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# BMJ Open Understanding the implementation strategy of a secondary care tobacco addiction treatment pathway (the CURE project) in England: a strategic behavioural analysis

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## ABSTRACT

**Objectives** The Conversation, Understand, Replace, Experts and evidence-based treatment (CURE) project implemented an evidence-based intervention that offers a combination of pharmacotherapy and behavioural support to tobacco-dependent inpatients. Understanding key characteristics of CURE's implementation strategy, and identifying areas for improvement, is important to support the roll-out of nationwide tobacco dependence services. This study aimed to (1) specify key characteristics of CURE's exiting implementation strategy and (2) develop theoretical-informed and stakeholder-informed recommendations to optimise wider roll-out.

**Design and methods** Data were collected via document review and secondary analysis of interviews with 10 healthcare professionals of a UK hospital. Intervention content was specified through behaviour change techniques (BCTs) and intervention functions within the Behaviour Change Wheel. A logic model was developed to specify CURE's implementation strategy and its mechanisms of impact. We explored the extent to which BCTs and intervention functions addressed the key theoretical domains influencing implementation using prespecified matrices. The development of recommendations was conducted over a two-round Delphi exercise.

**Results** We identified six key theoretical domains of influences: 'environmental context and resources', 'goals', 'social professional role and identity', 'social influences', 'reinforcement' and 'skills'. The behavioural analysis identified 26 BCTs, 4 intervention functions and 4 policy categories present within the implementation strategy. The implementation strategy included half the relevant intervention functions and BCTs to target theoretical domains influencing CURE implementation, with many BCTs focusing on shaping knowledge. Recommendations to optimise content were developed following stakeholder engagement.

**Conclusions** CURE offers a strong foundation from which a tobacco dependence treatment model can be developed in England. The exiting strategy could be strengthened via the inclusion of more theoretically congruent BCTs, particularly relating to 'environmental context and

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study is the first to qualitatively explore behavioural factors underpinning the implementation of the Conversation, Understand, Replace, Experts and evidence-based treatment (CURE) project.
- ⇒ The behavioural analysis, and subsequent stakeholder involvement, has resulted in tailored, practical recommendations for optimisation of future tobacco dependence services, which facilitate efficient translation of findings into policy and practice.
- ⇒ Due to its early phase of roll-out, our recommendations have been developed from implementation within a single UK hospital implementing CURE, therefore generalisability of findings to other contexts may be limited.
- ⇒ Feedback was not gathered from patients or members of the public, therefore the barriers and facilitators of implementation and the stakeholder-informed recommendations are limited to the views of those commissioning, delivering and implementing CURE.

resources'. The recommendations provide routes to optimisation that are both theoretically grounded and stakeholder informed. Future research should assess the feasibility/acceptability of these recommendations in the wider secondary-care context.

## INTRODUCTION

The government NHS Long Term Plan<sup>1</sup> has outlined a commitment to offer National Health Service (NHS)-funded tobacco treatment services to all those admitted to hospital by 2023/2024. However, the most recent National Smoking Cessation Audit Report from the British Thoracic Society<sup>2</sup> suggests that adherence to national smoking cessation standards remain poor. For example, despite the expected standard being 100%, only 77% of inpatients had their smoking

status recorded. Of those who smoked, just 44% were asked if they would like to quit smoking; and of those who were referred for smoking cessation support, just 16% were referred to hospital-based services (with a further 8% referred to community-based services). In addition to this, only 31% of the smokers were offered nicotine replacement therapy (NRT). As a result, the report set national improvement objectives to support and offer NRT to all inpatient smokers, and to provide further support and training to hospital staff to ensure that they are able to implement tobacco dependence treatment into their everyday practice.

Hospitalisation provides a unique opportunity to identify and engage smokers, initiate cessation treatments and facilitate appropriate follow-up and support for them.<sup>3 4</sup> Intensive smoking cessation interventions that begin in hospital and include pharmacotherapy, counselling and post-discharge support for  $\geq 1$  month, increase the likelihood of smoking abstinence (risk ratio 1.37, 95% CI 1.27 to 1.48; 25 studies) compared with hospital-only interventions with no follow-up.<sup>4</sup>

The Ottawa Model for Smoking Cessation (OMSC), initially implemented in Canada, aims to increase the rate at which smoking cessation support is offered to all smokers within secondary care (ie, hospital settings).<sup>5 6</sup> The OMSC provides a systematic approach to screening all inpatients for smoking status, with those who smoke offered a combination of pharmacotherapy and behavioural support. Patients are then attached to ongoing community stop-smoking support post-discharge.<sup>7</sup> The OMSC model was found to have positive outcomes in increased smoking abstinence at 6 months, reduced all-cause re-admissions at 30 days and 1 year and reduced mortality at 1 year when compared with a control group receiving usual care.<sup>7</sup>

The positive outcomes observed in Canada led to the development of the Conversation, Understand, Replace, Experts and evidence-based treatments (CURE) and has recently been piloted within an NHS trust in the North West of England.<sup>8</sup> Importantly, CURE aims to increase awareness about the medicalisation of tobacco dependence and encourage clinicians in offering smoking cessation care to all inpatient smokers. Similar to the OMSC, the CURE project aims to improve smoking outcomes by providing combination of pharmacotherapy (eg, NRT, varenicline) and behavioural support to patients, as well as post-discharge care at 2, 4 and 12 weeks. The CURE implementation intervention includes various strategies designed to change behaviours at organisational, practitioner or patient levels and to enhance the adoption of a clinical innovation.<sup>9</sup> Examples of implementation strategies include outreach activities, in-house training, audit and feedback and computer prompts.

Evaluation of the CURE pilot (October 2018 to March 2019) showed that 92% of all adult admissions (total admissions: 14 690) were screened for smoking status<sup>10</sup> with a cost per quit of £475.<sup>11</sup> More importantly, the evaluation demonstrated a positive patient impact; out of 2293 patients identified as current smokers, 96% were

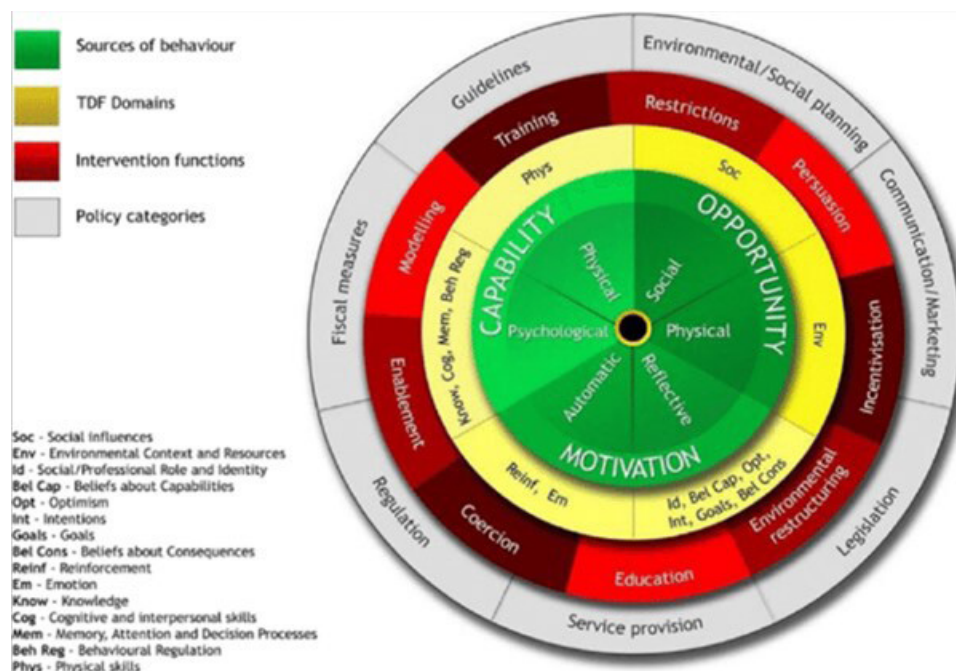
provided with brief advice, 61% accepted and completed a specialist behavioural support, 66% were prescribed pharmacotherapy (eg, NRT, varenicline) to support quit attempts and 22% were abstinent at 3 months post-discharge.<sup>10</sup> These findings suggest that the model may be useful in assisting clinicians' behaviour change when compared with national audit data. It would therefore be valuable to determine how the CURE project was delivered in practice. This knowledge would support recommendations for a national specification model, based on the OMSC and CURE, for further testing and piloting.<sup>1</sup>

To maximise the potential benefits of CURE, there is a need to understand the implementation process of this evidence-based smoking cessation intervention in routine secondary care. Several theoretical approaches (ie, theories, models, frameworks) can be used to provide a better understanding and explanation of how and why implementation succeeds or fails.<sup>12 13</sup> For instance, the Theoretical Domains Framework (TDF) represents an approach to understand what determinants are hypothesised to influence implementation outcomes, (eg, healthcare practitioners' adoption of an evidence-based patient intervention).<sup>13 14</sup> The TDF summarises 14 broad domains relevant to changing behaviour, 'knowledge', 'beliefs about consequences', 'beliefs about capabilities', 'skills', 'environmental context and resources', 'social influences', 'memory, attention and decision processes', 'behavioural regulation', 'emotion', 'social or professional role/identity', 'optimism', 'intentions', 'goals' and 'reinforcement'.<sup>15 16</sup>

