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Original Research

A digital solution to streamline access to smoking cessation interventions in England; findings from a primary care pilot (STOPNOW study)

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ABSTRACT

Objectives: Despite the proven efficacy of several smoking cessation medications that have been shown to improve long-term abstinence rates, approximately two-thirds of smokers report not having used medication in their most recent quit attempt. A main barrier could be delayed access to pharmacological interventions. This study investigated the utility of a primary care linked online portal to streamline timely access to pharmacological support to patients who want to quit smoking by making an asynchronous request for treatment to their general practitioner.

Study design: Prospective cohort study.

Methods: An online portal with added functionality was developed, which allowed patients with a unique link to make an asynchronous request for treatment. Two GP practices identified a total of 4337 eligible patients who received an SMS or email invite to engage with an online portal including an electronic survey to capture information about smoking behaviours and to request treatment. Portal informatics and patient level data were analysed to measure the efficacy of the online system in reducing the time between making a formal request to treatment and access to pharmacological support. The primary outcome measure was the time between making a formal request for treatment and access to pharmacological support from a designated community pharmacy.

Results: 323 patients (7.4%) initiated the survey, but only 56 patients completed the survey and made a formal request for treatment. 94% of participants did not return to use the portal to make a second or follow-up request for treatment. Only 3 participants completed the 12-week pathway. A total of 75 medication items were prescribed and collected by 56 patients. The time difference between the formal request to treatment and GP review ranged between 20 h and 1 week. The time difference between approval of prescription by the GP and access to medication was 5 days ± 2.1 days (range = 1.9–7.0 days).

Conclusion: The widespread adoption and diffusion of an IT enabled and asynchronous primary care led remote consultation pathway can streamline timely access to smoking cessation support without the need for the patient to see a GP or an independent prescriber in the first instance.

1. Introduction

Smoking is the leading cause of preventable mortality accounting for the pre-mature death of approximately eight million people worldwide [1–3], and remains the single biggest preventable cause of socioeconomic health inequalities in the UK [4]. In 2015, 16% of all deaths in the

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England were attributable to smoking [5], and accounted for half the difference in life expectancy between the richest and poorest in society [6]. The majority of smokers want to quit but find it difficult to abstain [7–10]. An English study in 2017 showed that only half of smokers who set a quit date had successfully quit smoking at 4 weeks [11]. Less than 5% of smokers who make a decision to quit achieve long-term abstinence in the absence of support including behavioural support, nicotine replacement therapy (NRT) or pharmacotherapy [12].

Various smoking cessation medications including NRT and pharmacotherapy have been shown to improve long-term abstinence rates [7,8,13], but despite their proven efficacy, approximately two-thirds of smokers report not having used medication in their most recent quit attempt [14]. Patient-level barriers to the use of pharmacotherapy include poor awareness, concern regarding adverse effects and poor accessibility of treatment [8,10], cost and difficulties in obtaining a prescription from a physician or an independent prescriber [15]. In England, extant regulatory restrictions require a visit to a prescriber to obtain a prescription for bupropion (Zyban) or varenicline (Champix) even when the recommendation was made with the support of a qualified and local authority-funded smoking cessation advisor in the community setting.

The delay between decision to quit and accessing support and pharmacotherapy may reduce the smoker's motivation to quit smoking. Some studies suggest that websites that can be accessed from the home setting, are interactive or tailored to participants' demographic characteristics are more effective than sites that are static or more general, whereas other studies suggest equal effects [16,17]. Internet-based interventions may be more effective if they include direct interaction between participants and their health care providers [18], although adding internet-based components to counselling does not necessarily improve counselling's effects on quit rates [16,19]. A systematic review of trials that compared a tailored and interactive Internet intervention to a non-active control demonstrated an effect in favour of the intervention [16], but none of these studies involved making a formal request for treatment using an online portal with direct linkage to general practice. There is already widespread availability of smartphone applications [20–23] and online support tools for smoking cessation [24] with demonstrable evidence of effectiveness of internet based interventions [16,25].

