

1 Understanding the implementation strategy of a secondary care tobacco
2 addiction treatment pathway (The CURE Project) in England: A Strategic
3 Behavioural Analysis

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30 **Abstract**

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

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

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

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

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

60

61 **Strengths and limitations of this study**

- 62 • This study is the first to qualitatively explore behavioural factors underpinning the
63 implementation of the CURE project.
- 64 • The behavioural analysis, and subsequent stakeholder involvement, has resulted in
65 tailored, practical recommendations for optimisation of future tobacco dependence
66 services, which facilitate efficient translation of findings into policy and practice.
- 67 • Due to its early phase of roll-out, our recommendations have been developed from
68 implementation within a single UK hospital implementing CURE, therefore
69 generalisability of findings to other contexts may be limited.
- 70 • Feedback was not gathered from patients or members of the public, therefore the
71 barriers and facilitators of implementation and the stakeholder-informed
72 recommendations are limited to the views of those commissioning, delivering and
73 implementing CURE.

74

75 **Keywords:** Implementation intervention, intervention content, intervention function,
76 behaviour change intervention, Strategic behavioural analysis, Theoretical Domains
77 Framework, Behaviour Change Technique, smoking, Health professional behaviour

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79 **Word count: 5637**

80

81 **Introduction**

82 The government NHS Long Term Plan (1) has outlined a commitment to offer NHS-funded
83 tobacco treatment services to all those admitted to hospital by 2023/24. However, the most
84 recent National Smoking Cessation Audit Report from the British Thoracic Society (2)
85 suggests that adherence to national smoking cessation standards remain poor. For example,
86 despite the expected standard being 100%, only 77% of inpatients had their smoking status
87 recorded. Of those who smoked, just 44% were asked if they would like to quit, and of those
88 who were referred for smoking cessation support, just 16% were referred to hospital-based
89 services (with a further 8% referred to community-based services). In addition, only 31% of
90 smokers were offered nicotine replacement therapy (NRT). As a result, the report set
91 national improvement objectives to support and offer NRT to all inpatient smokers, and to
92 provide further support and training to hospital staff to ensure they are able to implement
93 tobacco dependence treatment into their everyday practice.

94 Hospitalisation provides a unique opportunity to identify and engage smokers, initiate
95 cessation treatments, and facilitate appropriate follow-up and support (3,4). Intensive
96 smoking cessation interventions that begin in hospital and include pharmacotherapy,
97 counselling, and post-discharge support for ≥ 1 month, increase the likelihood of smoking
98 abstinence (risk ratio 1.37, 95% confidence interval [CI] 1.27–1.48; 25 studies) compared to
99 hospital only interventions with no follow-up (4).

100 The Ottawa model for smoking cessation (OMSC), initially implemented in Canada, aims to
101 increase the rate at which smoking cessation support is offered to all smokers within
102 secondary care (i.e. hospital settings) (5,6). The OMSC provides a systematic approach to
103 screening all inpatients for smoking status, with those who smoke offered a combination of
104 pharmacotherapy and behavioural support. Patients are then attached to ongoing
105 community stop-smoking support post-discharge (7). The OMSC model was found to have
106 positive outcomes in increased smoking abstinence at 6 months, reduced all-cause re-

107 admissions at 30 days and 1 year, and reduced mortality at 1 year when compared to a
108 control group receiving usual care (7).

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

121 Evaluation of the CURE pilot (October 2018-March 2019) showed that 92% of all adult
122 admissions (total admissions:14,690) were screened for smoking status (10) with a cost per
123 quit of £475 (11). More importantly, the evaluation demonstrated a positive patient impact;
124 out of 2,293 patients identified as current smokers, 96% were provided with brief advice,
125 61% accepted and completed specialist behavioural support, 66% were prescribed
126 pharmacotherapy (e.g. NRT, varenicline) to support quit attempts, and 22% were abstinent
127 at 3 months post-discharge (10). These findings suggest that the model may be useful in
128 assisting clinicians' behaviour change when compared to national audit data. It would
129 therefore be valuable to determine how the CURE project was delivered in practice. This
130 knowledge would support recommendations for a national specification model, based on the
131 OMSC and CURE, for further testing and piloting (1).

132 To maximise the potential benefits of CURE, there is a need to understand the
133 implementation process of this evidence-based smoking cessation intervention in routine

134 secondary care. Several theoretical approaches (i.e. theories, models, frameworks) can be
135 used to provide a better understanding and explanation of how and why implementation
136 succeeds or fails (12,13). For instance, the Theoretical Domains Framework (TDF)
137 represents an approach to understand what determinants are hypothesized to influence
138 implementation outcomes, (e.g. healthcare practitioners' adoption of an evidence-based
139 patient intervention) (13,14). The TDF summarises 14 broad domains relevant to changing
140 behaviour, 'knowledge', 'beliefs about consequences', 'beliefs about capabilities', 'skills',
141 'environmental context & resources', 'social influences', 'memory, attention & decision
142 processes', 'behavioural regulation', 'emotion', 'social or professional role/identity',
143 'optimism', 'intentions', 'goals' and 'reinforcement' (15,16).

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

154 [Insert Figure 1 here]

155 **Figure 1: Visual representation of the Behaviour Change Wheel (14)**

156 When aiming to understand how behaviour may be changed and/or specify implementation
157 content, the intervention functions within the BCW can be linked to specific BCTs, which are
158 defined as "an active component of an intervention designed to change behaviour". BCTs

159 have been associated with many types of behaviour which have been brought together to
160 form an international BCT Taxonomy v1 with 93 BCTs (18).

161 Theoretical approaches such as BCW, the COM-B model (Fig. 1), the TDF, and the BCT
162 Taxonomy (BCTTv1), may be applied in conjunction with one another to understand the
163 implementation process, identify implementation strategy content, and to explore barriers to
164 and facilitators of behaviour. Prior research has successfully integrated these theoretical
165 approaches to explore determinants influencing the implementation process of evidence-
166 based practice in healthcare (16,19).

167 When planning implementation, developing a logic model of links between implementation
168 strategies, mechanisms and outcomes is crucial (20). The BCW facilitates the specification
169 of outcomes, determinants, change objectives and intervention, and it thereby enables
170 intervention developers to map specific BCTs to behavioural determinants (17).

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

175 The specific objectives of this study were to:

- 176 1. Describe the content of CURE's implementation strategy, using BCW functions,
177 policy categories, and the BCT Taxonomy (v1)(21);
- 178 2. Characterise the intervention in a logic model to clarify causal assumptions and
179 mechanism of impact using the Medical Research Council (MRC) guidance (21);
- 180 3. Explore to what extent the barriers and facilitators of CURE implementation are
181 addressed by existing implementation strategy components;
- 182 4. Develop recommendations to optimise the future implementation.