Another theoretical approach to explain the causal mechanisms of implementation is the COM-B (Capability, Opportunity, Motivation and Behaviour) model, which suggests behaviour is a function of physical and psychological capability, physical and social opportunity and automatic and reflective motivation. The COM-B model sits at the hub of the Behaviour Change Wheel (BCW) (see figure 1),<sup>14 17</sup> a well-established guide, applied to health services research, to provide a systematic approach to identifying intervention content and specifying mechanisms of action (ie, how interventions elicit behaviour change).<sup>14</sup> The wheel comprises three main 'layers': (1) sources of behaviour (ie, the COM-B model), (2) nine intervention functions (ie, means by which behaviour can be changed) and (3) policy categories (ie, that may support delivery of intervention functions) (p.17).<sup>14</sup>

When aiming to understand how behaviour may be changed and/or may specify implementation content, the intervention functions within the BCW can be linked to specific behaviour change techniques (BCTs), which are defined as 'an active component of an intervention designed to change behaviour'. BCTs have been associated with many types of behaviour which have been brought together to form an international BCT Taxonomy V.1 with 93 BCTs.<sup>18</sup>

Theoretical approaches such as BCW, the COM-B model (figure 1), the TDF and the BCT Taxonomy (BCTTv1), may be applied in conjunction with one another to



**Figure 1** Visual representation of the Behaviour Change Wheel.<sup>14</sup> TDF, Theoretical Domains Framework.

understand the implementation process, identify implementation strategy content and to explore barriers to and facilitators of behaviour. Prior research has successfully integrated these theoretical approaches to explore determinants influencing the implementation process of evidence-based practice in healthcare.<sup>16 19</sup>

When planning implementation, developing a logic model of links between implementation strategies, mechanisms and outcomes is crucial.<sup>20</sup> The BCW facilitates the specification of outcomes, determinants, change objectives and intervention, and it thereby enables intervention developers to map specific BCTs to behavioural determinants.<sup>17</sup>

Informed by the BCW,<sup>14</sup> the present study aimed to describe the core elements of the CURE implementation strategy in the pilot site, particularly the activities directed at promoting behaviour change in healthcare practitioners and wider organisational implementation strategies (organisational/professional level).

The specific objectives of this study were to:

1. Describe the content of CURE's implementation strategy, using BCW functions, policy categories and the BCTTv1.<sup>21</sup>
2. Characterise the intervention in a logic model to clarify causal assumptions and mechanism of impact using the Medical Research Council (MRC) guidance.<sup>21</sup>
3. Explore to what extent the barriers and facilitators of CURE implementation are addressed by existing implementation strategy components.
4. Develop recommendations to optimise the future implementation of CURE.

This work is a first step in designing a successful theoretical-informed implementation strategy for wider, national roll-out. This work was conducted alongside a

TDF-based, qualitative study which explored the barriers and facilitators of CURE implementation and delivery, from the perspective of healthcare professionals engaged in the project pilot.<sup>22</sup>

## METHODS

We undertook a systematic, theoretically-guided approach to specify the content and possible mechanisms of action and impact of the implementation strategy of CURE. This process has previously been coined as 'strategic behavioural analysis'.<sup>19</sup> We have employed the use of the StaRI (Standards for Reporting Implementation Studies) as our reporting standard.<sup>23</sup>

## Setting and participants

The pilot site is a major acute teaching hospital with approximately 900 beds and 27500 inpatient admissions per year (excluding maternity, paediatrics, Accident & Emergency (A&E) admissions and Intensive Care Unit), providing both district general hospital services and specialist tertiary services. Tertiary services include cardiology, cardiothoracic surgery, heart and lung transplantation, respiratory conditions, burns and plastics, cancer and breast care services. The smoking prevalence included in the pilot site was modelled based on 20% of inpatient admissions (approximately 5500 smokers per year).

At admission, the admitting clinicians (doctor or nurse) were responsible for recording smoking status, assessing level of addiction and offering initial rapid treatment. A CURE specialist team would then perform a visit, review all smokers admitted (opt-out service) and complete specialist assessment, update treatment plan and plan for



discharge (eg, refer to community service). For the pilot study, the implementation plan modelled the need for five specialist CURE nurses to deliver the specialist assessment, treatment planning and follow-up for all smokers admitted as inpatients.

### Patient and public involvement

As this study focused on healthcare professionals' behaviour change, no patients or members of the public were involved.

### Procedure and sources of data

To collect data on the implementation strategy content, we used two different methods:

1. *Document analysis.* Researchers read and re-read training materials (ie, training manual, training poster, teaching slides, level 1 and 2 eLearning modules, Steering Group Terms of Reference) and the CURE project webpage (available from <https://thecureproject.co.uk/>) describing implementation strategy content, including the training materials, practice tools, promotional/educational materials and smoke-free policy. We (AMR, AH and AW; health psychology specialists) reviewed and appraised documentation by systematically mapping information against the Template for Intervention Description and Replication (TIDieR)<sup>24</sup> and the BCW components, including BCTs, intervention functions and policy categories.<sup>14</sup> This information was also used to develop an initial logic model.
2. *Semi-structured interviews.* We conducted secondary analysis of semi-structured interview data with 10 purposively sampled healthcare professionals, who were involved in the implementation and delivery of the CURE evidence-based intervention (reported in full elsewhere; 22). Participants spanned core CURE management (n=2) and specialist nursing staff (n=3), pharmacy (n=1), primary care (n=1) and public health (n=3). Interview topic guides were informed by TDF domains and asked participants to discuss barriers and facilitators to implementing the CURE project pilot and detail implementation strategy content (ie, describing what was delivered, with what aim, how much, to whom and by whom). All interviews were digitally recorded, transcribed verbatim and analysed using the Framework Method.<sup>25</sup> Data from interviews were also used to revise the logic model.

### Data analysis

#### Step 1—implementation strategy content analysis

Using the TIDieR framework,<sup>24</sup> we created a broad outline of the implementation strategy that included the content delivered, to whom and by whom, why, by what mode of delivery, how often, where, when and how much, tailoring, modifications and fidelity. Data from all data sources were used. Data collected from both the document analysis and interviews were coded for implementation strategy content (AMR, AH and AW) using existing coding frameworks provided by the BCW guide<sup>14</sup>; appendix 4 (p.259

of the guide) for BCTs, table 2.1,<sup>14</sup> (p.111 of the guide) to code intervention functions and table 2.7,<sup>14</sup> (p.135 of the guide) to code policy categories. Any discrepancies in coding were resolved via consensus discussion.

#### Step 2—mechanisms of impact (logic model)

Following the guidance on developing logic models in process evaluations of complex interventions, issued by the MRC,<sup>21</sup> we developed a logic model by reviewing the CURE documentation and service specification (<https://thecureproject.co.uk/>), current evidence,<sup>7 8 26</sup> and theoretical understandings of both the evidence-based intervention and the implementation strategy as suggested in the TiDIER guidelines. Public Health England liaised with the CURE project team (via email) who provided additional documentation (pathway mapping workshop slides, early evaluation options, inpatient numbers and time commitments for specialist nurses, communications plan, Tobacco Addiction Service data) to further inform the logic model. An initial logic model was reviewed and updated based on findings from the qualitative interviews and behavioural analysis demonstrating the intended mechanisms of impact (initial model) versus actual mechanisms of impact, that is, what was delivered in practice (revised model).

#### Step 3—identifying opportunities for optimisation

In line with previous research,<sup>19 27</sup> the following mapping exercise was conducted in order to explore the extent to which barriers and facilitators of CURE implementation<sup>22</sup> were addressed by existing implementation strategy components, and to identify any missed opportunities for further design:

1. A concurrent qualitative study<sup>22</sup> reported eight key TDF domains that influenced CURE implementation (see online supplemental file 1 for a summary of these findings). To identify key domains influencing the implementation of CURE, we ranked these previously reported TDF/COM-B domains using established criteria: frequency (number of transcripts in which a domain occurred), elaboration (number of themes within a domain) and evidence of conflicting statements within domains (eg, if some participants report lack of specific skills whereas others report having the relevant skills).<sup>28–30</sup> All of these factors were considered concurrently in establishing domain relevance. This process was facilitated through consensus discussion between the two researchers (AMR and AW) and supported by a third researcher to resolve any discrepancies (AH).
2. The outputs of the key domains and content analysis stages were combined by mapping the identified influences to the identified BCT and intervention functions of the CURE implementation strategy. This was achieved by combining two available matrices that map the TDF to the BCTTv1<sup>31 32</sup> and the Theory and Techniques Tool (<https://theoryandtechniquetool.humanbehaviourchange.org/>) as was developed for previous

- research.<sup>19</sup> This analysis investigated the level of theoretical congruence between implementation strategy components of CURE and the qualitative data on barriers and facilitators influencing its implementation.
3. The level of theoretical congruence between influences on behaviour (TDF domains) and implementation strategy content to change behaviour (BCTs) was achieved by analysing the extent to which the BCTs identified in the CURE implementation strategy targeted the key TDF domains (identified in the qualitative data). Each BCT identified was coded as either low congruence (did not target any key domain), medium congruence (targeted at least one key domain) or high congruence (targeted two or more key domains).<sup>19</sup>
  4. The mapping exercise was repeated for intervention functions and policy categories, by consulting the matrices mapping BCW against COM-B/TDF<sup>14</sup> to identify the extent to which functions (matrix on p. 116) and policy categories (matrix on p. 138) in the CURE implementation strategy targeted key factors influencing the implementation process, and what additional intervention functions and policies may address barriers/facilitators within the key domains. The following definitions were applied:
    - a. Opportunity seized—instances where a theoretically congruent intervention function/policy category (according to the matrices) was identified in the existing CURE implementation strategy at least once.
    - b. Missed opportunity—instances where the theoretically congruent intervention function/policy category was not identified in the existing CURE implementation strategy.

