Original Article

Smoking cessation in elective surgical patients offered free nicotine patches when listed for surgery: a pilot study*

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Short title:

Smoking cessation in elective surgical patients

Summary

Free nicotine patches may promote pre-operative smoking cessation. Smokers (≥ 10 cigarettes.day⁻¹) awaiting non-urgent surgery were randomised (3:1) to an offer of free nicotine patches or a control group who were not offered free nicotine patches. The suggested regimen lasted five weeks, with patch strength decreasing incrementally after three and four weeks. The primary outcome was smoking abstinence for four or more weeks, as self-reported by participants on the day of surgery, including, where possible, corroboration using exhaled carbon monoxide testing. Of 600 included smokers, 447 were randomised to an offer of pre-operative nicotine patches, with 175 (39.1%) accepting the offer and 56 (12.5%) using patches for three or more weeks. Of 396 offered nicotine patches who were included for analysis: 36 (9.1%) quit smoking for four or more weeks prior to surgery as compared with 8 (5.9%) controls, OR 1.5 [95% CI 0.7-3.2], $p = 0.300$. Sixty-three (15.9%) quit smoking for 24 hours prior to surgery as compared with 15 (11.1%) controls, OR 1.4 [95% CI 0.8-2.4], $p = 0.200$. Participants offered nicotine patches were more likely to engage in a cessation attempt lasting more than 24 hours, 46 (11.6%) vs. 5 (3.7%), OR 3.4 [95% CI 1.8-8.8], $p = 0.010$. Of 78 participants who quit smoking by the day of surgery and were followed up at six-months, 46 (59%) had relapsed. Offering free nicotine patches stimulated interest in quitting compared to controls, but our protocol had limited effectiveness.

Introduction

Smoking causes a range of diseases and increases peri-operative risks including death, wound infection, airway hyperreactivity and postoperative pulmonary complications [1,2]. Tobacco cessation is an important component of surgical prehabilitation, as it significantly lowers respiratory and wound complication risks after just four-weeks [3,4]. Statements and guidelines from national anaesthesia bodies universally recommend healthcare providers advise smokers of the benefits of preoperative quitting and offer assistance [5,6].

Nevertheless, there is considerable variation in the delivery of pre-operative tobacco interventions by clinicians and health services [7,8]. The majority of smokers do not receive the major components of a brief tobacco intervention which include: asking about tobacco

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use; advising to quit; and arranging or offering assistance [9-11]. The offer of assistance is the most frequently omitted [9,11], yet offers of help have been shown to be the single-most important component associated with significantly increasing unplanned cessation attempts [12,13].

The observed variability in smoking cessation prehabilitation may result from a lack of provider knowledge, training or resources [7]. Furthermore, although there is good evidence to support smoking cessation interventions, such as nicotine replacement therapy (NRT) in the general community [14], clinicians may question its feasibility and effectiveness in surgical populations, where the evidence on how best to intervene is less clear [4,7,8]. Many countries, including the UK and Australia, have surgical waiting-lists for elective surgical patients. This allows weeks, months or longer for smoking prehabilitation. While evidence suggests that upcoming surgery is a 'teachable moment' for smoking cessation [15], it is not known if this effect is as powerful when the proposed surgery is several months in the future. Furthermore, the responsibility for addressing smoking cessation during this period may be clear enough to permit a systematic offer of help from the health service.

This pilot study aimed to assess the feasibility and effectiveness of an offer of five-weeks of free NRT transdermal patches, delivered through the post to nicotine dependant smokers (≥ 10 cigarettes.day⁻¹) at the time of listing for surgery, to determine the effect on sustained abstinence for four or more weeks before surgery. Collecting data on our ability to implement and manage the protocol will inform a future randomised controlled trial on how best to provide systematic pharmacological cessation support in this population.

Methods

This prospective, single-centre randomised controlled trial with a 3:1 allocation ratio was approved by the Peninsula Health Human Research Ethics Committee (HREC/15/PH/29) with patient consent waiver granted at the time of randomisation. We obtained verbal consent on the day of surgery for the cessation survey and written consent for exhaled carbon monoxide testing. The local government area rate of daily smoking is 17.2% [16]. Patients were screened for eligibility by waiting list office staff, who were sent a written health questionnaire that includes questions on tobacco use. Patients are routinely required to complete this form when listed for surgery. Included patients were aged 18 or more years, smoked 10 or more cigarettes.day⁻¹ and were listed for elective, non-urgent surgery. Exclusion criteria were: non-operative theatre cases; weight < 45 kg; pregnancy; breastfeeding; allergy to transdermal NRT; and those already receiving NRT.

