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The effectiveness of NHS smoking cessation services: a systematic review

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ABSTRACT

Objectives To analyse evidence on the effectiveness of intensive NHS treatments for smoking cessation in helping smokers to quit.

Methods A systematic review of studies published between 1990 and 2007. Electronic databases were searched for published studies. Unpublished reports were identified from the national research register and experts.

Results Twenty studies were included. They suggest that intensive NHS treatments for smoking cessation are effective in helping smokers to quit. The national evaluation found 4-week carbon monoxide monitoring validated quit rates of 53%, falling to 15% at 1 year. There is some evidence that group treatment may be more effective than one-to-one treatment, and the impact of 'buddy support' varies based on treatment type. Evidence on the effectiveness of in-patient interventions is currently very limited. Younger smokers, females, pregnant smokers and more deprived smokers appear to have lower short-term quit rates than other groups.

Conclusion Further research is needed to determine the most effective models of NHS treatment for smoking cessation and the efficacy of those models with subgroups. Factors such as gender, age, socio-economic status and ethnicity appear to influence outcomes, but a current lack of diversity-specific analysis of results makes it impossible to ascertain the differential impact of intervention types on particular subpopulations.

Keywords deprivation, gender, NHS stop smoking services, smoking cessation, smoking treatment, systematic review

Introduction

Cigarette smoking remains the leading cause of preventable death in England today; it is estimated to be responsible for up to 86 500 deaths per year[1] and costs the National Health Service (NHS) between approximately 1.4 and 1.5 billion pounds annually.[2] Since the publication of the White Paper *Smoking Kills*,[3] the UK government has demonstrated a strong commitment to reducing smoking prevalence[4] through the implementation of an advertising ban, increases in the price of tobacco, a ban on smoking in workplaces and enclosed public places and the creation of a national network of smoking cessation services—known as NHS stop smoking services.[5]

NHS stop smoking services represent a unique national initiative to provide support for smokers motivated to quit.[4–6] The service provision framework employed by the smoking cessation clinics was originally based on the Maudsley model,[7] an evidence-based approach to treating dependent smokers.[8,9] This approach entails regular meetings (group or one to one) with a trained adviser using structured, withdrawal-oriented behavioural therapy combined with smoking cessation medications such as nicotine replacement therapy (NRT), bupropion or varenicline.

Since the establishment of the services, the Department of Health (DH) has required individual primary care trusts (PCTs) in England to monitor the effectiveness of their local services. This involves regular reporting of the number of people setting a quit date and the number of 4-week quitters. This monitoring data provides an overview of the volume of clients treated by the services (over 2 million people between 2003 and 2007) but has a number of limitations, not least the

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fact that it relies on self-report rather than carbon monoxide monitoring (CO)-validated outcomes.[10,11]

In addition to routine monitoring, the DH commissioned a national evaluation of the NHS stop smoking services in England between 2001 and 2004; results were published in *Addiction* in 2005.[12,13] As part of the process of developing smoking cessation guidance in England,[14] the National Institute for Health and Clinical Excellence (NICE) commissioned a systematic review of existing evidence and this article describes findings from this review. The review aimed to analyse available evidence on the effectiveness of intensive NHS treatments for smoking cessation and to consider the differential impact of treatment on subpopulations. The review therefore reports findings on the effectiveness of cessation interventions in clinical, as opposed to research, settings. As such, and in contrast to other reviews of smoking cessation interventions, it provides evidence of effectiveness in 'real-world' settings.

Methods

Search methods

The review was conducted in May 2006 with an update in November 2007. The literature search was carried out by the Centre for Reviews and Dissemination at the University of York. Articles from 1990 to 2007 written in English were searched in the following bibliographic databases: Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, Health Technology Assessment Database, National Research Register (including CRD ongoing reviews database), SIGN Guidelines, National Guideline Clearinghouse, HSTAT, TRIP and Medline.

However, because the services have been in existence for less than 10 years, it was expected that some relevant studies would be found in the grey literature. Grey literature was accessed through three avenues: (i) the National Research Register; (ii) the Smoking Cessation Services Research Network and (iii) tobacco control experts within academia and government.

