark (Bristol CCG, learning from other areas exercise).

Clinician Survey Responses

An electronic survey was sent out to clinicians with 82 responses. The following summarises the views received:

Question: How can we improve the way people are diagnosed with a respiratory condition?

- We need more awareness of respiratory conditions in local communities, to include symptoms, the benefits of early diagnosis and who they should contact for support
- Dispel the myth 'it is just a smokers cough'
- Use the British Lung Foundation (BLF) self-assessment tool – COPD patient passport

Question: How can we help people to self-manage their respiratory condition?

- Better signposting to BLF website, helpline and local self-help groups (which professionals need to support)
- Provide education sessions for people with a new diagnosis, even if symptoms are mild. Teach self-management early (similar to diabetes education sessions)

Question: How can we help people to self-manage their respiratory condition?

- Provide online resources for patients and carers
- Provide more regular reviews and education, rather than one offs
- Offer education courses minus the exercise initially

- Widen the access to Pulmonary Rehabilitation (PR) and support people to remain on the programme
- Provide PR in gyms on popular bus routes
- Provide transport to PR courses
- Offer respiratory psychology to anyone who struggles with treatment adherence
- Provide one to one education and empowerment

Question: How can we help people to self-manage their respiratory condition?

- Early referral to smoking cessation support
- Teach inhaler techniques
- Make expectations around self-management clear to patients
- Make sure everyone has an easy to understand, individualised self-management plan
- Provide easy access to a community matron or practice nurse
- Ensure people get their flu injection
- Inform people of 'red flag' or danger signs, such as chest pains, drowsiness etc. and when to seek more urgent help
- Provide follow up in the community (by phone or in person) following an admission

Question: How can we improve the way people are diagnosed with a respiratory condition?

- We need more awareness of respiratory conditions in local communities, to include symptoms, the benefits of early diagnosis and who they should contact for support
- Dispel the myth 'it is just a smokers cough'
- Use the British Lung Foundation (BLF) self-assessment tool – COPD patient passport

Nabil Jarad, Consultant Physician

Question: What more can we do to prevent hospital admissions

- Improve timely access to and capacity within hot clinics, we need hot clinics at Weston
- Community hot clinics?
- Easy access and more capacity in the community respiratory teams (7 day service)
- More short term support at home for exacerbations, e.g. nebuliser/oxygen
- Home emergency packs with rescue antibiotics and steroids and written information
- Direct telephone access to specialist teams
- Educate patients in self-care and how to recognise signs of exacerbation and how to seek help
- Individualised, written care plans
- More psychological support

- Web based technology
- Volunteers in the community to support people with respiratory needs

Question: How can we improve the respiratory care people receive in hospital?

- Ensure all respiratory patients are seen by respiratory specialists
- Ensure bundles are completed for admissions
- Continuity of care, same respiratory consultant and seen by Clinical Nurse Specialist
- Early discharge of patients who are medically fit in conjunction with community services
- Inform community services of what follow up is required at home
- More IV antibiotics at home
- Teach people how and when to use their inhalers. Ward staff need to administer inhalers correctly
- Better system to ensure people who attend A&E regularly get followed up in the community
- Early assessment in A&E with clear management plan and involvement of respiratory specialist team
- Acute slots in 'hot clinic' to help people get a diagnosis

Question: How can we improve their discharge from hospital?

- Coordinate discharge between secondary, community and primary care so a community nurse can visit promptly post discharge or the person can be seen in the practice
- Good communication between hospital and community/primary care
- Clear plan on discharge, which makes it clear who is going to do what
- Discharge care bundles and written plans
- Electronic discharge summary to GP practice within 24 hours
- Effective handover between discharge support teams and GP
- Early MDT support to ensure there is a holistic approach to management of the person

ii) Service User Feedback

Feedback on service user education and information from 2 Breathe Easy Groups and 5 service users in an outpatients clinic:

- The British Lung Foundation leaflets are really informative
- I like talking to people with the same condition using web based forums, it is very helpful
- It is not always clear which websites contain accurate information
- I had a pad at home with a questionnaire that went straight to a respiratory nurse so she could decide whether to visit me, it was excellent but the NHS stopped the service
- Self-management plans are really important; we know our own bodies so we

need to know what to do. There was less knowledge about self-management plans at the Weston Group

