Developing and testing a standardised evaluation framework for hospital-initiated tobacco dependence treatment services

5/4/2020

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Reference

Robson D., Richardson S., Howle F., Clegg., H, Evison, M., Spaducci, G., Malik, S. and McNeill A. (2020) Developing and testing a standardised evaluation framework for hospital-initiated tobacco dependence treatment services. Cancer Research UK.

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Acknowledgements

We would like to thank the stakeholders who participated in the Delphi study and the following who supported the clinical audit:

Kathryn Groom & Ryan Moore (CURE Assistant Project Managers, Greater Manchester Cancer).

Claire O'Rourke & Jonathan Hirst (Greater Manchester Cancer Team); Jane Pilkington (Greater Manchester Health & Social Care Partnership).

Elizabeth Benbow, Andrea Crossfield & Scott Crosby (Making Smoking History Team).

Kerry Buckley (Royal Oldham Hospital, Northern Care Alliance NHS Group); Deborah Kershaw & Jan Sinclair (Stepping Hill Hospital, Stockport NHS Foundation Trust); Alison Unsworth (Royal Albert Edward Infirmary, Wrightington, Wigan and Leigh NHS Foundation Trust); Jeanette Davidson, Viv Buckett & Alison Hilton (Tameside General Hospital, Tameside and Glossop Integrated Care NHS Foundation Trust); Gareth Jones, Kate Maitland, Charlotte King, Fred Fyles & Tom Green (Royal Liverpool Hospital, Liverpool University Hospitals NHS Foundation Trust); Irem Patel & Arran Woodhouse (King's College Hospital NHS Foundation Trust); Mary Yates (South London & Maudsley NHS Trust).

Cancer Research UK

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This research was funded by the Cancer Policy Research Centre, Cancer Research UK.

http://www.cancerresearchuk.org/

Executive Summary

Hospitalisation provides a critical window of opportunity to prompt a quit attempt and provide tobacco dependence treatment. However, these opportunities are often missed. Several studies have shown that tobacco dependence treatment which is started in hospital, and includes the systematic assessment of smoking behaviour, the provision of pharmacotherapy with behavioural support or counselling, along with post-discharge follow-up, can help people quit smoking. The most widely known model of a hospital-initiated tobacco dependence treatment model is the Ottawa Model for Smoking Cessation (OMSC), embedded in several primary and secondary health care settings in Canada. An adapted version has been developed - 'CURE' (Conversation, Understand, Replace, Expert & Evidence-based) - for implementation in NHS Trusts in Greater Manchester and beyond.

As part of the new NHS Long Term Plan, NHS England have committed to fund new NHS tobacco dependency treatment services and stated that: '*the NHS will support people in contact with NHS services to quit, based on a proven model implemented in Canada and Manchester and by 2023/24, all people admitted to hospital who smoke will be offered NHS-funded tobacco treatment services'.*

Currently, there is no agreement in the UK on how the new NHS England Long Term Plan's recommended tobacco dependency treatment services, such as the OMSC and CURE models should be evaluated or audited, what data should be recorded in NHS Electronic Healthcare Records (EHCR) to facilitate this, and what outcomes should be reported so that variation in outcomes can be compared across the NHS.

The first stage of this project developed a consensus evaluation framework for assessing tobacco dependence treatment started in NHS hospitals. A two-round online Delphi study was conducted with stakeholders who work in commissioning or delivering tobacco dependence treatment in the NHS. An initial 49 item questionnaire was constructed based on variables assessed in evaluations of OMSC, CURE, and a rapid literature review of published trials that evaluated outcomes of tobacco dependence treatment started in hospital. Stakeholders were asked to rate the items on importance of inclusion in EHCR and ease of recording. After two rounds, consensus was reached for 40 items and a draft evaluation framework was developed.

In the second stage we assessed the current capability of EHCR systems and the feasibility of extracting data to assess the outcomes identified in the draft evaluation framework. We conducted a clinical audit across nine NHS organisations in England and extracted data from a random set of 890 patient EHCRs.

Records of smoking status were high on admission but declined over time (from 82% on admission, to 17% at discharge and 15% after discharge). In this sample, 21% of patients were identified as current smokers. Among these, we identified that a third had a record of treatment being offered during admission but recording of treatment further along the pathway also declined. Patient reported outcomes were mostly absent. Records of readmission to hospital, use of A&E services and mortality following discharge were available for a third of patients. Improvements in the electronic capture of smoking status, smoking behaviours, treatment provided, and outcomes are necessary for routine collection of data and future evaluations of new NHS England Long Term Plan tobacco dependency treatment

such as CURE and similar models.

On the basis of the first and second stages of this project, we have developed a final evaluation framework of 26 items, which we propose may be used as a common set of criteria for standardising the evaluation of CURE and similar hospital-initiated tobacco dependence interventions across the NHS. Including these items in EHCRs (and consistency in classification) will enable coherent evaluation for treatment of the largest single cause of preventable death and disease in the UK.

Acronyms and abbreviations

ASH = Action on Smoking and Health

CPD = Cigarettes per day

CURE = Conversation, Understand, Replace. Experts and Evidence-based treatments

HSI = Heaviness of smoking index

OMSC = Ottawa Model of Smoking Cessation

TTFC = Time to first cigarette of the day

NHS = National Health Service

NICE = National Institute for Health and Care Excellence

Contents

Introduction

Background

People who smoke tobacco are overrepresented in the population who use NHS secondary care services but receive little support to quit during a stay in hospital. An estimated 1.1 million people who smoke are treated in hospitals in England each year, receiving approximately 2.6 million episodes of care (Szatkowski et al, 2015), at a cost to the NHS of around £620 million (Royal College of Physicians, 2018). Hospitalisation provides a critical window of opportunity to prompt a quit attempt due to increased contact with health professionals, a focus on current and future health concerns, and time in a smoke-free environment away from usual smoking triggers. However, these opportunities, or teachable moments, are often missed. An audit of 14,750 patient records conducted in 2016 by the British Thoracic Society across 146 NHS acute hospitals, found that smoking status was documented in 73% of records. Of the 25% of current smokers identified, only 153 (5.5%) were referred to a hospital smoking service (Hutchinson et al, 2018)..

Several published studies have shown that tobacco dependence treatment which is started in hospital, and includes the systematic assessment of smoking behaviour, the provision of pharmacotherapy with behavioural support or counselling, along with post-discharge follow-up, can increase quit attempts and success (Murray et al, 2013; Reid et al, 2010; Rigotti et al, 2016; Nahhas et al, 2017; Mullen et al, 2017; Evison et al, 2020). However, despite being recommended in several UK and international clinical or policy guidelines (e.g. NICE, 2006, 2013; Fiore et al, 1996), historically, ascertainment of smoking status and treatment for tobacco dependence during a hospital stay is not well embedded in service designs, patient pathways or disease treatment guidelines (Royal College of Physicians, 2018).

We can only estimate from research studies how many people who smoke are in the NHS system. Currently there is no statutory responsibility for acute, maternity or mental health NHS Trusts to collect or report on the smoking status of patients admitted to hospital (or community services) and what, if any, tobacco dependence treatment they receive and the outcomes of such treatment.

Models of hospital-initiated tobacco dependence treatment

There are several models of hospital-initiated tobacco dependence treatment. The most widely known model is the Ottawa Model for Smoking Cessation (OMSC) which is embedded in several primary and secondary care healthcare settings across Canada (Mullen et al, 2017). Its core components are the systematic identification and documentation of all smokers admitted to hospital, followed by brief advice, personalised bedside counselling, and the provision of nicotine replacement therapy (NRT). Patients are followed up after discharge using an automated telephone service and provided with eight telephone calls over six months. Access to counselling from a smoking cessation nurse specialist is facilitated in case of a relapse to smoking or low confidence about quitting (Papadakis et al, 2016). Although OMSC has not been evaluated in a randomised controlled trial, an evaluation based on a retrospective cohort design has demonstrated that this model significantly improves long-term quit rates. It also significantly reduces the probabilities of all-cause readmissions,

smoking-related readmissions, and all-cause emergency department visits after one, 12 and 24 months. Significant absolute risk reductions in mortality were also observed after 12 months (6%) and 24 months (7.3%) (Mullen et al, 2017).

The Royal College of Physicians (RCP, 2018) has estimated the impact of implementing OMSC across the NHS in England, relative to a minimum intervention to be £182 (£159–213) per smoker with annual savings to the NHS of between £31 - £62 million. The RCP recommended that smoking cessation should be incorporated as a systematic and opt-out component of all NHS services, as a complement to local authority services and delivered in smoke-free settings.

Few studies have evaluated such hospital-initiated tobacco dependence treatment in the NHS. Murray et al (2013) randomised 264 patients who smoked to an intervention comprising of the systematic identification of smoking status, default provision of daily bedside behavioural support and pharmacotherapy for the duration of a hospital stay, and referral to a local stop smoking service after discharge. Smoking cessation outcomes were compared with 229 patients who smoked who had been randomised to receive usual care. Quit rates were higher in the intervention group compared with those who received usual care at 4 weeks follow-up (42% vs 17%) and at 6 months follow-up (19% vs 9%). Uptake of behavioural cessation support, use of pharmacotherapy, and uptake of a referral to the local stop smoking service were all significantly higher in the intervention group than in the usual care group. This model was recommended in NICE PH48 guidance – *Smoking: acute, maternity and mental health services* (NICE, 2013), however implementation has proved inconsistent (Royal College of Physicians, 2018).

Evison and colleagues (2018a) modelled and designed the CURE (Conversation, Understand, Replace, Expert & Evidence-based) project, a comprehensive hospital-initiated secondary care programme for the treatment of tobacco dependence, initially to be implemented across Greater Manchester. Its core components are electronic screening of all patients to identify those who smoke; the provision of brief advice and pharmacotherapy by frontline staff; opt-out referral of patients identified as smokers to a specialist team for inpatient behavioural interventions; and continued support after discharge. Evison and colleagues (2020) evaluated the CURE project in Wythenshawe Hospital, Manchester NHS Foundation Trust, between October 2018 and March 2019. They reported that 92% (13,515/14,690) of adult admissions were screened for smoking status, 17.7% (2,393) of whom were identified as current smokers; 61% of patients identified as smokers completed inpatient behavioural interventions with a specialist cessation practitioner (the majority within the first 48 hours of admission). Overall, 66% were prescribed pharmacotherapy and 22% of all patients who smoked admitted during the pilot reported that they were abstinent from smoking 12 weeks after discharge.