#### Step 4—development of recommendations to support future implementation

Following steps 1–3, the research team used the findings from the qualitative interviews and strategic behavioural analysis to draft a list of practical recommendations to strengthen implementation strategy content (ie, content likely to encourage healthcare professional behaviour change and support implementation of a secondary care-based tobacco dependence treatment model). These recommendations included example strategies to deliver BCTs relevant to the key TDF domains. To enhance the suitability and acceptability of these recommendations, a Delphi study was conducted by collecting data from a panel of six experts until consensus was reached.<sup>33</sup> Experts included the CURE management team, PHE Programme Managers (eg, Tobacco Control and NHS Long Plan) and NHS England representatives. The six experts independently rated whether each recommendation was affordable, practical, effective, acceptable, safe and equitable (the APEASE criteria),<sup>14</sup> on a dichotomous scale of yes,<sup>1</sup> no/uncertain (0) for each criteria. This gave a total possible score of 36 for each recommendation. These ratings were then used to structure and encourage discussion surrounding uncertainties and potential modifications during a collaborative, stakeholder workshop. A

total of 11 stakeholders participated in the stakeholder workshop. Participants included two members of the research team (one workshop facilitator and one scribe), two members of the CURE management team, four PHE Programme Managers (eg, Tobacco Control and NHS Long Plan), one representative from NHS England and two consultants. Workshop feedback was incorporated into a refined recommendations table, which was then circulated via email for further stakeholder comment and review. This process resulted in the final list of recommendations.

## RESULTS

### Step 1—implementation strategy content

Table 1 summarises the content of the implementation strategy, using the TIDieR framework. The following broad components of CURE implementation strategy were identified: staff training, practice tools, reminder systems, educational outreach visits, audit and feedback, primary care incentives, use of a steering group, branding materials, clinician implementation team meetings to promote reflective discussion, provision of local technical assistance (eg, admin support), promotion of network weaving (eg, information sharing), physical environment changes (eg, consultation facilities) and a triage system.

Through content coding we identified 26 BCTs (ie, ‘active components’), 5 intervention functions and 4 policy categories. Further details of these activities, BCTs, intervention functions and policy categories can be found in table 2.

### Step 2—mechanisms of impact (logic model)

The initial model is presented in figure 2. The original logic model, based on the CURE implementation strategy, shows all patients who are admitted to hospital should be asked whether they smoke, and their response should be recorded in the hospitals’ electronic patients records. All smokers should be offered immediate NRT and specialist support through motivational interviewing and behavioural change support as well as access to additional evidence-based pharmacotherapy treatments for tobacco addiction. All smokers should be offered further appointments with a specialist team after discharge from hospital to continue their support.

The logic model was reviewed and updated iteratively based on findings from the qualitative interviews and behavioural analysis. The final model is presented in figure 3. The final logic model contains further facilitators identified as important by key stakeholders (eg, funding, tobacco policy, nurse champion) as well as clarification of the meaning of an adequately resourced and staffed implementation strategy (eg, office space, clerical support, phone/computer access). Other local stakeholders essential to the smooth implementation and delivery of CURE were also added to the revised model (eg, Clinical Commissioning Group; Local Medical Committee (LMC); local General practitioner) as well as

**Table 1** TIDieR table for the CURE project implementation strategy in the pilot site

TIDieR checklist item	CURE project implementation intervention
What	<p>The primary focus of the CURE project implementation strategy is to:</p> <ul style="list-style-type: none"> <li>– Implement systematic screening of all hospital admissions for smoking status.</li> <li>– Implement an automated opt-out referral process to a specialist tobacco addiction treatment team for active smokers.</li> <li>– Train the medical workforce to have the competence and confidence to discuss and initiate the treatment for tobacco addiction with smokers.</li> <li>– Provide a standardised assessment and treatment pathway for smokers admitted to secondary care.</li> <li>– Provide an appropriately resourced specialist nurse team to see all smokers admitted to secondary care and design individualised treatment plans including beyond discharge.</li> <li>– Promote standardised and robust handover of treatment plan to primary care on discharge.</li> <li>– Promote culture change within secondary care to embed the treatment of tobacco addiction into all medical teams' day-to-day practice.</li> <li>– Provide IT systems to support the delivery of this programme.</li> </ul>
Who delivered	<p>Two eLearning modules developed by the CURE project team and dynamic to fit the needs of the gaps in knowledge for staff in the hospital as well as the new treatment pathway.</p> <p>Bespoke face-to-face teaching sessions delivered by clinical lead, nurse lead and project manager (induction, departmental teaching, grand rounds, ward walk-arounds, educational resources).</p>
How	<p>Two eLearning modules developed and promoted by internal communications/education teams prior to formal launch of CURE project.</p> <p>Specialist nurse training manual developed to support the CURE nursing team in their role.</p> <p>Posters, screensavers, flyers, ID badge foldout prescribing protocol created to promote project and key elements of the pathway.</p> <p>Bespoke teaching sessions (induction, departmental teaching, grand rounds, ward walk-arounds, educational resources).</p>
Where	<p>Online training.</p> <p>Face-to-face training sessions.</p> <p>Slots on existing educational training sessions for doctors and nurses.</p> <p>Hospital setting.</p>
When and how much	<p>ELearning module launched September 2018—1 month prior to launch to give time to embed.</p> <p>Face-to-face training/updates given over 3–4 months before and after launch of the CURE project in October 2018.</p>
Tailoring	No tailoring.
Fidelity	No fidelity checks.
CURE project, Conversation, Understand, Replace, Expert and evidence-based treatment project; IT, information technology; TIDieR, Template for Intervention Description and Replication.	

barriers to successful implementation and delivery (eg, staff turnover, staff confidence, paperwork). While a structured protocol and treatment pathway was an important facilitator, the final model includes more detail regarding the potential variety of patient journeys and the role of hospital pharmacy. The importance of patient choice was added to the final model, because it was highlighted as important to both choices of NRT and of the discharge pathways. However, there were many challenges to implementing many of the pathways as intended. This tension between primary and secondary care was highlighted in the final model.

### Step 3—identifying opportunities for optimisation

Previously identified TDF/COM-B domains influencing implementation are summarised in online supplemental file 1. Considering the frequency, elaboration of the domains and evidence of conflict, the following six domains were considered the key domains of influence

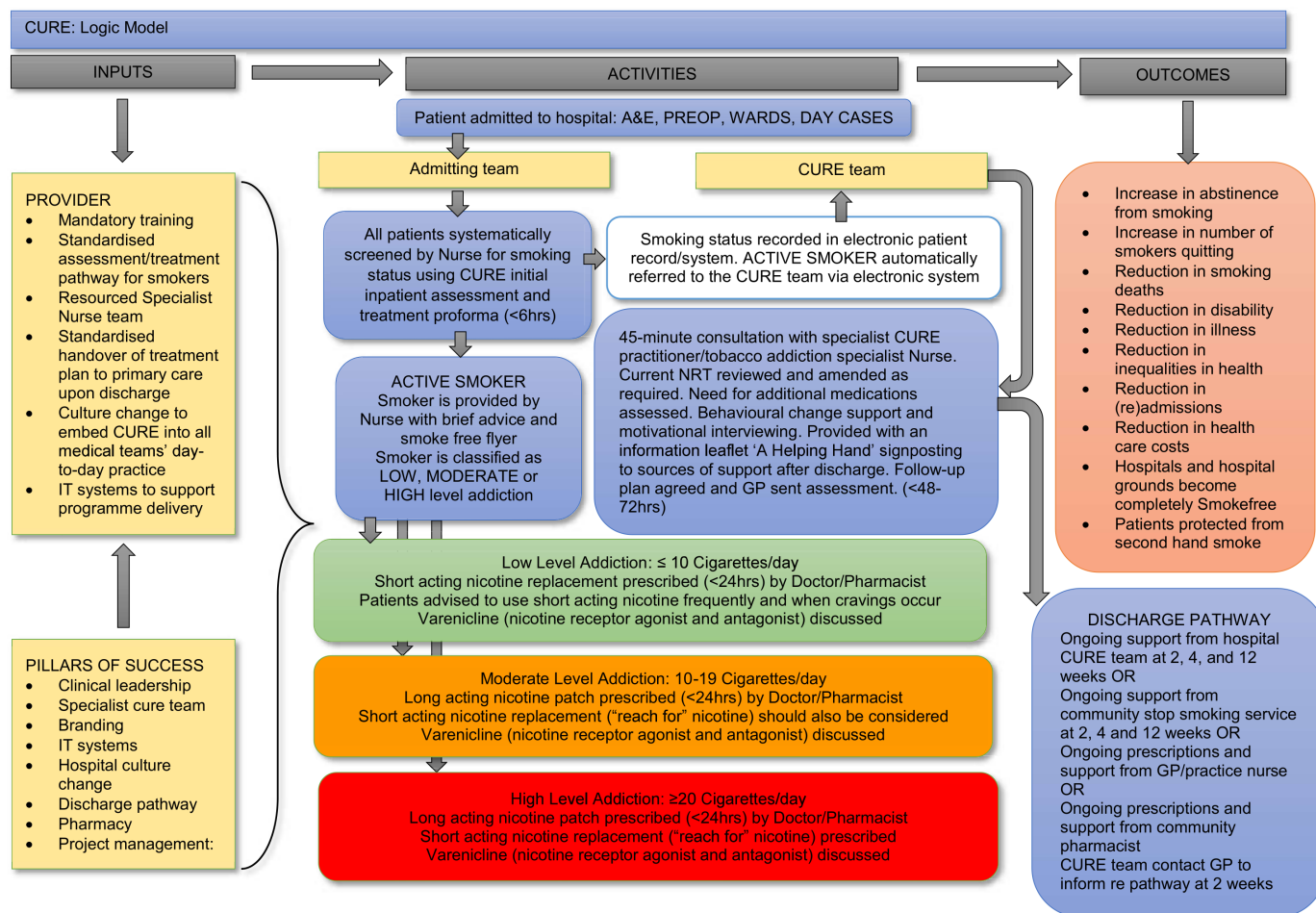
relating to the implementation strategy; (i) Environmental Context and Resources (Physical Opportunity; eg, integration with the wider healthcare context, staffing resources, hospital delivery environment, availability of CURE-related knowledge and training, CURE branding and flexibility of the service specification), (ii) Goals (Reflective Motivation; eg, promoting CURE, adhering to a CURE service specification, identifying and evaluating outcomes), (iii) Social Influences (Social Opportunity; eg, peer support, CURE champions, organisational culture change), (iv) Reinforcement (Automatic Motivation; eg, reflection on intrinsic rewards related to CURE involvement and delivery), (v) Social Professional Role and Identity (Reflective Motivation; eg, commitment to patient choice, acceptance of responsibility for delivering tobacco dependence treatment) and (vi) Skills (Psychological Capability and Physical Capability; eg, previous experience and skills supporting smoking cessation