- Helping people to stop smoking is very important
- Pulmonary rehabilitation is excellent but it is hard to get onto, it should be available to more people
- The name Pulmonary Rehabilitation is off putting, I wasn't sure what it meant, you need a name that everyone can understand

Feedback from 3 Breathe Easy Groups, 13 service users in an outpatient's clinic and 17 patients using a community respiratory service. Many people had not had a stay in hospital but the combined feedback from those who had is as follows:-

What works well?

- Hot clinics, there was lots of support for hot clinics
- Open appointments for a chest X ray
- Couldn't fault my care in hospital x3
- There was total involvement of my family by the staff, which was excellent

What could be improved?

- It is a long walk between the outpatient's clinic at NBT and Radiology; it took me a week to recover. There is a buggy now but it is driven by volunteers and they are not always there
- Team to team communication seems to be a problem, people in the practice and community didn't seem to know I had been in hospital. They have my records so they should know

A number of people were unhappy about receiving no follow up once discharged from hospital. One person said 'I didn't see anyone for 4 months after I was discharged from hospital, I felt abandoned'.

8) Key issues and gaps

Respiratory disease mortality

- Respiratory disease accounts for between 10% and 19% of the gap in life expectancy between the most and least deprived males across BNSSG, and for females between 16% and 26% of the gap.
- Premature deaths from respiratory disease have risen in Bristol in recent years and are higher than the England average. In North Somerset, the rate has also risen but is still lower than the England average. In South Gloucestershire rates have seen a slight decline and remain lower than the England average.
- Premature deaths from respiratory disease are higher in males than females across BNSSG.
- Bristol and North Somerset has seen an upward trend in female early deaths from respiratory disease in recent years. South Gloucestershire rates have been steady over recent years.

COPD mortality

- Rates of death from COPD vary across BNSSG. In Bristol the rate has been rising in recent years and is now significantly higher than the England rate. North Somerset and South Gloucestershire rates remain lower than the England average.

COPD morbidity

- The rate of COPD emergency admissions per 100,000 population aged 35 in Bristol is significantly higher than the England average. In North Somerset and South Gloucestershire the rates are significantly lower than the England average.

COPD prevalence

- There are around 16,835 known cases of COPD among BNSSG registered patients and prevalence is rising.
- Recorded COPD prevalence varies widely across BNSSG: 1.7% in Bristol, 2.0% in North Somerset and 1.5% in South Gloucestershire.
- The pattern of COPD prevalence mirrors the pattern of socio-economic deprivation. Smoking is the major risk factor.
- Many cases of COPD are undiagnosed – it is estimated over half of cases are undiagnosed in Bristol and South Gloucestershire and 30% in North Somerset, suggesting an additional 17,000 cases across BNSSG.
- COPD prevalence has been projected to increase by over a third by 2030, particularly amongst females.

Smoking and respiratory disease

- Whilst smoking prevalence shows a downward trend overall in Bristol, it varies across BNSSG: 16.3% in Bristol, 11.7% in North Somerset and 9.7% in South Gloucestershire.
- QOF data show recording of smoking status in patients with long term conditions (LTCs) is significantly lower in BNSSG than the England average. This may represent some missed opportunities to offer support to stop smoking.
- Most known smokers with LTCs across BNSSG have been offered support to stop smoking, in line with England average rate.
- Smoking cessation is key for COPD prevention, both primary and secondary prevention, and support to stop should be offered at every opportunity. Stopping smoking is one of the most important components of COPD management.
- There may be opportunities to strengthen support to stop smoking in respiratory pathways prior to surgery.

COPD diagnosis and spirometry

- NICE guidance recommends diagnosis by spirometry, and quality control in spirometry services. Diagnosis of COPD confirmed through spirometry is lower across BNSSG than the England average. There is also much variation across GP practices.
- The extent of BNSSG participation in the new national assessment and accreditation programme for spirometry is not known.
- Local stakeholder views support a need for improved quality and timeliness in spirometry.