NHS Long Term Plan

NHS England published the NHS Long Term Plan in January 2019, setting out its priorities for healthcare over the next ten years. A more joined-up and co-ordinated system and greater emphasis on prevention of ill health and reducing health inequalities was proposed. The Plan acknowledges that smoking still accounts for more years of life lost than any other modifiable risk factor and improving upstream prevention of avoidable illness and exacerbations by quitting smoking is necessary. NHS England have committed to fund new NHS tobacco dependency treatment services to complement, rather than replace, local authority-funded

community smoking cessation services and recommended models based on OMSC and CURE (see box 1).

Box 1: Excerpt from NHS Long Term Plan

The NHS will make a significant new contribution to making England a smoke-free society, by supporting people in contact with NHS services to quit based on a proven model implemented in Canada and Manchester. By 2023/24, all people admitted to hospital who smoke will be offered NHS-funded tobacco treatment services.

The model will also be adapted for expectant mothers, and their partners, with a new smoke-free pregnancy pathway including focused sessions and treatments.

A new universal smoking cessation offer will also be available as part of specialist mental health services for long-term users of specialist mental health, and in learning disability services. On the advice of PHE, this will include the option to switch to e-cigarettes while in inpatient settings.

NHS Long Term Plan (NHS England, 2019)

As these or similar models are implemented across NHS Trusts over the next four years, variation in implementation is likely to occur depending on factors such as the type and size of the Trust, geographical location and competency of the workforce. Currently, there is no agreement in England about how hospital-initiated tobacco dependence treatment models should be evaluated, what data should be recorded in NHS Electronic Healthcare Records (EHCRs) to facilitate this, and what outcomes should be reported.

Study purpose

Cancer Research UK funded a two-stage project to 1) develop a consensus evaluation framework for tobacco dependence treatment started in NHS hospitals and, 2) evaluate the capability of EHCR systems to assess the feasibility of extracting data to assess items identified in the consensus evaluation framework. The project was a collaboration between King's College London and the CURE Team in Manchester and served to support the development of baseline data collection methods for the roll out of CURE across acute hospitals in Greater Manchester.

Research aims and objectives

Aims

The aim of the first stage of the project was to develop a consensus evaluation framework among stakeholders working in roles related to commissioning or delivering tobacco dependence treatment in NHS acute and mental health Trusts. They were asked to decide on what data should be recorded in NHS patient EHCRs to facilitate the evaluation of tobacco dependence treatment started in hospital settings and what outcomes should be evaluated.

The aim of the second stage of the project was to assess the capability of NHS EHCR systems to see how feasible it was to extract data relating to the items identified in the consensus evaluation framework. Nine NHS organisations, covering seven NHS Trusts in three geographical locations across England (Greater Manchester, Liverpool and South London) agreed to participate.

Objectives

- To assess stakeholders' views about which items from a pre-defined list were important for inclusion in EHCRs and which were easy to record.
- To reach consensus among stakeholders about which items should be included in an evaluation framework.
- To assess the feasibility of extracting data from NHS Electronic Healthcare Records relating to the items in the evaluation framework.
- To report existing data relating to the items in the evaluation framework.

We have organised the rest of the report as follows: Further methods and the results of the Delphi study, followed by the methods and results of the clinical audit.

Stage 1: Delphi Study

Methods

Study design

A two round online Delphi survey was conducted with key stakeholders working in the commissioning or delivery of tobacco dependence treatment in the NHS. The surveys were conducted in July and August 2019. The Delphi technique is a widely used and accepted method for consensus building and achieving convergence of expert opinion (Dalkey and Helmer, 1963). The method uses group facilitation techniques in an iterative multistage process, designed to transform opinion into group consensus. Participants remain anonymous to minimise conformity bias whilst they respond to a series of questionnaires in which the feedback process encourages participants to reassess their initial judgements. It is commonly used in health and social care research and several Delphi studies have been conducted to achieve a consensus relating to smoking and cessation outcomes (Cheung et al, 2017; Elfeddali et al 2010; Fergie et al 2019).

Participants

These were a convenience sample of stakeholders working in primary and secondary care NHS settings (acute and mental health), public health commissioning services, Public Health England, NHS England and charities. Stakeholders were purposively recruited by the study team via email, using existing networks (i.e. commissioners and health providers across Greater Manchester who had committed to implementing CURE; those across England who had expressed an interest in implementing CURE and the Mental Health and Smoking Partnership, hosted by Action on Smoking and Health (ASH). People were eligible to participate if they worked in a role that either directly involved delivering treatment for tobacco dependence to smokers in hospital; those who supported the delivery of such treatment (e.g. information technology (IT) staff); commissioners of tobacco dependence treatment services and colleagues who were involved in providing or commissioning national guidance about tobacco dependence treatment started in hospital. Once potential participants were identified (n=142), they were invited by email to opt-in to the Delphi survey. Only those who agreed to participate (n=94) were sent the first-round survey questionnaire.

Procedures: Questionnaire development and survey rounds

Round one

A 49 item survey (Table 4) was developed by the study team based on outcomes reported in evaluations of OMSC (Reid et al, 2010; Papadakis et al 2016; Mullen et al 2017), a list of measures used in an early evaluation of CURE in Wythenshawe Hospital, Manchester NHS Foundation Trust (Evison et al, 2020) and a rapid literature review of trials published between 2012 and 2019 that evaluated outcomes of tobacco dependence treatment started in hospital (Appendix 1). We also included items related to the recording of the use of e-cigarettes/vaping products as there are currently round 3.1 million vapers in England (McNeill

et al, 2020). Moreover, the NHS Long Term Plan includes the recommendation that long-term users of mental health services should have the option to switch to an e-cigarette while in inpatient settings. ASH (2019) reported that 91% of NHS Mental Health Trusts who responded to a recent survey allowed vaping and 42% provided e-cigarettes free of charge as a way to help patients who smoked either temporarily abstain or quit smoking completely during an admission to hospital.

Questionnaire items were grouped according to stage of an admission to hospital; 1) at the start of the admission (e.g. within 48 hours of admission); 2) during admission; 3) on discharge; 4) for up to 12 months after discharge; and 5) readmission to hospital. The order of questions also reflected the CURE and OMSC pathways, in which screening for smoking status and the start of treatment is initiated by the admitting ward team, followed by specialist support for the remainder of the hospital stay and post discharge. Participants were asked to rate each item on a 5-point Likert scale for importance of inclusion in EHCRs (0=not important at all, 4=absolutely essential to include). They were also asked to rate the ease of recording each item in EHCRs for round one only (0=very difficult to record, 4=very easy to record). Participants were asked to rate each question independently of their responses to other questions. Space for free text was provided and participants were encouraged to elaborate on their ratings and invited to suggest additional items that could be included in the evaluation framework for rating in the second round.

SmartSurvey was used to conduct the surveys. Participants who agreed to take part in the study were sent a link to the survey by one of the study team in two sequential rounds. The survey was initially piloted by six tobacco control experts (who were not part of the study team or Delphi survey participants) and no amendments were made. Time to complete the survey was estimated between 7 and 15 minutes. Participants had two weeks to complete each round. Information about the study, and links to the CURE[1] and OMSC[2] websites were also provided if participants wanted further information about these models. Participants were also asked to provide brief information on their job role and the type of organisation they worked for.

The first-round responses were analysed to provide an initial breakdown of the frequency of endorsed items. It was deemed a priori that ratings of 3 or 4 meant an item was perceived as important or easy to record. We calculated the proportion of respondents who rated each item as 3 or 4 for importance and ease separately. Consensus of an item's importance or ease was defined a priori as being equal to or greater than 75%. One of the 49 items asked participants to rate the time frame for assessing measures following discharge, from five options (4 weeks, 3, 6, 12 and 18 months); participants could choose more than one option; This item is reported separately.

Round two

Following analysis of responses to the first-round questionnaire, the items that had achieved consensus on importance (Table 4) were removed from the questionnaire for round two. The additional item about the time frame for assessing items was also removed. Participants were emailed the revised questionnaire and were provided with feedback about how the whole group had rated the items in round one (proportions and means), in addition to being asked

[1] https://thecureproject.co.uk/more-about-cure/
[2] https://ottawamodel.ottawaheart.ca/about-omsc

to re-rate the remaining items. This time they were only asked to rate on importance, using the same Likert scale. Additionally, if more than one stakeholder participant from round one made the same or a similar suggestion about additional items that could be included in the evaluation framework, these were added to the second-round questionnaire for all participants to rate. This resulted in nine new items being added to round two (Table 5) and participants were asked to rate these for importance and ease of recording. The final set of items for inclusion in the evaluation framework comprise of those with ≥75% endorsement of importance from two rounds.

Ethics

Ethical approval was obtained from King's College London Research Ethics Committee. Electronic consent was obtained from participants before they could access the questionnaire.

Results

Respondents

In round one, 94 stakeholders who had agreed to participate in the study were emailed the link to the online survey questionnaire, and 53 (56%) completed it. Thirty people did not log on to the survey website. A further 11 partially completed the questionnaire and their responses were not included in the analysis.

In round two, the same 94 people were emailed the link to the online revised questionnaire, and 37 (39%) completed it. A further five people partially completed the revised questionnaire and their responses were not included in the analysis. The remainder did not log on. Thirty-six of the 37 respondents participated in both rounds, one person only participated in the second round. Details of respondents' workplaces and proportion of their job role that is dedicated to tobacco control work are described in Tables 1 and 2.

Table 1: Type of organisation in which respondents worked

Type of organisation	Round 1 (n=53)	Round 2 (n=37)
NHS Mental Health Trust	19 (36%)	16 (43%)
NHS Acute or Community Trust	12 (23%)	8 (22%)
Government or arm's length body	6 (11%)	4 (11%)
Commissioner (e.g. local authority)	6 (11%)	4 (11%)
Charity	4 (7%)	3 (8%)
Academic organisation	4 (7%)	1 (2.7%)
Private or social enterprise sector	2 (4%)	1 (2.7%)

Table 2: Proportion of time respondents' roles are dedicated to tobacco control work

Amount of time	Round 1 (n=53)	Round 2 (n=37)
>80% (5 days a week or full time equivalent)	16 (30%)	9 (24%)
20-80% (>1 day but < 5 days per week full time equivalent)	22 (41%)	15 (41%)
<20% (1 day or less per week full-time equivalent)	15 (28%)	13 (35%)

Consensus ratings: round one

Seventy five percent or greater endorsement was reached for **15 items that were rated as both *important to include and easy to record*** in EHCRs (Table 3). **Twelve items were rated important** to include by ≥75% of participants, but there was no consensus (≤75%) about their ease of recording (Table 3).

Participants were asked to rate at what time points smoking related information and outcome data should be recorded after discharge. Categories were not mutually exclusive (if a participant indicated yes to one option, that did not restrict answers for other time periods.) The most popular choice was 4 weeks after discharge followed by 12 months after discharge (Figure 1).