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

185 qualitative study which explored the barriers and facilitators of CURE implementation and
186 delivery, from the perspective of healthcare professionals engaged in the project pilot (22).

187 **Methods**

188 We undertook a systematic, theoretically guided approach to specify the content and
189 possible mechanisms of action and impact of the implementation strategy of CURE. This
190 process has previously been coined as 'strategic behavioural analysis' (19). We have
191 employed the use of the StaRI (Standards for Reporting Implementation Studies) as our
192 reporting standard (23). Ethical approval for this study was granted from Northumbria
193 University Faculty of Health and Life Sciences (Ref: 21358).

194 Setting and participants

195 The pilot site is a major acute teaching hospital with approximately 900 beds and 27,500
196 inpatient admissions per year (excluding maternity, paediatrics, and AE/ICU admissions),
197 providing both district general hospital services and specialist tertiary services. Tertiary
198 services include cardiology, cardiothoracic surgery, heart and lung transplantation,
199 respiratory conditions, burns and plastics, cancer, and breast care services. The smoking
200 prevalence included in the pilot site was modelled based on 20% of inpatient admissions
201 (approximately 5,500 smokers per year).

202 At admission, the admitting clinicians (doctor or nurse) were responsible for recording
203 smoking status, assessing level of addiction, and offering initial rapid treatment. A CURE
204 specialist team would then perform a visit, review all smokers admitted (opt-out service), and
205 complete specialist assessment, update treatment plan and plan for discharge (e.g. refer to
206 community service). For the pilot study, the implementation plan modelled the need for five
207 specialist CURE nurses to deliver the specialist assessment, treatment planning and follow
208 up for all smokers admitted as inpatients.

209 Patient and public involvement

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

212 Procedure and sources of data

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

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

235 Data analysis

236 *Step 1 - Implementation strategy content analysis*

237 Using the TiDiER framework (24), we created a broad outline of the implementation strategy
238 that included the content delivered, to whom and by whom, why, by what mode of delivery,
239 how often, where, when and how much, tailoring, modifications, and fidelity. Data from all
240 data sources were used. Data collected from both the document analysis and interviews
241 were coded for implementation strategy content (AR, AH and AW) using existing coding
242 frameworks provided by the BCW guide (14); Appendix 4 (p.259 of the guide) for BCTs,
243 Table 2.1 (p.111 of the guide) to code intervention functions, and Table 2.7 (p.135 of the
244 guide) to code policy categories. Any discrepancies in coding were resolved via consensus
245 discussion.

246 *Step 2 – Mechanisms of impact (Logic model)*

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

259 *Step 3 – Identifying opportunities for optimisation*

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

- 264 1. A concurrent qualitative study (22) reported eight key TDF domains that influenced
265 CURE implementation (see additional file 1 for a summary of these findings). To
266 identify key domains influencing the implementation of CURE, we ranked these
267 previously reported TDF/COM-B domains using established criteria: frequency
268 (number of transcripts in which a domain occurred), elaboration (number of themes
269 within a domain) and evidence of conflicting statements within domains (e.g. if some
270 participants report lack of specific skills whereas others report having the relevant
271 skills) (28–30). All of these factors were considered concurrently in establishing
272 domain relevance. This process was facilitated through consensus discussion
273 between the two researchers (AR, AW) and supported by a third researcher to
274 resolve any discrepancies (AH).
- 275 2. The outputs of the key domains and content analysis stages were combined by
276 mapping the identified influences to the identified BCT and intervention functions of
277 the CURE implementation strategy. This was achieved by combining two available
278 matrices that map the TDF to the BCT Taxonomy v1 (31,32) and the Theory &
279 Techniques Tool (<https://theoryandtechniquetool.humanbehaviourchange.org/>) as
280 was developed for previous research (19). This analysis investigated the level of
281 theoretical congruence between implementation strategy components of CURE and
282 the qualitative data on barriers and facilitators influencing its implementation.
- 283 3. The level of theoretical congruence between influences on behaviour (TDF domains)
284 and implementation strategy content to change behaviour (BCTs) was achieved by
285 analysing the extent to which the BCTs identified in the CURE implementation
286 strategy targeted the key TDF domains (identified in the qualitative data). Each BCT
287 identified was coded as either low congruence (did not target any key domain),

288 medium congruence (targeted at least one key domain) or high congruence (targeted
289 2+ key domains) (19).

290 4. The mapping exercise was repeated for intervention functions and policy categories,
291 by consulting the matrices mapping BCW against COM-B/TDF (14) to identify the
292 extent to which functions (matrix on p. 116) and policy categories (matrix on p. 138)
293 in the CURE implementation strategy targeted key factors influencing the
294 implementation process, and what additional intervention functions and policies may
295 address barriers/facilitators within the key domains. The following definitions were
296 applied:

297 a. Opportunity seized - instances where a theoretically congruent intervention
298 function/policy category (according to the matrices) was identified in the
299 existing CURE implementation strategy at least once.

300 b. Missed opportunity – instances where the theoretically congruent intervention
301 function/policy category was not identified in existing implementation strategy.

302 *Step 4 – Development of recommendations to support future implementation.*

303 Following steps 1-3, the research team used the findings from the qualitative interviews and
304 strategic behavioural analysis to draft a list of practical recommendations to strengthen
305 implementation strategy content (i.e. content likely to encourage healthcare professional
306 behaviour change and support implementation of a secondary care-based tobacco
307 dependence treatment model). These recommendations included example strategies to
308 deliver BCTs relevant to the key TDF domains. To enhance the suitability and acceptability
309 of these recommendations, a Delphi study was conducted by collecting data from a panel of
310 six experts until consensus was reached (33). Experts included the CURE management
311 team, PHE Programme Managers (e.g. Tobacco Control and NHS Long Plan), and NHS
312 England representatives. The six experts independently rated whether each
313 recommendation was affordable, practical, effective, acceptable, safe and equitable (the
314 APEASE criteria) (14), on a dichotomous scale of yes (1), no/uncertain (0) for each criteria.

315 This gave a total possible score of 36 for each recommendation. These ratings were then
316 used to structure and encourage discussion surrounding uncertainties and potential
317 modifications during a collaborative, stakeholder workshop. A total of 11 stakeholders
318 participated in the stakeholder workshop. Participants included 2 members of the research
319 team (1 workshop facilitator and 1 scribe), 2 members of the CURE management team, 4
320 PHE Programme Managers (e.g. Tobacco Control and NHS Long Plan), 1 representative
321 from NHS England, and 2 consultants. Workshop feedback was incorporated into a refined
322 recommendations table, which was then circulated via email for further stakeholder comment
323 and review. This process resulted in the final list of recommendations.