12 month reviews for COPD patients

- COPD reviews within 12 months using the MRC breathlessness score are recorded less in Bristol than England overall. North Somerset and South Gloucestershire are similar to the England average. There is also much variation across GP practices.
- Annual respiratory function measurement in COPD is also recorded less in Bristol and South Gloucestershire compared with England. North Somerset is better than the England average. There is also much variation across GP practices.

Self- management

- COPD self-management plans with individual action plans and an educational component can reduce hospital visits. Local stakeholders have raised the need for educational for patients newly diagnosed with COPD with a focus on self-management. There may be opportunities to exploit digital resources e.g. COPD apps.

Pulmonary rehabilitation

- Pulmonary rehab is an evidence-based and cost effective intervention, recommended for COPD patients with an MRC breathlessness score of 3 or more, and for patients who have experienced a recent exacerbation. Pulmonary rehab appears to be under-used both nationally and locally. A recent local audit showed that:
 - in Bristol 35% of those referred completed (8 or more sessions)
 - in North Somerset 32% of those referred completed pulmonary rehab
 - in South Gloucestershire: through the LEEP programme, 26% of those referred completed pulmonary rehab (data regarding completion of pulmonary rehab through the Sirona pulmonary rehabilitation programme will be available in the future).
- There is a shared view among local stakeholders that more education around pulmonary rehab is needed, for both professional and patients, in order to increase awareness, engagement and uptake.
- Barriers to accessing pulmonary rehab could be addressed through exploring alternative models including access to sessions out of normal working hours, and home based rehab.

9) Knowledge gaps

- Barriers to Access to Pulmonary Rehab - Despite increasing awareness of patient barriers to pulmonary rehabilitation a systematic review of interventions to improve uptake and completion found insufficient evidence to guide clinical practice on improving patient uptake and completion of pulmonary rehab. This could be viewed as an opportunity for research on an intervention considered to be a cornerstone of COPD (Jones, 2017).
- The role of digital technologies in COPD management pathways

C: What should we do next?

10) Recommendations for consideration

1. Address the inequalities in COPD prevalence and outcomes across BNSSG, through targeting interventions and efforts according to need.
2. Ensure respiratory patients are asked about their smoking, and support to stop (or a harm reduction approach) is offered at every opportunity.
3. Strengthen leadership and impact of smoke-free work and practice in acute settings, including strengthening support for staff to become exemplars in smoke free practice.
4. Review support to stop within pathways for respiratory patients needing procedures or surgery and ensure effective and timely support.
5. Ensure availability and accessibility of effective smoking cessation support that meets the needs of patients with COPD.
6. Address unwarranted variations in respiratory disease care across BNSSG.
7. Explore ways to improve the proportion of COPD cases that are diagnosed. This could include consideration of systematic methods such as use of GRASP-COPD to interrogate practice clinical data.
8. Raise awareness of signs and symptoms of COPD through targeted localisation of national campaigns such as PHE's 'Be clear on cancer: respiratory symptoms' campaign.
9. Establish a local system to support clinicians in use of spirometry for COPD diagnosis. This could include consideration of a diagnostic hub, learning from experience of implementation in other areas, and access to telephone advice.
10. Implement the competency framework for improving the quality of diagnostic spirometry.
11. Explore opportunities to increase referrals to pulmonary rehab. This could include systematic approaches to identify eligible patients through practice data systems, and development of a single point of access.
12. Identify opportunities to raise awareness and promote referral pathways and benefits of rehab to relevant clinicians.
13. Review current provision and uptake of rehab in relation to needs across BNSSG, to inform redesign.
14. Consider and evaluate alternative models such as home based rehab, use of digital apps with rehab component to increase engagement.
15. Promote greater use and consistency of self-management approaches for respiratory patients, including self-management plans with individual action plans for COPD, and use of digital opportunities to support self-management.
16. Consider need and feasibility of opportunistic flu vaccination for respiratory patients in secondary and community care settings.

