Royal College of Physicians

Hiding in plain sight
Treating tobacco dependency in the NHS

A report by the Tobacco Advisory Group of the Royal College of Physicians

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Declaration of contributors' interests

Alex Bobak has received funding for smoking cessation education from Cancer Research UK (CRUK), the National Centre for Smoking Cessation and Training (NCSCT) and pharmaceutical companies involved in smoking cessation.

Wei Shen Lim is chief investigator on a pneumonia cohort study with unrestricted investigator-initiated research funding from Pfizer.

Martin Raw is director of the International Centre for Tobacco Cessation (ICTC), which is currently funded by donations from Pfizer and the InterAmerican Heart Foundation but managed and run independently of these organisations.

Andy McEwen has received travel funding, honoraria and consultancy payments from manufacturers of smoking cessation products (Pfizer Ltd, Novartis UK and GSK Consumer Healthcare Ltd) and hospitality from North51 who provide online and database services. He also receives payment for providing training to smoking cessation specialists and receives royalties from books on smoking cessation. He is an associate member of the New Nicotine Alliance (NNA), a charity that works to foster greater understanding of safer nicotine products and technologies.

Hayden McRobbie has received honoraria for speaking at smoking cessation educational and advisory group meetings, which have been organised by Johnson & Johnson and Pfizer.

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Foreword

Smoking kills, but is entirely preventable. All clinicians encounter smokers in their daily work, and most will have first-hand experience of caring for people whose lives have been destroyed by addiction to smoking tobacco. For nearly six decades, the Royal College of Physicians has led medical opinion on tobacco policy and clinical practice, and with the many other organisations and individuals involved in advocacy for smoking prevention has made a significant contribution to achieving a substantial fall in smoking prevalence in the UK.

However, there is one area where policy and practice have singularly failed to achieve their potential, and that is in helping our patients who smoke to quit. Despite the availability of evidence-based clinical guidelines on smoking interventions in the UK for 20 years, smokers who use NHS facilities, and in particular our hospitals, are admitted and discharged without being asked if they are a smoker, or if asked, without being offered help, or if offered help, without that help being delivered at the time of the admission. Our consistent failure to act on the largest avoidable cause of premature death and disability in the UK needs to be remedied.

This report addresses the harms and costs arising from smoking in the patients we see every day, and argues for a new approach to treating their addiction. We argue that existing models of delivering stop smoking services separately from mainstream NHS services, while successful in the past, may now not be the best approach. We argue that responsibility for treating smokers lies with the clinician who sees them, and that our NHS should be delivering default, opt-out, systematic interventions for all smokers at the point of service contact. We demonstrate that clinicians working in almost all areas of medicine will see their patient's problems improved by quitting smoking, and that systematic intervention is a cost-effective means of both improving health and reducing demand on NHS services. Smoking cessation is not just about prevention. For many diseases, smoking cessation represents effective treatment.

As doctors we must therefore recognise that treating tobacco dependence, effectively and routinely, is our business. Smoking cessation should be incorporated, as a priority, as a systematic and opt-out component of all NHS services, and delivered in smoke-free settings. It is unethical to do otherwise.

Professor Jane Dacre
President, Royal College of Physicians

1 Introduction

1.1 Tobacco smoking and health

Tobacco smoking has a devastating effect on health. Since the earliest reports linking tobacco smoking with human disease[1,2] and the work of Doll and Hill characterising the causal association with lung cancer in the early 1950s,[3–5] the range of diseases known to be caused or exacerbated by smoking has grown dramatically. Just 12 years after the first Doll and Hill paper[3] the Royal College of Physicians (RCP) concluded that in addition to lung cancer, tobacco smoking caused chronic bronchitis; that smoking probably contributed to the development of cardiovascular disease, pulmonary tuberculosis and cancers of the mouth, throat and oesophagus; and that smoking was associated with other conditions including bladder cancer, amblyopia and low birth weight.[6] Five decades later, the 2014 US Surgeon General report on smoking and health concluded that tobacco smoking causes cancer in 12 body sites and a wide range of non-malignant disease and disorders (listed in Table 1.1);[7] and that passive exposure to tobacco smoke causes coronary heart disease and lung cancer in adults, and low birth weight, sudden infant death, middle ear disease and respiratory disease in children.[7]

Previous RCP reports have quantified in detail the mortality and morbidity caused in the UK by active or passive smoking in adults,[8,9] and by passive exposure of children to tobacco smoke both before and after birth.[10] They have also documented the strong association between smoking and socio-economic disadvantage, and the particularly high prevalence of smoking among people with mental health problems.[11,12] Smoking is the largest avoidable cause of death and disability, and of social inequalities in health, in the UK. Preventing smoking should therefore be the highest priority in medicine.

1.2 Policies to prevent smoking in the UK

Recognition of the harm to health that smoking causes has led governments in many countries to introduce tobacco control policies, across a spectrum of

Table 1.1 Health consequences causally linked to smoking by the 2014 US Surgeon General report[7]

Cancers	Non-malignant conditions
Oropharynx	Chronic obstructive pulmonary disease
Larynx	Pneumonia
Oesophagus	Tuberculosis
Trachea, bronchus and lung	Asthma
Acute myeloid leukaemia	Coronary heart disease
Stomach	Stroke
Liver	Aortic aneurysm
Pancreas	Peripheral vascular disease
Kidney and ureter	Diabetes
Cervix	Congenital oro-facial cleft
Bladder	Rheumatoid arthritis
Colon and rectum	Hip fracture
	Cataract
	Age-related macular degeneration
	Periodontitis
	Ectopic pregnancy
	Male erectile dysfunction
	Reduced fertility in women

actions first defined by the RCP in 1962.[6] These policies, which include mass media campaigns against smoking, high taxes on tobacco products, smoke-free public and workplaces, prohibition of advertising and other forms of promotion, preventing children from purchasing tobacco and providing help for smokers who want to quit smoking, were adopted by the World Health Organization as global strategy in the first ever international health treaty, the Framework Convention on Tobacco Control, in 2003.[13] All of these policies have now, to varying degrees, been implemented in the UK (Table 1.2), in some

Table 1.2 Summary timeline of major UK tobacco control policies

Date	Policy
1965	Television cigarette advertising prohibited
1971	First health warnings on packs
1973	Tar and nicotine content tables produced (and tar categories in 1974)
1978	Radio cigarette advertising prohibited
1987	Smoking prohibited on London Underground network
1993+	Regular annual tax increases making tobacco less affordable
1998	Smoking kills[14] White Paper published
1999	Increased use of mass media campaigns
1999	NHS smoking cessation services introduced
2003	Large health warnings required by law
2003–2005	Legislation prohibiting most forms of tobacco advertising and sponsorship
2007	Prohibition of smoking in enclosed public places and workplaces
2007	Minimum age for purchase of tobacco raised to 18 years
2008	Pictorial health warnings introduced
2011	Tobacco vending machines prohibited
2012–2015	Point of sale display ban in large (2012) and small (2015) shops
2016	Prohibition of smoking in cars with children
2017	Standardised tobacco packaging

cases initially through voluntary agreements with industry but latterly in most cases by law. Progress in implementation was accelerated by the publication of the tobacco White Paper *Smoking kills*, the first national tobacco control strategy, in 1998.[14] Although the degree of implementation (eg spending on mass media campaigns or tax increases) has varied over time, a recent independent assessment indicates that UK tobacco control policy is the most advanced in Europe.[15]

Implementing these policies has contributed to a significant decline in UK smoking prevalence. In 1962, three-quarters of men and half of women were smokers,[6] and by 1998, when *Smoking kills* was published,[14] prevalence had fallen to 28% of men and 26% of women.[8] In 2016 the respective figures were 18% and 14%.[16] Despite this progress, however, smoking currently kills around 100,000 people in the UK every year,[16] and although much of this mortality is a legacy of the higher smoking prevalence of earlier decades[17] smoking remains a major current and future health problem. In 2016 there were an estimated 7.6 million UK adult smokers,[16] half of whom, if they continue to smoke, will die prematurely as a consequence of smoking, losing an average of 10 years of life, or 1 day of life for every 4 days of smoking after the age of 35.[18,19] Furthermore, as argued in our 2016 *Nicotine without smoke* report, the decline in smoking prevalence in the general population over recent decades has been achieved more by reducing the uptake of smoking by young people than by increasing the likelihood that established smokers will quit.[12] The health benefits of this progress will therefore be realised in decades to come but not in the more immediate and near-term future. Helping the existing population of smokers to quit smoking tobacco, as soon as possible, is therefore now the most immediate tobacco control imperative. Our 2016 report advocated the promotion of electronic cigarettes (e-cigarettes) and other novel nicotine products as consumer alternatives to tobacco, as a parallel strategy to encourage as many smokers as possible to switch from smoked tobacco to a less harmful source of nicotine.[12] The report did not, however, address another pressing area of need in comprehensive tobacco control: ensuring that health services take every opportunity to ensure that as many smokers as possible are offered, and receive, the best possible services and interventions to help them to quit.

1.3 Services to help people to quit smoking

Medical services to help smokers to quit smoking probably originated with experimental use of intravenous nicotine in 1942[20] but their importance as a clinical service was championed in particular by Michael Russell in the 1970s.[21,22] The first UK smoking cessation clinical guidelines for healthcare professionals, based on the model of combining behavioural support with medicinal nicotine (nicotine replacement therapy, or NRT) developed by Russell, were published in 1998[23] alongside evidence of high cost-effectiveness.[24] In 1998 the *Smoking kills* White Paper announced that the NHS would establish, initially (in 1999/2000) in areas of special need known as Health Action Zones, and in the following 2 years throughout the UK, smoking cessation services offering specialist counselling and pharmacotherapy with NRT.[14] Funding for the services was ring-fenced from other NHS budgets, thus establishing stand-alone services to which smokers could self-refer, or be referred by health professionals, for help to quit. Referral to NHS Stop Smoking Services, as they

became known, was embedded in clinical guidelines on smoking cessation issued by the National Institute for Health and Care (previously Clinical) Excellence (NICE).[25]

In England for over a decade these services treated increasing numbers of smokers every year, with a peak of 816,000 in 2011/12 (Figure 1.1; data on numbers accessing services in the devolved nations are presented in Chapter 5). Treatment outcomes were measured as carbon monoxide (CO) validated (<10 parts per million) smoking cessation at 4 weeks, and between 2001/2 and 2016/17 more than 3 million smokers quit according to this metric. A recent evaluation of longer term quitting, similarly CO validated, indicates that around 9% of those setting a quit date with these services, equivalent to around 810,000 smokers in England, succeeded in quitting smoking for at least 1 year.[26] However, since 2011/12 the number of smokers accessing the services each year has declined progressively, to a total of 306,000, or less than 5% of all smokers in England[16] in 2016/17. The explanation for this profound decline in service uptake is not yet clear, but it is evident that the services are failing to reach millions of smokers. In secondary care settings, to which around 1 million smokers are admitted in England at least once each year,[27] a recent national audit found that smoking status was not ascertained in around one in four admissions, and that among those who were ascertained to be current smokers, less than 30% were asked if they wanted help to quit and only 8% referred either to in-house or

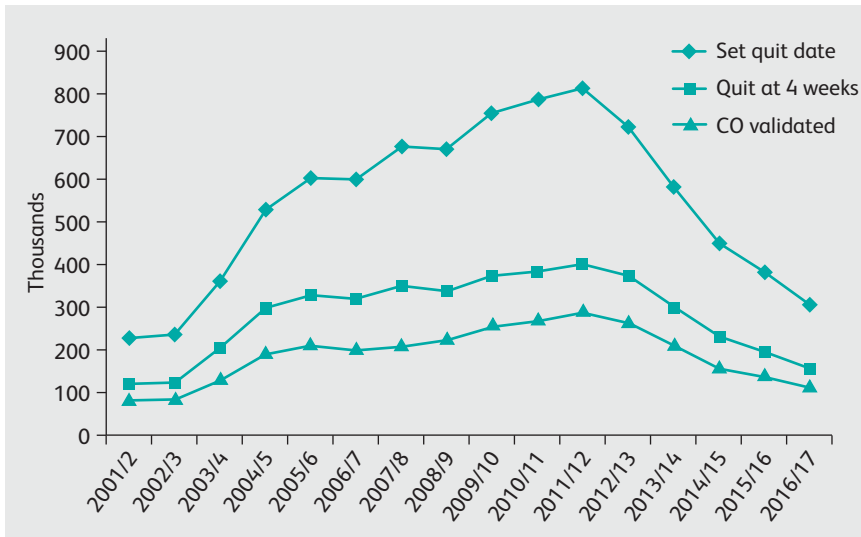

Figure 1.1 Number of smokers setting a quit date, and self-reported and CO validated quitting at 4 weeks, in NHS Stop Smoking Service in England from 2001/2 to 2016/17.

community stop smoking services.[28] The audit concluded that management of smoking in UK hospitals was 'woefully lacking'.[28]

A recent audit of 141 UK or European transnational clinical management guidelines for conditions caused or exacerbated by smoking found that only 40% recommended smoking cessation in care pathways, and that guidance on how to intervene to support cessation was included in only 19%.[29] Thus, while a focus on disease prevention has been recognised as vital to managing costs and sustaining the viability of the NHS in the future,[30,31] and the delivery of smoking interventions has been consistently and widely recommended throughout all areas of clinical practice by NICE,[32] the NHS has largely failed to address smoking by the patients it serves. In this respect the NHS is missing a golden opportunity to realise major improvements in health and wellbeing, and to reduce service costs. The latest (2017) Tobacco Control Plan for England correctly prioritises changing NHS practice, to ensure that smoking cessation becomes a core activity, as the next priority in tobacco control in England.[33]

1.4 Objectives of this report

Helping smokers to quit smoking is the current most pressing need in health promotion and disease prevention in the UK. This report aims to maximise smoking cessation among people using NHS services by quantifying the burden that smoking places on the NHS, discussing how current failings in NHS services could be remedied, and explaining why it is the business of everyone working in the health service to engage in identifying smokers and helping them to quit.

1.5 Summary

- Smoking is the largest avoidable cause of death, and of social inequalities in life expectancy, in the UK.
- Preventing smoking should therefore be the highest priority for health services and health policy.
- Tobacco control policies have achieved substantial reductions in smoking prevalence, but more from reductions in smoking uptake than from quitting among established smokers.
- NHS Stop Smoking Services have succeeded in helping up to 800,000 smokers in England alone to quit smoking since their inception, but the number of smokers accessing them is falling.
- Management of smoking in secondary care settings is 'woefully lacking'.
- By failing to address smoking, the NHS is failing to realise substantial gains in both health and sustainability.

- The NHS needs systems change to prioritise smoking cessation.
- This report aims to demonstrate why smoking prevention should become a core activity for all health professionals and services, why it is not, and how to achieve the necessary change.

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2 Associations between smoking and disease

2.1 Introduction

In addition to the wide range of diseases outlined in Chapter 1 that smoking is recognised to cause,[1,2] there is a much wider spectrum of diseases and adverse health outcomes that are more common in smokers. This chapter aims to summarise and explore these associations, drawing on a combination of narrative and systematic reviews, as well as original data analysis. The chapter looks briefly at the effects of smoking on overall mortality and life expectancy and then in more detail at specific disease risks in current and former smokers; and at the effects of smoking cessation after disease diagnosis on subsequent disease natural history.

2.2 Smoking, mortality and life expectancy

The definitive study of smoking and life expectancy in the UK was initiated by Doll and Hill in the early 1950s and provides data on five decades of follow-up in over 30,000 male British doctors.[3] The study demonstrates a threefold higher overall mortality among doctors who smoke throughout their adult life relative to those who do not, resulting in an average loss of 10 years of life expectancy.[3] Smokers who quit smoking at age 30, 40, 50 or 60 years gained, respectively, 10, 9, 6 and 3 years of life relative to those who continued to smoke.

Although these findings were derived exclusively from men, a second definitive British cohort study of over 1 million women demonstrated very similar increases in mortality and estimates of years of life lost to lifelong smoking in women.[4] These studies are thus consistent in finding that in approximate terms, smoking after age 30 results in the loss of approximately 1 year of life for every 4 years of smoking, and that quitting smoking generates appreciable gains in life expectancy, relative to continued smoking, at all ages.[3,4] Broadly consistent findings are reported from other countries, along with evidence consistent with the finding of these British studies that the loss of life associated with smoking is related to the duration of smoking and the number of cigarettes smoked per

day.[5,6] There is mixed evidence as to whether reducing but not quitting smoking generates appreciable health benefit.[7–9]

2.3 Smoking and the risks of specific diseases and disorders

The evidence base on the associations between smoking and individual disease is massive, and a systematic review of original studies is far beyond the scope or resources available for this report. To make a review of the associations between smoking and specific disease risks manageable we have therefore searched the literature for systematic reviews of these associations with meta-analyses of effect sizes. Where more than one recent review was available we took either the most recent or the review that identified the most individual studies; and where possible we selected reviews of longitudinal rather than cross-sectional studies. Where we have been unable to identify a recent or definitive review of a disease we consider too important to exclude, we have either carried out our own review or referred to substantive cohort study evidence. To provide insight into the level of risk that pertains after quitting smoking, where possible we provide estimates of disease risk in former as well as current smokers. For simplicity we have used the term 'relative risk' in this section to include both relative risks and hazard ratios, but not odds ratios. We have limited our summary in the main to reviews that identified statistically significant positive or negative associations with smoking. We have disregarded reviews published by authors with known past or present links to the tobacco industry.

For diseases of adults we have limited our searches to studies of associations with active smoking. For effects on fetal health and development we have searched for studies of maternal smoking during pregnancy, and in child health, for studies of passive exposure to smoking by parents or other household members. For simplicity we have typically focused on maternal smoking, as this tends to be associated with higher risks, but recognise, however, that the observed risks are not necessarily exclusively attributable to smoking by the mother.

2.3.1 Smoking and cancer

This section draws on an extensive range of systematic reviews of the association between smoking and individual site-specific cancers, and on two reviews of effects on multiple outcomes:

- the 2016 systematic review and meta-analysis of 19 current US and European cohort studies reported by the CHANCES (Consortium on Health and Ageing: Network of Cohorts in Europe and the United States) consortium and relating to cancer at seven sites[10]

- the meta-analyses of 293 observational studies, published between 1961 and 2003, of smoking effects on cancer at 13 sites recognised in 2002 to be related to tobacco smoking by the International Agency for Research on Cancer (IARC),[1] published in 2008 by Gandini *et al.*[11]

Estimates from these two reports are summarised in Tables 2.1 and 2.2, respectively. A further pooled analysis of five US cohort studies by Carter *et al*[12] has been used where other estimates are lacking.

2.3.1.1 Lung cancer

A 2016 meta-analysis of 34 studies[13] estimates the risk of lung cancer to be increased approximately 11-fold in current smokers relative to non-smokers (OR 10.92, 95% confidence interval (CI) 8.28–14.40). This effect is similar in men and women, and increases in relation to both the duration and the intensity of smoking. However, risk estimates from studies from European countries are higher (OR 14.68, 95% CI 10.22–21.09) than those carried out elsewhere (OR 8.96, 95% CI 6.20–12.96). Among former smokers the risk of lung cancer

Table 2.1 Pooled hazard ratios for cancer in relation to smoking from the CHANCES meta-analysis of 19 prospective US and European cohort studies[10]

Cancer site	Hazard ratio (95% CI)[a] for smoking, relative to non-smokers		Hazard ratio (95% CI) in former smokers by duration quit, relative to continued smokers		
	Current smokers	Former smokers	<9 years	10–19 years	>20 years
Lung	13.1 (9.90–17.3)	4.06 (3.13–5.26)	0.60 (0.48–0.73)	0.33 (0.25–0.44)	0.15 (0.12–0.19)
Head and neck	2.89 (1.98–4.21)	1.73 (1.57–1.92)	1.08 (0.80–1.47)	0.61 (0.40–0.92)	0.55 (0.34–0.91)
Colorectal	1.20 (1.07–1.34)	1.20 (1.15–1.25)	1.00 (0.87–1.16)	1.11 (0.97–1.27)	0.88 (0.78–1.00)
Gastric	1.74 (1.50–2.02)	1.18 (0.95–1.46)	0.85 (0.60–1.20)	0.68 (0.41–1.12)	0.69 (0.51–0.93)
Pancreatic	1.90 (1.48–2.43)	1.13 (0.95–1.35)	0.83 (0.62–1.11)	0.71 (0.52–0.96)	0.47 (0.31–0.70)
Breast	1.07 (1.00–1.15)	1.08 (1.04–1.12)	0.97 (0.84–1.13)	1.03 (0.81–1.31)	1.03 (0.85–1.24)
Prostate	0.81 (0.72–0.91)	0.88 (0.82–0.95)	1.00 (0.90–1.12)	1.03 (0.89–1.19)	1.08 (0.99–1.18)

[a]CI, Confidence interval.

Table 2.2 Pooled relative risks for cancer in relation to smoking from 293 studies published 1961–2003 and drawn from the 2004 IARC report[1] by Gandini *et al*[11]

Cancer site	Relative risk (95% CI)[a] for smoking, relative to non-smokers	
	Current smokers	Former smokers
Oral cavity	3.43 (2.37–4.94)	1.40 (0.99–2.00)
Pharynx	6.76 (2.86–16.0)	2.28 (0.95–5.50)
Oesophagus	2.50 (2.00–3.13)	2.03 (1.77–2.33)
Stomach	1.64 (1.37–1.95)	1.31 (1.17–1.46)
Liver	1.56 (1.29–1.87)	1.49 (1.06–2.10)
Pancreas	1.70 (1.51–1.91)	1.18 (1.04–1.33)
Nasal-sinuses and nasopharynx	1.95 (1.31–2.91)	1.39 (1.08–1.79)
Larynx	6.98 (3.14–15.5)	4.65 (3.35–6.45)
Lung	8.96 (6.73–12.1)	3.85 (2.77–5.34)
Cervix	1.83 (1.51–2.21)	1.26 (1.11–1.42)
Kidney	1.52 (1.33–1.74)	1.25 (1.14–1.37)
Lower urinary tract	2.77 (2.17–3.54)	1.72 (1.46–2.04)
Myeloid leukaemia	1.09 (0.70–1.70)	1.27 (0.28–5.83)

[a]CI, Confidence interval.

remains elevated relative to never smokers, by an OR estimated at 3.85 (95% CI 2.77–5.34) in an earlier meta-analysis of 20 studies[11] (Table 2.2).

Individual studies indicate that quitting smoking reduces or prevents further increase in relative risk of lung cancer, but the increased risk acquired from smoking falls minimally, if at all.[14–16] However, relative to continued smokers, cancer risk falls quickly after quitting smoking, to 0.60 (95% CI 0.48–0.73) among those who have quit for up to 10 years; 0.33 (95% CI 0.25–0.44) in those who have quit for 10–19 years, and 0.15 (95% CI 0.12–0.19) in those who have quit for 20 years or more[10] (see Table 2.1).

2.3.1.2 Head and neck cancer

The CHANCES consortium study estimates the risk of head and neck cancer to be increased by a ratio of 2.89 (95% CI 1.98–4.21), to fall progressively over time after quitting smoking relative to continued smoking, but also to remain elevated in former smokers by a ratio of 1.73 (95% CI 1.57–1.92) relative to never smokers (Table 2.1).[10] The Gandini *et al* study estimated relative risks for cancer of the oral cavity of 3.43 (95% CI 2.37–4.94) and 1.40 (95% CI 0.99–2.00) in current and former smokers, respectively, and for cancer of the pharynx of 6.76 (95% CI 2.86–16.0) and 2.28 (95% CI 0.95–5.50).[11] Risks were also significantly increased among current and former smokers in relation to nasal and nasopharyngeal cancer, and cancer of the larynx (Table 2.2).

2.3.1.3 Oesophageal cancer

The risk of oesophagus cancer is increased among smokers by a ratio of 2.50 (95% CI 2.00–3.13), and among former smokers by a ratio of 2.03 (95% CI 1.77–2.33)[11] (Table 2.2).

2.3.1.4 Gastric cancer

The CHANCES consortium study estimates the risk of gastric cancer to be increased in smokers by a ratio of 1.74 (95% CI 1.50–2.02), and describes a decline in risk after quitting to the point that the risk among former smokers is not significantly increased (relative risk 1.18, 95% CI 0.95–1.46, Table 2.1).[10] Estimates from Gandini *et al* are very similar (Table 2.2).[11]

2.3.1.5 Pancreatic cancer

The CHANCES consortium estimate of the relative risk of pancreas cancer among smokers is 1.90 (95% CI 1.48–2.43), but as with gastric cancer, this risk falls after quitting and is not significantly increased in former smokers (relative risk 1.13, 95% CI 0.95–1.35; Table 2.1).[10] The Gandini *et al* study again reported similar estimates.[11] The risk of neuroendocrine tumours in the pancreas is also increased among people who have ever smoked (odds ratio 1.34, 95% CI 1.10–1.63).[17]

2.3.1.6 Liver cancer

A 2009 meta-analysis estimates the risk of liver cancer among current smokers to be increased by a ratio of 1.51 (95% CI 1.37–1.67), but with no significantly increased risk among former smokers (relative risk 1.12 (95% CI 0.78–1.60).[18] The latter finding contrasts with the Gandini *et al* analysis, which reported a similar increased risk among smokers, but this was sustained among former smokers (1.49, 95% CI 1.06–2.10).[11]

2.3.1.7 Small intestine neuroendocrine cancer

Among ever smokers the risk of neuroendocrine tumours in the small intestine is increased by an odds ratio of 1.59 (95% CI 1.07–2.37).[17]

2.3.1.8 Colorectal cancer

The CHANCES consortium estimates the relative risk of colorectal cancer to be increased by 20% in both current (1.20, 95% CI 1.07–1.34) and former smokers (1.20, 95% CI 1.15–1.25, Table 2.1).[10] A 2015 meta-analysis of 24 prospective studies estimated the relative risk of colon cancer among smokers at 1.09 (95% CI 1.01–1.18), and of rectal cancer at 1.24 (95% CI 1.16–1.39);[19] and similarly these risks remained sustained among former smokers (1.24 (95% CI 1.12– 1.39) and 1.20 (1.11–1.30), respectively).[19] A meta-analysis of the association between current smoking and colorectal polyps estimated the relative risk at 2.47 (95% CI 2.12–2.87).[20]

2.3.1.9 Kidney cancer

The Gandini *et al* meta-analysis estimated the relative risk of kidney cancer among smokers at 1.52 (95% CI 1.33–1.74) and in former smokers at 1.25 (95% CI 1.14–1.37).11. Similar estimates were generated in a separate 2006 meta-analysis, which also reported a decline in risk with time after quitting smoking in men.[21]

2.3.1.10 Bladder and other lower urinary tract cancers

A 2016 meta-analysis reported summary odds ratios for bladder cancer among smokers of 3.14 (95% CI 2.53–3.75) and former smokers of 1.83 (95% CI 1.52–2.14).[22] The Gandini *et al* study estimated these risks for lower urinary tract (renal pelvis, bladder and ureter) cancer at 2.77 (95% CI 2.17–3.54) and 1.72 (95% CI 1.46–2.04), respectively.[11]

2.3.1.11 Prostate cancer

The CHANCES consortium analysis found no evidence of increased risk of prostate cancer among smokers (Table 2.1),[10] as did a 2010 meta-analysis of a broader range of cohort studies.[23] However, the latter study did report an increased risk of fatal prostate cancer among smokers relative to non-smokers (relative risk 1.14, 95% CI 1.06–1.19).[23]

2.3.1.12 Breast cancer

The CHANCES consortium reported a modest but statistically significant increase in the risk of breast cancer among smokers, by a ratio of 1.07 (95% CI

1.00–1.15), and in former smokers of 1.08 (95% CI 1.04–1.12), with no clear evidence of a decline in risk after smoking cessation (Table 2.1).[10] A 2015 analysis of a more extensive range of 27 prospective studies reported a similar finding, with a relative risk in current smokers of 1.13 (95 % CI 1.09–1.17).[24]

2.3.1.13 Cervix cancer

The Gandini *et al* study estimated relative risks of cervix cancer among smokers of 1.83 (95% CI 1.51–2.21) and former smokers of 1.26 (95% CI 1.11–1.42).[11]

2.3.1.14 Acute myeloid leukaemia

A 2015 meta-analysis of case-control studies estimated the odds ratio for acute myeloid leukaemia among current smokers to be 1.36 (95% CI 1.11–1.66); among former smokers 1.21 (95% CI 1.03–1.41) and among ever smokers at 1.25 (95% CI 1.14–1.38). Estimates of relative risks from the small number of available cohort studies were higher, at 1.52 (95% CI 1.10–2.14) for current smokers, 1.45 (95% CI 1.10–1.90) for ever smokers, and 1.45 (95% CI 1.08–1.94) for former smokers.[25] There is evidence that these effects were exposure related.[25,26]

2.3.1.15 Malignant melanoma

An analysis of five US cohort studies by Carter *et al*[12] estimates the relative risk of malignant melanoma in male smokers aged 55 and over at 1.7 (95% CI 1.2–2.6), and in male former smokers at 1.4 (95% CI 1.1–1.7). Relative risks were not significantly increased in female smokers.[12]

2.3.2 Respiratory disease

2.3.2.1 Chronic obstructive pulmonary disease

The 2016 SmokeHaz meta-analysis of 22 longitudinal studies estimated the relative risk of chronic obstructive pulmonary disease (COPD) among current smokers at 4.01 (95% CI 3.18–5.05) but did not estimate risk in former smokers.[13] The SmokeHaz estimate for current smokers is, however, similar to that from a meta-analysis of five cohort studies reported in 2015, which provided an estimate of the risk of COPD in former smokers of 3.13 (95% CI 1.24–7.87).[27]

2.3.2.2 Asthma

The relative risk of asthma in adult smokers, estimated in the SmokeHaz project, is 1.61 (95% CI 1.07–2.42).[13]

2.3.2.3 Tuberculosis

The SmokeHaz analysis estimates the relative risk of tuberculosis in adult smokers at 1.57 (95% CI 1.18–2.10).[13] This effect appears to be exposure related.[13]

2.3.2.4 Pneumonia

We found no recent meta-analysis of the association between smoking and pneumonia. We therefore searched MEDLINE, Embase, CINAHL, LILACS and Web of Science for studies of community-acquired pneumonia in adults. We also searched for unpublished studies using trials registers and databases, and direct contact with investigators and experts. We identified 12 eligible studies,[28–39] which in meta-analysis generated a summary odds ratio of 2.18 (95% CI 1.69–2.80, Figure 2.1).

2.3.2.5 Influenza

We were unable to identify a recent meta-analysis of the association between smoking and influenza infection in adults. We therefore searched MEDLINE,

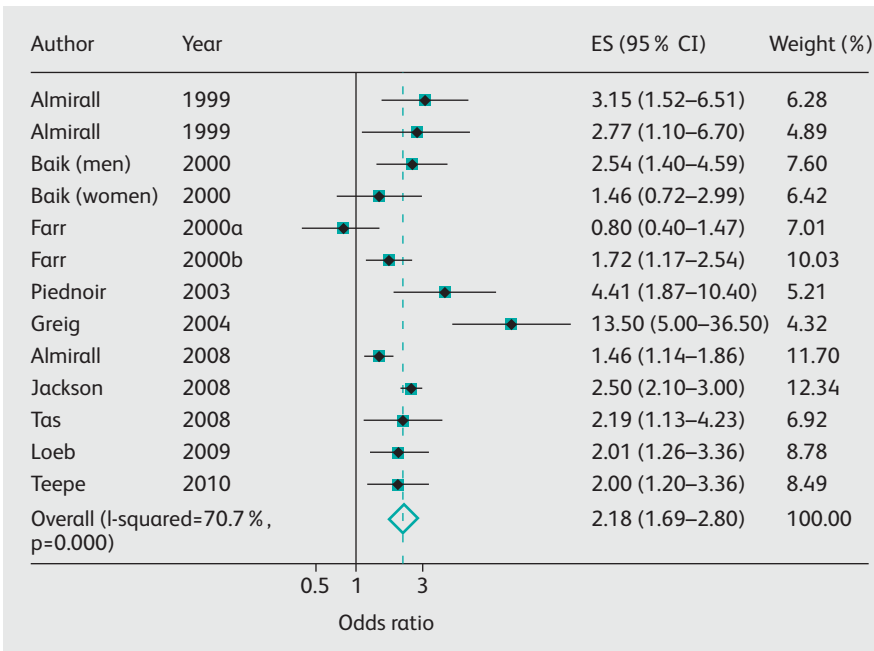

Figure 2.1 Meta-analysis of risk of community-acquired pneumonia in current smokers relative to non-smokers. ES, effect size. Weights are from random effects analysis.

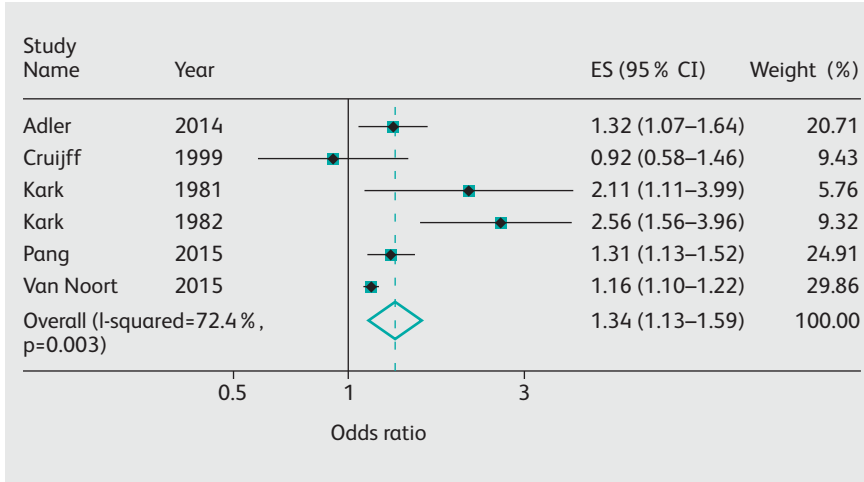

Figure 2.2 Meta-analysis of risk of influenza-like illness in current smokers relative to non-smokers. ES, effect size. Weights are from random effects analysis.

Embase, CINAHL, LILACS and Web of Science for observational studies including prospective and retrospective cohort and case-control studies of adults aged 18 years and above, with no language or date restriction. Cross-sectional studies were excluded. We included studies that defined influenza as a clinical entitiy (influenza-like illness) and those that used microbiological methods to confirm a diagnosis of influenza, and ran separate analyses subsequently.

For influenza-like illness we identified six eligible studies,[40–45] which in meta-analysis generated a summary odds ratio of 1.34 (95% CI 1.13–1.59, Figure 2.2).

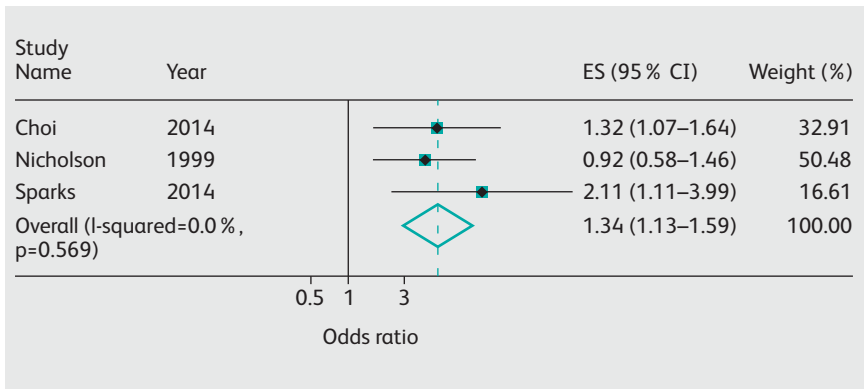

Figure 2.3 Meta-analysis of risk of microbiologically confirmed influenza in current smokers relative to non-smokers. ES, effect size. Weights are from random effects analysis.

For microbiologically confirmed influenza we identified three studies,[46–48] which in meta-analysis generated a summary odds ratio of 5.69 (95% CI 2.79–11.60, Figure 2.3).

2.3.2.6 Pulmonary fibrosis

A 2006 meta-analysis estimated the odds ratio for idiopathic pulmonary fibrosis among smokers, relative to non-smokers, at 1.58 (95% CI 1.27–1.97).[49]

2.3.2.7 Obstructive sleep apnoea

The SmokeHaz meta-analysis of two studies suggests that sleep apnoea is approximately twice as common among smokers (relative risk 1.97, 95% CI 1.02–3.82), with some evidence that this effect was stronger in heavy smokers.[13]

2.3.3 Cardiovascular disease

2.3.3.1 All cardiovascular disease

The most comprehensive recent systematic review and meta-analysis of smoking effects on cardiovascular disease we were able to identify was the 2015 review of cohort studies published by the CHANCES consortium, an analysis restricted to persons aged 60 and over.[50] This study documents a doubling (relative risk 2.07, 95% CI 1.82–2.36) of overall mortality from cardiovascular disease among current smokers relative to never smokers; and among ex-smokers, a relative risk of 1.37 (95% CI 1.25–1.49).[50] The increase in risk was exposure related, and decreased among ex-smokers (relative to never smokers) with time since quitting falling to 1.74 (95% CI 1.51–2.01) at 5 years, and to 1.15 (95% CI 1.02–1.30) at 20 years.[50]

2.3.3.2 Acute coronary events

Relative risks for acute coronary events in current and ex-smokers relative to never smokers in the CHANCES review were 1.98 (95% CI 1.75–2.25) and 1.18 (95% CI 1.06–1.32), respectively.[50]

2.3.3.3 Ischaemic heart disease

An analysis of US National Health Interview Survey data by Rostron in 2013[51] estimates relative risks for ischaemic heart disease in current and former smokers, respectively, as follows:

- in male smokers aged 35–64 at 3.18 (95% CI 2.34–4.33) and 1.59 (95% CI 1.11–2.27)

- in male smokers aged 65 and over at 1.96 (95% CI 1.62–2.37) and 1.16 (95% CI 1.01–1.34)
- in female smokers aged 35–64 at 3.93 (95% CI 2.56–6.05) and 1.48 (95% CI 0.82–2.64), and
- in female smokers aged 65 and over at 1.95 (95% CI 1.60–2.37) and 1.37 (95% CI 1.18–1.58).

2.3.3.4 Stroke

A 2013 meta-analysis of smoking risks for stroke in men and women estimated relative risks of 1.57 (95% CI 1.49–1.88) and 1.83 (95% CI 1.58–2.12), respectively, in current smokers relative to non-smokers, and 1.08 (95% CI 1.03–1.13) and 1.17 (95% CI 1.12–1.22) for former smokers relative to never smokers.[52]

2.3.3.5 Peripheral arterial disease

A 2014 meta-analysis estimated a pooled odds ratio for peripheral arterial disease in current smokers of 2.71 (95% CI 2.28–3.21), and in former smokers of 1.67 (95% CI 1.54–1.81).[53]

2.3.3.6 Abdominal aortic aneurysm

A 2004 meta-analysis estimated the pooled odds ratio for the occurrence of asymptomatic abdominal aortic aneurysm among current smokers to be 2.41 (95% CI 1.94–3.01).[54]

2.3.3.7 Venous thromboembolism

A 2013 meta-analysis estimated pooled relative risks for current smokers of 1.23 (95% CI 1.14–1.33), and for former smokers 1.10 (95% CI 1.03–1.17).[55] These effects were exposure related, with risk increasing by 10.2% (95% CI 8.6%–11.8%) for every additional 10 cigarettes per day smoked or by 6.1% (95% CI 3.8%–8.5%) for every 10 pack-years. Smoking was associated with an absolute risk increase of 24.3 (95% CI 15.4–26.7) cases per 100,000 person-years.[55]

2.3.4 Mental health

2.3.4.1 Dementia

A 2015 meta-analysis of 37 prospective cohort studies of Alzheimer's disease, vascular dementia and all-cause dementia identified a relative risk among smokers relative to non-smokers of 1.40 (95% CI 1.13–1.73) for Alzheimer's disease, 1.38 (95% CI 1.15–1.66) for vascular dementia, and 1.30 (95% CI

1.18–1.45) for all-cause dementia.[56] For all-cause dementia this effect was exposure related, increasing by 34% for every 20 cigarettes per day (relative risk 1.34, 95% CI 1.25–1.43). The risk of Alzheimer's disease among current smokers appears to be higher in those who do not carry the apolipoprotein E (APOE) 4 allele. There was no increased risk of any dementia among former smokers (relative risks being 1.04 (95% CI 0.96–1.13) for Alzheimer's disease, 0.97 (95% CI 0.83–1.13) for vascular dementia and 1.01 (95% CI 0.96–1.06) for all-cause dementia).[56] Dementia risks were lower among smokers aged over 75, consistent with survival bias and competing risk effects.[56]

Evidence of an effect of smoking on rate of cognitive decline is less conclusive, with one earlier meta-analysis suggesting that smoking accelerates decline,[57] but a more recent systematic review (without meta-analysis) reporting no consistent effect.[58]

2.3.4.2 Depression

A meta-analysis of data from 85 studies published by the end of 2012 demonstrates an increased risk of incident depression among current smokers relative to never smokers in prospective studies by a ratio of 1.62 (95% CI 1.10–2.40).[59] These findings are consistent with those of meta-analyses carried out for the 2013 RCP report on smoking and mental health, which in addition demonstrated similar effects in adolescents and adults[60] and found evidence of an exposure–response relation in the effect of smoking on risk of depression.[60]

2.3.4.3 Anxiety

A 2013 review by the RCP of evidence on the association between smoking and anxiety concluded that smokers were more likely to develop anxiety, and that people with anxiety were more likely to become smokers, but differences in methods of assessment and definitions of exposures and outcome measures precluded formal meta-analysis.[60] Broadly similar conclusions were drawn from a more recent systematic review, which also did not proceed to meta-analysis.[61]

2.3.4.4 Psychosis

A meta-analysis of 61 studies published up to January 2014 reports that in prospective studies, smokers were twice as likely as non-smokers to experience a first episode of psychosis (relative risk 2.18, 95% CI 1.23–3.85).[62] Regular (daily) smokers developed their psychosis an average of 1 year earlier than non-smokers. The study did not provide evidence on the effect of smoking cessation on psychosis risk, or adjust for confounding by other substance abuse. A review and meta-analysis of suicide in people with psychosis has demonstrated a twofold increased risk among smokers (odds ratio 2.12, 95% CI 1.67–2.7).[63]

2.3.4.5 Bipolar disorder

We were unable to identify a systematic review and meta-analysis of longitudinal studies of smoking and bipolar disorder. A 2015 review based on a PubMed search and a trawl of the senior author's personal database of publications estimated a weighted average odds ratio for smoking among people with bipolar disorder of 3.5 (95% CI 3.39–3.54), but did not carry out a formal meta-analysis.[64]

2.3.4.6 Schizophrenia

We were unable to identify a recent systematic review of smoking and schizophrenia. We therefore searched Ovid Medline in-process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946–2017, and Embase, PsychInfo and Web of Science from database inception to 2017 using search keywords based on Cochrane review group terms for smoking and schizophrenia,[65,66] and BMJ Clinical Evidence study design search filters.[67] We also hand searched the reference lists of included studies, and of review articles identified in the search. No language restrictions were applied. To exclude reverse causation we limited our analysis to longitudinal studies.

We identified five eligible studies, two of which presented risk estimates as odds ratios,[68,69] and three as hazard ratios.[70–72] We combined these estimates in a meta-analysis on an assumption of constant risk over time, and acknowledging that, despite schizophrenia being a rare disease, the odds ratios will slightly overestimate the true relative risk. The combined estimate of effect was a relative risk of 2.24 (95% CI 1.10–4.55; Figure 2.4).

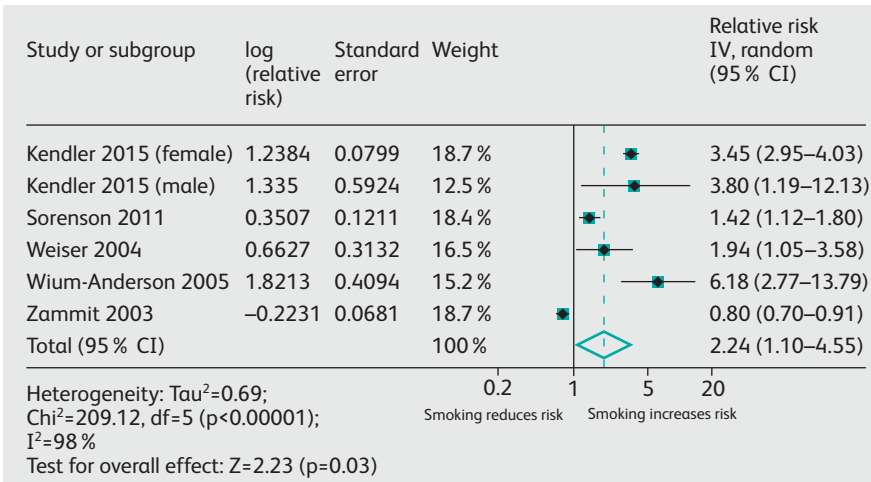

Figure 2.4 Meta-analysis of longitudinal studies of the association between smoking and schizophrenia.

2.3.4.7 Eating disorders

A 2016 systematic review demonstrated that both current and ever smoking were approximately twice as common among people with bulimia nervosa (current smoker odds ratio 2.32, 95% CI 1.12–4.78; ever smoker 2.16, 95% CI 1.64–2.85), and ever smoking in those with a binge eating disorder (odds ratio 1.79, 95% CI 1.23–2.62), but with no association between smoking and anorexia nervosa.[73]

2.3.5 Other adult disease

2.3.5.1 Rheumatoid arthritis

A 2014 meta-analysis identified an increased relative risk of rheumatoid arthritis among smokers which was related to the number of pack-years smoked, to a maximum of 20 pack-years.[74] A comparison of the highest smoking category in each study with the lowest (never smokers) produced a single summary relative risk estimate of 2.02 (95% CI 1.75–2.33), and the risk rose with pack-years smoked from 1.26 (95% CI 1.14–1.39) among individuals with 1–10 pack-years exposure, to 1.70 (95% CI 1.44–2.01) with 11–20 pack-years exposure, and stabilised at 1.94 (95% CI 1.65–2.27) among those with 21–30 pack-years exposure.[74] There was no increased risk above this level of exposure (relative risk for >40 pack-years= 2.07, 95% CI 1.15–3.73). The effect of smoking was greater for rheumatoid factor positive disease.[74] This study did not provide estimates of risk in all current or in former smokers.

2.3.5.2 Chronic kidney disease

A 2017 meta-analysis of cohort studies estimates the standardised rate ratio for chronic kidney disease in current smokers at 1.34 (95% CI 1.23–1.47) for current smokers and 1.15 (95% CI 1.08–1.23) for former smokers; and for end-stage renal disease at 1.91 (95% CI 1.39–2.64) for current smokers and 1.44 (95% CI 1.00–2.09) for former smokers.[75]

2.3.5.3 Systemic lupus erythematosus

A 2015 meta-analysis estimates the pooled odds ratio for systemic lupus erythematosus to be 1.56 (95%CI 1.26–1.95) among current smokers, and 1.23 (95% CI 0.93–1.63) in former smokers.[76]

2.3.5.4 Diabetes

A 2015 systematic review and meta-analysis of prospective studies involving nearly 6 million participants and over 295,000 new cases of type 2 diabetes found

evidence of a 37% increase in risk among current smokers relative to non-smokers (pooled relative risk 1.37, 95% CI 1.33–1.42).[77] This effect was exposure related, ranging from a relative risk of 1.21 in light smokers to 1.57 in heavy smokers. Risks were also increased among former smokers relative to never smokers (relative risk 1.14, 95% CI 1.10–1.18). The risk of incident type 2 diabetes fell over time among smokers who quit, from 1.54 (95% CI 1.36–1.74) within the first 5 years after quitting, to 1.18 (1.07–1.29) between 5 and 9 years from quitting, and to 1.11 (1.02–1.20) for those who had quit 10 or more years previously.[77]

A 2015 review concluded that smokers are more likely than non-smokers with diabetes to develop peripheral neuropathy (pooled odds ratio 1.42, 95% CI 1.21–1.65) but this study did not explore the effects of smoking cessation on this outcome.[78]

2.3.5.5 Psoriasis

A 2014 review of smoking and psoriasis estimated increased risks of psoriasis among smokers (pooled odds ratio 1.78, 95% CI 1.52–2.06) and former smokers (odds ratio 1.62, 95% CI 1.33–1.99).[79] The review also reported evidence that this association was exposure related, and that smoking was a risk factor for incident psoriasis, with an adjusted odds ratio of 1.94 (95% CI 1.64–2.28).[79]

2.3.5.6 Multiple sclerosis

A 2016 systematic review and meta-analysis estimated that multiple sclerosis is around 50% more likely to occur in smokers (odds ratio 1.55, 95% CI 1.48–1.62),[80] with a similar risk estimated for former smokers (odds ratio 1.58, 95% CI 1.38–1.82).80 A 2017 review reported similar findings, and concluded that smoking increases the risk of secondary progressive multiple sclerosis, by a ratio of 1.80 (95% CI 1.04–3.10).[81]

2.3.5.7 Eye disease

A systematic review of cohort studies of smoking and age-related cataract estimates an odds ratio of 1.47 (95% CI 1.36–1.59) for the onset of cataract among current smokers, and 1.19 (95% CI 1.01–1.41) in former smokers.[82] Age-related macular degeneration is also more common among smokers, the estimated relative risk from cohort studies being 1.86 (95% CI 1.27–2.73).[83] An earlier review suggests that an increased risk applies to both geographic atrophy (GA) and neovascular subtypes of the condition.[84] Smoking cessation is associated with a reduced risk of developing cataract relative to continued smokers.[85,86]

2.3.5.8 Erectile dysfunction

A 2013 meta-analysis estimates the relative odds of erectile dysfunction among current smokers at 1.81 (95% CI 1.34–2.44), and among ex-smokers at 1.25 (95% CI 1.07–1.47).[87] The effect of smoking appears to be exposure related.[88]

2.3.5.9 Low back pain

A 2010 meta-analysis of cross-sectional and longitudinal studies identified increased risks of low back pain among smokers and ex-smokers relative to never smokers. For cohort studies, the effect on back pain among current smokers was estimated in a pooled odds ratio of 1.16 (95% CI 1.02–1.32).[89]

2.3.5.10 Crohn's disease

A 2006 meta-analysis documented an increased risk of Crohn's disease among smokers, with an odds ratio of 1.76 (95% CI 1.40–2.22).[90] A 2016 systematic review of smoking and Crohn's disease, which included papers published by July 2015, identified increased odds of flares of disease activity (odds ratio 1.56, 95% CI 1.21–2.01), flares after surgery (odds ratio 1.97, 95% CI 1.36–2.85), need for first surgery (odds ratio 1.68, 95% CI 1.33–2.12) and need for second surgery (odds ratio 2.17, 95% CI 1.63–2.89).[75] Risks among ex-smokers were not significantly raised relative to never smokers. The increased risk of bowel resection among smokers with Crohn's disease was confirmed in a meta-analysis of studies published up to April 2016, which estimated a hazard ratio of 1.27 (95% CI 1.08–1.49).[76]

2.3.5.11 Barrett's oesophagus

A 2013 meta-analysis indicates that ever smokers are at increased risk of Barrett's oesophagus, with an odds ratio of 1.42 (95% CI 1.15–1.76),[91] with evidence that the magnitude of this effect is related to pack-years of smoking exposure. The study does not, however, provide estimates of the effect of current or former smoking.