**Table 2** BCTs, intervention functions and policy categories identified in CURE

Activities and intervention strategies	Source of information	Behaviour change techniques	Intervention functions	Policy categories
HCP training (ie, training manual, training poster, teaching slides, Level 1 and Level 2 eLearning modules)	Document analysis	Action planning; monitoring of behaviour by others without feedback; monitoring outcome(s) of behaviour by others without feedback; instruction on how to perform the behaviour; information about antecedents; information about health consequences; salience of consequences; information about social and environmental consequences; information about emotional consequences; demonstration of the behaviour; credible source; verbal persuasion about capability.	Education Training Modelling Enablement Persuasion	Service provision Guidelines Communication/ marketing Environmental/social planning
Other features of HCP training (ie, shadowing, observation of new staff, repetition of training, lunchtime training sessions, certificate on completion of training)	Interviews only	Monitoring of behaviour by others without feedback; social support (practical); social support (emotional); demonstration of the behaviour; behavioural practice/rehearsal; credible source; reward (outcome).	Education Training Modelling Enablement Persuasion	
Practice tools (eg, assessment forms, prescribing protocols, NRT products for demonstration)	Document analysis; interviews	Goal setting (behaviour); action planning; instruction on how to perform the behaviour; adding objects to the environment	Education Enablement Training Environmental restructuring	
Reminder systems (eg, lanyard card, IT systems)	Document analysis; interviews	Prompts/cues; adding objects to the environment	Education Environmental restructuring	
Educational outreach visits (inclusive of both senior management and the wider healthcare team/staff)	Interviews only	Social support (practical); instruction on how to perform the behaviour; information about health consequences; information about social and environmental consequences; demonstration of the behaviour; credible source	Education Enablement Modelling Persuasion	
Ongoing audit and feedback	Interviews only	Review outcome goal(s); feedback on behaviour; feedback on outcome(s) of behaviour; social support (unspecified)	Education Enablement Persuasion Incentivisation Training	
GP financial incentives (ie, discharge pathway in primary care)	Interviews only	Cue signalling reward; material incentive (behaviour)	Incentivisation Environmental restructuring	
Steering groups meetings	Document analysis; interviews only	Monitoring of behaviour by others without feedback; monitoring outcome(s) of behaviour by others without feedback; restructuring the social environment	Education Enablement Environmental restructuring	
Branding and educational tools (eg, posters, website, eLearning modules, pens, media campaign)	Document analysis; interviews	Prompts/cues; adding objects to the environment	Environmental restructuring	
Reflective discussions	Interviews only	Social support (unspecified); restructuring the social environment	Enablement Environmental restructuring	
Information sharing	Interviews only	Social support (practical); information about social and environmental consequences; restructuring the physical environment	Education Persuasion Enablement Environmental restructuring	
Admin Support	Interviews only	Restructuring the social environment	Enablement Environmental restructuring	
Consultation facilities	Interviews only	Restructuring the physical environment	Environmental restructuring	
Triaging system	Interviews only	Restructuring the physical environment	Environmental restructuring	

BCTs, behaviour change techniques; CURE, Conversation, Understand, Replace, Expert and evidence-based treatment; GP(s), General practitioner(s); HCP, Healthcare practitioners; IT, information technology; NRT, nicotine replacement therapy.





**Figure 2** CURE stop smoking project: Initial logic model. CURE, Conversation, Understand, Replace, Expert and evidence-based treatment; IT, information technology; NRT, nicotine replacement therapy; PREOP, preoperative.

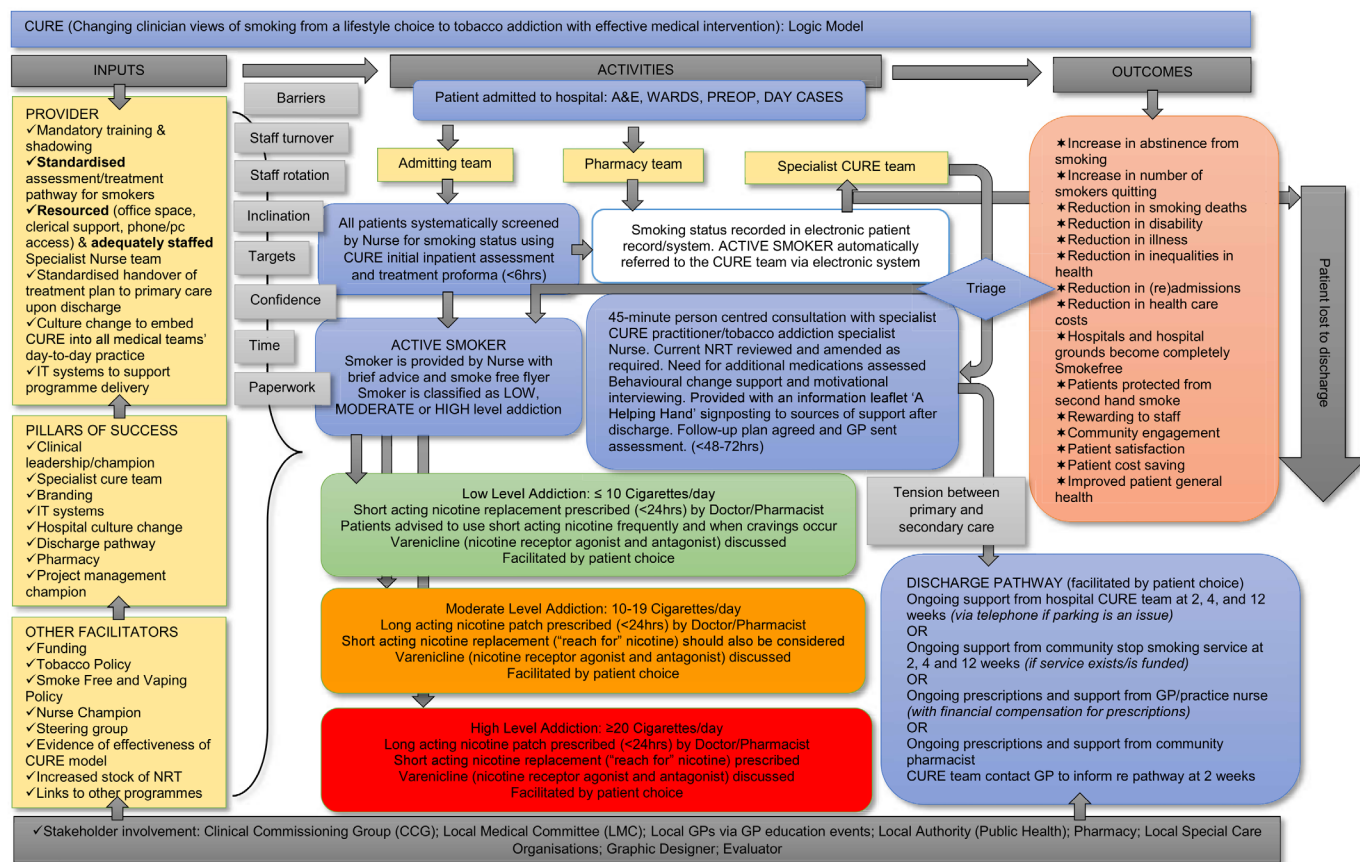
and using hospital-based information technology (IT) systems). These domains acted as both barriers and facilitators to implementation. Based on the criteria, we suggest these six key domains are prioritised for change (see table 3).