In the UK, a Patient Group Direction (PGD) is already in place for varenicline, and some private pharmacy groups are using this to facilitate the provision of smoking cessation support to fee-paying patients in the community setting. This is made possible by arrangements that would allow an appropriately trained independent prescriber to issue a prescription in the community pharmacy setting based on the patient's responses to a questionnaire which asks about their smoking habits and other lifestyle factors. In the case of some providers and large multiples such as Boots and the Lloyds pharmacy groups, the questionnaire or algorithm can be administered online or face to face in the community pharmacy setting. However, there is currently no similar algorithm-based service routinely offered to NHS patients by their GP practice to make a formal request for treatment for smoking cessation since patients are either referred to a local smoking cessation provider or an appropriately trained healthcare professional. Further, a routine consultation with a smoking cessation provider could still require the patient to be referred back to the General Practitioner (GP) on occasion that they require prescription only medicines (POM) such as varenicline for example.

A recent national survey found that 14.1% of the UK population smokes cigarettes, equating to approximately 6.9 million people [26]. Previous studies showed that the large-scale distribution of free over the counter NRT mailed to smokers wanting to quit demonstrated success and reduced the barrier of geographic access to health services [27–30]. As the time between the decision to quit by a smoker and access to behavioural support, pharmacotherapy or NRT on the NHS is protracted and could take days in some instances, it is desirable to explore the use of an IT enabled primary care led pathway that would give patients who smoke the option to make an asynchronous formal request for treatment without the need to make a visit to their GP practice or a smoking cessation provider in the community setting. This arrangement could facilitate speedier access to NRT, pharmacotherapy and POM via electronic prescription service (EPS) and may increase patient motivation to stop smoking and successful quit attempts whilst reducing costs and pressures on general practice [31,32].

The primary aim of this pilot was to assess the feasibility of a primary care led online solution to streamline timely access to NRT and pharmacological products to patients who want to quit smoking by making an asynchronous request for treatment.

2. Methods

2.1. Development of algorithm and online portal

We developed a clinically compliant online questionnaire to capture responses from patients who want to quit smoking. The online questionnaire included an algorithm to screen off unsuitable smoking cessation options based on the patient's responses. An online portal with added functionality was developed by AT Tech, London to facilitate engagement with patients and to streamline timely access to support for patients who want to quit smoking by making an asynchronous request for formal treatment to their GP using a secure environment on their smartphone or personal computer. The STOPNOW online portal could be securely accessed by patients by following a unique link sent to them via short messaging service (SMS) or via email. A wireframe of the STOPNOW portal is shown in **supplementary file 1**.

2.2. Eligibility criteria

Patients on the GP list who are over 18 years of age and who have a telephone number or email address were earmarked for enrolment into the STOPNOW pilot. Patients who are recorded as smokers but currently pregnant or breast feeding, currently using NRT or pharmacotherapy or referred to a local stop smoking services provider in the last 3 months, registered under "palliative care" category in the GP records, have a learning disability or who suffer from dementia were excluded from the study.

2.3. Patient recruitment

A GP practice in West London who commissioned the development of the STOPNOW portal were confirmed as primary care sites to run the pilot. The list size was 9000 patients. Patients who met the eligibility criteria were identified on the GP system. The practice manager then used the functionality of the STOPNOW portal to contact patients via SMS or email with a unique identifier link with a invitation to make a request for treatment on the STOPNOPW portal. The first patient was recruited on August 7, 2019. The last patient was recruited on November 4, 2019. The last patient to exit the STOPNOW pathway was on November 4, 2019.

2.4. Making a formal request for treatment using STOPNOW portal

Patients may choose to enter the STOPNOW portal pathway to learn more about their addiction score, what suitable NRT or pharmacotherapy options are available for them and how to make a formal request for treatment from their GP. Briefly, the portal onboarded patients who accessed the system using a unique link by providing information about the service which could be used to make a formal but asynchronous request for treatment to the GP. After answering clinically relevant questions about their smoking habits and lifestyle choices, the patient was provided with an 'addiction score'. A list of suitable NRT or pharmacotherapy options were then displayed alongside additional

information about each product for the patient to select from. Once a selection was made, the patient may choose to make a formal request for treatment by the GP.

2.5. Assessing formal request for treatment

An independent prescriber sitting across the two pilot GP practices was alerted when a formal request for treatment was made by a patient entering the STOPNOW pathway. The prescriber who had access to the patient's electronic health record (EHR) reviewed the summary tab and cross-checked key information on the portal before either approving or denying the original request for treatment. On the occasion that the appropriate selection of NRT and pharmacotherapy product was selected by the patient and the prescriber approved, an SMS with a unique reference number was sent to the patient alerting them that their prescription was ready for collection at a designated local pharmacy. The pharmacy received the script via electronic prescription service (EPS). On occasion that the selection made by the patient was deemed unsuitable either due to contraindications on EHR or for other reasons, the patient was recalled for a routine appointment with the GP.

