Section A: CPH to complete	
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Guidance title:	Disability, dementia and frailty in later life - mid-life approaches to prevention
Committee:	PHAC D
Subject of expert testimony:	Smoking
Evidence gaps or uncertainties:	
Relationship of smoking to the development and onset of dementia, disability and frailty	
Effectiveness of interventions to reduce smoking on the development and onset of dementia, disability and frailty in the general population	
How the mid-life population may differ from the general adult population	
Section B: Expert to complete	
Summary testimony:	

The purpose of this testimony is twofold. First, to describe the relationship between smoking and smoking cessation and the development of dementia, disability and frailty. Secondly to describe the most effective interventions to address smoking that can contribute to delaying the onset of dementia, disability and frailty.

Smoking prevalence in England has steadily declined over several decades. In 1974, for example, more than half of all men and just over one in four women were smokers. In 2013 just under one in five adults were smokers, although rates remain significantly higher in more disadvantaged groups. Despite this decline, smoking is still the leading cause of preventable death in England with one half of continuing smokers dying prematurely, losing 10 years of life on average[1]. There are still more than 80,000 people who die each year from a smoking-related disease[2,3].

Smoking is the largest preventable cause of cancer with one in four of all cancers attributable to smoking, including 90% of lung cancers and 73% of deaths from upper respiratory cancer[4,5]. Recent studies of cancer genes have found that cigarette smoke causes DNA mutations that lead to lung cancer[6]. Smoking also causes a range of respiratory diseases including 86% of chronic obstructive lung disease and around one in five cases of cardiovascular disease, with smoking being a key risk factor for peripheral arterial disease[7].

Smoking is also associated with an increased risk of a having a stroke and number of other conditions that can contribute to disability and frailty in later life. Examples include: asthma, angina, diabetes, Crohn's disease, ulcers, osteoporosis, rheumatoid arthritis, cataracts, eye conditions that affect vision (optic neuropathy for instance),

hearing loss and multiple sclerosis[8]. A number of these conditions have been associated with development of dementia (such as cardiovascular disease, diabetes, and stroke). There is, therefore, a growing body of evidence that people who smoke have a higher risk of developing dementia, although there remains some inconsistency as to whether this is for all types of dementia[9 10].

Stopping smoking can significantly reduce the risk of smoking-related disease at any age (including those aged over 80[11]). The millennium women's study found that stopping smoking around the age of 40 avoided 90% of the health risk of smoking and 97% if stopped around 30 years old[12]. This followed earlier findings from the British doctors study which found that men who stopped smoking at 50 halved their mortality risk from smoking and almost avoided this risk if abstinent from smoking by aged 30.[13]

Smoking cessation can also improve the symptoms for people living with illness. For example it can reduce the progression of Crohn's disease[14]. Other research focusing on diabetes found that five years after stopping smoking for women, and ten years for men, the incidence of diabetes was the same as for non- smokers[15]. Finally, the Whitehall II cohort study[16] found that in government employees who had been abstinent from smoking for at least a decade, this past history of tobacco use had no adverse effects on cognitive decline.

There is extensive evidence on the effectiveness of interventions to reduce smoking rates, possibly more than in any other area of public health. These interventions can either focus at the level of a population, or on individuals. These two levels of interventions are included in what World Bank has described as the six key elements of tobacco control. When these are translated into policy, they form the core of recommendations for action in the World Health Organisation Framework Convention on Tobacco Control (FCTC), a global public health treaty, to which the UK is a signatory[17]. These policies aim to:

1. deliver effective communications and education campaigns;
2. support smokers to quit;
3. reduce exposure to secondhand smoke;
4. reduce tobacco advertising, marketing and promotion;
5. effectively regulate tobacco products; and
6. reduce the availability and supply of tobacco products.

Together, policies or interventions of this type form a comprehensive package of measures that interact with one another to both prevent young people from starting to smoke and encourage adults to stop. Individual level smoking cessation interventions (second on the list above) are most effective in reaching large numbers of smokers and maximising the chances of success if they are provided *in conjunction* with other measures. So, for example, communication and education campaigns (such as mass media campaigns) help to trigger quit attempts[18,19]. Measures to reduce exposure to second hand smoke (such as smokefree legislation) mean smokers forgo cigarettes and may provide increased confidence that they can quit[20]. Reducing tobacco promotion (such as removing point of sale displays) can help prevent relapse by removing the temptation of visible displays in shops[21]. NICE guidance exists that outlines how the NHS, local authorities and other organisations can act alongside government to develop and implement some of these population level tobacco control interventions[22,23,24].

Adults in mid and later life who continue to smoke significantly increase their risk of smoking-related illnesses that lead to disability and frailty and in some cases, dementia. Most adults who try to stop smoking do so unaided, relying on willpower alone. However, the chances of successfully stopping are significantly increased by

smoking cessation interventions. These interventions are recommended in previous NICE guidance, for the general adult population and for priority groups such pregnant women, those living in disadvantaged areas and people with mental health problems[25,26,27]. In summary, there is good evidence that the following are effective in supporting adult smokers to quit[25,28]:

Brief advice from a health professional

- Telephone quit lines (particularly proactive support)
- One to one or group behavioural support
- Nicotine replacement therapy (single or dual product)
- Bupropion (Zyban)
- Varenicline (Champix)

There is also emerging evidence on new media interventions such as online support programmes and mobile phone interventions (i.e. behavioural support via text messaging) [29].

The best outcomes for smokers engaging with a cessation programme are achieved through a combination of behavioural support and medication. This combination of support is provided by stop smoking services in England. A number of studies have now shown that these services are effective and cost-effective[30,31] and, on average, increase the odds that a smoker will quit by four times when compared with willpower alone[32]. Studies of the services have noted, in particular, that older smokers are more successful than younger smokers in quitting when they access these services, suggesting that they provide a particularly effective form of support for adults in mid and later life[32,33]. Stop smoking services represent one of the only health service interventions that has been found to be effective in reaching and treating disadvantaged groups and in contributing to reducing inequalities in health[34,35]. Improving access to these services (through effective referral routes and easy entry for smokers who self-refer) is key, as is maintaining quality and adapting to new developments such as integrating tobacco harm reduction approaches into existing provision. Stop smoking services represent effective interventions to reduce disability, dementia and frailty in later life and, along with wider tobacco control measures, have an important role to play in continuing to drive down smoking rates now and in the future.

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