2.3.5.12 Bone fracture

A 2005 review concluded that smokers were at a higher risk of bone fracture (relative risk 1.25, 95% CI 1.15–1.36).[92] Much, but not all, of this increase in risk was explained by reduced bone mineral density in smokers.[92] The risk of fracture was also significantly higher, though to a lesser degree, among former smokers (relative risk 1.19, 95% CI 1.12–1.27).[92] A meta-analysis of 10 prospective studies of smoking and hip fracture in women estimated the relative risk in current female smokers to be 1.30 (95% CI 1.16–1.45), and in former smokers 1.02 (95% CI 0.93–1.11), with risk falling to below that of smokers (relative risk 0.70, 95% CI 0.50–0.90) after 10 years.[93]

2.3.5.13 Hearing loss

A 2005 review and meta-analysis estimated the odds ratio for hearing loss in current smokers, from cohort studies, at 1.97 (95% CI 1.44–2.70).[94] A more recent (2012) review estimated the risk of sudden sensorineural hearing loss among smokers (the definition of which was not clear, but appears consistent with ever smoking) at 1.34 (95% CI 1.12–1.61).[95]

2.3.6 Postoperative complications

2.3.6.1 Wound healing

An comprehensive 2012 review of a broad range of surgical procedures, involving 140 cohort studies and 479,150 patients, generated pooled adjusted odds ratios (95% CI) of 3.60 (2.62–4.93) for postoperative necrosis, 2.07 (1.53–2.81) for healing delay and dehiscence, 1.79 (1.57–2.04) for surgical site infection, 2.27 (1.82–2.84) for unspecified wound complications, 2.07 (1.23–3.47) for hernia, and 2.44 (1.66–3.58) for failure of fistula or bone healing among smokers compared with never smokers.[96] Among former smokers, the risk of healing complications (analysed as a combined category not analyses in comparison between smokers and never smokers) was substantially lower than in current smokers (odds ratio 0.28, 95% CI 0.12–0.72) but increased relative to never smokers by an odds ratio of 1.31 (95% CI 1.10–1.56).

2.3.6.2 Dental implants

A 2014 review of dental implant failure estimated the odds to be increased in smokers by a ratio of 1.87 (95% CI 1.35–2.58).[97]

2.3.7 Maternal smoking, fertility and pregnancy outcomes

2.3.7.1 Conception

A 1998 review and meta-analysis estimated the odds of infertility in women who smoke relative to those who do not at 1.60 (95% CI 1.34–1.91).[98] The odds of pregnancy through assisted reproduction are also lower among women who smoke, by a ratio of 0.56 (95% CI 0.43–0.73) per cycle.[99]

2.3.7.2 Miscarriage

A 2014 review estimated that the risk of miscarriage was increased in general among smokers (relative risk 1.23, 95% CI 1.16–1.30) and particularly in relation

to smoking during pregnancy (relative risk 1.32, 95% CI 1.21–1.44).[100] The effects of smoking were exposure related, increasing by 1% per cigarette smoked per day.[100]

2.3.7.3 Placenta previa, placental abruption, ectopic pregnancy, premature rupture of membranes

A 1999 systematic review of these outcomes estimated the odds of placenta previa among pregnant women who smoke at 1.58 (95% CI 1.04–2.12, six studies); placental abruption at 1.62 (95% CI 1.46–1.77, eight studies), ectopic pregnancy at 1.77 (95% CI 1.31–2.22, nine studies), and of premature rupture of membranes at 1.70 (95% I 1.18–2.25, six studies).[101] A more recent (2017) review and meta-analysis of cohort studies of smoking and placental abruption confirmed the 1999 finding, generating an almost identical estimate of relative odds of 1.65 (95% CI 1.51–1.80).[102]

2.3.7.4 Stillbirth, neonatal and perinatal death

A 2015 meta-analysis of 34 studies estimated the risk of stillbirth among women who smoke to be increased by an odds ratio of 1.47 (95% CI 1.37–1.57). This effect was exposure related and did not vary with gestation period.[103] A separate review published in 2016, which searched to 2011 rather than 2012, came to a very similar estimate but also estimated relative risks for neonatal death of 1.22 (95% CI 1.14–1.30), and perinatal death of 1.33 (95% CI 1.25–1.41).[104]

2.3.7.5 Preterm birth

A systematic review published in 2000 estimated the relative risk of preterm birth associated with maternal smoking to be 1.27 (95% CI 1.21–1.33).[105]

2.3.7.6 Low birthweight and fetal growth

A 2017 meta-analysis of the association between maternal smoking and the risk of low birthweight, but limited to studies in the Americas, estimated the relative odds at 2.00 (95% CI 1.77–2.26).[106] The 2004 US Surgeon General report arrived at a similar overall estimate but also concluded that the effect is exposure related, with odds ratios of 1.8, 2.2 and 2.4 for light, moderate and heavy smokers, respectively, or by an average of 134 g and 301 g in relation to maternal age below or above 35 years, and that these excess risks are reduced by smoking cessation in the first trimester of pregnancy.[107] A 2017 meta-analysis documented reductions in several measures of fetal growth after the first trimester in relation to maternal smoking, with third-trimester fetal weight reduced by 0.18 (95% CI 0.11–0.24) standard deviations.[108]

2.3.7.7 Fetal developmental abnormalities

A comprehensive systematic review of studies of developmental abnormalities reported in 2011 identified significant associations between maternal smoking and a range of developmental abnormalities including cardiovascular/heart defects (odds ratio 1.09, 95% CI 1.02–1.17), musculoskeletal defects (odds ratio 1.16, 95% CI 1.05–1.27), limb reduction defects (odds ratio 1.26, 95% CI 1.15–1.39), missing or extra digits (odds ratio 1.18, 95% CI 0.99–1.41) and clubfoot (odds ratio 1.28, 95% CI 1.10–1.47).[109] There were increased risk of craniosynostosis (odds ratio 1.33, 95% CI 1.03–1.73), facial defects (odds ratio 1.19, 95% CI 1.06–1.35), eye defects (odds ratio 1.25, 95% CI 1.11–1.40), orofacial clefts (odds ratio 1.28, 95% CI 1.20–1.36), gastrointestinal defects (odds ratio 1.27, 95% CI 1.18–1.36), gastroschisis (odds ratio 1.50, 95% CI 1.28–1.76), anal atresia (odds ratio 1.20, 95% CI 1.06–1.36), hernia (odds ratio 1.40, 95% CI 1.23–1.59) and undescended testes (odds ratio 1.13, 95% CI 1.02–1.25).109. There were reduced risks of hypospadias (odds ratio 0.90, 95% CI 0.85–0.95) and skin defects (odds ratio 0.82, 0.75–0.89).[109]

A 2017 review of effects of maternal smoking on congenital heart defects reported an increased risk of similar magnitude to the above (pooled risk ratio 1.11, 95% CI 1.04–1.18),[110] and evidence in subgroup analysis by diagnosis of a significant association with septal defects (pooled risk ratio 1.21, 95% CI 1.01–1.46).[110]

2.3.8 Smoking and male fertility

A 2011 review demonstrated significant reductions in measures of sperm quality, including semen volume, sperm density, total sperm count, and the percentage of sperm progressive motility and normal sperm in male smokers relative to non-smokers.[111]

2.3.9 Maternal and household smoking during or after pregnancy and child health

2.3.9.1 Sudden infant death

The 2010 RCP report review estimated that maternal smoking after birth increases the risk of sudden infant death by an odds ratio of 3.15 (95% CI 2.58–3.85).[112] Risks were also increased in relation to paternal and other household smoking.[112]

2.3.9.2 Childhood cancer

A 2016 review identified increased risks of brain and central nervous system tumours (odds ratio 1.09, 95% CI 1.02–1.17) and lymphoma (odds ratio 1.21,

95% CI 1.05–1.34) in the children of mothers who smoked during pregnancy.[113] The association with brain and nervous system tumours included a substantial component of risk of neuroblastoma,[113] estimated in another 2016 review at 1.28 (95% CI 1.01–1.62).[114] The association with lymphoma applied predominantly to non-Hodgkins disease.[113] Smoking during pregnancy is also associated with an increased risk of acute lymphoblastic leukaemia in children (odds ratio 1.10, 95% CI 1.02–1.19).[115]

2.3.9.3 Asthma and wheeze

The 2010 RCP report on passive smoking and children[112] presented extensive reviews of effects of maternal and familial smoking on the occurrence of wheezing and asthma during different stages of childhood. These estimates were updated in a 2012 review,[116] which found significant effects of prenatal and postnatal maternal and household smoking on the incidence of wheeze before age 22 years; prenatal and postnatal maternal smoking on the incidence of wheeze between ages 3 and 4; and of prenatal maternal, paternal and household

Table 2.3 Passive smoke exposure and the risk of incident wheeze in children, by age and source of exposure (adapted with permission from Burke *et al*[116])

Smoking exposure	Age the outcome was collected	No. of studies	Pooled OR	95% Cis
Prenatal maternal	≤2	14	1.41	1.19–1.67
Maternal	≤2	4	1.70	1.24–2.35
Paternal	≤2	0		
Household	≤2	10	1.35	1.10–1.64
Prenatal maternal	3–4	8	1.28	1.14–1.44
Maternal	3–4	4	1.65	1.20–2.28
Paternal	3–4	0		
Household	3–4	4	1.06	0.88–1.27
Prenatal maternal	5–18	5	1.52	1.23–1.87
Maternal	5–18	3	1.18	0.99–1.40
Paternal	5–18	2	1.39	1.05–1.85
Household	5–18	5	1.32	1.12–1.56

Table 2.4 Passive smoke exposure and risk of incident asthma in children, by age and source of exposure (adapted with permission from Burke *et al*[116])

Smoking exposure	Age the outcome was collected	No. of studies	Pooled OR	95% Cis
Prenatal maternal	≤2	5	1.85	1.35–2.53
Maternal	≤2	2	2.47	0.65–9.39
Paternal	≤2	0		
Household	≤2	3	1.14	0.94–1.38
Prenatal maternal	3–4	1	1.30	0.88–1.92
Maternal	3–4	4	1.05	0.88–1.25
Paternal	3–4	1	1.34	1.23–1.46
Household	3–4	5	1.21	1.00–1.47
Prenatal maternal	5–18	8	1.23	1.12–1.36
Maternal	5–18	8	1.20	0.98–1.44
Paternal	5–18	3	0.98	0.71–1.36
Household	5–18	6	1.30	1.04–1.62

smoking on the incidence of wheeze between ages 5 and 18 (see Table 2.3).[116] Broadly consistent results were reported in a similar meta-analysis, reported in 2015[117] and in the updated searches carried out for the SmokeHaz project.[13]

For incident asthma there were significant effects of prenatal maternal smoking on asthma before the age of 2 and between 5 and 18 years, of paternal and household smoking on asthma incidence between 2 and 5 years, and of household smoking on asthma incidence between 5 and 18 years (see Table 2.4).[116]

2.3.9.4 Lower respiratory infection

The SmokeHaz project has estimated that smoking by either parent or other household members increases the risk of lower respiratory infection in children by odds ratios of 1.19 (95% CI 1.10–1.29) in relation to paternal smoking, 1.43 (95% CI 1.28–1.59) if both parents smoke, and 1.82 (95% CI 1.51–2.19) for any household member smoking.[13] Prenatal maternal smoking (odds ratio 1.15, 95% CI 0.97–1.36) had a weaker effect than postnatal smoking (odds ratio 1.62, 95%

CI 1.46–1.79).[13] These estimates were generated from searches extending those in the 2010 RCP meta-analysis, which also estimated the effect of household smoking as a relative odds of 2.51 (95% CI 1.96–3.21).[112]

2.3.9.5 Middle ear disease

The 2010 RCP report estimated that prenatal maternal smoking increased the risk of middle ear disease in children by an odds ratio of 1.11 (95% CI 0.55–2.24); postnatal maternal smoking by 1.46 (95% CI 1.21–1.76); paternal smoking by 1.27 (95% CI 0.97–1.66); and household smoking by 1.35 (95% CI 1.23–1.49).[112]

2.3.9.6 Meningococcal disease

A 2012 meta-analysis documented that passive exposure to smoke in the home doubled the risk of invasive meningococcal disease (odds ratio 2.18, 95% CI 1.63–2.92), with some evidence of an exposure–response gradient.[118] This effect was strongest in children under 5 years (odds ratio 2.48, 95% CI 1.51–4.09) and in children whose mothers smoked during pregnancy (odds ratio 2.93, 95% CI 1.52–5.66).[118]

2.3.9.7 Obesity

A 2010 systematic review identified a pooled adjusted odds ratio for obesity in children whose mothers smoked during pregnancy of 1.64 (95% CI 1.42–1.90).[119]

2.3.9.8 Surgical complications

Parental smoking is associated with a more than twofold increase in the risk of respiratory complications after surgery in children (pooled risk ratio 2.52, 95% CI 1.68–3.77).[120]

2.3.9.9 Smoking

A 2011 systematic review demonstrated that children who grow up with parents or other household members who smoke are more likely to become smokers themselves, thus transmitting tobacco dependency from one generation to the next.[121] For maternal smoking, the risk of smoking uptake is increased by an odds ratio of 2.19 (95% CI 1.73–2.79).[121]

2.3.10 Disorders less common among smokers

2.3.10.1 Ulcerative colitis

Smokers are less likely to develop ulcerative colitis[122] but we found no systematic

review of this association. A 2015 systematic review of cohort studies of risk factors for colectomy in patients with ulcerative colitis found that smoking is associated with a significantly reduced risk (odds ratio 0.55, 95% CI 0.33–0.91),[123] but a 2016 review found that despite early anecdotal reports to the contrary,[124] the natural history of ulcerative colitis was similar in smokers and non-smokers.[125]

2.3.10.2 Parkinson's disease

A 2016 review found that current smokers are around half as likely as non-smokers to develop Parkinson's disease, the relative risk being 0.46 (95% CI 0.42–0.51).[126]

2.3.10.3 Pre-eclampsia

A 2016 meta-analysis of prospective studies estimated the incidence of pre-eclampsia to be around 30% lower (relative risk 0.67, 95% CI 0.60–0.75) in women who smoke.[127]

2.3.10.4 Fetal development abnormalities

The 2011 review of fetal development abnormalities (Section 2.3.7.7) identified significantly reduced risks of hypospadias (OR 0.90, 95% CI 0.85–0.95) and skin defects (OR 0.82, 0.75–0.89).[109]

2.3.11 Summary table

Table 2.5 summarises the estimates of relative risk (whether from risk, odds or hazard ratios) we take to be the most representative and recent figures based on the above literature sources, and in which risks are significantly increased in relation to smoking. Blank cells represent effects for which estimates are not available in the reviewed literature.

2.4 UK national cohort analysis of morbidity and mortality from smoking

To provide an alternative insight into the magnitude of disease risks among apparently healthy smokers, and hence the potential preventive value of supporting smoking cessation in this group, we have compared morbidity and mortality among smokers, former smokers and never smokers in a UK primary care population cohort. Since the majority of the excess mortality caused by smoking occurs in smokers aged over 35,[3,4] and since earlier mortality among

Table 2.5 Effects of current or former smoking on disease outcomes

Disease	Estimated relative risks (95% CI) for smoking, relative to non-smokers		Source
	Current smokers	Former smokers	
Cancer			
Lung	10.92 (8.28–14.40)	3.85 (2.77–5.34)	Jayes *et al* (2016)[13]
Head and neck	2.89 (1.98–4.21)	1.73 (1.57–1.92)	Ordóñez-Mena *et al* (2016)[10]
Nasal sinuses and nasopharynx	1.95 (1.31–2.91)	1.39 (1.08–1.79)	Gandini *et al* (2008)[11]
Oral cavity	3.43 (2.37–4.94)	1.40 (0.99–2.00)	Gandini *et al* (2008)[11]
Pharynx	6.76 (2.86–16.00)	2.28 (0.95–5.50)	Gandini *et al* (2008)[11]
Larynx	6.98 (3.14, 15.5)	4.65 (3.35, 6.45)	Gandini *et al* (2008)[11]
Oesophagus	2.50 (2.00–3.13)	2.03 (1.77–2.33)	Gandini *et al* (2008)[11]
Stomach	1.74 (1.50–2.02)	1.18 (0.95–1.46)	Ordóñez-Mena *et al* (2016)[10]
Pancreas	1.90 (1.48–2.43)	1.13 (0.95–1.35)	Ordóñez-Mena *et al* (2016)[10]
Neuroendocrine tumours in pancreas	1.34 (1.10–1.63) (ever smokers)		Leoncini *et al* (2016)[17]
Liver	1.51 (1.37–1.67)	1.12 (0.78–1.60)	Lee *et al* (2009)[18]
Neuroendocrine tumours in small intestine	1.59 (1.07–2.37) (ever smokers)		Leoncini *et al* (2016)[17]
Colorectal	1.20 (1.07–1.34)	1.20 (1.15–1.25)	Ordóñez-Mena *et al* (2016)[10]
Rectal	1.24 (1.16–1.39)	1.20 (1.11–1.30)	Cheng *et al* (2015)[19]
Colorectal polyps	2.47 (2.12–2.87)		Bailie *et al* (2017)[20]
Kidney	1.52 (1.33–1.74)	1.25 (1.14–1.37)	Gandini *et al* (2008)[11]
Lower urinary tract	2.77 (2.17–3.54)	1.72 (1.46–2.04)	Gandini *et al* (2008)[11]
Bladder	3.14 (2.53–3.75)	1.83 (1.52–2.14)	van Osch *et al* (2016)[22]
Breast	1.07 (1.00–1.15)	1.08 (1.04–1.12)	Ordóñez-Mena *et al* (2016)[10]
Cervix	1.83 (1.51–2.21)	1.26 (1.11–1.42)	Gandini *et al* (2008)[11]
Acute myeloid leukaemia	1.36 (1.11–1.66)	1.21 (1.03–1.41)	Colamesta *et al* (2016)[25]
Malignant melanoma	1.7 (1.2–2.6) (men aged >50 only)	1.4 (1.1–1.7) (men aged >50 only)	Carter *et al* (2015)[12]
Respiratory disease			
Chronic obstructive pulmonary disease (COPD)	4.01 (3.18–5.05)	3.13 (1.24–7.87)	Jayes *et al* (2016)[13] Kamal *et al* (2015)[27]
Asthma	1.61 (1.07–2.42)		Jayes *et al* (2016)[13]
Tuberculosis	1.57 (1.18–2.10)		Jayes *et al* (2016)[13]
Pneumonia	2.18 (1.69–2.80)		In-house
Influenza:			
clinically diagnosed	1.34 (1.13–1.59)		In-house
microbiologically confirmed	5.69 (2.79–11.60)		In-house
Idiopathic pulmonary fibrosis	1.58 (1.27–1.97)		Taskar *et al* (2006)[49]
Obstructive sleep apnoea	1.97 (1.02–3.82)		Jayes *et al* (2016)[13]

Table 2.5 *continued*

Disease	Estimated relative risks (95% CI) for smoking, relative to non-smokers		Source
	Current smokers	Former smokers	
Cardiovascular disease			
Cardiovascular mortality (aged 60+)	2.07 (1.82–2.36)	1.37 (1.25–1.49)	Mons *et al* (2015)[50]
Ischaemic heart disease	Male 35–64: 3.18 (2.34–4.33) Male 65+: 1.96 (1.62–2.37) Female 35–64: 3.93 (2.56–6.05) Female 65+: 1.95 (1.60–2.37)	Male 35–64: 1.59 (1.11–2.27) Male 65+: 1.16 (1.01–1.34) Female 35–64: 1.48 (0.82–2.64) Female 65+: 1.37 (1.18–1.58)	Rostron (2013)[51]
Stroke	Male: 1.57 (1.49–1.88) Female: 1.83 (1.58–2.12)	Male: 1.08 (1.03–1.13) Female: 1.17 (1.12–1.22)	Peters *et al* (2013)[52]
Peripheral arterial disease	2.71 (2.28–3.21)	1.67 (1.54–1.81)	Lu *et al* (2014)[53]
Abdominal aortic aneurysm	2.41 (1.94–3.01)		Cornuz *et al* (2004)[54]
Venous thromboembolism	1.23 (1.14–1.33)	1.10 (1.03–1.17)	Cheng *et al* (2013)[55]
Mental health			
Alzheimer's disease	1.40 (1.13–1.73)	1.04 (0.96–1.13)	Zhong *et al* (2015)[56]
Vascular dementia	1.38 (1.15–1.66)	0.97 (0.83–1.13)	
All-cause dementia	1.30 (1.18–1.45)	1.01 (0.96–1.06)	
Depression	1.62 (1.10–2.40)		Luger *et al* (2014)[59]
Psychosis	2.18 (1.23–3.85)		Gurillo *et al* (2015)[62]
Suicide (in people with psychosis)	2.12 (1.67–2.70)		Sankaranarayanan *et al* (2015)[63]
Schizophrenia	2.24 (1.10–4.55)		In-house
Bulimia	2.32 (1.12–4.78)		Solmi *et al* (2016)[73]
Binge eating disorder	1.79 (1.23–2.62) (ever smokers)		Solmi *et al* (2016)[73]
Other adult disease			
Rheumatoid arthritis	2.02 (1.75–2.33)		Di Giuseppe *et al* (2014)[74]
Chronic kidney disease	1.34 (1.23–1.47)	1.15 (1.08–1.23)	Xia *et al* (2017)[75]
End-stage renal disease	1.91 (1.39–2.64)	1.44 (1.00–2.09)	Xia *et al* (2017)[75]
Systemic lupus erythematosis	1.56 (1.26–1.95)	1.23 (0.93–1.63)	Jiang *et al* (2015)[76]
Diabetes	1.37 (1.33–1.42)	1.14 (1.10–1.18)	Pan *et al* (2015)[77]

Table 2.5 *continued*

Disease	Estimated relative risks (95% CI) for smoking, relative to non-smokers		Source
	Current smokers	Former smokers	
Peripheral neuropathy in diabetes	1.42 (1.21–1.65)		Clair *et al* (2015)[78]
Psoriasis	1.78 (1.52–2.06)	1.62 (1.33–1.99)	Armstrong *et al* (2014)[79]
Multiple sclerosis	1.55 (1.48–1.62)		Zhang *et al* (2016)[80]
Cataract	1.47 (1.36–1.59)	1.19 (1.01–1.41)	Ye *et al* (2012)[82]
Age-related macular degeneration	1.86 (1.27–2.73)		Chakravarthy *et al* (2010)[83]
Erectile dysfunction	1.81 (1.34–2.44)	1.25 (1.07–1.47)	Cao *et al* (2013)[87]
Low back pain	1.16 (1.02–1.32)		Shiri *et al* (2010)[89]
Crohn's disease	1.76 (1.40–2.22)	No increased risk	Mahid *et al* (2006)[90]
Flare of disease activity	1.56 (1.21–2.01)		To *et al* (2016)[128]
Flare after surgery	1.97 (1.36–2.85)		To *et al* (2016)[128]
Need for first surgery	1.68 (1.33–2.12)		To *et al* (2016)[128]
Need for second surgery	2.17 (1.63–2.89)		To *et al* (2016)[128]
Risk of bowel resection	1.27 (1.08–1.49)		Kuenzig *et al* (2016)[129]
Barrett's oesophagus	1.42 (1.15–1.76) (ever smokers)		Andrici *et al* (2013)[91]
Bone fracture	1.25 (1.15–1.36)	1.19 (1.12–1.27)	Kanis *et al* (2005)[92]
Hip fracture in women	1.30 (1.16–1.45)	1.02 (0.93–1.11)	Shen *et al* (2015)[93]
Hearing loss	1.97 (1.44–2.70)		Nomura *et al* (2005)[94]
Sudden sensorineural hearing loss	1.34 (1.12–1.61) (ever smokers)		Lin *et al* (2012)[95]
Surgical complications			
Healing delay and dehiscence	2.07 (1.53–2.81)		Sørensen *et al* (2012)[96]
Surgical site infection	1.79 (1.57–2.04)		Sørensen *et al* (2012)[96]
Wound complications (unspecified)	2.27 (1.82–2.84)		Sørensen *et al* (2012)[96]
Hernia	2.07 (1.23–3.47)		Sørensen *et al* (2012)[96]
Lack of fistula or bone healing	2.44 (1.66–3.58)		Sørensen *et al* (2012)[96]
All healing complications		1.31 (1.10–1.56)	Sørensen *et al* (2012)[96]
Dental implant failure	1.87 (1.35–2.58)		Chambrone *et al* (2014)[97]
Maternal fertility and pregnancy outcomes			
Infertility	1.60 (1.34–1.91)		Augood *et al* (1998)[98]
IVF success	0.56 (0.43–0.73)		Waylen *et al* (2009)[99]
Miscarriage	1.32 (1.21–1.44)		Pineles *et al* (2014)[100]
Placenta previa	1.58 (1.04–2.12)		Castles *et al* (1999)[101]
Placenta abruption	1.62 (1.46–1.77)		Castles *et al* (1999)[101]
Ectopic pregnancy	1.77 (1.31–2.22)		Castles *et al* (1999)[101]
Premature rupture of membranes	1.70 (1.18–2.25)		Castles *et al* (1999)[101]
Stillbirth	1.47 (1.37–1.57)		Marufu *et al* (2015)[103]
Neonatal death	1.22 (1.14–1.30)		Pineles *et al* (2016)[104]
Perinatal death	1.33 (1.25–1.41)		Pineles *et al* (2016)[104]

Table 2.5 *continued*

Disease	Estimated relative risks (95% CI) for smoking, relative to non-smokers		Source
	Current smokers	Former smokers	
Preterm birth	1.27 (1.21–1.33)		Shah *et al* (2000)[105]
Low birthweight	2.00 (1.77–2.26)		Pereira *et al* (2017)[106]
Cardiovascular/ heart defects	1.09 (1.02–1.17)		Hackshaw *et al* (2011)[109]
Musculoskeletal defects	1.16 (1.05–1.27)		Hackshaw *et al* (2011)[109]
Limb reduction defects	1.26 (1.15–1.39)		Hackshaw *et al* (2011)[109]
Missing/extra digits	1.18 (0.99–1.41)		Hackshaw *et al* (2011)[109]
Club foot	1.28 (1.10–1.47)		Hackshaw *et al* (2011)[109]
Craniosynostosis	1.33 (1.03–1.73)		Hackshaw *et al* (2011)[109]
Facial defects	1.19 (1.06–1.35)		Hackshaw *et al* (2011)[109]
Eye defects	1.25 (1.11–1.40)		Hackshaw *et al* (2011)[109]
Orofacial clefts	1.28 (1.20–1.36)		Hackshaw *et al* (2011)[109]
Gastrointestinal defects	1.27 (1.18–1.36)		Hackshaw *et al* (2011)[109]
Gastroschisis	1.50 (1.28–1.76)		Hackshaw *et al* (2011)[109]
Anal atresia	1.20 (1.06–1.36)		Hackshaw *et al* (2011)[109]
Hernia	1.40 (1.23–1.59)		Hackshaw *et al* (2011)[109]
Undescended testes	1.13 (1.02–1.25)		Hackshaw *et al* (2011)[109]
Maternal smoking and child health			
Sudden infant death	3.15 (2.58–3.85)		RCP (2010)[112]
Brain and central nervous system tumours	1.09 (1.02–1.17)		Rumrich *et al* (2016)[113]
Lymphoma	1.21 (1.05–1.34)		Rumrich *et al* (2016)[113]
Acute lymphoblastic leukaemia	1.10 (1.02–1.19)		Yan *et al* (2015)[115]
Asthma and wheeze	*See tables 2.3 and 2.4*		Burke *et al* (2012)[116]
Lower respiratory infection	1.62 (1.46–1.79)		Jayes *et al* (2016)[13]
Middle ear disease	1.46 (1.21–1.76)		RCP (2010)[112]
Meningococcal meningitis	2.18 (1.63–2.92)		Murray *et al* (2012)[118]
Obesity	1.64 (1.42–1.90)		Ino (2010)[119]
Respiratory complications after surgery	2.52 (1.68–3.77)		Chiswell *et al* (2016)[120]
Disorders less common among smokers			
Ulcerative colitis	0.55 (0.33–0.91)		Dias *et al* (2015)[123]
Parkinson's disease	0.46 (0.42–0.51)		Breckenridge *et al* (2016)[126]
Pre-eclampsia	0.67 (0.60–0.75)		Wei *et al* (2015)[127]
Congenital skin disorders	0.82 (0.75–0.89)		Hackshaw *et al* (2011)[109]
Hypospadias	0.90 (0.85–0.95)		Hackshaw *et al* (2011)[109]

smokers is likely to distort disease incidence in later life, we have analysed data from primary care records for all adults with at least 1 year of continuous data from registration with the same GP in the Clinical Practice Research Datalink (CPRD) database[130] between 1 January 2004 and 31 December 2016, and who were aged between 40 and 50 on 1 January 2004. For each patient, observation begins from the study start date (1 January 2004), the start of current GP registration, or practice up-to-standard (UTS) date, whichever is latest. Observation ends on 31 December 2016, the date the patient left their GP (transfer out date), the last collection date, or date of death or disease incidence, whichever comes first. Smoking status is ascertained using a previously developed code list and algorithm,[131] and in accordance with established practice, individuals whose smoking status cannot be ascertained are categorised as never smokers.[132] The analysis uses Cox proportional hazard models, with adjustment for age, sex and socio-economic status, measured as the Index of Multiple Deprivation[133] in quintiles, to compare all-cause mortality and the incidence of a range of cancers (lung, oropharynx, larynx, oesophagus, acute myeloid leukaemia, stomach, liver, pancreas, kidney and ureter, bladder, cervix and colorectal), ischaemic heart disease, stroke, abdominal aortic aneurysm, pneumonia, COPD and diabetes between smokers, former smokers and never smokers.

2.4.1 Data availability

Data were analysed from a total of 1,092,083 participants, and included an average of 11.15 years of prospective data per participant. The prevalence of current smoking among participants was 26%, which is consistent with the available contemporary estimate in the 35–49 age group in the general population in 2004 of 29%[134] and with previous work demonstrating the similarity of smoking prevalence estimates based on national surveys and primary care records.[135]

2.4.2 Disease incidence

Table 2.6 presents prospective hazard ratios for incident disease in current and former smokers relative to never smokers. Compared with estimates from section 2.3, the hazard ratios for cancer in current and former smokers are broadly similar for cancer of the lung, pharynx, oesophagus, pancreas, liver, stomach, kidney, bladder, and acute myeloid leukaemia; lower for colorectal cancer; and substantially higher for cancer of the larynx (though the confidence intervals on this hazard ratio are wide as the number of cases is small). Of the non-cancer diseases analysed, estimates are also broadly similar to those in section 2.3 for ischaemic heart disease, stroke, abdominal aortic aneurysm and diabetes, but much higher for COPD.

Table 2.6: Prospective disease hazard ratios (relative to never smokers) in smokers and former smokers aged 40–50 years in 2004

Disease		Estimated relative risks (95% CI) for smoking, relative to non-smokers	
		Current smokers	Former smokers
Cancer			
Lung	Both sexes	9.37 (8.09–10.85)	2.72 (2.25–3.29)
	Males	12.31 (9.66–15.70)	3.63 (2.69–4.90)
	Females	7.93 (6.58–9.56)	2.25 (1.75–2.89)
Oropharynx	Both sexes	6.10 (4.17–8.91)	2.08 (1.25–3.46)
	Males	5.76 (3.69–9.00)	2.33 (1.31–4.12)
	Females	5.89 (2.86–12.13)	1.19 (0.37–3.79)
Larynx	Both sexes	17.62 (9.95–31.21)	3.44 (1.66–7.16)
	Males	17.37 (8.76–34.43)	3.81 (1.63–8.92)
	Females	15.3 (5.38–43.52)	2.22 (0.50–9.93)
Oesophagus	Both sexes	3.17 (2.59–3.87)	1.81 (1.41–2.33)
	Males	2.93 (2.32–3.70)	1.92 (1.44–2.56)
	Females	3.22 (2.18–4.76)	1.22 (0.73–2.21)
Gastric	Both sexes	2.12 (1.55–2.92)	1.53 (1.04–2.26)
	Males	2.09 (1.41–3.12)	1.32 (0.79–2.20)
	Females	2.03 (1.21–3.42)	1.84 (1.02–3.32)
Pancreas	Both sexes	2.49 (1.93–3.20)	1.79 (1.32–2.43)
	Males	2.11 (1.50–2.99)	1.86 (1.24–2.77)
	Females	2.96 (2.04–4.28)	1.67 (1.04–2.68)
Liver	Both sexes	3.06 (2.26–4.15)	1.96 (1.35–2.85)
	Males	3.85 (2.59–5.72)	2.48 (1.54–3.99)
	Females	1.92 (1.16–3.17)	1.30 (0.69–2.44)
Colorectal	Both sexes	1.02 (0.92–1.15)	1.32 (0.18–1.49)
	Males	1.04 (0.89–1.21)	1.44 (1.23–1.69)
	Females	1.01 (0.85–1.19)	1.18 (0.99–1.41)
Kidney and ureter	Both sexes	1.63 (1.26–2.12)	1.35 (0.99–1.85)
	Males	1.66 (1.20–2.30)	1.46 (1.00–2.14)
	Females	1.45 (0.93–2.26)	1.11 (0.65–1.92)
Bladder	Both sexes	3.02 (2.47–3.69)	2.21 (1.74–2.81)
	Males	2.92 (1.36–3.88)	2.61 (1.97–3.46)
	Females	2.91 (2.06–4.10)	1.33 (0.83–2.13)

Table 2.6 *continued*

Disease		Estimated relative risks (95% CI) for smoking, relative to non-smokers	
		Current smokers	Former smokers
Acute myeloid leukaemia	Both sexes	1.64 (1.12–2.39)	1.25 (0.79–1.99)
	Males	2.30 (2.28–3.75)	2.20 (1.21–3.98)
	Females	1.11 (0.63–1.96)	0.52 (0.22–1.25)
Respiratory disease			
Chronic obstructive pulmonary disease (COPD)	Both sexes	30.94 (28.45–33.65)	7.92 (7.20–8.71)
	Males	26.45 (23.49–29.79)	8.06 (7.06–9.21)
	Females	36.40 (32.33–40.98)	7.72 (6.74–8.85)
Cardiovascular disease			
Ischaemic heart disease	Both sexes	3.45 (3.32–3.59)	2.11 (2.01–2.22)
	Males	3.09 (2.96–3.24)	2.11 (2.00–2.23)
	Females	3.90 (3.62–4.21)	1.91 (1.73–2.11)
Stroke	Both sexes	2.85 (2.68–3.03)	1.52 (1.41–1.65)
	Males	2.72 (2.51–2.95)	1.58 (1.42–1.75)
	Females	2.94 (2.678–3.23)	1.40 (1.24–1.59)
Abdominal aortic aneurysm	Both sexes	2.63 (2.04–3.40)	1.56 (1.52–1.61)
	Males	1.57 (1.53–1.63)	1.83 (1.53–1.63)
	Females	1.36 (1.31–1.41)	1.19 (1.14–1.24)
Other adult disease			
Diabetes	Both sexes	1.51 (1.47–1.55)	1.56 (1.52–1.61)
	Males	1.57 (1.53–1.63)	1.83 (1.76–1.89)
	Females	1.36 (1.31–1.41)	1.19 (1.14–1.24)

The explanations for these discrepancies are not clear, but for COPD the risk in later life is likely to be significantly attenuated by competing sources of disease, particularly cardiovascular disease (for which mortality from smoking is highest in middle age[136]) and to a lesser degree lung cancer. There is substantial heterogeneity between existing studies of smoking and COPD, with some studies reporting effects of similar magnitude to this present analysis.[27]

2.4.3 Mortality

Hazard ratios for mortality in current and former smokers in this cohort, relative to never smokers, were 2.50 (95% CI 2.42–2.58) and 1.18 (1.13–1.23),

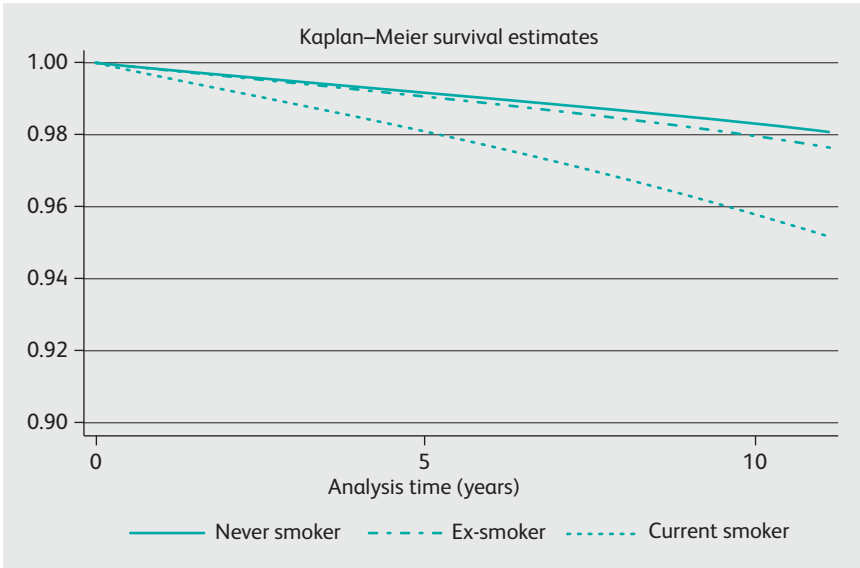

Figure 2.5 Survival curves for current smokers, former smokers and never smokers in the CPRD analysis.

respectively, for both sexes; 2.66 (95% CI 2.55–2.78) and 1.27 (1.20–1.35), respectively, in men, and 2.23 (95% CI 2.12–2.34) and 1.06 (0.99–1.13) in women (Figure 2.5).

2.5 Effects of smoking cessation after diagnosis on disease natural history or other outcomes

It is a consistent finding across many studies that patients who smoke experience a more severe natural history or worse clinical outcomes than never smokers (as demonstrated, for example, for a range of cancers[137]), and at least part of this difference is likely to be attributable to disease-specific effects of continued smoking, rather than the more general increased risk of mortality among smokers (see Section 2.2). However, evidence on the effect of smoking cessation after, rather than before, disease diagnosis is far more limited.[138] In the following examples, quitting smoking at the time of, or soon after, diagnosis has been demonstrated to improve disease outcomes in relation to continued smoking.

2.5.1 Lung cancer

A 2010 systematic review of quitting smoking at the time of diagnosis of early stage lung cancer demonstrated significant beneficial effect on subsequent disease

course and outcome.[13] Among those with early stage non-small cell cancer, all-cause mortality is nearly three times higher among those who continue to smoke relative to those who quit (hazard ratio 2.94, 95% CI 1.15–7.54) and the risk of recurrence nearly twice as high (hazard ratio 1.86, 95% CI 1.01–3.41). Among those with limited stage small cell cancer, these risks are 1.86 (95% CI 1.33–2.59) and 1.26 (95% CI 1.06–1.50), respectively, and the risk of development of a second primary tumour four times higher (hazard ratio 4.31, 95% CI 1.09–16.98).[13] Five-year survival in 65-year-old patients with early stage non-small cell lung cancer who continued to smoke was estimated at 33%, and in those who quit smoking at 70%.[13] A 2017 analysis of CPRD data demonstrated a significant reduction in all-cause mortality among smokers with any lung cancer who quit in the year after diagnosis (hazard ratio 0.82, 95% CI 0.74–0.92),[139] while a 2015 study in which smokers with lung cancer were automatically referred into a telephone-based smoking cessation service demonstrated a near doubling of survival (hazard ratio 1.79, 95% CI 1.14–2.82) and a median 9-month improvement in overall survival among those who quit.[140] Quitting smoking shortly before surgery for lung cancer is not associated with any increase in risk of pulmonary complications.[141,142]

2.5.2 Head and neck cancer

Analysis of CPRD data on patients with upper aero-digestive tract cancer demonstrates non-significant reduction in all-cause mortality of similar magnitude (but with wider confidence intervals) than that seen in patients with lung cancer in the same study (hazard ratio 0.81, 95% CI 0.58–1.14).[139] A prospective case series study from Canada also demonstrated a non-significant reduction in mortality among smokers who quit after a diagnosis of head and neck cancer.[143] Significant reductions in mortality from mouth cancer among patients who cut down or quit smoking at the time of diagnosis were also reported in a 2012 study, though the reductions were not quantified in the paper.[144]

2.5.3 COPD

A 2008 systematic review of the effects of smoking cessation in people with COPD concluded that cessation reduces the rate of disease progression (generally measured as decline in one-second forced expiratory volume, FEV_1) and overall mortality, but did not provide a meta-analysis of the magnitude of these effects.[145] However, the Lung Health Study provides strong evidence of a sustained 50% reduction in the rate of decline in FEV_1 among people with COPD who succeed in quitting smoking,[146] and a significant reduction (from

10.38 per 1,000 person-years to 8.83 per 1,000 person-years, p=0.03) in mortality.[147] Quitting smoking in people with impaired lung function has also been shown to improve survival, particularly in relation to cardiovascular mortality.[148]

2.5.4 Coronary heart disease

A 2000 meta-analysis reported that smoking cessation generates an approximate 50% reduction in mortality (odds ratio 0.54, 95% CI 0.46–0.62) after myocardial infarction.[149] A very similar reduction in risk (hazard ratio 0.52, 95% CI 0.35–0.79) was reported in 2011 in a cohort of patients who quit within 3 months of acute myocardial infarction, acute coronary syndrome or coronary artery intervention;[150] in a 2013 report of patients followed up after percutaneous angiography (hazard ratio 0.57, 95% CI 0.46–0.71);[151] and in a 2009 report of patients who quit after acute myocardial infarction (hazard ratio 0.63, 95% CI 0.48–0.82).[152] A 2004 Cochrane review reported reductions in mortality (relative risk 0.64, 95% CI 0.58–0.71) and non-fatal myocardial infarctions (relative risk 0.68, 95% CI 0.57–0.82) in people with diagnosed coronary heart disease who quit smoking relative to those who did not,[153] though at the time of writing a 2012 update to that review had been withdrawn from the Cochrane website. Long-term survival in a cohort of patients with angiographically diagnosed coronary artery disease is higher among smokers who quit than those who continue to smoke (95% vs 89%, p<0.05).[154] The risk of atherosclerotic events is also reduced by smoking cessation among people with familial hypercholesterolaemia, the hazard ratio among those who continue to smoke being 2.02 (95% CI 1.44–2.84) in relation to those who quit.[155]

2.5.5 Stroke

In a 2017 report, smoking cessation after stroke or transient ischaemic attack reduced the 5-year risk of stroke, myocardial infarction, or death to 15.7% (from 22.6% among those who continued to smoke), the hazard ratio being 0.66 (95% CI 0.48–0.90).[156]

2.5.6 Peripheral vascular disease

Among smokers with peripheral vascular disease, those who quit after diagnostic angiography experience significantly lower all-cause mortality over the following 5 years (14% vs 31%; hazard ratio 0.40 (95% CI 0.18–0.90) and improved amputation-free survival (81% vs 60%; hazard ratio 0.43 (95% CI 0.22–0.86) relative to those who continue to smoke.[157]

2.5.7 Dementia

A study of smoking cessation after diagnosis of dementia has demonstrated reduced rates of decline in cognitive function among smokers who succeeded in quitting.[158]

2.5.8 Depression

A systematic review of studies of the effect of smoking cessation on depression, drawing data from 26 trials and cohort studies published before April 2012, documented significant improvement in measures of anxiety, depression, stress, positive affect and quality of life among smokers who quit smoking relative to those who did not.[159] The magnitudes of these improvements were similar to those achieved by antidepressant drug therapy.[159]

2.5.9 Anxiety

A study of smoking cessation in people with anxiety demonstrated a significant reduction in anxiety scores among individuals who quit smoking, relative to those who relapsed.[160]

2.5.10 Diabetes

Quitting smoking is associated with deterioration in glycaemic control for up to 3 years after quitting.[161] However, it appears that cessation generates significant reductions in cardiovascular disease despite this period of reduced glycaemic control.[162]

2.5.11 Multiple sclerosis

A study of smoking cessation among people with multiple sclerosis documented reduced rates of progression among those who quit.[163]

2.5.12 Crohn's disease

Patients with Crohn's disease who quit smoking for a year or more experience a significant reduction in the risk of flares, need for steroids and introduction or reinforcement of immunosuppressive therapy.[164]

2.5.13 Chronic kidney disease

Smoking cessation has been shown significantly to reduce the rate of decline in creatinine clearance among people with progressive nephropathy.[165]

2.5.14 Postoperative complications

A 2011 review of randomised trials of the effect of smoking cessation on postoperative complications (including wound healing, respiratory complications and mortality) generated an estimated reduction by a relative risk of 0.59 (95% CI 0.41–0.85), with evidence that this effect increased with duration of cessation, for at least 4 weeks.[166] Meta-analyses of observational studies have produced similar estimates.[166,167] A 2012 review of the relative risks of respiratory complications among smokers who quit smoking more than 4 or more than 8 weeks before surgery, relative to those who did not, estimated respective reductions by 0.77 (95% CI 0.61–0.96) and 0.53 (95% CI 0.37–0.76).[167]

2.6 Summary

- Smokers who start smoking at around the start of adult life lose an average of 10 years of life expectancy, or around 1 year for every 4 years of smoking after the age of 30.
- Smoking is a recognised cause of lung cancer, COPD, cardiovascular disease and a wide range of other diseases.
- However, there are many more diseases and disorders that are significantly more likely to occur in smokers, and for which this risk is reduced in former smokers, suggesting a causal link.
- This broader spectrum of disease crosses almost all areas of medicine, meaning that patients in almost all specialties are either more likely to be smokers, or (in children) to have been exposed to others' smoke, than the general population.
- Treating smoking at the point of diagnosis of a wide range of diseases also substantially improves subsequent natural history.
- Intervening to help all smokers to quit smoking thus has major potential to improve current and future health of all patients who use NHS services, and should be part of routine care in all specialties.

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3 The financial cost of smoking to NHS secondary care

3.1 Introduction

The increased disease risks associated with tobacco smoking inevitably results in increased demand for health services, which in turn represents an entirely avoidable burden on all parts of the NHS. The NHS estimates the secondary care component of this burden in England at 474,000 hospital admissions, or 4% of all admissions, each year,[1] and Public Health England has estimated that these admissions cost around £850 million per annum.[2] Smokers and former smokers also use primary care services and outpatient secondary care services more than never smokers, adding annual costs estimated by Public Health England at £1.1 billion and £696 million, respectively.[2]

However, these secondary care admission numbers and costs include those attributable to both current and former smokers, and as the health harms accrued in the latter group are irreversible, overestimate the avoidable cost of current smoking to the NHS. On the other hand, they are estimated in relation to a limited range of 26 cancers and other common adult diseases caused by smoking[3] and exclude secondary care costs arising from mental illness, maternity and child health services and postoperative complications. Furthermore, the risk estimates for the 26 diseases used in the secondary care calculations[3] are now more than 30 years old, being based on data from the American Cancer Society Cancer Prevention Study-II cohort study.[4] In this chapter we have therefore estimated secondary care costs in more detail, using the more recent risk estimates for the wider range of diseases described in Chapter 2 and summarised in Table 2.5, estimating the annual secondary care cost to the NHS of treating this disease burden and describing the distribution of these costs across socio-economic groups. To identify the burden of care arising from the current, and hence preventable, smoking population, we have excluded costs attributable to past smoking in people who no longer smoke. We also provide additional detail on the costs arising from smoking in two populations worthy of a special focus: adults with mental illness and NHS staff.

3.2 Secondary care costs in the general adult population

3.2.1 Population

Our analysis relates to adults aged from 35 to 89 years in England. The lower age limit of 35 is chosen because active smoking has little effect on adult health before this age (see Chapter 2) and because relative risks of disease associated with smoking are typically reported only for ages 35 or over.[1] We categorised age into 10-year intervals from 35 to 75+, and measured socio-economic deprivation using the English Index of Multiple Deprivation (IMD), a composite area-level measure based on 37 indicators reflecting income, employment, health and disability, education and skills, housing, services, accessibility, crime and living/physical environment.[5] The IMD is calculated for small geographic areas in England of approximately 1,500 people. We divided IMD scores into quintiles, the first being the least deprived, and the fifth the most deprived.

3.2.2 Smoking prevalence

We have taken smoking prevalence data from the Health Survey for England (HSE) for 2015.[6] We calculated the overall prevalence of smoking for all adult ages (18+) in the HSE 2015 sample at 18.0% (16.8–19.2%), which is slightly

Table 3.1 Current smoking prevalence (%) at ages 35–89 according to HSE 2015 by sex, age and IMD quintile, with 95% confidence intervals[a]

Sex and age	IMD quintile[b] 1	2	3	4	5
Females					
35–44	13 (7.9–18.2)	14 (8.1–20)	16.4 (9.8–23)	21.5 (14.6–28.5)	31.3 (24.4–38.2)
45–54	10.5 (5.7–15.3)	12.6 (7.2–17.9)	16.7 (11.2–22.3)	16 (9.6–22.5)	30.3 (22.5–38.1)
55–64	6.6 (2.9–10.4)	13.2 (7.3–19)	8.9 (4.3–13.4)	25.9 (18–33.7)	25 (16–34)
65–74	6.9 (2.9–10.9)	5.3 (1.7–8.8)	12.1 (6.8–17.4)	14.2 (7.7–20.7)	22.4 (13.1–31.6)
75+	3.6 (0.1–7)	4.6 (0.6–8.6)	0.6 (0–1.8)	8 (1.7–14.4)	11.6 (3.8–19.3)
Males					
35–44	8.5 (2.9–14)	15.7 (8.4–22.9)	29.8 (21–38.6)	22.9 (14.4–31.4)	31.9 (22.6–41.2)
45–54	11.3 (6.6–16.1)	6.7 (2–11.4)	20.5 (13–28)	29.7 (20.9–38.5)	36.9 (27.9–45.8)
55–64	9 (3.8–14.3)	7.7 (3.4–12)	14.6 (7.5–21.7)	23.3 (13.9–32.7)	28 (19–37.1)
65–74	7 (2.9–11.1)	7.5 (3.2–11.8)	7.7 (3.3–12.1)	16.3 (9–23.5)	21.7 (10.6–32.9)
75+	6.3 (1.2–11.3)	5.1 (0.8–9.4)	1 (0–3.1)	7.8 (2–13.5)	11.7 (3.8–19.6)

[a]Confidence intervals (CI) are shown in parentheses.
[b]1=Least deprived; 5=most deprived.

higher than the 16.9% (16.7–17.1%) reported in 2015 in the larger Adult Population Survey (APS),[7] but used HSE data in preference to APS data because the latter do not include measures of deprivation. The overall prevalence of smoking in those aged 35–89 years in the HSE 2015 sample was 15.4% (14.3–16.5%). Table 3.1 shows the distribution of smoking prevalence by sex, age category and IMD quintile.

3.2.3 Relative risks

We took relative risks for 52 smoking-related diseases from the data in Table 2.5. In this section we have excluded diagnoses relating to maternal smoking and the fetus or child (see Sections 3.3 and 3.4), and postoperative complications (see Section 3.5). We also exclude diseases that are subcategories of a broader smoking-attributable disease (eg peripheral neuropathy in diabetes that falls within our overall costing for diabetes); for which there was no evidence of altered risk (eg prostate cancer) or the relative risk was defined only for 'ever' smokers; and conditions for which the International Classification of Diseases v10 (ICD-10) coding was insufficiently detailed to capture the diagnosis (eg erectile dysfunction). The included diseases, the ICD codes and the relative risk estimates used are listed in Table 3.2. We assumed equivalence of odds ratios and other measures of relative risk.

3.2.4 Hospital admissions data

Secondary care data for each of the above diseases were obtained from the Admitted Patient Care component of the Hospital Episode Statistics (HES) for patients resident in England during the period April 2015–March 2016.[8] HES information is stored as one record per episode, with an episode being a finished period of care under one consultant (an admission can comprise several episodes of care). Up to 20 disease diagnoses can be recorded for each episode of care, and these are recorded using ICD-10 codes. The 'primary diagnosis' is that recorded in the first diagnostic position. We have assumed that this diagnosis best represents the clinical reason for that episode of care.