To be included in the review, studies had to fulfil each of the following criteria:

(i) They had to examine smoking cessation interventions provided within the NHS in the UK. Although the review focused on England, studies from other parts of the UK were included.
(ii) The interventions had to be moderately intensive or intensive interventions conducted through the NHS; brief interventions (such as brief advice to stop smoking by a health professional) were not included.

The literature search generated 5131 citations. Before acquiring papers for assessment, titles were initially scanned by one reviewer who removed the irrelevant studies. The remaining 292 abstracts were independently scrutinized by two reviewers and those that did not fulfil the inclusion criteria were eliminated. Sixty-nine studies, reports and reviews remained and were acquired for assessment. Upon examination of the full articles, 14 published studies met the inclusion criteria for this review. A further 25 reports were acquired through the grey literature search, and 6 met the inclusion criteria. Thus, in total 20 studies were reviewed.

Methodological quality assessment

Studies were assessed by two reviewers for their methodological rigour and quality based on the critical appraisal checklists provided in the NICE *Public Health Guidance Methods Manual*.[14] Each study was categorized by study type and graded using a code '++', '+' or '−', based on the extent to which the potential sources of bias had been minimized (see Tables 1 and 2). Those studies that received discrepant ratings from the two reviewers were given to a third reviewer for final evaluation. Unpublished data was subjected to a quality assessment in the same way as published studies.

Results

Short- and longer term quit rates

The overall effectiveness of NHS stop smoking services in England was assessed as part of the national evaluation of services that reported in 2005. This high-quality study (2++) described self-report and CO-validated quit rates at 4 and 52 weeks. At 4 weeks, 53% of clients were recorded as CO-validated quitters, rising to 60.7% when self-report cases were included.[15] At 1 year, 14.6% of clients were CO-validated as abstinent, rising to 17.7% when self-report cases were included.[13] These results are comparable with previous trials of intensive smoking cessation interventions published in the international literature. Other studies included in this review also reported short- and longer term quit rates but these were either recorded as part of a comparison of treatment models (described below) or as part of a study that did not include biochemical validation and was assessed as poor quality.

Intervention type and evidence of effectiveness

Group versus one-to-one interventions

Two high-quality (2++) observational studies indicate that group treatment for smoking cessation may be more effective than one-to-one treatment.[15,16] The national evaluation

Table 1 Level and quality of evidence[14]

Type and quality of evidence		
1^{++}	High-quality meta-analyses, systematic reviews of RCTs or RCTs (including cluster RCTs) with a very low risk of bias	
1^{+}	Well conducted meta-analyses, systematic reviews of RCTs or RCTs (including cluster RCTs) with a low risk of bias	
1^{-}	Meta-analyses, systematic reviews of RCTs or RCTs (including cluster RCTs) with a high risk of bias	
2^{++}	High-quality systematic reviews of these types of studies, or individual, non-RCTs, case–control studies, cohort studies, CBA studies, ITS and correlation studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal	
2^{+}	Well conducted non-RCTs, case–control studies, cohort studies, CBA studies, ITS and correlation studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal	
2^{-}	Non-RCTs, case–control studies, cohort studies, CBA studies, ITS and correlation studies with a high risk—or chance—of confounding bias, and a significant risk that the relationship is not causal	
3	Non-analytic studies (for example, case reports, case series)	
4	Expert opinion, formal consensus	
Grading the evidence		
++	High quality	All or most of the quality criteria have been fulfilled Where they have been fulfilled the conclusions of the study or review are thought *very unlikely* to alter
+	Medium quality	Some of the criteria have been fulfilled Where they have been fulfilled the conclusions of the study or review are thought *unlikely* to alter
−	Low quality	Few or no criteria fulfilled The conclusions of the study are thought *likely or very likely* to alter

RCTs, randomized controlled trials.

of the services found that although the vast majority of users received one-to-one support, group counselling substantially improved (OR: 1.38) CO-validated quit rates.[15] Another study of group treatment for smoking cessation versus one-to-one treatment in primary care also found that group treatment was more successful.[16] Results indicated that 30% of clients receiving group treatment and 19% of clients receiving one-to-one treatment were CO-validated as continuously abstinent at 4 weeks (OR: 2.27).