324 **Results**

325 *Step 1 - Implementation strategy content*

326 Table 1 summarises the content of the implementation strategy, using the TIDieR
327 framework. The following broad components of CURE implementation strategy were
328 identified: staff training, practice tools, reminder systems, educational outreach visits, audit
329 and feedback, primary care incentives, use of a steering group, branding materials, clinician
330 implementation team meetings to promote reflective discussion, provision of local technical
331 assistance (e.g. admin support), promotion of network weaving (e.g. information sharing),
332 physical environment changes (e.g. consultation facilities), and a triage system.
333 Through content coding we identified 26 BCTs (i.e. 'active components'), five intervention
334 functions and four policy categories. Further details of these activities, BCTs, intervention
335 functions and policy categories can be found in Table 2.

336 *Step 2 -Mechanisms of impact (Logic model)*

337 The initial model is presented in Figure 2. The original logic model, based on the CURE
338 implementation strategy, shows all patients who are admitted to hospital should be asked
339 whether they smoke, and their response should be recorded in the hospitals' electronic
340 patients records. All smokers should be offered immediate Nicotine Replacement Therapy

341 and specialist support through motivational interviewing and behavioural change support as
342 well as access to additional evidence-based pharmacotherapy treatments for tobacco
343 addiction. All smokers should be offered further appointments with a specialist team after
344 discharge from hospital to continue their support.

345

346 [Insert Figure 2 here]

347 **Figure 2. CURE stop smoking project: Initial logic model**

348

349 The logic model was reviewed and updated iteratively based on findings from the qualitative
350 interviews and behavioural analysis. The final model is presented in Figure 3. The final logic
351 model contains further facilitators identified as important by key stakeholders (e.g. funding,
352 tobacco policy, nurse champion) as well as clarification of the meaning of an adequately
353 resourced and staffed implementation strategy (e.g. office space, clerical support,
354 phone/computer access). Other local stakeholders essential to the smooth implementation
355 and delivery of CURE were also added to the revised model (e.g. Clinical Commissioning
356 Group (CCG); Local Medical Committee (LMC); local GPs) as well as barriers to successful
357 implementation and delivery (e.g. staff turnover, staff confidence, paperwork). While a
358 structured protocol and treatment pathway was an important facilitator, the final model
359 includes more detail regarding the potential variety of patient journeys and the role of
360 hospital pharmacy. The importance of patient choice was added to the final model, because
361 it was highlighted as important to both choices of Nicotine Replacement Therapy (NRT) and
362 of the discharge pathways. However, there were many challenges to implementing many of
363 the pathways as intended. This tension between primary and secondary care was
364 highlighted in the final model.

365

366 [Insert Figure 3 here]

367 **Figure 3. CURE stop smoking model: Final logic model following stakeholder**
368 **consultations and behavioural analysis**

369 *Step 3 - Identifying opportunities for optimisation*

370 Previously identified TDF/COM-B domains influencing implementation are summarised in
371 additional file 1. Considering the frequency, elaboration of the domains and evidence of
372 conflict, the following six domains were considered the key domains of influence relating to
373 the implementation strategy; (i) Environmental Context and Resources (Physical
374 Opportunity; e.g. integration with the wider healthcare context, staffing resources, hospital
375 delivery environment, availability of CURE related knowledge and training, CURE branding
376 and flexibility of the service specification), (ii) Goals (Reflective Motivation; e.g. promoting
377 CURE, adhering to a CURE service specification, identifying and evaluating outcomes), (iii)
378 Social Influences (Social Opportunity; e.g. peer support, CURE champions, organisational
379 culture change), (iv) Reinforcement (Automatic Motivation; e.g. reflection on intrinsic rewards
380 related to CURE involvement and delivery), (v) Social Professional Role and Identity
381 (Reflective Motivation; e.g. commitment to patient choice, acceptance of responsibility for
382 delivering tobacco dependence treatment.), and (vi) Skills (Psychological Capability &
383 Physical Capability; e.g. previous experience and skills supporting smoking cessation and
384 using hospital-based IT systems). These domains acted as both barriers and facilitators to
385 implementation. Based on the criteria, we suggest these six key domains are prioritised for
386 change (see Table 3).

387 Of the 26 BCTs identified in the current implementation strategy content, six had high
388 theoretical congruence with the key domains identified above, nine had medium congruence
389 and eleven BCTs had low theoretical congruence (see Table 4). The BCTs observed to have
390 high theoretical congruence were (i) Social support (practical), (ii) Social support (emotional),
391 (iii) Social support (unspecified), (iv) Reward (outcome), (v) Restructuring the social
392 environment, and (vi) Demonstration of the behaviour. These BCTs were paired with
393 domains rated as important in influencing CURE implementation. For instance, the domain
394 *Social influences (e.g. peer support, visibility of CURE champions)* was appropriately
395 targeted via the BCT *Social support (practical)*, delivered through the implementation

396 strategy component *educational outreach visits* (whereby nurse leads, clinical leads and/or
397 CURE nurses visit colleagues, providing information and advice to support their ability to
398 engage with CURE).

399 Table 5 shows whether intervention functions identified in the CURE implementation strategy
400 appropriately targeted the six most important TDF/COM-B components. The potential
401 missed opportunities (e.g. as highlighted by the analysis) were related to the intervention
402 functions Coercion and Restriction, which were not identified in the CURE implementation
403 strategy. The Coercion intervention function may have been useful in targeting the domains
404 linked to Reflective Motivation addressing themes under the TDF domain 'Goals' such as
405 *Managing competing goals and priorities* and *Promoting CURE*. Nevertheless, other
406 intervention functions were used to target this component: Education, Incentivisation and
407 Persuasion. The Restriction intervention function may have been useful in targeting
408 Environmental Context and Resources (Physical Opportunity) and Social Influences (Social
409 Opportunity). Other intervention functions were used to target these TDF/COM-B
410 components: Enablement, Environmental restructuring, Training, and Modelling.

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

415 There were missed opportunities to deliver functions identified in implementation strategy
416 through the policy category of fiscal measures, regulation and legislation. This was
417 particularly important for the Training (1 out of 4 opportunities were 'seized') and Environmental
418 restructuring (2 out of 5 opportunities were 'seized') intervention functions, as they could
419 have been better supported by including these policy categories.