Figure 1: Respondents' consensus on the time frame of recording outcomes after discharge

Participants were invited to suggest additional information for inclusion in the evaluation framework. We included these items in the second-round survey if more than one person suggested them. This resulted in a further nine items being added to the second-round survey (Table 4).

Consensus ratings: round two

We removed the 27 items where consensus was reached for importance (either alone or in combination with ease of recording), as well as the timing question, leaving 21 items to be re-rated in the second-round questionnaire. Participants were only asked to re-rate importance for this round. Consensus (≥75 endorsement) was reached for 11 items: (see also Table 3). Consensus was reached for two of the additional nine items suggested by participants in the first round (Table 4). After the two rounds, 10 items did not reach consensus (Table 3). This left 40 items for inclusion in the draft evaluation framework (Table 5).

Table 3: First & second round ratings

		Information	Importance of inclusion (1st round) Consensus (%)	Ease of recording (1st round) Consensus (%)	Consensus reached 1st round (Y/N)	Importance of inclusion (2nd round) Consensus (%)	Consensus reached 2nd round (Y/N)
On admission to hospital (within 24-48 hours)	1	**Self-reported smoking status at time of admission** (e.g. current, former, never)	96.2	98.1	Y		
	2	Carbon monoxide (CO) expired air (e.g. Smokerlyzer® test)	59.6	34.6	N	55.7	N
	3	**Usual number of cigarettes smoked per day before admission**	79.3	83.1	Y		
	4	**Usual time to first cigarette after waking before admission**	62.3	77.3	N	81.5	Y
	5	Other tobacco use before admission (e.g. smokeless tobacco and/or 'Heat-not-Burn' products)	71.7	61.5	N	63.9	N
	6	**Self-reported vaping (e-cigarette use) status**	88.5	80.8	Y		
	7	Usual frequency of vaping (e.g. daily, non-daily) before admission	68.6	74.6	N	66.6	N
	8	**Was NRT offered within 24 of admission? (e.g. yes/no/not applicable)**	94.4	92.4	Y		
	9	**Was other pharmacotherapy (i.e. varenicline, bupropion) offered within 24–48 hours of admission? (e.g. yes/no/not applicable)**	88.7	86.8	Y		
	10	**Was an e-cigarette offered within 24 hours of admission? (e.g. yes/no/not applicable)**	77.0	82.7	Y		
	11	**Other type of support offered (e.g. brief advice, behavioural support)**	96.2	90.6	Y		
	12	**Was NRT accepted by the patient? (e.g. yes/no)**	100.0	93.4	Y		
	13	**Was other pharmacotherapy (e.g. varenicline, bupropion) accepted by the patient? (e.g. yes/no)**	96.2	85.7	Y		
	14	**Was an e-cigarette accepted by the patient? (e.g. yes/no/not applicable)**	86.8	77.4	Y		
During admission	15	**Advice given about available support for tobacco dependence during admission (e.g. yes/no)**	94.3	86.8	Y		
	16	**Type of treatment/support offered (e.g. NRT, varenicline, bupropion, brief advice, behavioural support, e-cigarette, etc.)**	90.5	86.6	Y		
	17	**Type of treatment/support accepted (e.g. NRT, varenicline, bupropion, brief advice, behavioural support, e-cigarette etc.)**	94.4	86.8	Y		
	18	**Is the patient making a quit attempt or temporarily abstaining?**	83.1	75.5	Y		
	19	**Side effects of stop smoking treatment**	64.1	56.6	N	75	Y

	20	**Self-reported patient satisfaction with treatment**	66.0	58.5	N	77.8	Y
	21	**Severity of tobacco withdrawal symptoms (self-reported by patient)**	62.2	52.8	N	77.8	Y
	22	Who provided support for tobacco dependence/smoking cessation? (e.g. ward staff, specialist adviser)	60.4	64.1	N	57.2	N
	23	Staff grade of the specialist adviser providing support to the patient whilst on the ward	7.6	39.6	N	0	N
On discharge	24	**Self-reported smoking status at time of discharge**	88.7	77.3	Y		
	25	Carbon monoxide (CO) expired air (e.g. Smokerlyzer® test)	66.0	49.0	N	63.8	N
	26	Number of cigarettes smoked in the 24 hours before discharge	58.5	47.2	N	66.6	N
	27	Other tobacco use (e.g. smokeless tobacco and/or 'Heat-not-Burn' products) in the 24 hours before discharge	57.7	48.1	N	61.1	N
	28	**Self-reported vaping status**	83.0	69.8	Y		
	29	Usual frequency of vaping in the 24 hours before discharge (e.g. daily, non-daily)	54.7	50.0	N	45.7	N
After discharge from hospital	30	**Who provided follow up tobacco dependence treatment support (e.g. hospital team, community stop smoking service, pharmacy, GP, etc.)**	96.2	39.7	Y		
	31	**Type of treatment/support received after discharge from hospital (e.g. NRT, varenicline, behavioural support, telephone, face to face support, etc.)**	86.8	34.2	Y		
	32	**Duration of above treatment (for each type of treatment received)**	71.7	35.8	N	80	Y
	33	**Self-reported smoking status**	92.3	54.9	Y		
	34	**Carbon monoxide (CO) expired air (e.g. Smokerlyzer® test)**	73.6	28.3	N	80.6	Y
	35	**Usual number of cigarettes smoked per day in the previous 7 days**	71.6	34.6	N	88.8	Y
	36	**Usual time to first cigarette of the day in the previous 7 days**	60.4	39.6	N	75	Y
	37	**Other tobacco use (e.g. smokeless tobacco and/or 'Heat-not-Burn' products) in the previous 7 days**	62.2	37.8	N	77.8	Y
	38	**Self-reported vaping status**	77.3	44.2	Y		
	39	Usual frequency of vaping in the previous 7 days (e.g. daily, non-daily)	57.7	37.2	N	55.6	N
Readmission	40	**Readmission to hospital within 30 days of discharge for a smoking-related condition (e.g. yes/no)**	88.7	51.0	Y		
	41	**Readmission to hospital within 12 months of discharge for a smoking-related condition (e.g. yes/no)**	88.6	51.0	Y		
	42	**Readmission to hospital within 30 days of discharge for all causes (e.g. yes/no)**	80.8	67.3	Y		

	43	**Readmission to hospital within 12 months of discharge for all causes (e.g. yes/no)**	77.3	62.3	Y		
	44	**Attendance at A&E within 30 days of discharge for a smoking-related condition (e.g. yes/no)**	81.1	41.5	Y		
	45	**Attendance at A&E within 12 months of discharge for a smoking-related condition (e.g. yes/no)**	79.2	40.4	Y		
	46	**Attendance at A&E within 30 days of discharge for all causes (e.g. yes/no)**	62.3	53.8	N	84.3	Y
	47	**Attendance at A&E within 12 months of discharge for all causes (e.g. yes/no)**	60.4	50.0	N	80.5	Y
	48	**Mortality 12 months following discharge from hospital (e.g. yes/no)**	88.3	55.7	Y		

Table 4: Second round responses to new items

	Information	Importance of inclusion: Consensus %	Ease of recording: Consensus (%)	Consensus reached (Y/N)
On admission	Number of quit attempts within the last 12 months (including successful or unsuccessful)	71.5	49.0	N
	If the patient is an ex-smoker, how long ago (before admission) had s/he last smoked?	57.1	52.8	N
	Presence of other smokers in the patient's household)	66.6	52.7	N
	How long after admission was the patient offered NRT? (if NRT was offered, e.g. <1 hour, 1-3 hours etc.)	77.8	69.5	Y
During	**Does the patient have an intention to abstain from smoking for the duration of their admission in hospital?**	77.8	58.4	Y
	Why did the patient refuse treatment or support for smoking cessation during their admission in hospital?	74.3	44.1	N
After	Presence of other smokers in the patient's household	66.6	42.8	N
	Attendance at one or more GP appointments after discharge from hospital	27.8	28.6	N
	Co-use of cannabis with tobacco (e.g. yes/no)	61.1	26.1	N

Text in bold in tables 3 and 4 are the consensus items

Consensus evaluation framework

Forty items were included in the draft evaluation framework, based on reaching consensus over two rounds (Table 5).

Table 5: Draft evaluation framework

	Items to be included in EHCRs
On admission to hospital	Self-reported smoking status at time of admission (e.g. current, ex-smoker, never smoker)
	Usual number of cigarettes smoked per day before admission
	Usual time to first cigarette after waking before admission
	Self-reported vaping (e-cigarette use) status
	Was NRT offered within 48 hours of admission? (e.g. yes/no/not applicable)
	Was NRT accepted by the patient? (e.g. yes/no)7
	How long after admission was the patient offered NRT?
	Was other pharmacotherapy (i.e. varenicline, bupropion) offered within 48 hours of admission? (e.g. yes/no/not applicable)
	Was other pharmacotherapy (e.g. varenicline, bupropion) accepted by the patient? (e.g. yes/no)
	Was an e-cigarette offered within 48 hours of admission? (e.g. yes/no/not applicable)
	Was an e-cigarette accepted within 48 hours of admission? (e.g. yes/no/not applicable
	Other type of support offered (e.g. brief advice, intensive brief advice, behavioural support)
During admission in hospital	Advice given about available support for tobacco dependence during admission (e.g. yes/no)
	Type of treatment/support offered (e.g. NRT, varenicline, bupropion, brief advice, behavioural support, e-cigarette, etc.)
	Type of treatment/support accepted (e.g. NRT, varenicline, bupropion, brief advice, behavioural support, e-cigarette etc.)
	Is the patient making a quit attempt or temporarily abstaining?
	Does the patient have an intention to abstain from smoking for the duration of their admission in hospital? (e.g. yes/no)
	Side effects of treatment (e.g. sore mouth from lozenges, nausea from varenicline, etc.)
	Self-reported patient satisfaction with treatment
	Severity of tobacco withdrawal symptoms (self-reported by patient)
On discharge	Self-reported smoking status at time of discharge (e.g. smoked in the last 24 hours before discharge/abstinent)
	Self-reported vaping status
After discharge from hospital	Self-reported smoking status
	Usual number of cigarettes smoked per day in the previous 7 days
	Usual time to first cigarette of the day in the previous 7 days

	Carbon monoxide (CO) expired air (e.g. Smokerlyzer® test)
	Self-reported vaping status
	Who provided follow up tobacco dependence treatment support (e.g. hospital team, community stop smoking service, pharmacy, GP, etc.)
	Type of treatment/support received after discharge from hospital (e.g. NRT, varenicline, behavioural support, telephone, face to face support, etc.)
	Duration of above treatment (for each type of treatment received)
	Other forms of tobacco used (e.g. smokeless/ Heated Tobacco Products
Readmission to hospital (and mortality)	Readmission to hospital within 30 days of discharge for a smoking-related condition (e.g. yes/no)
	Readmission to hospital within 12 months of discharge for a smoking-related condition (e.g. yes/no)
	Readmission to hospital within 30 days of discharge for all causes (e.g. yes/no)
	Readmission to hospital within 12 months of discharge for all causes (e.g. yes/no)
	Attendance at A&E within 30 days of discharge for a smoking-related condition (e.g. yes/no)
	Attendance at A&E within 12 months of discharge for a smoking-related condition (e.g. yes/no)
	Attendance at A&E within 30 days of discharge for all causes (e.g. yes/no)
	Attendance at A&E within 12 months of discharge for all causes (e.g. yes/no)
	Mortality 12 months following discharge from hospital for all causes (e.g. yes/no)

Stage 2: Clinical Audit

In the second stage of the project, we assessed the feasibility of extracting data relating to the items identified in the draft evaluation framework from EHCRs in nine NHS organisations in England (Table 6).