Buddy interventions

Some NHS stop smoking services have experimented with 'buddy' interventions, where individual smokers pair up to offer each other mutual support with their quit attempts. Two high-quality (1++) randomized controlled trials (RCTs) have explored the impact of 'buddy' conditions on the effectiveness of intensive interventions: one in the context of individual counselling and the other in the context of group counselling. The study exploring 'buddy' interventions in the context of individual counselling[17] found that the odds of patients in the buddy condition remaining abstinent (based on CO validation) after 4 weeks was 2.6 times higher than patients in the solo condition. However, the second RCT found that buddy interventions did not have an additive effect to group smoking cessation interventions.[18] The findings of these studies indicate that while buddy systems may be more than double the 4-week effectiveness of one-to-one interventions, they do not substantially increase the effectiveness of group interventions.

Inpatient interventions

Although there has been recent progress in NHS stop smoking services entering hospital settings[19] the search only identified one published study that explored the effectiveness of inpatient interventions in a UK setting. This medium-quality (1+) experimental study focused on whether NRT increases the effectiveness of inpatient smoking cessation interventions and included inpatients with smoking-related diseases randomized to receive either NRT plus advice and support or advice and support only.[20] The study found that for both the intervention and control groups the percentage of quitters at 1 year was approximately 14%, which is in line with the long-term abstinence rates reported for the NHS stop smoking services more generally.[13]

Impact of intensity of the intervention on effectiveness

The national evaluation found that CO-validated 4-week quit rates were enhanced by the number of individual sessions in a complete treatment course.[4] Another high-quality evaluation (2++) of the NHS smoking cessation services in Glasgow also found that the more intensive smoking treatment services

Table 2 Summary of methodological characteristics and main findings of studies

Study and country	*Study population*	*Research question/outcome measure (OM)*	*Intervention*	*Results*
Aveyard *et al.*[22], England; RCT high quality (1++)	$N = 925$, smokers from 26 GPs in Buckingham-shire and Oxfordshire	To assess whether moderate intensity behavioural support increased quit rates over minimal support in primary care in short and long term. OM: biochemical validation.	Minimal support (basic) (BS) versus moderate (weekly) support (WS): two extra phone calls and extra visit.	% Abstinent at follow-up: 4 weeks: BS: 22.4%, WS: 22.4 (0.1, −5.3–5.5) 12 weeks: BS: 14.1%, WS: 11.4 (−2.6, −6.9–1.7) 26 weeks: BS: 10.7%, WS: 8.8% (−1.9, −5.7–2.0) 52 weeks: BS: 7.7%, WS: 6.6% (−1.1, −4.4–2.3).
Baker *et al.*[23], England; correlational high quality (2++)	$N = 103\,290$, smokers attending services in West Midlands	To determine if region's stop smoking services are equitable in terms of access and outcomes OM: self-report.	One-to-one and group support for smokers wanting to quit.	High proportion of people from deprived areas accessed services. Lowest proportion of smokers accessing services age 18–34. Low SES smokers less likely to quit than affluent smokers, F less likely to quit than M, younger smokers than older smokers.
Bauld *et al.*[4], England; cross-sectional high quality (2++)	$N = 88$, smoking cessation coordinators	To determine the extent to which NHS smoking cessation services reach smokers and support them to quit and which area characteristics contribute to outcomes.	One-to-one and group support for smokers wanting to quit.	Group support more effective than one-to-one interventions. Services based in HAZ reached greater numbers of smokers but had lesser quit rates.
Bauld *et al.*[21], Scotland; correlational high quality (2++)	$N = 448$, smokers attending intensive group services: $N = 13\,035$ attending pharmacy-based services	Analysing effects of recent and past policies and interventions for smoking cessation in intensive group-based services and pharmacy-based treatments. OM: biochemical validation and self report.	Intensive group-based smoking cessation services vs pharmacy-based treatment.	Intensive services: CO-validated quit rate: 44.4%; pharmacy services: CO-validated quit rate: 19.8%. F less likely to quit than M (OR: 0.56). More affluent smokers more likely to quit (OR: 2.1). First cigarette smoked in 5 minutes of waking and >31 more cigarettes/day associated with lower odds of quitting (OR: 0.66 and 0.41, respectively).