420 *Step 4 - Development of recommendations to support future implementation.*

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

424 Initially, 26 recommendations were developed to address the themes identified within the six
425 most important TDF domains. Recommendation ratings from the Delphi survey ranged from
426 3 to 36 (maximum score) with a median of 28.5 (IQR, 25.25 - 31). Survey responses are
427 available in additional file 2. These ratings were used to structure discussion within the
428 subsequent stakeholder workshop. The workshop focused predominately on
429 recommendations which had greatest levels of uncertainty, further contextualised these
430 recommendations considering the existing healthcare system and specified the feasibility of
431 implementing recommendations in practice. This included the removal of a recommendation
432 related to financial incentives for GPs (i.e., *Provide financial incentive on performance (e.g.,*
433 *when prescribing NRT) for primary care staff supporting service outpatients in the*
434 *community*). This was the lowest rated recommendation within the Delphi survey, with
435 further stakeholder discussion suggesting financial incentives were not deemed acceptable
436 nor considered effective within the pilot phase. Another recommendation relating to the
437 delivery environment (i.e., *Ensure adequate facilities are available to support delivery,*
438 *including physical spaces for one-to-one sessions, hospital accessibility for patients (i.e.,*
439 *through parking, public transport) and vaping facilities*) was thought to cover a lot of separate
440 components and thus was separated into three recommendations covering the need to
441 provide 1) adequate office space for delivery staff 2) physical space to deliver one-to-one
442 support to patients and 3) on-site vaping facilities. Access to IT equipment (e.g., laptops),
443 was also added as a recommendation in light of increased need to self-isolate due to the
444 COVID-19 pandemic. A highly rated recommendation relating to deliverers' skill
445 development (i.e., *Provide additional training on how to use tools associated with*
446 *intervention delivery, so staff practice and observe use of these tools to facilitate day to day*

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

451 **Discussion**

452 Summary of findings

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

466 The study used a systematic, theoretically guided approach to specify the content and
467 possible mechanisms of action of an implementation strategy using behavioural science
468 methodology and triangulation from different data sources (i.e. semi-structured interviews,
469 document analysis, Delphi survey, stakeholder engagement). We have also illustrated how
470 theory can be used to optimise the implementation strategy of the CURE project. From
471 interviews with healthcare professionals, six themes were identified as influences for the
472 implementation of CURE (22). These were used to identify gaps in the existing

473 implementation strategy and informed recommendations for refinement. The implementation
474 strategy consisted of 26 BCTs (i.e. 'active components'), seven intervention functions, and
475 four policy categories that could stimulate behaviour change through several mechanisms of
476 action, especially 'beliefs about consequences' (Reflective Motivation) and 'knowledge'
477 (Psychological Capability). Similarly, previous systematic reviews have shown that
478 educational strategies were the most commonly used strategies in multi-strategy
479 interventions (34,35). Current evidence suggests that organisational-level interventions in
480 the healthcare context can influence clinical outcomes and efficiency (36). When used as
481 part of multi-strategy interventions, group education and organisational strategies (e.g.
482 creation of an implementation team) corresponded with positive significant changes in
483 outcomes (34). Incorporating theory (12) in the design of implementation strategies would
484 enhance the field's understanding of the causal mechanisms by which the strategies lead, or
485 do not lead, to changes in outcomes at all levels.

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

493 Several challenges to adoption and implementation of the Ottawa model have been
494 identified previously (Reid et al 2010). Likewise, these challenges typically included staff
495 regarding smoking as a 'lifestyle choice' and a lack of support from key opinion leaders and
496 clinical managers. Leadership and performance feedback from managers, training about
497 tobacco-dependence treatment, and smoke-free hospital policies were the key
498 recommendations to improve adoption and implementation (Reid et al 2010). This evidence

499 base has been used to underpin the delivery of smoking cessation in secondary care
500 settings, and to inform future implementation strategies (37).
501 Other studies have successfully integrated similar theoretical approaches (i.e. BCW, TDF)
502 and methodologies (e.g. qualitative interviews, Delphi, stakeholder involvement) to
503 characterise the content and theoretical mechanisms of action of an existing implementation
504 strategy, and to optimise an existing implementation strategy (38,39). The findings from this
505 strategic behavioural analysis are similar to those of other studies, particularly that only a
506 small percentage of BCTs used in interventions (21% to 37.5%) are theoretically relevant for
507 targeting identified barriers to deliver or implement behaviour change interventions (18, 29).
508 Likewise, missed opportunities in the implementation strategy content are similar across
509 other behavioural analyses that highlighted that most focus on shaping knowledge rather
510 than addressing motivational, social and environmental influences (18, 29).
511 This study provides relevant evidence to further guide the implementation process and
512 selection of strategies; ensuring that enough attention is paid to planning implementation;
513 and a flexible approach that allows response to emerging barriers, particularly at the
514 organisational level. According to Li et al. (40) organisational contextual features (e.g.
515 organisational culture; leadership; networks and communication; resources; evaluation,
516 monitoring and feedback; and champions) were most commonly reported to influence
517 implementation outcomes across a wide range of healthcare settings.

518 Strengths and limitations

519 This study is the first to qualitatively explore behavioural factors underpinning the
520 implementation of the CURE project. Considering barriers and facilitators to implementation
521 through the lens of the TDF allows for the identification of both internal and external factors
522 which are known to influence behaviour change and evidence-based intervention
523 implementation. The behavioural analysis links these barriers and facilitators to specific
524 components underpinning the CURE implementation strategy. This therefore provides novel
525 insight into key factors which can facilitate implementation of such an intervention in a
526 hospital setting. The NHS long-term plan aims to roll-out adaptations of the CURE and

527 Ottawa models across acute, maternity and mental health settings (1). As such, this study is
528 further informing and supporting implementation of NHS-funded tobacco dependence
529 services in England (41). Given the time and financial constraints of this study (conducted
530 during the early stages of the COVID-19 pandemic), and the focus on facilitating healthcare
531 professionals' implementation behaviour, stakeholder consultation was limited to healthcare
532 professionals. As such, patients or the public were not involved in the development of this
533 research. The inclusion of patient perspectives should therefore be prioritised in future work.
534 Due to its early phase of roll-out, our recommendations were developed from data relating to
535 a single UK hospital implementing CURE. As such, generalisability of findings to other
536 contexts may be limited. From these findings, relevant decision makers can make a
537 strategic, informed decision using evidence-based recommendations to optimise the
538 implementation and delivery of future NHS-funded tobacco dependence treatment and target
539 mechanisms of healthcare professional's behaviour change. This approach also provides
540 further insight into potentially overlooked, yet relevant, intervention functions (i.e. missed
541 opportunities) which may be considered by decision makers to optimise the implementation
542 of secondary care-based tobacco dependence services. Overall, the systematic approach
543 taken throughout the present research, and use of established theoretical frameworks,
544 results in evidence which, importantly, facilitates efficient translation to policy and practice
545 (14).