2.6. Collecting prescriptions from the pharmacy

Patients who made a formal request for treatment using the STOPNOW portal and who had their medication approved by the independent prescriber presented the community pharmacist with the SMS showing the unique code. The pharmacist verified the patient's identify, obtained a carbon monoxide (CO) reading following exhalation test where possible and dispensed the medication. The patient paid for their first prescription as normal unless they were exempted under current qualifying criteria. The pharmacist kept a log of the date stamp of when the medication by each patient was picked up.

2.7. Repeat prescriptions

As per clinical guidelines, NRT and/or POM for smoking cessation should be provided for quitters for 12-weeks. Patients who make a formal request for treatment using the online portal and who collected their prescription within 7 days of issue were sent another SMS 5 days later. Subsequent follow-up SMS included a unique link that can be used by the patient to report on their smoking and relevant lifestyle habits and to make a formal request for follow-up prescriptions. This cycle was repeated every 4 weeks for patients who picked up their medication from the pharmacy and who accessed the portal using subsequent links sent to them via SMS up until 3 months after initial request for treatment. Patients who selected to receive traditional face-to-face support at GP or community provider were followed up as usual.

2.8. End of Treatment

All patients entering the STOPNOW pathways were eligible to receive support for up to 12 weeks. End of Treatment was at 12 weeks after initial sign-up for patients who returned to make subsequent requests, or 1 week after choosing not to return to make subsequent requests. Patients who did not re-engage with the portal or who contacted the GP with a request for face-to-face support exited the pathway.

2.9. Data analysis

All data was anonymised for researchers and was only identifiable to GPs involved in the care of participants. Descriptive analysis was used to summarize sociodemographic characteristics of study participants, the number of touchpoints with community pharmacy and the type and volume of prescriptions issued and collected. Continuous data were reported using means and standard deviation (SD) and categorical variables using frequencies (n) and percentages (%). Missing observations or incomplete data were excluded. Statistical analysis was caried out using Stata-15.

3. Results

3.1. Portal functionality

A wireframe diagram and flowchart illustrating portal functionality and patient journey through the different checkpoints of the STOPNOW portal shown in Fig. 1.

3.2. Primary care recruitment

Two GP practices identified a total of 4337 eligible patients on their list using specified inclusion criteria. The average age of patients who are recorded as smokers on GP list was as 34.3 years (±12.7 SD); range = 19–94 years. Gender distribution was 52.6% female, 44.7% male and 2.6% unknown. A third (35.9%) of patients identified as either White British, or White Other; 36.8% identified as mixed or Asian, 5.9% as Black, 8.6% as Other and 12.7% as not given. This pool of potentially eligible participants (n = 4337) was contacted via SMS (n = 3989) and email (n = 348). A total of 3241 SMS and 319 email reminders were sent 2 weeks later. These invitations resulted in a total of 748 visits to the STOPNOW portal between August 2, 2019 & November 5, 2019. From this sample, only 323 patients (43.1%) engaged with the portal and completed questions.

3.3. Formal request for treatment

Only 56 patients (17.3%) completed the questionnaire and made a formal request for treatment. The mean age of participants who entered the STOPNOW pathway was 36.4 years (±11.9 SD); range = 22–80 years (Table 1). Gender distribution was 42.8 female, 55.4% male and 1.79% not recorded. Ethnicity was 10.78% White British, 30.4% White Other, 32.1% Mixed race, 8.9% Asian, 5.6% Black, 12.5% Other ethnic background and 1.79% not recorded. From the 56 patients entering the STOPNOW pathway, 11 patients (19%) had an addiction score of 1, fourteen patients (25%) had an addition score of 2, sixteen patients (28%) had an addiction score of 3, and fifteen patients (26%) had an addiction score of 4. The average addiction score of participants entering the pathway was 2.62 (±1.07 SD).

From the 56 patients who entered the pathway, only 4 patients returned to make another (second) request for treatment at week 2. Only one patient returned to make subsequent requests for treatment at weeks 6 and 10. The first request for treatment was made on August 2, 2019. The last request for treatment was made on November 4, 2019. The last patient to exit the pathway was on November 21, 2019.