Bauld *et al.*[30], England; observational medium quality (2+)	$N = 1.5$, million smokers who set a quit date with services in England between April 2003 and March 2006	To assess the extent to which services have made a contribution to reducing inequalities in smoking between 2003/04 and 2005/06 by comparing outcomes between Spearhead (relatively deprived) areas and non-Spearhead areas.	NHS stop smoking services in England: all models of available service.	Short-term cessation rates were lower in disadvantaged areas (52.6%) than elsewhere (57.9%) ($P < .001$), but the proportion of smokers being treated was higher (16.7% compared with 13.4%) ($P < .001$). The net effect was that a higher proportion of smokers in the most disadvantaged areas reported success (8.8%) than in more advantaged areas (7.8%) ($P < .001$). Using the evidence-based assumption that three-quarters of short-term quitters will relapse within 1 year, the absolute and relative rate gaps in smoking prevalence between Spearhead areas and others are estimated to fall by small but statistically significant amounts from 5.2 and 1.215 (CIs: 1.216, 1.213) to 5.0 and 1.212 (CIs: 1.213, 1.210) between 2003/4 and 2005/6.
Bryce *et al.*[26], Scotland; observational medium quality (2+)	$N = 152$, pregnant women under the age of 25 receiving intensive support in their homes in a deprived area	How effective is a supportive midwifery intervention in helping young, deprived pregnant smokers to quit?	Home-based intensive smoking cessation support from trained midwives using motivational interviewing techniques plus NRT.	Of 152 eligible clients referred during the 16 month study period, 52% (79) joined the programme. 20.3% (16 women) were CO-validated as quitters at 12 weeks rising to 22.8% (18) when self-reported quitters were included. 12.7% (10 women) were CO- validated quitters at 12 months, rising to 16.5% including self-report quitters.
Chesterman *et al.*[28], England; correlational high quality (2++)	$N = 38\,778$, records from 19 separate smoking cessation services	To determine effectiveness of services in enabling smokers living in disadvantaged areas to access treatment services, and to assess the extent of variations between areas. OM: self-report.	NHS smoking cessation services.	32.3% of all smokers lived in most disadvantaged areas (versus 9.6% resident in most advantaged quintile). 'Positive discrimination' indicator: ranged from just under 0% to 18%.