Methods

Study design

Following analysis of the second round of the Delphi survey we conducted a retrospective clinical audit of EHCRs of patients admitted to inpatient services across nine NHS organisations, covering seven NHS Trusts in Greater Manchester, Liverpool and South London (six acute Trusts and one mental health Trust). One further acute Trust agreed to participate but was unable to provide data within the time scale of the study. Clinical audit staff of the respective Trusts were asked to extract data from up to 100 random sets of EHCRs for patients admitted between 1/10/2018 and 31/09/19, according to the items in the draft evaluation framework. Trusts were provided with a random set of dates over the 12-month period (identified from a random date generator in Excel). Clinical audit staff were asked to identify patients admitted on those dates and extract anonymous data. Audit approval was sought from each Trust.

Table 6: Participating NHS organisations

Fairfield General Hospital, Pennine Acute Hospital NHS Trust, Northern Care Alliance
Royal Oldham Hospital, Pennine Acute Hospital NHS Trust, Northern Care Alliance
Rochdale Infirmary, Pennine Acute Hospital NHS Trust, Northern Care Alliance
Tameside General Hospital, Tameside and Glossop Integrated Care NHS Foundation Trust
The Royal Liverpool Hospital, The Royal Liverpool and Broadgreen University Hospitals NHS Trust
Stepping Hill Hospital, Stockport NHS Foundation Trust
Royal Albert Edward Infirmary, Wrightington, Wigan and Leigh NHS Foundation Trust
King's College Hospital NHS Foundation Trust
South London & Maudsley NHS Foundation Trust (SLaM) (Mental Health Trust)

Results

The nine NHS Trusts extracted information from 890 patient records; 51% (n=454) of patients were female and 73% (n=658) were 45 years of age or older. Sixty six percent (n=588) had received care from a medical ward, 13.4% (n=119) from a surgical ward and 11.2% (n=100) from a mental health ward.

On admission to hospital

Smoking status

81.8% (728/890) of patients had their smoking status recorded on admission. There was variation across Trusts: King's College Hospital NHS Foundation Trust had the most completed records (100%) and Rochdale Infirmary, Northern Care Alliance, had the fewest completed records (39%) (Figure 2) (the latter Trust mostly provide care for day cases and have 21 inpatient beds).

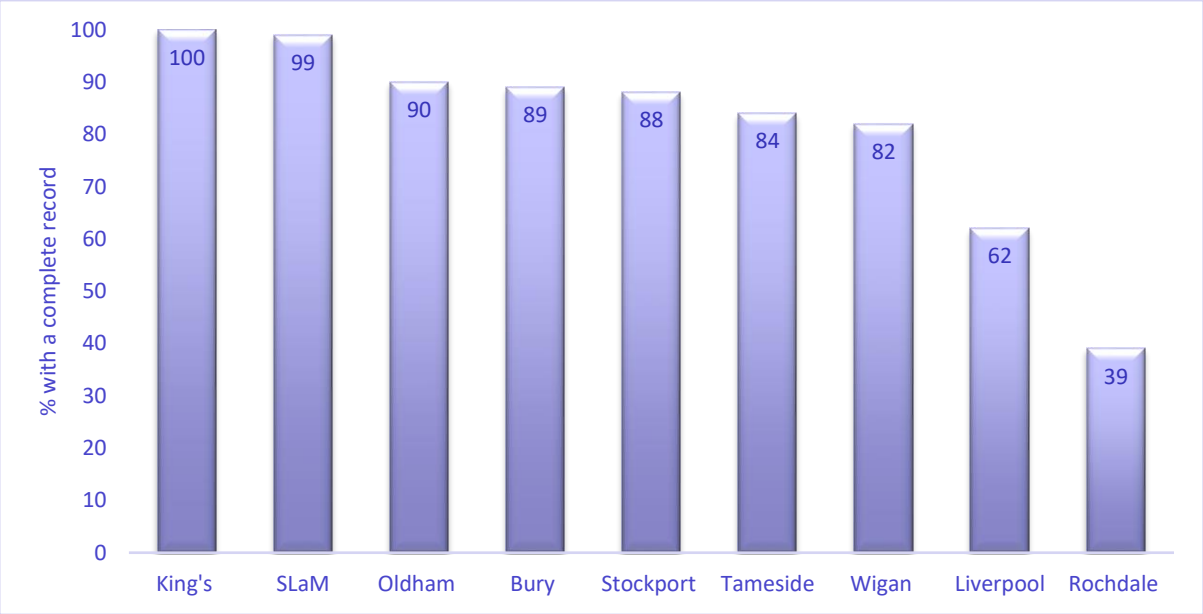

Figure 2: The proportion of patient records with a record of smoking status on admission by organisation.

Prevalence of smoking on admission

Smoking status is classified differently across Trusts, e.g. in one Trust, patients are classified as a current smoker if they have smoked in the 14 days prior to admission, whereas in another, within four weeks prior to admission. Several did not specify a time frame.

- Of those who had a recorded smoking status, **153 patients (21%)** were identified as **current smokers**, whereas **162 patients (22.3%)** were identified as **former smokers** (this excludes King's College Hospital who record patients as either current or non-smokers).
- Smoking prevalence was higher in males (21.4%) than in females (18.7%), with the

highest prevalence among those 45 years of age and over (33.7%) compared with those under 45 (16.4%). Smoking was most common in those admitted to a mental health ward (31.3%), followed by a surgical ward (27.4%), then a medical ward (20.6%).

Severity of tobacco dependence %

81% (124/153) of patients who were identified as current smokers had a record of the usual number of cigarettes per day (CPD) smoked before admission, whereas 16.3% (25/153) had a record of time to first cigarette of the day (TTFC) (all in the mental health Trust).

- 38% (47/124) smoked ≤10 CPD; 50% (62/124) smoked 11-20 CPD and 12% (15/124) smoked ≥12 CPD.

Vaping status

Very few (6.7%, 60/890) patients had their vaping status recorded on admission and most of these were identified with the mental health Trust:

- Of those with a record of vaping status 30% (18/60) were current vapers.
- 83% (15/18) of the identified current vapers were also smokers.

Treatment offered to smokers within 48 hours of admission

Treatment was offered to fewer than half of patients identified as smokers (with available data):

- 33.3% (51/153) of current smokers had a record of NRT being offered.
- 49% of those offered NRT (25/51) had a record of accepting NRT.
- It was only possible to identify how soon NRT was offered in 10/51 patient records.
- There was no record of any other pharmacotherapy (e.g. varenicline, bupropion) being offered or accepted for any of the identified smokers.
- There was a record as to whether (or not) other types of support had been offered on admission for 70% (107/153) of smokers.
- No Trust offered an e-cigarette to smokers.

During admission

- 67% (103/153) of current smokers had a record about whether or not they had been given advice about quitting.
  - 60.2% (62/103) of those with a record had received advice about quitting.
- 21.5% (33/153) had a record of behavioural support being offered and 87.9% (29/33) of these accepted the support.
- 12.4% (19/153) of smokers had a record as to whether they were specifically making a quit attempt or temporarily abstaining.
  - Five of the 19 patients were recorded as making a quit attempt.

- 21% (32/153) of smokers had a record as to whether or not they intended to abstain or not from smoking for the duration of their admission in hospital.
    - 24 of the 32 patients (75%) had a record of intending to abstain during their admission.

Patient experience

Evidence of the patient's experience of treatment was either absent or very low.

- Severity of tobacco withdrawal symptoms was recorded for 1/153 identified smokers.
- Self-reported patient satisfaction with NRT was recorded for the same one smoker.
- Of the 25 smokers who had a record of accepting the offer of NRT, 12 (48%) had a recording of side effects, but no further details of their side effects were given.

On discharge

- 16.7% (149/890) of patients had their smoking status recorded on discharge, of which 38.6% (59/153) were identified as current smokers on admission. Of these:
    - 56 were recorded as smokers, 3 were recorded as being non-smokers on discharge.

- 10.1% (90/890) patients had a record of their vaping status on discharge (more than at admission); of these, 32% (29/90) also had a record of their vaping status on admission.
    - Overall, 14/90 were identified as current vapers on discharge.

After discharge

Data were collected where there was a record of smoking-related behaviour and treatment at any time point post discharge. Locating and extracting smoking related information post discharge was a challenge for most participating hospitals as health information is located in EHCRs outside of their control (e.g. GP records or community team records). They may also not have regular or established access to this data, hence the poor capacity to capture this information. Our timing question suggested that obtaining data at 4 weeks or 12 months after discharge would be most preferable.

Smoking and vaping status

- 15.4% (137/890) patients had their smoking status recorded any time after discharge or 29.4% (45/153) smokers identified at admission, of these:
    - 43 were recorded as smokers after discharge; two were recorded as being a non-smoker.
- 1.6% (13/890) of all patients had a record of vaping status (or 11/60 vapers identified at admission).
    - Overall, 9/13 were current vapers.

Treatment after discharge

- Smoking status after discharge was not CO verified for any smoker.

- 5.2% (8/153) of smokers who had been identified as current smokers on admission had a record of who followed them up or how they were followed up.
- 2.6% (4/153) had a record of the type of treatment/support received after discharge.
- None had a report of the duration of post-discharge treatment.
- 11.1% (17/153) had a record of the usual number of cigarettes smoked a day in the 7 days before follow-up.
- There were no records of time to first cigarette of the day.
- 1.6% (15/890) had a recording if they had used non-combustible tobacco products.
    - no current users were identified.