3.4. Prescriptions

Only two out of the fifty-six patients that entered the pathway made a formal request for behavioural support without NRT or pharmacological support. Both patients were referred to the local smoking cessation service and exited the pathway. A total of 75 medication items were prescribed to the remaining 54 patients, including 29 requests for nicotine patches; 5 for varenicline; 4 for nicotine gum, 2 for nicotine micro-tabs, 3 for Nicotine nasal spray, 3 for nicotine Inhalators and 5 for Lozenges; Table 2). These 75 items were prescribed using 65 scripts issued via EPS to a designated community pharmacy between 2 August and November 6, 2019. The average number of items per scrip was 1.2 (±0.4 SD). Three quarters (55/75; 73%) of the medications were prescribed between 2 Aug-30 August 2019. The remaining 20 medications (27%) were prescribed between 1 September and November 6, 2019.

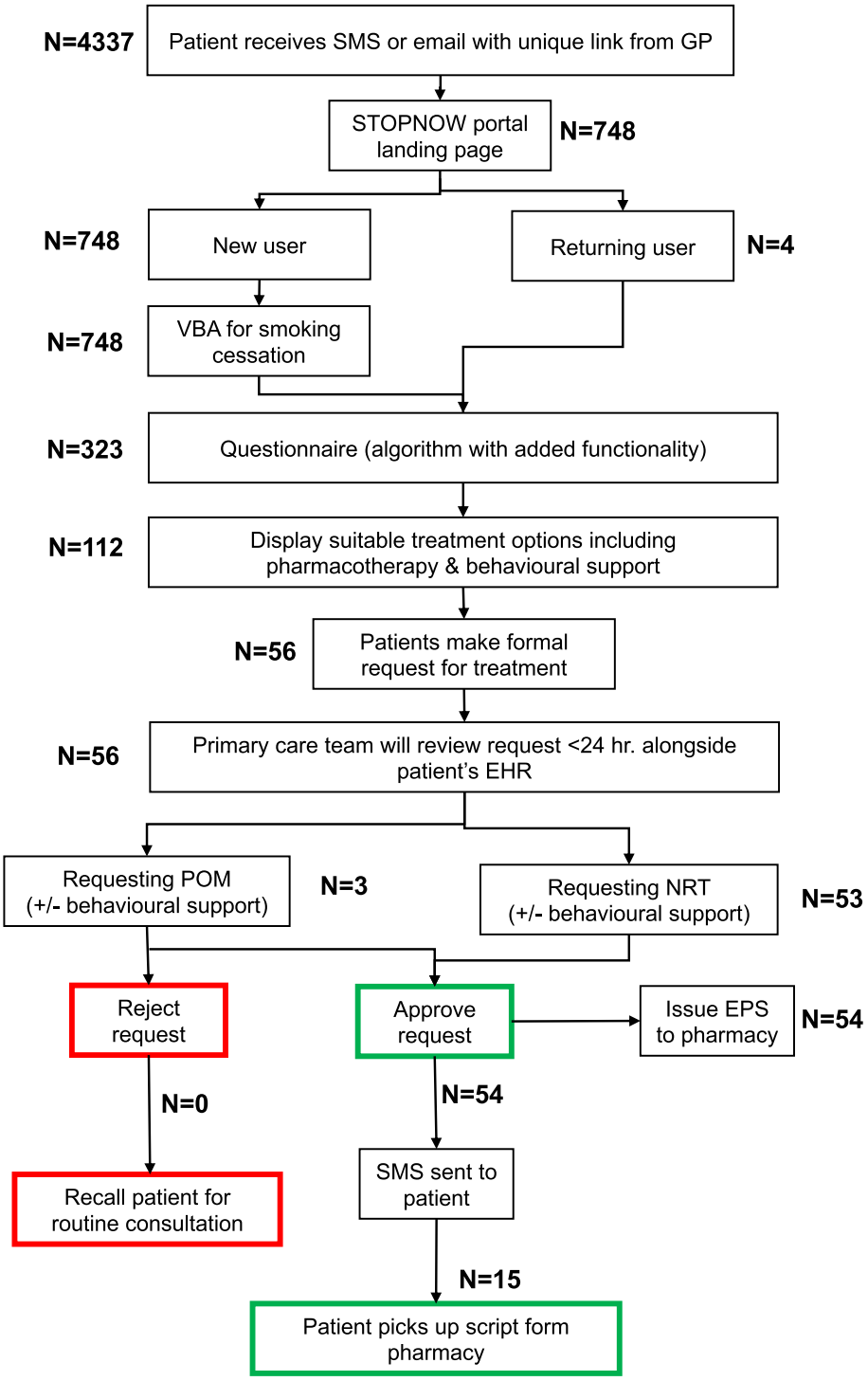

Fig. 1. Flowchart illustrating uptake and patient journey through the different checkpoints of the STOPNOW portal.