546

547 Implications for practitioners, policymakers, and future research

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

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

562 The inclusion of fiscal measures (i.e., using the tax system to reduce or increase the
563 financial cost), and legislation (i.e., making or changing laws) was considered less
564 practicable in the hospital context. For the policy category of regulation, further strategies
565 could be introduced, e.g., establishing rules or principles for vaping within the hospital
566 premises, and further evaluated through research.

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

578 Conclusion

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

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

592

593 **List of abbreviations**

594 CURE: Conversation, Understand, Replace, Expert and Evidence based Treatments.

595 OMSC: Ottawa Model for Smoking Cessation

596 TDF: Theoretical Domains Framework

597 BCT: Behaviour Change Technique

598 BCW: Behaviour Change Wheel

599 MRC: Medical Research Council

600 APEASE: Affordability, Practicality, Efficacy, Acceptability, Safety and Equity/Side Effects

601

602 **Declarations**

603 Availability of data and material: The datasets used and/or analysed during the current study
604 are available from the corresponding author on reasonable request.

605 Competing interests: VM is employed by project funders, Public Health England. ME and FH
606 led the pilot evaluation of the CURE project in Greater Manchester.

607 Funding: This research was commissioned and funded by Public Health England
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609 Authors' contributions: AR, AH and CH developed the initial study design and secured
610 funding for the study. AW conducted preparation of study materials, data collection and
611 analysis for the qualitative interviews and drafted summary reports. AR conducted the
612 behavioural analysis. CH developed the logic models. AR and AW drafted the manuscript.
613 CH, AH, VM, FH and ME contributed and provided comments on data analysis and
614 interpretation, and report drafts. All co-authors have reviewed and agreed the final draft of
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620 Patient and Public Involvement: As this study focussed on healthcare professionals'
621 behaviour change, no patients or members of the public were involved.

622 Ethics statement: Ethical Approval was granted from Northumbria University Faculty of
623 Health and Life Sciences Ethics Committee (Ref 21358). Informed consent was obtained
624 from all study participants. All methods were carried out in accordance with relevant
625 guidelines and regulations.

626

627 **References**

- 628 1. National Health Service, NHS England. The NHS long term plan [Internet]. 2019 [cited
629 2020 Apr 6]. Available from: www.longtermplan.nhs.uk
- 630 2. Mangera Z, Devani N. National Smoking Cessation Audit Report 2019 National
631 Improvement Objectives : Key Findings. London, UK; 2020.
- 632 3. Rigotti NA, Munafò MR, Stead LF. Interventions for smoking cessation in hospitalised
633 patients. *Cochrane Database Syst Rev.* 2007;
- 634 4. Rigotti NA, Clair C, Munafò MR, Stead LF. Interventions for smoking cessation in
635 hospitalised patients. *Cochrane Database Syst Rev.* 2012 May 16;2017(12).
- 636 5. Papadakis S, Cole AG, Reid RD, Coja M, Aitken D, Mullen KA, et al. Increasing rates
637 of tobacco treatment delivery in primary care practice: Evaluation of the Ottawa model
638 for smoking cessation. *Ann Fam Med.* 2016;14(3):235–43.
- 639 6. Reid RD, Mullen KA, D'Angelo MES, Aitken DA, Papadakis S, Hale PM, et al.
640 Smoking cessation for hospitalized smokers: An evaluation of the “Ottawa Model.”
641 *Nicotine Tob Res.* 2009;12(1):11–8.
- 642 7. Mullen KA, Manuel DG, Hawken SJ, Pipe AL, Coyle D, Hobler LA, et al. Effectiveness
643 of a hospital-initiated smoking cessation programme: 2-year health and healthcare
644 outcomes. *Tob Control.* 2017;26(3):293–9.
- 645 8. Evison M, Agrawal S, Conroy M, Bendel N, Sewak N, Fitzgibbon A, et al. Building the
646 case for comprehensive hospital-based tobacco addiction services: Applying the
647 Ottawa Model to the City of Manchester. *Lung Cancer.* 2018;121:99–100.
- 648 9. Powell BJ, Waltz TJ, Chinman MJ, Damschroder LJ, Smith JL, Matthieu MM, et al. A
649 refined compilation of implementation strategies: Results from the Expert
650 Recommendations for Implementing Change (ERIC) project. *Implement Sci* [Internet].
651 2015 Feb 12 [cited 2021 Apr 9];10(1):21. Available from:

- 652 <http://implementationscience.biomedcentral.com/articles/10.1186/s13012-015-0209-1>
- 653 10. Evison M, Pearse C, Howle F, Baugh M, Huddart H, Ashton E, et al. Feasibility,
654 uptake and impact of a hospital-wide tobacco addiction treatment pathway: Results
655 from the CURE project pilot. *Clin Med (Northfield Il)*. 2020;20(2):196–202.
- 656 11. Evison M, Cox J, Howle F, Groom K, Moore R, Clegg H, et al. Health economic
657 analysis for the CURE Project' pilot: A hospital-based tobacco dependency treatment
658 service in Greater Manchester. *BMJ Open Respir Res* [Internet]. 2021 [cited 2022 Apr
659 8];8(1):e001105. Available from:
660 <https://bmjopenrespres.bmj.com/content/8/1/e001105>
- 661 12. Birken SA, Powell BJ, Shea CM, Haines ER, Alexis Kirk M, Leeman J, et al. Criteria
662 for selecting implementation science theories and frameworks: Results from an
663 international survey. *Implement Sci* [Internet]. 2017 Oct 30 [cited 2021 Apr 9];12(1):1–
664 9. Available from: <https://link.springer.com/articles/10.1186/s13012-017-0656-y>
- 665 13. Nilsen P. Making sense of implementation theories, models and frameworks.
666 *Implement Sci* [Internet]. 2015 Apr 21 [cited 2021 Apr 9];10(1):53. Available from:
667 <http://implementationscience.biomedcentral.com/articles/10.1186/s13012-015-0242-0>
- 668 14. Michie S, Atkins L, West R. *The Behaviour Change Wheel: A Guide to Designing*
669 *Interventions*. Great Britain: Silverback Publishing; 2014.
- 670 15. Michie S, Johnston M, Abraham C, Lawton R, Parker D, Walker A. Making
671 psychological theory useful for implementing evidence based practice: A consensus
672 approach. *Qual Saf Heal Care*. 2005;14(1):26–33.
- 673 16. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for
674 use in behaviour change and implementation research. *Implement Sci*. 2012;7(1):1–
675 17.
- 676 17. Michie S, van Stralen MM, West R. The behaviour change wheel: A new method for