Of the 26 BCTs identified in the current implementation strategy content, 6 had high theoretical congruence with the key domains identified above, 9 had medium congruence and 11 BCTs had low theoretical congruence (see table 4). The BCTs observed to have high theoretical congruence were (i) social support (practical), (ii) social support (emotional), (iii) social support (unspecified), (iv) reward (outcome), (v) restructuring the social environment and (vi) demonstration of the behaviour. These BCTs were paired with domains rated as important in influencing CURE implementation. For instance, the domain *Social influences* (eg, *peer support*, *visibility of CURE champions*) was appropriately targeted via the BCT *Social support (practical)*, delivered through the implementation strategy component *educational outreach visits* (whereby nurse leads, clinical leads and/or CURE nurses visit colleagues, providing information and advice to support their ability to engage with CURE).

Table 5 shows whether intervention functions identified in the CURE implementation strategy appropriately

targeted the six most important TDF/COM-B components. The potential missed opportunities (eg, as highlighted by the analysis) were related to the intervention functions Coercion and Restriction, which were not identified in the CURE implementation strategy. The Coercion intervention function may have been useful in targeting the domains linked to Reflective Motivation addressing themes under the TDF domain 'Goals' such as *Managing competing goals and priorities* and *Promoting CURE*. Nevertheless, other intervention functions were used to target this component: Education, Incentivisation and Persuasion. The Restriction intervention function may have been useful in targeting Environmental Context and Resources (Physical Opportunity) and Social Influences (Social Opportunity). Other intervention functions were used to target these TDF/COM-B components: Enablement, Environmental restructuring, Training, and Modelling.

Table 6 shows whether intervention functions identified in the CURE implementation strategy were delivered through policy categories suggested by the BCW intervention function/policy category matrix. All intervention functions were delivered through at least one policy category suggested by the matrix.



**Figure 3** CURE stop smoking model: Final logic model following stakeholder consultations and behavioural analysis. CURE, Conversation, Understand, Replace, Expert and evidence-based treatment; IT, information technology; NRT, nicotine replacement therapy; PREOP, preoperative.

There were missed opportunities to deliver functions identified in implementation strategy through the policy category of fiscal measures, regulation and legislation. This was particularly important for the Training (one out of four opportunities were 'seized') and Environmental restructuring (two out of five opportunities were 'seized') intervention functions, as they could have been better supported by including these policy categories.

#### Step 4—development of recommendations to support future implementation

Following stakeholder involvement, the final list includes 29 recommendations. Table 7 presents the final overview of recommendations, with a brief indication of stakeholder APEASE evaluations.

Initially, 26 recommendations were developed to address the themes identified within the six most important TDF domains. Recommendation ratings from the Delphi survey ranged from 3 to 36 (maximum score) with a median of 28.5 (IQR, 25.25–31.0). Survey responses are available in online supplemental file 2. These ratings were used to structure discussion within the subsequent stakeholder workshop. The workshop focused predominantly on recommendations which had greatest levels of uncertainty, further contextualised these recommendations considering the existing healthcare system and

specified the feasibility of implementing recommendations in practice. This included the removal of a recommendation related to financial incentives for GPs (ie, *Provide financial incentive on performance (eg, when prescribing NRT) for primary care staff supporting service outpatients in the community*). This was the lowest rated recommendation within the Delphi survey, with further stakeholder discussion suggesting financial incentives were not deemed acceptable nor considered effective within the pilot phase. Another recommendation relating to the delivery environment (ie, *Ensure adequate facilities are available to support delivery, including physical spaces for one-to-one sessions, hospital accessibility for patients (ie, through parking, public transport) and vaping facilities*) was thought to cover a lot of separate components and thus was separated into three recommendations covering the need to provide (1) adequate office space for delivery staff, (2) physical space to deliver one-to-one support to patients and (3) on-site vaping facilities. Access to IT equipment (eg, laptops), was also added as a recommendation in light of increased need to self-isolate due to the COVID-19 pandemic. A highly rated recommendation relating to deliverers' skill development (ie, *Provide additional training on how to use tools associated with intervention delivery, so staff practice and observe use of these tools to facilitate day to day delivery*)

**Table 3** Prioritisation of TDF domains for the implementation of the CURE model by frequency, thematic elaboration and evidence of conflicting beliefs

Ranking	TDF domain (COM-B)	Frequency (no. of transcripts identified in; max n=10)	Elaboration (number of themes (barriers/facilitators))	Evidence of conflicting beliefs within domains (yes/no)
1	Environmental context and resources (physical opportunity)	10	13	Yes
2	Goals (reflective motivation)	7	4	Yes
3	Social influences (social opportunity)	9	3	Yes
4	Reinforcement (automatic motivation)	8	2	Yes
5	Social professional role and identity (reflective motivation)	7	2	Yes
6	Skills (psychological capability and physical capability combined)	7	1	Yes
7	Beliefs about consequences (reflective motivation)	7	2	No
8	Knowledge (psychological capability)	3	1	No
Joint 9th–14th	Beliefs about capabilities (reflective motivation)	0	0	–
	Intentions (reflective motivation)	0	0	–
	Memory, attention and decision-making (psychological capability)	0	0	–
	Behavioural regulation (psychological capability)	0	0	–
	Emotions (automatic motivation)	0	0	–
	Optimism (reflective motivation)	0	0	–

COM-B, Capability, Opportunity, Motivation and Behaviour; CURE, Conversation, Understand, Replace, Expert and evidence-based treatment; TDF, Theoretical Domains Framework.

was expanded to support deliverers capacity to provide behavioural support to patients. As such, an additional recommendation (to allow deliverers to shadow experienced staff members) was added, as this was identified as a facilitator of delivery during the pilot phase.

## DISCUSSION

### Summary of findings

This study aimed to specify the content of CURE's implementation strategy and to develop theory-based recommendations to optimise future implementation of secondary-care/hospital-based tobacco dependence services. The existing implementation strategy incorporated half the potentially relevant content to target key identified barriers and facilitators for the CURE project. However, there were missed opportunities to further facilitate implementation as a large proportion of the BCTs within the current implementation strategy focused on the TDF domain 'knowledge'. These findings highlight that some of the implementation strategy features were primarily educational, though many of the barriers related to the social and environmental context. More theoretically congruent BCTs should be included in the implementation strategy, particularly for the TDF domains 'environmental context and resources', 'social professional role and identity' and 'social influences'. The recommendations presented within [table 7](#) highlight potentially feasible ways in which these BCTs could be operationalised.

The study used a systematic, theoretically-guided approach to specify the content and possible mechanisms of action of an implementation strategy using behavioural science methodology and triangulation from different data sources (ie, semi-structured interviews, document analysis, Delphi survey, stakeholder engagement). We have also illustrated how theory can be used to optimise the implementation strategy of the CURE project. From interviews with healthcare professionals, six themes were identified as influences for the implementation of CURE.<sup>22</sup> These were used to identify gaps in the existing implementation strategy and informed recommendations for refinement. The implementation strategy consisted of 26 BCTs (ie, 'active components'), 7 intervention functions and 4 policy categories that could stimulate behaviour change through several mechanisms of action, especially 'beliefs about consequences' (Reflective Motivation) and 'knowledge' (Psychological Capability). Similarly, previous systematic reviews have shown that educational strategies were the most commonly used strategies in multi-strategy interventions.<sup>34 35</sup> Current evidence suggests that organisational-level interventions in the healthcare context can influence clinical outcomes and efficiency.<sup>36</sup> When used as part of multi-strategy interventions, group education and organisational strategies (eg, creation of an implementation team) corresponded with positive significant changes in outcomes.<sup>34</sup> Incorporating theory<sup>12</sup> in the design of implementation strategies would enhance the field's understanding of the causal

**Table 4** Theoretical congruence between the BCTs identified in CURE implementation strategy content and the key TDF domains influencing implementation of CURE within the pilot site

BCT	Linked TDF domains according to integrated mapping matrix*	Domain importance ranking†	Theoretical congruence between BCT and domain‡
Social support (practical)	Environmental Context and Resources Goals Social professional role/ identity Social influences Beliefs about capabilities	1 2 3 3 9-14	HIGH
Social support (emotional)	Goals Social professional role/ identity Social influences Beliefs about capabilities Emotions	2 3 3 9-14 9-14	HIGH
Social support (unspecified)	Goals Social professional role/ identity Social influences Beliefs about capabilities	2 3 3 9-14	HIGH
Reward (outcome)	Goals Reinforcement Skills Beliefs about consequences	2 5 6 9-14	HIGH
Restructuring the social environment	Environmental Context and Resources Social influences	1 3	HIGH
Demonstration of the behaviour	Social influences Skills Beliefs about capabilities	3 6 9-14	HIGH
Prompts/cues	Environmental Context and Resources Memory, Attention, Decision Making Behavioural Regulation	1 9-14 9-14	MED
Restructuring the Physical environment	Environmental Context and Resources	1	MED
Adding objects to the environment	Environmental Context and Resources	1	MED
Action Planning	Goals Behavioural Regulation Memory, Attention, Decision Making	2 9-14 9-14	MED
Verbal persuasion about capability	Goals Beliefs about capabilities Optimism	2 9-14 9-14	MED
Review outcome goal(s)	Goals	2	MED
Material incentive (behaviour)	Reinforcement Beliefs about consequences	5 9-14	MED
Instruction on how to perform the behaviour	Skills Knowledge Beliefs about capabilities	6 8 9-14	MED
Behavioural practice/rehearsal	Skills Beliefs about capabilities	6 9-14	MED
Credible source	Beliefs about consequences	9-14	LOW
Feedback on outcome(s) of behaviour	Beliefs about consequences	9-14	LOW
Feedback on behaviour	Knowledge Beliefs about consequences	8 9-14	LOW
Information about Antecedents	Knowledge Behavioural regulation	8 9-14	LOW