3.5. Collection of prescriptions

Only 15 patients had collected their medications from the nominated pharmacy. Nearly half (6/13; 46%) of patients paid for their prescriptions, with the remaining indicating they were exempted. None of the patients agreed to have CO monitoring at baseline. Only one patient reported successfully quitting at end of the 12-week pathway. The time difference between formal request for treatment and GP review ranged between 20 h and 1 week. The time difference between approval of prescription by the GP and access to medication was 5 days ± 2.1 days (range = 1.9–7.0 days). The calculated time difference between formal request for treatment via STOPNOW and pick up of prescription by the patient (the primary outcome) from the pharmacy ranged between 2.9 days and 8 days.

4. Discussion

Whereas smoking is the major avoidable cause of preventable morbidity and mortality in the UK and internationally, there are surprisingly few examples of a patient-facing primary care led IT system to streamline the delivery of evidence based smoking cessation interventions in the community setting [22,33–35]. The aim of this study

Table 1
Participant characteristics of patients who made a formal request for treatment using online portal.

Age (in years), Mean (SD)	36.5 (11.9)
Addiction Score, n (%)	
1 (Very low)	11 (19.6)
2 (Low)	14 (25.0)
3 (High)	16 (28.6)
4 (Very high)	15 (26.8)
Gender, n (%)	
Male	31 (55.4)
Female	25 (42.9)
Unknown	1 (1.8)
Ethnicity, n (%)	
White British	6 (10.7)
White Other	17 (30.4)
Mixed	18 (32.1)
Asian	5 (8.9)
Black	2 (3.6)
Other	7 (12.5)
Not given	1 (1.8)
Formal request for treatment, n (%)	
First request (baseline)	56 (100)
Second request at 2 weeks	4 (7.1)
Third request at 6 weeks	1 (1.7)
Fourth request at 10 weeks	1 (1.7)
Completed Pathway at 12 weeks	1 (1.7)

GP approvals of formal requests for treatment.

was to investigate the efficacy of a patient-facing portal to streamline timely access to pharmacological support to smokers who want to quit by making an asynchronous request for treatment with their designated NHS primary care provider. To our knowledge, this is the first study that piloted a GP-led system for this purpose.

The development of primary care led electronic portals with incorporated decision support holds promise to meet emerging preferences while overcoming the primary barriers to improved dissemination of smoking cessation interventions. Among other strengths, these patient-facing tools can be personalised and tailored to the patient's needs and can be accessed at any time form the home or community setting. Primary care led tools can also fit into and streamline the workflow of routine general practice thus saving clinician time by summarizing information for rapid review and incorporation into EHR whilst facilitating communication with patients across the literacy spectrum [22].

The STOPNOW portal was developed to test the primary hypothesis that an IT enabled asynchronous request for treatment would significantly reduce the time between the patient's decision to seek medical advice to stop smoking and access to NRT or pharmacological support when compared to traditional face-to-face GP consultations or engagement with smoking cessation clinics in the community setting. Since all participants learned about the study directly from their GP either by receiving an unsolicited SMS or an invitation email with a unique link, the decision to make a formal request for treatment was entirely up to the patients themselves. This might partially explain the low uptake following initial invite and subsequent SMS or email reminders since most recipients may not have been ready or strongly motivated to stop smoking at the time of contact. Additional research may determine how to alter the content or format of the invitation messages and email to improve traction with smokers to motivate them to stop smoking [36].

All 56 participants who completed the questionnaire and requested suitable treatment options were prescribed their preferred choice of intervention suggesting a high level of acceptability of the algorithm and the functionality of the STOPNOW portal. As with the tool previously developed by Selby et al. [35], the portal included a series of automated a priori procedures that blocked multiple or incongruent resubmissions by the same patient, including conditional checkpoints and digital identifiers that ensured a patient who did not pick up the first prescription cannot re-enter the pathway in error or make another new request for treatment. Despite these features, the vast majority of

Table 2
Prescription items (for 56 patients).