- 677 characterising and designing behaviour change interventions. *Implement Sci.*
678 2011;6(1):42.
- 679 18. Michie S, Richardson MS, Johnston M, Abraham C, Francis J, Hardeman W, et al.
680 The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered
681 Techniques: Building an International Consensus for the Reporting of Behavior
682 Change Interventions. *Ann Behav Med.* 2013;46(1):81–95.
- 683 19. Atkins L, Sallis A, Chadborn T, Shaw K, Schneider A, Hopkins S, et al. Reducing
684 catheter-associated urinary tract infections: a systematic review of barriers and
685 facilitators and strategic behavioural analysis of interventions. *Implement Sci.*
686 2020;15(1):44.
- 687 20. Araújo-Soares V, Hankonen N, Pesseau J, Rodrigues A, Sniehotta FF. Developing
688 Behavior Change Interventions for Self-Management in Chronic Illness: An Integrative
689 Overview. *Eur Psychol.* 2019;24(1):7–25.
- 690 21. Moore G, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process
691 Evaluation of Complex Interventions: UK Medical Research (MRC) Guideline. *Br Med*
692 *J* [Internet]. 2015 [cited 2018 Sep 30];350. Available from:
693 <https://mrc.ukri.org/documents/pdf/mrc-phsrn-process-evaluation-guidance-final/>
- 694 22. Wearn A, Haste A, Haighton C, Mallion V, Rodrigues AM. Barriers and facilitators to
695 implementing the CURE stop smoking project: a qualitative study. *BMC Health Serv*
696 *Res.* 2021;21(1):481.
- 697 23. Pinnock H, Barwick M, Carpenter CR, Eldridge S, Grandes G, Griffiths CJ, et al.
698 Standards for Reporting Implementation Studies (StaRI) Statement. *BMJ* [Internet].
699 2017 Mar 6 [cited 2021 Apr 9];356. Available from:
700 <http://www.bmj.com/permissions>Subscribe:<http://www.bmj.com/subscribe>BMJ2017;35
701 6:i6795doi:10.1136/bmj.i6795

- 702 24. Hoffmann TC, Glasziou PP, Boutron I, Milne R, Perera R, Moher D, et al. Better
703 reporting of interventions: template for intervention description and replication
704 (TIDieR) checklist and guide. *Br Med J.* 2014 Mar 7;348.
- 705 25. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method
706 for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res*
707 *Methodol.* 2013 Dec 18;13(1):117.
- 708 26. Cartmell KB, Dismuke CE, Dooley M, Mueller M, Nahhas GJ, Warren GW, et al.
709 Effect of an evidence-based inpatient tobacco dependence treatment service on 1-
710 year postdischarge health care costs. *Med Care.* 2018;56(10):883–9.
- 711 27. Riordan F, Racine E, Phillip ET, Bradley C, Lorencatto F, Murphy M, et al.
712 Development of an intervention to facilitate implementation and uptake of diabetic
713 retinopathy screening. *Implement Sci.* 2020;15(1):1–17.
- 714 28. Atkins L, Francis J, Islam R, O'Connor D, Patey A, Ivers N, et al. A guide to using the
715 Theoretical Domains Framework of behaviour change to investigate implementation
716 problems. *Implement Sci.* 2017;12(1):77.
- 717 29. Patey AM, Islam R, Francis J, Bryson GL, Grimshaw JM, Driedger M, et al.
718 Anesthesiologists' and surgeons' perceptions about routine pre-operative testing in
719 low-risk patients: Application of the Theoretical Domains Framework (TDF) to identify
720 factors that influence physicians' decisions to order pre-operative tests. *Implement*
721 *Sci.* 2012;7(1):52.
- 722 30. Haighton C, Newbury-Birch D, Durlak C, Sallis A, Chadborn T, Porter L, et al.
723 Optimising Making Every Contact Count (MECC) interventions: A strategic
724 behavioural analysis.
- 725 31. Cane J, Richardson M, Johnston M, Ladha R, Michie S. From lists of behaviour
726 change techniques (BCTs) to structured hierarchies: Comparison of two methods of

- 727 developing a hierarchy of BCTs. *Br J Health Psychol.* 2015;20(1):130–50.
- 728 32. Michie S, Johnston M, Hardeman W, Eccles M. From Theory to Intervention: Mapping
729 Theoretically Derived Behavioural Determinants to Behaviour Change Techniques.
730 *Appl Psychol.* 2008;57(4):660–80.
- 731 33. de Meyrick J. The Delphi method and health research. *Health Educ.* 2003 Feb
732 1;103(1):7–16.
- 733 34. Tomasone JR, Kauffeldt KD, Chaudhary R, Brouwers MC. Effectiveness of guideline
734 dissemination and implementation strategies on health care professionals' behaviour
735 and patient outcomes in the cancer care context: A systematic review [Internet]. Vol.
736 15, *Implementation Science.* BioMed Central Ltd.; 2020 [cited 2021 Apr 9]. p. 41.
737 Available from:
738 [https://implementationscience.biomedcentral.com/articles/10.1186/s13012-020-0971-](https://implementationscience.biomedcentral.com/articles/10.1186/s13012-020-0971-6)
739 [6](https://implementationscience.biomedcentral.com/articles/10.1186/s13012-020-0971-6)
- 740 35. Grimshaw JM, Thomas RE, MacLennan G, Fraser C, Ramsay CR, Vale L, et al.
741 Effectiveness and efficiency of guideline dissemination and implementation strategies.
742 *Health Technol Assess (Rockv)* [Internet]. 2004 [cited 2021 Apr 9];8(6). Available
743 from: <https://pubmed.ncbi.nlm.nih.gov/14960256/>
- 744 36. Straus SE, Tetroe J, Graham ID. Knowledge Translation in Health Care: Moving from
745 Evidence to Practice [Internet]. Straus S, Tetroe J, Graham I., editors. *Knowledge*
746 *Translation in Health Care: Moving from Evidence to Practice.* John Wiley & Sons;
747 2009 [cited 2021 Apr 9]. 1–318 p. Available from: <https://cihr-irsc.gc.ca/e/40618.html>
- 748 37. Jones S, Hamilton S. Smoking cessation: Implementing hospital-based services. *Br J*
749 *Nurs* [Internet]. 2011 Oct 13 [cited 2021 Apr 9];20(18):1210–5. Available from:
750 <https://www.magonlinelibrary.com/doi/abs/10.12968/bjon.2011.20.18.1210>
- 751 38. Steinmo S, Fuller C, Stone SP, Michie S. Characterising an implementation