Continued

Table 2 *Continued*

Study and country	*Study population*	*Research question/outcome measure (OM)*	*Intervention*	*Results*
Ferguson *et al.*[13], England; cohort high quality (2++)	$N = 2069$, smokers who accessed services (63% relatively d'dvantaged; 43.6% M, 56.4% F)	To examine the relationship between service-related characteristics and socio-demographic and behavioural factors with cessation outcomes at 52 weeks. OM: biochemical validation.	One-to-one and group support for smokers wanting to quit combined with NRT or bupropion.	14.6% reported 1 year abstinence (17.7% with self-report cases). Older age (OR: 1.023; CI: 1.014–1.032), smoking for pleasure (OR: 1.38; CI: 1.02–1.87), determination (OR: 1.58; CI: 1.21–2.05) positively associated with abstinence at 1 year; lower SES (OR: 0.86; CI: 0.78–0.96), who smoking first cigarette in 5 minutes of waking (OR: 0.73; CI: 0.55–0.96) or other smoker in household (OR: 0.65; CI: 0.49–0.86) less likely to quit.
Hand *et al.*[20], Wales; RCT medium quality (1+)	Patients ($N = 245$) with smoking-related diseases	To investigate if success of NRT among healthy patients could be replicated in hospital patients using another combination of two forms of NRT (patch and inhaler). OM: biochemical validation.	Comparison of patients in two groups: NRT and inhaler + advice and support; advice and support (AS) only.	1 year: AS: 15% attained cessation, S + NRT: 14% ($P = 0.857$). No significant difference between two groups.
Judge *et al.*[15], England; correlational high quality (2++)	$N = 6959$ (6% low SES, 41.7% M, 3.2% BMEG).	To examine the impact of socio-demographic factors, smoking-related behaviour and service characteristics on CO-validated quit rates at 4 weeks. OM: biochemical validation.	One-to-one and group support for smokers wanting to quit combined with NRT or bupropion.	53% CO-validated quitters at 4 weeks, rising to 60.7% with self-report cases. Age (OR: 1.026; CI: 1.022–1.029), determination (OR: 1.46; CI: 1.26–1.71), group counseling more likely to quit; F (OR: 0.85; CI 0.77–0.94), low SES (OR: 0.92; CI: 0.88–0.95), >31cigarettes/day (OR: 0.75; CI: 0.64–0.88), poor health status (OR: 0.72; CI: 0.63–0.82) less successful
Lowey *et al.*[27], England; correlational high quality (2++)	$N = 43\,020$, smokers attending services in NW	Aimed to establish whether NHS smoking cessation services across North West region make significant contribution to promoting equity of access to health care and to reducing inequalities in health. OM: self report.	One-to-one and group support for smokers wanting to quit combined with NRT or bupropion.	Younger smokers less likely to set quit date. Greater proportion who set quit date were F. 50% setting quit date lived in most deprived areas. 48.5% successfully quit (at 4 weeks). Smokers living in deprived areas achieve lesser success rates than more advantaged smokers ($P = 0.16$)
May *et al.*[18], England; RCT high quality (1++)	$N = 564$, participants (62% F, 84% in paid employment; mean age: 43.6 years)	To assess the effectiveness of including social support intervention ('buddy system') in a group treatment programme to aid smoking cessation. OM: biochemical validation.	Weekly support groups versus support + buddy.	78 participants (14%) reported continuous abstinence at 26 weeks: 15% ($n = 48$) of those in the solo condition and 13% ($n = 30$) of those in the buddy condition. This difference was not significant.

McEwen *et al.*[16], England; correlational high quality (2++)	$N = 1501$, participants in London clinics	Explores most effective form of treatment to aid smoking cessation: group treatment by specialists or one-to-one treatment provided in community by nurses or pharmacists. OM: biochemical validation.	Group support versus community (one-to-one) treatment.	30% group clients CO-validated abstinent at 4 weeks after quit date compared with 19% of one-to-one clients (Fisher's exact <0.001).
NEPHO[25], England; correlational medium quality (2+)	$N = 28\,473$, smokers attending services in NE	Aims to find out if NE services are effective in reducing health inequalities. OM: biochemical validation.	one-to-one and group support for smokers wanting to quit combined with NRT or bupropion.	People in deprived quintiles less likely to quit successfully at 4 weeks ($P < 0.0001$) but more likely to access services. Likelihood of quitting at 52 weeks increases with age, no significant difference between M and F.
Owens and Springett[51], England; correlational low quality (2−)	Clients (number unspecified) accessing the Roy Castle Fag Ends Stop Smoking Service in Liverpool	To describe how the Fag Ends service functions and to report 4 and 52 week monitoring outcomes from clients attending between 2001 and 2005.	one-to-one and drop in, rolling group support for smokers wanting to quit combined with NRT or bupropion.	CO-validated quit rates at four weeks ranged from 34% to 45% between 2001 and 2005, rising to 57% overall when self-report cases were included. Self-report 52 week quit rates (only 4% were CO validate) ranged from 16 to 22% between 2001 and 2004.
Ritchie *et al.*[50], Scotland; qualitative low quality (2−)	Clients (number unspecified) attending 12 smoking cessation groups in a deprived area	To make explicit the assumptions shaping the practice of open 'rolling' groups that use narrative therapy and to assess smokers' perceptions of the value of these groups.	Drop in, rolling group support using narrative therapy.	Hypotheses generated suggest that flexible services that offer support to a range of smokers at different stages in their quit attempt are beneficial. Programmes that are tailored to the individual's personal situation are valued by participants.
Springett *et al.*[52], England; qualitative low quality (2−)	Staff and service users of the Fag Ends service in Liverpool (numbers unclear)	To ascertain the main characteristics of the Fag Ends smoking cessation service and how they contribute to its effectiveness from a user and service provider perspective.	one-to-one and drop in, rolling group support for smokers wanting to quit combined with NRT or bupropion.	A service that employs lay advisers, rather than health professionals can be successful in helping smokers to quit. A service which provides access to group and one-to-one support on a drop in basis in a wide range of venues is accessible and valued by clients.
South Gloucestershire PCT[29], England; correlational medium quality (2+)	$N = 1657$, smokers attending services in Glouchestershire	How fairly are smoking cessation services distributed in relation to the health needs of different groups and areas? OM: self-report.	NHS stop smoking intervention.	Percentage of successful quitters from first quintile (least deprived): 55%, second quintile: 52%, third quintile: 54%; fourth quintile: 49%, fifth quintile (most deprived): 48%.