Prescription item	N. of requests made	N. of prescriptions collected	Time horizon
Behavioural support	**2**	NA	At baseline
Pharmacotherapy	**5**	**4**	
Champix 0.5mg/1 mg, 2-week treatment initiation pack	2	2	At baseline
Champix 1 mg BD x 28 tablets	1	1	At week 2
Champix 1 mg BD x 56 tablets	1	1	At week 6
Champix Low Dose (0.5 mg x 25 tablets) Champix 0.5 mg OD for 3 days, then 0.5 mg BD for 11 days	1	1	At week 10
Nicotine replacement therapy	**36**	**11**	
Nicotine Chewing Gum 2 mg x 210 pieces	3	3	At baseline
Nicotine Inhalator 15 mg cartridges with device (2 × 36 cartridges)	3	3	At baseline & week 2
Nicotine Microtabs 2 mg (2 × 100 tablets)	1	1	At baseline
Nicotine Patch 21mg/24 h (2 × 7 patches) + Nicotine 15 mg cartridges with device (2 × 36 cartridges)	3		At baseline (n = 2) & week 2 (n = 1)
Nicotine Patch 21mg/24 h (2 × 7 patches) + Nicotine Gum 4 mg x 210 pieces	1	–	At baseline
Nicotine Patch 21mg/24 h (2 × 7 patches) + Nicotine Lozenge 4 mg (2 × 80 lozenges)	4	2	At baseline
Nicotine Patch 21mg/24 h (2 × 7 patches) + Nicotine Microtabs 2 mg (2 × 100 tablets)	1	–	At baseline
Nicotine Patch 21mg/24 h (2 × 7 patches) + Nicotine Nasal Spray 500mcg/dose (4 × 10 ml)	1	–	At baseline
Nicotine Patch 21mg/24 h (4 × 7 patches) + Nicotine 15 mg cartridges with device (4 × 36 cartridges)	4	–	At baseline
Nicotine Patch 21mg/24 h (4 × 7 patches) + Nicotine Nasal Spray 500mcg/dose (8 × 10 ml)	1	–	At baseline
Nicotine Patch 25mg/16 h (2 × 7 patches) + Nicotine 15 mg cartridges with device (2 × 36 cartridges)	2	–	At baseline
Nicotine Patch 25mg/16 h (2 × 7 patches) + Nicotine Lozenge 2 mg (2 × 96 lozenges)	1		At baseline
Nicotine Patch 25mg/16 h (2 × 7 patches) + Nicotine Nasal Spray 500mcg/dose (4 × 10 ml)	1	0	At baseline
Nicotine Patches 15mg/16 h (2 × 7 patches)	9	–	At baseline
Nicotine Patches 25mg/16 h (2 × 7 patches)	1	–	At baseline

patients who made a congruent formal request for treatment and who were prescribed pharmacological support or NRT via EPS did not pick up their medication. Further, nearly all patients who entered the pathway and collected their first prescription form the pharmacy did not re-engage with the STOPNOW portal to make a subsequent formal request to continue their treatment even after receiving SMS reminders. This is consistent with other studies which showed that the passive

dissemination of adjunct motivational SMS or emails did not significantly influence traction with the intended behaviour change intervention [37]. The six-day calculated time difference between initiating a formal request for treatment and collecting the prescription could be due to the patient's self-determined quit date. Similarly, the high attrition rate of patients enrolled into the STOPNOW pathway that did not ultimately follow thought to pick up their prescription may also be due to loss of motivation to quit smoking other factors.

The routine availability of pharmacists and the conglomeration of GP practices into Primary Care Networks that serve a larger population could enhance the accessibility of pharmacy-based smoking cessation interventions offering NRT and counselling [38,39]. Further streamlining access to pharmacotherapy options almost triples the odds of long-term cessation [40–42], and empowering patients to take an active role in their treatment would help foster greater autonomous motivation to use smoking cessation medications which could result in higher levels of abstinence. This proof-of-concept primary care pilot showed that it is logistically feasible to provide NRT and/or pharmacotherapy options including prescription only medicines to NHS patients across a wide geographic area following an asynchronous request for treatment without the need for the patient to book an appointment with a smoking cessation advisor or a GP in the first instance. However, study data was limited to patient reported outcomes and the small number of participants who entered the pathway.