- 752 intervention in terms of behaviour change techniques and theory: The “Sepsis Six”
753 clinical care bundle. *Implement Sci* [Internet]. 2015 Aug 8 [cited 2020 Jul
754 16];10(1):111. Available from:
755 <http://implementationscience.biomedcentral.com/articles/10.1186/s13012-015-0300-7>
- 756 39. Steinmo S, Michie S, Fuller C, Stanley S, Stapleton C, Stone SP. Bridging the gap
757 between pragmatic intervention design and theory: Using behavioural science tools to
758 modify an existing quality improvement programme to implement “Sepsis Six.”
759 *Implement Sci* [Internet]. 2016;11(1):1–12. Available from:
760 <http://dx.doi.org/10.1186/s13012-016-0376-8>
- 761 40. Li SA, Jeffs L, Barwick M, Stevens B. Organizational contextual features that
762 influence the implementation of evidence-based practices across healthcare settings:
763 A systematic integrative review. *Syst Rev* [Internet]. 2018 May 5 [cited 2021 Apr
764 9];7(1):72. Available from:
765 [https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-018-](https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-018-0734-5)
766 [0734-5](https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-018-0734-5)
- 767 41. Kaner EFS, Ramsay SE, Aquino MRJV, Wearn A, Fong M, Todd A, et al. Supporting
768 the NHS Long Term Plan: An evaluation of the implementation and impact of NHS-
769 funded tobacco dependence services. NIHR Applied Research Collaboration National
770 Priority Areas: Prevention, including behavioural risk factors.; 2021.
- 771 42. Perry C, Chhatralia K, Damesick D, Hobden S, Volpe L. Behavioural insights in health
772 care | The Health Foundation [Internet]. The Health Foundation. 2015 [cited 2021 Apr
773 23]. Available from: [https://www.health.org.uk/publications/behavioural-insights-in-](https://www.health.org.uk/publications/behavioural-insights-in-health-care)
774 [health-care](https://www.health.org.uk/publications/behavioural-insights-in-health-care)
- 775 43. Meeker D, Knight TK, Friedberg MW, Linder JA, Goldstein NJ, Fox CR, et al. Nudging
776 guideline-concordant antibiotic prescribing: A randomized clinical trial. *JAMA Intern*
777 *Med* [Internet]. 2014 Mar 1 [cited 2021 Apr 9];174(3):425–31. Available from:

778 <https://jamanetwork.com/>

779 44. Human Behaviour Change Project. The Theory and Techniques Tool [Internet]. [cited
780 2020 Apr 20]. Available from:

781 <https://theoryandtechniquetool.humanbehaviourchange.org/tool>

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800 **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"> - Implement systematic screening of all hospital admissions for smoking status - Implement an automated opt-out referral process to a specialist tobacco addiction treatment team for active smokers - Train the medical workforce to have the competence and confidence to discuss and initiate the treatment for tobacco addiction with smokers; - Provide a standardised assessment and treatment pathway for smokers admitted to secondary care; - Provide an appropriately resourced Specialist Nurse team to see all smokers admitted to secondary care and design individualised treatment plans including beyond discharge; - Promote standardised and robust handover of treatment plan to primary care upon discharge; - Promote culture change within secondary care to embed the treatment of tobacco addiction into all medical teams' day-to-day practice; - Provide IT systems to support the delivery of this programme.
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. 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. Specialist Nurse Training manual developed to support the CURE Nursing Team in their role. Posters, screensavers, flyers, ID badge foldout prescribing protocol created to promote project and key elements of the pathway. Bespoke teaching sessions (induction, departmental teaching, grand rounds, ward walk-arounds, educational resources)</p>
Where	<p>Online training Face to face training sessions Slots on existing educational training sessions for doctors and nurses Hospital setting</p>
When and How much	<p>Elearning module launched September 2018 – one month prior to launch to give time to embed Face to face training/updates given over 3-4 months before and after launch of the CURE Project in October 2018</p>
Tailoring	<p>No tailoring</p>
Fidelity	<p>No fidelity checks</p>

802 **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 (i.e. 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 (i.e. shadowing, observation of new staff, repetition of training, lunchtime training sessions, certificate upon 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 (e.g. 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 (e.g. 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	

Activities and intervention strategies	Source of information	Behaviour Change Techniques	Intervention functions	Policy Categories
GP financial incentives (i.e. 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 (e.g. posters, website, e-learning 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	

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811 **Table 3. Prioritisation of TDF domains for the implementation of the CURE model by**
 812 **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 & Physical Capability combined)	7	1	Yes
7	Beliefs about consequences (reflective motivation)	7	2	No
8	Knowledge (psychological capability)	3	1	No
Joint 9 th – 14 th	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	-

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816 **Table 4. Theoretical congruence between the BCTs identified in CURE implementation**
 817 **strategy content and the key TDF domains influencing implementation of CURE within**
 818 **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	1	HIGH
	Goals	2	
	Social professional role/ identity	3	
	Social influences	3	
	Beliefs about capabilities	9-14	
Social support (emotional)	Goals	2	HIGH
	Social professional role/ identity	3	
	Social influences	3	
	Beliefs about capabilities	9-14	
	Emotions	9-14	
Social support (unspecified)	Goals	2	HIGH
	Social professional role/ identity	3	
	Social influences	3	
	Beliefs about capabilities	9-14	
Reward (outcome)	Goals	2	HIGH
	Reinforcement	5	
	Skills	6	
	Beliefs about consequences	9-14	
Restructuring the social environment	Environmental Context and Resources	1	HIGH
	Social influences	3	
	Social influences	3	
Demonstration of the behaviour	Social influences	3	HIGH
	Skills	6	
	Beliefs about capabilities	9-14	
Prompts/cues	Environmental Context and Resources	1	MED
	Memory, Attention, Decision Making	9-14	
	Behavioural Regulation	9-14	
Restructuring the Physical environment	Environmental Context and Resources	1	MED
Adding objects to the environment	Environmental Context and Resources	1	MED
Action Planning	Goals	2	MED
	Behavioural Regulation	9-14	
	Memory, Attention, Decision Making	9-14	
	Optimism	9-14	
Verbal persuasion about capability	Goals	2	MED
	Beliefs about capabilities	9-14	
	Optimism	9-14	
Review outcome goal(s)	Goals	2	MED
Material incentive (behaviour)	Reinforcement	5	MED
	Beliefs about consequences	9-14	
Instruction on how to perform the behaviour	Skills	6	MED
	Knowledge	8	
	Beliefs about capabilities	9-14	
Behavioural practice/rehearsal	Skills	6	MED
	Beliefs about capabilities	9-14	
Credible source	Beliefs about consequences	9-14	LOW
Feedback on outcome(s) of behaviour	Beliefs about consequences	9-14	LOW
	Knowledge	8	
Feedback on behaviour	Knowledge	8	LOW
	Beliefs about consequences	9-14	

BCT	Linked TDF domains according to integrated mapping matrix*	Domain importance ranking**	Theoretical congruence between BCT and domain***
Information about Antecedents	Knowledge Behavioural regulation	8 9-14	LOW
Information about health consequences	Knowledge Beliefs about consequences Intentions	8 9-14 9-14	LOW
Saliency 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

819 * TDF x BCT mapping matrices (31,32) and The Theory and Techniques Tool (44).