Continued

Table 2 *Continued*

Study and country	*Study population*	*Research question/outcome measure (OM)*	*Intervention*	*Results*
Watt *et al.*[24], England; cohort low quality (2−)	$N = 3318$, smokers attending Cornwall/Isles of Scilly services	To monitor people in Cornwall and Isles of Scilly who have used the SSS and to assess how successful services have been in helping them stop smoking at 52 week follow-up.	NHS stop smoking services.	23.4% successful in quitting after 52 weeks. Outcomes varied by gender, age and level of deprivation. For example males had higher success rates than females (31.8% versus 15.1%)—success rate higher for males in all age bands.
West *et al.*[17], England; RCT high quality (1++)	$N = 172$, smokers in London clinic (66% F)	To assess abstinence rates of pairing up smokers attending a general practice smokers clinic to provide mutual support between clinic sessions.	Patients attended private sessions alone or in pairs with clinic nurse.	Smokers abstinent at the end of the treatment was significantly higher in the buddy condition than the solo condition (27% versus 12%, $P < 0.01$).

achieved higher 4-week quit rates (44.4%) than less intensive pharmacy-delivered interventions, which achieved 4-week CO-validated quit rates of approximately 20%.[21]

On the other hand, in the context of interventions provided in the primary care settings, a high-quality (1++) RCT has found no benefit from adding an extra visit and two additional phone calls to the programme of one-to-one support usually provided by NHS smoking cessation services in primary care.[22] The authors argue that the intervention failed to have a significant effect because the additional support was not delivered in a systematic way across the NHS services participating in the trial. They also suggested that the behavioural support that was provided may have lacked efficacy because many services use primary care providers to provide less intensive support geared largely towards ensuring that medication is used effectively; thus, these community advisors may have less experience in delivering behavioural support. Overall, therefore, there is some evidence that intensive interventions achieve higher success rates than less intensive interventions delivered in primary care settings, but this is an area for further research.

Effectiveness of interventions for particular subpopulations

Younger and older smokers

Three high-quality (2++) studies,[21,23,26] one medium-quality (2+) study[25] and one low-quality (2−) study[24] have found that there is a relationship between quit status at 4 weeks and age, with younger smokers significantly less likely to achieve abstinence through the smoking cessation services than older smokers. A fourth high-quality (2++) study found that this effect was also evident at 1 year.[15]

Men and women

A range of observational studies (3 high-quality [2++] studies and 1 low-quality [2−] study) have found that women are less likely to successfully achieve short-term abstinence through the NHS stop smoking services than men, although they are more likely to access services.[13,21,23,24] For example, the evaluation of the stop smoking services in Glasgow found that women were less likely to be CO-validated as successful quitters at 4 weeks than men (40.5% versus 53.2%), although they constituted over two-thirds of the clients accessing the services.[21]

Black and minority ethnic groups

Extremely limited information exists on how readily black and minority ethnic groups (BMEG) are accessing the services and how successful they are in completing treatment.