3.2.5 Costs

Unit costs for episodes of care were derived from NHS reference costs.[9] Hospital episodes and reference costs were linked using the HRG4+ reference costs code to group workbook published by the NHS information centre.[10] Additional costs were included for days in bed beyond the number considered standard in the reference costs. For chemotherapy, radiotherapy and renal dialysis, many

Table 3.2 Diseases, ICD codes and relative risk estimates used in attributable fraction and costs analysis

Disease	ICD-10 codes used	Relative risks (95% CI) in current smokers
Cancers		
Trachea, bronchus and lung	C33–C34	10.92 (8.28–14.40)
Nasal sinuses and nasopharynx	C11, C30–C31	1.95 (1.31–2.91)
Oral cavity	C10	3.43 (2.37–4.94)
Pharynx	C14	6.76 (2.86–15.98)
Larynx	C32	6.98 (3.14–15.52)
Oesophagus	C15	2.50 (2.00–3.13)
Stomach	C16	1.74 (1.50–2.02)
Pancreas	C25	1.90 (1.48–2.43)
Liver and intrahepatic bile ducts	C22	1.51 (1.37–1.67)
Colorectal	C18–C20	1.20 (1.07–1.34)
Kidney	C64	1.52 (1.33–1.74)
Lower urinary tract	C65–C66	2.77 (2.17–3.54)
Bladder	C67	3.14 (2.53–3.75)
Breast	C50	1.07 (1.00–1.15)
Cervix	C53	1.83 (1.51–2.21)
Acute myeloid leukaemia	C92	1.36 (1.11–1.66)
Malignant melanoma	C43, C44	1.70 (1.20–2.60) (men aged >50 only)
Respiratory		
Chronic obstructive pulmonary disease	J40–J44, J47	4.01 (3.18–5.05)
Asthma	J45–J46	1.61 (1.07–2.42)
Tuberculosis	A15–A19, B90	1.57 (1.18–2.10)
Pneumonia	J12–J18	2.18 (1.69–2.80)
Influenza: clinically diagnosed	J11	1.34 (1.13–1.59)
Influenza: microbiologically confirmed	J09, J10	5.69 (2.79–11.60)
Idiopathic pulmonary fibrosis	J84.1	1.58 (1.27–1.97)
Obstructive sleep apnoea	G47.3	1.97 (1.02–3.82)
Cardiovascular		
Ischaemic heart disease	I20–I25	Males aged 35–64: 3.18 (2.34–4.33) Males aged 65+: 1.96 (1.62–2.37) Females aged 35–64: 3.93 (2.56–6.05) Females aged 65+: 1.95 (1.60–2.37)

Table 3.2 *continued*

Disease	ICD-10 codes used	Relative risks (95% CI) in current smokers
Stroke	I61–I66	Males: 1.57 (1.49–1.88) Females: 1.83 (1.58–2.12)
Peripheral arterial disease	173.9	2.71 (2.28–3.21)
Abdominal aortic aneurysm	I71	2.41 (1.94–3.01)
Venous thromboembolism	I26, I80–I82	1.23 (1.14–1.33)
Mental health		
Alzheimer's disease	G30	1.40 (1.13–1.73)
Vascular dementia	F01	1.38 (1.15–1.66)
All-cause dementia	F02, F03	1.30 (1.18–1.45)
Depression	F32, F33	1.62 (1.10–2.40)
Psychosis	F28, F29	2.18 (1.23–3.85)
Schizophrenia	F20–F25	2.24 (1.10–4.55)
Bulimia	F50.2	2.32 (1.12–4.78)
Other adult diseases		
Rheumatoid arthritis	M05–M06	2.02 (1.75–2.33)
Chronic kidney disease	N18 (excluding N18.5)	1.34 (1.23–1.47)
End-stage renal disease	N18.5	1.91 (1.39–2.64)
Systemic lupus erythematosis	M32	1.56 (1.26–1.95)
Diabetes (type 2)	E11	1.37 (1.33–1.42)
Psoriasis	L40	1.78 (1.52–2.06)
Multiple sclerosis	G35	1.55 (1.48–1.62)
Senile cataract	H25	1.47 (1.36–1.59)
Age-related macular degeneration	H35.3–H52.4	1.86 (1.27–2.73)
Low back pain	M54	1.16 (1.02–1.32)
Crohn's disease	K50	1.76 (1.40–2.22)
Hip fracture (women)	S72.0–S72.2	Males 1, females 1.30 (1.16–1.45)
Hearing loss	H90, H91	1.97 (1.44–2.70)
Disorders less common among adult smokers		
Ulcerative colitis	K51	0.55 (0.33–0.91)
Parkinson's disease	G20	0.46 (0.42–0.51)

episodes are assigned a zero-cost code for same day treatment, therefore for episodes with a primary diagnosis of cancer, we added chemotherapy and/or radiotherapy costs, as these are costed separately as high-cost treatments. For episodes with a primary diagnosis of chronic kidney disease or end-stage renal failure, we included additional renal dialysis costs. Episodes therefore include a cost based on the Secondary Uses Service generated code and one or more procedures. All costs were inflated to 2015/16 price levels, when necessary, using the Hospital and Community Health Service's (HCHS) pay and price inflation index.[11]

3.2.6 Smoking-attributable fractions

We calculated new estimates of the proportion of disease cases attributable to current smoking, the smoking-attributable fractions (SAFs), for each of our 52 diseases, by age, sex and IMD using the formula below, from the relative risk of disease for current smokers (*RR*) and the proportion of individuals who are current smokers (*P*).

$$SAF = \frac{P(RR-1)}{P(RR-1)+1}$$

3.2.7 Smoking-attributable costs of care

To identify smoking-related episodes we scanned the primary diagnosis codes for matches with the ICD-10 codes in Table 3.2. To calculate smoking-attributable costs, we multiplied our calculated cost of each episode by the SAF corresponding to that episode's primary diagnosis and the patient's age, sex and IMD. For the two diseases in Table 3.2 for which smoking carried a protective effect, we calculated the cost saving due to smoking by estimating the higher cost that would have occurred if nobody smoked from a formula using the negative attributable fraction, higher cost = observed cost / (1 + SAF) and taking the difference between this higher cost and the observed cost.

3.2.8 Total and disease-specific hospital care costs of current smoking

We estimated that current smoking in 2015/16, considering the pattern of smoking by age, sex and IMD, caused 432,229 episodes of admitted patient care, costing the NHS in England £620,327,669. Of this cost, 57.9% is contributed by men (£359,259,503). The two diseases for which smoking carries protective effects saved the NHS £5,344,463 through the prevention of 4,646 episodes of care. Figure 3.1 shows the cost breakdown by age, sex and IMD.

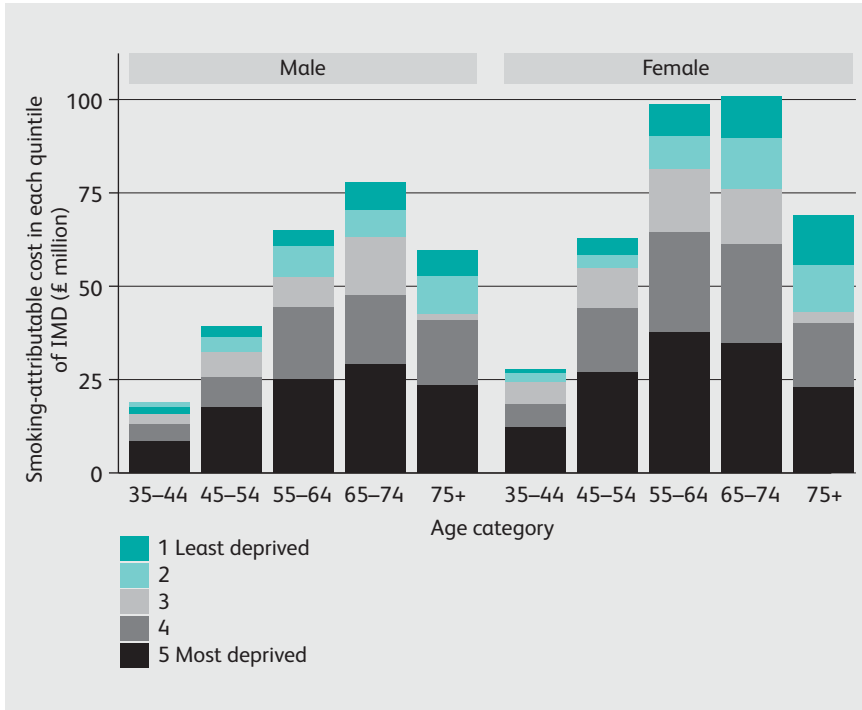

Figure 3.1 Smoking-attributable costs, by age, sex and IMD quintile.

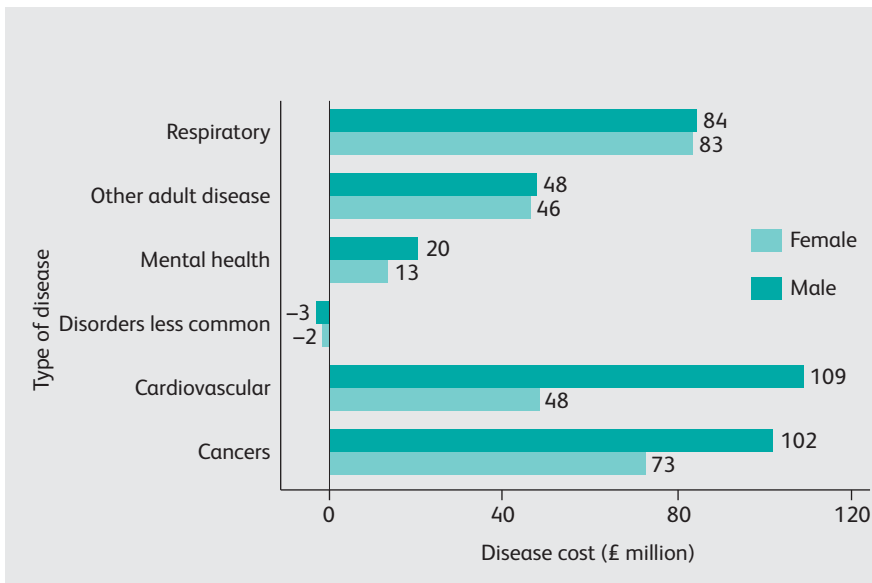

Figure 3.2 Smoking-attributable costs in secondary care, by disease and sex (numbers=cost by disease group).

Table 3.3 Breakdown of the smoking-attributable episode costs by disease and sex

Disease	Females			Males		
	Episode costs	Number of episodes	SAF	Episode costs	Number of episodes	SAF
Cancers						
Trachea, bronchus, lung	£48,841,786	29,848	0.53	£53,142,519	34,206	0.55
Nasal sinuses and nasopharynx	£180,456	126	0.11	£516,931	348	0.12
Oral cavity	£133,558	88	0.24	£889,231	550	0.25
Pharynx	£281,168	137	0.41	£811,996	380	0.42
Larynx	£1,263,956	613	0.42	£6,167,283	2,617	0.43
Oesophagus	£2,278,849	1,676	0.17	£6,534,987	4,816	0.18
Stomach	£1,034,480	664	0.09	£2,513,109	1,617	0.10
Pancreas	£2,428,460	1,767	0.11	£3,040,322	2,251	0.12
Liver	£662,323	346	0.07	£1,372,355	640	0.07
Colorectal	£2,884,041	1,831	0.03	£4,430,966	2,811	0.03
Kidney	£931,498	295	0.07	£1,884,285	656	0.07
Lower urinary tract	£422,498	175	0.19	£830,721	377	0.20
Bladder	£4,308,338	2,951	0.22	£13,198,286	9,561	0.23
Breast	£3,501,539	2,581	0.01	£0	0	0.00
Cervical	£1,653,297	1,050	0.10	£0	0	0.00
Acute myeloid leukaemia	£1,703,085	920	0.05	£2,424,597	1,434	0.05
Malignant melanoma	–	–	0.00	£3,793,674	4,272	0.06
Cancers total	**£72,509,332**	**45,068**		**£101,551,262**	**66,536**	

Table 3.3 *continued*

Disease	Females Episode costs	Females Number of episodes	Females SAF	Males Episode costs	Males Number of episodes	Males SAF
Respiratory						
COPD	£40,913,326	32,319	0.28	£36,997,698	29,592	0.29
Asthma	£2,987,581	3,346	0.08	£1,267,234	1,536	0.08
Tuberculosis	£315,655	89	0.07	£775,673	323	0.08
Pneumonia	£35,809,552	19,971	0.14	£40,810,770	22,845	0.15
Influenza: clinically diagnosed	£46,939	40	0.04	£53,082	40	0.05
Influenza: microbiologically confirmed	£2,257,991	1,309	0.37	£2,520,258	1,345	0.38
Idiopathic pulmonary fibrosis	£438,795	257	0.07	£694,724	392	0.08
Obstructive sleep apnoea	£612,062	513	0.12	£1,155,284	1,232	0.13
Respiratory total	**£83,381,900**	**57,841**		**£84,274,722**	**57,305**	
Cardiovascular						
Ischaemic heart disease	£30,438,765	16,785	0.23	£82,665,397	38,327	0.20
Stroke	£13,583,847	4,570	0.10	£14,005,870	4,725	0.08
Peripheral arterial disease	£1,023,451	377	0.18	£2,331,205	812	0.20
Abdominal aortic aneurysm	£1,808,185	345	0.16	£8,362,159	1,362	0.17
Venous thromboembolism	£1,224,197	955	0.03	£1,413,331	1,147	0.03
Cardiovascular total	**£48,078,445**	**23,032**		**£108,777,962**	**46,373**	

Table 3.3 *continued*

Disease	Females Episode costs	Females Number of episodes	Females SAF	Males Episode costs	Males Number of episodes	Males SAF
Mental health						
Alzheimer's disease	£499,026	122	0.05	£517,907	110	0.05
Vascular dementia	£347,614	84	0.05	£462,879	102	0.05
All-cause dementia	£328,039	104	0.04	£289,610	84	0.04
Depression	£2,148,108	559	0.08	£1,801,128	550	0.09
Psychosis	£537,466	167	0.14	£442,547	160	0.15
Schizophrenia	£9,349,985	1,560	0.14	£16,812,074	2,425	0.15
Bulimia	£15,722	7	0.17	£2,088	1	0.20
Mental health total	**£13,225,961**	**2,604**		**£20,328,232**	**3,431**	
Other adult diseases						
Rheumatoid arthritis	£4,992,609	8,066	0.12	£1,692,344	2,668	0.13
Chronic kidney disease	£380,675	605	0.04	£603,133	939	0.05
End-stage renal disease	£18,949,796	32,312	0.11	£31,441,026	54,415	0.12
Systemic lupus erythematosis	£198,817	225	0.07	£32,801	31	0.08
Diabetes (type 2)	£980,561	645	0.05	£1,973,008	1,107	0.05
Psoriasis	£399,853	499	0.10	£557,821	673	0.10
Multiple sclerosis	£1,830,405	2,395	0.07	£976,227	1,119	0.08
Senile cataract	£3,351,098	3,744	0.06	£2,704,384	3,023	0.07
Age-related macular degeneration	£3,719,487	5,392	0.10	£3,850,146	5,753	0.11

Table 3.3 *continued*

Disease	Females Episode costs	Females Number of episodes	Females SAF	Males Episode costs	Males Number of episodes	Males SAF
Low back pain	£1,641,031	1,959	0.02	£1,162,583	1,351	0.02
Crohn's disease	£2,748,598	3,329	0.09	£2,342,891	3,013	0.10
Hip fracture (women)	£6,434,139	1,098	0.04	£0	0	0.00
Hearing loss	£309,631	164	0.12	£271,255	161	0.13
Other adult disease total	**£45,936,698**	**60,433**		**£47,607,618**	**74,252**	
Disorders less common among smokers						
Ulcerative colitis	–£1,492,364	–1,691	–0.07	–£2,039,240	–2,319	–0.08
Parkinson's disease	–£571,805	–211	–0.08	–£1,241,054	–425	–0.10
Disorders less common total	**–£2,064,169**	**–1,902**		**–£3,280,294**	**–2,744**	
Grand total	£261,068,167	187,076		£359,259,502	245,153	

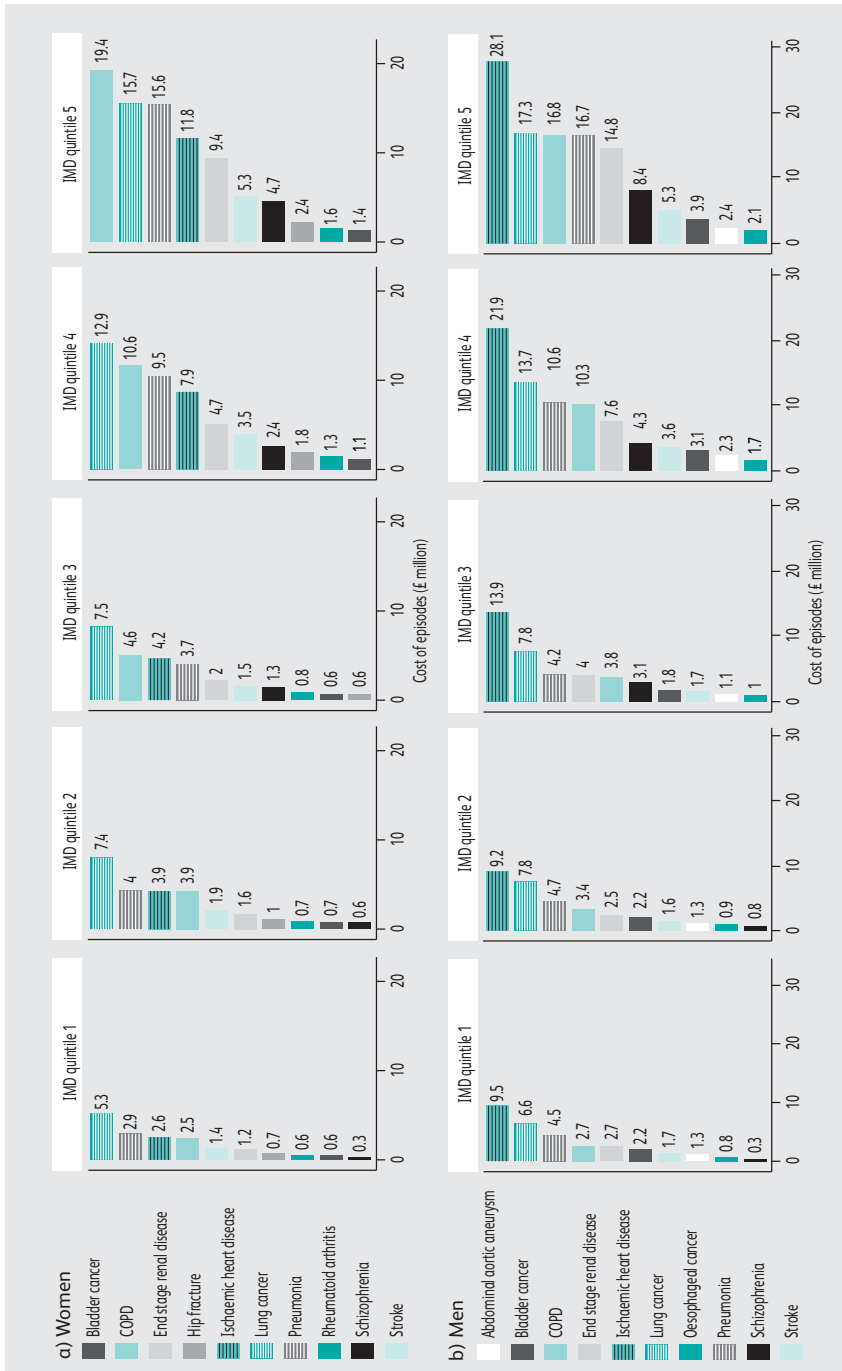

Figure 3.3 The 10 highest-cost diseases in a) women and b) men, by IMD quintile.

Table 3.3 presents the breakdown of the smoking-attributable episode costs by disease and sex alongside population weighted average SAFs. Cancer, respiratory disease and cardiovascular disease together accounted for 80.4% of the costs of smoking, at 28%, 27% and 25%, respectively. Figure 3.2 shows the distribution of cost between types of disease for men and women. The four individual diseases responsible for the highest costs were ischaemic heart disease (£113,104,162), lung cancer (£101,984,305), COPD (£77,911,024) and pneumonia (£76,620,322).

The 10 highest-cost diseases in men and women, by number of episodes and costs incurred, broken down by IMD quintile, are demonstrated in Figure 3.3. For women, the three diseases with the highest cost were lung cancer, COPD and pneumonia. For men, the three diseases with the highest cost were ischaemic heart disease, lung cancer and pneumonia. There were strong relations between disease cost and IMD, particularly for COPD in women, the treatment costs for which increased from £2.5 million among the least deprived to £19.4 million in the most deprived quintile; while in men, treatment costs for ischaemic heart disease rose from £9.5 million in the least deprived quintile to £28.1 million in the most deprived quintile.

3.3 Effects of maternal smoking during pregnancy

Systematic reviews identified in Chapter 2 demonstrate that smoking during pregnancy is associated with an increased risk of a range of adverse outcomes for the mother during pregnancy, fetal development, and child health after birth. While active maternal smoking is not the only source of fetal and childhood exposure to smoke, and hence not the exclusive cause of these adverse outcomes, maternal smoking is the predominant source of exposure during pregnancy. This section estimates the costs of admitted patient care for mothers and children that can be considered to arise from the effects of maternal smoking during pregnancy.

3.3.1 Population and data

We used a female population aged 16–54 to estimate the smoking-attributable costs of care during pregnancy, and a population of children aged under 16 to estimate the subsequent smoking-attributable costs of prenatal smoking on children. We have taken data on the percentage of women in England who smoked at the time of delivery from NHS Digital, which in 2015/16 is recorded as 10.6%.[12]

We identified 35 smoking-attributable adverse outcomes and their relative risks from the summary of systematic reviews presented in Table 2.5. In this section,

Table 3.4 Relative risks of diseases causally associated with maternal smoking during pregnancy

Description	ICD-10 codes used	Relative risks (95% CI)
Pregnancy outcomes		
Miscarriage	O03	1.32 (1.21–1.44)
Placenta previa	O44, O44.0, O44.1	1.58 (1.04–2.12)
Placenta abruption	O45, O45.0, O45.8, O45.9	1.62 (1.46–1.77)
Ectopic pregnancy	O00.0, O00.1, O00.2, O00.9	1.77 (1.31–2.22)
Premature rupture of the membranes	O42	1.70 (1.18–2.25)
Preterm birth	O60, O60.0, O60.1, O60.2	1.27 (1.21–1.33)
Pre-eclampsia	O13, O14.0, O14.1, O14.9	0.67 (0.60–0.75)
Stillbirth	P95	1.47 (1.37–1.57)
Low birthweight (<2500 g)	P07.0, P07.1	2.00 (1.77–2.26)
Development abnormalities		
Heart defects	Q20–Q24	1.09 (1.02–1.17)
Musculoskeletal defects	Q65–79	1.16 (1.05–1.27)
Limb reduction defects	Q71, Q72, Q73	1.26 (1.15–1.39)
Missing/extra digits	Q69	1.18 (0.99–1.41)
Clubfoot	Q66.0, Q66.1, Q66.4, Q66.8	1.28 (1.10–1.47)
Craniosynostosis	Q75.0	1.33 (1.03–1.73)
Facial defects	Q18	1.19 (1.06–1.35)
Eye defects	Q10–15	1.25 (1.11–1.40)
Orofacial clefts	Q35, Q36, Q37	1.28 (1.20–1.36)
Gastrointestinal defects	Q41, Q42, Q43, Q44, Q45	1.27 (1.18–1.36)
Gastroschisis	Q79.3	1.50 (1.28–1.76)
Anal atresia	Q42.2, Q42.3	1.20 (1.06–1.36)
Hernia	Q79.0	1.40 (1.23–1.59)
Undescended testes	Q53	1.13 (1.02–1.25)
Skin defects	Q80, Q81, Q82	0.82 (0.75–0.89)
Hypospadias	Q54	0.90 (0.85–0.95)
Child health		
Obesity	E66	1.64 (1.42–1.90)
Brain and central nervous system tumours	C71, C72	1.09 (1.02–1.17)
Lymphoma	C81–86	1.21 (1.05–1.34)
Acute lymphoblastic leukaemia	C91.0	1.10 (1.02–1.19)

we limit the conditions and risk relationships analysed to those affected by prenatal smoking (Table 3.4; effects of exposure to maternal passive smoking are explored in Section 3.4). To avoid a double counting of costs from mothers

Table 3.5 Cost estimates of smoking during pregnancy

Description	Episodes	Cost	SAF
Pregnancy outcomes			
Miscarriage	1,251	£1,115,655	0.03
Placenta previa	402	£1,064,025	0.06
Placenta abruption	108	£332,516	0.06
Ectopic pregnancy	748	£1,678,341	0.08
Premature rupture of membranes	3,409	£4,329,415	0.07
Preterm birth	322	£595,637	0.03
Pre-eclampsia	–980	–£1,714,370	–0.04
Stillbirth	73	£40,230	0.05
Low birthweight (<2500 g)	3,367	£10,228,960	0.10
Total	**8,700**	**£17,670,408**	
Development abnormalities			
Heart defects	96	£406,182	0.01
Musculoskeletal defects	154	£342,916	0.02
Limb reduction defects	13	£38,431	0.03
Missing/extra digits	29	£41,226	0.02
Clubfoot	99	£192,326	0.03
Craniosynostosis	31	£95,066	0.04
Facial defects	15	£17,875	0.02
Eye defects	54	£63,582	0.03
Orofacial clefts	84	£253,673	0.03
Gastrointestinal defects	68	£294,552	0.03
Gastroschisis	23	£153,388	0.05
Anal atresia	10	£32,831	0.02
Hernia	13	£53,099	0.04
Undescended testes	97	£164,641	0.01
Skin defects	–57	–£69,193	–0.02
Hypospadias	–41	–£89,032	–0.01
Total	**723**	**£2,241,911**	
Child health			
Obesity	39	£32,429	0.07
Brain and central nervous system tumours	77	£144,909	0.01
Lymphoma	169	£376,635	0.02
Acute lymphoblastic leukaemia	227	£307,347	0.01
Total	**512**	**£861,320**	
Grand total	**10,032**	**£20,773,639**	

smoking during and after pregnancy, we have excluded diseases that are attributable to both prenatal and postnatal smoking here and deal with them in Section 3.4 only.

3.3.2 Cost estimates

We estimated that in 2015/16, the cost of maternal smoking during pregnancy was £20,773,639 through 10,032 episodes of admitted patient care. Table 3.5 presents the disease breakdown of these smoking-attributable costs. The three outcomes with over 1,000 estimate smoking-attributable episodes were premature rupture of membranes, low birthweight and miscarriage; and the six outcomes with a smoking-attributable cost over £1 million were low birthweight, premature rupture of the membranes, ectopic pregnancy, miscarriage and placenta previa.

3.4 Passive smoking effects on child health

The exposure of children to second-hand smoke has significant effects on their health. Although after birth the effects of paternal and other household members smoking play an important role, maternal smoking is typically the source most strongly related to adverse child health.[13] This section estimates the smoking-attributable costs of admitted patient care that arise from effects of second-hand smoke on child health. Our investigation is limited to the effects on care for

Table 3.6 Relative risks of childhood diseases associated with passive maternal smoking

Description	ICD-10	Age (years)	Relative risk (95% CI)
Wheeze	R06.2	0–2	1.70 (1.24–2.35)
		3–4	1.65 (1.20–2.28)
		5–18	1.18 (0.99–1.40)
Asthma	J45	0–2	2.47 (0.65–9.39)
		3–4	1.05 (0.88–1.25)
		5–18	1.20 (0.98–1.44)
Lower respiratory tract infection	J20–J22	0–2	1.62 (1.46–1.79)
Middle ear disease	H65–H66	0–15	1.46 (1.21–1.76)
Meningococcal disease	A39.0	0–15	2.18 (1.63–2.92)

children aged up to 16. We exclude sudden infant death from this analysis as this condition is not a cause of hospital admission.

3.4.1 Exposure to passive smoke and disease risks

We used two alternative estimates of the percentage of children who are exposed to passive smoking in 2015. Our upper estimate was that 19.4% of households with dependent children contained an adult who smoked.[7] Our lower estimate was taken from the HSE 2015,[6] that 8.1% of children were exposed to passive smoking from an adult household member who smoked and also did so within the home on most days.

We identified five smoking-attributable adverse outcomes and their relative risks from the summary of systematic reviews presented in Table 2.5. In this section, we use the risk relationships associated with passive maternal smoking (Table 3.6) and assume that these apply to the exposure to second-hand smoke from any source.

3.4.2 Secondary care costs

We estimate that in 2015/16 the cost of admitted patient care in children attributable to passive smoking in England was between £5,181,577 and

Table 3.7 Lower estimate of costs of childhood diseases attributable to passive smoking

Diagnosis	Age of child (years)	Episodes	Cost	SAF
Wheeze	0–2	148	£101,235	0.05
	3–4	51	£34,835	0.05
	5–18	12	£8,573	0.01
Asthma	0–2	311	£244,061	0.11
	3–4	217	£166,979	0.04
	5–18	255	£208,861	0.04
Lower respiratory tract infection	0–2	2,914	£3,502,789	0.05
Middle ear disease	0–15	938	£853,917	0.04
Meningococcal disease	0–15	23	£60,327	0.09
Total		**4,869**	**£5,181,577**	

Table 3.8 Upper estimate of costs of childhood diseases attributable to passive smoking

Diagnosis	Age of child (years)	Episodes	Cost	SAF
Wheeze	0–2	327	£223,528	0.12
	3–4	113	£77,130	0.11
	5–18	29	£19,930	0.03
Asthma	0–2	644	£504,897	0.22
	3–4	486	£375,030	0.09
	5–18	592	£484,494	0.04
Lower respiratory tract infection	0–2	6,482	£7,792,285	0.11
Middle ear disease	0–15	2,120	£1,929,137	0.08
Meningococcal disease	0–15	49	£320,588	0.18
Total		**10,842**	**£11,727,019**	

£11,727,019, of which 80–85% arises from the treatment of middle ear and lower respiratory infections. Tables 3.7 and 3.8 show the disease breakdown of our lower and upper estimates of costs.

3.5 The cost of surgical complications due to smoking

Chapter 2 summarised the increased risks of a range of perioperative and postoperative complications, particularly wound infections, in current smokers. In this section of the report we attempt to provide a minimum estimate for the smoking-attributable component of those costs by estimating the costs of surgical site infections (SSI), and specifically finished consultant episodes of care that occurred primarily to treat an SSI. We recognise that this focus will undoubtedly underestimate the true costs of SSIs, and excludes costs arising from other complications listed in Table 2.5. We also recognise that we lack the detailed patient information available (eg re-operation, extra nursing care and drug costs) in cohort studies designed to investigate SSIs, which in England have estimated the extra cost of care due to the presence of an SSI at between £814 and £6,626,[14,15] or the detail collected in the SSI surveillance system.[16]

3.5.1 Data sources and risks

We selected HES data on episodes of care based on two criteria. First, that surgery was indicated as the external cause of care (ICD-10 diagnosis code Y83 – 'Surgical operation and other surgical procedures as the cause of abnormal reaction of the patient, or of later complication, without mention of misadventure at the time of the procedure'); and second, that the primary diagnosis code indicated the presence of an infection following surgery (ICD-10 diagnosis code T81.4 – 'wound infection following a procedure').

Our estimate of risk is taken from the review and meta-analysis by Sørensen *et al*, who estimated the relative risk of SSI in smokers relative to never smokers at 1.79 (95% confidence interval (CI) 1.57–2.04);[17] and we assumed that smoking prevalence among the population undergoing surgery is broadly similar to that of the general English population by age, sex and IMD quintile.

3.5.2 Cost estimates

We estimate that in 2015/16 the smoking-attributable cost of wound infection following surgery was £2,506,669, arising from 11,662 episodes of care. Table 3.9

Table 3.9 Cost breakdown by type of surgery

Type of surgery	Episodes	Cost	SAF
Removal of other organ (partial or total)	5,202	£987,226	0.09
Surgical operation with implant of artificial internal device	2,085	£519,680	0.08
Surgical operation with anastomosis, bypass or graft	1,278	£286,016	0.08
Other reconstructive surgery	1,044	£240,492	0.10
Surgical operation with formation of external stoma	421	£97,667	0.08
Amputation of limb(s)	165	£58,329	0.09
Surgical operation with transplant of whole organ	104	£34,376	0.11
Other or unspecified	1,363	£227,424	0.09
Total	**11,662**	**£2,506,669**	

Table 3.10 Cost breakdown by consultant specialty

Consultant specialty	Episodes	Cost	SAF
General surgery	3,911	£712,889	0.09
Trauma and orthopaedics	1,757	£486,652	0.08
General medicine	876	£111,300	0.08
Gynaecology	794	£146,194	0.10
Plastic surgery	534	£134,839	0.09
Urology	469	£90,047	0.09
Colorectal surgery	336	£82,332	0.09
Cardiac surgery	276	£85,507	0.08
Accident and emergency (A&E)	266	£18,810	0.08
Ear, nose and throat (ENT)	241	£42,724	0.10
Vascular surgery	235	£70,793	0.08
Neurosurgery	226	£107,940	0.10
Breast surgery (excluding cosmetic surgery)	202	£38,617	0.08
Cardiology	158	£38,790	0.07
Geriatric medicine	145	£22,752	0.05
Upper gastrointestinal surgery	111	£24,950	0.09
Other	1,125	£291,534	0.09
Total	**11,662**	**£2,506,669**	

gives the cost breakdown by the type of surgery specified as the external cause, and Table 3.10 the cost breakdown by the specialty in which the consultant was working during the period of care.

3.6 Secondary care costs from smoking among people with mental disorders

Smoking is particularly common among people with mental health problems. In England in 2014 about one in six adults had a common mental disorder

(generalised anxiety disorder, depressive episodes, phobias, obsessive compulsive disorder, panic disorder and mixed anxiety/depression),[18] and among those with long-standing mental health conditions the prevalence of smoking is more than twice as high as in the rest of the population.[19] Furthermore, while the average population prevalence of smoking has declined steadily over the past two decades, smoking among those with long-standing mental health problems has remained largely unchanged.[19] People with mental health problems consume around one-third of all tobacco smoked in the UK.[20,21] Smoking in this population represents not only a major threat to the health and wellbeing of the individuals who smoke but also is likely to generate substantial demand for NHS services.

In estimates produced for our 2013 report on smoking and mental health we calculated that smoking-related diseases among people with mental disorders cost the NHS £719 million in 2009–2010.[20,22] In this section we use the latest data from a variety of sources to provide updated information on the economic burden arising from smoking in people with mental disorders to the NHS, in relation to hospitalisation for diseases caused by smoking, and increased drug costs.

3.6.1 Smoking prevalence data

Estimates of the prevalence of mental disorders are taken from the 2014 Adult Psychiatric Morbidity Survey (APMS).[18] We have analysed data for all of the common mental disorders, and other illnesses including post-traumatic stress disorder (PTSD), psychotic disorder (in the past year), bipolar disorder, harmful drinking and probable alcohol dependence (defined as an Alcohol Use Disorders Identification Test (AUDIT) score of 20 or more), suicide attempts, eating disorders and substance misuse. Prevalences of these conditions are listed in Table 3.11. APMS also collected information on participants' lifestyles, such as smoking and drinking, in the surveys. At the time of writing, APMS data on smoking prevalence within diagnostic groups were not available, so we have used the figures from APMS 2007[23] (Table 3.12). Using cost-of-illness (COI) methodology[24,25] as in Section 3.2, we calculated the SAFs for the 52 smoking-related diseases listed in Table 3.2 using data on the prevalence of smoking in people with mental disorders (Table 3.12) instead of the general population prevalence in Table 3.1. Smoking-attributable costs were calculated by multiplying SAFs to corresponding inpatient hospitalisation cost for each smoking-related disease in the population of people with mental health disorders. The hospital admission costs were obtained from the calculated hospital admission cost in Section 3.2.4.[26,27] Hospital episodes and reference costs were linked using the *HRG4+ 2015/16 Reference costs code to group* workbook published by the NHS information centre.[10]

Table 3.11 Prevalence (%) of mental disorders, by age and sex, for adults aged 35 and over[18]

Diagnosis	Age group (years)				
	35–44	45–54	55–64	65–74	75+
Males					
Any common mental disorder	**16.3**	**13.8**	**15.6**	**8.1**	**5.6**
Generalised anxiety disorder	6.8	6.0	6.2	2.0	0.9
Depressive episode	2.7	4.2	4.2	2.4	0.3
Phobias	2.5	2.3	1.2	0.7	0.3
Obsessive compulsive disorder	1.7	1.4	0.7	0.3	0.3
Panic disorder	0.2	0.1	0.7	0.4	0.3
Mixed anxiety/depression	6.1	5.6	6.8	3.5	3.8
PTSD	4.4	4.2	5.0	1.1	0.4
Psychotic disorder (in the past year)	1.0	0.5	0.7	0.1	–
Eating disorder	0.5	0.5	0.2	0.2	0.0
Bipolar disorder	2.9	2.1	1.6	0.4	–
Harmful drinking and probable alcohol dependence	0.9	0.7	0.6	0.1	–
Dependent on cannabis	2.2	1.6	1.0	0.1	–
Dependent on any other drug	1.8	0.7	0.3	0.2	0.3
Suicide attempts (past year)	0.5	0.5	0.2	0.2	–
Females					
Any common mental disorder	**22.3**	**24.2**	**20.2**	**14.7**	**11.0**
Generalised anxiety disorder	7.0	8.5	6.7	5.8	3.6
Depressive episode	5.5	4.8	4.4	1.9	2.0
Phobias	3.5	3.0	3.3	0.5	0.6
Obsessive compulsive disorder	1.6	1.8	2.1	0.4	0.2
Panic disorder	0.3	0.8	0.4	0.9	0.8
Mixed anxiety/depression	10.3	11.8	9.4	6.9	5.7
PTSD	4.7	4.8	2.5	2.0	0.8
Psychotic disorder (in the past year)	0.9	0.5	0.8	0.3	0.2
Eating disorder	2.9	2.9	0.6	0.6	0.2
Bipolar disorder	1.9	1.2	1.3	0.4	–
Harmful drinking and probable alcohol dependence	2.0	1.2	0.8	0.3	0.3
Dependent on cannabis	1.6	0.9	0.7	0.1	–
Dependent on any other drug	0.9	0.1	0.1	0.1	–
Suicide attempts (past year)	0.5	0.4	0.9	0.1	–

Table 3.12: Smoking prevalence (%) according to mental health diagnosis for adults aged 35 and above[23]

Diagnosis	Male	Female
Generalised anxiety disorder	38.0	34.0
Depressive episode	39.7	30.5
Phobias	36.3	40.7
Obsessive compulsive disorder	31.5	25.7
Panic disorder	21.7	36.3
Mixed anxiety/depression	31.3	41.0
PTSD	46.8	31.0
Psychotic disorder (in the past year)	50.0	31.8
Eating disorder	12.5	43.1
Bipolar disorder	57.8	32.1
Harmful drinking and alcohol dependence (AUDIT score 20+)	42.8	43.8
Dependent on cannabis	66.6	26.3
Dependent on any other drug	40.0	58.3
Suicide attempts (past year)	66.7	22.2
Currently taking a psychoactive medication		
Currently taking any antipsychotic medication (oral or injection)	41.7	25.8
Antidepressant medication	40.9	37.5
Hypnotic medication	53.8	43.8
Anxiolytic medication	56.0	37.0

3.6.2 Changes in drug dose requirements

Interactions between tobacco smoke and medication requirements have also been identified, arising from drug metabolism enzyme induction by non-nicotine components of tobacco smoke.[20] As a result, smoking significantly reduces drug plasma levels of many psychotropic drugs, including clozapine, fluphenazine, haloperidol, chlorpromazine, olanzapine, many tricyclic antidepressants, mirtazapine, fluvoxamine and propranolol resulting in higher dose requirements; and after quitting smoking, doses of these drugs can be reduced (Table 3.13).[28] We estimated drug costs attributable to the higher doses required by smoking by analysing Prescription Cost Analysis (PCA) data, which provide details of the number of items and the net ingredient cost of all prescriptions dispensed in the community in England.[29] The analysis includes people of all ages. All costs were inflated to 2015/16 price levels, when necessary, using the HCHS pay and price inflation index.[11]

Table 3.13 Psychotropic drugs affected by smoking status, and action to take on smoking cessation[28]

Drug	Effect of smoking	Action to be taken on stopping smoking	Action to be taken on restarting smoking
Agomelatine	Plasma levels reduced	Monitor closely. Dose may need to be reduced	Consider reintroducing previous smoking dose
Benzodiazapines	Plasma levels reduced by 0–50%	Monitor closely. Consider reducing dose by up to 25% over 1 week	Monitor closely. Consider restarting 'normal' smoking dose
Carbamazepine	Unclear, but smoking may reduce carbamazepine plasma levels	Monitor for changes in severity of adverse effects	Monitor plasma levels
Chlorpromazine	Plasma levels reduced. Varied estimates of exact effect	Monitor closely. Consider dose reduction	Monitor closely. Consider restarting previous smoking dose
Clozapine	Reduces plasma levels by up to 50%. Plasma level reduction may be greater in those receiving valproate	Take plasma level before stopping. On stopping, reduce dose gradually (over a week) until around 75% of original dose reached (ie reduce by 25%). Repeat plasma level 1 week after stopping. Anticipate further dose reductions	Take plasma level before restarting. Increase dose to previous smoking dose over 1 week. Repeat plasma level
Duloxetine	Plasma levels may be reduced by up to 50%	Monitor closely. Dose may need to be reduced	Consider reintroducing previous smoking dose

Table 3.13 *continued*

Drug	Effect of smoking	Action to be taken on stopping smoking	Action to be taken on restarting smoking
Fluphenazine	Reduces plasma levels by up to 50 %	On stopping, reduce dose by 25 %. Monitor carefully over following 4–8 weeks. Consider further dose reductions	On restarting, increase dose to previous smoking dose
Fluvoxamine	Plasma levels decreased by around one-third	Monitor closely. Dose may need to be reduced	Dose may need to be increased to previous level
Haloperidol	Reduces plasma levels by around 20 %	Reduce dose by around 10 %. Monitor carefully. Consider further dose reductions	On restarting, increase dose to previous smoking dose
Mirtazapine	Unclear, but effect probably minimal	Monitor	Monitor
Olanzapine	Reduces plasma levels by up to 50 %	Take plasma level before stopping. On stopping, reduce dose by 25 %. After 1 week, repeat plasma level. Consider further dose reductions	Take plasma level before restarting. Increase dose to previous smoking dose over 1 week. Repeat plasma level
Tricyclic antidepressants	Plasma levels reduced by 25–50 %	Monitor closely. Consider reducing dose by 10–25 % over 1 week. Consider further dose reductions	Monitor closely. Consider restarting previous smoking dose
Zuclopentixol	Unclear, but effect probably minimal	Monitor	Monitor

Table 3.14 Hospital costs of smoking-attributable diseases in people with mental disorders in England

Disease	Male	Female	All
Cancers			
Trachea, bronchus, lung	£10,590,054	£14,094,918	£24,684,972
Nasal sinuses and nasopharynx	£197,933	£89,909	£287,842
Oral cavity	£280,725	£63,893	£344,618
Pharynx	£221,390	£96,697	£318,087
Larynx	£1,431,296	£404,369	£1,835,665
Oesophagus	£2,205,273	£1,000,522	£3,205,795
Stomach	£922,837	£498,707	£1,421,544
Pancreas	£1,131,543	£1,185,324	£2,316,867
Liver	£510,290	£327,746	£838,036
Colorectal	£1,942,475	£1,716,710	£3,659,185
Kidney	£784,254	£475,641	£1,259,895
Lower urinary tract	£241,627	£185,899	£427,526
Bladder	£3,795,992	£1,774,611	£5,570,603
Breast	£7,836	£2,190,785	£2,198,621
Cervical	£0	£841,186	£841,186
Acute myeloid leukaemia	£1,080,763	£1,001,891	£2,082,654
Malignant melanoma	£1,390,191	–	£1,390,191
Cancers total	**£26,734,478**	**£25,948,810**	**£52,683,288**
Respiratory			
COPD	£8,731,947	£13,728,590	£22,460,537
Asthma	£510,979	£1,509,008	£2,019,987
Tuberculosis	£275,626	£137,820	£413,446
Pneumonia	£12,013,917	£15,273,195	£27,287,112
Influenza: clinically diagnosed	£740,358	£832,664	£1,573,022
Influenza: microbiologically confirmed	£21,602	£387,537	£409,139
Idiopathic pulmonary fibrosis	£265,702	£215,434	£481,136
Obstructive sleep apnoea	£489,271	£292,487	£781,758
Respiratory total	**£23,049,402**	**£32,376,736**	**£55,426,137**
Cardiovascular			
Ischaemic heart disease	£29,925,423	£13,080,803	£43,006,226
Stroke	£4,907,665	£4,784,281	£9,691,947
Peripheral arterial disease	£675,759	£394,430	£1,070,189
Abdominal aortic aneurysm	£2,566,063	£794,156	£3,360,219
Venous thromboembolism	£580,509	£640,587	£1,221,096
Cardiovascular total	**£38,655,419**	**£19,694,258**	**£58,349,677**
Other adult diseases			
Alzheimer's disease	£148,532	£247,249	£395,780
Vascular dementia	£127,789	£172,058	£299,847

Table 3.14 continued

Disease	Male	Female	All
All-cause dementia	£89,551	£164,829	£254,381
Rheumatoid arthritis	£656,728	£2,484,762	£3,141,490
Chronic kidney disease	£225,997	£194,141	£420,138
End-stage renal disease	£10,847,626	£8,198,666	£19,046,291
Systemic lupus erythematosis	£13,011	£107,600	£120,611
Diabetes (type 2)	£707,964	£453,425	£1,161,389
Psoriasis	£221,189	£196,857	£418,046
Multiple sclerosis	£467,255	£1,096,703	£1,563,958
Senile cataract	£922,132	£1,696,428	£2,618,561
Age-related macular degeneration	£1,394,399	£1,813,220	£3,207,619
Low back pain	£527,895	£940,980	£1,468,874
Crohn's disease	£1,064,908	£1,472,511	£2,537,419
Hip fracture (women)	£0	£3,458,662	£3,458,662
Hearing loss	£108,238	£161,197	£269,436
Other adult disease total	**£17,523,214**	**£22,859,288**	**£40,382,501**
Disorders less common among smokers			
Ulcerative colitis	–£1,016,038	–£929,729	–£1,945,767
Parkinson's disease	–£528,202	–£357,724	–£885,926
Disorders less common total	**–£1,544,240**	**–£1,287,453**	**–£2,831,693**
Grand total	**£104,418,272**	**£99,591,638**	**£204,009,911**

3.6.3 Costs of smoking-related diseases

Table 3.14: summarises preventable smoking-attributable hospital costs in people with mental disorders in England in relation to the diseases listed in Table 3.2, with the exclusion of the four primary mental health diagnoses (depression, schizophrenia, psychosis, bulimia) and using the disease-specific smoking prevalences given in Table 3.12. The total smoking-related cost is estimated at £204 million per year at 2015/16 prices, around one-third of the £620 million total hospital costs attributable to current smoking (Section 3.2). The leading cause of smoking-attributable hospital cost (28% and £58 million) is cardiovascular disease, followed by respiratory disease (27%, £55 million) and cancers (25%, £53 million).

Table 3.15 and Figure 3.4 present a breakdown of the smoking-attributable hospital costs by mental disorder diagnosis and gender. Over half (58%) of all

Table 3.15 Smoking-attributable secondary care costs by gender and mental disorder diagnosis

Diagnosis	Male	Female	All
Mixed anxiety/depression	£25,129,542	£28,205,669	£53,335,211
Generalised anxiety disorder	£18,761,851	£20,707,096	£39,468,947
Depressive episode	£13,908,878	£13,130,508	£27,039,386
PTSD	£14,671,363	£9,106,882	£23,778,244
Phobias	£5,305,585	£9,058,465	£14,364,050
Bipolar disorder	£5,859,230	£2,598,260	£8,457,490
Alcohol dependence	£5,974,583	£1,402,370	£7,376,953
Obsessive compulsive disorder	£2,989,741	£4,047,717	£7,037,457
Drug dependency (cannabis)	£3,941,127	£2,082,418	£6,023,546
Panic disorder	£1,660,961	£3,082,765	£4,743,726
Probable psychosis	£1,931,624	£1,995,829	£3,927,453
Eating disorder	£489,723	£2,521,007	£3,010,730
Suicide attempts (past year)	£1,393,502	£1,368,192	£2,761,694
Drug dependency (other)	£2,400,563	£284,461	£2,685,023
Total	**£104,418,272**	**£99,591,638**	**£204,009,911**

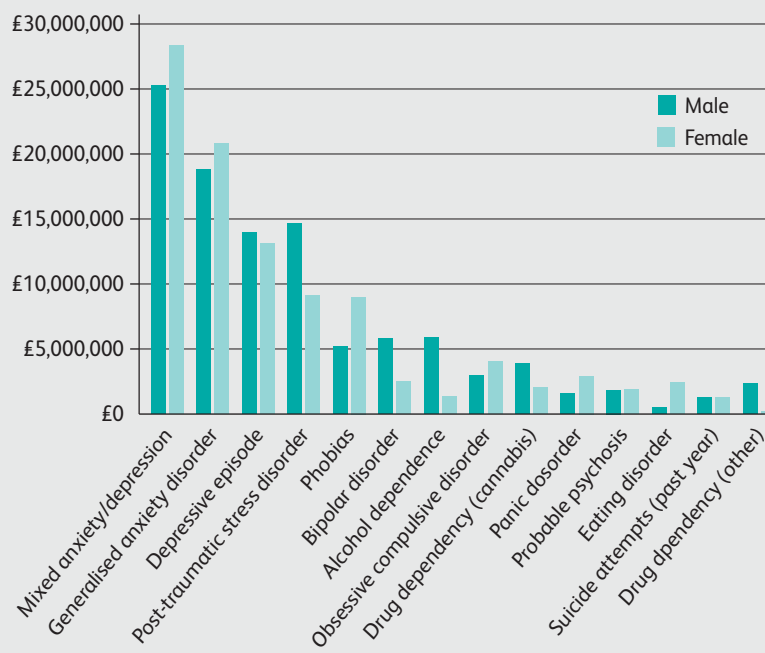

Figure 3.4 Smoking-attributable secondary care costs by gender and mental disorders.

Table 3.16 Estimated cost savings in 2016 from psychotropic drug dose reduction after smoking cessation

BNF chemical name[a]	Best-case dose reduction (%) with smoking cessation	Smoking prevalence (%)	Total prescription cost	Cost savings
Duloxetine	50	32.6	£19,543,207	£3,186,902
Clozapine	50	38.2	£153,164	£29,240
Fluphenazine	50	38.2	£232,282	£44,345
Fluvoxamine	33	32.6	£697,897	£75,112
Haloperidol	20	38.2	£2,110,012	£161,128
Olanzapine	50	38.2	£4,972,840	£949,360
Alprazolam	50	43.0	£73	£16
Bromazepam	50	43.0	£158	£34
Chlordiazepoxide	50	43.0	£596,029	£128,259
Diazepam	50	43.0	£8,326,161	£1,791,706
Lorazepam	50	43.0	£4,246,556	£913,816
Oxazepam	50	43.0	£218,338	£46,984
Temazepam	50	33.3	£5,568,457	£928,076
Amitriptyline	50	32.6	£24,633,502	£4,016,974
Clomipramine	50	32.6	£1,277,039	£208,246
Dosulepin	50	32.6	£2,651,544	£432,386
Doxepin	50	32.6	£7,330,596	£1,195,397
Imipramine	50	32.6	£562,996	£91,808
Lofepramine	50	32.6	£3,294,991	£537,313
Mianserin	50	32.6	£102,361	£16,692
Nortriptyline	50	32.6	£22,173,631	£3,615,844
Trazodone	50	32.6	£42,199,181	£6,881,401
Trimipramine	50	32.6	£19,835,783	£3,234,612
Total			**£170,726,799**	**£28,485,651**

[a]BNF, British national formulary.

costs in this group were accounted for by people with one of three diagnoses: mixed anxiety/depression, generalised anxiety disorder and depressive episodes.