820 **Domain ranking based on thematic analysis of barrier/facilitators data from interviews (see **Error!**
821 **Reference source not found.**).

822 ***Classification of theoretical congruence: Low: BCT is not paired with any of the 6 key domains

823 identified as important in the thematic analysis; Medium: BCT is paired with at least one domain

824 identified as important; High: BCT is paired with two or more domains identified as important.

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834 **Table 5. Seized and missed opportunities: Intervention functions linked with CURE.**

	Intervention functions

TDF domain (COM-B)	Educational	Enablement	Environmental restructuring	Incentivisation	Coercion	Modelling	Persuasion	Training	Restriction
Skills (Physical capability)		Green						Green	
Skills (Psychological capability)	Green	Green						Green	
Goals, Professional role, (Reflective motivation)	Green			Green	Red		Green		
Reinforcement (Automatic motivation)		Green	Green	Green	Red	Green	Green	Green	
Environmental context and resources (Physical opportunity)		Green	Green					Green	Red
Social Influences (Social opportunity)		Green	Green			Green			Red

835 Table seven displays links between the intervention functions coded in the existing CURE intervention, and the intervention
836 functions linked to the top TDF domains using the BCW matrix (p.116). Green indicate an opportunity seized, and red indicate

837 an opportunity missed. White is not paired. Note: the definition of Skills used for this exercise combines Physical Skills and
838 Cognitive/Interpersonal Skills (see Table 1.5, p.88 of The Behaviour Change Wheel(Michie et al., 2014)). Furthermore, both
839 types of Skill are linked to the same intervention functions and BCTs in the mapping matrices used throughout this paper.

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841 **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	Green	Green	White	Red	Red	White	Green
Enablement	White	Green	Red	Red	Red	Green	Green
Environmental restructuring	White	Green	Red	Red	Red	Green	White
Incentivisation	Green	Green	Red	Red	Red	White	Green
Coercion	Grey	Grey	Grey	Grey	Grey	White	Grey
Modelling	Green	White	White	White	White	White	Green
Persuasion	Green	Green	White	Red	Red	White	Green
Training	White	Green	Red	Red	Red	White	Green
Restriction	White	Grey	White	Grey	Grey	White	White

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

845 **Table 7. Recommendations to support the implementation of a nationwide, secondary care-based tobacco dependence treatment**
 846 **model, based upon 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) ^a
<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, for example, Local Medical Committees, Local Care	Uncertain, dependent on 'buy-in' from stakeholder groups.

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) ^a
		Organisations and Medicine Optimisation Services.	
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 (i.e. support staff, delivery staff, project team and community support). Designated hours for management to focus on the implementation of the	Restructuring the social environment	Model and implement staffing requirements appropriate to the location, particularly in terms of support staff (e.g. admin, IT support).	High

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) ^a
intervention, particularly during the pre-launch phase.			
<p>Ability to access space(s) and equipment which enable delivery of the intervention.</p> <p>On-site smoking policy that aligns with intervention principles.</p>	Restructuring the physical environment	<p>Provide adequate office space to specialist nursing staff/deliverers, to facilitate private telephone calls to patients and for use of IT.</p> <p>Ensure those involved in delivery and/or implementation of the intervention can access and use IT equipment (e.g. laptops) in light of the increasing need to work from home and self-isolate.</p> <p>Provide physical space for one-to-one support sessions, ensuring that these spaces are</p>	<p>Variable</p> <p>Uncertain</p> <p>Variable</p>

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) ^a
		<p>accessible to both staff and outpatients from the surrounding areas.</p> <p>Provision of on-site vaping space/facilities.</p>	Uncertain
Ability to provide a choice of Nicotine Replacement Therapy (NRT) to service users during their time in hospital and upon 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.	<p>Prompts/Cues</p> <p>Adding objects to the environment</p>	Prioritise the amendment of existing data storage systems to allow recording and documenting of patient information and journey through the	Moderate

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) ^a
Integration with existing IT systems to remind wider healthcare staff to deliver the brief intervention.		intervention (e.g. computers programmed with pop up requests for data).	
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 e-learning modules/online training resources.	High
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 i.e. posters, pens, and screensavers to promote awareness of the service and prompt staff engagement.	High

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) ^a
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 (For example, 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	Goal setting (behaviour) Action planning	Communicate shared goals of the intervention across management and deliverers, so required behaviours can be agreed upon and planned.	High

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) ^a
model, to ensure the intervention is delivered as intended.			
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

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) ^a
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	Goal setting (outcome) Review of outcome goal(s)	Advise project team to plan specific outcomes of interest from the earliest stages and engage in	Moderate

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) ^a
of the success of the programme and return on investment.	<p>Feedback (outcome)</p> <p>Verbal persuasion</p>	<p>ongoing audit and feedback of these outcomes on a regular basis.</p> <p>Share performance related feedback to delivery teams and wider stakeholders (e.g. in primary care) to encourage further 'buy-in'.</p>	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

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) ^a
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

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) ^a
<i>Social Influences</i>			
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

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) ^a
Strong and visible peer leadership across stakeholder groups.	<p>Restructuring the social environment</p> <p>Social support (unspecified)</p> <p>Credible source</p> <p>Verbal persuasion</p>	<p>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:</p> <ul style="list-style-type: none"> • Clinical/Nurse/Pharmacy champion • Primary Care Champion • in different Hospital wards/departments <p>As much as practicable, integrate opportunities for staff to observe peers presenting/discussing the intervention. For example, within educational</p>	<p>High, depending on affordability.</p> <p>High, depending on practicality/ availability of peer leads.</p>

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) ^a
	Identification of self as a role model Vicarious Consequences	outreach/information should be delivered by local clinical and nursing 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. For example, 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	Cue signalling reward	Educational outreach workshops or online information provision to advise GPs that funding is	Uncertain

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) ^a
ongoing treatment/prescribing within the community.	Material incentive (behaviour)	allocated for NRT prescriptions in the community and that this is a cost-effective approach.	Provision of a material (e.g. 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	Allow deliverers to shadow experienced staff providing support to patients. Provide training on how to use tools associated with intervention delivery (i.e. I.T systems).	High High

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) ^a
	Behavioural practice		

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