11) Key contacts

Commissioning/strategic group who own the chapter: BNSSG Respiratory Board

Named leads within Bristol City Council, Bristol CCG, and BNSSG respiratory programme board:

Lynn Stanley Bristol City Council: lynn.stanley@bristol.gov.uk

Dr Viv Harrison, Bristol City Council: viv.harrison@bristol.gov.uk

Elizabeth Williams, Bristol CCG: Elizabeth.williams@bristolccg.nhs.uk

Dr Jonathan Evans: Jonathanevans@nhs.net

References

- Abell, F. e. a., 2008. The effect of including a clinical psychologist in pulmonary rehabilitation on completion rates and hospital resource utilisation in COPD. *Thorax*, p. 63. Suppl VII; A93.
- Adams, R. J. e. a., 2000. factors associated with hospital admissions and repeat emergency department visits for adults with asthma. *Thorax*.
- All Party Parliamentary Group (APPG) on Respiratory Health, 2014. *Report on inquiry into respiratory deaths*, s.l.: s.n.
- American Thoracic Society/European Respiratory Society Task Force on Policy in Pulmonary Rehabilitation, 2016. Increasing implementation and delivery of pulmonary rehabilitation ; key messages from the new ATS/ERS policy statement. *Rehabilitation. European Respiratory Journal*, pp. 47: 1336-1341.
- Association for Respiratory Technology and Physiology, n.d. [Online]
Available at: <http://www.artp.org.uk/en/spirometry/>
- Association of Directors of Public Health, 2017. *Air quality, a briefing for Directors of Public Health (March 2017)*. [Online]
Available at: <http://www.adph.org.uk/2017/03/air-quality-a-briefing-for-directors-of-public-health/>
- Asthma UK, 2015. [Online]
Available at: <https://asthma.org.uk/advice/understanding-asthma/causes/>
[Accessed 3 March 2017].
- Barnett, K. e. a., 2012. Epidemiology of multimorbidity and implications for healthcare, research and medical education; a cross sectional study. *Lancet*, pp. O12: 380:37-43.
- Bartlett, Y. e. a., 2014. Effective behaviour change techniques in smoking cessation interventions for people with chronic obstructive pulmonary disease a meta analysis. *British Journal of Health Psychology*.
- blah, s. w., 2017. [Online]
Available at: www....
- BNSSG Sustainability and Transformation Plan, 2017. *Lessons from other areas report*, s.l.: s.n.
- British Lung Foundation, 2001-2010. *statistics*. [Online]
Available at: <https://statistics.blf.org.uk/copd>
[Accessed 7 April 2017].
- British Thoracic Society & Primary Care Respiratory Society UK, 2012. *IMPRESS guide to the relative value of COPD interventions*, s.l.: s.n.
- British Thoracic Society (BTS) & Scottish Intercollegiate Guidelines Network (SIGN), 2016. *British Guideline on the management of asthma, a national clinical guideline*, s.l.: s.n.
- British Thoracic Society, n.d. *Standards of care*. [Online]
Available at: <https://www.brit-thoracic.org.uk/standards-of-care/quality-improvement/copd-and-spirometry>
[Accessed 2017].
- Cox, N. e. a., 2017. Pulmonary rehabilitation referral and participation are commonly influenced by environment, knowledge and beliefs about consequences: a systematic review using the Theoretical Domains Framework. *Journal of physiotherapy (Netherlands)*.
- Department of Health, 2011. *An outcomes strategy for chronic obstructive pulmonary disease (COPD) and asthma in England*, s.l.: s.n.
- Department of Health, 2012. *Outcomes strategy for COPD and Asthma in England: NHS companion document*, s.l.: s.n.
- Global Initiative for Chronic Obstructive Lung Disease (GOLD), 2017. *Global strategy for diagnosis, management and prevention of COPD 2017 Report*, s.l.: s.n.
- Holland, A. e. a., 2016. Home-based rehabilitation for COPD using minimal resources; a randomised controlled equivalence trial. *Thorax*, 72(1).
- Howcroft, M. e. a., 2016. Action plans with brief patient education for exacerbations in COPD. *Cochrane database of systematic reviews*.