3.6.4 Cost savings from psychotropic drug dose reduction after smoking cessation

In 2016, 92 million prescription items (with a net ingredient cost of £428 million) for mental disorders, comprising £267 million (62%) for antidepressants, £93 million (22%) for antipsychotics, and £68 million (16%)

for hypnotics and anxiolytics, were prescribed in England.[29] Table 3.16 summarises the selection of psychotropic drugs affected by smoking, the net ingredient cost of total prescriptions dispensed in 2016, together with the best-case, maximum percentage dose reduction achievable by smoking cessation. Cost savings from quitting smoking were then calculated by multiplying the percentage dose reduction by the dose taken by smokers and corresponding unit costs. In total, people with mental health disorders who quit smoking have the potential to save the NHS £28 million per year in psychotropic medicine costs.

3.7 Costs arising from smoking by NHS staff

The NHS is the fifth largest employer in the world. In September 2017 in England alone, the NHS employed about 1.3 million staff,[30,31] and although smoking rates among healthcare staff are typically lower than the general population average, a substantial number of NHS staff are likely to be smokers. Smoking by employees in any setting imposes costs on the employer through productivity lost to sickness[32–36] and smoking breaks, but in the NHS represents an additional burden because, in contrast to other employers, the NHS typically provides and hence incurs the treatment costs of illness caused by smoking in NHS staff. Almost uniquely among employers therefore, the NHS would accrue savings in health costs as well as productivity savings from helping staff to quit. Having non-smoking staff is also important to the key role of the NHS in helping patients to quit, since effectiveness in promoting smoking cessation among patients is impaired if employees smoke,[37,38] since these staff tend to have more positive attitudes to smoking and to be less likely to advise patients to quit.[38–41] Patients who smoke may also be more likely to stop smoking in response to advice and support from staff who do not smoke.[42,43]

This section therefore estimates the excess costs to the NHS of employing individuals who smoke, relative to those who do not, in relation to absenteeism due to illness, smoking breaks and excess healthcare costs. Costs are estimated in UK pounds for the 2016/17 financial year from an employer's perspective and, at the same time, from the NHS's perspective.

3.7.1 NHS staff numbers, salaries and smoking prevalence

According to *NHS workforce statistics*[30] and the *General and personal medical services, England, provisional experimental statistics*,[31] the NHS employed 1,369,362 in England in September 2017, in 1,178,076 full-time equivalent (FTE) posts. These FTE posts include 143,093 doctors, 476,106 nurses and 558,877 support staff.

The unit cost for NHS staff includes their basic salary plus salary oncosts (employer contributions to national insurance and pensions), and non-staff overheads (such as office accommodation, training, supplies and services, capital overheads of buildings and land). The calculation of salary oncosts, overheads and capital overheads follows the methods used by Curtis and Burns for the unit cost calculations for health and social care in England.[44]

The mean basic salary for HCHS staff such as HCHS doctors, nurses and health visitors, midwives and NHS infrastructure support were taken from the *NHS staff earnings estimates to September 2017*,[45] and salaries for general and personal medical services from the *Unit costs of health and social care 2017*.[44] Table 3.17 provides details of the NHS staff groups and the numbers of employees and the corresponding salaries in each staff group.

Smoking prevalence among NHS staff were taken from a 2011 study of staff in Wales.[46] Assuming that the reported survey took place in 2010 we have adjusted reported prevalences down by a factor of 0.73 to reflect the trend in general population smoking prevalence in Wales, from 23.3% in 2010 to 16.9% in 2016, and by a further factor of 0.92 to adjust for the lower prevalence of smoking (of 15.5%) in England[7] (Table 3.18). Combining the NHS staff numbers in Table 3.17 with the smoking prevalences in Table 3.18 generates an estimate of 73,352 smokers among the 1,178,076 FTE NHS staff, or a prevalence in 2017 of 6.23%.

3.7.2 Lost productivity due to excess absenteeism

Sickness absence rates for NHS staff in 2017 were taken derived from the *NHS sickness absence rates* report based on the data from the electronic staff record.[47] Here, the sickness absence rate was defined as the percentage of working hours lost to sickness absences out of FTE working hours for the employees. In September 2017, the average sickness absence rate for the NHS in England was 3.99%,[47] and NHS staff are absent for an average of 9 days a year due to ill health, amounting to around 11 million working days lost to the NHS in England in 2017.[30,31,47] We have estimated the cost of increased absenteeism due to smoking among NHS staff in England using the equation below and the SAF equation given in section 3.2.6, taking relative risks for the latter from the Office for National Statistics (ONS) report *Sickness absence in the labour market: 2016* which reported sickness absence rates by smoking status from 2010 to 2016 in the UK labour market and found that the absence rates are consistently higher in smokers than in never smokers throughout the years.[48] These data reveal that the sickness absence rates for smokers and never smokers were 2.5% and 1.6% in 2016, respectively, generating a relative risk of sickness absence at 1.56 in smokers relative to

Table 3.17 Number of NHS staff and the annual unit costs by staff group

Staff group	FTE[e]	Mean annual basic pay per FTE[f]	Basic pay + salary oncosts + overheads
Total	**1,178,076**		
Professionally qualified clinical staff	**619,200**		
HCHS doctors[a,b]	**109,002**		
Consultant (including directors of public health)	45,825	£90,359	£168,820
Associate specialist	2,088	£81,623	£152,854
Specialty doctor	6,528	£60,395	£114,059
Staff grade	365	£54,941	£104,091
Specialty registrar	30,448	£40,294	£76,257
Core training	9,737	£33,171	£63,239
Foundation doctor year 2	6,510	£29,117	£55,830
Foundation doctor year 1	6,130	£25,782	£49,735
Hospital practitioner / clinical assistant	484	£107,011	£199,252
Other and local HCHS doctor grades	886	£79,959	£148,745
GPs[c,d]	**34,091**		
GP providers	20,234	£103,800	£203,551
Other GPs	7,603	£55,800	£115,829
GP registrars	5,135	£37,315	£82,047
GP retainers	90	£90,100	£178,514
GP locums	1,029	£90,100	£178,514
Nurses and health visitors[a,b]	**283,853**	**£31,302**	**£57,490**
Midwives[a,b]	21,206	£33,024	£60,638
Ambulance staff[a,b]	20,258	£27,301	£50,178
Scientific, therapeutic and technical staff (ST&T)[a,b]	134,990	£35,002	£64,253
Nurses in GP practices[c,d]	**15,800**	**£25,902**	**£49,589**
Support to clinical staff[a,b]	**314,592**		
Support to doctors, nurses and midwives	243,762	£18,828	£34,694
Support to ambulance staff	14,731	£19,881	£36,617
Support to ST&T staff	56,099	£19,934	£36,714
NHS infrastructure support[a,b]	**164,584**		
Central functions	80,739	£25,619	£47,105
Hotel, property and estates	51,890	£17,942	£33,074

Table 3.17 continued

Staff group	FTE[e]	Mean annual basic pay per FTE[f]	Basic pay+ salary oncosts + overheads
Senior managers	10,282	£77,653	£142,199
Managers	21,673	£47,459	£87,018
Other HCHS staff or those with unknown classification[a,b]	**4,478**	**£14,137**	**£26,122**
GP direct patient care and admin staff[c,d]	**75,223**		
GP direct patient care staff	11,610	£32,342	£61,358
GP admin/non-clinical staff	63,613	£27,823	£51,132

[a]Source: NHS workforce statistics, September 2017.[30]
[b]Source: NHS staff earnings estimates to September 2017.[45]
[c]Source: the General and personal medical services, England as at 31 December 2017, provisional experimental statistics.[31]
[d]Source: Unit costs of health and social care 2017.[44]
[e]We assume that there are 260 full-time equivalent (FTE) days available in 1 year (225 working days, 27 days annual holiday and 8 bank holidays).
[f]Mean annual basic pay per FTE is the mean amount of basic pay paid per one FTE post in a 12-month period.

Table 3.18 Adjusted smoking prevalence among healthcare professionals in the UK, 2016

Staff group	Current smokers		Former smokers		Never smokers	
	Percentage	95% CI	Percentage	95% CI	Percentage	95% CI
Doctors[a]	1.75	(0.22–6.25)	13.15	(4.66–20.95)	85.10	(77.00–91.98)
Nurses[b]	5.84	(2.24–11.03)	37.65	(14.98–42.79)	60.60	(52.02–69.67)
Allied healthcare professionals[c]	7.32	(4.01–12.37)	34.85	(12.77–36.48)	63.40	(56.17–70.93)

[a]Doctors includes A&E, anaesthetics, GP trainees, hospital physicians and surgical specialities.
[b]Nurses includes medical wards, midwifery, cardiology and respiratory specialist nurses and rehabilitation.
[c]Allied healthcare professional includes ambulance service, healthcare assistants, office staff, pharmacy staff, radiology technicians and specialist therapies.

never smokers. Table 3.19 shows average sickness absence rates by healthcare professional groups.

$$\textit{Smoking attributable absenteeism cost} = \textit{Smoking-attributable fraction} \times \textit{Sickness absence rate} \times \textit{FTE days} \times \textit{Unit staff cost}$$

The number of smokers and the estimated cost of additional absenteeism by smokers compared with non-smokers, together with the estimate ranges, are listed in Table 3.20. The total cost of excess absenteeism attributable to smoking amounted to £101 million. Nurses and health visitors accounted for 23% of this total cost.

3.7.3 Lost productivity due to smoking breaks

Although staff smoking is actively discouraged in the NHS,[38] staff members do still smoke during working hours.[49–51] We have estimated the annual cost of smoking-related productivity loss due to smoking breaks by multiplying the minutes of excess breaks taken by smokers outside of existing breaks by the cost of compensation per minute.

The unit of annual cost for various NHS staff was reported in Table 3.20, and the standard hours of work for NHS employees were 7.5 hour per day or 37.5 hours per week, or 2,250 min per week.[11] Since data on smoking break length are not

Table 3.19 Average sickness absence rate of NHS staff in 2017[47]

Staff group	Average sickness absence rate (%)[a,b]
All staff total	**3.99**
Ambulance staff	5.31
Administration and estates	3.59
Healthcare assistants and other support staff	6.06
Medical and dental staff	1.23
Nursing, midwifery and health visiting staff	4.63
Nursing, midwifery and health visiting learners	0.94
Scientific, therapeutic and technical staff	3.27
Healthcare scientists	3.37

[a]The sickness absence rate is the proportion of working hours lost to sickness absence by NHS staff.
[b]We assume that there are 260 FTE days available in 1 year (225 working days, 27 days annual holidays and 8 bank holidays).

Table 3.20 Cost of additional absenteeism and breaks of smokers compared with non-smokers

Staff group	Absenteeism				Smoking breaks	
	Number of FTE staff	Number of smokers	Basic pay + oncosts + overheads	Range	Basic pay + oncosts + overheads	Range
HCHS doctors	109,002	1,903	£1,757,484	(£218,327–6,349,695)	£5,708,690	(£703,125–20,424,581)
GPs total	34,091	595	£773,530	(£96,093–2,794,723)	£2,512,595	(£309,470–8,989,574)
Nurses and health visitors	283,853	16,585	£27,920,090	(£10,939,514–54,422,806)	£24,627,675	(£9,460,394–46,477,565)
Midwives	21,206	1,239	£2,200,561	(£862,213–4,289,409)	£1,941,064	(£745,634–3,663,194)
Ambulance staff	20,258	1,483	£2,481,214	(£1,385,443–4,364,701)	£1,920,671	(£1,053,296–3,245,028)
Scientific, therapeutic and technical (ST&T) staff	134,990	9,882	£13,026,197	(£7,273,474–22,914,366)	£16,407,882	(£8,998,084–27,721,580)
Nurses in GP practices	15,800	923	£353,583	(£138,539–689,217)	£1,174,725	(£43,240–1,256,050)
Support to clinical staff						
Support to doctors, nurses and midwives	243,762	17,844	£23,472,304	(£13,106,296–41,290,100)	£15,940,334	(£8,741,681–26,931,645)
Support to ambulance staff	14,731	1,078	£1,497,741	(£836,298–2,634,674)	£1,017,135	(£557,797–1,718,478)
Support to ST&T staff	56,099	4,107	£5,718,971	(£3,193,318–10,060,234)	£3,883,824	(£2,129,890–6,561,831)
NHS infrastructure support						
Central functions	80,739	5,910	£6,266,336	(£3,498,952–11,023,103)	£7,183,506	(£3,939,435–12,136,736)

Table 3.20 *continued*

Staff group		Absenteeism			Smoking breaks	
	Number of FTE staff	Number of smokers	Basic pay + oncosts + overheads	Range	Basic pay + oncosts + overheads	Range
Hotel, property and estates	51,890	3,799	£2,820,761	(£1,575,036–4,961,998)	£3,233,621	(£1,773,318–5,463,294)
Senior managers	10,282	753	£2,418,274	(£1,350,298–4,253,982)	£2,772,224	(£1,520,288–4,683,750)
Managers	21,673	1,587	£3,115,684	(£1,739,713–5,480,796)	£3,571,710	(£1,958,726–6,034,505)
Other HCHS staff or those with unknown classification	4,478	328	£191,829	(£107,112–337,445)	£219,905	(£120,596–371,536)
GP direct patient care and admin staff						
GP direct patient care staff	11,610	678	£1,588,870	(£622,543–3,097,081)	£1,070,409	(£39,400–1,144,512)
GP admin/non-clinical staff	63,613	4,657	£5,361,723	(£2,993,841–9,431,801)	£6,146,490	(£180,580–5,245,546)
Total	**1,178,076**	**73,351**	**£100,965,151**	**(£49,937,010–188,396,131)**	**£99,332,461**	**(£42,274,954–182,069,405)**

Table 3.21 NHS staff age and gender distribution by staff group[30,31]

Staff group	Gender		Age (years)					
	Male (%)	Female (%)	Under 25(%)	25–34(%)	35–44(%)	45–54(%)	55–64(%)	65 and over (%)
HCHS doctors	50.43	49.57	0.26	16.21	24.16	30.77	26.27	2.32
Nurses and health visitors	11.88	88.12	0.14	11.31	25.25	44.38	18.14	0.78
Midwives	10.00	90.00	0.00	10.00	30.00	30.00	30.00	0.00
Scientific, therapeutic and technical (ST&T) staff	34.33	65.67	2.36	24.33	31.91	27.52	13.12	0.76
Support to doctors, nurses and midwives	29.21	70.79	2.78	11.72	17.00	35.75	29.92	2.83
Support to ST&T staff	37.64	62.36	8.07	37.96	23.10	18.02	11.42	1.43
Central functions	35.35	64.65	5.74	26.24	27.87	26.52	12.79	0.84
Hotel, property and estates	29.33	70.67	1.70	10.30	15.66	30.31	33.58	8.45
Senior managers	52.18	47.82	0.00	3.85	20.37	49.38	24.64	1.77
Managers	47.63	52.37	0.69	14.14	32.06	36.22	16.06	0.83
Other staff or those with unknown classification	31.93	68.07	23.53	19.33	29.41	21.85	5.04	0.84
GP providers	61.29	38.71	0.00	11.40	32.88	32.36	19.35	4.00
Salaried/other GPs	30.56	69.44	0.00	21.42	31.17	27.67	16.26	3.48
GP registrars	34.86	65.14	0.00	77.92	19.47	2.40	0.20	0.00
GP retainers	8.08	91.92	0.00	18.71	64.40	10.64	4.99	1.26
GP locums	54.84	45.16	0.00	22.45	38.63	22.65	9.84	6.44
GP practice nurses	2.50	97.50	0.62	8.42	19.27	39.89	29.47	2.32
GP direct patient care staff	6.96	93.04	5.08	15.36	19.03	34.38	23.75	2.39
GP admin/non-clinical staff	5.68	94.32	8.50	12.78	14.16	31.14	28.99	4.43

Table 3.22 Hospital cost of smoking-attributable diseases in NHS staff by disease category

Disease	Male		Female	
	Mean cost	Range	Mean cost	Range
Cancers				
Trachea, bronchus, lung	£356,232	(£211,665–506,975)	£808,423	(£486,811–1,107,938)
Nasal sinuses and nasopharynx	£3,617	(£1,822–6,273)	£3,151	(£1,567–5,377)
Oral cavity	£6,816	(£3,558–11,240)	£3,136	(£1,621–5,067)
Pharynx	£7,414	(£4,125–11,308)	£5,445	(£3,051–8,024)
Larynx	£42,103	(£23,548–63,926)	£23,012	(£12,937–33,771)
Oesophagus	£38,236	(£19,414–65,620)	£27,349	(£13,916–45,531)
Stomach	£13,693	(£6,820–24,171)	£13,046	(£6,462–22,449)
Pancreas	£17,639	(£8,821–30,932)	£32,073	(£16,002–54,760)
Liver	£7,270	(£3,597–12,953)	£8,245	(£4,056–14,334)
Colorectal	£21,429	(£10,749–3,332)	£42,034	(£20,546–74,818)
Kidney	£11,705	(£5,802–20,789)	£13,118	(£6,450–22,803)
Lower urinary tract	£3,801	(£1,955–6,427)	£4,214	(£2,158–6,947)
Bladder	£65,104	(£33,799–108,702)	£45,576	(£23,404–74,878)
Breast	£93	(£46–169)	£69,428	(£33,360–123,975)
Cervical	£0	(£0–0)	£32,762	(£16,133–56,383)
Acute myeloid leukaemia	£15,750	(£7,751–28,264)	£30,867	(£14,996–54,442)
Malignant melanoma	£1,404	(£704–2,453)	–	–
Cancers total	**£612,308**	**(£344,175–939,533)**	**£1,161,878**	**(£663,470–1,711,496)**
Respiratory				
COPD	£175,680	(£93,009–285,620)	£425,555	(£223,225–680,542)
Asthma	£8,567	(£4,293–14,989)	£54,265	(£26,527–94,322)
Tuberculosis	£4,497	(£2,256–7,862)	£4,238	(£2,074–7,365)
Pneumonia	£178,781	(£90,943–307,287)	£311,965	(£156,734–526,691)
Influenza: clinically diagnosed	£22,557	(£12,384–34,957)	£48,135	(£26,228–72,879)
Influenza: microbiologically confirmed	£324	(£160–577)	£753	(£366–1,321)
Idiopathic pulmonary fibrosis	£3,748	(£1,863–6,643)	£4,773	(£2,339–8,371)
Obstructive sleep apnoea	£9,068	(£4,587–15,639)	£11,569	(£5,736–19,753)
Respiratory total	**£403,223**	**(£209,495–673,575)**	**£861,252**	**(£443,231–1,411,245)**
Cardiovascular				
Ischaemic heart disease	£711,086	(£368,531–1,186,004)	£601,298	(£313,409–966,324)
Stroke	£67,733	(£33,692–119,995)	£77,529	(£38,261–134,356)
Peripheral arterial disease	£12,131	(£6,209–20,602)	£9,768	(£4,975–16,165)
Abdominal aortic aneurysm	£37,945	(£19,154–65,821)	£14,635	(£7,381–24,623)

Table 3.22 continued

Disease	Male		Female	
	Mean cost	Range	Mean cost	Range
Venous thrombo-embolism	£7,921	(£3,904–14,208)	£14,075	(£6,848–24,813)
Cardiovascular total	**£836,815**	**(£431,490–1,406,630)**	**£717,306**	**(£370,874–1,166,282)**
Mental health				
Alzheimer's disease	£1,348	(£679–2,375)	£1,509	(£747–2,654)
Vascular dementia	£1,110	(£560–1,952)	£502	(£252–869)
All-cause dementia	£931	(£465–1,654)	£706	(£347–1,247)
Depression	£10,360	(£5,194–18,124)	£29,769	(£14,598–51,760)
Psychosis	£2,977	(£1,525–5,053)	£9,733	(£4,843–16,490)
Schizophrenia	£118,104	(£60,508–200,296)	£171,852	(£85,777–290,251)
Bulimia	£19	(£10–32)	£319	(£160–535)
Mental health total	**£134,849**	**(£68,941–229,487)**	**£214,390**	**(£106,723–363,805)**
Other adult diseases				
Rheumatoid arthritis	£11,528	(£5,783–20,101)	£89,736	(£44,670–152,772)
Chronic kidney disease	£3,278	(£1,622–5,843)	£5,408	(£2,627–9,541)
End-stage renal disease	£181,363	(£91,277–315,333)	£266,821	(£131,745–458,656)
Systemic lupus erythematosis	£215	(£108–374)	£4,202	(£2,053–7,309)
Diabetes (type 2)	£10,120	(£4,990–18,120)	£11,132	(£5,437–19,500)
Psoriasis	£3,915	(£1,966–6,825)	£7,429	(£3,658–12,796)
Multiple sclerosis	£7,938	(£3,982–13,871)	£42,847	(£20,890–74,624)
Senile cataract	£10,694	(£5,304–19,077)	£21,683	(£10,770–37,613)
Age-related macular degeneration	£21,623	(£10,813–37,959)	£44,113	(£21,826–76,056)
Low back pain	£7,595	(£3,750–13,584)	£28,155	(£13,596–49,899)
Crohn's disease	£18,470	(£9,326–31,983)	£57,475	(£28,238–99,203)
Hip fracture (women)	£0	(£0–0)	£28,491	(£13,918–50,489)
Hearing loss	£1,912	(£966–3,304)	£6,454	(£3,190–11,054)
Other adult disease total	**£278,651**	**(£139,887–486,373)**	**£613,945**	**(£302,618–1,059,512)**
Disorders less common among smokers				
Ulcerative colitis	–£11,489	(–£5,560 to –£21,207)	–£23,481	(–£11,125 to –£42,916)
Parkinson's disease	–£4,458	(–£2,151 to –£8,303)	–£4,391	(–£2,099 to –£8,032)
Disorders less common total	–£15,947	(–£7,711 to –£29,510)	–£27,872	(–£13,224 to –£50,948)
Grand total	**£2,249,899**	**(£1,186,278–3,706,088)**	**£3,540,899**	**(£1,873,692–5,661,392)**

Table 3.23 The hospital cost of smoking-attributable diseases in NHS staff by staff group

Staff group	Male		Female	
	Mean cost	Range	Mean cost	Range
HCHS doctors	£69,406	(£9,038–217,970)	£38,389	(£4,971–121,686)
GPs total	£36,758	(£4,761–116,788)	£20,681	(£2,701–64,650)
Nurses and health visitors	£383,486	(£162,319–647,539)	£247,149	(£105,838–413,748)
Midwives	£196,497	(£82,839–333,052)	£980,082	(£419,288–1,641,291)
Ambulance staff	£16,460	(£9,773–25,154)	£100,800	(£60,601–152,202)
Scientific, therapeutic and technical (ST&T) staff	£26,183	(£15,350–40,636)	£36,360	(£21,482–56,066)
Nurses in GP practices	£3,884	(£1,640–6,575)	£2,524	(£1,045–4,391)
Support to clinical staff				
Support to doctors, nurses and midwives	£254,568	(£150,416–391,251)	£325,726	(£194,263–496,568)
Support to ambulance staff	£671,352	(£399,706–1,022,629)	£1,007,741	(£607,390–1,517,026)
Support to ST&T staff	£18,162	(£10,678–28,081)	£24,944	(£14,795–38,267)
NHS infrastructure support				
Central functions	£98,503	(£58,379–150,857)	£102,252	(£61,207–155,193)
Hotel, property and estates	£148,916	(£88,127–228,421)	£179,825	(£107,487–273,372)
Senior managers	£200,806	(£119,738–305,395)	£261,851	(£158,211–393,037)
Managers	£48,508	(£28,784–74,181)	£28,867	(£17,317–43,705)
Other HCHS staff or those with unknown classification	£66,307	(£39,276–101,575)	£48,639	(£29,110–73,822)
GP direct patient care and admin staff				
GP direct patient care staff	£3,125	(£1,321–5,282)	£76,295	(£32,816–127,060)
GP admin/non-clinical staff	£6,977	(£4,132–10,700)	£58,776	(£35,169–89,308)
Total	**£2,249,899**	**(£1,186,278–3,706,088)**	**£3,540,899**	**(£1,873,692–5,661,392)**

available for the NHS, we have used estimates for the general population. In this study, we adopted the most commonly used estimates by a wide range of UK studies, which is 10 min per day.[52–54] Using these figures, Table 3.20 summarises the estimated cost of staff smoking breaks to the NHS England at £99 million.

3.7.4 Costs of diseases caused by smoking

Section 3.2 estimates the avoidable hospital admission costs caused by smokers at £620 million per year in England. We now use the same method to estimate the component of this cost attributable to smoking among NHS staff.[24,25] Table 3.21 lists the age and gender distribution of NHS staff groups, using data from the *NHS workforce statistics*[30] and the *General and personal medical services, England, provisional experimental statistics.*[31]

Tables 3.22 and 3.23 summarise the healthcare costs attributable to smoking by disease category and by NHS staff group, respectively. The estimated hospital cost for treating smoking-attributable diseases in staff aged 35 and over was £6 million per year at 2017 prices.

3.7.5 Total annual excess NHS costs per smoking employee

The total staff smoking cost imposed on NHS as an employee and healthcare provider by staff smoking is thus estimated at £206 million per annum. This total economic loss averages at £175 per employee, or £2,810 per smoker per year.

3.8 Summary

- Current smoking in 2015/16 cost the NHS in England £620 million in adult secondary care costs, arising from 432,229 episodes of care.
- Cancer, respiratory disease, and cardiovascular disease together accounted for 80% of these costs of smoking, at 28%, 27% and 25%, respectively.
- The four individual adult diseases responsible for the highest costs were ischaemic heart disease (£113 million), lung cancer (£102 million), COPD (£78 million) and pneumonia (£77 million). Demand for services for these diseases, and their resulting costs, arise disproportionately from the most disadvantaged in society.
- Maternal smoking during pregnancy costs the NHS in England approximately £21 million each year in secondary care costs, arising predominantly from low birthweight, premature rupture of membranes, ectopic pregnancy, miscarriage and placenta previa.
- Exposure of children to passive smoking costs the NHS in England at least

£5 million and possibly as much as £12 million in hospital costs, mostly from the treatment of lower respiratory infections and middle ear disease.

- Postoperative infections caused by current smoking cost the NHS in England at least £2.5 million each year.
- The contribution to NHS costs from current smoking among people with mental health problems is £204 million each year in hospital care, of which over half is in people with anxiety and/or depression; and £28 million in additional drug costs.
- The NHS employs around 73,000 smokers, who cost the NHS approximately £206 million each year, comprising £101 million from sickness absence, up to £99 million from smoking breaks, £6 million in sickness treatment costs, or around £2,800 per smoker per year.
- The total avoidable cost to the NHS from current smoking, arising from hospital care, postoperative infections, the higher doses of drugs for mental health problems, and loss of productivity in staff, amounts to around £890 million each year in England, and hence around £1 billion per year for the UK.

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4 Providing stop smoking services and treatment for tobacco dependency in the NHS

4.1 Introduction

Helping smokers to quit smoking is an essential component of any comprehensive tobacco control policy. In the UK, the policies summarised in Table 1.2 have achieved substantial reductions in smoking prevalence, and act by both discouraging smoking uptake and encouraging smokers to quit. However, while preventing uptake has had a significant effect on smoking prevalence the health benefits from reduced uptake among adults today will, for the most part, be realised only in several decades time. To reduce the current burden of death and disability caused by smoking it is necessary to encourage as many current smokers as possible to make a quit attempt, and to ensure that when they do, as many as possible use the most effective methods. However, despite the existence of effective and cost-effective smoking cessation therapies and services, the majority of smokers in Britain who quit smoking do so only after multiple attempts, and typically without accessing formal treatment.[1,2] This failure to match smokers' desires to quit with the support most likely to help them succeed represents a major missed opportunity in UK smoking prevention policy, and is an area in which the NHS could make a huge contribution. Given the magnitude of the burden placed on the NHS by smoking (see Chapter 3 for costs from current smoking in secondary care alone), the NHS also has much to gain by helping smokers to quit. This chapter will review evidence-based treatment, smoking cessation service design, the role of new technologies, smoking cessation within clinical care pathways and the cost-effectiveness of systematic provision of smoking cessation, including harm reduction, across the NHS.

4.2 Treatments for tobacco dependence and their effectiveness

Many options are available to treat tobacco dependence. The most effective and cost-effective combinations of pharmacotherapy, behavioural support, treatment intensity and setting have been evaluated in guidelines focusing on NHS patients and the general population produced by NICE, Public Health England, the Royal Colleges and specialist societies.[3–10] Around one in three smokers in England

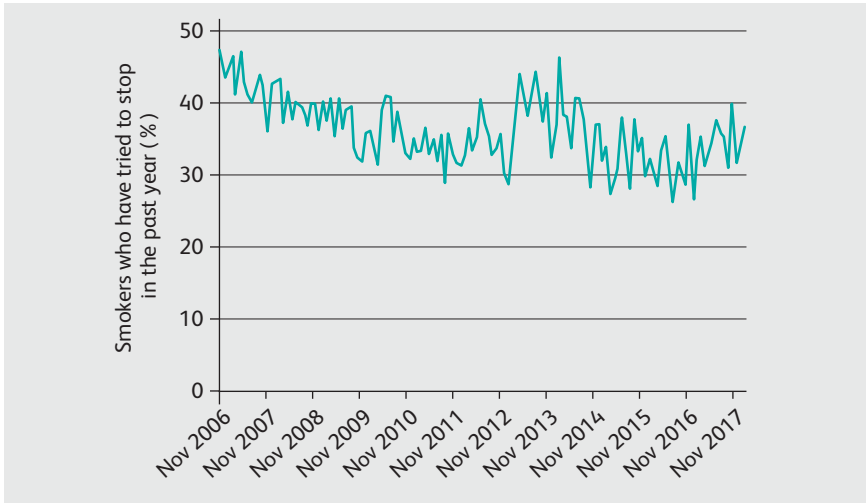

Figure 4.1 Attempts to stop smoking, England 2006–2017.[2]

report making an attempt to stop smoking sometime in the past year, although data from the Smoking Toolkit Study suggest that the numbers making a quit attempt have declined[2] (Figure 4.1).

4.2.1 Behavioural support

There is no standard definition of behavioural support for smoking cessation. Terms and descriptors used include 'intensive support (multiple session support)', 'brief intervention (single consultation lasting less than 20 minutes plus one follow-up visit)', 'brief advice (10 minutes or less)' and 'very brief advice (less than 30 seconds)'. The way in which these terms are defined, applied, measured, who delivers them and whether this is done in person to individuals or with groups, by phone or other channels all influence their effectiveness.

Two Cochrane reviews have looked at the effectiveness of brief advice, focusing on current smokers in a health setting, some of whom were motivated to quit. Stead *et al*[11] looked at brief advice (defined as advice with or without a leaflet) delivered by physicians supported by other healthcare workers during a single consultation lasting less than 20 minutes plus one follow-up visit, and found increased quit rates compared with no advice or usual care of similar magnitude to that achieved by nicotine replacement therapy (NRT) and bupropion (17 trials, relative risk (RR) 1.66, 95% CI 1.42–1.94). A study by Rice *et al*[12] focused on brief advice (a single 10 minute session with one follow-up visit) delivered by nurses and found increased quit rates, but not significantly higher than from no advice or usual care (17 trials, RR 1.27, 95% CI 0.99–1.62). Stead *et al*[11] found

that direct comparison between intensive and brief advice from 15 trials identified an advantage for more intensive advice (RR 1.37, 95% CI 1.20–1.56). Carr *et al*[13] found evidence from eight studies suggesting behavioural interventions from oral health professionals can increase tobacco abstinence rates (odds ratio 1.74, 95% CI 1.33–2.27). However, two studies of pharmacy personnel-delivered smoking cessation interventions that did not involve pharmacotherapy found no evidence of benefit.[14]

A further Cochrane review by Lancaster and Stead[15] identified significant benefit from individual counselling (27 trials, RR 1.57, 95% CI 1.40–1.77), and possibly more so for group-based programmes (nine trials, RR 2.60, 95% CI 1.8–3.76) compared with no intervention. The review found that group-based therapy was effective when compared with self-help (13 trials, RR 1.88, 95% CI 1.52–2.33) or brief advice (16 trials, RR 1.25, 95% CI 1.07–1.46).

Overall therefore the evidence from multiple systematic reviews indicates that behavioural support is effective in increasing quit rates, with physician-delivered advice being more effective than advice delivered by nurses or pharmacists, intensive support being more effective than brief advice and group and individual interventions having similar efficacy.

4.2.2 Pharmacotherapy

Some smokers prefer to use only pharmacotherapy, either in the form of licensed medicines or consumer e-cigarettes, to support attempts to quit smoking, but the pharmacotherapy chosen by smokers has changed significantly over recent years[2] (see Figure 4.2). The data demonstrate that nicotine delivered through consumer e-cigarettes has become by far the most popular pharmacotherapy used, and that this increase has occurred in conjunction with a marked reduction in the use of over-the-counter NRT (which can be purchased without support in the quit attempt), and prescribed varenicline, NRT or bupropion. There has also been a sustained reduction in the proportion of smokers using NHS stop smoking services (which offer pharmacotherapy and behavioural support).

4.2.2.1 NRT

NRT products include long-acting (transdermal patches) and short-acting products (lozenges, gum, buccal patches, oral and nasal sprays and inhalators). A Cochrane review of 117 trials[16] in 2012 investigated the effectiveness of NRT (long- and short-acting products) and found the pooled risk ratio for abstinence for any form of NRT relative to control (placebo or non-NRT control group) was 1.60 (95% CI 1.53–1.68). These effects were largely independent of the effects of any other support used in the quit attempt.[16] Each of the six forms of NRT

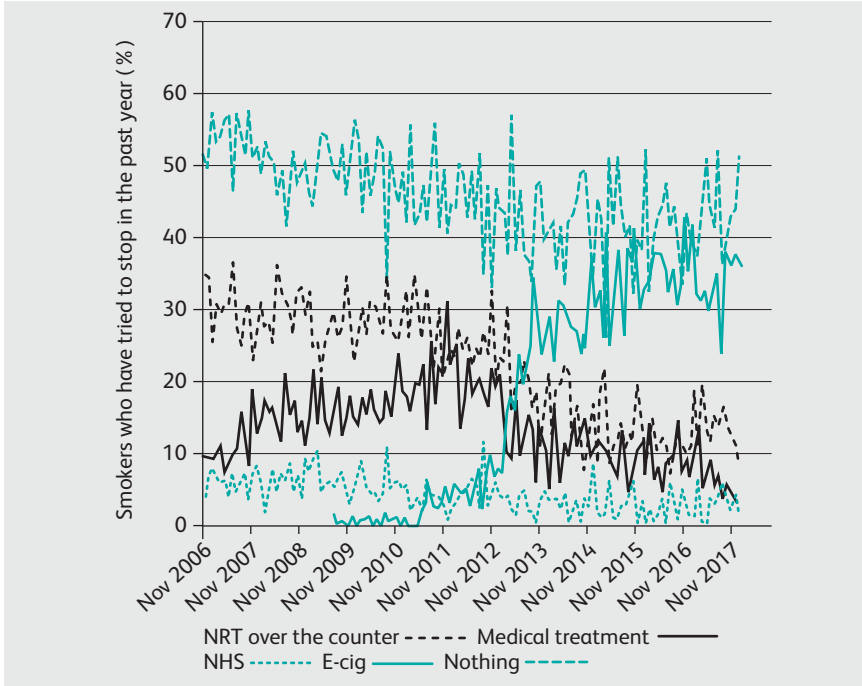

Figure 4.2 Support used in quit attempts since 2006.[2]

product significantly increased the rate of cessation compared with placebo or no NRT. In addition, NRT was found to be effective when used in over-the-counter settings (five trials, RR 2.71, 95% CI 2.11–3.49), smoking clinics (10 trials, RR 1.73, 95% CI 1.48–2.03) and primary care settings (23 trials, RR 1.52, 95% CI 1.34–1.71). Evidence from the same review found that a combination of long- and short-acting NRT was more effective than single NRT (nine trials, RR 1.34, 95% CI 1.18–1.51). Longer duration (more than 8–10 weeks) of treatment with nicotine patch may also lead to improved smoking cessation rates;[17–19] in one study, 8 weeks of therapy increased the odds of quitting for 1 month or more, relative to 4 weeks of therapy, by a ratio of 2.26 (95% CI 1.58–3.22).[17] NRT is also licensed for use for temporary abstinence from smoking, and for harm reduction.

4.2.2.2 Varenicline

Varenicline is an alpha-4-beta-2 nicotinic acetylcholine receptor agonist and blocker, and hence has the dual action of relieving nicotine withdrawal while blocking reward from smoking. A 2016 Cochrane review found high quality evidence that a standard dose of varenicline is more effective than placebo at helping smokers quit for at least 6 months (RR 2.24, 95% CI 2.06–2.43; 27

trials, 12,625 people).[20] Low or variable doses of varenicline were also shown to be effective (RR 2.08, 95% CI 1.56–2.78; four trials, 1,266 people). The review also found high quality evidence that varenicline is more effective than bupropion at 6 months (RR 1.39, 95% CI 1.25–1.54; five trials, 5,877 people) and moderate evidence that it is more effective than single NRT (RR 1.25, 95% CI 1.14–1.37; eight trials, 6,264 people). In one of the largest trials to date, an international double-blind four-group randomised controlled trial involving over 8,000 patients comparing varenicline, bupropion, nicotine patches and placebo, participants who received varenicline achieved higher abstinence rates than those on placebo (odds ratio 3.61, 95% CI 3.07–4.24), nicotine patch (odds ratio 1.68, 95% CI 1.46–1.93), and bupropion (odds ratio 1.75, 95% CI 1.52–2.01).[21]

4.2.2.3 Bupropion

Bupropion is a norepinephrine–dopamine reuptake inhibitor and is also a nicotinic antagonist[22] and acts as both an antidepressant and a smoking cessation aid. Evidence from a 2014 Cochrane review of 44 trials found that bupropion, compared with placebo or no pharmacotherapy, significantly increased smoking cessation (RR 1.62, 95% CI 1.49–1.76).[23] Eight trials provided direct comparisons between bupropion and NRT: pooled results for all forms of NRT suggested that the two therapies are broadly equivalent (RR 0.96, 95% CI 0.85–1.09).[23]

4.2.2.4 Other pharmacotherapies

Nortriptyline and cytisine are also effective cessation therapies but are not widely used for this purpose in the UK. Nortriptyline, an antidepressant, showed moderate efficacy in aiding smoking cessation in a meta-analysis of six trials, increasing the likelihood of abstinence by a RR of 2.03 (95% CI 1.48–2.78).[23] Cytisine, a plant derivative, is a partial agonist and antagonist at the alpha-4 beta-2 nicotinic acetylcholine receptor, similar to varenicline. It has been used as a low-cost therapy for smoking cessation in Eastern Europe since the 1960s. In a systematic review and meta-analysis[24] of two high quality trials, the efficacy of cytisine compared with placebo appears to be greater than other pharmacologic therapies, with a pooled RR of 3.29 (95% CI 1.84–5.90). In a randomised trial[25] of 1,310 adult daily smokers, self-reported continuous abstinence was higher with cytisine than with NRT at 1 month (40% versus 31%) and at 6 months (22% versus 15%). Furthermore, a Health Technology Assessment estimated cytisine to be more effective and cost-effective than varencline.[26]

4.2.3 Combination pharmacotherapy and behavioural support

A Cochrane review found that compared with usual care, a combination

pharmacotherapy and intensive behavioural support increased quit rates with a pooled RR of 1.83 (95% CI 1.68–1.98, 52 trials).[27] The same review found evidence that the use of behavioural interventions as an adjunct to NRT is effective for smoking cessation with a pooled RR of 1.17 (95% CI 1.11–1.24, 47 trials), and more effective than NRT with minimal behavioural support;[14,15,28] and that adding multi-session group behavioural support or multi-session individual counselling increases the effectiveness of quit attempts using bupropion by RRs of 1.76 (95% CI 1.44–2.16, 10 trials) and 1.60 (95% CI 1.46–1.76, 30 trials), respectively.[23] In 2016, Windle *et al*[29] reviewed the efficacy of combining pharmacotherapy with behavioural therapy compared with monotherapies. In data from over 57,000 people in 115 randomised control trials they found that varenicline combined with behavioural therapy increased abstinence more than other combinations of a pharmacotherapy with behavioural therapy: varenicline versus bupropion odds ratio 1.56 (95% credible interval (Crl) 1.07–2.34), varenicline versus nicotine patch odds ratio 1.65 (95% Crl 1.10–2.12), varenicline versus short-acting NRT odds ratio 1.68 (95% Crl 1.15–2.53).

4.2.4 E-cigarettes

E-cigarettes are consumer products used by smokers as an alternative and less harmful source of nicotine,[8] and are the most widely used quitting aid (see Figure 4.2), being used in more than one in three quit attempts among smokers who report trying to quit at some point in the past year. The popularity of e-cigarettes has plateaued since the end of 2016 but recent estimates suggest that there are 2.9 million e-cigarettes users in Great Britain and just over half of these are now ex-smokers, with the proportion of dual users (people continuing to smoke, even at a reduced level, while vaping) declining over time.[30] Their effectiveness as smoking substitutes and cessation aids is dependent on a range of factors including nicotine content, device type and frequency and duration of use which have been discussed in detail elsewhere.[8,31]

At least 21 systematic reviews on the use of e-cigarettes for smoking cessation have been conducted to the end of 2017, and 10 in the last year alone. O'Leary[32] recently completed a review of these reviews which involved both synthesising their findings and conducting a critical appraisal of review quality using the AMSTAR 2 quality assessment tool. Only two reviews were rated as high quality: the Cochrane review of e-cigarettes for smoking cessation,[33] and a review by Malas and colleagues.[34] A third review[35] was rated as moderate quality; the remainder as low, or critically low, quality. The three higher quality reviews all reached similar conclusions, however, consistent with an approximate doubling of the likelihood of quitting smoking, by a ratio estimated in the Cochrane review at 2.29 (95% CI 1.05–4.96).[33] The Cochrane

review also identified 15 trials currently underway, indicating that more detailed estimates of e-cigarette effectiveness will soon be available.[33] This new evidence is likely to be more reflective of the effect of later generation devices capable of delivering nicotine more effectively than those used in the trials included in the Cochrane review.[31]

4.3 Harm reduction

In the UK, harm reduction is a recognised element of comprehensive tobacco control, underpinned by guidance from NICE published in 2013.[36] NICE defines tobacco harm reduction as an approach aimed at smokers who may not be able (or do not want) to stop smoking in one step; may want to stop smoking, without necessarily giving up nicotine; or may not be ready to stop smoking but want to reduce the amount they smoke. The NICE guidance recommended the use of licensed NRT as a substitute for smoking, but e-cigarettes have become increasingly accepted and used in this context.

4.4 Smoking reduction

More than four in 10 smokers currently report that they have tried to reduce the amount they smoke (Figure 4.3). Most try to cut down without using any other products, although a minority report cutting down with help from NRT or e-cigarettes.

Smoking reduction confers few if any health benefits. A systematic review of 24 studies identified benefit in respiratory symptoms and cardiovascular risk factors among those who cut down substantially[37] but a Danish study with 15 years follow-up of a large cohort of smokers found no evidence that heavy smokers who reduced their number of cigarettes had a lower risk of death from myocardial infarction or from all causes.[38,39] Likewise, a prospective study with more than 30 years of follow-up in Scotland identified no significant overall long-term survival benefit among smokers who reported reducing their daily consumption of cigarettes between two screenings a few years apart.[40] There are several well-established reasons why simply cutting down smoking may not result in health improvement. First, reductions may not be sustained. Second, and particularly in the absence of any nicotine substitution, compensatory smoking offsets most, if not all, of the reduction in number of cigarettes smoked.[41] Third, and particularly for cardiovascular disease, a non-linear dose–response curve results in significant disease risks even at very low smoking levels.[42] For these reasons, smoking reduction alone is not recommended by stop smoking services in the UK or indeed elsewhere.

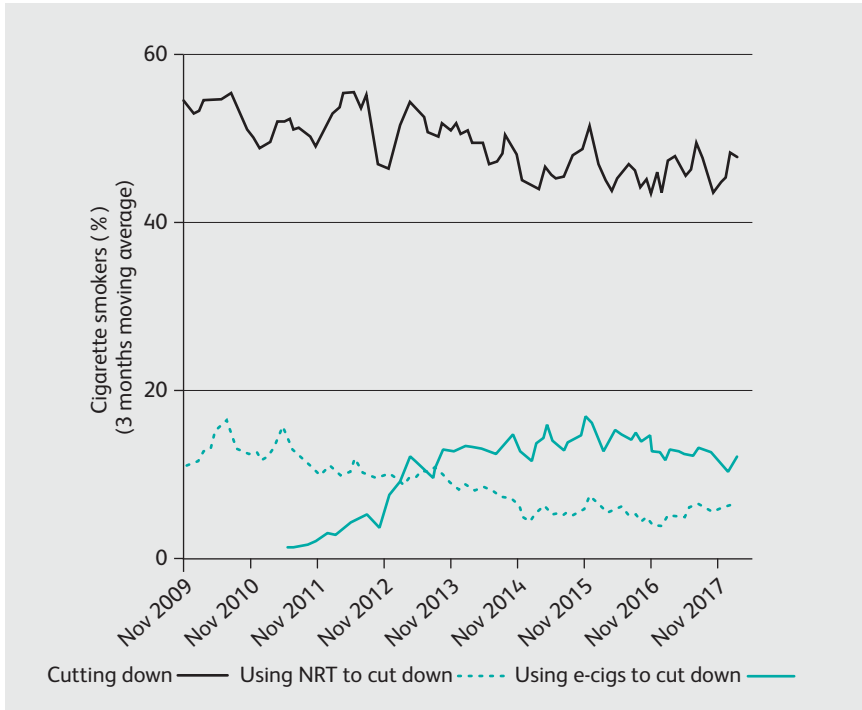

Figure 4.3 Cutting down smoking, England 2009–2017.[2]

Smoking reduction may have a valuable role to play as a step towards smoking cessation, however. In surveys, smokers who cut down are more likely to report that they want to stop smoking, intend to make a quit attempt, feel more confident in their ability to stop when compared with smokers who are not engaged in cutting down,[43] and are more likely to proceed to a successful quit attempt.[44] For these reasons, NICE tobacco harm reduction guidance endorses cutting down to quit in smokers who do not want to quit abruptly,[36] and many NRT products are now licensed in the UK for this use.

4.5 Novel approaches

In addition to the above established methods for smoking cessation and the more recent options for tobacco harm reduction, other interventions exist for smokers trying to quit. Some of these harness new technologies such as digital or electronic aids to cessation including mobile phone text messaging and advice and support available online. Others involve incentivising smoking cessation through financial incentives, gifts or competitions.

4.5.1 Digital or electronic aids to cessation

Smoking cessation support delivered online via smartphones or by text message is of increasing interest either as an adjunct to face-to-face support, or as a stand-alone intervention. Several reviews of electronic or digital aids to smoking cessation have been published, including a systematic review and meta-analysis in the UK published in 2012.[45]

This was a broad review of available evidence on internet sites, computer programmes, text messages and other electronic aids. On the basis of 60 randomised control trials and quasi-randomised control trials the authors concluded that computer and other electronic aids can increase smoking cessation, compared with no intervention or generic self-help materials (RR 1.32, 95% CI 1.21–1.45), but that the effect was modest. Due in part to the breadth of the review and the range of interventions involved the authors could not identify whether effectiveness varied depending on the type of technology used. However, they did conclude that making some form of electronic aid to smoking cessation available is highly likely to be cost-effective, either when delivered with brief advice or more intensive support.

Two more recent Cochrane reviews have explored internet-based smoking cessation interventions, and mobile phone text messaging for smoking cessation. The internet-based interventions review[46] found that interactive and tailored internet programmes with or without additional support were moderately effective at 6 months or longer, specifically five pooled studies comparing an internet programme plus behavioural support compared with a non-active control (n=2334), had an RR of 1.69 (CI 1.30–2.18) favouring the intervention. However, there were insufficient data to draw conclusions about internet-based smoking cessation interventions with young people, and found no evidence that internet interventions were better than other smoking cessation programmes not delivered online.[46]

The 2016 review of mobile phone-based interventions for smoking cessation[47] pooled results from 12 studies with outcomes reported at 6 months in smokers of any age who wanted to quit. Some of these studies involved text messaging only, while others combined messages with an initial assessment or face-to-face visits. One study involved text messages linked to video messages. Taken together the data suggested that mobile phone-based smoking interventions had a positive impact on smoking cessation, compared with a variety of control programmes (including no intervention, untailored materials and messages, and intensive support from practice staff including pharmacotherapy) by a ratio of 1.67 (95% CI 1.46–1.90). Six studies had biochemically validated outcomes, and these showed a slightly stronger effect (RR 1.83, 95% CI 1.54–2.19).[47]

4.5.2 Financial and other incentives

A 2015 Cochrane review identified 21 trials, 15 of which were conducted in the USA, concerning the use of incentives for smoking cessation in 8,400 people from clinics or health centres, a community setting, academic institutions and worksites.[48] Incentives included cash, shopping vouchers, lottery tickets, prize draws and deposit refund contracts (whereby people deposit their own money, and have it returned to them if they succeed in stopping smoking). In a meta-analysis of the 17 trials with follow-up of 6 months or more, incentives increased smoking cessation by an odds ratio of 1.42 (95% CI 1.19–1.69). In the three trials that used high cash rewards or bonus payments in addition to a deposit refund scheme, a direct comparison between the rewards-based and the deposit-based groups found a benefit for the rewards arms, with an odds ratio at 12 months of 1.76 (95% CI 1.22–2.53; 2,070 participants).[48]

Incentive schemes to promote smoking cessation in pregnancy have been relatively extensively tested.[49,50] This may be because public concern about the use of public funds to provide incentives for behaviour change are thought to be less pronounced when the health of mothers and their unborn children are the target. A meta-analysis of eight of nine trials with pregnant smokers, involving just under 1,300 women, found that incentives increased the likelihood of smoking cessation in pregnancy at the longest follow-up (up to 24 weeks postpartum) by more than threefold (odds ratio 3.60, 95% CI 2.39–5.43), which is more than double the effect size than seen in the mixed populations described above. Three of these trials showed a clear benefit of 'contingent rewards', where the incentives were dependent on biochemically validated smoking cessation. The single UK study was the largest included and involved just over 600 women in Glasgow.[51] All participants were offered NHS stop smoking support, but those randomised to the incentive group received cumulative contingent incentives totalling £400 in value (£50 for setting a quit date, £50 for quitting for 4 weeks, £100 at 12 weeks and £200 for quitting to the end of pregnancy). The quit rate was 15.4% at the end of pregnancy in the incentives group, and 4% in the control group. The study also found that incentives were cost-effective.[52]

4.6 Approaches and cautions with treatment of tobacco dependency in patient subgroups

4.6.1 Cardiovascular disease

Smoking cessation interventions are safe and effective in patients with cardiovascular disease (CVD). The evidence review for NICE PH48[6] found that in patients with CVD, standard evidence-based treatment including face-to-face support and pharmacotherapy for at least 1 month was effective (odds ratio 1.81,

95% CI 1.42–2.32), and found no evidence to suggest that NRT is unsafe in people with stable or unstable CVD, or that NRT use is associated with an increased risk of cardiovascular events in the general population.[6] Patients with CVD are, however, relatively likely to be using warfarin therapy, and as stopping smoking can increase plasma levels of warfarin it is important to monitor anticoagulant status closely when smoking status changes. Although concern has been raised that varenicline might increase the risk of adverse cardiovascular events, a systematic review found no difference in cardiovascular serious adverse events when comparing varenicline with placebo (38 trials, RR 1.03, 95% CI 0.72–1.49) in patients with or without a cardiovascular history.[53] In a UK study of 14,350 patients with COPD, neither bupropion nor varenicline use were associated with any increase in risk of adverse cardiovascular events compared with NRT.[54] It is in any case highly likely that any cardiovascular risk of taking varenicline, if any exists, is far smaller than the risk of continuing to smoke cigarettes.