The main barrier for the widespread diffusion and adoption of IT enabled primary care led online portals to support patients in the community setting is how smoking cessation services are currently funded in England. Commissioners and public health local area teams therefore need to work collaboratively to ensure a coordinated approach to using the quality standard to improve outcomes for people who want to stop smoking [43], including leveraging IT to streamline access to smoking cessation support. A progressive commissioning landscape by local authorities and public health local area teams that would enable the disbursement of activity-based funds to primary care led smoking cessation services is indicated. This is because only 65% of local authorities in England now offer specialised smoking cessation services, and in 9% of local authorities the only way to access smoking cessation advice was through a GP or pharmacist [44,45]. Thus, whereas it is possible to signpost patients to an interactive intervention where they can learn about suitable options to help them quit smoking, there is little incentive for general practice to develop in-house solutions unless this activity can be captured on EHR and can be used to attract funding for primary care activity. A more simplistic approach would involve making smoking cessation products more available in the community setting by not requiring a prescription. However, this would require a revision of the patient group directions to that guide the supply medicines to patients in planned circumstances including prescription only medicine such as varenicline.

4.1. Study limitations

The principal limitation of this study was the low uptake rate which resulted in only 323 engagements with the portal from a total of 56 patients entering the pathway. This equated to an take-up rate of only 1.3% overall. This low uptake rate is not too dissimilar to previous studies that sought to support patients using SMS pathway [37]. However, the small sample size recruited is not an indicator of failure since the primary aim was to demonstrate feasibility of the IT led pathway, and not specifically to improve the frequency of successful quit rates compared to traditional face-to-face treatment. Future studies could include a qualitative research component to understand patient's and primary care staff's perspectives as regards the suitability and usability of the online platform. Another limitation resulted from delegation of tasks in the primary care site which led to the staggered and delayed review of formal requests for treatments made by patients who used the online portal. Thus, whereas GP motivation was initially high, independent prescribers in the practice group may not have received appropriate training or guidance to ensure that the recommended protocol to review all formal requests for treatment within the recommended 24hr window. This unnecessarily delayed approvals and may have negatively impacted on the motivation of smokers who have made a decision to stop but could not access support within 24 h. A future trial designed to assess the cost effectiveness of this intervention could include extensive training to all primary care and pharmacy staff to ensure that all data is logged on the portal directly. Further, abstinence should be biochemically verified in via CO monitoring when patients visited the pharmacy to collect the prescription, and future trials could also consider providing NRT in the form of electronic cigarettes.

5. Conclusion

The study has several limitations but established the feasibility of using a primary care led IT enabled model that engages smokers directly via SMS or email with an invitation to make an asynchronous request for treatment. Whereas it was possible to develop a successful pathway integrating both community pharmacy and primary care, providing an online platform does not necessarily result in a high take up or completion of treatment. The current model can be studied further to investigate how it can be scaled up to enhance the primary care provision of smoking cessation services at a population-wide level.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhip.2021.100176.

Contributors

All authors provided substantial contributions to the conception (AEO, CH, CP, AT, MA, EB, VV, MB and AA), design (AEO, CH, CP, VV), portal development (AT, AEO) primary care pilot (AT, MA), pharmacy support (BG) analysis and interpretation of the study data (AEO, EB) and approved the final version of the paper (AM, CH, AT). AEO took the lead in planning the study with support from the co-authors and carried out the data analysis with support from MB. AEO wrote the first draft of the paper, which was then revised by all co-authors. AEO is the guarantor.

Ethical approval

Ethics clearance was not required for this study which was classed as a service evaluation. This was confirmed by the Health Research Authority (HRA) and Imperial College London Research Ethics Committee (ICREC) – **supplementary file 1.**

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Patient and public involvement

PPI was considered as a cross cutting theme throughout the undertaking of the project. Various PPI meetings were held to inform overall

portal development, and to agree a suitable wording of the SMS and email invites intended for potentially eligible patients.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Austen El-Osta received an unrestricted medical education grant from Pfizer UK Ltd to support the development of this project. The funder did not contribute to the development of the protocol or the analysis of findings.

Data sharing statement

No additional data are available.

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