Recording of smoking behaviours and treatment offered and accepted reduced over time, as visually demonstrated in figure 3. Table 7 offers a summary of the completeness of records for each item in EHCRs.

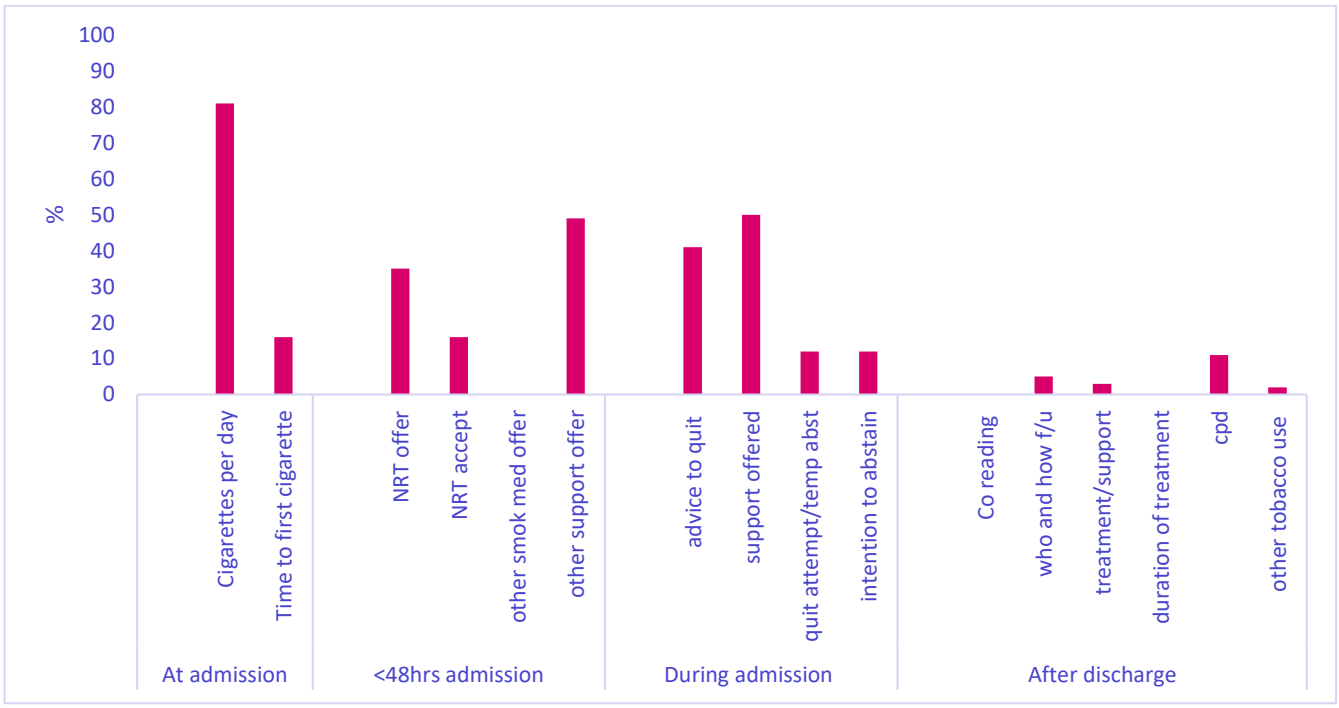

Figure 3: Completeness of recordings for smokers (n=153)

Table 7: Summary of the completeness of record for each item in EHCRs.

	Items in EHCRs	Number out of total sample or of smokers identified on admission	%
On admission to hospital	Self-reported smoking status at time of admission (e.g. current/ ex-smoker, never)	728/890	81.8
	Usual number of cigarettes smoked per day before admission	124/153	81.0
	Usual time to first cigarette after waking before admission	25/153	16.3
	Self-reported vaping (e-cigarette use) status	60/890	6.7
	Was NRT offered within 24–48 hours of admission? (e.g. yes/no/not applicable)	51/153	33.3
	Was NRT accepted by the patient? (e.g. yes/no)7	25/51	49
	How long after admission was the patient offered NRT? (if NRT was offered, e.g. <1 hour, 1-3 hours etc.)	10/51	19.6
	Was other pharmacotherapy (i.e. varenicline, bupropion) offered within 24 hours of admission? (e.g. yes/no/not applicable)	0/153	0
	Was other pharmacotherapy (e.g. varenicline, bupropion) accepted by the patient? (e.g. yes/no)	0/153 (N/A)	0
	Was an e-cigarette offered within 24–48 hours of admission? (e.g. yes/no/not applicable)	0/153 (N/A)	0
	Was an e-cigarette accepted within 24–48 hours of admission? (e.g. yes/no/not applicable	0 (N/A)	0
	Other type of support offered (e.g. brief advice, behavioural support)	107/153	70.0
During admission in hospital	Advice given about available support for tobacco dependence during admission (e.g. yes/no)	103/153	67
	Type of treatment/support offered (e.g. NRT, varenicline, bupropion started or augmented; brief advice, behavioural support etc.)	33/153	21.5
	Type of treatment/support accepted (e.g. NRT, varenicline, bupropion, brief advice, behavioural support, e-cigarette etc.)	29/33	87.9
	Is the patient making a quit attempt or temporarily abstaining?	19/153	12.4
	Does the patient have an intention to abstain from smoking for the duration of their admission in hospital? (e.g. yes/no)	32/153	21
	Side effects of treatment (e.g. sore mouth from lozenges, nausea from varenicline, etc.)	12/25	48
	Self-reported patient satisfaction with treatment	1/25	4
	Severity of tobacco withdrawal symptoms (self-reported by patient)	1/153	0.6
On discharge	Self-reported smoking status at time of discharge	149/890	16.7
	Self-reported vaping status	90/890	10.1
After discharge	Self-reported smoking status	137/890	15.4

from hospital	Carbon monoxide (CO) expired air	0 (N/A)	0
	Usual number of cigarettes smoked per day in the previous 7 days	17/153	11.1
	Usual time to first cigarette of the day (e.g. in the previous 7 days)	0 (N/A)	0
	Self-reported vaping status	13/890	1.6
	Who provided follow up tobacco dependence treatment support (e.g. hospital team, community stop smoking service, pharmacy, GP, etc.)	8/153	5.2
	Type of treatment/support received after discharge from hospital (e.g. NRT, varenicline, behavioural support, telephone, face to face support, etc.)	4/153	2.6
	Duration of above treatment (for each type of treatment received)	0 (N/A)	0
	Other forms of tobacco used (e.g. smokeless/ Heated Tobacco Products	15/890	1.6

Recording of readmission to hospital, attendance at A&E & mortality among smokers

Audit departments were able to ascertain whether smokers identified on admission had a record of whether or not they had been readmitted or attended an A&E department at the same hospital within 12 months in less than 35% of cases (Figures 4 and 5).

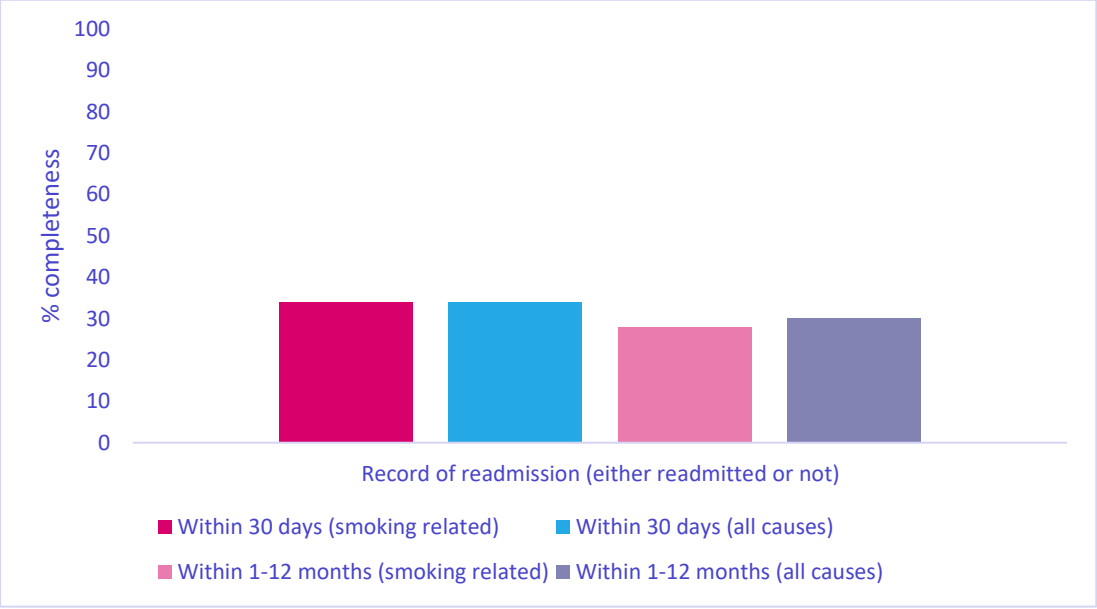

Figure 4: Proportion of patient notes (n=890) where readmission could be ascertained (either readmitted to the same hospital or not)

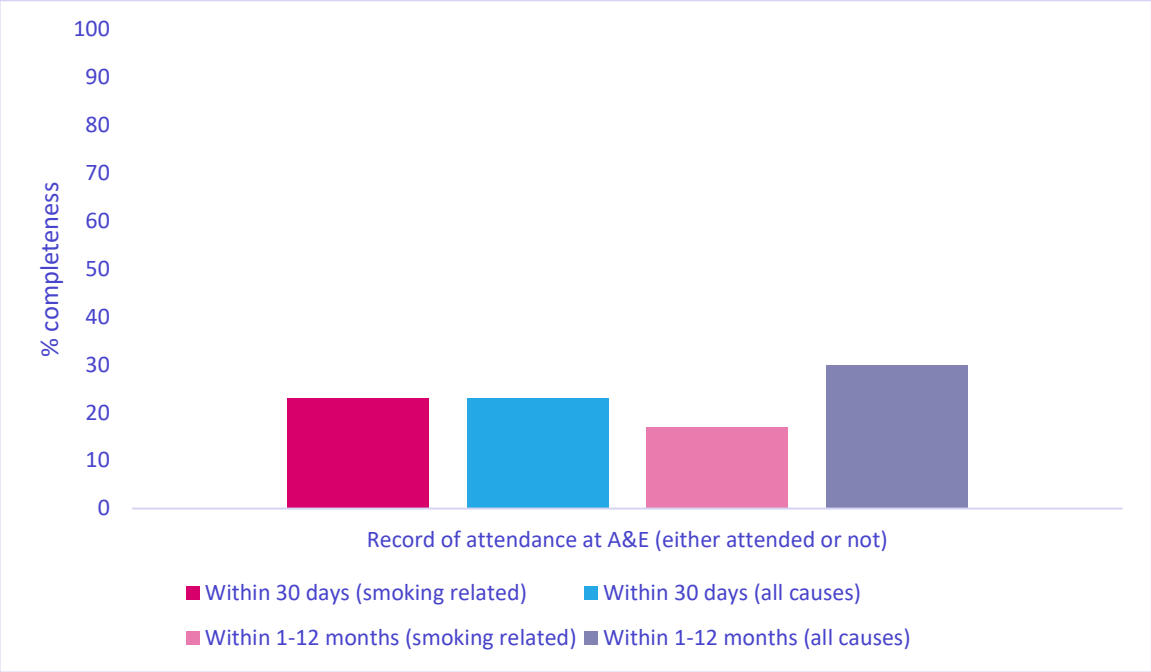

Figure 5: Proportion of patient notes (n=890) where attendance at A&E could be ascertained (either attended or not)

For those smokers identified on admission and who had a record of **readmission** to the same hospital:

- 71/153 had a record whether or not they had been readmitted within 30 days of discharge for a smoking related condition.
    - 3% (2/71) were readmitted.