4.6.2 Mental health disorders

Smoking cessation interventions using combination behavioural therapy with pharmacotherapy were found to be safe and effective in patients with mental health disorder across a wide spectrum of disorders and inpatient and outpatient settings in the evidence review for NICE PH48.[6] Varenicline and bupropion were both found to be tolerable in the network meta-analysis (a meta-analysis in which three or more treatments are compared using both direct comparisons of interventions within randomised control trials and indirect comparisons across trials based on a common comparator),[55] and did not significantly increase the risk of neuropsychiatric adverse events when compared to placebo or nicotine patch in patients with or without psychiatric disorders.[21] In 2016 the European Medicines Agency removed the black triangle warning symbol that signified a requirement for additional monitoring when used by people with mental health problems from prescribing information for varenicline. Varenicline has no known interactions with psychotropic medication, but bupropion has the potential to interact with several psychotropic medications, including antipsychotics. Bupropion is contraindicated in those with seizure disorders, eating disorders and alcohol dependence. Common side effects include dry mouth, insomnia and headache. NRT is safe and effective for smokers with mental health problems. There is evidence that adding NRT to varenicline or bupropion for smokers with psychosis improves quit rates.[55]

Smoking (as opposed to using nicotine) increases the metabolism of some psychotropic medicines via induction of the CYP450 isoenzyme system (primarily CYP450 1A2). Within the first week of significantly reducing or stopping smoking, plasma levels of affected medicines increase (see Section 3.6).

Doses of these medicines therefore need to be adjusted down following smoking cessation.[56] Plasma levels of clozapine may still be altered for up to 6 months after stopping smoking.[57]

4.6.3 Pregnancy

4.6.3.1 Reaching and supporting pregnant smokers

Pregnancy is probably the life event which most motivates smokers to try stopping; of women who smoke before conception, around 50% make a quit attempt in pregnancy.[58] Despite being so highly motivated towards quitting, however, only around 12% of pregnant smokers use NHS stop smoking services and most make unsupported quit attempts.[59] Women who continue to smoke in pregnancy tend to be younger and socio-economically disadvantaged than those that manage to stop. In pregnancy there are far fewer proven, effective options for helping women to stop smoking.

4.6.3.2 Tailoring support to pregnancy

Counselling interventions in which stop smoking support is delivered are the most researched cessation interventions in pregnancy, and evidence for their effectiveness is stronger than for any other cessation interventions trialled in pregnancy.[60] To be successful, counselling interventions must be delivered by appropriately trained staff in addition to, rather than as part of, routine antenatal care,[60] and compared with usual care, the average RR for smoking cessation by pregnant smokers who receive counselling interventions is 1.44 (95% CI 1.19–1.75).

Self-help support for smoking cessation almost doubles the odds of cessation in late pregnancy (odds ratio 1.83, 95% CI 1.23–2.73).[61] Self-help support is usually provided in a structured programme which a woman works through on her own after minimal, if any, introduction by a health professional. Structured programmes aim to equip women with the skills to combat their nicotine addiction rather than just giving information, and can be delivered by any modality; booklets and DVDs have been used previously. Unfortunately, available self-help support programmes are dated[61] and written in media that are not readily used by young, pregnant women. This probably explains why none are routinely used in the UK to help pregnant smokers to stop.[62] To enable self-help support provision in a readily-accessible format, a prototype self-help support programme (MiQuit) which delivers support by text message has been designed for the UK context[63] and is currently being evaluated.[64] Women can activate this system after reading NHS care leaflets[65] or after seeing online adverts. Three randomised control trials [63,64,66] suggest that MiQuit is very likely to prove

effective and cost-effective and, if this is the case, MiQuit could be used by stop smoking services to reach women who reject face-to-face support or to augment support for those who do.

The evidence that NRT is effective in non-pregnant smokers is strong. In pregnancy, nine randomised controlled trials provide evidence that NRT can help pregnant smokers to stop; the RR for stopping smoking with NRT and behavioural support compared with behavioural support alone is 1.41 (95% CI 1.03–1.93).[67] However, nicotine metabolism is accelerated in pregnancy[68] and so higher-than-standard NRT doses may be necessary to overcome withdrawal symptoms. To date, NRT trials in pregnancy have used single types of NRT (usually a transdermal patch, and in some cases gum) and this probably explains why adherence to NRT has been poor in all of them.[67] Adherence to NRT is also low when pregnant women obtain prescriptions for this as part of routine healthcare; in the UK more than 70% of pregnant smokers who are prescribed NRT receive only one, 2-week prescription[69] and such short treatment courses are likely to be ineffective. If pregnant women's adherence to NRT treatment courses was more complete, it is likely these would be more effective[70] and possibly even as effective as NRT is outside of pregnancy.

Despite understandable concerns over giving NRT (or, indeed, any drug) to pregnant women, trials have been justified on the basis of consensus that exposing the fetus to nicotine from NRT, in the context of an attempt to quit smoking, is much less hazardous than continued exposure to nicotine plus the many toxins and carcinogens emitted from burnt tobacco. From the nine trials of single NRT used for cessation in pregnancy there is no evidence that NRT harms the fetus.[67] Conversely, 2-year follow-up[71] from the largest of these studies[72] suggests that NRT use in pregnancy for cessation may actually be beneficial for the developing infant. In this trial of nicotine patches, infants born in the NRT group were significantly less likely to have developmental impairments at 2 years than those born in the placebo group.[71] Some NHS stop smoking services now provide dual NRT for pregnant women who are trying to stop smoking; dual NRT involves using both a long- and short-acting NRT to deliver higher-than-standard doses of nicotine and, in observational analyses of stop smoking services data, dual NRT use is associated with higher rates of smoking cessation by pregnant women.[73]

4.7 Treating smokers who use the NHS

4.7.1 Treatment guidelines and NHS policy on treating smoking

Evidence-based guidelines on smoking cessation in patients using the NHS, whether in primary or secondary care, mental health or maternity services, universally recommend that:

- All patients should have their smoking status recorded.
- All patients should be offered timely treatment for tobacco dependence at every opportunity.
- All patients should have access to a full range of pharmacotherapy and behavioural support.
- Healthcare workers should be trained to give very brief advice.
- NHS organisations should provide the resources and smoke-free estates to support these objectives.[3–6,10]

Additional recommendations for maternity patients include measuring exhaled carbon monoxide and automatic referral for smoking cessation treatment for current smokers.[4]

Recent national policy documents and goals set out an ambition for widespread treatment of smokers using the NHS in England. The *NHS five year forward view*[74] prioritises prevention of illness, the *NHS outcomes framework 2016 to 2017*[75] outlines goals to reduce premature mortality and management of chronic illness, the *NHS mandate 2017–18*[76] declares fair access to treatment for all patients, the *NHS constitution for England*[77] highlights providing a comprehensive service available to all and *Towards a smokefree generation. A tobacco control plan for England*[78] specifies treatment of tobacco dependence in the NHS. Similar plans published in the other UK nations include *Creating a tobacco-free generation*,[79] a 5-year strategy published in 2013 in Scotland addressing smoking cessation in health settings and smoke-free NHS estates; the *Tobacco control delivery plan for Wales 2017–2020*[80] that outlines specific actions for health services; and in Northern Ireland the *Ten year tobacco control strategy for Northern Ireland*[81] published in 2012, which recognised the importance of health services to treat tobacco dependency.

4.7.2 The case for treating smoking in patients who use the NHS

Current or future health issues are powerful triggers for people to make a quit attempt[82] (Figure 4.4), and advice from healthcare workers influences the likelihood of making a quit attempt more than input from family or friends. Smokers using healthcare services are therefore likely to be relatively motivated to quit smoking.

Smoking quit attempts triggered in healthcare settings are effective. A Cochrane review identified that providing a combination of pharmacotherapy and intensive behavioural support, compared with usual care, in patients recruited in a healthcare setting had a pooled RR of 1.97 (95% CI 1.79–2.18, 43 trials), higher than that for eight trials with community-based recruitment, which had a pooled RR of 1.53 (95% CI 1. 33–1.76, 8 trials).[27] Smokers are overrepresented in the

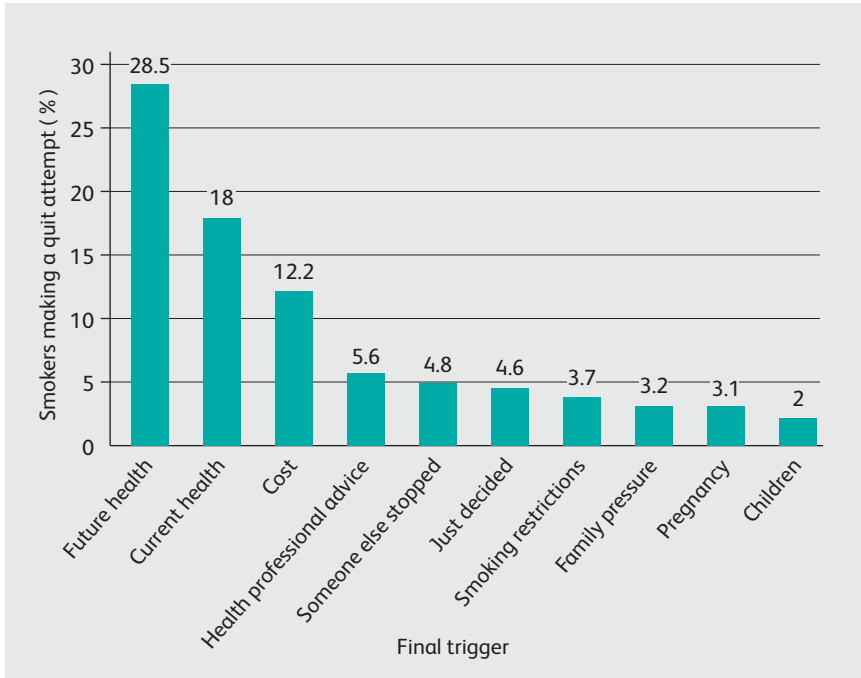

Figure 4.4 Triggers reported as prompting the most recent quit attempt.[82]

population of people who use NHS secondary care services, being around 36% more likely to be admitted to hospital (odds ratio 1.36, 95% CI 1.33–1.39)[83] and in the 2010/11 financial year, 1.1 million smokers, equivalent to over 3,000 per day, were admitted to NHS hospitals in England a total of 2.6 million times.[83] A recent meta-analysis[84] suggested that treatment of tobacco dependence by physicians advising all smokers to quit on medical grounds significantly increased the frequency of quit attempts (RR 1.24, 95% CI 1.16–1.33) and offering both behavioural support and medication generated more quit attempts than advice to quit on medical grounds alone (RR 1.69, 95% CI 1.24–2.31 and RR 1.25, 95% CI 1.25–1.54, respectively).

Finally, treatment of tobacco dependence in the NHS is highly cost-effective. The economic report accompanying the 2018 NICE NG92 guidelines[10] for smoking cessation services and interventions analysed cost-effectiveness for smoking cessation interventions with modelling of six common conditions (lung cancer, stroke, COPD, myocardial infarction, asthma exacerbation and coronary heart disease) caused or exacerbated by smoking. The effectiveness evidence from 30 different interventions, with the costs of interventions ranging from £19 for brief advice to £763 for an extended course of NRT, and intervention effectiveness (quitting smoking) ranging from 9% to 47%, found all to be highly cost-effective.

A threshold analysis showed that even when the lowest quit rate identified in the effectiveness study (9%) is combined with the most expensive intervention (£763 per person), the intervention is still cost-effective.

4.7.3 Implementation of treatment guidelines and policy measures

The essence of NHS tobacco-related guidelines and policy is to ascertain smoking status and treat tobacco dependence in all patients using the NHS. To assess whether these guidelines and policies have been effective, reviewing the data on smoking ascertainment and treatment of patients accessing the NHS would be a logical step. This data capture is considered in detail in Chapter 6 but the broad conclusions are as follows.

- Little data are reported on smoking status in NHS patients as a whole system or by sector or individual NHS provider.
- Some data are collected on the offer of treatment in general practice through the Quality and Outcomes Framework and sporadic secondary care audit.

In addition guidelines on maintaining smoke-free hospital grounds which require acute treatment of tobacco dependency for inpatients, are poorly implemented across UK hospitals.[85] This is discussed further in Chapter 8.

4.7.4 Commissioning and provision of stop smoking services in the NHS

The NHS in England is no longer responsible for commissioning or providing dedicated stop smoking services in any sector of the NHS, and the primary source of access to smoking cessation services for NHS patients in England is therefore now referral to local authority stop smoking services, the funding and delivery of which varies considerably across the country. This split of responsibility for funding cessation support from NHS hospitals and other service providers is inevitably an obstacle to integrated service provision in England, though less so in the devolved nations where health and social care integration is more established (see Chapter 5 for more detailed discussion).

4.7.5 Tobacco dependency treatment for individual NHS patients

When smokers access NHS services or self-refer to a local stop smoking service, the standards and the service they should be able access are set out in new NICE guidance published in March 2018.[10] The guidance makes several recommendations relevant to NHS patients (Box 4.1).

Box 4.1 NICE NG92 recommendations relevant to provision of stop smoking support for NHS patients[10]

- Ensure evidenced-based stop smoking interventions and services are available for everyone who smokes, including brief advice, behavioural support, varenicline, buproprion, long- and short-acting NRT.
- Prioritise specific groups who are at high risk of tobacco-related harm including inpatients, people with mental health disorders, people with conditions made worse by smoking, people with smoking-related illness and pregnant women who smoke.
- Encourage people being referred for elective surgery to stop smoking before their surgery.
- Ensure people have access to trained stop smoking staff.
- Train all frontline healthcare staff to offer brief advice and make referrals to stop smoking services.
- Provide additional specialised training for those working with specific groups, for example people with mental health problems and pregnant women who smoke.
- If people are not ready to stop smoking: make sure they understand that stopping smoking reduces the risk of developing smoking-related illnesses or worsening conditions affected by smoking, ask them to think about adopting a harm reduction approach, encourage them to seek help to quit in the future, record the fact that they smoke and ask them about it again at every opportunity.
- For people who smoke and who are using or are interested in using a nicotine-containing e-cigarette to quit smoking explain that although these products are not licensed medicines, they are regulated by the Tobacco and Related Products Regulations 2016; and that many people have found them helpful to quit smoking cigarettes.

4.7.6 Smoking cessation and clinical management guidelines, patient pathways and care bundles

Helping smokers to quit smoking should be a particular priority in the management of diseases caused by and/or exacerbated by smoking. However, a recent systematic review of 144 UK or European guidelines on tobacco-related diseases found that only 60% identified smoking as a risk factor for the disease in question, only 40% recommended smoking cessation in disease management, and only 19% provided detailed support on how to deliver stop smoking intervention (Table 4.1).[86]

This under-emphasis on treating tobacco dependence is likely to contribute to the failure of those delivering these guidelines to engage in treating smoking. For

Table 4.1 Summary of review of smoking intervention content in clinical guidelines on management of smoking-related diseases[86]

Disease	Number of guidelines referring to smoking			
	Number of guidelines included	Smoking as a risk factor	Smoking cessation is advised	Specific treatment/ reference to guideline is provided
Cancer				
Lip, oral cavity and pharynx	2	2	2	2
Oesophagus	8	4	3	1
Lung	26	21	14	4
Gastric	16	10	4	1
Pancreas	14	3	1	1
Kidney, pelvis and bladder	35	19	1	0
Cerebrovascular disease	11	5	6	0
Cardiovascular disease	21	13	17	13
Respiratory disease	11	9	9	6
TOTAL	**144**	**86 (60%)**	**57 (40%)**	**28 (19%)**

example, specialist care in hospitals is supported by multidisciplinary team (MDT) meetings in many specific diseases and disease pathways. The most well-developed of these are the cancer MDTs, in which diagnostic tests and treatments are directed for people with suspected or confirmed cancer. MDTs are commissioned, and cancer pathways and outcomes are strictly monitored and performance-managed. However, although tobacco is the biggest single preventable cause of all cancers, patients with cancer are particularly likely to be smokers, and treatment of tobacco dependency after cancer diagnosis improves cancer outcomes (see Chapter 2), data on smoking status and smoking intervention delivery are not routinely recorded in cancer management protocols and MDTs are not required to address tobacco dependency. The *Cancer outcome and services dataset*[87] that collects data for all patients diagnosed with cancer each year, demonstrates that smoking status was recorded as 'unknown' in almost 40,000 people in 2016 (see Chapter 6).

Guidelines usually encompass the care of a patient across a whole disease pathway, with the aim of driving up standards and reducing unwarranted variation. Bundles are a discrete set of evidenced-based interventions, usually in the form of a list, often focused on a specific time point or element of care, which, when completed reliably, improve patient outcomes. Bundles have been found to be effective in a variety of medical conditions and settings including critical care,[88] surgery[89] and across several hospital departments.[90] Bundles that include treatment of tobacco dependence have been used in COPD, and have been shown significantly to improve ascertainment and management of smoking.[91,92] The COPD discharge bundle with the smoking cessation element included now forms part of the 'best practice tariff' (see Chapter 5) for patients admitted to English hospitals.

4.7.7 Opt-out models

The most recent estimates from the Smoking Toolkit Study suggest that over 50% of quit attempts are made with no support, and that less than 5% used NHS support or prescription NRT,[2] despite a combination of behavioural support and pharmacotherapy being accepted as the most effective way to support smokers to quit. One reason for this low use of evidence-based support may at least in part be explained by the way that tobacco dependence treatment is structured, and specifically that the default treatment option in most NHS settings is no treatment. Healthcare professionals are encouraged to assess motivation to quit, and to offer support to quit to those smokers who report that they are ready to do so, in what is in essence an 'opt-in' treatment model. This is contrary to interventions for many or most other chronic conditions in healthcare, for which the default position is to provide evidence-based healthcare as soon as the condition is identified. Most routine chronic disease management is thus provided on an 'opt-out' basis.

Applying opt-out models to smoking intervention increases quitting. In antenatal care settings, the use of exhaled carbon monoxide monitoring to identify smokers and referring for cessation support on an opt-out basis doubles referrals and doubles quit rates.[93] These referral methods have proved to be acceptable to the staff tasked with implementing them[94] and also to patients.[95] Opt-out models have similar effects in general secondary care settings: a study in the UK documented a doubling of uptake of support and quit rates when inpatient smokers were systematically identified and offered support as a default,[96] and similar findings have been reported from the USA.[97,98] The Ottawa Model for Smoking Cessation (OMSC)[99] also uses systematic methods of identifying smokers and providing evidence-based cessation support. Key components include documentation of smoking status, inclusion of cessation intervention on patient care maps, individualised

bedside counselling by a nurse counsellor, appropriate and timely use of NRT, automated telephone follow-up, referral to outpatient cessation sources and training of clinical staff. A specialist database provides automated follow-up to smokers, providing up to nine automated calls or emails to monitor quitting progress and flags patients who indicate during their automated call that they need contact from a smoking cessation specialist. The OMSC was subsequently adapted for use in primary care and has now been tested in more than 350 secondary and primary care settings across Canada, proving effective in increasing delivery of support and quit rates in both settings.[100,101]

4.8 Cost-effectiveness of smoking cessation in relation to therapies used routinely to treat diseases caused by smoking

We have searched for cost–utility analyses (CUAs) of smoking cessation interventions, and compared these with CUAs for a range of routine standard practice or other widely used therapies and interventions identified in searches of NICE guidelines for two major disease areas caused by smoking: stable COPD[102] and cardiovascular diseases including acute coronary syndrome, heart failure, myocardial infarction, stroke and stable angina.[103–105] The information was obtained from the NICE website, NHS Economic Evaluation Database (NHS EED) and Health Technology Assessment (HTA) databases.

The median incremental cost-effectiveness ratios (ICERs) of smoking cessation interventions and of COPD, statin and other CVD treatments were £634, £16,228, £11,103 and £7,556, respectively. Only one COPD and three CVD base-case estimates had ICERs lower than the median for smoking cessation interventions (Figure 4.5), indicating that smoking cessation interventions are not only cost-effective in their own right, but especially so in relation to routine therapies for diseases caused or exacerbated by smoking that clinicians prioritise over smoking cessation.

4.9 Summary

- Smoking cessation interventions are highly effective and cost-effective in treating tobacco dependence in all patient groups.
- Smoking cessation interventions are also far more cost-effective than many of the treatments and interventions used routinely to treat smoking-related diseases.
- The most effective interventions combine behavioural therapy with pharmacotherapy.

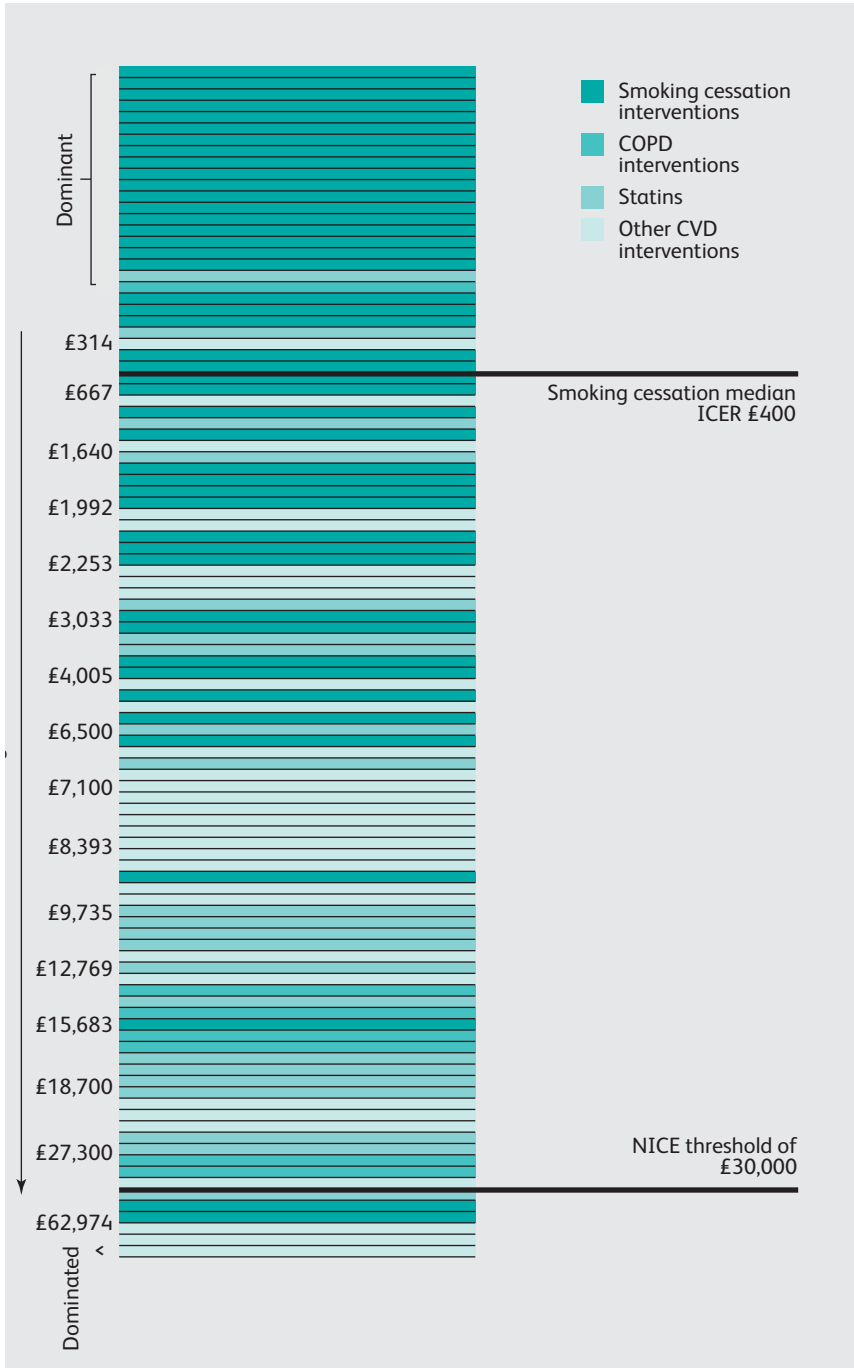

Figure 4.5 Smoking, and routine COPD and cardiovascular interventions ranked by ICER.

- E-cigarettes are the most popular smoking cessation aid in the UK and are also effective in helping people to stop smoking.
- Digital aids and financial incentives can be effective in quit attempts.
- The NHS has an enriched population of current smokers, many of whom want to quit.
- NHS policy, guidelines and financial commissioning tools encourage smokers using the NHS to be identified and treated for tobacco dependency with maintenance of smoke-free hospital grounds.
- However, ascertainment and treatment of smokers using NHS services is not well embedded in service designs, patient pathways or disease treatment guidelines, and typically use opt-in designs. Smoke-free hospital grounds are rarely maintained.
- Systems in which smokers are systematically identified and offered treatment on an opt-out basis generate approximately double the quit rates achieved by opt-in approaches.
- Making opt-out treatment of tobacco dependency a systematic and routine component of all NHS care is therefore likely to increase smoking cessation dramatically among NHS patients.

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5 Commissioning stop smoking interventions in the NHS

5.1 Introduction

In the 1940s William Beveridge, a social reformer, designed the UK's healthcare system, which was financed by the government through tax payments and managed through a central planning function which defined the services required by the population and how they would be delivered.[1] In the modern NHS in England, much of this planning function has been devolved to allow greater local control and flexibility in the way services are provided,[2] which has had important implications for the commissioning and availability of services to help smokers to quit.[3]

The preceding chapters have discussed the impact of tobacco on health; the financial costs of smoking to the NHS, particularly in secondary care; and the effectiveness and cost-effectiveness of treating tobacco dependence. This chapter discusses NHS commissioning to explore where the money comes from to pay for stop smoking services, where and how much money is spent, how decisions are made, the impact on patients in the NHS and the tensions that arise from the funding structure, before proposing a new model for an NHS stop smoking service.

The focus of the discussion is primarily the NHS in England, for which the organisational structure of smoking service funding is summarised in Figure 5.1, and in which smoking services are now delivered independently from NHS patient services. The different, and for the most part simpler and more direct, funding structures retained in the other devolved nations are also described in this chapter.

5.2 Expenditure on the NHS, public health and stop smoking services

In 2015, government expenditure on healthcare, via the Department of Health in the UK was £147.1 billion, of which £7.4 billion (5.0% of government healthcare

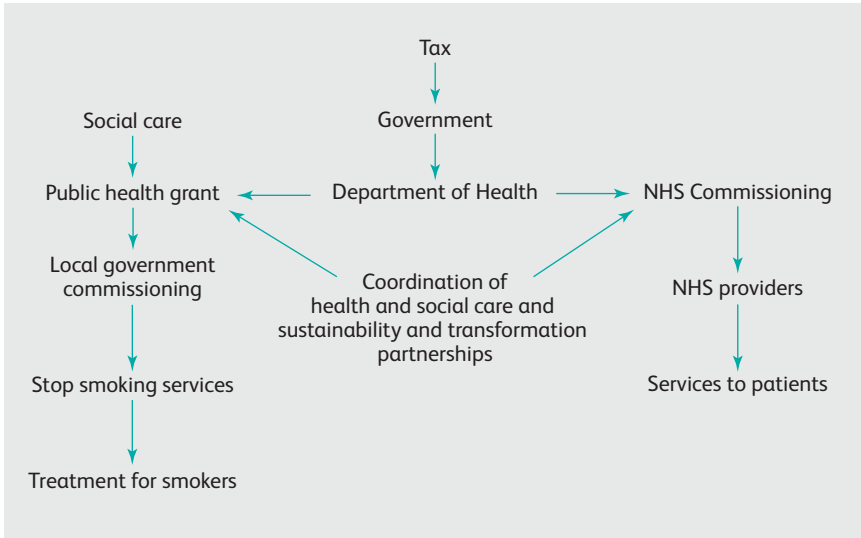

Figure 5.1 The relation between health, social care and stop smoking services in England.

expenditure) was spent on a range of 'preventative care' activities.[4] Spending on stop smoking services across the UK is a component of the 32.6% of the preventive care budget spent on education and counselling, a category which also includes services for alcohol and substance misuse, sexual health, obesity and other health promotion.[4] Government health spending on the treatment of tobacco dependence thus represents a tiny fraction of the preventive care budget, which, as in other countries, is disproportionately small as a proportion of the healthcare costs associated with smoking.[5,6]

5.3 Commissioning the health service and public health in England

Commissioning as a discrete function within the NHS in England began in 1991. Until then, local health authorities organised both the planning and the delivery of services for their patients, but in 1991 this function was split to create 'purchasers' and 'providers' in the local health system.[7] Over time, the commissioning function was split between general practice (GP fundholding) and primary care trusts (PCTs), the successors to the local health authorities.[8]

Public health services, which include stop smoking services, were part of the NHS and commissioned by PCTs until 2013, when the Health and Social Care Act 2012[2] transferred the public health function and budget from the NHS to local authorities. The 2012 Act also established clinical commissioning groups

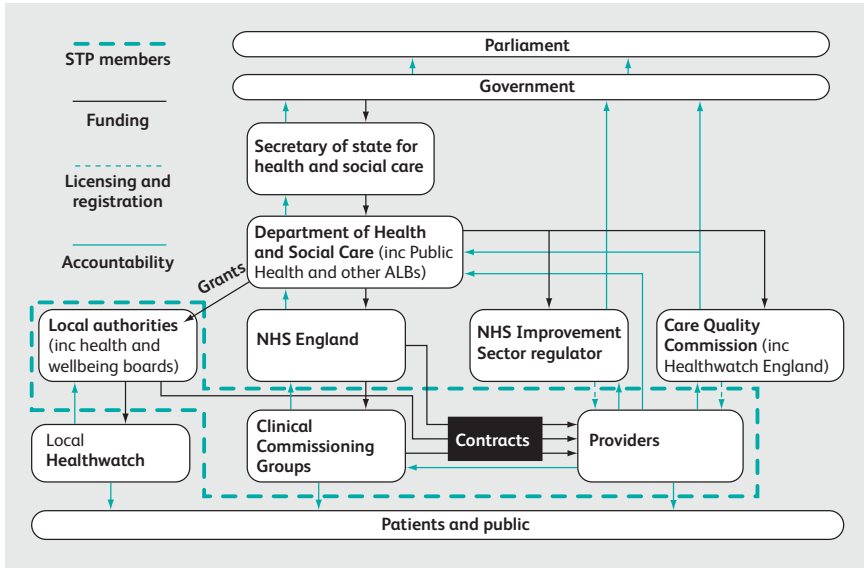

Figure 5.2 Flow of funding in the English NHS.[1] ALBs, arm's length bodies; STP, sustainability and transformation partnership.

(CCGs) as the commissioners of services that remained in the NHS (Figure 5.2). 'Upper tier' local authorities – comprising counties, metropolitan boroughs and London boroughs – thus became responsible for commissioning stop smoking services. Funding was provided through a ring-fenced grant from the Department of Health, but allowed considerable scope for local authorities to decide for themselves how to use the grant. This flexibility was consistent with the rationale for the reorganisation, which was to encourage local action on the wider determinants of health, but also created tensions as to how the resources should be spent.[9] Local authorities also inherited from the NHS the costs of providing stop smoking medications to people using stop smoking services.

5.4 Local government and stop smoking services in England

Following the transition of public health services to local authorities, the public health grant initially rose, but in 2015 the Treasury made an in-year cut to the grant of 6.2% and announced further cuts of nearly 4% per year in the 2015 Spending Review. As a result, the public health grant in 2017/18 was worth less, in real terms, than in 2013/14 on a like-for-like basis.[10] Over the same period, local authorities have also been struggling to manage deep cuts to their overall government grants, which have contrasted with an actual rise in NHS funding (Table 5.1).[11–13]

Table 5.1 Local authority central government grants and NHS England funding since 2013/14[11–13]

	Financial year				
	2013/14	2014/15	2015/16	2016/17	2017/18
Local authority central government grants (England) (£ billion)	64.58	61.31	57.09	54.01	50.19
Percentage of total local authority expenditure coming from central government	67.00 %	63.90 %	60.40 %	57.40 %	53.10 %
NHS England funding (£ billion)	94.21	97.59	100.28	104.80	109.30

Spending on stop smoking services by local authorities in England amounted to approximately £111 million in 2015/16, and to a budgeted £105 and £89 million in 2016/17 and 2017/18, respectively (Figure 5.3).[14] The fall in spending has differed considerably between the English regions (Figure 5.4) and local

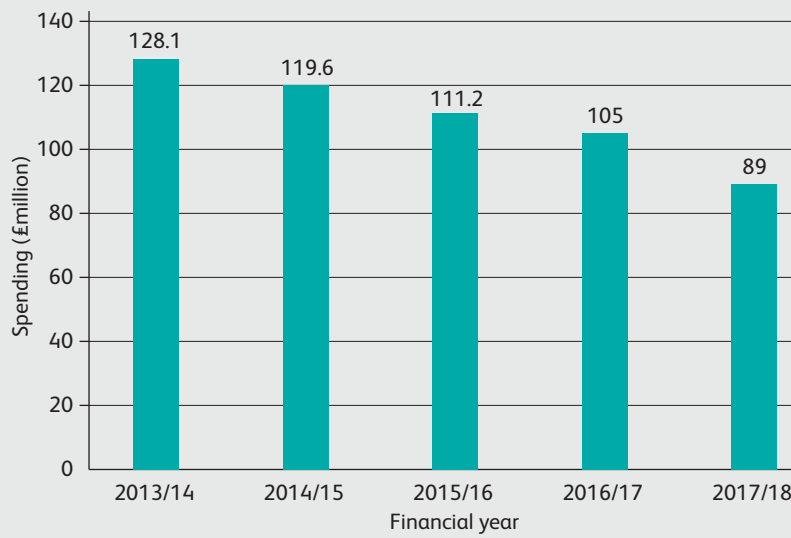

Figure 5.3 Spending (£ millions) on smoking cessation services in England 2013/14–2017/18.[14]

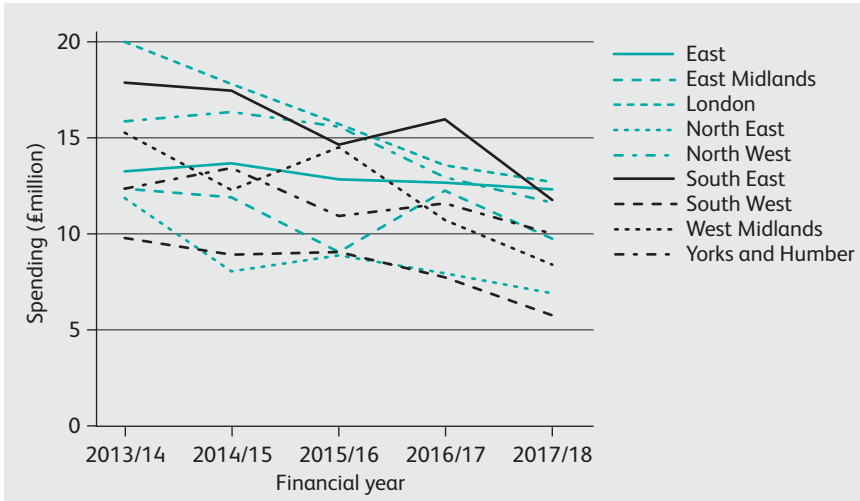

Figure 5.4 Trends in spending on smoking cessation in England by region 2013/14–2017/18.[14]

authorities, though in 2015, 39% of local authorities cut their budgets for stop smoking services; in 2016, 59% made cuts; and in 2017, 50% cut their budgets. Among the 90% of local authorities that hold budgets for stop smoking medications, 34% cut these budgets in 2017, on top of cuts in 44% of local authorities in 2016.[3]

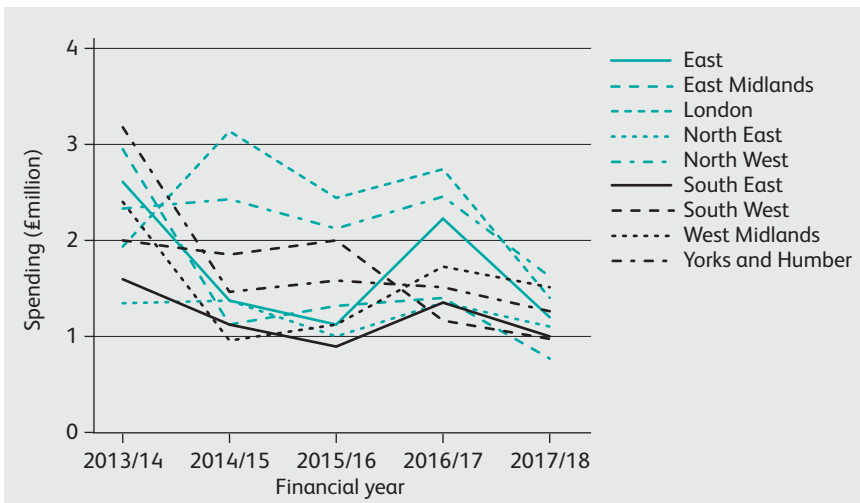

Figure 5.5 Spending on other tobacco control activity in England by region 2013/14–2017/18.[14]

Local authorities typically have separate budgets for stop smoking services and for wider tobacco control work, such as tackling the illicit trade in tobacco products, promoting smoke-free environments, and media campaigns to prevent smoking. These wider tobacco control budgets were always much smaller than those for stop smoking services, but have also been widely cut, from £20.2 million in 2013/14 to £10.8 million in 2017/18.[14] Again, there is variation in the extent of the changes in these budgets between regions (Figure 5.5), but a third of local authorities no longer had a distinct budget for tobacco control in 2017.[14]

5.4.1 Local government decision making – prioritisation, return on investment, unwarranted variation and service specification

5.4.1.1 Prioritisation

Local authorities' public health commissioning decisions are based on a range of factors including local political priorities, national guidance, financial constraints, data analysis (including Public Health England's CleaR assessment),[15] return on investment (ROI) and the needs of the local population, as described in joint strategic needs assessments (JSNAs).[16]

However, local political priorities play a greater role in local government decision making than in the wider NHS,[17] making tobacco control and stop smoking service budgets vulnerable in the absence of local support. In 2016, 27% of tobacco control leads in local authorities felt that tobacco control enjoyed a high priority within their authority, and cuts were made to stop smoking service budgets in 40% of these. In the 8% of authorities in which the tobacco control leads felt the priority afforded to tobacco control was low, cuts were made in all.[18]

These successive cuts to stop smoking service budgets have substantially diminished the support available to smokers in England. In 2013, when the NHS relinquished responsibility for commissioning stop smoking services, all smokers could access a local specialist stop smoking service. In 2017, this universal specialist offer was available in only 61% of local authorities.[18,19]

5.4.1.2 ROI

Commissioners of local stop smoking services have access to the NICE tobacco return on investment tool, which compares different portfolios of stop smoking interventions and models their economic returns over different timescales.[20] Commissioners assess ROI over a specific time horizon and clearly define the cost and benefit data. Public health commissioners also need to compare the ROI of different services, as well as the results of the JSNA, before deciding how much to spend on smoking cessation.

Using ROI in commissioning decision making can be difficult as the following may all have an adverse influence on the commissioning of stop smoking services:

- Short timelines may be used to calculate returns.
- Money to pay for the costs of running the service may not be available within annual budgets.
- The financial returns on investment may be judged to accrue disproportionately to other partners within a commissioning coalition.
- There may be political pressure over particular issues or measured targets (such as emergency department 4-hour waits).

ROI is therefore an important decision-making tool in local government, but use of ROI in some but not all areas of health planning can disadvantage public health.[21]

5.4.1.3 Unwarranted variation data

Unwarranted variation refers to appreciable differences in health outcomes or process measures that cannot be explained by chance or by underlying differences in disease prevalence or severity or medical need. Variation that arises from healthcare innovation and improvement is good, and provides models that might be appropriate for others to adopt. Variation arising from poor or inappropriate services identifies areas for improvement.

Assumptions about the causes of variation and whether it is unwarranted may be difficult to resolve, but commissioners of smoking services can use data from a variety of sources to identify unwarranted variation and to guide their decisions. These include Local Tobacco Control Profiles,[22] stop smoking service returns,[14] Smoking Status at the Time of Delivery data[23] and NHS Right Care data packs[24] (see Chapter 6 for further details).

5.4.1.4 Stop smoking service specification and payment systems

Stop smoking services offer many different interventions, including face-to-face support, telephone helplines and web-based delivery (see Chapter 4), and there is significant variation in the local models of service structure that are commissioned. Also, some local authorities deliver stop smoking services using in-house capacity, while others put this work out for tender to allow other providers, including commercial companies, to bid to deliver services. In response to financial pressures some local authorities have restricted their specialist services to high prevalence or other priority groups (such as pregnant women or mental health patients) only; others have decommissioned specialist services and integrated stop smoking support into services offered for broader

lifestyle changes, such as reducing alcohol or weight reduction; some now offer support only from GPs and pharmacists; and an increasing number now offer no support whatsoever.[3] In areas where local authorities have retained responsibility for funding stop smoking pharmacotherapies, this reduction in service provision also limits smokers' access to medicines as well as behavioural support.

Commissioning teams in some local authorities make payments for stop smoking services delivered by external providers, for example from the independent sector, or from community interest companies or NHS providers. If the stop smoking provider is an in-house local authority element of a public health department, then it would have an individual budget as part of the overall departmental budget. Payment systems can include block contracts for stop smoking services or contributions to integrated lifestyle services and may involve higher tariffs for treating priority groups such as pregnant women, those with poor mental health, or routine and manual workers. Part of the budget allocated for stop smoking services would typically be used to pay for subcontracted services from community pharmacists and practice nurses in primary care.

Under a tariff system, the payment would generally include a fixed amount for every individual setting a quit date, a further amount for each person achieving a 4-week quit, and sometimes an additional payment for carbon monoxide validation. There may be further payment-by-results incentives for 12-week quits, and penalties for under-performance. Tariff payments may or may not include payment for pharmacotherapy.

National guidelines recommend that stop smoking support is provided to NHS patients,[25–28] but local authorities commission these services, specify how they are configured, and determine whether they will provide a direct service to patients within the NHS. Typically, smokers using NHS services are referred to stop smoking services through electronic or paper-based systems, but in some cases dedicated specialist practitioners are 'hosted' within NHS organisations (eg hospitals) to provide treatment directly to smokers on site, and sometimes to train other healthcare staff in cessation intervention. Some services set up 'service level agreements' or other contracts between the stop smoking service and the NHS provider, in which healthcare professionals are trained to deliver some or all support within pharmacies, GP surgeries and hospitals and receive a payment for doing so. However, the transfer of budgets for stop smoking services from the NHS to local authorities has inevitably introduced disjunction into service provision, particularly within the NHS, where delivering stop smoking services to patients is no longer regarded as an NHS responsibility.

5.5 Commissioning in the NHS and stop smoking treatment in England

Since the 2013 Health and Social Care Act moved smoking cessation services to local authorities the NHS is not required to commission services for NHS patients, and there is currently no NHS standard tariff for providing stop smoking support to hospital patients. Some CCGs have elected to pay for smoking cessation pharmacotherapy, while some NHS organisations hold service level agreements with local authority stop smoking services or host its staff, but the majority of English NHS patients who smoke can only access treatment for tobacco dependence outside the NHS. This split presents challenges to the NHS, not least in delivering care in accordance with NICE guidance,[27,28] but also in delivering on the NHS Standard Contract and respecting the NHS constitution.[29]

5.5.1 The NHS Standard Contract

NHS England has mandated that commissioners use the NHS Standard Contract for all contracts for health services other than primary care.[30] These contracts were traditionally updated annually, but from 2017 the contract period has been extended to 2 years, to facilitate a longer planning cycle for NHS commissioners and providers. The current NHS Standard Contract (2017–2019) refers to smoking in two areas:

- Service Development and Improvement Plans (SDIPs)
- Commissioning for Quality and Innovation (CQUIN).

5.5.1.1 SDIPs

SDIPs express agreed actions aimed at improving services and are binding once included in the contract. One of the two areas for commissioners to agree SDIPs for 2017–2019 relates to smoke-free premises and specifies that commissioners 'should set out what action providers will take to ensure that their premises, grounds and vehicles are smoke free by no later than 31 December 2018'.[30] This specification 'applies to providers of acute, maternity and mental health services'.[30]

5.5.1.2 CQUIN

The CQUIN framework was introduced in 2009 and covers acute care, ambulance, mental health, community and learning disability services, NHS 111, integrated care providers, care homes and non-NHS providers of other services. CQUIN is designed to support the ambitions of the *NHS five year forward view*[31] and link directly to *The NHS mandate 2017–18*.[32] The CQUIN framework

supports improvements in the quality of services and the creation of new, improved patterns of care, and CQUINs are set out as part of the NHS Standard Contract. CQUIN goals were initially locally identified and negotiated quality improvement goals to encourage ownership and engagement of clinical teams, providers and commissioners. Subsequently national CQUIN indicators were introduced alongside local CQUINS. Criteria to demonstrate the attainment of the CQUIN indicator and the payment of the incentive are decided locally between providers and commissioners for those CQUINS that are not nationally mandated. In 2017–2019 a tobacco-related CQUIN is specified which includes the identification of smokers, delivery of brief advice and referral for treatment (see Section 5.5.2.2 below).

5.5.2 Using incentives and penalties in NHS commissioning

Commissioners in the NHS have long used a system of penalties or incentives alongside standard contracts to drive up quality and the delivery of service specifications, and these are sometimes referred to as 'pay for performance' schemes. In England, general practice uses the Quality and Outcomes Framework (QOF), while in secondary care commissioners can use CQUIN and best practice tariffs (BPTs). Financial incentives have been applied to the treatment of tobacco dependency as a commissioning tool, with varying degrees of effectiveness.

5.5.2.1 The QOF

The QOF, a performance-related pay system, was introduced into the UK General Practice Contract in 2004 and now governs approximately 30% of GP income. Under the QOF, GPs earn 'QOF points' for compliance with 'QOF targets' which set standards for the delivery of health care. Compliance is demonstrated by electronic audits of patient medical records. Earned QOF points are rewarded in the performance-related element of GP income.

From 2004 to 2012, QOF targets incentivised GPs to record the smoking status of all patients, and to deliver brief stop-smoking advice to those with selected smoking-related conditions. Annually, minor changes were made to targets: for example, the list of smoking-related conditions was added to and the periodicity with which smoking data needed recording was amended. However, the most radical QOF revision occurred in 2012 when, for the first time, QOF targets incentivised GPs to 'offer support and treatment' to all smokers, whether or not they had a smoking-related illness. 'Support and treatment' was envisaged to include referral to stop smoking services and provision of pharmacotherapy.

When the QOF was first introduced there were immediate increases in GP recording of both patients' smoking status and the delivery of smoking cessation

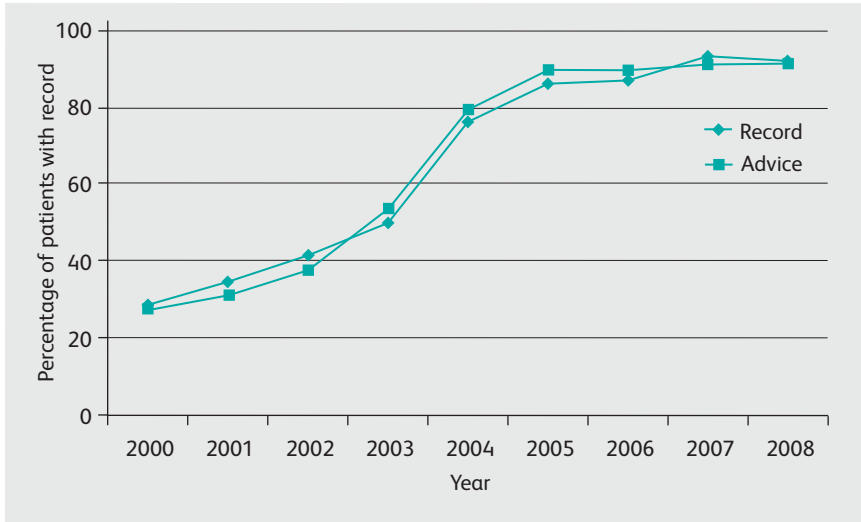

Figure 5.6 Recording of smoking status and advice in patients with comorbidities before and after QOF introduction in 2004.[34]

advice,[33] particularly in smokers with the comorbidities identified in the QOF targets[34] (Figure 5.6). Referrals from GPs to stop smoking services also increased after QOF targets were extended to all smokers in 2012.[35] Both before and after 2012, however, the QOF appears to have had no impact on GPs' rates of prescribing nicotine addiction treatments such as nicotine replacement therapy, bupropion or varenicline.[33,35]

The QOF experience thus demonstrates that data-driven clinical targets coupled with financial incentives can change clinician behaviour, but that the nature of the targets chosen is crucial to the nature of the behaviour change achieved. QOF targets have increased smoking ascertainment and referral, but not necessarily the delivery of stop smoking support to patients by GPs.

5.5.2.2 CQUIN

An evaluation of the CQUIN framework published in 2013 found that smoking-related CQUIN goals were present in 39% of acute and community-provider local schemes between 2009 and 2011.[36] The CQUIN scheme currently includes 13 indicators which aim to improve quality and outcomes for patients including reducing health inequalities, encourage collaboration across different providers and improve the working life of NHS staff.[37] One of these indicators focuses on smoking cessation, under 'preventing ill health by risky behaviours – alcohol and tobacco'. The goal is 'to support people to change their behaviour to reduce the risk to their health from alcohol and tobacco'. It is relevant to community and

Table 5.2 The components and weighting of the national tobacco CQUIN[37]

National CQUIN	Indicator	Indicator weighting (% of CQUIN scheme available)
CQUIN 9 – Tobacco	**9a Tobacco screening** Percentage of unique adult patients screened for smoking status and whose results are recorded.	5 % of 0.25 % (0.0125 %)
	9b Tobacco brief advice Percentage of unique patients who smoke and are given very brief advice.	20 % of 0.25 % (0.05 %)
	9c Tobacco referral and medication offer Percentage of unique patients who are smokers and are referred to stop smoking services and offered stop smoking medication.	25 % of 0.25 % (0.0625 %)

mental health providers in both 2017/18 and 2018/19, and to acute providers in 2018/19. It is anticipated that acute providers will begin planning activities in 2017/18 to facilitate a smooth and effective delivery in 2018/19. Three parts of the indicator relating to smoking are shown in Table 5.2.

In the period 2017–2019 CQUIN payments for all 13 indicators will total up to 2.5% (with the tobacco CQUIN contributing 0.25% to the total 2.5%) of the 'actual annual value', which is the total 'of all payments made to a provider for services delivered under the specific contract during the contract year, not including CQUIN and other incentive payments and after any deductions or withholdings, subject to certain exclusions'.[37] An evaluation of the impact of the national tobacco-related CQUIN is planned.