A tick-box for 'smoker of 10 cigarettes.day⁻¹' was created within the existing hospital patient administration software (iPM, DXC Technology, Tysons Corner, USA) and waiting list staff would check this when they received a relevant questionnaire. Two researchers (LW/LP) were based in the waiting list office to ensure compliance. A list of new smokers added to the waiting list were produced at least twice-weekly between February-December 2017, and a scanned copy of individual questionnaires used to confirm eligibility. Sequential study numbers were assigned to new participants and matched to sealed opaque envelopes containing an allocation to NRT offer and control groups in a 3:1 ratio based on a computer-generated sequence (www.randomizer.org). We chose a 3:1 ratio to maximise NRT use data in a setting of uncertainty regarding the proportion who might accept the NRT offer. Participants were unaware of their randomisation for a study and that other patients

had or had not received NRT offers. If a control group patient had contacted us for free NRT, we would have provided it, but this did not occur.

Participants in both groups received the standard hospital printed 'quit-pack' (a stop-smoking before surgery brochure and self-referral form) through the post at the time of listing for surgery [17]. Participants randomised to the NRT offer also received literature offering access to five-weeks of free NRT patches for help quitting smoking prior to surgery. Participants offered NRT who had not contacted us within a week were telephoned and offered the NRT by a researcher. Up to three attempts were made and when possible, text messages were sent advising contact with us to receive the NRT package. Acceptors of NRT patches were re-screened for contraindications and then sent the package with instructions. We classified refusers as those who told us they did not want NRT in addition to those who never returned calls or were uncontactable. The progress of waiting list patients were tracked so they could be surveyed about smoking cessation on the day of surgery.

The five-week course of Nicotinell® NRT patches (Perrigo, Dublin, Ireland) was a single regimen consisting of three-weeks 21 mg daily patches followed by one-week 14 mg daily patches and a final week of 7 mg daily patches. A researcher monitored compliance and adverse effects by telephone approximately two days and five weeks following receipt of the package, and the study nicotine helpline was available during business hours. Advice was given to contact the telephone helpline for behavioural support while quitting. On the day of surgery, randomised participants were approached by a researcher blinded to allocation and verbal consented for a survey on smoking cessation prior to surgery. We collected data on: the demographics of participants; the number of cigarettes smoked per day; the time after waking until the first cigarette; pre-operative smoking cessation attempts; the duration and recency of cessation attempts; the use of other smoking cessation medication waiting

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for surgery; and the use of telephone helplines. For patients who claimed to have quit for 24 hours or more prior to surgery, we requested corroboration using a handheld piCO+ Smokerlyzer® (Bedfont Scientific, Kent, UK) where a threshold for expired carbon monoxide of less than eight parts per million (ppm) is considered confirmatory [18]. Patients were classified as currently smoking for all analyses if exhaled carbon monoxide levels were above 8 ppm. To monitor postoperative relapse, confirmed quitters were asked permission for telephone follow-up for self-reported smoking at three and six postoperative months.

The primary outcome of this pilot-study was self-reported smoking cessation for four or more weeks before surgery including corroboration, when possible, by carbon monoxide testing on the day of surgery. Secondary outcomes were: cessation for 24 or more hours before surgery; total quitting activity, defined as successful quits plus cessation attempts lasting for more than 24-hours that ended in relapse; the use of any stop-smoking medication; cessation for at least 24-hours before surgery; and self-reported smoking reduction. Smoking relapse rates amongst newly abstinent smokers at three and six months were determined by telephone follow-up. Results generated from this pilot study will be used to inform: protocol amendments; trial design issues; and patient numbers for a larger, definitive trial. The feasibility outcomes of the study were to determine: the feasibility of recruitment and randomisation; the uptake rate of free NRT; the compliance with NRT use if accepted; the adverse event rate; the feasibility of allocation and follow-up; and the number of protocol violations. Due to uncertainty regarding NRT offer effectiveness, a sample size calculation was not performed. Available funds allowed at least 150 offer acceptances, which equates with a minimum of 200 participants with 100% offer uptake.

Data were analysed using STATA software (V13, StataCorp, College Station, TX, USA), with the major categorical data outcomes (e.g. quit/not quit, attempted/no attempt) analysed in

'2 x 2' tables using Fisher's exact test. For continuous parametric data, we used the unpaired Student's t-test to make comparisons between groups.