Continued



**Table 4** Continued

BCT	Linked TDF domains according to integrated mapping matrix*	Domain importance ranking†	Theoretical congruence between BCT and domain‡
Information about health consequences	Knowledge Beliefs about consequences Intentions	8 9-14 9-14	LOW
Salience of consequences	Knowledge Beliefs about consequences	8 9-14	LOW
Information about social and environmental consequences	Knowledge Beliefs about consequences	8 9-14	LOW
Information about emotional consequences	Knowledge Beliefs about consequences	8 9-14	LOW
Cue signalling reward	None	NA	LOW
Monitoring of behaviour by others without feedback	None	NA	LOW
Monitoring outcome(s) of behaviour by others without feedback	None	NA	LOW

\*TDF × BCT mapping matrices<sup>31 32</sup> and The Theory and Techniques Tool.<sup>44</sup>

†Domain ranking based on thematic analysis of barrier/facilitators data from interviews (see [table 1](#) Prioritisation of TDF domains for the implementation of the CURE model by frequency, thematic elaboration, and evidence of conflicting beliefs).

‡Classification of theoretical congruence: Low: BCT is not paired with any of the six key domains identified as important in the thematic analysis; Medium: BCT is paired with at least one domain identified as important; High: BCT is paired with two or more domains identified as important.

BCTs, behaviour change techniques; CURE, Conversation, Understand, Replace, Expert and evidence-based treatment; TDF, Theoretical Domains Framework.

mechanisms by which the strategies lead, or do not lead, to changes in outcomes at all levels.

The logic model specifies the theory of change related to mechanisms, assumptions and outcomes of the CURE model. The initial version of the model (as presented in [figure 2](#). CURE stop smoking project: Initial logic model) presents the intended process of change, as informed by the document review. The final iteration of the model (as presented in [figure 3](#)) demonstrates a more accurate overview of what ultimately was delivered in the programme, and documents the actual process of change, as informed by document review, stakeholder views and behavioural analysis.

Several challenges to adoption and implementation of the Ottawa model have been identified previously (Reid *et al*, 2010). Likewise, these challenges typically included staff regarding smoking as a ‘lifestyle choice’ and a lack of support from key opinion leaders and clinical managers. Leadership and performance feedback from managers, training about tobacco-dependence treatment and smoke-free hospital policies were the key recommendations to improve adoption and implementation (Reid *et al*, 2010). This evidence base has been used to underpin the delivery of smoking cessation in secondary care settings, and to inform future implementation strategies.<sup>37</sup>

Other studies have successfully integrated similar theoretical approaches (ie, BCW, TDF) and methodologies (eg, qualitative interviews, Delphi, stakeholder involvement) to characterise the content and theoretical

mechanisms of action of an existing implementation strategy, and to optimise an existing implementation strategy.<sup>38 39</sup> The findings from this strategic behavioural analysis are similar to those of other studies, particularly that only a small percentage of BCTs used in interventions (21%–37.5%) are theoretically relevant for targeting identified barriers to deliver or implement behaviour change interventions.<sup>18 29</sup> Likewise, missed opportunities in the implementation strategy content are similar across other behavioural analyses that highlighted that most focus on shaping knowledge rather than addressing motivational, social and environmental influences.<sup>18 29</sup>

This study provides relevant evidence to further guide the implementation process and selection of strategies; ensuring that enough attention is paid to planning implementation; and a flexible approach that allows response to emerging barriers, particularly at the organisational level. According to Li *et al*<sup>40</sup> organisational contextual features (eg, organisational culture; leadership; networks and communication; resources; evaluation, monitoring and feedback; and champions) were most commonly reported to influence implementation outcomes across a wide range of healthcare settings.

### Strengths and limitations

This study is the first to qualitatively explore behavioural factors underpinning the implementation of the CURE project. Considering barriers and facilitators to implementation through the lens of the TDF allows for the

**Table 5** Seized and missed opportunities: intervention functions linked with CURE

Intervention functions									
TDF domain (COM-B)	Environmental restructuring			Intervention functions					
	Education	Enablement	Environmental restructuring	Incentivisation	Coercion	Modelling	Persuasion	Training	Restriction
Skills (physical capability)									
Skills (psychological capability)									
Goals, professional role (reflective motivation)									
Reinforcement (automatic motivation)									
Environmental context and resources (physical opportunity)									
Social influences (social opportunity)									

Table 7 displays links between the intervention functions coded in the existing CURE intervention, and the intervention functions linked to the top TDF domains using the BCW matrix (p. 116). Green indicates an opportunity seized, and red indicates an opportunity missed. White is not paired. Note: The definition of skills used for this exercise combines physical skills and cognitive/interpersonal skills (see table 1.5, <sup>14</sup>, p.88 of the BCW<sup>14</sup>). Furthermore, both types of skills are linked to the same intervention functions and BCIs in the mapping matrices used throughout this paper.

BCIs, behaviour change techniques; BCW, Behaviour Change Wheel; COM-B, Capability, Opportunity, Motivation and Behaviour; CURE, Conversation, Understand, Replace, Expert and evidence-based treatment; TDF, Theoretical Domains Framework.

**Table 6** Seized and missed opportunities: policy categories linked with CURE

Intervention functions	Policy categories						
	Communication/marketing	Guidelines	Fiscal Measures	Regulation	Legislation	Environmental/Social planning	Service provision
Education							
Enablement							
Environmental restructuring							
Incentivisation							
Coercion							
Modelling							
Persuasion							
Training							
Restriction							

Table 8 shows whether intervention functions identified in the CURE interventions were delivered through policy categories suggested by the BCW intervention function × policy category matrix. Green indicates an opportunity seized, grey indicates an intervention function not identified in the intervention and red indicate an opportunity missed. White is not paired.

BCW, Behaviour Change Wheel; CURE, Conversation, Understand, Replace, Expert and evidence-based treatment.

identification of both internal and external factors which are known to influence behaviour change and evidence-based intervention implementation. The behavioural analysis links these barriers and facilitators to specific components underpinning the CURE implementation strategy. This therefore provides novel insight into key factors which can facilitate implementation of such an intervention in a hospital setting. The NHS long-term plan aims to roll-out adaptations of the CURE and Ottawa models across acute, maternity and mental health settings.<sup>1</sup> As such, this study is further informing and supporting implementation of NHS-funded tobacco dependence services in England.<sup>41</sup> Given the time and financial constraints of this study (conducted during the early stages of the COVID-19 pandemic), and the focus on facilitating healthcare professionals' implementation behaviour, stakeholder consultation was limited to healthcare professionals. As such, patients or the public were not involved in the development of this research. The inclusion of patient perspectives should therefore be prioritised in future work.

Due to its early phase of roll-out, our recommendations were developed from data relating to a single UK hospital implementing CURE. As such, generalisability of findings to other contexts may be limited. From these findings, relevant decision-makers can make a strategic, informed decision using evidence-based recommendations to optimise the implementation and delivery of future NHS-funded tobacco dependence treatment and target mechanisms of healthcare professional's behaviour change. This approach also provides further insight into potentially overlooked, yet relevant, intervention functions (ie, missed opportunities) which may be considered by decision-makers to optimise the implementation of secondary care-based tobacco dependence services.

Overall, the systematic approach taken throughout the present research, and use of established theoretical frameworks, results in evidence which, importantly, facilitates efficient translation to policy and practice.<sup>14</sup>

### Implications for practitioners, policymakers and future research

Based on the appraisal of the CURE implementation strategy content, the current package shows good practice for implementation including relevant BCTs, intervention functions and policy categories. However, the additional recommendations provided may optimise and inform future implementation. This is a set of practical recommendations co-developed with stakeholders and informed by robust behaviour change theoretical approaches.