5.5.2.3 BPTs

A BPT is a national tariff designed to reduce unexplained variation in clinical quality and incentivise high quality, cost-effective care. The price differential between best practice and usual care tariffs is calculated to ensure that the expected costs of undertaking best practice are reflected, and to create an incentive for providers to shift from usual care to best practice. BPTs include a

number of pricing models, including paying for best practice, incentivising day-case and streamlined care pathways.[38]

A BPT for COPD was introduced in 2017/18 and will be in place for 2017/18 and 2018/19. It takes the form of an additional payment made only if all specified characteristics of best practice are achieved. These include receipt of a discharge bundle before leaving hospital which includes smoking status ascertainment and support to quit. Attainment against the COPD BPT will be measured by the National COPD Audit Programme's continuous secondary care audit.[39]

5.5.2.4 Evaluation of the different incentive schemes

Secondary care financial incentive schemes were evaluated in a report commissioned by the Department of Health and published in 2013.[36] The report focused mainly on CQUIN but also considered BPTs. The report concluded that:

> *Assessing the impact of CQUIN on quality is problematic due to the wide range of schemes and indicators which characterise the national CQUIN picture. Based on the evidence in our report, however, the impact has been disappointing. Whilst the theory underpinning CQUIN has some validity, its implementation departs substantially from that theory. Financial incentive schemes can place a heavy burden on participants. It is important, therefore, that we learn lessons from CQUIN and other schemes if the benefits of such schemes are to outweigh the costs.*[36]

The researchers found that as CQUIN schemes often introduced new indicators and dropped existing ones on a regular basis, performance often fell after indicators were dropped. Local CQUIN schemes could sometimes could be influenced by clinicians and managers who set easily achievable goals which did not necessarily deliver the desired quality improvements. CQUIN payments based on an 'all or nothing' approach sometimes deterred organisations from seeking to improve quality targets if they believe them to be unachievable, and as CQUIN generally resulted in one-off payments, providers were sometimes reluctant to invest in service improvements with non-recurrent funding. In contrast, BPTs tended to focus on a smaller number of nationally determined indicators linked to high impact changes, which in the opinion of researchers was a more focused and sustainable approach than CQUIN. Getting engagement from clinicians for incentives was identified to be challenging with either method. The researchers identified several lessons to be learnt from CQUIN and BPT for the design of financial incentives, including the need to use longer rather than short-term incentive cycles; avoiding local indicator development; focusing on a small number of indicators linked to high impact changes; avoiding 'all or nothing' payment rules; and identifying mechanisms to engage clinicians.[36]

5.6 Integrating health and social care in England

We have seen in earlier sections in this chapter that the commissioning and provision of stop smoking services in the NHS and local authorities in England has become fragmented. There is recognition that health and social care services in England need better planning and integration to meet the needs of their population. The Health and Social Care Act in 2013[40] legislated for health and wellbeing boards to serve this function in part, and the more recent creation of 44 sustainability and transformation partnerships (STPs) in England has taken this concept further.[41] STPs have a responsibility for the health and social care needs and budgets of large geographic regions, are plans that are influenced by national policy, including the *NHS five year forward view*[31] which set out a vision for healthcare in the UK with an emphasis on prevention. Of the STP plans published in 2017, 75% reference work on tackling tobacco directly, although it is unclear whether plans include more resources for smoking cessation, or focus on the treatment of patients accessing the NHS, or other tobacco control activities.

In addition to STPs, The Care Act 2014 provided the legislative framework for another form of integration of health and social care called the 'Better Care Fund' (BCF). The BCF is designed to support transformation in integrated care and has been used by CCGs and local authorities to attempt to transform locally delivered services, based on a shared plan and a defined pooled budget. The BCF pooled budget amounted to more than £5 billion in 2015/16, but it is unclear whether BCF has contributed to the integration of smoking cessation service provision across local government and CCGs.

5.7 Commissioning stop smoking services in the devolved nations

5.7.1 Scotland

Scotland's legislation requiring integration of health and social care[42] came into effect in April 2016 and new integration authorities now have responsibility for over £8 billion of funding for local services. Thirty-two health and social care partnerships (HSCPs) were formed as part of the integration of services provided by health boards and councils in Scotland.

While NHS Scotland delivers smoking cessation services, HSCPs have a responsibility to deliver on the national health and wellbeing outcomes set by the Scottish Government, including supporting people to maintain their own health and wellbeing, helping people to have a positive quality of life, and contributing to a reduction in health inequalities. In February 2017 Scotland's chief medical officer announced[43] that a Scottish Atlas of Variation would be published and

this too will seek to address inequalities in smoking prevalence. The Scottish Government also aspires to have a health-promoting health service, as stated in a 2012 Chief Executive's letter[44] on action in health settings, which expressed an aim 'to ensure dedicated specialist smoking cessation support is available within the hospital/acute setting which is integrated with community-based cessation services'.

Smoking cessation services in Scotland were established in 1999 and are delivered by NHS Scotland via 14 regional NHS boards, a public health service national community pharmacy smoking cessation service (introduced in 2009), a national telephone support line and supporting website,[45] and brief intervention delivery and referral into services from a range of health and other professionals. Scotland has its own guidelines on planning and providing specialist smoking services, on helping smokers to stop, and on e-cigarettes and harm reduction.[46] Furthermore, the Scottish Government abolished prescription charges on 1 April 2011, so all prescribed NHS stop smoking medication (NRT products, varenicline and bupropion) in Scotland is free. Priority groups for specialist smoking cessation services include pregnant women, young people, people with mental health problems, prisoners and those living in disadvantaged areas. Funding for NHS Scotland smoking cessation services is provided to NHS boards by Scottish Government, but the national community pharmacy smoking cessation service and the telephone helpline service are funded separately.

Relative to England, therefore, stop smoking services in Scotland have remained relatively accessible and, unlike those in England, make pharmacotherapy available free of charge. However, as in England, uptake of the services increased to a peak in 2011/12 and has since fallen (Figure 5.7).[47] In relative terms the magnitude of the fall in numbers, of around 50% in Scotland, is smaller than that in England (62%, see Figure 1.1), but the implication of these data is that while reductions in local funding for services, and hence service availability and accessibility, in England may have contributed to the decline in number of smokers using the services, reduced funding is not the primary cause of the marked decline in service uptake.

5.7.2 Northern Ireland

Northern Ireland has had an integrated system of health and social care since 1973, with one overall commissioner commissioning health and social care services from five local provider trusts and one regional trust. The budget is fully shared and pooled. All acute, community and social services are provided by the local provider trusts. The Department of Health in Northern Ireland published a review of commissioning arrangements in November 2015.[48] As a result, a move

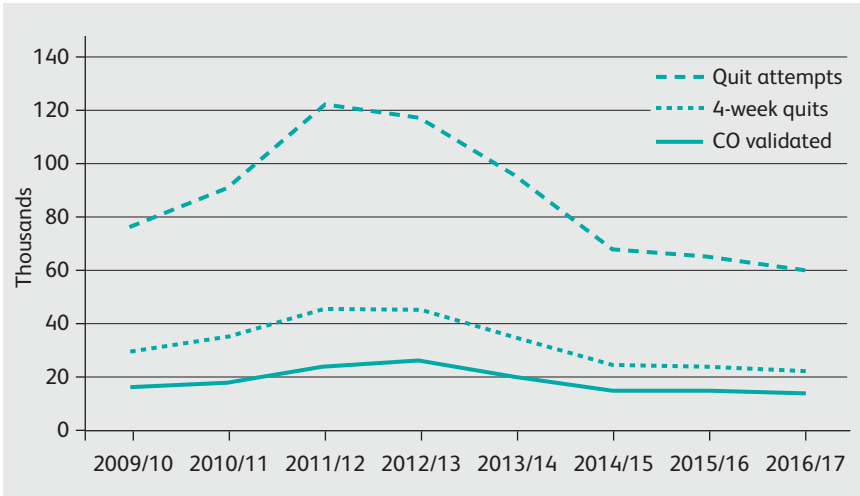

Figure 5.7 Number of smokers setting a quit date, and self-reported and CO validated quitting at 4 weeks, in NHS Stop Smoking Service in Scotland 2009/10–2016/17.[47]

away from a separate commissioning function is planned. This responsibility will be devolved to the provider trusts.

There are over 600 support services in Northern Ireland for people who want to stop smoking, based in GP surgeries, community pharmacies, hospitals, community centres and workplaces. The Public Health Agency works with local councils to enforce smoking legislation. Smokers can order a 'Quit kit' free of charge through the 'Want 2 stop' website.[49] National data on stop smoking service use[50] indicate the number of individuals setting a quit date reached a peak in 2011/12,[51] and that there has since been a sustained decline in the number of people setting a quit date through the stop smoking services, by 52%, from 39,204 in 2011/12 to 18,637 in 2016/17 (Figure 5.8).

5.7.3 Wales

The seven local health boards in Wales commission and provide primary, secondary and community health services to the Welsh population. Since the NHS (Wales) Act 2006,[53] local authorities and health boards have been able to operate pooled budgets.

In May 2014, the Welsh Assembly passed the Social Services and Well-being (Wales) Act 2014.[54] The regulations associated with this Act require local authorities and health boards to work together on the joint assessment of local

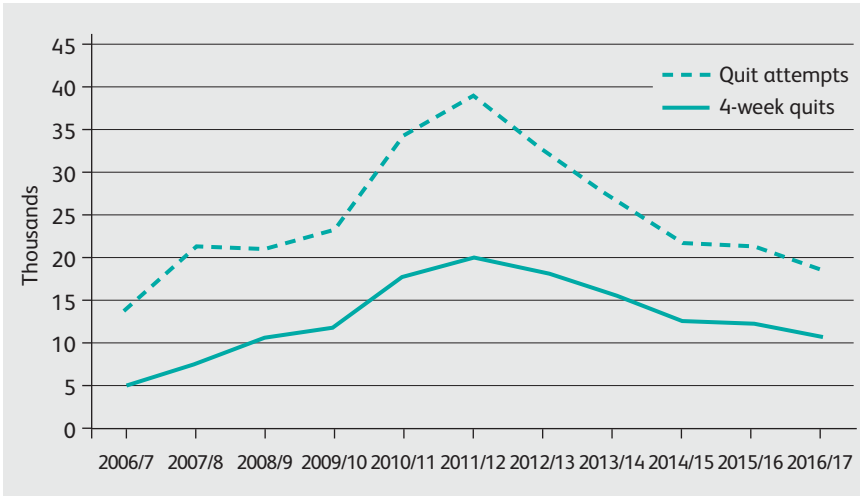

Figure 5.8 Number of smokers setting a quit date, and self-reported quitting at 4 weeks (CO-validated data not provided at source), in NHS Stop Smoking Service in Northern Ireland 2011/12–2016/17.[51,52]

population needs, joint assessment of individual care needs and a requirement to work in a formal partnership arrangement with pooled budgets, shared information and regulated working arrangements. Regulations specify which health boards and local authorities should work together in regional partnership boards.

The Well-being of Future Generations (Wales) Act 2015[55] created statutory organisations called public service boards (PSBs) for each local authority. The local authority, the local health board(s), the local fire and rescue authority and the natural resources body for Wales are all represented. PSBs are required to conduct a wellbeing assessment of their local area and prepare a local wellbeing plan.[1]

Smoking cessation services are commissioned in two ways. The Welsh Government commissions Public Health Wales to deliver a community-based national smoking cessation service, while the seven local health boards commission their own services which include in-hospital services for pregnant women and selected patient groups, and community pharmacy services. Commissioning of secondary care and community pharmacy services by local health boards is based on the NHS Delivery Framework (Wales), which includes a Tier 1 target for smoking cessation (5% of smokers making a quit attempt). Each local health board has a Tobacco Control Delivery Board which assesses local need and proposes commissioning of services to the strategic management board of the health board. Funding for these services is dependent on priorities

within each local health board, with some of these services being commissioned with fixed-term contracts.

Under this arrangement, Public Health Wales delivers a national service under the name 'Stop Smoking Wales'. The service provides a telephone helpline and employs trained smoking cessation practitioners to provide one-to-one and group sessions in community settings across Wales. The services accessed by individual smokers and by professional referral via the 'Help me quit' website and helpline.[56] At a local level, health boards employ their own smoking cessation practitioners to provide in-house services in secondary care settings, and commission community pharmacies to provide services in areas of defined need. These local services are dependent on local health board priorities, so the availability of services in secondary care and the level of service provided by community pharmacies vary substantially.

Data on national stop smoking service uptake are available since 2014/15 and in contrast to other parts of the UK show rising numbers of smokers accessing the services, from 11,927 in 2014/15 to 14,750 in 2016/17.[57] The numbers who had self-reported quitting at 4 weeks, and who had had this validated by exhaled carbon monoxide (CO) measurement, were 6,203 and 4,465, respectively.[57] It is not clear why numbers are rising in Wales but falling in all other parts of the UK. However, as a proportion of the adult population[58] the 2016/17 figure is low in relation to all other parts of the UK, suggesting that the increase is from a relatively low baseline.

5.8 Approaches to stop smoking service model design and provision in other countries

Although many high-income countries (eg the UK, New Zealand and the USA) provide support systems to treat tobacco users, the majority, especially low- and middle-income countries, typically provide far more limited support.[59] Some low- and middle-income countries (eg Uruguay, Costa Rica and Lebanon) are exploring methods to improve delivery of stop smoking interventions, for example:

- by increasing the number of healthcare workers trained to give brief advice
- by fast tracking the licensing of cytisine, a potentially very low-cost medication similar in effectiveness to varenicline[60]
- in Uruguay, by developing a national text messaging system, which in principle could be far simpler to implement and achieve broader reach than telephone helplines, which require relatively expensive infrastructure and training.

One region in Uruguay reported a 28% quit rate at 8 weeks using automated text messaging.[61] These approaches are likely to be highly cost-effective, and may be worth exploring in the provision of services in the UK. In terms of ensuring that smokers who engage with health services receive stop smoking advice and support, the New Zealand Government has achieved some success by introducing targets in 2009 for ascertainment and delivery of advice to quit to all smokers accessing primary and secondary care services, and report delivery in 95% of smokers using secondary care services in 2016/17.[62]

5.9 A proposed new model for treating tobacco dependence in the NHS

The data on stop smoking service provision in the NHS across the UK indicate that in England, Scotland and Northern Ireland the number of smokers accessing services reached a peak in 2011/12 and has since declined by over 60% in England, where funding for stop smoking services has been cut substantially since the transfer of responsibility for service provision to local authorities in 2013, and by around 50% in Scotland and Northern Ireland, where these funding changes did not occur. In Wales, the number of smokers accessing services is rising, but from a relatively low baseline.

These data indicate that the decline in service uptake in most of the UK is for the most part not attributable to funding cuts, or indeed to the separation of smoking services from the NHS demonstrated in Figure 5.1. While there are several potential causes of the decline in numbers, which include increasing use of e-cigarettes (see Chapter 4) and markedly reduced spending on mass media campaigns,[63] the fact that the numbers of smokers using stop smoking services in all parts of the UK only represent a very small proportion of the total smoking population indicates that health services throughout the UK are failing to engage the great majority of smokers in any formal quit attempt. We conclude from this that the current opt-in model of service provision, whereby smokers accessing NHS services are referred on to stand-alone stop smoking services is no longer an optimal model. An alternative approach, of bringing stop smoking interventions into routine NHS practice, and using the NHS commissioning structure and tariff model to ensure that stop smoking interventions are delivered, on an opt-out rather than opt-in basis at the point of service access by smokers, is therefore recommended.

The commissioning instruments and processes used to achieve this will vary between the different health service funding structures that apply in different parts of the UK. However, they need to involve the inclusion of treatment of tobacco dependency in all; the introduction of tariffs to reimburse the costs of treating smoking to primary and secondary care providers; the inclusion of the

delivery of behavioural support and pharmacotherapy in QOF, CQUIN and disease-specific BPTs; and in all cases to require NHS facilities to be comprehensively smoke free.

5.10 Summary

Stop smoking services have evolved in the UK primarily as stand-alone services, available to smokers on an opt-in basis.

- Models of funding these services vary between parts of the UK, but in total represent a small proportion of total NHS spending.
- Levels of funding have fallen dramatically in England since the transfer of responsibility for stop smoking service provision to local authorities in 2013.
- The devolved UK nations have maintained the provision of stop smoking services, free at the point of use, within the NHS. In Wales the numbers of smokers accessing stop smoking services are growing, but from a relatively low baseline. In Scotland and Northern Ireland, the numbers of smokers accessing stop smoking services have fallen substantially since 2011/12.
- The decline in numbers of smokers accessing stop smoking services is greatest in England, suggesting that funding reductions have exacerbated the problem of falling service uptake.
- Overall, however, the falling numbers signify a failing model of service provision.
- NHS commissioners encourage NHS providers to ascertain smoking status and refer smokers to stop smoking services through the NHS Standard Contract and financial incentive tools including QOF, CQUIN and BPT with oversight by STPs and health and wellbeing boards.
- The low levels of delivery of stop smoking services in the NHS, and low uptake by smokers in general, indicate that none of these objectives has yet succeeded. It is therefore time to consider an alternative approach.
- A rational approach would be to move responsibility for smoking interventions back into the NHS in England, and use commissioning processes, including a standard tariff for treating tobacco dependence, or their equivalents in the devolved nations, to ensure that ascertainment and treatment of smokers becomes a core NHS activity.
- This requires including smoking ascertainment and treatment, and for NHS facilities to be comprehensively smoke free, in all commissioning instruments and processes.

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6 Using data to drive improvement in treating tobacco dependence

6.1 Introduction

Planning, delivering and improving smoking cessation support in NHS services depends on the acquisition and use of accurate data on who smokes, which interventions are delivered to them, and whether these interventions are effective at individual, population, healthcare provider and healthcare system levels. Data need to be collected from populations that include some of the most disadvantaged and marginalised individuals in the UK, and for whom access to and delivery of treatment services can be challenging;[1] and across a disparate and sometimes fragmented range of services and providers in primary and secondary NHS care and local authorities. The availability of such data is essential to the application of quality improvement methods to make healthcare safe, effective, patient-centred, timely, efficient and equitable, as encouraged by regulators, Royal Colleges, specialist societies and health charities.[2] Applying quality improvement to a hospital service for the treatment of tobacco dependence, for example, requires data on:

- who is a current smoker
- where and when in the inpatient or outpatient setting they are seen
- by whom they were offered cessation advice and pharmacotherapy
- where this was recorded and aggregated
- whether they were provided with follow-up treatment on site or in the community, and
- the transfer and recording of this data between the patient's hospital, primary care and community stop smoking service record.[3]

In addition, clinicians, service managers, commissioners and other stakeholders require aggregated data to identify service utilisation, costs and savings, unwarranted variation and whether quality improvement is succeeding.

This chapter explores the availability and use of data relevant to smoking cessation in the NHS, and aims to identify gaps in the provision of the data

needed to plan and deliver high quality support to smokers, in the context of specific undertakings made in the Tobacco Control Plan for England in 2017;[4] more general commitments in the *NHS five year forward view*,[5] which prioritises the prevention of avoidable ill health; and *The NHS constitution for England*,[6] which requires the NHS to 'provide a comprehensive service available to all' and to 'work across organisational boundaries', addressing the issues of unequal access to treatment for smokers and the poor integration of care between health and social care sector.[7]

6.2 Data sources

The NHS, local government and bodies including health charities, Royal Colleges and universities produce a wide range of smoking data. This section describes the availability of data at population level and by NHS sector.

6.2.1 Population data

Table 6.1 identifies some key sources of population data that are used or that have the potential to be applied more effectively to drive improvements in smoking cessation delivery. The list is not fully comprehensive but provides examples of the data available and opportunities they present.

Nationally representative data on adult smoking in the general population are collected in a range of annual government surveys including the Annual Population Survey (APS),[8] the Opinions and Lifestyle Survey (OLS)[9] and the Health Survey for England (HSE);[10] and on smoking in children in the Smoking, Drinking and Drug Use Among Young People in England Survey (SDD), which is now carried out every 2 years.[11] Data from these surveys provide varying degrees of detail on smoking behaviour and are typically, though not invariably, published in the year following the year of data collection. Smoking among people with mental health problems is measured in the Adult Psychiatric Morbidity Survey (APMS)[12] every 7 years, most recently in 2014.

National stop smoking service returns provide quarterly detail on the quit attempts made by thousands of people using stop smoking services in England,[13] with similar reporting available from Wales, Scotland and Northern Ireland (see Table 6.1 for sources). The returns for England include data on the use of, and quit rates achieved with, different pharmacotherapies including e-cigarettes (referred to in the returns as unlicensed nicotine-containing products). Limitations to the data include the growing number of areas no longer submitting returns as local stop smoking services are reduced or

decommissioned altogether. In 2016/17 there were five local authorities in England who did not submit returns at all, and six who did not submit at least one quarterly return, and these numbers are likely to increase substantially as increasing numbers of local authorities stop providing cessation services (see Chapter 5). Reporting on the accuracy of the data provided by local stop smoking services and the various subcontractors now involved in service provision is not provided.

In addition to these government or NHS sources, further longitudinal data on smoking, smoking cessation service use and quitting behaviour are collected in the Smoking Toolkit Study (STS),[14] and the Smokefree GB Survey and Smokefree GB Youth Survey.[15,16] The STS is a rolling monthly survey of around 1,800 people managed by the Tobacco Research Group at University College London, funded by Cancer Research UK and the Department of Health, and carried out by a commercial organisation (Ipsos MORI). The STS reports data within weeks of collection, thus providing more 'real-time' insight into smoking trends than the government-led national surveys listed above. The Smokefree GB surveys are commissioned annually by Action on Smoking for Health (ASH), are also carried out by a commercial organisation (YouGov), provide detail on tobacco and e-cigarette use in adults and children, and on motivation, knowledge and beliefs about these products, and report within weeks of survey completion.

The Public Health England *Local Tobacco Control Profiles* website[17] brings together comprehensive information on 12 key tobacco indicators from several data sources in a web portal with functionality to allow users to analyse data. In addition, there are several explanatory sections highlighting limitations in the source data for each of the indicators. Comparisons between areas allow unwarranted variation in service provision to be identified and addressed, for example in relation to data on the number of smokers setting quit dates, and rates of successful quitting.

6.2.2 Primary care data

Primary care services include general practice, dental services, pharmacies and optometry services, and account for 90%[18] of contacts between patients and the NHS. These services therefore have significant potential to initiate stop smoking interventions. We found no source of data on smoking interventions in optometry or dental services, though some pharmacy stop smoking services return data via local authority stop smoking services. This section summarises the main sources of data on smoking ascertainment and activity in general practice.

Table 6.1: Example sources of population data on smoking

Name and information provided	How generated	Uses
Annual Population Survey (APS) www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/annualpopulationsurveyapsqmi Smoking prevalence by socio-economic status, gender and age	Produced by the Office of National Statistics UK-wide continuous household survey with an annual sample size of 320,000 Samples adults 18 years and over Also uses data from the Data Force Survey	Provides information on social and socio-economic variables at a local level covering employment, housing, ethnicity, religion, health and education Data feed into the Local Tobacco Control Profiles
Opinions and Lifestyle Survey (OLS) www.ons.gov.uk/surveys/informationforhouseholdsandindividuals/householdandindividualsurveys/opinionsandlifestylesurveyopn Covers smoking habits and attitudes including smoking prevalence, average daily cigarette consumption, e-cigarette use	Produced by the Office of National Statistics Great Britain-wide face-to-face household interviews with adults Monthly sample size of approximately 2,000 households Samples adults 16 years and over Has core demographic questions and non-core questions that vary each month Modules can be commissioned by government organisations, academic institutions and charities	Multipurpose survey with rapid data acquisition and availability about topics of interest used to inform government departments, public bodies and charities about the planning of policies and services
Health Survey for England (HSE) http://content.digital.nhs.uk/article/3741/Health-Survey-for-England-Health-social-care-and-lifestyles	Produced by NHS Digital Annual interview-based survey in England of 8,000 adults and 2,000 children (with nurse visit if permitted)	Provides information on changes in the health and lifestyles of people for use by central and local government in monitoring, planning, policy development and evaluation

Table 6.1 continued

Name and information provided	How generated	Uses
Smoking prevalence and trends in adults and children in England	Has core demographic questions and non-core questions that vary each year	
Smoking, Drinking and Drug Use Among Young People in England Survey (SDD) http://digital.nhs.uk/catalogue/PUB30132 Attitudes and use of tobacco and e-cigarettes in schoolchildren by age, gender, ethnicity and region	Produced by the NHS Digital in consultation with the Department of Health, Department of Education and Public Health England Survey of secondary schools (mostly aged 11–15 years) in England; series began in 1982	Provides longitudinal data on the behaviours of young adults and the impact of public policy in England
Scottish Schools Adolescent Lifestyle and Substance Use Survey www.gov.scot/Topics/Research/by-topic/health-community-care/social-research/SALSUS Attitudes and use of tobacco and e-cigarettes in schoolchildren by age, gender, ethnicity and region	Produced by the Scottish Government Biennial survey of secondary schools (aged 13–15 years)	Provides longitudinal data on the behaviours of young adults and the impact of public policy in Scotland
Health Behaviour in School-aged Children http://gov.wales/statistics-and-research/health-well-being-measures-children/?lang=en Tobacco use in children	Conducted by Ipsos MORI produced by the Welsh Government School-based survey aged 7–11 years Last report for 2013/14	Provides data on a number of individual and combined health behaviours in children

Table 6.1 continued

Name and information provided	How generated	Uses
Adult Psychiatric Morbidity Survey (APMS) https://digital.nhs.uk/catalogue/PUB21748 Smoking status, daily tobacco consumption, quit motivation, quit attempts, use of cessation pharmacotherapy and healthcare-worker quit advice in people with psychiatric disorders	Produced by NHS Digital Conducted every 7 years Survey in England of 16 year olds and over in 7,500 households	Information on prevalence and trends of treated and untreated psychiatric disease with information on physical health, and drug, alcohol and tobacco use
Stop smoking service returns data England: https://digital.nhs.uk/catalogue/PUB30058 Number of people setting quit dates, self-reported and CO-validated 4-week quit rates, use of pharmacotherapy, geographic breakdown **Wales, Scotland, Northern Ireland:** https://statswales.gov.wales/Catalogue/Health-and-Social-Care/NHS-Performance/smoking-cessation-services www.isdscotland.org/Health-Topics/Public-Health/Publications/2017-10-24/2017-10-24-Smoking Cessation-Report.pdf? www.health-ni.gov.uk/publications/statistics-smoking-cessation-services-northern-ireland-2016[17]	Returns from stop smoking services	Quantifies use of stop smoking services in England Identifies trends in quit rates, use of telephone quitlines, e-cigarettes, pharmacotherapy, service provision(data provided in other devolved nations differs) Quality assurance for individual services against national benchmark

Table 6.2 2016/17 QOF smoking indicators

Smoking (SMOK) indicator	Points	Achievement thresholds
Records[a]		
SMOK002. The percentage of patients with any or any combination of the following conditions: CHD, PVD, stroke or TIA, hypertension, diabetes, COPD, CKD, asthma, schizophrenia, bipolar affective disorder or other psychoses whose notes record smoking status in the preceding 12 months *NICE 2011 menu ID: NM38*	25	50–90 %
Ongoing management		
SMOK003. The provider supports patients who smoke in stopping smoking by a strategy which includes providing literature and offering appropriate therapy *NICE 2015 menu ID: NM113*	2	
SMOK004. The percentage of patients aged 15 or over who are recorded as current smokers who have a record of an offer of support and treatment within the preceding 24 months *Based on NICE 2011 menu ID: NM40*	12	40–90 %
SMOK005. The percentage of patients with any or any combination of the following conditions: CHD, PAD, stroke or TIA, hypertension, diabetes, COPD, CKD, asthma, schizophrenia, bipolar affective disorder or other psychoses who are recorded as current smokers who have a record of an offer of support and treatment within the preceding 12 months *NICE 2011 menu ID: NM39*	25	56–96 %

[a]CHD, coronary heart disease; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; PVD, peripheral vascular disease; TIA, transient cerebral ischaemic attack.

6.2.2.1 The Quality and Outcomes Framework data

The Quality and Outcomes Framework (QOF) is a performance-related pay system used in general practice (see Chapter 5) which encourages GPs to earn

'QOF points' to reach QOF targets for quality improvement, for which they receive financial rewards. Since 2004 some of these targets have been related to identifying and treating tobacco dependence (Table 6.2). The data are coded in patient electronic records and can be accessed through NHS Digital (https://qof.digital.nhs.uk). Capture of data in patients who do not attend general practice frequently, and the possibility that the QOF incentive scheme may change in the coming years, are limitations of these data.

6.2.2.2 Primary care prescribing data

Prescription of smoking cessation medications is a key indicator for the activity and quality of services. The NHS in England publishes anonymised data about the drugs prescribed by GPs on a monthly basis, and the OpenPrescribing.net website[19] provides an online service that allows trends in prescribing to be identified from national to individual GP practice levels, and to identify, for example, trends over time (Figure 6.1) or geographical region.

Changes in prescribing can reflect influences arising from changes in case ascertainment in primary and secondary care, patient-driven demand and use of over-the-counter products or e-cigarettes, budgetary constraints applied by clinical commissioning groups (CCGs) and provision by local authority stop smoking services.

6.2.2.3 General Practice Patient Survey

The General Practice Patient Survey (GPPS)[20] is a survey of primary care

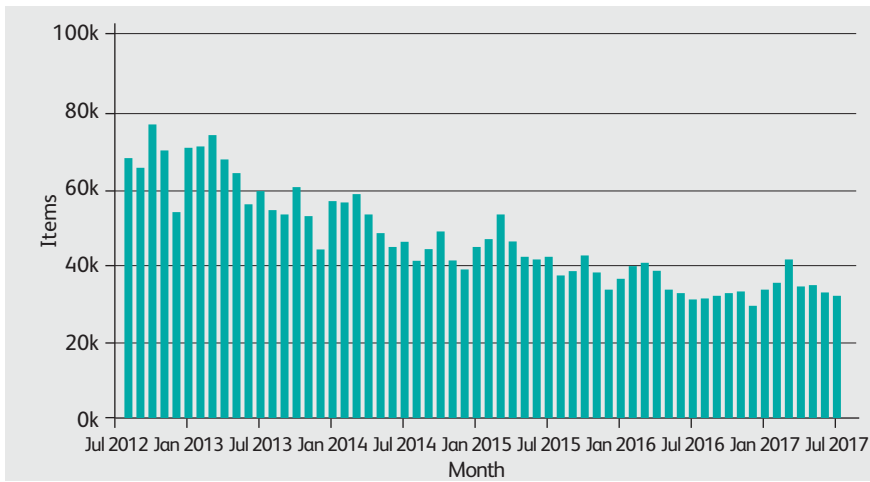


Figure 6.1 Trend in number of varenicline prescriptions in all general practices in England, 2012–2017.[19]

patients conducted at regular intervals since 2007 by Ipsos MORI for NHS England. Approximately 2.15 million surveys were sent out in the last survey in 2017, with 808,332 patients responding. The survey covers many aspects of people's experience attending general practice and NHS dentists. There is one question on smoking status, and in 2017 15.6% of respondents stated they were regular or occasional smokers, a reduction from 18.7% in 2012. Data from GPPS are used in the construction of Local Tobacco Control Profiles by Public Health England (see above).

6.2.2.4 Dentistry

NHS dental statistics[21] do not currently report on the smoking status of patients using NHS services.

6.2.2.5 Primary care research databases

UK general practice patient records are available for research primarily through three databases which originate in the different software packages developed in the 1980s to computerise GP records. The largest is the Clinical Practice Research Datalink (CPRD),[22] now funded by the National Institute for Health Research (NIHR) and the Medicines and Healthcare products Regulatory Agency (MHRA). CPRD provides anonymised primary care records for public health research and has been used for improvements in drug safety, best practice and clinical guidelines. Several studies with tobacco as a focus have used CPRD. Alternative sources include The Health Improvement Network (THIN)[23] and QResearch.[24]

6.2.3 Secondary care data

NHS secondary care includes acute, mental health and maternity services for inpatients, outpatients, emergency, elective and specialist care. In 2016 these services provided care in over 125 million inpatient and outpatient attendances.[25] In contrast to the reporting of other conditions with a public health impact such as *Clostridium difficile* or methicillin-resistant *Staphylococcus aureus* (MRSA) infections, there is no statutory responsibility for acute care trusts to collect or report on smoking ascertainment or treatment of tobacco dependence.

6.2.3.1 Hospital episode statistics

Data on hospital inpatient and outpatient activity in England are captured via hospital episode statistics (HES)[25] and reported annually. National reporting on hospital tobacco-related admissions uses data based on HES and defined

smoking-related conditions, and applies population-level smoking prevalence estimates to calculate attributable hospital admissions, mortality, length of stay and cost reported in Local Tobacco Control Profiles (see Section 6.2.1 above). In 2016 there were an estimated 474,000 admissions with tobacco-related disease, accounting for 4% of hospital admissions,[26] though, as outlined in Chapter 3, these estimates are based on a relatively narrow group of tobacco-related diseases and include former as well as current smokers. Data on hospital activity are also available for the UK devolved nations.[27–29]

6.2.3.2 CQUIN and BPT data

The 2017–2019 tobacco-related CQUIN (details of CQUIN and BPT are given in Chapter 5) will generate data on achievement of CQUIN indicators, and specifically patients who have had smoking status recorded, referral for treatment and prescription of pharmacotherapy in acute care, mental health and community care trusts. The data will be submitted centrally and have the potential to provide insight on the number of organisations taking part in the CQUIN and achieving these targets. This information could be linked with stop smoking services returns and prescribing data.

The BPT for chronic obstructive pulmonary disease (COPD) is in place for the financial years 2017–2019 and has a component that includes identifying smokers and referring for smoking cessation treatment. These data are submitted by hospitals to the national COPD audit and to commissioners. A quarterly report on achievement of the BPT criteria is produced by the Royal College of Physicians.[30] The third quarter report released in February 2018 showed 42% of 137 trusts had achieved the BPT threshold, suggesting that in these trusts the majority of people admitted with COPD had their smoking status ascertained and were offered treatment.

6.2.3.3 Mental health data

Smoking rates are much higher among people with a mental health condition.[31,32] The Mental Health Services Data Set (MHSDS),[33] which applies to patients using secondary care, contains a non-mandatory data field on smoking status. The Mental Health and Learning Disabilities Data Set (MHLDDS) provides national time series data on over 2 million people accessing adult and children's mental health services, representing a significant opportunity to identify and treat tobacco dependence in this patient group. Other data on smoking in people with mental health problems are recorded and hence are potentially available, through QOF in primary care, HES in secondary care, stop smoking service returns and the APMS (see above); and in the *National audit of schizophrenia*.[34]

6.2.3.4 Data on smoking in pregnancy

Smoking in pregnancy is an important source of health inequality and poor outcomes, and data capture and use is recommended in NICE guidance PH26 *Smoking: stopping in pregnancy and after childbirth*,[35] including universal carbon monoxide (CO) screening for pregnant women in the NHS by midwives at registration. Current sources of data for pregnant smokers include the *Smoking status at the time of delivery* (SATOD)[36] and the *Maternity services dataset* (MSDS).[37]

SATOD collection covers information on the number of women smoking or not smoking at time of delivery, with data provided by CCGs, who are mandated to submit figures each quarter. In 2016/17, 10.5% of pregnant women were known to be smokers at the time of delivery, and there is substantial geographic variation and a gradient across social class.[36]

MSDS integrates data collected across primary and secondary care. The data are reported monthly and cover aspects of care from the registration of pregnancy through to delivery. This dataset began in 2014 and the report from February 2018 stated that 12% of women smoked at the time of registration, although smoking status was not recorded in 5% of women. No information is provided on treatment of tobacco dependence.[37]

6.2.3.5 Data on smoke-free hospital estates

Smoke-free hospital estates support the treatment of tobacco dependency in hospital, while also reducing second-hand smoke exposure for patients, staff and carers (see Chapter 8). In 2013 NICE PH48 made clear recommendations on maintaining smoke-free hospital estates[38] and the current NHS contract in England[39] specifies commissioners to agree plans to ensure smoke-free hospital estates by the end of 2018. In addition the Care Quality Commission (CQC) in England have produced a guide for smoke-free policies in mental health inpatient services.[40] Data are not routinely collected on adherence to these guidelines by government agencies. The British Thoracic Society national hospital audit in 2016 found that only one in 16 hospitals completely enforced their smoke-free hospital policy.[41]

6.2.4 National audits, registries and disease-specific pathways

There are numerous clinical pathways, registries and national audits which each generate datasets collected across the NHS and often spanning primary and secondary care. Some (eg the *Cancer Outcomes and Services Dataset* (COSD)[42] and the *NHS Right Care* pathways[43]) are publicly funded and mandated by the

NHS or Public Health England. Others are collected through organisations such as the Healthcare Quality Improvement Partnership (HQIP)[44] which supports, manages and promotes national programmes of quality improvement that use audits, reviews and registries run by health professionals, specialty societies, Royal Colleges and health charities. With the exception of the national COPD audit,[45] to our knowledge data on smoking status and treatment are not collected routinely in most of these pathways, registries and national audits.

6.2.4.1 National audits

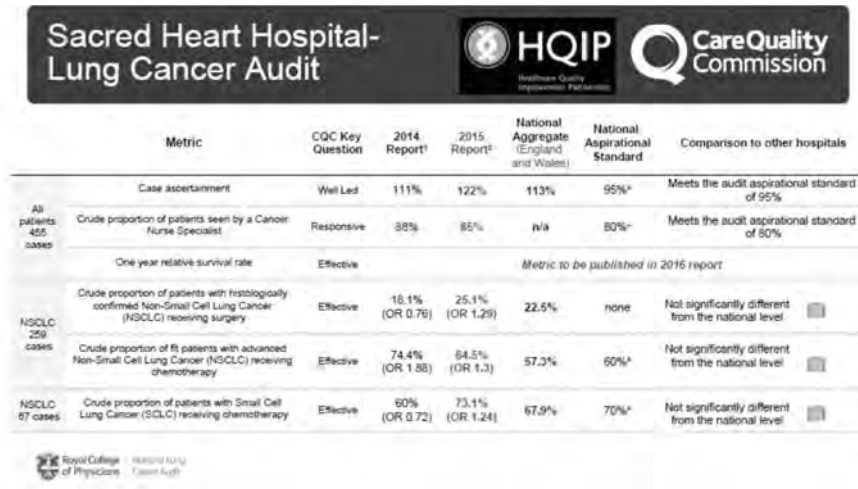
6.2.4.1.1 The HQIP

HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and a patient organisation (Patient Voices[46]) and aims to increase the impact that clinical audit has on healthcare quality. HQIP manages the National Clinical Audit and Patient Outcomes Programme (NCAPOP) funded by the four UK health departments, comprised of almost 50 clinical audits that cover care provided to millions of people with a wide range of medical, surgical and mental health conditions.

Only a small number of the national audits (namely, the audits on COPD, diabetes, myocardial infarction, maternity and mental health) record tobacco use, and only the COPD audit[47] measures treatment of tobacco dependence. The National Lung Cancer Audit 2017 reported that 67% of hospitals had access to a local smoking cessation service, down from 86% in 2014.[48] From late 2017, two of the six key COPD metrics that are measured in the national COPD audit (prescribing smoking cessation pharmacotherapy and application of the COPD discharge bundle) will be used by the CQC as part of the National Clinical Audit Benchmarking (NCAB) project[49] to measure trust performance. NCAB provides a visual snapshot of individual trust audit data set against national benchmarks to help CQC inspectors, medical directors, clinicians and others to engage and share clinical audit data. A mock example is shown in Figure 6.2.

6.2.4.1.2 British Thoracic Society Hospital tobacco audit

The British Thoracic Society undertook a national hospital tobacco audit in 2016 to assess whether smokers were being identified and treated according to national standards.[41,50] The audit, which involved 146 hospitals and 14,750 patients, found that smoking status was recorded in 73% of all patients and that only 28% of those identified as smokers were asked if they would like to quit. Of these, 48% declined a referral to a stop smoking service, 28% were referred to a hospital smoking cessation service and 7% to a community smoking cessation service, with the remaining patients agreeing to self-refer or consult their GP. In



Sacred Heart Hospital-Lung Cancer Audit

HQIP

CareQuality Commission

	Metric	CQC Key Question	2014 Report[1]	2015 Report[2]	National Aggregate (England and Wales)	National Aspirational Standard	Comparison to other hospitals
All patients 455 cases	Case ascertainment	Well Led	111%	122%	113%	95%[a]	Meets the audit aspirational standard of 95%
	Crude proportion of patients seen by a Cancer Nurse Specialist	Responsive	88%	85%	n/a	80%[c]	Meets the audit aspirational standard of 80%
	One year relative survival rate	Effective	*Metric to be published in 2016 report*				
NSCLC 259 cases	Crude proportion of patients with histologically confirmed Non-Small Cell Lung Cancer (NSCLC) receiving surgery	Effective	18.1% (OR 0.76)	25.1% (OR 1.29)	22.5%	none	Not significantly different from the national level
	Crude proportion of fit patients with advanced Non-Small Cell Lung Cancer (NSCLC) receiving chemotherapy	Effective	74.4% (OR 1.88)	64.5% (OR 1.3)	57.3%	60%[b]	Not significantly different from the national level
NSCLC 67 cases	Crude proportion of patients with Small Cell Lung Cancer (SCLC) receiving chemotherapy	Effective	60% (OR 0.72)	73.1% (OR 1.24)	67.9%	70%[a]	Not significantly different from the national level

Royal College of Physicians

Figure 6.2 Mock example of national lung cancer audit data for CQC inspectors.[49]

those smokers referred to a hospital stop smoking service, 85% received documented interventions (including pharmacotherapy). In smokers not asked if they wanted to quit, just 4% were offered nicotine replacement therapy to help alleviate symptoms of nicotine withdrawal.

Of 140 hospitals returning data on smoking cessation services and policies, 94% indicated that they had access to a smoking cessation service (41% to both hospital- and community-based services, 31% to a community-based service only and 16% to a hospital-based service only). Many hospital services did not, however, meet the criteria of providing a fully evidence-based service. In those institutions with a hospital-based service, only 34% could always provide access to a hospital smoking cessation practitioner (HSCP) for inpatients and outpatients. A further 38% indicated that they could mostly provide access to an HSCP, and 20% sometimes. The audit results have been used to produce a quality improvement toolkit for treatment of tobacco dependency in hospitals[3].

6.2.4.1.3 The National COPD Audit

The National COPD Audit programme for England and Wales[47] is a continuous audit that collects and links patient journey data through primary and secondary care. There are several tobacco-related elements in the data collection including recording of smoking status, smoking cessation pharmacotherapy prescriptions, application of the COPD discharge bundle (which includes smoking cessation) when admitted to secondary care, and data on smoking cessation time allocation for healthcare workers and pharmacotherapy availability.

The RCP 2014 COPD organisational audit found that of units admitting patients with an acute exacerbation of COPD, 37% had no access to inpatient smoking cessation services, and in a further 34% less than 0.5 of a whole time equivalent (WTE) member of staff was available to undertake this activity. The Welsh primary care arm of the National COPD Audit[51] in 2017 reported that 23% of patients were not asked about their smoking status and that only 13% of smokers were recorded as having received a referral for treatment of tobacco dependence or a prescription for smoking cessation pharmacotherapy.

6.2.4.2 Cancer registries and datasets

The COSD[42] is the national standard for reporting cancer in the NHS in England and specifies the items to be submitted electronically by NHS providers of cancer services to the National Cancer Registration Service (NCRS) on a monthly basis. COSD also identifies the items the NCRS will obtain from other sources such as the Office of National Statistics (ONS). The NCRS links data from service providers at patient level using the NHS number. The submitted COSD data for 2016 are, at the time of writing, awaiting verification and quality assurance. However, data from over 57,000 records of people with cancer indicate that only around 19,000 had a definitive smoking status recorded, with some regions essentially not recording smoking status at all (Figure 6.3).[42]

Lung cancer audit data are submitted to the National Lung Cancer Audit and a report produced each year. The latest report published on returns from 2016/17[48] does not provide data on lung cancer patients who currently smoke or who have been referred for treatment of tobacco dependence.

6.2.4.3 NHS Right Care

Since 2014 in England, NHS Right Care[43] have provided data to CCGs on clinical outcomes across a number of clinical pathways. Many of the conditions or procedures in these clinical pathways, such as COPD, cardiovascular disease or complications of surgical procedures, are caused or exacerbated by continued smoking. The data for the 'Right Care packs' are provided through Public Health England and provide CCGs with benchmarking data on these pathways so that unwarranted variation can be identified and addressed in the commissioning process. These patient pathways cover the patient journey through primary and secondary care and so provide an integrated data source and represent an opportunity to use data on clinical outcomes associated with tobacco dependence and commission smoking cessation interventions. The use of NHS Right Care data by CCGs to drive quality improvement activity is not mandatory.

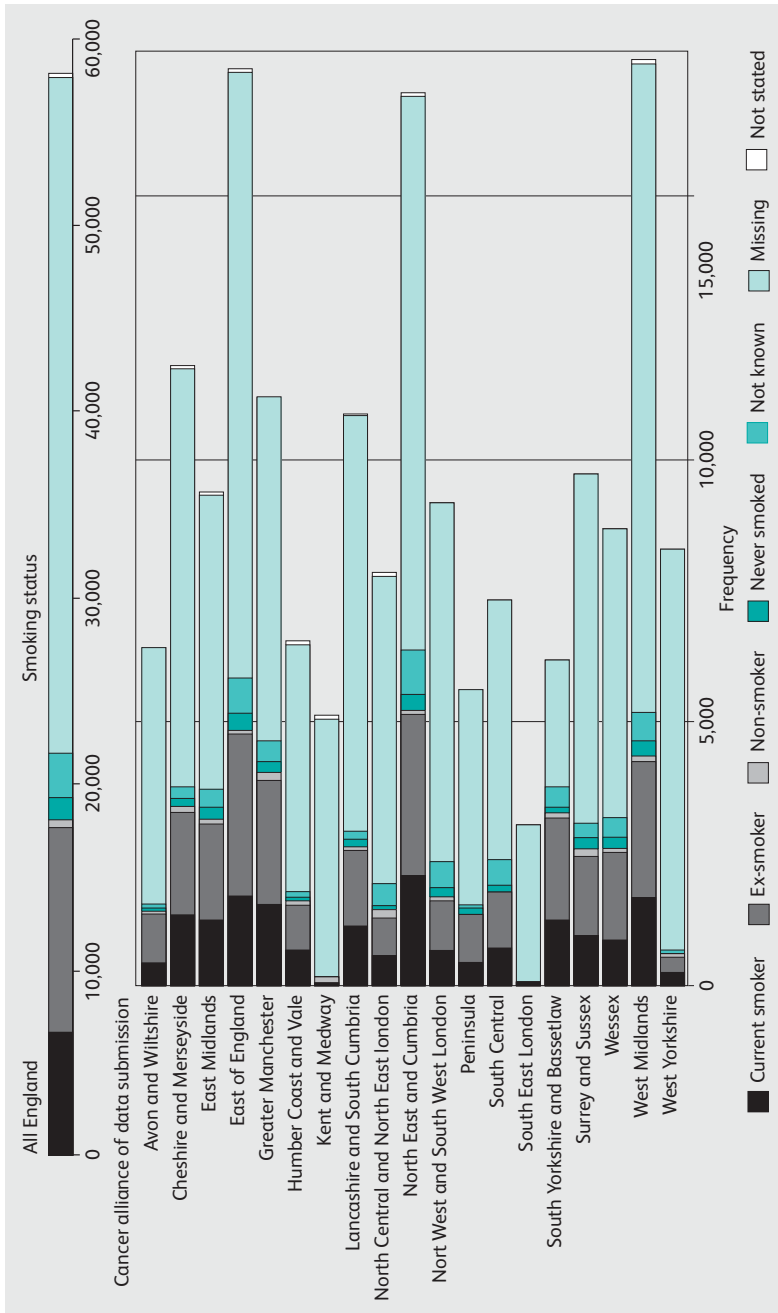


Figure 6.3 COSD database recording of smoking status in patients diagnosed with cancer in 2016.[42]

6.3 Using data to improve the treatment of tobacco dependence in the NHS

The sections above describe the current sources of data available, and their strengths, weaknesses and varying potential to be used to ascertain smoking status, treat smoking dependence and work across the boundaries of health and social care as envisaged in the Tobacco Control Plan for England (Box 6.1). This section considers steps that could get more value from the data being produced, and identifies gaps in the data being collected.

6.3.1 Population data

The APS, OLS and HSE provide nationally representative data on smoking from survey vehicles which all have much wider remits, and limits on the numbers of questions that can be included on any individual topic. However, none provide comprehensive data on quit attempts or e-cigarette use, and all are likely to need to adapt to include questions on heat-not-burn tobacco products if or when these become available and widely used in the UK. Details on the use of e-cigarettes and heat-not-burn products, and their relation to tobacco smoking, is also important in young people, and it is therefore essential that despite the falling prevalence of smoking in young people across the UK, the surveys of tobacco and nicotine use in young people continue.

The APMS is the only comprehensive source of data on smoking in people with mental health disorders. Since this group account for around one-third of all smokers in the UK, and since smoking rates in this group have proved so refractory to conventional tobacco control approaches, it would be extremely valuable if these data were collected more frequently than the current 7-year cycle.

Box 6.1 Tobacco control data undertakings included in the 2017 Tobacco Control Plan for England[4]

Consider how tobacco control measures could be better embedded into existing NHS data collections.

Explore how more frequent and reliable data could be collated to better inform tobacco control measures which aim to support people with mental health conditions.

Continue to work to improve the reliability of data measures for smoking during pregnancy, by removing 'unknowns' from the calculation of Smoking Status at Time of Delivery and reviewing the point at which smoking status is recorded for pregnant women.

Continue to develop the evidence base by funding further tobacco control research.

Primary care QOF data in England (see Chapter 5) suggest that GPs are offering referral for treatment of tobacco dependency in almost 90% of smokers with comorbidities, while CQUIN schemes and BPT in secondary care should also be increasing referral rates to local stop smoking services. Currently, local stop smoking service returns do not report on the source of referrals, so the referral rates from the NHS to local services cannot be verified or used to drive NHS service improvement for treatment of tobacco dependence by individual NHS organisations. Current governance arrangements for data sharing may be hampering this process.

Local Tobacco Control Profiles provide the most comprehensive source of data by locality and could be extended to provide local level data by NHS provider, for example secondary care and general practice, and report the impact of provider interventions. In addition, this dataset could utilise directly recorded smoking status from hospital coding (see Section 6.3.3 below) rather than APS data to identify real-time smoking prevalence in people attending hospitals.

Occupational data could be used more widely to drive change, particularly in the NHS, which (as outlined in Chapter 3) is the largest employer in the UK and, uniquely in relation to other employers, meets directly the healthcare costs arising from disease caused by smoking in its own employees. The prevalence of smoking in this population is not known, with no routinely collected data on smoking status or interventions being collected nationally.

6.3.2 Primary care data

QOF data could be enhanced by adding a field that records delivery of stop smoking advice and pharmacotherapy. This field would highlight the discrepancy between the very high rates of 'offer' of treatment or referral and the actual take up of these offers, which would provide an opportunity to identify and improve the uptake of treatment. In addition, this step may facilitate data sharing and verification between primary care and local government providers of stop smoking services. QOF-recorded smoking status could be used to trigger opt-out referrals to local authority stop smoking services (as is the case in maternity patients), and for data transfer across service providers including mental health, acute care and community services to trigger faster support when patients are admitted or use these services.

Primary care prescribing data could be used to investigate unwarranted variation between general practices for the prescription of smoking cessation pharmacotherapy, and could be linked with QOF data on reported offers of pharmacotherapy. In addition, examination of these data together with data on prescribing smoking cessation pharmacotherapy from local government

stop smoking services could build a picture of gaps in pharmacotherapy treatment provision as stop smoking services are decommissioned and CCGs restrict or discourage prescribing of these drugs by GPs or hospitals.

6.3.3 Secondary care data

There is substantial scope to improve smoking data collection and use in secondary care. According to the 2017 Tobacco Control Plan,[4] NHS trusts are to be supported to implement, by 2022, the NICE Guidance PH48 recommendations published in 2013,[38] which the British Thoracic Society audit has demonstrated had not been widely implemented by 2016,[50] and on which data are not routinely collected. Hospitals should collect data on:

- patient smoking status, ideally through routine measurement of exhaled CO
- delivery of behavioural and pharmacotherapy support
- the availability of stop-smoking pharmacotherapies in hospital pharmacies
- smoking behaviour and support delivered at discharge
- measurements of smoking status in staff, and
- enforcement of smoke-free grounds.