Jones, A. e. a., 2017. Systematic review of interventions to improve patient uptake and completion of pulmonary rehab in COPD. *ERJ Open Research* , Volume 3 (no 1).

Lokke, A. e. a., 2006. Developing COPD: a 25 year follow up study of the general population. *Thorax*, pp. 61:935-939.

London Respiratory Network, 2014. *London COPD Value Pyramid*. [Online]
Available at: <https://www.networks.nhs.uk/nhs-networks/london-lungs/latest-edition-of-thorax-publication>

London Respiratory Network, 2014. *NHS Networks*. [Online]
Available at: <https://www.networks.nhs.uk/nhs-networks/london-lungs/documents/top-10-respiratory-commissioning-tips/view>

London Respiratory Network, 2016. *The value of psychology and psychologists in supporting people with COPD and respiratory teams*, s.l.: s.n.

McLean, S. e. a., 2016. Projecting the COPD population and costs in England and Scotland 2011 to 2030. *Scientific Reports*, pp. 6: 31893, DOI: 10.1038/srep31893.

McManus, S. e. a., 2010. *Smoking and mental health in England*, s.l.: s.n.

National Institute for Health and Care Excellence (NICE), 2016. *Chronic obstructive pulmonary disease in adults, quality standard (QS10)*, s.l.: s.n.

NHS England, 2012. *NHS Atlas of Variation in healthcare for people with respiratory disease*. [Online].

NHS Rightcare, 2017. *Commissioning for value where to look packs Bristol, North Somerset and South Gloucestershire CCGs January 2017*. [Online].

NHS Rightcare, 2017. *Commissioning for Value Where to look packs January 2017*. [Online]
Available at: <https://www.england.nhs.uk/rightcare/products/ccg-data-packs/where-to-look-packs/#south>

NICE Local Government Briefing, 2013. *Local Government Briefing (LGB10) Judging whether public health interventions offer value for money*. [Online]
Available at: www.nice.org.uk/advice/lgb10/chapter/judging-the-cost-effectiveness-of-public-health-activities

NICE, 2010. *Chronic obstructive pulmonary disease in over 16's, diagnosis and management, clinical guideline (CG101)*. [Online]
Available at: <https://www.nice.org.uk/guidance/cg101>

NICE, 2013. *Quality Standard (QS25) Asthma*. [Online]
Available at: <https://www.nice.org.uk/guidance/qs25/chapter/Quality-statement-5-Review>

NICE, 2015. *Air Pollution - outdoor air quality and health. Final scope.*, s.l.: NICE.

NICE, 2016. *Quality Standard (QS10): COPD in adults*. [Online]
Available at: <https://www.nice.org.uk/guidance/qs10>

North Bristol NHS Trust website, 2017. *Respiratory Hot Clinic*. [Online]
Available at: <https://www.nbt.nhs.uk/our-services/a-z-services/respiratory-medicine/respiratory-hot-clinic>

Nottingham University PRIMIS, n.d. [Online]
Available at: <http://www.nottingham.ac.uk/primis/tools-audits/tools-audits/asthma.aspx>

Office National Statistics, 2016. ONS 2016 mid year population estimates by age and sex for UK.

PHE PHOF, 2017. *Public Health Outcomes Framework (PHOF)*. [Online]
Available at: <https://fingertips.phe.org.uk/>
[Accessed March 2017].

PHE Public Health Profiles, 2015. [Online]
Available at:
<https://fingertips.phe.org.uk/search/copd%20mortality#page/1/gid/1/pat/6/par/E12000009/ati/101/are/E06000023/iid/1204/age/1/sex/4>
[Accessed 3 March 2017].

PHE Tobacco Control Profiles, 2016. s.l.: s.n.

PHE, GP Practice Profiles, n.d. *National General Practice Profiles*. [Online]
 Available at: <https://fingertips.phe.org.uk/profile/general-practice/data#mod,3,pyr,2016,pat,19,par,E38000022,are,-,sid1,2000006,ind1,90609-4,sid2,-,ind2,->

Poole, P. e. a., 2006. Influenza vaccine for patients with COPD. *Cochrane Library*.