Results

Waiting list staff identified 600 eligible participants for randomisation between February and November 2017. We surveyed participants on the day of surgery between March 2017 and April 2018. Three- and six-month follow-up was conducted until September 2018. The characteristics of the 600 included patients are displayed in Table 1. Of 600 participants initially recruited, 447 were randomised to the offer of NRT (Fig. 1). Of these, 175 (39.1%) accepted the NRT package. The median daily cigarette use in the offer group was similar to the control group, but the distribution of smoking amongst acceptors was highly skewed towards heavier smoking (Table 2). Those offered NRT who smoked ≥ 15 cigarettes.day⁻¹ were: younger [50.3 (15.0) vs. 55.4 (15.6)], $p < 0.001$; be more likely to accept NRT [71 (43.1%) vs. 44 (32.7%)], $p = 0.040$; and be very nicotine dependent [59 (40%) vs. 54 (23%)], $p = 0.030$ as compared with those smoking 10-14 cigarettes.day⁻¹ (Table 2). The study population was predominantly female, socioeconomically disadvantaged and listed for minor surgery, but these factors were not associated with offer acceptance.

Of 447 participants offered NRT, 99 (22.1%) were not contactable; 133 (29.8%) reported no interest in quitting; 40 (8.9%) declined due to other plans to quit, which included eight using varenicline, three using e-cigarettes, 25 using other forms of NRT and four using willpower alone. Of the 447 participants offered NRT, 175 (39.1%) accepted and received their NRT package according to Australia Post tracking, but three patients claimed non-delivery and were re-sent products. Follow-up calls to check on the use and side-effects of the five-week patch regimen were successfully carried out for 167 (95.4%) acceptors. Fifty-six (33.5%) of these used patches for more than three-weeks. Conversely, 61 (36.5%) participants made

limited use of products, defined as less than two-weeks use, with an additional 26 (15.6%) using none at all. The remaining 24 (14.4%) participants had moderate patch use of between two- to three-weeks. Cessation of patch use was due to self-reported quitting in 42 (25.1%) patients while the remaining 125 (74.9%) had returned to smoking five-weeks following the intervention, with inadequate craving relief in 50 (40%), skin or adhesion issues in 48 (38.4%) and side-effects such as headaches, poor sleep or nausea in 27 (21.6%).

Of 600 randomised participants 55 (9.2%) did not undergo surgery at our institution during the study period (Figure 1). Three participants remained on the waiting list, one died, and 51 were removed from the waiting list due to either having their operation elsewhere, or because surgery was no longer indicated. Fourteen patients (2.6%) refused consent for any data collection on their day of surgery. Of the 531 patients providing day of surgery data, it was only possible to obtain data pre-operatively in 406 cases due to research assistant availability. The other 135 provided data postoperatively (Figure 1), often via telephone. It was, therefore, not possible to use carbon monoxide breath testing for 19 (24.4%) participants claiming to have quit smoking for more than 24 hours on the day of surgery (Table 3). Of the 531 participants available for the survey on the day of surgery, 78 (14.7%) told researchers they had quit for more than 24 hours but 19 (24.3%) of these were classified as not having quit for all tables and analyses, based on two subsequently refusing exhaled carbon monoxide (CO) testing and 17 producing exhaled CO > 8 ppm, leaving 59 (11.1%) participants who had quit as corroborated with breath testing. Of the 51 (9.6%) participants that quit for more than 24-hours at any time prior to surgery and during the study period, attempts lasted less than a week in 59% but more than a month in 18%, with 80% of attempts failing in the three-weeks prior to surgery (25% failing within seven-days of surgery). Sixty-four (12.1%) of participants stated higher levels of smoking on the day of surgery as compared with the pre-operative health questionnaire, but the major pattern of

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change was smoking reduction in the NRT group; 237 (59.8%) vs. 62 (45.9%), $p = 0.010$.

In total, 170 (32%) participants recalled using some form of smoking cessation medication while waiting for surgery, including 12 (8.9%) in the control group and 158 (39.9%) of the intervention group, which were mostly our NRT patches. Medication users had significantly higher cessation on the day of surgery rates than non-medication users; 116 (29.4%) vs. 11 (7.8%), $OR = 1.9$ [95%CI 1.2, 2.9], $p = 0.002$). Using non-pharmacological adjuncts to quitting was uncommon, with two (1.5%) controls contacting the telephone helpline during the study period. Of the 396 participants offered NRT, eight (2.0%) used the telephone helpline, seven (1.8%) used cessation smartphone applications, three (0.8%) used face-to-face counselling in and one (0.3%) used a self-help book.