A significant step forward in the use of data collected routinely in secondary care would be to use the directly recorded smoking status that informs hospital episode statistics (HES).[25] When patients are admitted to hospital, their diagnosis, procedures, treatments and comorbidities are coded at the end of their inpatient hospital stay into 'health resource groups' (HRGs) using the *International statistical classification of diseases and related health problems*, 10th revision (ICD-10).[52] Code Z72.0 classifies 'tobacco use', although this excludes tobacco dependence, which is coded under F17: 'mental and behavioural disorders due to use of tobacco'. This code is sub-categorised similarly to other toxins with quantifiers for 'harmful use', 'dependence syndrome', 'withdrawal state' and more. Data from HES suggest that code F17.1 ('harmful use') is the most commonly used code, with over 1.6 million uses in 2016/17 compared with fewer than 2,000 records for Z72.0 (tobacco use). Code F17.2 is used for tobacco dependence, with almost 14,000 uses in 2016/17. HES data suggest that use of F17 codes has increased over recent years (see Figure 6.4), primarily through an increase in the use of the code for 'harmful use' (from 1.49 million in 2012/13 to 1.67 million in 2016–17), with a reduction in the code for 'dependence' (from 32,918 in 2012/13 to 13,994 in 2016/17). Collecting and coding smoking status as a routine would provide a robust means of monitoring smoking in secondary care populations, and support coordination of stop smoking service delivery.

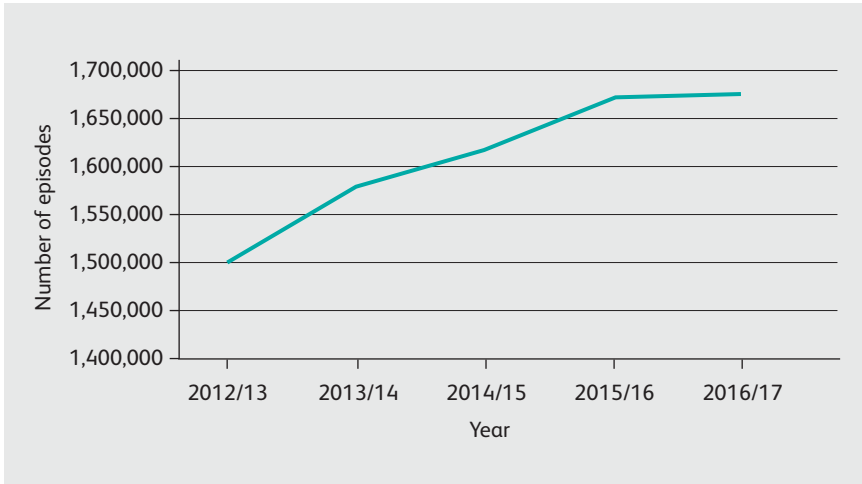


Figure 6.4 Use of F17 diagnostic code in UK hospitals.[25]

In mental health services, the new MHLDDS is an opportunity to mandate the collection of data on smoking status and treatment, and replicate the questions on this area from the APMS. In addition directly recorded smoking status from diagnostic codes recorded in HES data should be linked to MHLDDS. CQUIN data that has been submitted by trusts should be reported on to give a national picture of smoking status, very brief advice and cessation support delivery.

The Smoking Cessation in Pregnancy Challenge Group has identified several opportunities to improve data collection and patient care (Box 6.2).[53]

National audits, registries and disease-specific pathways data could take a major step forward by requiring smoking status be recorded at the time of diagnosis and more importantly, record treatment of tobacco dependence in these patients. Using HES or QOF data to automatically populate smoking status fields may help to reduce the amount of work in this element of data collection.

Finally, NHS contract monitoring data from commissioners (see Chapter 5) should report elements of the contract that involve tobacco, both locally and nationally, and specifically compliance data on Service Development Improvement Plans for maintaining NHS smoke-free estates and in CQUIN and BPT data. Having these data reported nationally will aid policymakers, commissioners and regulators to develop a national picture of the success of these contract elements, the interventions implemented to achieve them and to hold NHS providers to account.

Box 6.2 Proposals to improve smoking data collection in pregnancy[53]

1 Ensure that effective data collection takes place across the system. Smoking status is collected at booking visit and throughout pregnancy and that it is recorded and validated using CO screening.

2 Check smoking status at approximately 36-weeks gestation, validated through CO screening.

3 A briefing should be produced by NHS England, Public Health England and the Health and Social Care Information Centre outlining best practice for collecting the new MSDS. This should be produced without delay.

4 The Department of Health should task local area teams with bringing all CCGs to the same standards of data collection and implement support plans to address areas identified as having high rates of smoking in pregnancy and/or poor data collections.

5 NHS England should ensure that CCGs commission and clinical/medical directors deliver adequate systems, equipment and training to collect and record CO readings during antenatal appointments and that appropriate time is allocated for this.

6 Data systems should capture information on relapse rates and whether a women's partner smokes.

7 Local authorities and local NHS organisations should establish how they can better share data regarding pregnant women who smoke.

8 Following the cancellation of the Infant Feeding Survey, the Government should consider alternative ways to collect ongoing data to record the age and socio-economic status of pregnant smokers. Such data are essential to understanding smoking in pregnancy rates and where work in this area should be prioritised.

6.4 Summary

- Reliable data on smoking, at individual, population, healthcare provider and healthcare system levels, are essential to the identification of smokers and the design, delivery and evaluation of services and interventions to help them to quit smoking.
- Current systems of data collection in the NHS are incomplete and fragmented.
- There is little linkage between population-level data and local NHS service provision, making it difficult to apply quality improvement.

- These problems could be overcome by improving and linking existing data collection systems, and introducing regular audit to ensure functionality.
- However, a system that ensures that current smoking status is ascertained, recorded and maintained as a core requirement for all NHS patients is urgently needed to enable routine identification and treatment of smokers at all points of contact with the NHS.

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7 Teaching and training in smoking cessation

7.1 Introduction

Smoking cessation interventions range from brief opportunistic interventions such as very brief advice (VBA)[1] designed to encourage smokers to take up a supported quit attempt, through to fully supported quit attempts with a range of pharmacotherapy options and intensive behavioural support. At all levels these interventions are among the most clinically- and cost-effective available in healthcare (see Chapter 4),[2,3] and it is recognised that opportunistic brief advice from a health professional can be one of the most important triggers for a quit attempt.[4,5] Every encounter between a healthcare professional and a patient who smokes is an opportunity to promote quitting, ideally by delivering detailed advice and support but, at the very least, to spend the less than 30 seconds necessary to deliver VBA. It is reasonable therefore, to expect that all healthcare professionals who interact with smokers be taught how to give brief opportunistic advice to all smokers, and to have at least a basic understanding of the essentials of smoking cessation treatments and the principles of behavioural support so they can deliver more detailed information if required. This chapter reviews current teaching and examination on smoking in general, the delivery of brief opportunistic advice and more detailed smoking cessation treatments and support, in the undergraduate and postgraduate training of UK healthcare professionals.

7.2 Undergraduate training of healthcare professionals

7.2.1 Doctors

A 2004 study of smoking and smoking cessation teaching in the undergraduate curricula of the 24 medical schools in the UK at the time concluded that teaching was inadequate.[6] The published curricula of 10 (42%) medical schools included no mention of smoking or smoking cessation, while those that did include smoking tended to do so in relation to the importance of taking a smoking history and the occurrence of tobacco-related disease. A survey of newly

graduated doctors revealed that training in clinical aspects of smoking cessation was particularly neglected, with 60% reporting that they graduated unable to deliver smoking cessation interventions in accordance with national guidelines pertaining at the time, only 17% feeling well prepared to deliver advice on using nicotine replacement therapy (NRT), and only 5% on bupropion therapy (varenicline was not available at the time of the study).[6]

An online questionnaire survey sent to representatives of the 33 medical schools in the UK in 2013, and to which 22 schools responded, found that the health effects of smoking were now addressed in more than 90% of curricula, but content on nicotine addiction and withdrawal symptoms was included by only half.[7] Only one in three medical schools offered practical skills training in simulated (eg role play) or clinical settings, and half did not address smoking in summative assessments.[7] The study concluded that training on cessation support remained insufficient at most UK medical schools, and that this conclusion would remain valid even if the 11 medical schools that did not participate were teaching smoking cessation to the highest standard. The authors recommended increased curricular coverage, including summative assessments, to ensure that future physicians are adequately equipped to encourage and support effective evidence-based quit attempts in their patients.

For this report we carried out, in 2017, a further online survey of curriculum content of the 33 UK medical schools in relation to topics considered essential for medical practitioners to deliver evidence-based smoking cessation advice to their smoking patients. After three reminders and a follow-up telephone call only 13 responded, and their responses on topics taught or examined are shown in Figure 7.1. Nearly all (92%) reported teaching opportunistic brief interventions such as VBA, and around 70% taught behavioural support, cost-effectiveness and clinical effectiveness, and the role of stop smoking services. Only around half covered the use of NRT or varenicline, 30% taught practical delivery of cessation interventions in artificial settings, and 23% in clinical settings. The management of mental health patients who smoke was taught by only one medical school. The proportions of responding medical schools examining in the topics explored were broadly similar to those for course content (Figure 7.1). More than half of responding schools allocated less than 3 hours of curriculum time to teaching smoking cessation. In the context of the low participation rate it is difficult to draw firm conclusions from these data on current undergraduate medical curriculum content, but the findings do at least indicate that inclusion of comprehensive training on smoking cessation intervention is far from universal.

Studies of medical curricula in other countries reflect similar findings, with tobacco content having increased over recent years, but remaining far from comprehensive in relation to teaching practical skills to promote smoking cessation.[8,9] It is thus essential that medical schools prioritise smoking cessation

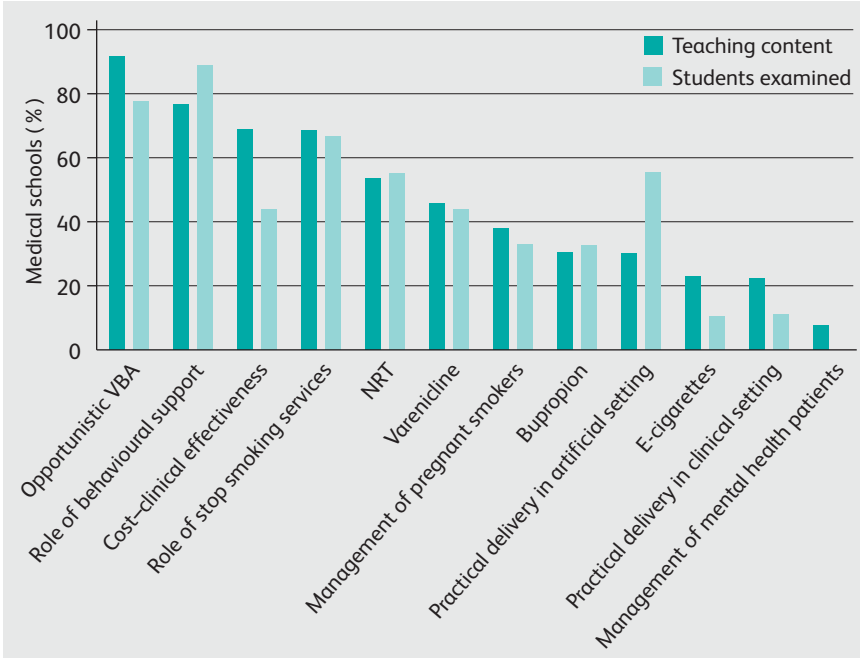

Figure 7.1 Smoking cessation topics reported as taught and/or examined in 13 of 33 UK medical schools in 2017.

in their curricula, to ensure that the next generation of doctors is confident in its ability to advise smokers appropriately.

7.2.2 Nurses

In 2014, 32 of the 71 nursing schools in the UK responded to a survey on their smoking cessation education.[10] Almost all (91%) included the harmful effects of tobacco use in their curriculum, and two-thirds (66%) provided training to deliver brief interventions to smokers, but only around half taught about nicotine addiction and its treatment. Only 6% of schools examined students on their smoking cessation learning, and over a third (38%) spent less than 3 hours teaching smoking cessation throughout the entire curriculum.

Lack of knowledge among staff, and uncertainty about who should deliver smoking cessation teaching, were reported as barriers to teaching. The conclusion of the study was that UK nursing curricula do not appear to be adequately preparing undergraduate nurses to deliver smoking cessation interventions, and hence not fulfil their potential to reduce smoking prevalence.[10]

7.2.3 Midwives

A survey of smoking cessation education in the curricula of the 55 UK midwifery schools in 2014[11] obtained data from just over half (55%) of the schools. All reported teaching the harmful effects of tobacco use and over 80% reported training students in brief intervention delivery and ways to assist quit attempts, though only a quarter (24%) reported any assessment of students' knowledge of smoking cessation. The most frequently reported barriers to teaching smoking cessation were lack of knowledge among staff (17%), lack of space in a crowded curriculum (17%), and administrative problems (13%). The study concluded that student midwives are not being sufficiently trained on relapse prevention or assessed in the practical skills necessary for delivering evidence-based interventions, and recommended that midwifery schools revise the content and delivery of smoking cessation training to ensure midwives are equipped with the necessary knowledge and skills to contribute to the challenge of smoking cessation in pregnancy.[11]

7.2.4 Dentists and dental hygienists

A survey carried out in 2016 assessed tobacco and smoking cessation teaching in the 16 UK dental schools, and 21 dental hygiene and therapy undergraduate programmes.[12] Responses were obtained from 25 institutions, and results presented only for the combined responses from both programmes. However, all of the courses included tobacco content, and over 70% included examination of practical skills in smoking cessation delivery, though most courses included less than 2 hours of practical training. All graduates were expected to be clinically competent at discussing the health consequences of smoking, deliver a brief smoking cessation intervention, and referring patients to stop smoking services. The use of the National Centre for Smoking Cessation Training (NCSCT) VBA training package[1] was reported to be mandatory in 36% of courses. Most programmes also reported delivery of teaching on e-cigarettes, with 12% delivering a standalone lecture on this topic.[12] These findings are a significant improvement from 2001 where just over half of dental schools surveyed taught about smoking cessation.[13]

7.2.5 Optometrists

Smoking is a risk factor for eye conditions including age-related macular degeneration and cataract (Chapter 2), and optometrists are well placed to deliver smoking cessation advice to a wide population of otherwise healthy smokers. All nine UK optometry schools responded to a survey on smoking cessation training curriculum coverage and assessment to smoking cessation

training published in 2016,[14] which found that while most schools included teaching on the harmful effects of smoking, only three taught about smoking cessation interventions and only one provided practical teaching in VBA.[14] Lack of knowledge among staff was identified as the key barrier to teaching about smoking cessation support.

7.2.6 Other undergraduate healthcare professional training

Our literature searches found no other studies of undergraduate healthcare professional training content. While producing this report we contacted the head of school or programme director at all 43 pharmacy and 35 physiotherapy schools in the UK, with two reminders to non-responders, in an attempt to survey undergraduate course content. Only two pharmacy schools and one physiotherapy school responded, so the study was abandoned.

7.3 Postgraduate training of doctors via specialist medical colleges

7.3.1 Introduction

Postgraduate medical education and training in the UK is the joint responsibility of the four Departments of Health (in England, Northern Ireland, Scotland and Wales), the General Medical Council, Postgraduate Deaneries and the Royal Colleges. The Royal Colleges are primarily responsible for developing and overseeing speciality curricula within these training programmes. For 30 medical specialties this is overseen by the three UK Royal Colleges of Physicians (London, Edinburgh and Glasgow) through the Joint Royal Colleges of Physicians Training Board (JRCPTB), and it is mandatory for all trainees undertaking postgraduate medical training in the UK to be enrolled with the JRCPTB. The JRCPTB offers a range of workplace based assessments to help trainees to provide evidence of competence acquisition, and an e-portfolio to support core medical training, which trainees must complete before progressing to specialty training. Curricula for speciality training programmes in medicine are drawn up by national Specialist Advisory Committees, which include representatives of the Colleges, the Deaneries and relevant specialist societies.

Most of the other Royal Colleges and faculties have their own responsibility for setting standards for curricula and training, and administering examinations in their own specialities. However, speciality training in occupational medicine is managed in conjunction with the Faculty of Occupational Medicine and the National School of Occupational Health.

Table 7.1 Curriculum topics for smoking, brief advice and cessation

Topic	Content
Background to smoking	Pathologies / harm caused by smoking Health inequalities / demographics of smoking Neurophysiology of smoking / nicotine addiction / how smokers start
Brief smoking advice	Opportunistic brief interventions (VBA or three As (Ask, Advise, Act)) Practical delivery of brief advice in artificial settings (eg role play) Practical delivery of brief advice in clinical settings
Smoking cessation	Benefits of stopping Cost-effectiveness and clinical effectiveness Role of behavioural support Role of the stop smoking services How to refer to stop smoking services Licensed pharmacotherapy e-cigarettes Management of smokers according to available resources Management of smokers in special groups (pregnancy or mental health)

7.3.2 Core and specialty training website content

We have explored the published curricula of these colleges to determine whether training in smoking, VBA or more intensive smoking cessation interventions are mentioned, and whether trainees are assessed on this knowledge. The curriculum content searched for is summarised in Table 7.1, and the specialist medical college and faculty curricula explored are provided in Table 7.2.

Table 7.3 summarises the area or areas in which smoking is mentioned in the searched curricula, and whether and how trainees are assessed. We found no mention of smoking or smoking cessation in the curricula of the Royal College of Anaesthetists, Faculty of Occupational Medicine, or Faculty of Pharmaceutical Medicine; and no curriculum for the Faculty of Medical Leadership and Management. Details of the content of individual curricula follow.

Table 7.2 UK Royal Colleges, faculties and specialty curricula searched

Royal Colleges	Additional specialties overseen by College		
Anaesthetists Emergency Medicine General Practitioners Obstetricians and Gynaecologists Ophthalmologists Paediatrics and Child Health			
Pathologists	Analytical toxicology Chemical pathology Clinical biochemistry Diagnostic neuropathology Forensic histopathology Genetics	Haematology Histocompatibility and immunogenetics Histopathology Clinical immunology Medical microbiology; medical virology Microbiology	Molecular pathology of acquired disease Molecular pathology of infection Paediatric and perinatal pathology Reproductive science Virology
Joint Royal Colleges of Physicians	Core medical training Acute internal medicine Allergy Audio-vestibular medicine Aviation and space medicine Cardiology Clinical genetics Clinical neurophysiology	Gastroenterology General internal medicine Genitourinary medicine Geriatric medicine Haematology Immunology Infectious diseases and tropical medicine	Nuclear medicine Paediatric cardiology Palliative medicine Pharmaceutical medicine Rehabilitation medicine Renal medicine Respiratory medicine Rheumatology

Table 7.2 continued

Royal Colleges	Additional specialties overseen by College		
	Clinical pharmacology and therapeutics Dermatology Endocrinology and diabetes mellitus	Medical oncology Medical ophthalmology Metabolic medicine Neurology	Sport and exercise medicine Stroke medicine
Psychiatrists Radiologists			
Surgeons of England	Cardiothoracic surgery Core surgical training General surgery Neurosurgery	Oral and maxillofacial surgery Otolaryngology Paediatric surgery Plastic surgery	Trauma and orthopaedic surgery Urology Vascular surgery
Faculties			
Medical leadership and management Occupational medicine Public health Pharmaceutical medicine			

7.3.2.1 The Royal College of General Practitioners

The RCGP includes smoking within some professional and clinical modules, but there is no mention of assessment and formal training in VBA or smoking cessation interventions. The curriculum states that GP trainees are asked reflective questions relevant to their smoking patients, for example 'Should overweight smokers be offered open access to treatment if they do not lose weight or stop smoking? What are my personal feelings about smoking-related illnesses?'

7.3.2.2 The Royal College of Pathologists

Of the 17 specialties covered by this College only five mentioned smoking within their curriculum (Table 7.3), and in all cases briefly under the topic of health promotion. For example, trainees must 'know the key local concerns about health of communities such as smoking and obesity'. The chemical pathology specialty also mentions smoking within the topic of diabetes, with regard to giving appropriate lifestyle advice.

7.3.2.3 The Joint Royal Colleges of Physicians

Smoking is a core topic in core medical training, and in the acute internal medicine and general internal medicine speciality training, in which trainees are assessed on their ability to 'Outline the effects of smoking on health'; 'promote smoking cessation'; 'recognise the need for support during cessation attempts'; 'recognise and utilise specific smoking cessation health professionals'.

Paediatric cardiology assesses knowledge of 'the effects of smoking on health with particular relevance to congenital heart disease, the implications of addiction, and smoking cessation strategies' and expects trainees to have the skills to 'be able to advise on smoking cessation and supportive measures, and to identify "ready-to-quit" smokers'; and to be able to 'consider the importance of support during smoking cessation'.

Nine specialties (allergy, dermatology, gastroenterology, haematology, immunology, infectious diseases and tropical medicine, medical ophthalmology, rheumatology, stroke medicine) mention smoking only within the topic of health promotion and public health. In these cases, trainees are typically assessed on their knowledge of the health effects of smoking, health inequalities, and smoking as a risk factor for illness. For example, trainees must 'know the key local concerns about health of communities such as smoking and obesity', and must have the skills to 'identify opportunities to promote changes in lifestyle and other actions which will positively improve health, eg to encourage smoking cessation and/or weight reduction'.

Five specialties mention smoking within the topic of cardiovascular health (core medical training; acute internal medicine, cardiology, general internal medicine, nuclear medicine). Other topics where smoking was briefly included in the curriculum include breathlessness and cough; respiratory health; children and young people; community cardiology; clinical communication skills; hypertension; diabetes; older adults; head and neck cancer; asthma and COPD; drugs in sport; and stroke. For example, medical oncology specialist trainees must have skills for the 'determination of the risk of head and neck cancer based on aetiology and risk factors such as smoking'.

Sport and exercise medicine specialist trainees must have the knowledge to 'understand the effects of smoking on health'. Stroke medicine specialist trainees must be able to have a 'positive proactive discussion with patients to explain treatments, lifestyle changes and other actions which will positively improve health (eg smoking cessation) which encourages them to ask questions and participate in self-management'.

A knowledge of smoking cessation strategies is required of trainees undergoing core medical training, speciality training in acute internal medicine and general internal medicine, and respiratory medicine. Respiratory medicine requires trainees to be competent to assist patients to stop smoking, and during training the trainee must attend smoking cessation clinics. They must have knowledge of: 'Effects of smoking on general and respiratory health'; 'Global situation and economics of smoking'; 'Burden of smoking on health from a population perspective and an economic perspective'; 'pharmacological and non-pharmacological treatments available for smoking cessation' and have the skills to 'advise patients on smoking cessation and support measures available for smoking cessation (competence)', and 'Utilise opportunities to actively promote health benefits of smoking cessation for patients and those around them including children.'

Eight specialties did not mention smoking in their curricula (see Table 7.3).

7.3.2.4 Royal College of Surgeons of England

Smoking is mentioned in the context of health promotion in the curricula for all 11 specialties overseen by the Royal College of Surgeons of England. Trainees must have knowledge of 'the damaging health and social issues such as excessive alcohol consumption, obesity, smoking and illicit drugs and the harmful effects they have on health'. Only two specialties include smoking within the curriculum in additional topics: cardiothoracic surgery includes knowledge of smoking cessation measures within the emphysema and bullae topic; while general surgery includes smoking as a risk factor for colorectal cancer and the epidemiology of smoking in relation to chronic ischaemia. The trainees must also have knowledge

of the 'relationship between physical exercise programmes and healthy eating and smoking cessation programmes'.

7.3.2.5 Royal College of Psychiatrists

Smoking and Mental Health, a joint report by the RCP and the Royal College of Psychiatrists in 2013, recommended that:

> *All professionals working with or caring for people with mental disorders should be trained in awareness of smoking as an issue, to deliver brief cessation advice, to provide or arrange further support for those who want help to quit and to provide positive (ie non-smoking) role models. Such training should be mandatory*.[15]

In 2018 the only brief mention of smoking in The Royal College of Psychiatrists' curriculum is in relation to 'alcohol and other drugs', under 'giving brief advice concerning the effects of alcohol, tobacco and other drugs on health and wellbeing'.

7.3.2.6 Other specialist colleges or faculties that mention smoking

The Royal College of Paediatrics and Child Health briefly mentions smoking in relation to health promotion, stating that the trainee must 'know the role of health promotion programmes for example to prevent dental decay, smoking, accidents, obesity, sudden infant death'. The Royal College of Ophthalmologists mentions smoking within the topic of health promotion, 'Supports an individual in a simple health promotion activity (eg smoking cessation)' and the Royal College of Obstetricians and Gynaecologists 'explain to parents who smoke the health risk that this poses to their children, including those exposed to the effects of smoking in utero'.

7.3.3 Coverage of VBA or other brief opportunistic advice

VBA is perhaps the very minimum intervention that any health professional should be able to deliver. While it is likely that this would be covered or subsumed by more intensive cessation training in those curricula that included detail of smoking cessation intervention, we found no mention of VBA or other brief opportunistic advice on any site.

7.4 Postgraduate training of other healthcare professionals

We found no data on postgraduate training on smoking interventions, other

Table 7.3 Occurrences of smoking in the curriculum in the specialist medical colleges training

Royal College and subspecialty	Topic	Assessment[a]
Anaesthetists	–	
Emergency Medicine	Health promotion / preventative healthcare Breathlessness Cough	Exam, CBD, mini-CEX ACAT, CBD, MSF ACAT, CBD, MSF
General Practitioners	Health promotion / preventative healthcare Children and young people Older adults Men's health Cardiovascular health ENT, oral and facial problems Respiratory health Skin problems	
Radiologists	Thoracic disease	Mini-IPX
Obstetricians and Gynaecologists	Health promotion / preventative healthcare	
Ophthalmologists	Health promotion and public health	
Paediatrics and Child Health	Health promotion / preventative healthcare	MRCPCH exam, portfolio, CBD
Pathologists	–	
Analytical toxicology	–	
Chemical pathology	Health promotion / preventative healthcare Diabetes	
Clinical biochemistry	–	
Diagnostic neuropathology	–	
Forensic histopathology	Health promotion / preventative healthcare	
Genetics	–	
Haematology	–	
Histocompatibilty and immunogenetics	–	
Histopathology	Health promotion / preventative healthcare	CBD, DOPS, ECE
Clinical immunology	–	
Medical microbiology; medical virology	Health promotion / preventative healthcare	ACAT, CBD, mini-CEX
Microbiology	–	
Molecular pathology of acquired disease	–	

Table 7.3 continued

Royal College and subspecialty	Topic	Assessment[a]
Molecular pathology of infection	–	
Paediatric and perinatal pathology	Health promotion / preventative healthcare	
Reproductive science	–	
Virology	–	
Physicians		
Core medical training	Health promotion / preventative healthcare	CBD, mini-CEX
	Smoking	PACES, ACAT, CBD, mini-CEX
	Breathlessness	PACES, ACAT, CBD, mini-CEX
	Cough	ACAT, CBD, mini-CEX
	Cardiovascular health	PACES, ACAT, CBD, mini-CEX
	Respiratory health	PACES, ACAT, CBD, mini-CEX
Acute internal medicine	Health promotion / preventative healthcare	CBD, mini-CEX
	Smoking	PACES, ACAT, CBD, mini-CEX
	Breathlessness	ACAT, CBD, mini-CEX
	Cardiovascular health	PACES, ACAT, CBD, mini-CEX
	Respiratory health	PACES, ACAT, CBD, mini-CEX
Allergy	Health promotion / preventative healthcare	CBD, mini-CEX
Audio vestibular medicine	Health promotion / preventative healthcare	CBD, mini-CEX
	Children and young people	CBD, mini-CEX
	Emotional and social aspects	CBD, mini-CEX
Aviation and space medicine	–	
Cardiology	Health promotion / preventative healthcare	ACAT, CBD, mini-CEX
	Cardiovascular health	Exam, mini-CEX, CBD, MCR
	Community cardiology	exam, CBD, MCR
Clinical genetics	–	
Clinical neurophysiology	Communication skills	mini-CEX, CBD, MSF
Clinical pharmacology and therapeutics	Health promotion / preventative healthcare	ACAT, CBD, mini-CEX
	Hypertension	CBD
Dermatology	Health promotion / preventative healthcare	
Endocrinology and diabetes mellitus	Health promotion / preventative healthcare	CBD, mini-CEX
	Diabetes	CBD, mini-CEX
Gastroenterology	Health promotion / preventative healthcare	ACAT, CBD, mini-CEX
General internal medicine	Health promotion / preventative healthcare	CBD, mini-CEX
	Smoking	PACES, ACAT, CBD, mini-CEX
	Breathlessness	AA, ACAT, CBD, mini-CEX

Table 7.3 continued

Royal College and subspecialty	Topic	Assessment[a]
	Cardiovascular health	PACES, ACAT, CBD, mini-CEX
	Respiratory health	PACES, ACAT, CBD, mini-CEX
Genitourinary medicine	–	
Geriatric medicine	Health promotion / preventative healthcare	CBD, mini-CEX
	Older adults	
Haematology	Health promotion / preventative healthcare	
Immunology	Health promotion / preventative healthcare	CBD, mini-CEX
Infectious diseases and tropical medicine	Health promotion / preventative healthcare	ACAT, CBD, mini-CEX
Medical oncology	Head and neck cancer	Mini-CEX, CBD, PS, MSF
Medical ophthalmology	Health promotion / preventative healthcare	
Metabolic medicine	–	
Neurology	–	
Nuclear medicine	Cardiovascular health	DOPS, MSF
Paediatric cardiology	Health promotion / preventative healthcare	
	Smoking	CBD, mini-CEX
Palliative medicine	--	
Pharmaceutical medicine	–	
Rehabilitation medicine	–	
Renal medicine	Health promotion / preventative healthcare	ACAT, CBD, mini-CEX
	Diabetes	CBD, mini-CEX, SCE
Respiratory medicine	Health promotion / preventative healthcare	CBD, mini-CEX
	Smoking	SCE, mini-CEX, CBD
	Asthma	SCE, mini-CEX, CBD, ACAT
	COPD	SCE, mini-CEX, CBD, ACAT
Rheumatology	Health promotion / preventative healthcare	CBD, mini-CEX
Sport and exercise medicine	Health promotion / preventative healthcare	Dip SEM
	Drugs in sport	Dip SEM
Stroke medicine	Stroke	Mini-CEX
Psychiatrists	Alcohol and other drugs	
Surgeons		
Cardiothoracic surgery	Health promotion / preventative healthcare	
	Emphysema and bullae	
Core surgical training	Health promotion / preventative healthcare	CBD, MRCS exam
General surgery	Health promotion / preventative healthcare	CBD, MRCS exam

Table 7.3 continued

Royal College and subspecialty	Topic	Assessment[a]
	Colorectal neoplasia Chronic ischaemia	
Neurosurgery	Health promotion / preventative healthcare	CBD, MRCS exam
Oral and maxillofacial surgery	Health promotion / preventative healthcare	CBD, MRCS exam
Otolaryngology	Health promotion / preventative healthcare	CBD, MRCS exam
Paediatric surgery	Health promotion / preventative healthcare	CBD, MRCS exam
Plastic surgery	Health promotion / preventative healthcare	CBD, MRCS exam
Trauma and orthopaedic surgery	Health promotion / preventative healthcare	CBD, MRCS exam
Urology	Health promotion / preventative healthcare	CBD, MRCS exam
Vascular surgery	Health promotion / preventative healthcare	CBD, MRCS exam
Faculties		
Medical Leadership and Management	–	
Occupational Medicine	–	
Pharmaceutical Medicine	–	
Public Health	Policy and strategy development and implementation	WR, CBD
	Strategic leadership and collaborative working for health	MFPH exam, DOP, WR, CBD, MSF
	Health improvement, determinants of health, and health communication	MFPH exam, DOP, WR, CBD, MSF

[a]Assessment terminology: AA, audit assessment; ACAT, Acute Care Assessment Tool; CBD, case based discussion; Dip SEM, Diploma of Sport and Exercise Medicine; DOPS, direct observation of procedural skills; ECE, evaluation of clinical/management events; MCR, multiple constant report; MFPH, member of the Faculty of Public Health; mini-CEX, mini clinical evaluation exercise; mini-IPX, mini imaging interpretation exercise; MRCPCH, Membership of the Royal College of Paediatrics and Child Health; MRCS, member of the Royal College of Surgeons; MSF, multi source feedback; PACES, Practical Assessment of Clinical Evaluation Skills; PS, patient survey; SCE, Specialty Certificate Examination; WR, written reports.

than that provided by the NCSCT (see Section 7.7), for other healthcare professionals.

7.5 Training of 'non-professionalised' groups such as healthcare assistants

Other than that provided by the NCSCT (see Section 7.7) we found no evidence on training for non-professionalised groups.

7.6 Awareness of smoking cessation interventions among practising healthcare professionals

There is limited evidence available on awareness of smoking cessation practice among qualified healthcare professionals. The evidence we have been able to find, in relation to the speciality studies, is as follows.

7.6.1 GPs

A study of 123 GP trainees in England in 2015 found that less than 30% recalled having received training in nicotine addiction, and less than 20% had been trained in interacting with patients who smoke. Less than 2% of trainees felt they could explain the full range of pharmacological smoking cessation aids to their patients.[16] A study of the management of smoking among older people by GPs in Nottingham found that around 20% 'rarely or never' delivered smoking cessation advice to patients in this group, and that 40% rarely or never provided support to make a quit attempt.[17] In a 2007 qualitative study, GPs reported that they tended to regard their role as being one of identifying smokers and referring them on for cessation support, rather than delivering cessation support themselves.[18]

7.6.2 Medical and surgical specialist registrars

In 2005, 53 medical and surgical specialist registrars (SpRs) in the Oxford region were interviewed to determine what efforts they make to stop patients smoking. The authors of the study concluded that 'Most junior doctors ask whether patients smoke, but they do little about it'. Surgical SpRs were less likely than medical SpRs to give smoking advice, discuss smoking-related health problems, discuss the benefits of quitting or advise treatment. Few SpRs had been trained to counsel smokers, and less than half felt that their input helped patients to stop. The conclusion of the study was that medical education is lacking in teaching students and junior doctors how to help patients stop smoking.[19]

7.6.3 The maternity workforce

A 2017 report by Action on Smoking and Health and the Smoking in Pregnancy Challenge Group looked in detail into the training of the maternity workforce, mainly midwives and obstetricians, in what they call 'smokefree skills'. The report highlighted that while the workforce are taught and understand that smoking in pregnancy is extremely harmful, and is indeed the leading modifiable risk factor for poor pregnancy outcomes, many practising staff were unsure of their role in addressing smoking, and had received no training in how to help pregnant smokers to quit.[20] The report found that nearly 70% of midwives and over 80% of obstetricians had not been trained to deliver even VBA, and recommended that smoking cessation skills training should be embedded into undergraduate curricula and examinations and regular postgraduate training. Studies of midwives[1,2] have shown that while they appear highly motivated to help pregnant smokers stop smoking, this does not translate into practice.[21,22]

7.6.4 Mental health staff

A questionnaire survey of mental health staff from 25 inpatient units in England in 2009 obtained responses from 459 (68%) staff.[23] Less than half (42%) of participants agreed that dealing with patients' smoking was their responsibility as a mental health professional, and only half (50%) asserted that they could make time to treat smoking in their working routine. All professional groups demonstrated a lack of knowledge about tobacco dependence, treatment and its relation with mental illness, with healthcare assistants being least knowledgeable overall. Of the doctors, 41% were unaware that smoking can decrease blood levels of antipsychotic medications, and 36% were unaware that stopping smoking could reduce antipsychotic medicine dose requirements. Staff overestimated the prevalence of smoking in the general population, and over a third believed that nicotine was carcinogenic.[23]

7.6.5 Dental health professionals

In a recently completed survey of UK dental professionals, there was a more than doubling of numbers of dentists, dental hygiene therapists and dental nurses who always enquire about smoking status, from less than 40% in 2006 to around 80% in 2017.[24] Delivery of smoking cessation advice has also increased, though a fifth of dentists and a third of dental nurses do not offer it. The proportions of people in these three professional groups who had received smoking cessation intervention training almost doubled since 2006, but more than 40% of dentists, 20% of dental hygiene therapists and 63% of dental nurses still reported receiving no training in smoking cessation interventions. Lack of training is seen

by all dental health professionals as an important barrier to delivery of smoking cessation advice.[24]

7.6.6 Ophthalmologists

A 2008 postal survey of UK consultant ophthalmologists found that of the 55% who responded, only 35% asked about smoking status for new patients and 5% for follow-up patients.[25] Only 22% provided advice and assistance about how to stop smoking to smokers who wished to quit. Eighteen per cent stated that their departments provide information about smoking for patients and 6% that support is available for patients who want to quit. The study concluded that the assessment of smoking status and provision of targeted support for smokers to quit could be substantially improved in UK ophthalmology departments.[25]

7.6.7 Hospital staff

In 2016 the British Thoracic Society conducted a national audit on the treatment of tobacco dependence in UK hospitals.[26] Only 44% of 140 responding hospitals reported that frontline staff were offered regular training in smoking cessation, and that those trained were most likely to be nurses or foundation-year trainee doctors.[26]

7.6.8 Stop smoking practitioners

In 2012 an online survey of 484 stop smoking practitioners (SSPs) from the English NHS stop smoking services looked at self-reported practices, attitudes and levels of training.[27] Gaps were found between SSPs' current practice and evidence-based guidelines: for example, only 43% always used the abrupt quit model, and 30% reported ever recommending particular medication to clients. Differences in levels of training were found between specialist and community SSPs. 'Specialist' SSPs reported receiving more days training, more days observing an experienced practitioner when starting work, and were more likely to receive clinical supervision than 'community' SSPs. The recommendation was that standardised training in evidence-based practice should be implemented for all SSPs.[27]

7.7 Training by the NCSCT

The National Centre for Smoking Cessation and Training (NCSCT) provides evidence-based and effective training for SSPs, and broader health and social care professionals, in England. The NCSCT also delivers its online training and assessment programme under licence to Public Health Wales, the Ministry of

Defence, the Health Service Executive in the Republic of Ireland and the Centre for Postgraduate Pharmacy Education. Also it has provided the content of its training for delivery by the Scottish Government.

7.7.1 The NCSCT training and assessment programme

The training and assessment programme delivered by the NCSCT is founded upon evidence-based behaviour change techniques (specific activities that form part of complex multicomponent interventions)[28] and ensures that practitioners are trained in the knowledge and skills that improve the likelihood of quitting successfully. The NCSCT provides commissioned face-to-face training courses in behavioural support for smoking cessation, but most of its training activity occurs online via the following courses relevant to healthcare professionals.

7.7.2 SSP training

Aimed at those that provide behavioural support for smoking cessation, this course covers the competencies (knowledge and skills) needed to assist with quit attempts effectively. The course takes 4–6 hours to complete and includes information on smoking prevalence, health effects, stop smoking medications and behavioural support delivered via film clips, summative and formative multiple-choice questions, supplementary resources and certification. The emphasis within this online course is on clinical practice and includes what practitioners need to deliver at pre-quit, quit date and post-quit consultations.

7.7.3 VBA module

In 2012, the NCSCT produced a VBA or 'very brief advice on smoking' module. This was a short, 30-min training module based around modelling film clips providing examples of how very brief advice can be delivered to patients and includes key facts, figures and messages, plus an assessment and certification function.[29] After completing the module health professionals should understand the importance of delivering VBA to smokers, realise how simple this intervention can be, know how to ask, advise and act (the three As), and be confident in their knowledge of the smoker's pathway and referral options.

7.7.4 VBA on secondhand smoke module

Another open-access course, this module is aimed at all health and social care

professionals who come into contact with parents and carers of children. The course adapts the three elements of VBA (ask, advise and act) to promote adoption of smoke-free homes and cars. The module has been evaluated and found to improve knowledge, confidence and self-reported practice of health and social care professionals.[30]

7.7.5 Stop smoking medications course

This open-access course provides training for health and social care professionals whose role in smoking cessation may only extend as far as delivering VBA, and for SSPs who give behavioural support for quit attempts.

7.7.6 Enhanced very brief advice for pregnancy

Designed for midwifery teams this module describes the main effects of smoking upon the health of mother and baby, and the patterns and prevalence of smoking among pregnant women. It trains people to establish smoking status (Ask), including CO screening, advise women on the best way of stopping smoking or managing their exposure to smoke (Advise), support women to quit or manage their exposure to smoke (Act), and to deal with issues as they arise.

7.7.7 E-cigarette course

A new online open-access course on e-cigarettes, commissioned by Public Health England and designed for health and social care practitioners in general, and SSPs specifically, became available in February 2018. The course covers the safety and effectiveness of e-cigarettes, types of device and issues for e-cigarette users to consider. It looks specifically at the role of e-cigarettes for young people and pregnant women who smoke, and answers frequently asked questions.

7.7.8 Evaluation and effectiveness

Evaluation of the training programmes show substantial improvements in knowledge,[31,32] and confidence in the core skills needed to effectively assist smokers to quit, maintained 3 months after training.[33] The NCSCT is developing a system for recertification for all of its courses that have assessments, to ensure that SSPs maintain their knowledge and skills.

7.8 Summary

- Training in smoking cessation interventions for healthcare professionals is inadequate.
- Smoking is most commonly taught as part of a more general topic such as health promotion.
- With the exception of dental training, undergraduate courses tend to focus on the health effects of smoking to a much greater extent than on knowledge and practical skills to help smokers to quit.
- Cessation skills are rarely tested in student examinations.
- Postgraduate medical training is variable in cessation training content but few programmes mandate training in cessation techniques. Some postgraduate training schemes make no mention of smoking.
- Practising healthcare professionals who completed their training without exposure to smoking intervention practice are unlikely to feel equipped to intervene in smoking and may have negative attitudes and beliefs about smoking cessation.
- The high clinical and cost-effectiveness of smoking cessation intervention warrants dedicated training on the subject for all health professionals.
- Training in smoking cessation interventions needs to be introduced into all undergraduate and postgraduate healthcare professional curricula to ensure that all new staff are appropriately trained.
- Mandatory training in smoking cessation interventions, at levels appropriate to role, is essential for the entire NHS healthcare professional workforce to ensure that all practising staff are appropriately skilled to support smoking cessation.
- Effective, evidence-based training for staff at all levels is readily available from the NCSCT.

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8 Smoke-free NHS estates

8.1 The NHS estate

The NHS estate represents a vast network of public property used by millions of staff, patients, adults and children each day who need to be protected from the health harms of second-hand smoke exposure. In 1948 the NHS consisted of around 3,000 hospitals, run by local authorities and voluntary organisations, and the land area currently occupied by NHS provider trusts amounts to 6,500 ha of land (approximately one-third the area of Wales) over more than 1,200 sites.[1] This estate was used in 2015/16 for over 16 million hospital admissions and 89 million outpatient attendances, and in 2016/17 over 23 million A&E department attendances.[2] They also provide a workplace for the approximately 1.3 million people employed by the NHS.

The NHS collects information on this estate via the Estates Return Information Collection (ERIC) return, but does not measure smoke-free status.[3] In England the Care Quality Commission (CQC) inspects the estates of NHS providers and their compliance with Regulation 15, issued under the Health and Social Care Act 2008,[4] that states that all premises must be 'suitable for the purpose for which they are being used, properly used, properly maintained and appropriately located'.[4] The CQC has issued guidance for smoke-free policies in mental health trusts but not for other NHS facilities.[5]

8.2 Smoke-free legislation in the general population

Second-hand smoke has significant effects on health in adults and children,[6–9] and acknowledgement of these risks alongside public support for a comprehensive smoking ban led to legislation to protect the public and workers from the harms of second-hand smoke.[10] Scotland was the first country in the UK to introduce smoke-free legislation in 2006,[11] with England, Wales and Northern Ireland following in 2007.[12,13] All of this legislation required indoor and substantially enclosed outdoor workplaces and public places to become smoke free. Compliance with this legislation has been high[12] and popular with

the public and businesses, despite the initial concerns about the impact on the hospitality trade.[12] The legislation has also generated significant health benefits: in the first year there was a reduction in emergency admissions for myocardial infarction in England by 2.4%[14] and in admissions for acute coronary syndrome in Scotland by an additional 13% relative to the trend in the year before legislation was implemented in England.[15] An additional 300,000 people made smoking quit attempts at the time the legislation was introduced;[10] exposure of children to second-hand smoke fell by 70% in the decade leading up to legislation in England but particularly in the 2 years leading up to the ban;[16] and exposure to second-hand smoke in bar staff fell by 73% to 91% after the introduction of the legislation.[17,18] Further legislation prohibiting smoking in private motor vehicles with passengers under the age of 18 was introduced in England and Wales in October 2015,[19] and similar legislation in Scotland in December 2016.[20] Northern Ireland launched a public consultation in 2017. Local authorities in Wales implemented voluntary bans on smoking in children's playgrounds in 2016,[21] supported by legislation in 2017.[22]

8.3 Smoke-free policy in NHS settings

8.3.1 History

The history of efforts to achieve a smoke-free NHS estate spans more than three decades. Until the early 1980s, smoking in hospital buildings by patients, and in some cases staff, was widely tolerated. In 1985, district health authorities were instructed to develop policies to prevent smoking on health premises, and although many complied, few included explicit guidelines on implementation and monitoring.[23] In response to accumulating evidence on the risks of breathing in other people's cigarette smoke, the government indicated in 1992 that the NHS should adopt smoke-free policies;[24,25] that the sale of tobacco on NHS premises, except for long-stay patients who smoked, should end by December 1992; and that by the end of May 1993, the NHS was to be smoke free 'except for limited necessary provision of separate smoking rooms'.[24] From the late 1980s, evidence was also emerging on the greater risk of perioperative complications, delays in wound healing, increased rates of wound infection and postoperative pulmonary complications in smokers, resulting in delayed recovery, greater treatment costs and prolonged hospital stays.[26] Guidance also encouraged health professionals in hospitals to encourage and help smokers to quit.[27]

A Health Development Agency survey of a sample of hospitals at the end of 2003[26] indicated that virtually all had smoke-free policies, with 10% reporting that they were completely smoke free (indicating no exceptions and smoking not permitted anywhere in hospital buildings and grounds). Further research of a

subsample of the latter indicated, however, that this was not the case, with the policy having lapsed due to inadequate implementation and enforcement, or because smoking was allowed in shelters or wider outdoor areas. The remaining 90% were implementing partial bans which allowed smoking in some areas, predominantly smoking rooms (63%), shelters (61%), or outside hospital entrances (60%). Smoking rooms were most commonly located on wards (22%) or near the hospital canteen, but locations also included operating theatre, A&E department and maternity settings. Exceptions for special groups, predominantly bereaved relatives, long-stay patients and mental health patients were common. A significant minority of hospitals allowed staff to smoke.[26]

In the 2004 public health White Paper *Choosing health*, NHS organisations were advised 'to take action to eliminate second hand smoke from all their buildings and provide comprehensive support for smokers who want to give up'.[28] The White Paper acknowledged that this might not be achievable in cases where the hospital was people's main place of residence, but aimed for the NHS otherwise to be smoke free by the end of 2006.[28]

In 2005, new guidance was published by the Health Development Agency to support this goal, encouraging NHS organisations to provide smoke-free buildings 'to protect staff, patients and others from the health risks of second hand smoke'.[29] At that time smoke free was defined as smoking being:

> *not permitted anywhere within hospital buildings. No exceptions will be made for staff or visitors. For long-stay mental health patients in an acute psychiatric state or terminally ill patients, exceptions may be made on a case-by-case basis. However, no blanket exceptions will be allowed for particular categories of patients.*[29]

A survey carried out in February 2007 of all English acute and mental health trusts[30] with a response rate of 77% (76% of acute and 79% of mental health trusts) found that nearly all (98%) of those who responded reported that they had a smoke-free policy, and that in 84% of acute trusts and 64% of mental health trusts the policy covered grounds as well as buildings. Overall, 33% of respondent trusts (41% of acute, 13% mental health) reported that there were no exemptions allowed to their policy. However, site visits indicated that smoking on premises was still prevalent, even by staff in uniform, and that exemptions were frequently granted. Interviews with human resource directors, deputy directors or staff members in charge of smoke-free policies in 22 trusts indicated that the implementation of smoke-free policies was rated generally positively, although 59% reported challenges.[30] The most common concern, expressed by 68% of interviewees, was in relation to fears of aggression or abuse, particularly in response to attempts to enforce the policy. Just under a quarter of interviewees believed that allowing no exemptions and rigorous implementation was critical for success.

8.3.1.1 Mental health settings

On 31 March 2007 Rampton Hospital, a high secure long-stay psychiatric hospital, became the first high secure hospital in the UK to become comprehensively smoke free. Preparations included staff training, information and support for patients to stop smoking. The ban was rigorously enforced, and tobacco and ignition sources were banned. A retrospective evaluation of the policy found that the transition went smoothly with no marked increase in use of psychotropic medication, self-harm or behavioural disturbance,[31] replicating findings from secure hospitals in other countries.[32] Consistent with the now well-recognised effects of smoking cessation on drug metabolism (see Chapter 3), an increase in clozapine levels was observed.[33]

Several studies indicated that the implementation of smoke-free policies was often undermined in mental health settings by regular institutionalised smoking breaks which often became a fixation for patients.[34] Subsequent studies demonstrated that substantial time and resources were being devoted to escorting patients and supervising the breaks. There was also a lack of training and cessation or temporary abstinence support for smokers.[35,36] In one mental health trust, in 2010, over 3 years after implementation of the smoke-free policy, smoking interventions were not integrated into care pathways or standard procedures and documentation.[37] Despite smoke-free legislation therefore, a smoking culture remained prevalent in mental health care settings.[36,38]

In March 2013, the RCP[39] concluded that to address these issues in mental health settings there was an urgent need for training and support for mental health staff; provision of effective smoking cessation and harm reduction support for smokers; and for investment in achieving smoke-free mental health settings. Also in March 2013, the South London and Maudsley NHS Foundation Trust(SLaM) piloted a comprehensive smoke-free policy in secure settings, introduced in response to an audit that found up to 92% of patients smoked across their 10 wards and most staff, who were non-smokers, supported a proposal to work in a totally smoke-free environment.[40,41] Their approach to implementation included a period of preparation in which regular patient and staff focus groups identified potential obstacles and acceptable solutions. Listening events for families and carers were held to share information about the plans for improved wellbeing and respond to concerns. Staff training and tobacco dependence treatment plans for service users were put in place several months in advance of going smoke free. Consistent and visible leadership from a modern matron, engagement of ward managers and newly identified smoke-free champions contributed to cohesive teamwork, thought to be one of the critical elements to the success of the pilot. An evaluation of the pilot found improved engagement in therapy, 50% reduction in GP contacts, reduction in use of cannabis, improved sleep and a decrease in physical assaults on staff and patients.[40,41]

8.3.1.2 Acute and maternity settings

As in mental health settings, problems with the implementation of smoke-free policies after the 2007 smoke-free legislation were also apparent in acute and maternity NHS trusts in England. Smoking was frequently seen at entrances, and support provided to smokers was poor. Health professionals reported perceived lack of time, knowledge and skills to support smokers, some staff were concerned about taking away smokers' rights and did not see it as part of their job role. Midwives also perceived that their advice to stop smoking was ineffective and were concerned about it damaging their relationship with pregnant women.[42]

8.4 Why an NHS smoke-free estate is necessary

NICE guidance on smoking in secondary care settings issued in 2013 concluded that a smoke-free NHS estate, with a comprehensive smoke-free policy covering buildings, grounds and vehicles and accessible tobacco dependence treatment for all smokers, is essential to provide a healthy environment and promote non-smoking as the norm for people using NHS services.[43] There are many reasons why this is the case, as follows:

- Healthcare staff and organisations have a duty of care to protect health and promote healthy behaviours among people using or working in the NHS estate.
- Smoke-free policy communicates a clear and unambiguous message about the dangers of smoking, and the significance of smoking as a cause of ill health.
- There is no risk-free level of exposure to tobacco smoke, so smoke-free policies are necessary to protect people from breathing in other's smoke.
- Smoking is a fire risk wherever it is allowed.
- A high proportion of secondary care service users are smokers, as are their families and other visitors, making secondary care use a valuable opportunity to promote cessation.
- A smoke-free environment supports smokers who are trying to quit and removes triggers that cause relapse to smoking.
- Failure to implement a comprehensive smoke-free policy leaves all employers open to the risk of prosecution and litigation.