Prescott E, V. J., 1999. *Studies of socioeconomic status and indices of COPD*, s.l.: s.n.

Public Health England - Inhale, 2011. *Inhale - interactive health atlas of lung conditions in England*. [Online]
 Available at: <http://fingertips.phe.org.uk/profile/inhale/data#page/3/gid/8000003/pat/46/par/E39000036/ati/19/are/E38000022/iid/726/age/1/sex/4/nn/nn-2-E38000022>

Public Health England Segment Tool, 2016. *Segmenting life expectancy gaps by cause of death*. [Online]
 Available at: <https://fingertips.phe.org.uk/profile/segment>

Public Health England, 2015. *Respiratory disease, applying all our health*. [Online]
 Available at: <https://www.gov.uk/government/publications/respiratory-disease-applying-all-our-health/respiratory-disease-applying-all-our-health>

Puhan, M. A. e. a., 2016. Pulmonary Rehabilitation following exacerbations of COPD. *Cochrane database of systematic reviews* doi: 10.1002/14651858.CD005305.pub4.

Puhan, M. e. a., 2011. *Pulmonary rehab following exacerbations of COPD*, s.l.: Cochrane Database Systematic Reviews.

Puhan, M. e. a., 2011. *Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease*, s.l.: Cochrane Database Systematic Reviews doi: 10.1002/14651858.CD005305.pub3.

Purdy, S. e. a., 2011. *Emergency Respiratory admissions: influence of practice, population and hospital factors*, s.l.: J Health Serv Res Policy. 2011 Jul;16(3):133-40..

RCP National COPD Audit, 2015. *National COPD audit programme; clinical audit of pulmonary rehabilitation services in England and Wales 2015*, s.l.: s.n.

Royal College of Physicians, 2014. *National COPD audit programme: who cares when it matters most? Outcomes from the clinical audit of COPD exacerbations admitted to acute units in England 2014. Results and data analysis section 4: length of stay*. [Online]
 Available at: <https://www.rcplondon.ac.uk/projects/outputs/copd-who-cares-when-it-matters-most-outcomes-report-2014>

Royal College of Physicians, 2017. *National COPD Audit Programme, National Supplementary Report February 2017*, s.l.: s.n.

Simpson, C. a. S. A., 2010. *Trends in the epidemiology of Asthma in England; a national study of 333,294 patients*, s.l.: s.n.

Smith, S. e. a., 2014. A review of the effectiveness of psychological interventions used for anxiety and depression in chronic obstructive pulmonary disease. *BMJ Open Respiratory Research* doi:10.1136/bmjresp-2014-00042.

S, P., 2011. *Emergency respiratory admissions: influence of practice, population and hospital factors*, s.l.: s.n.

Toskala, E. K. D., 2015. Asthma risk factors. *International Forum of allergy and rhinology*, pp. Sep: 5 Suppl 1: S11-6.

University of Nottingham PRIMIS, n.d. *GRASP COPD quality improvement tool*. [Online]
 Available at: <http://www.nottingham.ac.uk/primis/tools-audits/tools-audits/grasp-suite/grasp-copd.aspx>

van Eerd, E. e. a., 2016. Smoking cessation for people with chronic obstructive pulmonary disease. *Cochrane Library*, p. DOI: 10.1002/14651858.CD010744.pub2.

Walters, J. e. a., 2017. Pneumococcal vaccines for preventing pneumonia in COPD. *Cochrane Library*.

WHO, 2016. [Online]

Available at: <http://www.who.int/mediacentre/factsheets/fs315/en/>
[Accessed 8 March 2017].

WHO, 2016. *Ambient (outdoor) air quality and health factsheet*. [Online]

Available at: <http://www.who.int/mediacentre/factsheets/fs313/en>
[Accessed 13 April 2017].

World Health Organisation, (WHO), n.d. [Online]

Available at: <http://www.who.int/respiratory/asthma/causes/en/>
[Accessed 3 March 2017].

Zwerink, M. e. a., 2014. self management for patients with chronic obstructive pulmonary disease.
Cochrane Library.