- 69/153 had a record whether or not they had been readmitted within 30 days of discharge for any cause.
    - 13% (9/69) were readmitted.
- 60/153 had a record whether or not they had been readmitted within 12 months of discharge for a smoking related condition.
    - 15% (9/60) were readmitted.
- 65/153 had a record whether or not they had been readmitted within 12 months of discharge for any cause.
    - 51% (33/65) were readmitted.

For those smokers identified on admission and who had a record of **A&E attendance**:

- 39/153 had a record of whether or not they had attended A&E within 30 days of discharge for a smoking related condition.
    - 3% (2/39) had attended.
- 70/153 had a record of whether or not they had attended A&E within 30 days of discharge for any cause.
    - 20% (14/70) had attended.

- 30/153 had a record of whether or not they had attended A&E within 12 months of discharge for a smoking related condition.
    - 17% (5/30) had attended.
- 64/153 had a record of whether or not they had attended A&E within 12 months of discharge for any cause.
    - 53% (34/64) had attended.

Mortality

Audit departments were able to ascertain in 37% (337/890) of cases if patients in the overall sample were deceased or alive:

- 18% (61/337) with available data were recorded as deceased.
- This included 14/153 patients who had been identified as smokers on admission.

Discussion

We developed an evaluation framework by consensus, using a Delphi technique with 53 stakeholders in the first round and 37 in the second. The draft evaluation framework, which included 40 items, was then used by clinical audit teams across nine NHS organisations. Data were extracted according to each of the 40 items from 890 patient EHCRs, chosen at random from admissions over a 12-month period.

Changes in smoking status between admission to hospital and after discharge are usually the main outcomes in studies evaluating hospital-initiated tobacco dependence treatment interventions (Reid et al 2010; Murray et al 2013; Evison et al, 2020). In this clinical audit, completeness of records of smoking status declined over time (from 82% on admission, to 17% at discharge and 15% after discharge). The proportion of patient records with a record of smoking status on admission is higher than the rate of 73% identified in a national acute hospital audit (Hutchinson et al, 2018) but lower than the 92% of patients with a record of smoking status, identified in Wythenshawe Hospital, where CURE has been piloted (Evison et al, 2020). Although the majority (77%) of stakeholders in the Delphi study thought that recording smoking status on discharge would be easy, this does not appear to be the case. Being able to identify smoking status at, and after, discharge needs to be made easier for clinicians (e.g. creating structured fields in EHCRs or being able to pull through data from community or primary care services). When evaluating changes in smoking status following admission, we recommend that the denominator include all smokers who were identified on admission, irrespective of whether they accepted treatment (Evison et al, 2020).

There was variation in how current smokers were classified. Consistency in classification within EHCRs will be necessary for any future large-scale evaluations of hospital-initiated tobacco dependence treatment services such as CURE or OMSC. If a patient has successfully stopped smoking in the 4 weeks prior to admission, they are at a high risk of relapsing back to smoking (West and Stapleton, 2008). We suggest these people are most in need of support and therefore recommend that a current smoker should be defined as someone who has smoked in the 4-weeks prior to admission. The above are all key issues for NHSE to reliably monitor the impact of the 10-year funding plan for the NHS Long Term Plan (NHSE, 2019).

The smoking prevalence of 21% found in this random sample is lower than the 25% identified in a national acute hospital audit (Hutchinson et al, 2018) but higher than 17.7% identified in the evaluation of the pilot of CURE (Evison et al, 2020). It is also higher than the smoking prevalence among the wider general population in England (14.4%) (NHS Digital, 2019). Unsurprisingly, prevalence was higher among patients admitted to mental health wards than medical or surgical wards, though much lower than what has been observed in previous studies of patients in mental health settings (Wu et al 2016).

The Heaviness of Smoking Index (HSI) (a combination of usual number of CPD and TTFC) is widely used to assess the severity of a smoker's dependence on tobacco (Heatherton et al, 1989). Both items, separately and in combination are predictive of the severity of tobacco dependence and quitting outcomes (Borland et al, 2010). Shorter TTFC is independently associated with greater tobacco related urinary carcinogenic levels and with an increased risk of lung cancer and chronic obstructive pulmonary disease (Gu et al, 2014; Guertin et al, 2015). The HSI score can help guide the dose and frequency of NRT patients require. However,

although there was consensus that this would be easy to record, only 16% of records included a HSI score (all from the mental health Trust). Ideally, both items should be retained in the final evaluation framework, though clinicians may need educating about why this is an important piece of clinical information to collect.

Only a third of smokers had a record of being offered NRT, and half of these had a record of accepting it. This is lower than 56% of smokers who were prescribed NRT in the Wythenshawe Hospital CURE pilot evaluation, either on admission or by a CURE specialist practitioner (Evison et al, 2020). No smoker had a record of being offered varenicline, the most effective licensed stop smoking aid. Clinicians are often deterred from prescribing varenicline during a hospital stay because product recommendations advise that people should smoke for up to two weeks after the start of treatment. Ten percent of smokers were prescribed varenicline in the CURE pilot evaluation (Evison et al, 2020) and improvements may be seen if guidelines for the use of varenicline in hospitalised smokers are implemented (Restrick et al, 2016). We recommend recording both the offer and acceptance/refusal of all stop smoking medicines and psychological interventions throughout the tobacco dependence treatment pathway if possible. If only the prescriptions of medication are recorded, there will be a missed opportunity to capture information about uptake of treatment; these items will be necessary in early evaluations to help estimate costs for the scaling up of tobacco dependence treatment. Also, CURE and OMSC pathways involve the initiation of treatment by ward staff followed by support from specialist practitioners, who review, and augment treatment as needed. Delineating at what stage of the pathway and who provides treatment are necessary for evaluating the added value (and cost effectiveness) of hospital-initiated tobacco dependence treatment services such as CURE/OMSC.

Almost no data existed about the patient experience of tobacco dependence treatment. As one's experience of treatment is likely to influence adherence with treatment, and in turn affect outcomes, such information is important to collect in clinical records. We recommend the use or adaptation of tools advocated by the National Centre for Smoking Cessation and Training (www.ncsct.co.uk). Specifically, for satisfaction with treatment, we suggest a single question, rated on a 5-point Likert scale:

- *Overall, how satisfied were you with the tobacco dependence support you received in hospital?* Very Unsatisfied (1) Unsatisfied (2) Unsure (3) Satisfied (4) Very Satisfied (5).
- For severity of withdrawal symptoms, we suggest the Mood and Physical Symptom Scale (West and Hajek, 2004).

Very little data were available to understand who followed up the smoker and what treatment they received after discharge. As CURE and OMSC include support after discharge, capturing this information in clinical records is important for evaluating outcomes.

We also recommend some items from the draft evaluation framework can be excluded. The time 'How soon after admission treatment was offered' was too difficult to identify. The items 'Whether the smoker is making a quit attempt or is temporarily abstaining' or 'intends to remain abstinent during the hospital stay' are likely to change on a daily basis, so capturing these on one occasion is unlikely to be informative. The item on 'duration of treatment' was also difficult to capture and also unlikely to be informative. The item on 'use of other tobacco products (e.g. smokeless and heated tobacco products)' was not rated by stakeholders as

important for inclusion in EHCRs on admission or discharge but was for after discharge. This information is important, however it's not that helpful without a recording at the beginning or end of the inpatient treatment pathway, so can be excluded. However, in areas where smokeless tobacco use is prevalent (e.g. among South Asian communities) NHS Trusts may want to consider capturing this on admission, discharge and after discharge. Similarly, the item on 'CO verification' was not rated by stakeholder participants as important for inclusion on admission or discharge (and difficult to collect) but was rated important for after discharge. CO monitoring can be a helpful motivational tool for people who smoke (Shahab et a, 2011) and is also used to verify self-reported quitting in clinical and research settings (West et al, 2005). It is part of a Stop Smoking Practitioners routine practice and adds value to clinical conversations when supporting patients to quit (Baxter et al 2016). Because of a lack of consensus for including this throughout the admission process, we have also excluded this item from the final framework; however, NHS Trusts may wish to make a local decision to record it on admission and discharge.

Regarding information about vaping, recording of vaping status was generally low and varied between admission and after discharge (6.7% on admission, 10.1% at discharge and 1.6% after discharge). No Trust offered e-cigarettes to smokers to support a quit attempt or for temporary abstinence, so these related questions were not applicable. However, we recommend they are retained in the evaluation framework, particularly for future evaluations in mental settings, as vaping behaviours are common among people with mental health conditions (McNeill et al, 2020) and nearly half of NHS mental health Trusts provide vaping products during an inpatient admission (ASH, 2019).

Data for readmission, attendance at A&E and mortality were hampered by lack of joined up IT systems and health information being held in different locations. These items were originally included as they mirrored the variables used in evaluations by OMSC teams (e.g. Mullen et al, 2017) and data relating to these formed part of the economic modelling for the implementation of CURE across Greater Manchester (Evison et al, 2018) and for OMSC nationally (RCP, 2018). However, because of the difficulty in capturing this information, we recommend reducing these to – 'readmitted within 30 days and 12 months of discharge *for any condition*'. We also recommend recording mortality within 12 months of discharge from any condition and from smoking. Given the current difficultly of identifying this information at a local level, NHS England should provide guidance on how this should be captured and reported. One option is to use linked mortality data from Hospital Episode Statistics (HES) and the Office for National Statistics, which allows the analysis of deaths in and outside of hospital for all patients with a record in HES, and can help to track performance of health care providers and outcomes of treatment over time.