The rate of postoperative relapse to smoking was high in the 78 newly abstinent participants. At three postoperative months, only 43 (55.1%) contactable patients reported continued abstinence, while 22 (28.2%) had relapsed and a further 13 (16.7%) were uncontactable and may have relapsed. At six postoperative months, contactable patients with continued abstinence had fallen to 32 (41%), with 22 (28.2%) confirmed relapses, and non-responders rising to 24 (30.8%).

Discussion

This pilot study examined the feasibility and effectiveness of offering mailed nicotine patches to a population of nicotine dependent patients not actively seeking treatment waiting for elective surgery. The offer stimulated more cessation attempts prior to surgery, particularly amongst the heavier, more nicotine dependent smokers, with many more in the intervention group either quitting or making attempts to quit. As expected, offers led to significantly more participants using cessation pharmacotherapy while waiting for surgery,

and those using medication were more likely to quit before surgery. The significant rise in cessation activities following the offer of NRT was consistent with non-surgical studies showing that offering help is the most important element of a brief tobacco intervention in triggering unplanned cessation attempts [12,13].

Given that it was not possible to power our study, it is perhaps unsurprising that the difference reported for the primary outcome, of sustained cessation for four or more weeks, was not statistically significant. Future, larger studies are needed, but our results suggest a number needed to treat (NNT) of approximately 31, which is high. Sustained cessation for four or more weeks significantly reduces postoperative wound infections, while six or more weeks cessation may prevent postoperative pulmonary complication [1,2,4]. We argue mailed pharmacotherapy may provide a novel means to encourage quitting amongst a population of patients awaiting elective surgery. Furthermore, the costs are modest, with a five-week NRT package costing AU\$65 (£37, €39, US\$44).

Based on the 3.2% difference between groups for the primary outcome, alpha of 0.05, power of 0.8 and a 1:3 randomisation ratio, 2940 participants would be required, reducing to 2126 participants with 1:1 randomisation. At our institution, this would take approximately four-years to complete. Alternative study designs could include those awaiting urgent surgery by changing the primary outcome to cessation for 24 or more hours prior to surgery. This would require 1590 participants based on the 4.8% difference between groups for this outcome. The appropriateness of the four-week cessation endpoint is not in question in terms of surgical complications but, in effect, it excludes participation of an important group of patients who are awaiting urgent surgery. Any cessation can be seen as positive from a public health perspective, and as urgent elective patients often undergo major surgery for cancer or vascular pathology, the importance of smoking cessation is

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greater, as is the likelihood of patients being receptive to the cessation message [15].

Strategies to increase the effectiveness of the intervention should be considered for future studies. Patches alone are not currently considered best practice, with evidence that combination NRT (patch + fast-acting oral nicotine) increases long-term cessation rates by 25% (95% CI 1.15-1.36) compared to patches alone [19]. Ongoing cravings followed by relapse to smoking was reported in a high proportion (40%) of the acceptors who relapsed within five-weeks of receiving patches, which may have decreased if fast-acting NRT products were added. The duration of patch supply (five-weeks) was short compared to most protocols, which may be eight or more weeks [20], although our compliance data suggested the bigger issue was patients not using the full course. It is doubtful that posting more supplies would increase effectiveness, but more support promoting NRT continuation may help. Furthermore, many patch users who quit successfully did so without using the entire five-week supply, so the cost-benefit ratio of posting more supplies may not be favourable. This is consistent with a recent meta-analysis showing no evidence that longer patch durations produced better outcomes [19]. Effectiveness may also be improved if we proactively referred acceptors to a telephone counselling helpline as an adjunct to pharmacotherapy, as this results in small but significant improvements [21]. We always recommended acceptors call the helpline, though few in this study did. Studies of proactive calls from the helpline to smokers increased quitting by 25% (95% CI 1.15-1.35), further supporting the hypothesis that offers of help are important factors triggering unplanned cessation attempts [21].

Increasing the offer acceptance rate may be another strategy to improve the study, as those using medication did significantly better. The 3:1 randomisation ratio was planned because we anticipated poor offer uptake, so the 39% rate after telephone cold-calling was

encouraging, but even higher acceptance rates would be preferable. Cold-calling was labour intensive at times with one-fifth of patients unreachable after three attempts. Most unreachable smokers probably had no interest in stopping, but many patients reported reluctance to take calls from unknown numbers, who may be telemarketers or scammers. Another disadvantage of cold-calling may be that smokers with no intention to quit found it easier to just say yes to free NRT from the research nurse than admit no intention to quit, contributing to the 15% who did not use any of the posted supplies. Offers by post or email would be easier, but response rates by such means are typically lower than telephone and easily ignored [22].