A medium-quality (2+) study conducted in the Northeast found that CO-validated quit outcome at 4 weeks did not vary with the broad ethnic categories of 'white' and 'non-white';[25] however, as the numbers of people setting quit dates from BMEG was small, this makes interpretation of the data difficult.

Pregnant women

The national evaluation (2++) of the NHS stop smoking services found a self-reported quit rate at 4 weeks of 40.5% amongst pregnant women.[13] However, the CO-validated success rate for these pregnant women was 37.2%. A more recent medium-quality (2+) study of an NHS cessation service targeted at younger, deprived pregnant women in Scotland found medium-term (12-week) CO-validated quit rates of 20.3%, rising to 22.8% when self-report quitters were included, and longer term (52-week) CO-validated quit rates of 12.7%, rising to 16.5% with self-report cases.[26]

Deprived populations

There is a body of evidence from a range of observational studies of varying quality that the NHS stop smoking services have been successful in attracting smokers from deprived areas, although these smokers are significantly less likely to quit successfully than smokers from more affluent areas. Four high-quality (2++) studies[4,23,27,28] and a medium-quality (2+) study[25] found evidence of 'positive discrimination' in the reach of NHS stop smoking services, although services operating in deprived areas achieved lower cessation rates. One medium-quality[29] (2+) and one low-quality (2−) assessment[24] of the stop smoking services also report that manual and routine groups had good access rates but poor quit rates. Two of the high-quality studies also disaggregated their results by sex as well as level of deprivation;[23,27] neither study found gender differences in quitting success amongst deprived smokers.

Most recently, a medium-quality observational study (2+) assessed the likely impact of NHS stop smoking services on reducing inequalities in health.[30] This study used routine monitoring data collected from services to compare outcomes between more deprived 'Spearhead' areas in England and less deprived areas. The study found that although cessation rates were lower in more deprived areas, the proportion of smokers reached by services was higher and the net effect was that a higher proportion of smokers in the more disadvantaged areas reported success at 4 weeks (8.8%) than in more affluent areas (7.8%). The authors concluded that NHS smoking cessation services were making a modest contribution to reducing inequalities in health.[30]

Discussion

Main findings of this study

The available evidence suggests that NHS stop smoking services are effective in supporting smokers to quit in the short- and longer term. There is some evidence to suggest that group interventions appear to be more effective than one-to-one interventions within NHS services. While 'buddy' systems may increase the CO-validated 4-week effectiveness of one-to-one interventions, they do not substantially increase the effectiveness of group interventions for smoking cessation. One study also indicates that inpatient interventions for those with smoking-related diseases are just as effective in the long term as the smoking cessation services more generally. The intensity of the intervention also appears to be integral to its effectiveness, although it may act in conjunction with other specific service characteristics.

Theoretically, these findings provide some support for intensive group interventions over other formats. Yet the reality is that this option is not attractive for many smokers, or feasible to deliver, especially in rural regions. Many clients express a clear preference for one-to-one treatment.[31] Moreover, although support delivered by community advisors (e.g. pharmacists) may not achieve the same quit rates as more intensive interventions, these providers are in an excellent position to reach a wide variety of smokers, particularly smokers from deprived areas and those people who are not interested in attending stop smoking groups.[16]

There is good evidence that older smokers are more likely to quit successfully than young smokers. Men also appear to be more successful at quitting than women, despite the fact that more women attend the smoking cessation services. These findings support international research that suggests that while women are highly motivated to quit smoking, men tend to be more successful at doing so.[33] There are several factors that seem to explain the lower success rates of women, such as less confidence in relation to quitting, the inter-relationship between gender and deprivation and differences in the meaning and role of tobacco in men and women's lives.[13,32–36]

The evidence on the effectiveness of stop smoking interventions for minority ethnic groups is inconclusive. Although a body of indicative information about the smoking patterns of BMEG indicates that there may be a lack of awareness of the health effects of smoking in BMEG[37,38] as well as a lack of knowledge about the range of available smoking cessation methods and services,[38–40] there is no available robust evidence on how regularly BMEG access NHS stop smoking services and how effective they are for ethnic minorities.