The BCTs currently in use are linked to multiple intervention functions, including the most relevant intervention functions to tackle the key domains. The introduction of strategies using the intervention function of Coercion (not currently in use) might not be considered acceptable/appropriate in the hospital context and future research could explore the practicalities of introducing this intervention function in secondary care settings (eg, having behavioural/letter commitments for staff involved in CURE).<sup>42</sup> This strategy was successful in avoiding inappropriate antibiotic prescribing by having poster-sized commitment letters featuring clinician photographs and signatures stating a commitment in wards.<sup>43</sup>

The inclusion of fiscal measures (ie, using the tax system to reduce or increase the financial cost), and legislation (ie, making or changing laws) was considered less practicable in the hospital context. For the policy category of regulation, further strategies could be introduced, for example, establishing rules or principles for

**Table 7** Recommendations to support the implementation of a nationwide, secondary care-based tobacco dependence treatment model, based on the CURE project

Summary of what needs to occur to support implementation, by TDF domain.	Behaviour change technique	Example delivery	Feasibility of recommendation (in line with APEASE criteria)
<i>Environmental context and resources</i>			
Clearly define discharge pathways, at the set-up of the implementation process, that support continuity of care/follow-up for outpatients.	Restructuring the physical environment	Set up a steering group to consider options for discharge pathways, involving representation from secondary care, primary care, community services, community pharmacists.	High, if flexible to local service availability.
Collaborative working and discussion with external stakeholders and organisations, from the pre-planning stages.	Restructuring the physical environment	Arrange educational outreach workshops and/or steering group meetings involving, eg, Local Medical Committees, Local Care Organisations and Medicine Optimisation Services.	Uncertain, dependent on 'buy-in' from stakeholder groups.
Financial support for outpatient follow-up care within the community.	Restructuring the physical environment	Project team to allocate specific funding for discharge pathways, to enhance integration with services external to secondary care.	Potentially high if acceptable and practical locally.
Appropriate level of staffing across groups (ie, support staff, delivery staff, project team and community support).	Restructuring the social environment	Model and implement staffing requirements appropriate to the location, particularly in terms of support staff (eg, admin, IT support).	High
Designated hours for management to focus on the implementation of the intervention, particularly during the pre-launch phase.			
Ability to access space(s) and equipment which enable delivery of the intervention. On-site smoking policy that aligns with intervention principles.	Restructuring the physical environment	Provide adequate office space to specialist nursing staff/deliverers, to facilitate private telephone calls to patients and for use of IT. Ensure those involved in delivery and/or implementation of the intervention can access and use IT equipment (eg, laptops) in light of the increasing need to work from home and self-isolate. Provide physical space for one-to-one support sessions, ensuring that these spaces are accessible to both staff and outpatients from the surrounding areas. Provision of on-site vaping space/facilities.	Variable Uncertain Variable Uncertain
Ability to provide a choice of nicotine replacement therapy (NRT) to service users during their time in hospital and on discharge.	Restructuring the physical environment	Provide access to a range of NRT products within secondary care, ensuring stock/options on wards are reflective of what is available in the community as much as practicable.	Uncertain, as may be unaffordable to offer a full range of NRT options.
Integration with existing IT systems to document/review patient information. Integration with existing IT systems to remind wider healthcare staff to deliver the brief intervention.	Prompts/Cues Adding objects to the environment	Prioritise the amendment of existing data storage systems to allow recording and documenting of patient information and journey through the intervention (eg, computers programmed with pop-up requests for data).	Moderate
Ability for all those involved in the delivery/implementation of the intervention to easily access information and training tools.	Adding objects to the environment	Refer to (and/or provide if not already available) freely accessible eLearning modules/online training resources.	High

Continued



**Table 7** Continued

Summary of what needs to occur to support implementation, by TDF domain.	Behaviour change technique	Example delivery	Feasibility of recommendation (in line with APEASE criteria)
Clear branding of the intervention and signposting in the hospital setting.	Prompts/cues Adding objects to the environment	Provide marketing materials in a range of formats that is, posters, pens, and screensavers to promote awareness of the service and prompt staff engagement.	High
Flexibility in the core service specification, as much as practicable, to facilitate shared decision-making.	Instruction on how to perform the behaviour	Advise deliverers that shared decision-making is encouraged in relation to NRT options and post-discharge support (eg, choosing face to face or telephone support depending on local restrictions).	High, depending on the availability of NRT options and physical space for one-to-one sessions.
<i>Goals</i>			
Ability to access a service specification which clearly stipulates the core intervention model, to ensure the intervention is delivered as intended.	Goal setting (behaviour) Action planning	Communicate shared goals of the intervention across management and deliverers, so required behaviours can be agreed on and planned.	High
Motivate healthcare staff to promote the intervention to others within their workplace.	Goal setting (behaviour) Review of outcome goal(s) Review behaviour goals Verbal persuasion	Arrange face-to-face or virtual discussions, training and the use of marketing materials to facilitate constant promotion of the intervention to a wide range of healthcare professionals (including new junior doctors).	Moderate
Integration of the intervention with existing hospital goals and priorities, to encourage 'buy-in' from senior decision-makers.	Goal setting (behaviour) Review of outcome goal(s) Review behaviour goals Action planning	Clearly communicate goals of the intervention, demonstrating how these align with existing hospital priorities.	Moderate
Identification and monitoring of outcomes that provide evidence of the success of the programme and return on investment.	Goal setting (outcome) Review of outcome goal(s) Feedback (outcome) Verbal persuasion	Advise project team to plan specific outcomes of interest from the earliest stages and engage in ongoing audit and feedback of these outcomes on a regular basis. Share performance related feedback to delivery teams and wider stakeholders (eg, in primary care) to encourage further 'buy-in'.	Moderate High
<i>Social/professional identity</i>			
Those involved in delivery/implementation to hold the view that the intervention allows for patient choice.	Social support (unspecified)	Educational outreach and training content to highlight that the intervention is aligned with a commitment to shared decision-making.	High
Clear project and peer leadership within the locality.	Social support (unspecified) Social support (practical) Social support (emotional)	Implement a full-time project manager and clinical lead(s), ensuring they are able to provide troubleshooting and peer support in implementing/delivering the intervention.	Moderate
Healthcare staff, across settings, to hold the view that delivery of the service aligns with their professional identity.	Social support (unspecified)	Educational outreach and training content to highlight how the intervention aligns with healthcare practice across settings and stakeholder groups.	Uncertain
<i>Social influences</i>			

Continued

**Table 7** Continued

Summary of what needs to occur to support implementation, by TDF domain.	Behaviour change technique	Example delivery	Feasibility of recommendation (in line with APEASE criteria)
Those involved in implementation and delivery to hold the view that healthcare staff have a responsibility to support patients in smoking cessation.	Social comparison	Encourage positive social comparison to share good practice and facilitate a culture change of smoking cessation being everyone's responsibility by, for example, comparing no. of patients screened, no. referred to the service and/or no prescribed pharmacotherapy across wards/hospitals	High
Strong teamwork and collaborative working within and across stakeholder groups.	Information about others' approval	Educational outreach and training content to highlight clear, visible senior leadership to ensure staff are aware of others' support of the intervention.	High
Strong and visible peer leadership across stakeholder groups.	Restructuring the social environment Social support (unspecified) Credible source Verbal persuasion Identification of self as a role model Vicarious consequences	Identify champions of the intervention within organisations, informing individuals that their own behaviour may set a good example for others and have positive consequences. This may relate to: <ul style="list-style-type: none"> <li>► Clinical/nurse/pharmacy champion.</li> <li>► Primary care champion.</li> <li>► In different Hospital wards/departments.</li> </ul> As much as practicable, integrate opportunities for staff to observe peers presenting/discussing the intervention. For example, within educational outreach/information should be delivered by local clinical and nursing leads.	High, depending on affordability. High, depending on practicality/ availability of peer leads.
<i>Reinforcement</i>			
Those involved in delivery and implementation to hold the view that intervention involvement is intrinsically rewarding.	Self-reward	Prompt self-praise or intrinsic rewards of involvement, when performing intervention related tasks. Eg, prompting staff to reflect on the likely health benefits for patients as a result of the treatment they are providing	High
Engagement from those working within primary care to support ongoing treatment/ prescribing within the community.	Cue signalling reward Material incentive (behaviour)	Educational outreach workshops or online information provision to advise GPs that funding is allocated for NRT prescriptions in the community and that this is a cost-effective approach.	Uncertain Provision of a material (eg, financial) incentive not deemed acceptable in the current context.
<i>Skills</i>			
Ensure deliverers have capability to provide behavioural support to patients. Ensure deliverers have capability to use supporting IT systems.	Instruction on how to perform behaviour Demonstration of the behaviour Behavioural practice	Allow deliverers to shadow experienced staff providing support to patients. Provide training on how to use tools associated with intervention delivery (ie, IT systems).	High High
CURE, Conversation, Understand, Replace, Expert and evidence-based treatment; GP(s), General practitioner(s) (GPs); IT, information technology; TDF, Theoretical Domains Framework.			

vaping within the hospital premises, and further evaluated through research.

The findings presented in this paper are related to the CURE pilot implementation strategy within an acute care setting. Given the long-term plan aims to roll out similar tobacco dependence services within acute, maternity and mental health settings,<sup>1</sup> it will be important to conduct qualitative work and strategic behavioural analysis in other contexts where the delivery and/or barriers/facilitators might be different. In addition, suggested future research should also try to understand how these findings differ in different geographical locations given different structures and systems within hospitals. Implementation fidelity across different pilot sites should be evaluated and compared with adherence to protocols. For example, implementation fidelity could be assessed by measuring the completeness of smoking cessation consultation forms and the proportion of patients for whom cessation medications were ordered in hospital.

## CONCLUSION

Despite treating tobacco dependence being one of the most cost-effective health interventions any healthcare system can provide, adherence to smoking cessation standards within hospitals settings remains poor in England. This strategic behavioural analysis study demonstrates how the use of a variety of behaviour change tools can be used to specify the content and possible mechanisms of action of an existing implementation strategy which has achieved some level of success in clinical practice but requires further improvement and evaluation. The CURE implementation strategy may be further optimised by using additional theoretically congruent BCTs to target the less commonly addressed influences related to the social and environmental context (eg, 'restructuring the physical environment' by creating a steering group to consider options for discharge pathways).