Concerns had been raised that long-stay settings such as mental health trusts should be exempt, or that exemptions should be offered to special groups such as the terminally ill or bereaved, or that smoking should be allowed in designated outdoor areas such as smoking shelters. These exemptions were rejected by NICE[43] on the grounds that they are likely to perpetuate smoking in disadvantaged groups, consume staff time and financial resources that would be better used providing effective cessation support and in other aspects of patient care, and contravene the NHS duty of care. The guidance also recognised that

abstaining from smoking while an inpatient or visitor to hospital can be challenging for smokers, and therefore that it is essential that patients and their visitors have access to therapies and products to relieve withdrawal symptoms, and to support quit attempts.[43] Smoking and ignition sources (matches, lighters) are also a common causes of accidental fire,[44] and since national smoke-free legislation was introduced there has been a steady decline in accidental hospital and medical care fires[45] as shown in Figure 8.1.

The NICE guidance is discussed in more detail in Section 8.5.5.

8.5 Implementing smoke-free estates in the NHS

8.5.1 Legislation

Current UK smoke-free legislation (Section 8.2) does not specifically apply to NHS hospital grounds, but the Health (Tobacco, Nicotine etc and Care) (Scotland) Act 2016 passed in Scotland in March 2016[46] will make it an offence to smoke within 15 metres of a hospital building. This legislation was introduced as an amendment to the Smoking Health and Social Care (Scotland) 2005 Act[11] and is essentially an extension of the Smoking Health and Social Care (Scotland) 2005 Act that defines a public space to include NHS buildings. This legislation

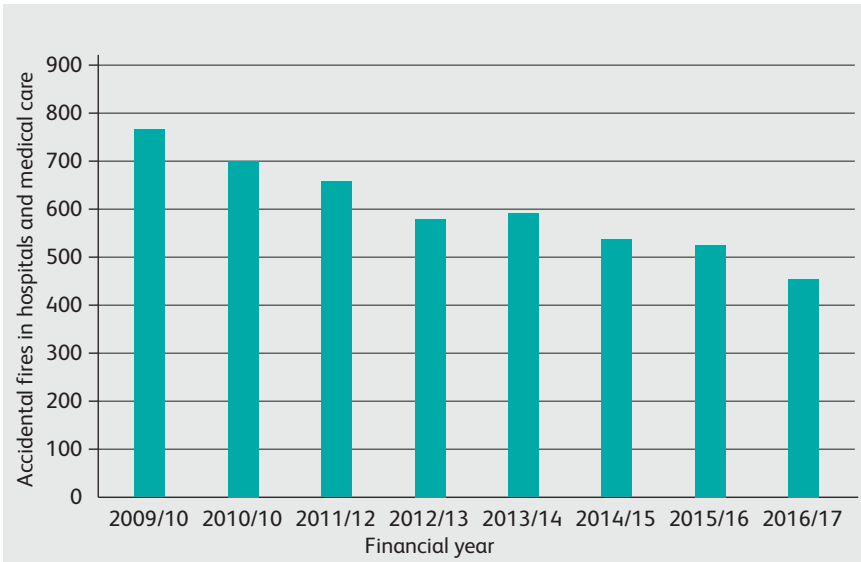

Figure 8.1 Reduction in accidental fires in hospitals and medical care settings in England. Data from Home Office statistics.[45]

Box 8.1 Explanatory notes for the Health (Tobacco, Nicotine etc and Care) (Scotland) Bill[47]

Section 4A: Offence of permitting others to smoke outside hospital building

Subsection (1) makes it an offence for a person who has management and control of a no-smoking area to knowingly permit smoking there.

Subsection (4) provides that a person who commits the offence under this section is liable on summary conviction to a fine not exceeding level 4 on the standard scale (currently £2,500).

Section 4B: Offence of smoking outside hospital building

Subsection (1) makes it an offence for a person to smoke within the no-smoking area outside a hospital building.

Subsection (3) provides that a person who commits the offence of smoking in a non-smoking area is liable on summary conviction to a fine not exceeding level 3 on the standard scale (currently £1,000).

Section 4C: Display of warning notices in hospital building and on hospital grounds

Subsection (1) places a duty on Health Boards to prominently display signs at every entrance to the hospital grounds.

Subsection (2) requires the person in management and control of each building on a hospital ground to prominently display signs at the entrance to each building.

Subsection (3) provides that a sign must state that it is an offence to smoke in the no-smoking area outside a hospital building or knowingly permit smoking there.

Subsection (4) gives the Scottish Ministers a power to make regulations which may provide further detail as to the manner of the display, form and content of the no-smoking signs.

Subsection (5) provides that a person who commits an offence of failing to display signage at the entrance to hospital buildings in compliance with this section is liable to a fine not exceeding level 3 on the standard scale (currently £1000).

awaits final ministerial approval before it can be implemented, expected in 2018. Some of the key elements in the explanatory notes in the original Bill introducing this legislation[47] are set out in Box 8.1. The costs of implementing the legislation in Scotland were estimated at £347,000 for communications and between £99,000 and £198,000 for signage and awareness raising; these would be largely one-off costs.[47]

No specific legislation requiring smoke-free NHS sites is planned for England, Wales or Northern Ireland, but NHS trusts can work in partnership with local authorities to make use of other legislation to support compliance with their

policy, particularly if smoking is a problem in the immediate perimeter of hospitals. Public Spaces Protection Orders (PSPOs),[48] available under the Anti-social Behaviour, Crime and Policing Act 2014,[49] can be used by councils in England to restrict behaviour that is detrimental to the quality of life in a designated locality.[50] PSPOs are enforced by local authorities, and the enforcement powers can be delegated to hospital staff. PSPOs have been used to ban smoking in children's play areas.[50] The Environmental Protection Act 1990[51] can also be enforced, particularly where cigarette litter becomes a problem in public places. Both of these pieces of legislation allow councils to impose fixed penalty notices in the event of non-compliance.

8.5.2 Commissioning

Commissioners in England may be able to require smoke-free estates through commissioning arrangements. The NHS contract in England for 2017–2019 specified that commissioners must agree plans from the provider to maintain a smoke-free hospital estate by December 2018 (see Chapter 5).[52]

8.5.3 Regulators

The CQC in England inspects NHS premises as part of its regulatory function overseeing NHS providers, and has provided guidance for smoke-free policies for mental health trusts.[5] However, the most recent CQC report does not comment on whether this guidance has been implemented.[53]

8.5.4 Advocacy

The *NHS Smokefree Pledge*[54] was launched in January 2018 by the Smoke-free Action Coalition, a group of more than 300 organisations committed to promoting public health and reducing the harm from tobacco use. NHS organisations are encouraged to sign the pledge to make a visible commitment to a smoke-free NHS, and specifically to 'create environments that support quitting through implementing smoke-free policies as recommended by NICE'[54] as well as many other elements of treating tobacco dependency and supporting the Tobacco Control Plan for England.[55]

8.5.5 Guidelines

In November 2013, NICE PH48 guidance recommended the adoption of comprehensive smoke-free policies and services in acute, maternity and mental

Box 8.2 NICE PH48 recommendations relevant to helping staff, visitors and others in a smoke-free NHS[43]

Recommendation 1: Provide information for planned or anticipated use of secondary care

Recommendation 2: Identify patients who smoke and offer help to stop

Recommendation 3: Provide intensive support for people using acute and mental health services

Recommendation 4: Provide intensive support for people using maternity services

Recommendation 5: Provide information and advice for carers, family and visitors

Recommendation 8: Make stop smoking pharmacotherapies available in hospital

Recommendation 11: Develop smokefree policies

Recommendation 12: Communicate the smokefree policy

Recommendation 13: Support staff to stop smoking

Recommendation 14: Provide stop smoking training for frontline staff

health services and recommended effective ways to help people stop smoking or abstain from smoking while using or working in these settings.[43] The guidance stresses that supporting patients to quit smoking requires that hospital grounds as well as buildings should be smoke free, with no exemptions, and therefore that shelters or other designated outdoor smoking areas should be removed. The guidance provides the framework of how NHS hospitals should approach

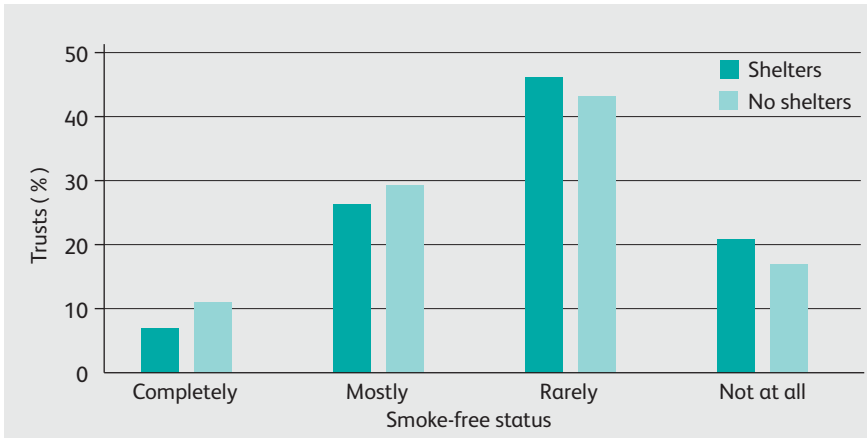

Figure 8.2 Smoke-free hospital grounds in hospitals with or without 'smoking shelters' (2016).[56]

implementing smoke-free policy, and the headline recommendations of particular relevance to smoke-free policy are listed in Box 8.2.

Compliance with these guidelines has, however, been universally poor, especially in relation to the maintenance of completely smoke-free grounds. A 2016 audit of 140 acute hospital trusts in the UK by the British Thoracic Society found few hospitals reported completely smoke-free grounds, whether an outdoor 'smoking shelter' was provided or not, shown in Figure 8.2.[56]

8.5.6 Barriers to implementation

Reasons for the poor implementation of the guidelines on smoke-free estates in secondary care will be specific to individual trusts, though with common underlying causes. As part of the evidence review for NICE PH48,[43] an extensive literature review of the barriers to implementation of smoke-free grounds was undertaken[57] and quoted below:

- *Some groups may be more resistant to accepting smoke-free policies and appear to require additional support. These include nurses, staff and patients who smoke, particularly staff who are heavy smokers. These findings relate to both mental health and broader health care settings.*
- *The widely held attitude that smokers have a right to smoke acts as a significant obstacle to acceptance of smoke-free policy, and emerged as a factor restricting the willingness of mental health staff to provide cessation support to patients. However, the evidence suggests policy initiatives that underline the addictive properties of smoking may help to overcome this barrier.*
- *A willingness among frontline staff in both settings to assume responsibility for enforcing smoke-free policy emerged as a significant barrier. This appears to be in part explained by a lack of clarity on the rules and the way in which they should be applied, and a lack of staff confidence about how to deal with patients who challenge their authority, leading to calls for better management support and greater guidance and training on how to deal with violations.*
- *Insufficient staff resources, particularly in mental health settings, were regarded as a barrier to enforcement. These resource limitations were seen to constrain staff ability to escort patients to outside areas and to patrol hospital grounds, the latter being particularly challenging where the service had large, shared grounds to which the wider public had access.*
- *Belief that smoke-free policy would adversely affect psychiatric patients' mental health. There is some evidence that these beliefs can diminish after exposure to the policy. Enforcement of smoke-free policy in both settings would result in an increase in abuse and aggression. Evidence suggests that the frequency and levels of abuse actually experienced are lower than expected. Recent research shows that in one mental health trust physical violence fell by 39% overall after a smoke-free policy was introduced.*[58]

- *Belief that smoke-free policies were damaging to the patient–carer relationship and the therapeutic environment, a view expressed particularly by staff in mental health settings.*
- *Belief that changing break patterns brought about by smoke-free policy places extra demands on staff time and resources and disrupts patient attendance for treatment and participation in therapeutic activity.*
- *Belief that implementing smoke-free policy in mental health settings results in an increased requirement for patient medication. There was a belief that these increases were not as significant as had been anticipated. There was also evidence of a lack of understanding by staff about the interaction between stopping smoking and dose requirements for antipsychotic medications.*
- *Belief that smoke-free policy discourages patients from attending for outpatient appointments, and results in inpatients refusing admission and discharging against medical advice. These concerns were mainly voiced by staff in mental health settings and the evidence suggests that negative outcomes were not always realised or did so at a diminished level.*
- *Belief that clandestine smoking brought about by smoke-free policy constitutes an enhanced fire hazard risk, a belief largely expressed by staff in mental health settings.*

8.5.7 Facilitators of implementation

The same NICE PH48 evidence review that identified barriers to implementation[57] also looked at facilitators of smoke-free policy. Some of the findings relevant to a completely smoke-free estate are summarised below:

- *Exposure to smoke-free policy leads to enhanced staff support for the policy in both mental health and broader healthcare settings.*
- *A number of important organisational factors emerged, mainly in mental health settings, which were seen to act as facilitators for smoke-free policy. These include: strong leadership; a responsive and committed management; having sufficient time in place to implement a robust consultation process; timing implementation to take advantage of favourable weather conditions; and having in place robust systems for monitoring implementation and responding to problems as they emerge.*
- *The introduction of smoke-free policy can act as a trigger for patients to considering quitting. However, uptake by those expressing a readiness to quit is considered more likely when cessation support is framed as an initiative designed to improve patient health and not simply to accommodate the smoke-free ordinance. Findings suggest that provisions also need to be made for those inpatients seeking temporary abstinence while attending for treatment.*
- *A number of factors were identified from both settings which were believed could enhance both the uptake and value of cessation support as part of a smoke-free policy: improved provision of information materials,*

pharmacotherapies, trained staff and diversionary activities; better continuity with stop smoking services provided in the community, including advanced warning of smoke-free rules; and provision of comparable services for staff who wish to stop smoking.

8.6 The role of electronic cigarettes

Electronic cigarettes (e-cigarettes) are currently the most popular source of support for smokers making a quit attempt or who want to cut down or abstain from smoking (see Chapter 4). There are as yet no identified health risks from breathing in other people's e-cigarette vapour, and Public Health England has produced guidance about the issues that need to be taken into account when considering their use in public places and workplaces,[59] producing recommendations on communicating policy summarised in Box 8.3.

The CQC guidance on smoke-free policies in mental health inpatient settings clearly distinguish tobacco cigarettes from e-cigarettes.[5] The guidance also highlights the role of e-cigarettes in supporting smoke-free policies. The ASH Mental Health and Smoking Partnership has also produced a statement on e-cigarettes in relation to mental health emphasising the relative risks and misperceptions about e-cigarettes.[40] The statement recommends that information on the use of e-cigarettes, alongside licensed treatments, should form part of the care package for people with mental health conditions who smoke, and that this advice should include information that e-cigarettes are significantly less harmful than tobacco cigarettes.

The Smoking in Pregnancy Challenge Group,[60] a coalition of health organisations led by ASH, has highlighted that although little research has been

Box 8.3 Summary of Public Health England recommendations on e-cigarette use in public places and workplaces[59]

- Make a clear distinction between vaping and smoking, for example by avoiding the use of smoking terminology when referring to e-cigarettes.
- Avoid routine inclusion of e-cigarette use in the requirements of smoke-free policy.
- Develop approaches to e-cigarette use that support smoke-free sites.
- Acknowledging that vaping can in certain circumstances be a nuisance or distraction for people, permit use in an enclosed place only in conjunction with some simple etiquette guidelines for vapers, such as minimising the production of visible vapour.
- Communicate policies on e-cigarette use clearly so that everybody using a public place or workplace is aware of the policy and understands where vaping is or is not allowed.

Box 8.4 Staff guidance for the use of e-cigarettes in hospital

- Assess the patient's smoking status and/or vaping status on admission.
- If the patient is an exclusive e-cigarette user be aware that prohibiting use may cause a relapse back to smoking.
- If the patient is a smoker and e-cigarette user, encourage to stop smoking and switch completely to vaping.
- Assess capacity and risk of using an e-cigarette in the hospital environment.
- For smokers, explain that the most effective way to stop smoking is with two NRT products or varenicline combined with intensive behavioural support, delivered by a trained advisor.
- If a patient declines licensed stop smoking medication provide verbal and written information about e-cigarette use for periods of temporary abstinence or to support a quit attempt.
- Explain the Trust policy on where e-cigarettes can and cannot be used (not in the same spaces as were previously allowed for smoking). Many mental health trusts allow their use in grounds and some in single private spaces.
- Explain the Trust policy on what type of e-cigarette can be used on Trust premises. If the patient wants to use a re-fillable e-cigarette consider potential for self-harm if the device has glass or sharp edges, and risk of adding illicit substances to the device (in which case ensure direct supervision of re-filling).
- Ensure the use of an e-cigarette is included in the patient's care plan.
- Rechargeable devices should be charged by staff for the length of time recommended by the manufacturer and using the charging unit specified for the device.
- Discuss where to purchase e-cigarettes (eg hospital shop).
- Ensure Trust infection control policy is followed and advise the e-cigarette should be for personal use only.
- Provide battery bins and ensure e-cigarettes are safely disposed of through the hazardous waste stream.
- Ensure plasma levels of relevant drugs are monitored and medication regimes adjusted when smoking status changes.
- Ensure patients do not use e-cigarettes near oxygen.
- Encourage and arrange access to behavioural support and assistance with using the device correctly.
- Discuss continued e-cigarette use to maintain smoking cessation in discharge plans.

conducted into the safety of e-cigarettes in pregnancy, they are likely to be significantly less harmful to a pregnant woman and her baby than smoking cigarettes. The group suggest that while licensed NRT are the recommended option, if a pregnant woman chooses to use an e-cigarette to stay smoke free, she should not be discouraged from doing so.[60]

Box 8.4 summarises staff guidance on the use of e-cigarettes to support smoke-free policy in a mental health setting (SLaM). Although some of the guidance is specific to the mental health setting, it provides a framework that could be applied to other settings and patient groups.

8.7 Return on investment from introducing smoke-free estates

The costs of introducing NHS smoke-free estates will vary between individual hospitals and trusts, depending on local need and demand. However, the most expensive components are the provision of staff to deliver stop smoking support, and the necessary pharmacotherapy. We have therefore generated approximate estimates of these costs for the NHS by extrapolating experience with the Ottawa Model [61] (see Chapter 4), which involved an intervention similar to current NICE guidance for UK hospitals[43] and included a highly intensive intervention delivering a 10–30 min consultation with a nurse or other healthcare professional, pharmacotherapy (NRT), and an average of 40 min telephone monitoring follow-up.[62] The smoking prevalence was 25.4% in this study, similar to the 25% smoking rate among admitted patients estimated in the British Thoracic Society audit of acute hospitals in the UK in 2016.[56] By combining the results of the smoking-related outcomes from this study with UK national unit costs for healthcare resource use and data on potential uptake from the British Thoracic Society audit,[56] we have estimated the potential intervention costs and cost savings from additional quitters generated.

Table 8.1 lists the intervention costs and quit rates for the intervention. The unit cost of health professionals are derived from *NHS staff earnings estimates to September 2017*,[63] using an average salary for professionally qualified clinical staff of £37,915 per year, or £49,274 per year with salary on-costs. Costs of NRT as used in the study are converted from Canadian dollars to UK sterling using the exchange rate reported by the UK HM Revenue & Customs[64] and inflated to the current price using the Hospital and Community Health Services pay and price inflation index.[65] The cost estimate for delivering the intervention was £51.85 per patient.

In 2016/17 there were 9,419,571 admitted patients and 16.5 million finished admission episodes recorded in England (excluding patients admitted in the previous year who were not admitted in 2016/17).[66] Approximately two-thirds of patients had only one admission, the remaining third having at least two

Table 8.1 Costs of implementation of Ottawa-Model smoking cessation support[62] in UK hospitals

Expense and source	Ottawa Model cost
Personnel costs associated with providing 30 min of bedside intervention[63]	£14.60
Personnel costs associated with 40 min of monitoring of the follow-up system[63]	£19.47
NRT[64,65]	£10.48
Telephone follow-up system and programme database management fees[63]	£7.30
Intervention cost per patient	£51.85
Number of patients treated[56]	471,421
Total intervention cost	£24,441,513
1-year quit rate[62]	28.5% (24.3–32.7%)
Cost per quitter	£182 (£159–£213)

admissions with a mean of 3.3.[66] The British Thoracic Society audit reported that among all the acute hospital inpatients in England, only 28% of smokers were offered treatment, and 27% of them accepted the treatments.[56] This means that 27% of the 72% smokers who were not offered any smoking cessation interventions could have been treated if the hospital-initiated interventions were universally implemented across all the NHS hospitals. Given a smoking prevalence among acute hospital inpatients of 25%,[67] the number of smokers that could have been treated was 471,421 in 2017. The reported 1-year quit rates in patients receiving the Ottawa Model[61] were 28.5% (24.3–32.7%), compared with 17.9% (14.0–21.8%) for a reference group (who received a patient education booklet). We estimate the cost of the Ottawa Model in England to be £182 (£159–213) per quitter.

Table 8.2 summarises the potential cost savings generated by the Ottawa Model relative to a minimum intervention (a leaflet) reference group, using the reported 1-year absolute risk reductions in all-cause readmission, smoking-related readmission, all-cause A&E visits and GP visits.[61] Compared with this minimum intervention, which is akin to delivering very brief advice to quit but with no additional support, offering services comparable to the Ottawa Model to all NHS hospital inpatients would save £85 million in healthcare resource use within 1 year. After deducting the intervention cost of £24 million, the net cost saving to

Table 8.2: Potential incremental 1-year cost saving comparing the intensive smoking cessation intervention and the minimum intervention

	1-year absolute risk reductions[61]	Unit cost[65,69]	Number of activities per patient per year[66]	Total number of patients treated[66,70]	Cost savings with 27% uptake rate	Cost savings with 13.5% uptake rate
All cause readmission	12%	£1,364 per admission	3.26 admissions	471,421	£82,885,076	£41,442,538
Smoking-related readmission	9%	£1,364 per admission	3.26 admissions	471,421	£62,543,487	£31,271,743
All-cause A&E visit	3%	£175 per attendance	0.42 times	471,421	£1,046,187	£523,093
GP visit	1%	£31 per visit	6 times	471,421	£876,842	£438,421
Incremental cost saving comparing the intensive with the minimum intervention					£84,808,106	£42,404,053

the NHS would be about £60 million. On a more conservative estimate of take-up rate by smokers not offered cessation, of 13.5% instead of 27%, the estimated cost saving for the intensive intervention (after allowing for lower intervention costs) is around £30 million within 1 year from treatment.

However, in the longer term, far more substantial savings would be achieved. A model of adult smoking-related costs by Ali *et al* projected that the discounted lifetime saving for a quitter was £2,006 for male and £1,432 for female at 2009 prices.[68] Allowing for the male:female gender ratio among hospital patients in England of 45:55,[66] the lifetime cost saving from the above intervention was estimated to be £129 million with a take-up rate of 13.5%.

8.8 Conclusions

A smoke-free national policy has triggered quit attempts in several thousand smokers, saved many thousands of lives in successful quitters and those no longer exposed to second-hand smoke, and this has been achieved across sectors and industries where few thought it could be possible. The NHS estate is vast and millions of people use it each day, of whom a significant proportion are tobacco dependent. Maintaining a completely smoke-free NHS estate will support the treatment of tobacco dependency in these patients, carers and staff, reduce harm caused by second-hand smoke and generate significant cost savings. The time to achieve a smoke-free NHS is now.

8.9 Summary

- Millions of people use NHS facilities each day, many of whom are tobacco dependent and many non-smokers are exposed to second-hand smoke.
- Ensuring that NHS facilities are smoke free is an essential component of encouraging smokers using NHS facilities to quit smoking and is essential to provide a healthy environment and promote non-smoking as the norm for people using NHS services.
- There is no routine data collection on hospital smoke-free estates locally, regionally or nationally although opportunities exist to do this through the ERIC. Hospital trusts and the CQC in England should be required to report on this annually.
- In 2013, NICE PH48 guidance advised that all secondary care NHS settings should implement a comprehensive smoke-free policy covering buildings, grounds and vehicles, with no exceptions or exemptions, and supported by accessible tobacco-dependence treatment for all smokers.
- Since the NICE guidance, implementation of smoke-free policies has become more widespread, though progress throughout the NHS is patchy.
- Strategies to increase compliance with smoke-free legislation include good

communication, provision of nicotine delivery devices and other support immediately on admission, staff training and education, ensuring that patients do not keep tobacco on site, and volunteer stop-smoking champions.

- Legislation requiring hospitals to maintain a smoke-free perimeter of 15 m around NHS buildings has been introduced in Scotland. Legislation requiring completely smoke-free grounds should be introduced throughout the rest of the UK.
- Allowing e-cigarettes to be used on NHS sites can support smokers in remaining smoke free and help to sustain smoke-free policy.
- Introducing a comprehensive smoke-free policy involves a range of start-up and maintenance costs, both for the smoke-free element of the policy and the provision of cessation or temporary abstinence support for smokers.
- The costs of these requirements will vary between individual hospitals and trusts, depending on local need and demand. However, the most expensive components are the provision of staff to deliver stop smoking support, and the necessary pharmacotherapy.
- Compared with offering only a minimum intervention, introducing services as broadly recommended by NICE PH48 guidance to all NHS hospitals would result in an approximate estimated net cost saving of between £30 and £60 million within 1 year, and far greater savings in the longer term.

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9 The ethics of health service engagement in the treatment of tobacco dependence

In our introduction (Chapter 1) we wrote: 'Smoking is the largest avoidable cause of death and disability, and of social inequalities in health, in the UK. Preventing smoking should therefore be the highest priority in medicine.' We take 'preventing' to include both preventing uptake of smoking and treating tobacco dependence. One of the most beneficial things a smoker can do to protect and improve their health is to stop smoking; and doing so has positive benefits for their families, friends, workmates and others affected by their smoking. We have also noted the success that has been achieved in reducing the prevalence of adult smoking in the UK, from three-quarters of adult males and half of the adult females in 1962 to 18% and 14%, respectively, in 2016; but that there are still 7.6 million adult smokers in the UK, half of whom will die prematurely as a consequence of smoking and lose an average of 10 years of adult life. We note that much of the reduction in smoking prevalence since the 1960s has arisen from reduced uptake of smoking in young people, and that the public health benefits of reduced uptake will not be experienced in the short term. The most pressing short-term need in terms of reducing death and morbidity due to smoking is to encourage and help current smokers to quit, yet the number of smokers accessing smoking cessation services, across most of the UK, has more than halved since 2011/12, while the great majority of smokers who try to quit do so without making use of the evidence-based services most likely to help them succeed.

In this report we have reviewed the evidence for associations between smoking and disease, the treatment costs these impose through NHS secondary care, the evidence base for stop smoking interventions, the commissioning of smoking cessation services in the NHS, the use of data to drive improvement in smoking cessation services, training NHS current and future staff and the challenges, but importance, of making hospitals smoke free. In this chapter we consider the ethical issues around treating tobacco dependency in the NHS.

9.1 Autonomy and justice

Patient autonomy is central to medical ethics. Given the importance of smoking

as a cause of ill health makes it essential that doctors and other healthcare providers ask patients about their smoking, educate about the effect of smoking, and ensure that smokers receive the behavioural and pharmacological support they need to maximise their chance of quitting smoking tobacco. Not to do so would be to neglect a crucial cause of the patient's current and future health problems, giving both an incomplete diagnostic picture and plan of care. While it is rational to prioritise any given patient's needs and focus on the more urgent of them, it would be unfair to the patient and neglectful of his or her long-term health to sideline smoking as of lesser urgency or importance, or 'merely' a lifestyle choice. Good medical practice requires doctors to respect a patient's autonomy, values and preferences, but this does not override the importance of health education, health promotion and advice. Indeed, facilitating patients' autonomy requires doctors to both elicit information about patients' health behaviours and their understanding of the effects of smoking, and offer information and treatment services as needed.

It is sometimes forgotten that the principle of justice is of equal importance to the principle of autonomy in medical ethics. Failing to discuss smoking with a patient, and failing to offer advice, support and treatment, violates this principle: to fail to offer this to some or all smokers would be unjust inasmuch as this would reflect a view that smokers' health is less important than the health of other patients, or that they are less open to advice, or less able to adhere to treatment. While smoking cessation can be difficult, and not all smokers see their smoking as a health problem, these factors apply to many other conditions with a behavioural element, and there is no argument made in, for example, the case of depression or substance misuse or obesity that these should not be discussed with patients or treatment should not be offered.

As well as the failure of justice in terms of treating smoking and non-smoking patients as of equal value and worthy of equal respect, we must also consider two kinds of failure of distributive justice: health inequalities and resource allocation. So far as health inequalities are concerned, the evidence we have presented confirms that smoking continues to be most prevalent in the most deprived socio-economic groups and that smoking is a major cause of ill health in those groups. So failing to provide support in smoking cessation perpetuates and exacerbates those health inequalities. Second, we have also reviewed the evidence for the clinical and cost-effectiveness of treatments for smoking, and the personal and public health benefits of stopping smoking, and there is no good evidence for considering that stop smoking interventions are not clinically effective, or cost-effective, or of low priority compared with other prevention services or treating the health consequences of smoking. Quite the reverse is true.

9.2 Treating smokers in primary and secondary care

We noted that ascertainment of patients' smoking status by doctors is much lower in secondary than in primary care, and that while offering support does not necessarily mean that support is received, smokers using secondary care services are also far less likely to be offered support to stop smoking. This may be partly explained by the specialist nature of secondary care services. Secondary care staff may not see smoking as relevant to their specialist focus, or they may see it as relevant but better addressed in primary care, or as of lesser priority than the diagnosis and treatment for which they have primary responsibility. We argued that these attitudes are mistaken, and indeed that for very good reasons secondary care can and should be a site for smoking cessation treatment that is at least as important as primary care. Not only does smoking influence the presentation of many of the diseases and disorders treated in secondary care, and their courses and prognoses, secondary care specialists cannot assume that smoking has been addressed by the patient's GP or by others involved in their care. Patients may, on occasion, be more receptive to such advice from a doctor who is new to them, or perceived by them as more 'expert' in some respects. Acute illness or the need for specialist referral can be a significant reminder or prompt to appreciate the impact of smoking on a patient's health, and an opportunity for this to be discussed by a clinician with the patient. Patients may indeed not have made the connection between their smoking and their diabetes or cardiovascular problem, for instance, until this is put to them by their specialist. Indeed, healthcare professionals should be aware that opportunities for patients to see doctors and nurses being relatively few, a conversation with a healthcare professional in any secondary care setting may be the one time that year they have a chance to discuss smoking and ways to quit.

We noted in our report on *Smoking and mental health*[1] that some mental health workers perceive smoking as either not relevant to their role in treating and supporting patients with serious mental health problems, or as in some way beneficial to people with serious mental health problems as a coping mechanism, or at least as something which enables mental health staff to keep mental health wards relatively calm. Yet, while there are certainly particular difficulties facing inpatient smokers with serious mental health problems to do with trust, insight and deprivation of liberty, our argument is that the physical health of such patients is no less important than the physical health of any other type of patient, and that smoking has negative consequences in many mental health disorders in any case.

9.3 Opt-in and opt-out models

At the moment, when doctors discuss smoking with their patients, whatever the presenting condition, they usually do so according to an opt-in model, in which

patients are asked whether they would like treatment, support or referral to a service, to help in stopping smoking; and the delivery of which (eg from community stop smoking services) often involves additional initiative or commitment on behalf of the smoker. An alternative would be to move to an opt-out model, in which a patient who smokes is given such treatment or support as a matter of course, unless they expressly decline it. This does not violate the principle of autonomy – patient choice remains central. But it would be another way of ensuring that tobacco dependence is treated like any other health problem. This is already the approach in maternity services, where pregnant women who smoke are automatically referred to smoking cessation services. Taking this approach as a general rule should be the norm. On the one hand, patients may otherwise be unaware of what the options are and what is possible, and lack access to expert advice; on the other, smoking should not be an exception to the general principle that where a patient has a health problem which comes to light when treating their presenting condition, they get appropriate advice and referral to address it.

9.4 Efficient and effective use of resources

Current spending on prevention of disease and promotion of health is far lower than spending on treatment of disease. But while effective treatment for disease is important, so is avoiding disease in the first place. Treatment gets a lot of attention in the media, and tends also to be cost-intensive. But would any of us not prefer to avoid being ill in the first place, than have to go through a period of illness and treatment, even if that treatment is successful? Prevention should be given its proper place in consideration of the most effective and efficient allocation of resources at every level within healthcare financing and commissioning.

Failure to include treatment and support to smokers in the normal process of diagnosis and treatment is wasteful. If we fail to take opportunities to treat and prevent smoking as they arise, the downstream consequence of this is avoidable smoking-related disease, which is not only bad for the patients themselves, but also represents avoidable cost to the NHS. While every patient should receive the best of care, as and when they need it, prevention is better than cure for the patient and the NHS.

The efficient and effective use of resources does not only mean preventing smoking; it means using the most effective *and cost-effective* means to do so. This is a case where investing in proven smoking prevention and treatment services is important, while continuing to rely on ineffective methods is counterproductive and wasteful. In this connection it is important to restate the value of research and the ongoing assessment of the evidence base for smoking treatment and prevention methods.

9.5 The health system

Given the importance of smoking to health, and the priority which should be given to smoking treatment and prevention, it is important to consider how smoking affects all aspects of the health system. One example of this is to make all NHS estates smoke free. In addition to the direct health benefits of maintaining smoke-free public places in general, this communicates an important public health message – that smoking is a crucial health issue, and that the NHS is taking a strong stance on it. Smoke-free estates are also essential to help patients and staff to succeed in quitting smoking.[2] This is an example of how smoking can and should be considered a strategic issue in organisation and management of health services: another would be to promote smoking cessation as a normal part of occupational health and staff wellbeing services in NHS organisations.

The NHS has a moral and medical obligation to protect and promote the health of all in the UK, but so too do local authorities. In England, public health and social care are now largely the responsibility of the local authorities, and although Health and Wellbeing Boards exist to coordinate responsibilities between the NHS and local authorities, too often smoking is lost or seen as a low priority. Commissioners in both the NHS and local authorities have a responsibility to see that services they commission are of high quality and evidence based, and are implemented effectively and properly monitored. Data sharing between organisations both within the NHS and between the NHS and local authorities should be normal, subject to the data protection law, just as data sharing between primary and secondary care organisations within the NHS is, but too often this does not happen. We should see failure to implement pathways to identify smoking and intervene as just as negligent as the failure of a GP to refer a patient with suspected cancer would be. That this negligence arises as a failure of system design and communications failure, rather than the negligence of an individual professional, should in no way excuse it. Indeed, systems failure of this kind is worse: it is not a momentary oversight but a persistent failure of design.

9.6 Correcting the system

Our recommendation in light of the evidence presented here is that smoking cessation should be incorporated, as a priority, as a systematic and opt-out component of all NHS services. In practice this means not only ensuring that all healthcare professionals are trained to ask patients about smoking and provide advice and support to patients seeking to quit, but also that systemic barriers to delivering smoking cessation services are removed. This requires commissioners to make smoking cessation services a priority; that information systems prompt

all healthcare staff when updating medical records to ask patients about smoking and make referrals where necessary; that treatments are funded; that data sharing on smoking is enabled; and that NHS facilities are smoke free. These issues are far from unique to smoking, but our argument here is that smoking should not be seen as a 'special case' or 'a lifestyle issue, not a medical issue'. Instead, our argument is that the evidence supports the effectiveness and cost-effectiveness of treating smoking in the same way as other causes of serious illness, and medical ethics requires us to do so.

9.7 Summary

- The principle of autonomy requires that patients who smoke and who are in contact with health services have their smoking ascertained, and information and treatment offered, to enable autonomous decisions on future smoking.
- The principle of justice requires that we offer smokers help to quit smoking; failure to so implies that smokers' health is less important than that of other patients.
- Failing to provide help to quit smoking while delivering other similarly or less cost-effective interventions to smokers represents distributive injustice which both perpetuates and exacerbates health inequalities.
- Opt-out models of treatment help to sustain autonomy and justice in treating smoking, and should be the norm.
- It is at least as important to address smoking in patients using secondary care as those in primary care.
- Treating the physical health of patients is also no less important than treating mental health. Treating smoking improves both.
- Since most people would prefer to avoid being ill than to go through illness and treatment, prevention should be given a proper place in the allocation of health service resources.
- Proper use of health service resources also requires that more cost-effective treatments are used in preference to less cost-effective treatments.
- Smoke-free NHS estates protect the health of patients and staff, signals that smoking is a crucial health issue, and supports smokers who are trying to quit.
- Heath service commissioners and practitioners have a responsibility to ensure that cost-effective smoking interventions are provided and properly implemented. Failure to identify and treat smokers is no less negligent than failure to identify and treat patients with cancer. Systems failure is no less negligent in this respect than individual failure.
- Smoking cessation should be incorporated, as a priority, as a systematic and opt-out component of all NHS services, and delivered in smoke-free settings. It is unethical to do otherwise.

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10 Conclusions and summary

10.1 Introduction

Smoking is the largest avoidable cause of death, and of social inequalities in health and life expectancy, in the UK. Preventing smoking should therefore be the highest priority in health service and public health policy. While substantial progress has been made in reducing the prevalence of smoking over recent decades, a great deal more could be done. One area of obvious potential and need is the treatment of tobacco dependency among patients who use NHS services. This is true in NHS secondary care, and where one in every eight smokers, or over 1 million smokers in England, are admitted each year,[1] but is also true for primary care and all other areas of medical practice. However, in secondary care, management of smoking has been described, on the basis of a national audit carried out in 2016, as 'woefully lacking'.[2] This problem does not arise from a lack of evidence-based clinical guidelines on the commissioning and delivery of smoking interventions for patients and staff, which have been available for the UK for 20 years[3,4] and have since been addressed extensively by NICE,[5] and specifically so for secondary care settings.[6] Neither does the problem arise from a lack of understanding of the economic importance of preventing smoking to public health or NHS sustainability.[7,8] It arises because NHS staff at all levels, and including commissioners, have failed to engage with smoking. In this respect the NHS, and public health, are failing in their duties of care.

10.2 Smoking, death and disease

Smoking harms health from preconception to old age, and from the age of 30 onwards costs smokers 1 day of life for every 4 days they smoke. Although lung cancer, COPD and cardiovascular disease are the most numerically prominent of the many diseases caused by smoking in adults, smoking is generally more common among adults with diseases across the full spectrum of major organ systems. Similarly, smoking during pregnancy causes harm across a wide range of developmental abnormalities and pregnancy complications, while smoking by parents or other household members causes or exacerbates multiple diseases in

children and these children are more likely to become adult smokers themselves, perpetuating health inequalities across generations. This means that all health professionals working in all areas of practice, whether physical or mental, child or adult, surgical or medical, primary or secondary, fetal or maternal, encounter a higher than average proportion of smokers among the people they treat. In all cases, treating tobacco dependence in these patients and their families not only benefits general future health: it also almost invariably improves the natural history and outcomes of the disease or condition being treated. It is therefore in the specific specialty interest of all clinicians, as well as the health interest of their patients, to ascertain and treat tobacco dependence. There is no justification for failing to do so.

10.3 The cost of smoking to NHS secondary care

Much of the demand for NHS services due to tobacco smoking arises from smoking in past years, and while regrettable is now unavoidable. However, the demand on NHS services generated by current smoking is largely, if not entirely, avoidable. In England alone, we estimate the secondary care treatment costs of adult diseases attributable to current smoking at £620 million per year. These costs arise disproportionately from treating people in the most deprived sectors of society, and from those with mental health problems. Current smoking by pregnant women costs around £21 million per year in secondary care costs, again predominantly in the most disadvantaged, while current smoking by parents is likely to cost at least £5 million per year to treat childhood illnesses caused by maternal smoking, which is only one source of exposure of children to passive smoking in the household.

However, the NHS also pays for smoking in other ways. Postoperative infections caused by current smoking cost at least £2.5 million each year. Smokers metabolise many drugs, and particularly those used to treat mental health conditions, more quickly than non-smokers and therefore require higher doses. This costs the NHS £28 million each year. The NHS employs over 70,000 smokers, who cost the NHS around £101 million recurrently each year from additional sickness absence, up to £99 million each year from taking one 10-min smoking break each day, and £6 million each year of the total adult secondary care sickness treatment cost. This means that smokers currently working for the NHS cost around £2,800 per year more than non-smokers. The NHS thus has much to gain from treating smoking by both patients and staff.

10.4 How should tobacco dependency be treated in the NHS?

Smoking cessation interventions have been extensively researched and there is an extensive evidence base demonstrating that advice to quit, behavioural support,

licensed pharmacotherapies and the use of e-cigarettes to replace nicotine are all effective, and especially so if delivered in combination rather than alone. They are also highly cost-effective, and typically far more so than many of the treatments offered routinely by the NHS, and many of those used as a routine to treat the chronic diseases that smoking causes or exacerbates. Efficacy can be improved by digital aids such as mobile phone applications or text messages, and by financial incentives. The challenge in addressing smoking in NHS patients is therefore not one of a lack of treatment options: it is to ensure that smokers are identified and receive treatment; and that this treatment is supported by a standard tariff for treating tobacco dependence, and a comprehensively smoke-free environment. However, ascertainment and treatment of smokers using the NHS is not well embedded in service designs, patient pathways or disease treatment guidelines, and typically use opt-in designs, often involving referral to a stand-alone community service, which make doing nothing the easiest option for both the patient and the healthcare professional. Providing stop smoking support as a default (opt-out) service, on site, doubles quit rates. The NHS should therefore make opt-out, on-site treatment of tobacco dependency a systematic and routine component of all NHS care.

10.5 Commissioning stop smoking treatments

Stop smoking services have evolved in the UK primarily as stand-alone and usually community-based services, available to smokers on an opt-in basis. Models of funding for these services vary across the different parts of the UK, but the devolved nations have maintained the provision of stop smoking services, free at the point of use, within the NHS. In England, responsibility for these services was transferred to local authorities in 2013 and funding has since fallen dramatically.

Trends in service uptake in England, Scotland and Northern Ireland are similar. Having risen progressively to a peak in 2011/12, uptake has since fallen by at least half and by more in England. It therefore appears that although funding reductions in England have exacerbated the problem of falling service uptake, they are not primarily responsible. Numbers in Wales have followed a very different pattern, until very recently being much lower as a proportion of population than elsewhere in the UK.

The low and in most countries falling levels of delivery of stop smoking services in the NHS, and low uptake by smokers in general, indicate that the commissioning systems for smoking services used across the UK are failing. NHS commissioners in England encourage NHS providers to ascertain smoking status and refer to stop smoking services through the NHS contract and a range of financial incentive tools, with oversight by stand-alone bodies: these approaches and the stand-alone

service provisions funded in the devolved nations are clearly not working. A rational approach for England would be to move responsibility for smoking interventions back into the NHS, and across the UK to use commissioning processes or their equivalents in the devolved nations to ensure that ascertainment of smoking status and treatment of smokers becomes a core NHS activity, and delivered on an opt-out basis at the point of NHS service contact.

10.6 Using data to drive improvement

Numerous sources of data are available on the smoking status, uptake of smoking and quit attempts for the general population, but data on patients accessing NHS services are incomplete and fragmented. Furthermore, data collected on smoking status or treatment in the NHS are rarely used to improve treatment provision, efficiency, effectiveness and quality improvement. Large clinical datasets focusing on specific tobacco-related diseases and high-cost therapies, such as cancer, rarely collect or validate smoking status or treatment, despite worse disease outcomes in smokers.

These problems could be overcome by improving and linking existing NHS data collection systems, and introducing regular audit to ensure that smoking status is ascertained, recorded and treated; that records are linked between NHS services; and that process and outcome data are used to drive quality improvement.

10.7 Teaching and training the NHS workforce about smoking cessation

The more than 1 million people working in the NHS in the UK collectively have hundreds of thousands of contacts with smokers each day. Regrettably only a tiny minority of clinical staff have ever received any training, either as undergraduates or postgraduates, in treating tobacco dependence. Smoking is often included in undergraduate and postgraduate training but typically as a cause of disease, not as something that should be treated. It appears that curriculum content on treating tobacco dependence is typically slight, and evaluation of knowledge acquired in formal examinations something of a rarity. There are some signs of improvement in this, for example in dentistry training; but such examples are few.

Just as current trainees are not typically receiving this training, so the delivery of smoking cessation interventions, even at the briefest level of advice, is also poor, and almost to the point of non-existence. As a result, clinical staff are less able to support and treat the smokers they encounter. Free and low-cost high quality training is made available to the NHS through the National Centre for Smoking Cessation and Training,[9] but is rarely taken up by clinical staff or encouraged by

those responsible for keeping clinical staff up to date. This means that NHS staff tend to feel ill equipped, and in many cases uninclined to intervene to help smokers to quit, or to help to sustain a smoke-free environment. Temporary payment incentives such as CQUINs in hospitals have been used to encourage training in smoking cessation in hospitals, but with little evidence of success.

The high clinical and cost-effectiveness of smoking cessation intervention warrants dedicated training on the subject for all health professionals, at all levels of training. Mandatory training in smoking cessation interventions, at levels appropriate to role, is essential for the entire NHS healthcare professional workforce to ensure that all practising staff are appropriately skilled to support smoking cessation.

10.8 Keeping NHS grounds smoke free

To maximise the uptake and success of smoking cessation in people using NHS facilities it is essential that those facilities are smoke free. Since the NICE PH48 guidance was published in 2013 advising that all secondary care NHS settings should implement comprehensive smoke-free policies covering buildings, grounds and vehicles, with no exceptions or exemptions, and supported by accessible tobacco dependence treatment for all smokers,[6] implementation of smoke-free policies has become more widespread, though progress throughout the NHS is patchy.

Strategies to increase compliance with smoke-free legislation include good communication, provision of nicotine delivery devices and other support immediately on admission, staff training and education, and a range of other measures outlined in the NICE guidance.[6] Allowing e-cigarettes to be used on NHS sites can support smokers in remaining smoke free and help to sustain smoke-free policy.

The main component costs of going smoke free to secondary care providers are the provision of staff to deliver stop smoking support and the necessary pharmacotherapy, and even with these factored in, providing a smoke-free site is cost-effective in the short as well as the long term. NHS regulators such as the CQC in England should ensure NHS facilities are smoke free.

10.9 The ethics of health service engagement in the treatment of tobacco dependence

The principle of autonomy requires that patients who smoke and who are in contact with health services have their smoking status ascertained, and

information and treatment offered. The principle of justice requires that we offer smokers help to quit smoking; failure to do so implies that smokers' health is less important than that of other patients. Opt-out models of treatment help to sustain autonomy and justice in treating smoking, and should be the norm, while a smoke-free NHS estate protects the health of patients and staff, signals that smoking is a crucial health issue, and supports smokers who are trying to quit. Heath service commissioners therefore have a responsibility to ensure that cost-effective smoking interventions are provided and properly implemented.

Failure to identify and treat smokers is no less negligent than failure to identify and treat patients with cancer. Systems failure is no less negligent in this respect than individual failure. For the NHS, failure to treat tobacco dependency is unethical.

10.10 Summary

- Smoking is the largest avoidable cause of death and social inequalities in life expectancy in the UK.
- Smoking is more common among people with a wide range of diseases and disorders in a manner consistent with a causal link.
- This broad spectrum of disease crosses almost all areas of medicine, meaning that patients in almost all specialties are either more likely to be smokers, or in the case of children to have been exposed to others' smoke, than the general population.
- Treating smoking prolongs life and substantially improves the natural history of many diseases.
- Smoking cessation is the most effective and high value treatment for many long-term conditions. It should be prioritised in disease-specific guidelines and audits.
- The cost to NHS secondary care from current smoking is around £1 billion per year for the UK. This total includes significant costs arising from smoking by NHS staff.
- Smoking cessation interventions are highly effective and cost-effective, far more so than many of the treatments and interventions used routinely to treat smoking-related diseases.
- Intervening to help all NHS patients and staff to quit smoking thus has major potential to improve current and future health and reduce NHS costs. However, management of smoking in secondary care settings was described in a 2016 national audit as 'woefully lacking'.
- Ascertainment of smoking status and treatment of smokers using NHS services is not well embedded in service designs, patient pathways or disease treatment guidelines, and typically use opt-in designs. Smoke-free hospital grounds are rarely maintained.

- Stop smoking services have evolved in the UK primarily as stand-alone services, available to smokers on an opt-in basis. The number of smokers using the services increased substantially in the decade to 2011/12 and then reduced by 50% or more in all parts of the UK except Wales, where uptake has been low.
- Models of funding these services vary across parts of the UK, but funding has fallen dramatically in England since the transfer of responsibility for stop smoking services to local authorities in 2013.
- However, both Scotland and Northern Ireland have also experienced substantial falls in service uptake, suggesting that funding changes are not the sole explanation for the decline in England and that stand-alone service models may not be the optimal approach.
- Systems in which smokers are systematically identified and offered treatment on an opt-out basis generate approximately double the quit rates achieved by opt-in approaches.
- Making opt-out treatment of tobacco dependency a systematic and routine component of all NHS care is therefore likely to increase smoking cessation dramatically among NHS patients.
- A rational approach would be to move responsibility for smoking interventions back into the NHS in England, and to use commissioning processes, including a standard tariff for treating tobacco dependence, or their equivalents in the devolved nations to ensure that ascertainment and treatment of smokers becomes a core NHS activity.
- Reliable data on smoking, at individual, population, healthcare provider and healthcare system levels, are essential to the identification of smokers and the design, delivery and evaluation of services and interventions to help them to quit smoking.
- Current systems of data collection in the NHS are incomplete and fragmented, making it difficult to apply quality improvement.
- A system that ensures that current smoking status is ascertained, recorded and maintained as a core requirement for all NHS patients is urgently needed to enable routine identification and treatment of smokers at all points of contact with the NHS.
- Training in smoking cessation interventions for healthcare professionals is generally inadequate, and should be introduced into all undergraduate and postgraduate healthcare professional curricula, and at levels appropriate to role, into mandatory training for the entire NHS healthcare professional workforce.
- Ensuring that NHS facilities are smoke free is essential to the provision of a healthy environment, promoting non-smoking as the norm, and encouraging smokers to quit smoking.
- In 2013, NICE PH48 guidance advised that all secondary care NHS settings should implement comprehensive smoke-free policies covering buildings, grounds and vehicles, with no exceptions or exemptions, and supported by accessible tobacco dependence treatment for all smokers. However, implementation is patchy.

- There are no data collected routinely on hospital smoke-free policy implementation locally, regionally or nationally. Opportunities exist to remedy this through the Estates Returns Information Collection (ERIC), or by requiring hospital trusts, and in England the CQC, to report on smoke-free implementation.
- Legislation requiring hospitals to maintain a smoke-free perimeter of 15 m around NHS buildings has been introduced in Scotland. Legislation requiring completely smoke-free grounds should be introduced throughout the rest of the UK.
- Allowing e-cigarettes to be used on NHS sites can support smokers in remaining smoke free and help to sustain smoke-free policy.
- Introducing a comprehensive smoke-free policy involves a range of start-up and maintenance costs, the most expensive of which are the provision of staff and medicines to deliver stop smoking support to patients, but this spending is highly cost-effective.
- The CQC should fulfil its duty as a regulator and ensure that NHS providers maintain a smoke-free estate through effective leadership and provision of treatment for tobacco dependency, with the threat of conditions on their licence for organisations that do not comply.
- The principle of autonomy requires that smokers who use health services have their smoking status ascertained, and information and treatment offered, to enable autonomous decisions on future smoking.
- The principle of justice requires that we offer smokers help to quit smoking; failure to do so implies that smokers' health is less important than that of other patients.
- Opt-out models of treatment help to sustain autonomy and justice in treating smoking, and should be the norm.
- Heath service commissioners and practitioners have a responsibility to ensure that smokers are identified and receive cost-effective smoking interventions. Failure to do so is no less negligent than failure to identify and treat patients with cancer. Systems failure is no less negligent in this respect than individual failure.
- Smoking cessation should be incorporated, as a priority, as a systematic and opt-out component of all NHS services, and delivered in smoke-free settings. It is unethical to do otherwise.

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