Pregnant women and more disadvantaged groups face particular challenges in quitting. Pregnant smokers who enrol in smoking cessation programmes may merely suspend their smoking behaviour for the duration of their pregnancy as opposed to quit altogether.[41] They are also more likely to be from routine and manual groups and may experience multiple barriers that make resisting relapse for long-term smoking cessation difficult.[42,43]

Similar difficulties face smokers from areas of deprivation more generally. Smoking is more prevalent among routine and manual groups. In some areas of deprivation, smoking is perceived as the norm, which makes quitting harder.[44–46] Reported barriers to accessing smoking cessation services are factors such as cost, timing, lack of childcare, lack of appropriate information, perceived ineffectiveness and negative publicity.[47] Another key barrier to quitting is the high level of nicotine dependence among routine and manual groups. Studies have shown that low socio-economic status (SES) smokers are often more highly addicted, have been smoking since a young age, and smoke more cigarettes per week compared with professional workers.[26,45,47] However, despite these barriers, there is some encouraging evidence that the NHS are making a modest contribution to reducing inequalities in health by supporting a larger proportion of deprived smokers to quit than their more affluent neighbours.[30]

Given the differences between smokers based on factors such as gender, ethnicity, class, age and level of dependency, it is possible that tailored interventions may help to improve cessation rates. For example, two reviews of NHS smoking cessation services for pregnant women provide evidence that the most effective treatment for pregnant smokers entails elements such as systematic training of midwives in how to refer pregnant smokers, offering flexible home visits, and providing intensive multi-session treatment delivered by a small number of dedicated staff.[48,49] There is now some limited but emerging evidence that modifying the Maudsley model of group treatment to encompass a drop in, rolling element where smokers can continue attending a group at any point in their quit attempt, may be effective in reaching and supporting clients living in deprived areas.[50–52] This type of adaptation of existing service models may be important if NHS stop smoking services are to continue to be effective as smoking rates become concentrated in more disadvantaged groups.

What is already known on this topic

Studies in the UK and overseas have demonstrated that behavioural support plus access to pharmacotherapy is effective in helping smokers to quit. This combination of support is used by NHS stop smoking services and a number of recent studies have examined their development and outcomes achieved.

What this study adds

This is the first review that brings together all the available published evidence on the efficacy of NHS smoking cessation services. The UK remains the only country in the world to have a comprehensive, free at the point of use cessation service. Results from this systematic review suggest that they provide effective support for smokers who want to quit. However, a number of important research questions remain regarding the efficacy of different forms of intervention offered by the services and, equally importantly, the efficacy of these interventions with different subpopulations of smokers.

Limitations of the study

This review faced two main limitations. The first relates to the research design of the available studies and the second relates to the extent of the evidence. First, conclusions drawn from systematic reviews usually rely on evidence from research that employs a controlled design, allowing explicit comparisons to be made between one type of intervention and another. Only four studies included in this review were RCTs and they examined particular elements of NHS stop smoking services rather than their overall effectiveness. However, to ignore the observational studies included in this review would have resulted in the conclusion that there is almost no reliable evidence regarding the role of these services in helping smokers to quit, which is clearly not the case. Well-designed observational studies yield valuable information about outcomes from 'real-world' services. However, the heavy reliance of this review on observational evidence does mean that a number of caveats have to be placed around the findings.

Secondly, although the vast majority of studies reviewed were of medium- to high quality, another limitation of this review is the lack of available evidence on many of the key issues under consideration. Because the NHS stop smoking services have been in place for under a decade, an adequate evidence base does not yet exist and a number of questions remain to be answered. For example, we have no clear evidence about the impact of service setting, location or, importantly, the quality of behavioural support on cessation outcomes. We also have very little evidence about the most effective way to deliver interventions in hospital settings. It is also clear that a great deal more needs to be learnt about how the characteristics of smokers themselves intersect with each other, and then with service characteristics. The failure

of some existing studies to disaggregate their results by sex or ethnicity, and then to fail to apply a gender and diversity-based analysis, limits our knowledge of which interventions work best for particular subpopulations.

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