Recording mortality within 12 months of discharge from tobacco dependence will also be challenging. Recording tobacco dependence on a death certificate when the death is attributable to a tobacco-related condition has been recommended since 1992 but compliance is very low (Proctor et al, 2012). Baxter et al (2016) have published guidance on how to improve compliance so that more accurate data about tobacco smoking and mortality can inform public health policy.

The **final** proposed evaluation framework (including 26 items) and outcomes they relate to are in Table 8.

Table 8: Final proposed evaluation framework

		Items in EHCRs	Related outcomes
On admission to hospital	1	Self-reported smoking status at time of admission (current smoker i.e. smoked in the 4-weeks prior to admission) /ex-smoker/ never smoker)	Change in smoking status between admission, on discharge and after discharge. Smoking prevalence
	2	Usual number of cigarettes smoked per day before admission (10 or fewer/ 11-20/ 21-30/ 31 or more)	Change in cigarette intake and cigarette dependence between admission and after discharge.
	3	Usual time to first cigarette of the day Within 5 minutes/ 6- 30 mins/ 31-60 mins/ after 60 minutes	
	4	Self-reported vaping (e-cigarette use) status	Change in vaping status between admission and after discharge. Vaping prevalence
	5	Was NRT offered within 48 hours of admission? (e.g. yes/no/not applicable)	Uptake of treatment (provided by ward staff) Change in smoking. status according to type of treatment. Cost of treatment.
	6	Was NRT accepted by the patient? (e.g. yes/no)	
	7	Was other pharmacotherapy (e.g. varenicline) offered within 48 hours of admission? (e.g. yes/no/not applicable)	
	8	Was other pharmacotherapy (e.g. varenicline) accepted by the patient? (e.g. yes/no)	
	9	Was an e-cigarette offered within 48 hours of admission? (e.g. yes/no/not applicable)	Uptake of provision (where applicable) Switching rates
	10	Was an e-cigarette accepted within 48 hours of admission? (e.g. yes/no/not applicable)	
During admission in hospital	11	Advice given about available support for tobacco dependence during admission (e.g. yes/no)	
	12	Type of treatment/support offered (e.g. further NRT, varenicline, bupropion started or augmented, brief advice, behavioural support etc.)	
	13	Type of treatment/support accepted (e.g. further NRT, varenicline, bupropion started or augmented, brief advice, behavioural support etc.)	
	14	Side effects of treatment (e.g. sore mouth from lozenges, nausea from varenicline, etc.)	Patient reported outcomes
	15	Self-reported patient satisfaction treatment (e.g. *Overall, how satisfied were you with the tobacco dependence support you received in hospital?* Very Unsatisfied (1) Unsatisfied (2) Unsure (3) Satisfied (4) Very Satisfied (5).	
	16	Severity of tobacco withdrawal symptoms (self-reported by patient) (e.g. the Mood and Physical	

		Symptom Scale, West & Hajek, 2004)	
On discharge	17	Self-reported smoking status at time of discharge (e.g. smoked in the last 24 hours before discharge/ abstinent)	Change in smoking status (and vaping status where applicable) between admission, on and after discharge.
	18	Self-reported vaping status	
After discharge from hospital **(4 weeks after discharge, 6 & 12 months)**	19	Self-reported smoking status (current smoker (i.e. smoked in the 4-weeks prior to admission) /ex-smoker/ never smoker)	
	20	Self-reported vaping status	
	21	Usual number of cigarettes smoked per day in the previous 7 days	Change in cigarette intake and cigarette dependence between admission and after discharge.
	22	In relation to ongoing tobacco dependence treatment support, who/how was the patient followed up (e.g. by hospital team, community stop smoking service, pharmacy, GP, etc.)	Change in smoking status according to type of treatment Cost of treatment
	23	Type of treatment/support received after discharge from hospital (e.g. NRT, varenicline, bupropion, behavioural support, e-cigarettes, telephone, face to face support, etc.)	
	24	Was the patient readmitted to hospital for any cause within 30 days of discharge?	Effect on health service use
	25	Was the patient readmitted to hospital for any cause within 12 months of discharge?	
	26	Did the patient die within 12 months of discharge? From any condition From tobacco smoking	Effect on mortality rate

Conclusion

The NHS England Long Term Plan, released in January 2019, signalled a renewed commitment to treating tobacco dependence in the health service. The Plan committed to supporting the national rollout of a tobacco dependence treatment in hospitals by 2023/24, based on OMSC and CURE models. But with fewer than three years to complete the rollout, there is no agreement on how this investment should be evaluated, and what data and outcomes must be recorded to facilitate this process.

We have developed an evaluation framework, by consensus, which we propose may be used as a common set of criteria, for standardising the evaluation of CURE and similar hospital-initiated tobacco dependence interventions across the NHS. The standardised collection and reporting of these data are paramount to effectively evaluate this incoming care model within individual trusts and at scale. Including these items in EHCRs (and consistency in classification) will enable coherent evaluation for treatment of the largest single cause of preventable death and disease in the UK.

Policy implications in light of the results of this study:

1. National specifications and guidance from NHS England will be needed for acute, maternity or mental health NHS Trusts to collect patient-level data to evaluate tobacco dependence treatment started in hospitals, in line with the final 26 item proposed evaluation framework outlined in this report (Table 8).
2. NHS Trusts should ensure they are able to systematically collect and extract patient-level data to evaluate tobacco dependence treatment started in hospitals, consistent with the national specifications and guidelines outlined in Recommendation 1. Additional funding will be required to support this.
3. NHS Trusts should provide education and training for clinical and non-clinical staff to support the delivery of tobacco dependence treatment started in hospitals. This training should include information about the rationale for recording smoking related information and treatment outcomes. Additional funding and guidance will be required to support this.

Next steps

Supporting the implementation of the CURE project:

The study has already helped to identify current gaps in IT systems and EHCRs across the hospitals that participated in the clinical audit. It has highlighted the need to work towards a combined approach across Acute and Primary Care when collecting and analysing data related to smoking status and smoking cessation. Going forward, we will provide each participating hospital and Trust with an individual report that benchmarks their audit results against the results of the other Trusts' combined data. These will be used as part of reflective discussions with hospital teams to support the future implementation of the CURE Project across Greater Manchester.

Supporting national work:

We will share the report and liaise with wider stakeholders (e.g. NHS England and NHS Improvement's Tobacco Addiction Working Group, Public Health England's Tobacco Control team and Action on Smoking and Health). Based on the findings of this study, we would expect to see a similar level of capability within EHCRs in the early implementer sites that have been funded to introduce hospital-initiated tobacco dependence treatment services (and in the wider NHS). This will need to be addressed before the impact of NHS England's and NHS Improvement's investment and ambition of the Long-Term Plan is evaluated.

Appendices

Findings from rapid review of studies evaluating tobacco dependence treatment commenced in a hospital setting (published between Jan 2012 & Oct 2019)

Authors and dates of publication	Identification of smoking status on admission	Smoking outcomes and verifications		Additional outcomes
		Primary	Secondary	
Balmford et al (2014)	Referred: smokers and recent ex-smokers. Eligible: all smokers. Timeframe not reported.	6-month sustained abstinence at 12-month follow-up (smoked <5 cigarettes). Validation: none.	7-day point prevalence abstinence (PPA) at 3,6 and 12-month follow-up. Receipt of dedicated smoking cessation service. Validation: none.	-
Berndt et al (2014)	Eligible: Smoking on average ≥5 CPD (cigarettes per day) in month prior to admission or if not smoking quit smoking <4 weeks prior to admission.	Self-reported continuous abstinence for ≥ 90 days. Validation: none.	7-day PPA Validation: none.	-
Busch et al (2017)	Eligible: smoking ≥3 cigarettes per day (CPD) immediately prior to hospitalisation.	7-day PPA. Validation: Carbon monoxide (CO) reading <10 parts per million (ppm).	Continuous abstinence after discharge measured using timeline follow-back. Time to first lapse and first relapse. Nicotine dependence measured using validated Fagerstrom Test for Nicotine Dependence (FTND).	Depression using validated Patient Health Questionnaire (PHQ-9). Positive and negative symptoms using validated 10 item positive affect negative affect scales. Perceived stress measured using validated Perceived

				Stress Scale.
Carson et al (2014)	Eligible: ≥10 CPD on average over past 12 months.	Effectiveness measured through continuous abstinence <5 cigarettes in total during follow-up periods and 7-day PPA. Validation: sample of participants CO monitoring <10 ppm.	-	Self-reported and observed (through medical records) adverse events. Self-reported levels of craving, anxiety, medication and confidence using Likert type scales.
Das et al (2017)	Eligible: ≥5 CPD prior to hospitalisation.	Tobacco abstinence 3, 6- and 12-month follow-up. Validation: CO monitoring ≤ 10PPM.	-	Abstinence from alcohol/illicit drugs using the Addiction Severity Index. Psychiatric symptoms using validated 24-item Behaviour and Symptom Identification Scale.
Duffy et al (2014)	Smokers identified from electronic medical record. Eligible: smoked within 1 month prior to hospitalisation.	7-day PPA. Validation: urinary cotinine level.	-	-
Duffy et al (2015)	Eligible: self-reported smoked ≥1 cigarette within 1 month prior to hospitalisation.	7-day abstinence at 6 months. Validation: urinary cotinine level <100ng/ml. Nicotine dependence measured using validated FTND.	-	Self-reported receipt of specific interventions received.