This study provides comprehensive evidence about current practice in the pilot site that can further inform implementation strategy improvement and the implementation of an NHS-funded tobacco dependence treatment and policy in secondary care in England.

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## REFERENCES

- 1 National Health Service, England NHS, 2019. The NHS long term plan. Available: [www.longtermplan.nhs.uk](http://www.longtermplan.nhs.uk) [Accessed 6 Apr 2020].
- 2 Mangera Z, Devani N. *National Smoking Cessation Audit Report 2019 National Improvement Objectives : Key Findings*. London UK, 2020.
- 3 Rigotti NA, Munafò MR, Stead LF. Interventions for smoking cessation in hospitalised patients. *Cochrane Database Syst Rev* 2007;CD001837.
- 4 Rigotti NA, Clair C, Munafò MR, *et al*. Interventions for smoking cessation in hospitalised patients. *Cochrane Database Syst Rev* 2012;2017:CD001837.
- 5 Papadakis S, Cole AG, Reid RD, *et al*. Increasing rates of tobacco treatment delivery in primary care practice: evaluation of the Ottawa model for smoking cessation. *Ann Fam Med* 2016;14:235–43.
- 6 Reid RD, Mullen K-A, Slovinec D'Angelo ME, *et al*. Smoking cessation for hospitalized smokers: an evaluation of the "Ottawa model". *Nicotine Tob Res* 2010;12:11–18.
- 7 Mullen KA, Manuel DG, Hawken SJ, *et al*. Effectiveness of a hospital-initiated smoking cessation programme: 2-year health and healthcare outcomes. *Tob Control* 2017;26:293–9.
- 8 Evison M, Agrawal S, Conroy M, *et al*. Building the case for comprehensive hospital-based tobacco addiction services: applying the ottawa model to the city of Manchester. *Lung Cancer* 2018;121:99–100.
- 9 Powell BJ, Waltz TJ, Chinman MJ, *et al*. A refined compilation of implementation strategies: results from the expert recommendations for implementing change (ERIC) project. *Implement Sci* 2015;10:21.

- 10 Evison M, Pearse C, Howle F, *et al.* Feasibility, uptake and impact of a hospital-wide tobacco addiction treatment pathway: results from the cure project pilot. *Clin Med* 2020;20:196–202.
- 11 Evison M, Cox J, Howle F, *et al.* Health economic analysis for the 'CURE Project' pilot: a hospital-based tobacco dependency treatment service in Greater Manchester. *BMJ Open Respir Res* 2021;8. doi:10.1136/bmjresp-2021-001105. [Epub ahead of print: 8 Apr 2022]
- 12 Birken SA, Powell BJ, Shea CM. Criteria for selecting implementation science theories and frameworks: results from an international survey. *Implement Sci* 2021;12:1–9.
- 13 Nilsen P. Making sense of implementation theories, models and frameworks. *Implement Sci* 2015;10. doi:10.1186/s13012-015-0242-0. [Epub ahead of print: 9 Apr 2021].
- 14 Michie S, Atkins L, West R. *The behaviour change wheel: a guide to designing interventions*. Great Britain: Silverback Publishing, 2014.
- 15 Michie S, Johnston M, Abraham C. Making psychological theory useful for implementing evidence based practice: a consensus approach. *Quality and Safety in Health Care* 2005;14:26–33.
- 16 Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Sci* 2012;7:1–17.
- 17 Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation Sci* 2011;6:42.
- 18 Michie S, Richardson M, Johnston M, *et al.* The behavior change technique taxonomy (V1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Ann Behav Med* 2013;46:81–95.
- 19 Atkins L, Sallis A, Chadborn T, *et al.* Reducing catheter-associated urinary tract infections: a systematic review of barriers and facilitators and strategic behavioural analysis of interventions. *Implementation Sci* 2020;15:44.
- 20 Araújo-Soares V, Hankonen N, Presseau J, *et al.* Developing behavior change interventions for self-management in chronic illness. *Eur Psychol* 2019;24:7–25.
- 21 Moore GF, Audrey S, Barker M. Process evaluation of complex interventions: medical Research council guidance. *BMJ* 2015;350. doi:10.1136/bmj.h1258. [Epub ahead of print: 30 Sep 2018].
- 22 Wearn A, Haste A, Haighton C, *et al.* Barriers and facilitators to implementing the cure stop smoking project: a qualitative study. *BMC Health Serv Res* 2021;21:481.
- 23 Pinnock H, Barwick M, Carpenter CR, *et al.* Standards for reporting implementation studies (STARi) statement. *BMJ* 2017;356. doi:10.1136/bmj.i6795. [Epub ahead of print: 9 Apr 2021]
- 24 Hoffmann TC, Glasziou PP, Boutron I, *et al.* Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ* 2014;348:g1687.
- 25 Gale NK, Heath G, Cameron E, *et al.* Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol* 2013;13:117.
- 26 Cartmell KB, Dismuke CE, Dooley M, *et al.* Effect of an evidence-based inpatient tobacco dependence treatment service on 1-year postdischarge health care costs. *Med Care* 2018;56:883–9.
- 27 Riordan F, Racine E, Phillip ET. Development of an intervention to facilitate implementation and uptake of diabetic retinopathy screening. *Implement Sci* 2020;15:1–17.
- 28 Atkins L, Francis J, Islam R, *et al.* A guide to using the theoretical domains framework of behaviour change to investigate implementation problems. *Implementation Sci* 2017;12:77.
- 29 Patey AM, Islam R, Francis JJ, *et al.* Anesthesiologists' and surgeons' perceptions about routine pre-operative testing in low-risk patients: application of the theoretical domains framework (TDF) to identify factors that influence physicians' decisions to order pre-operative tests. *Implementation Sci* 2012;7:52.
- 30 Haighton C, Newbury-Birch D, Durlak C, *et al.* Optimizing making every contact count (mecC) interventions: a strategic behavioral analysis. *Health Psychol* 2021;40:960–73.
- 31 Cane J, Richardson M, Johnston M, *et al.* From Lists of behaviour change techniques (BCTs) to structured hierarchies: comparison of two methods of developing a hierarchy of BCTs. *Br J Health Psychol* 2015;20:130–50.
- 32 Michie S, Johnston M, Francis J, Hardeman W, *et al.* From theory to intervention: mapping theoretically derived behavioural determinants to behaviour change techniques. *Appl Psychol* 2008;57:660–80.
- 33 de Meyrick J. The Delphi method and health research. *Health Educ* 2003;103:7–16.
- 34 Tomasone JR, Kauffeldt KD, Chaudhary R, *et al.* Effectiveness of guideline dissemination and implementation strategies on health care professionals' behaviour and patient outcomes in the cancer care context: a systematic review. *Implementation Sci* 2020;15. doi:10.1186/s13012-020-0971-6. [Epub ahead of print: 9 Apr 2021]
- 35 Grimshaw JM, Thomas RE, MacLennan G, *et al.* Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess* 2004;8. doi:10.3310/hta8060. [Epub ahead of print: 9 Apr 2021]
- 36 Straus SE, Tetroe J, Graham ID. Knowledge Translation in Health Care: Moving from Evidence to Practice. In: Straus S, Tetroe J, Graham I, eds. *Knowledge translation in health care: moving from evidence to practice*. John Wiley & Sons, 2009: 1–318. <https://cchr-irsc.gc.ca/e/40618.html>
- 37 Jones S, Hamilton S. Smoking cessation: implementing hospital-based services. *Br J Nurs* 2011;20:1210–5.
- 38 Steinmo S, Fuller C, Stone SP, *et al.* Characterising an implementation intervention in terms of behaviour change techniques and theory: the 'Sepsis Six' clinical care bundle. *Implement Sci* 2015;10. doi:10.1186/s13012-015-0300-7. [Epub ahead of print: 16 Jul 2020]
- 39 Steinmo S, Michie S, Fuller C, Implement Sci. Bridging the gap between pragmatic intervention design and theory: using behavioural science tools to modify an existing quality improvement programme to implement sepsis six. *Implement Sci* 2016;11:1–12.
- 40 Li S-A, Jeffs L, Barwick M, *et al.* Organizational contextual features that influence the implementation of evidence-based practices across healthcare settings: a systematic integrative review. *Syst Rev* 2018;7:72.
- 41 Kaner EFS, Ramsay SE, Aquino MRJ, *et al.* Supporting the NHS long term plan: an evaluation of the implementation and impact of NHS-funded tobacco dependence services. In: *NIHR applied research collaboration national priority areas: prevention, including behavioural risk factors*, 2021. (Unpublished)
- 42 Perry C, Chhatralia K, Damesick D. *Behavioural insights in health care | the health Foundation*. The Health Foundation, 2015. <https://www.health.org.uk/publications/behavioural-insights-in-health-care>
- 43 Meeker D, Knight TK, Friedberg MW. Nudging guideline-concordant antibiotic prescribing: a randomized clinical trial. *JAMA intern Med* 9 Apr 2021;174:425–31.
- 44 Human behaviour change project. The theory and techniques tool. Available: <https://theoryandtechniquetool.humanbehaviourchange.org/tool> [Accessed 20 Apr 2020].