Duffy et al (2016)	Smokers identified from electronic medical record. Validation: cotinine test. Eligible: smoked ≥1 cigarette within 1 month prior to hospitalisation.	30-day PPA 5-8 months post-discharge, either self-reported or from electronic medical record. Validation: Urinary cotinine tests.	-	-
Eisenberg et al (2013)	Eligible: smoked ≥10 CPD on average in past year.	Point prevalence (PP) cessation at 12 months (complete abstinence in week prior to 12-month clinic visit). Smoking cessation at weeks 4 and 9 and 6 months. Continuous abstinence at weeks 1, 2 4 and 9 and months 6 and 12. Validation (for all of above): CO ≤10PPM.	CPD. Safety and tolerability of bupropion at weeks 1, 2, 4 and 9 and months 6 and 12 measured using incidence of clinical events and non-dangerous side effects. Nicotine dependence measured using validated FTND.	Depression using validated Beck Depression Inventory.
Eisenberg et al (2016)	Eligible: smoked ≥10 CPD on average in past year.	PPA at 24 weeks. Validation: CO reading ≤10 ppm. 50% reduction CPD.	PPA at weeks 1, 2, 4, 12 and 24. Continuous abstinence at weeks 1, 2, 4, 12 and 24. Validation: CO reading ≤10 ppm. 50% reduction CPD.	Serious adverse events defined according to the International Conference on Harmonization and Good Clinical Practice guidelines. Adherence to study medication and use of non-study cessation medication.
Fellows et al (2016)	Electronic and administrative records. Eligible: smoked within	30-day abstinence at 6 months post randomisation. Validation: salivary cotinine	7-day continuous abstinence at 6-month follow-up. Validation: salivary cotinine	-

	previous 30 days.	level (≤10 ng/mL25) and CO reading (≤5 ppm). Self-reported cessation counselling program and medication utilisation at 6 months.	level (≤10 ng/mL25) and CO reading (≤5 ppm). Self-reported cessation counselling program and medication utilisation at 6 months.	
Gelkopf et al (2012)	Eligible: Self-reported ≥7 CPD for at least 6 months before study period.	Self-reported cigarettes smoked weekly.	Nicotine dependence: measured using FTQ for nicotine dependence (FTND).	Weight assessed weekly. Clinical status using validated PANSS and Clinical Global Impression Scale for Psychosis and Hamilton Rating Scale for Depression. Subjective quality of life measured using quality of life enjoyment and satisfaction questionnaire (Q-LES-Q-18).
Kathleen et al (2016)	Eligible: smoked ≥1 cigarette in previous 30 days.	30-day PPA at 6 months post-discharge. Validation: sample of participants' cotinine levels r10 ng/mL.	Nonquitters' smoking intensity during previous 30 days. Self-report tobacco and cessation aid use at 6-month follow-up.	Cost of intervention calculated by staff time and material costs. Self-reported quality of life. Participant engagement using website's administrative portal.
Lasser et al (2013)	Screened by researcher using survey. Eligible: smoked cigarettes in past week.	Stages of change to smoking cessation and satisfaction with navigator at 3 months.	-	Measures of feasibility through treatment engagement (completion of ≥ 1 quit line counselling session) or ≥ 1 PCP visit in which smoking cessation

				treatment was discussed or completion of ≥ 1 session of a BMC smoking cessation group as recorded on their medical record. Recruitment and retention as measured by number of participants navigator reached, time spent with participants and number of calls and home visits.
Levy et al (2018)	Eligible: Smoked ≥1 CPD when smoking normally in the month prior to admission.	-	-	Health Related Quality of Life (HRQoL) measured using. Single item global health measure (SFI), 4-tem PHQ for depression and anxiety (PHQ-4) at 1, 3- and 6-month post-discharge and 5-item EQ-5D-5L health utilities scale at 6-month follow-up.
Metse et al (2017)	Eligible: smoked any number of cigarettes in month prior to admission.	7-day PPA 6- and 12-months post hospital discharge. 1-month prolonged abstinence 6- and 12-months post hospital discharge. Validation: CO monitoring <7PPM.	CPD. Reduction in cigarettes smoked relative to baseline. Quit attempts (24hr abstinence). Nicotine dependence measured using FTND. Readiness to quit measured using (Readiness and	-

			Motivation to Quit Smoking Questionnaire).	
Nahhas et al (2016)	Eligible: Smoked within 30 days of admission	Self-reported smoking abstinence one month after discharge Number who received bedside counselling or opted out Number reached by phone post discharge		-
Ng et al (2018)	Eligible: Smoked >1 cigarette in previous month and 100 in lifetime.	Nicotine dependence measured using validated FTND. Validation: CO monitoring.	Self-efficacy of smoking abstinence measured using the Smoking Abstinence Self-Efficacy Questionnaire (SASEQ).	Functional independence measured using the Functional Independence Measure (FIM). Depression using validated Patient Health Questionnaire (PHQ-2). Health professional attitudes to determine their smoking behaviour, attitudes and knowledge towards improving smoking cessation care (self-report through questionnaire). Adverse events.
Ostroff et al (2014)	Eligible: ≥8 CPD within past 7 week.	7-day PPA at 6 months post-hospitalisation.	24hr PPA at hospital admission. 7-day PPA at 3 months post-hospitalisation.	-

			Validation of all 7-day PPA: saliva cotinine levels < 15ng/ml. Validation of 24-hr PPA: CO monitoring <10PPM. Self-reported CPD and recent changes in smoking rate.	
Pathak et al (2013)	Eligible: Smoked ≥ 1 pack of CPD. Time frame not specified.	Packs of cigarettes smoked p/d.		Worst daily mean arterial pressure; heart rate. use of vasopressors, sedatives and analgesics during ICU stay after the application of each patch. Use and duration of mechanical ventilation and ICU stay. Note. methods of recording were not stated.
Prochaska et al (2014)	Smokers were screened from medical record. Eligible: ≥ 5 CPD. Time frame not specified.	7-day abstinence at 3, 6, 12- & 18-month follow-ups. Validation: CO reading ≤10 ppm.	-	Rehospitalisation for psychiatric illness at 3, 6, 12- & 18-month follow-ups.
Richter et al (2016)	Eligible: Smoked cigarettes in past 30 days.	Enrolment in Quitline. 7-day abstinence at 1 and 6 months, also included proxy verification. Validation: salivary cotinine	Number and timing of Quitline calls provided by patient self-report and from Quitline service. Medication use recorded on prescription and patient self-	-

		≤15 ng/mL, those taking NRT provided CO reading ≤10 PPM.	report.	
Rigotti et al (2016)	Smoking status documented on electronical medical record. Eligible: smoked ≥1 CPD month prior to admission.	7-day tobacco abstinence 6 months post-discharge. Validation: saliva cotinine ≤10 ng/mL but those using e-cigarettes provided CO reading (<9PPM).	7-day PPA. Continuous abstinence at 1, 3 and 6 months and duration of post-discharge tobacco abstinence. Self-reported post-discharge treatment including pharmacotherapy or counselling.	-
Rigotti et al (2017)	Current daily smokers (as identified from Rigotti et al 2016).	Past 7-day tobacco abstinence. Validation: saliva cotinine ≤10 ng/ml or CO < 9PPM.		Satisfaction with intervention as measured through 2 closed questions on Likert type scale and one open ended question. Number of Interactive voice response (IVR) calls measured using records from the IVR provider.
Rogers et al (2017)	Nurse assessment at admission. Eligible: smoked during past 30 days.	30-day abstinence at 2 and 6 months. Validation: none.	CPD at 6 months. Quit attempts at 6 months. Utilisation of cessation medications and proportion of patients who completed at least 1 counselling call provided by Quitline records.	-

Ruther et al (2014)	Eligible: smokers with score ≥ 1 on FTND at baseline.	Nicotine dependence measured using validated FTND. CPD. Self-reported motivation to quit using Likert type scale. Validation: CO reading.	-	Program feasibility self-reported by instructors on Likert type scale. Patient acceptability rated by patients at discharge using Likert type scale.
Schulte et al (2016)	Smokers screened from medical record; current smokers were defined as smoking >9 CPD on average for last 6 months prior to admission.	Nicotine dependence measured using validated FTND. CPD. Self-reported motivation to quit using Likert type scale. Validation: CO reading.	-	Program feasibility self-reported by instructors on Likert type scale. Patient acceptability rated by patients at discharge using Likert type scale.
Sherman et al (2016)	Daily smokers documented electronic medical record. Eligible: smoking ≤30 days.	30-day PPA at 6-month follow-up. Validation: salivary cotinine level for sample of participants.	-	-
Slattery et al (2016)	Recorded as smoker in electronic record. Classified as nicotine dependent if smoked >10 CPD or >160 packs per year or >3 packs per week, or recorded as heavy smoker in medical record, or smoked ≤30 mins of waking up.	Quit advice recorded on their electronic medical record. NRT. Offer of inpatient/discharge NRT recorded in medical record/discharge summary of patient. Provision of	-	-

		inpatient/discharge NRT recorded in medication list or medical record/discharge summary. Quitline referral. Offer of referral to Quitline recorded in medical record/discharge summary. Acceptance referral recorded in medical record/discharge summary of patient accepting.		
Tague et al (2017)	Hospital staff screened for smoking status. Eligible: smoked ≥25 of past 30 days.	Self-reported type and duration of use of post-discharge cessation therapy. Self-reported adherence to stop-smoking pharmacotherapy.	-	-
Thomas et al (2016)	Eligible: Self-reported >1 Cigarette in previous week.	1-month sustained abstinence at 6 months post-discharge. 6 month sustained abstinence at 12 months post-discharge. Validation: CO monitoring ≤ 6PPM.	Self-reported continuous abstinence at 1, 6 and 12 months. Reducing tobacco smoking by 50%. Use of pharmacotherapy or other cessation treatments after discharge. Satisfaction with smoking cessation services measured using 5-point Likert type	-

			scale.	
Vamder weg et al (2017)	Eligible: >1 CPD. Time frame not reported.	7-day PPA at 6-months. Validation: saliva cotinine level <20ng/ml.	Self-reported 30-day PPA at 3 and 6 months. Self-reported tobacco and NRT use in preceding 7 days. Self-reported quit attempts lasting ≥25 h. CPD. Smoking at 3 and 6 months. Readiness to quit smoking measured using validated Contemplation Ladder. Self-efficacy to quit smoking using validated 12-item version of smoking self-efficacy and temptation questionnaire (SSEQ).	-
Warner et al (2016)	Recorded by nurse, screened electronic medical record. Eligible: >100 cigarettes lifetime consumption and history of smoking any cigarettes in prior week.	7-day PPA and continuous abstinence at 7 days after enrolment, 30 days and 6 months after hospital discharge. Validation: at 6-month assessment provided urine cotinine specimen <2 ng/mL.	-	Quitline utilisation measured using Quitline records, including number and duration of calls. Self-reported experience and satisfaction with Quitline services.
Wong et al (2012)	CO reading of ≥10PPM or urinary cotinine levels >100ng/ml.	7-day PPA at 12 months.	Abstinence on target quit day and 7-day PPA at 3 and 6 months after target quit date.	-

			Validation of abstinence: CO reading and urinary cotinine. Self-reported changes in CPD. Nicotine dependence measured using validated scale FTND. Stages of change to determine readiness to stop smoking at 3, 6 and 12 months measured using adapted version of validated Prochaska (2014) and DiClemente's stages of change questionnaire.	
Ylioja et al (2017)	Documented in medical record; daily smokers (smoked ≥ 1 cigarette/day in the past month when smoking in their usual pattern).	Past 7-day tobacco cessation at 6 months post-discharge. Validated: saliva cotinine levels of CO reading are still using NRT.	-	-

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