Pharmacotherapy offers were made weeks to months in advance of patients receiving their date for surgery, yet quit attempts mostly occurred within weeks of surgery when the surgery date was confirmed. While our intention to offer therapy at the time of listing for surgery was to allow maximal surgical prehabilitation time, when the surgery is in a distant/undetermined future, patients may not be as motivated as when the surgical date is looming. A second offer once the surgical date was known may have increased effectiveness, particularly in those who were early attempters but relapsed prior to surgery. Every successful quit began as an attempt and several are often required to obtain abstinence such that after failed attempts, approximately one third of smokers attempt again within 100 days, of which one third succeed at that re-attempt [23]. New found abstinence amongst our patients was fragile and strategies are needed to decrease high relapse rates after discharge, such as providing a 'relapse prevention kit' with fast-acting NRT and other resources to manage cravings once home.

The results of our study should be considered within the context of the overall challenge of treating tobacco addiction and the limitations of NRT efficacy. A recent meta-analysis

demonstrated that, when underlying quit rates are low, NRT increases successful quitting by just 2-3% (NNT=56), while in settings with better baseline quit rates such as 15%, the addition of NRT improved cessation by 8% (NNT=11) [14]. Given our intervention was just the offer of treatment, the 39% offer acceptance rate and increased quitting activity suggests reasonably high patient interest in pre-operative quitting. Surgery has been described as a 'teachable moment' for smoking cessation, and opportunistic interventions in the peri-operative period may be more effective than at other times [7,15]. Approximately 8% of all quitting in Americans aged over 50 was attributed to surgery, particularly major procedures [15]. Given studies show approximately 40% of community smokers recall making at least one quit attempt in the previous year [24], the control group cessation and cessation attempt rate (14.8%) showed baseline cessation activity was not especially, but did increase when the offer for help arrived (27.5%). Control group quit activity was lower than expected, given 44.7% either quit or made a quit attempt during the waiting period in earlier published data from our institution [17]. However, this included more major surgical cases as well as urgent elective cases, and there was no biochemical validation, so quit rates may have been overestimated. In the present study, cutting down smoking before surgery was common and anecdotally, many erroneously believed this would be enough to reduce peri-operative risk. The lower rate of offer acceptance in those smoking less was consistent with this risk perception; an effect described elsewhere [25].

This is the first study of mailed nicotine in surgical populations, but a number of community-based studies used mailed NRT to engage more smokers with quitting [26,27]. Cunningham et al. used a five-week patch regimen in a that recruited through cold-calling. They found more patch non-use (41% vs 15%) and fewer completing five-weeks therapy (18.7% vs 28.6%) but similar group difference in quit outcomes (4.6% vs 4.8%), which was statistically significant for their study, given their lower control quit rate (3%) [26]. Free

mailed NRT has the advantage of overcoming cost barriers to treatment and geographical remoteness to cessation services. Socioeconomic disadvantage was common in our study population, but this did not translate to higher rates of NRT acceptance, and the few other studies looking specifically at the issue of free vs. paid pharmacotherapy have not shown markedly better outcomes with free products [19].

The strength of our study that it provides data on how quitting behaviour changes after an offer of free mailed cessation pharmacotherapy to patients entering the surgical waiting list. Peri-operative tobacco trials have generally been restricted to interventions a few weeks before surgery, recruiting only those interested in trial participation [8], but our trial involved a broad population of smokers, including those who might have a poorer cessation prognosis. It included relevant elements of a properly conducted feasibility study [28], having addressed key logistic issues, such as: identifying smoking; contacting participants; NRT acceptance rates; willingness to use NRT; participant losses on the waiting list; the appropriateness of the primary outcome; and other areas of methodological uncertainty. Weaknesses of this trial were largely the result of pragmatic issues, often unavoidable, including losses of randomised subjects due to removal from the waiting list and incomplete biochemical verification of all cessation claims, which could result in overestimation of the effect of the NRT offer. We identified protocol weaknesses and identified improvements for future studies, including: addressing smoker motivation for increasing acceptance of help; fast-acting NRT in combination with patches; automatic referral of accepters to a telephone helpline; availability of additional mailed NRT if relapse occurred before surgery; and post-discharge relapse prevention for newly quit smokers.

A fully powered study of this novel approach to deliver systematic cessation assistance and overcome existing variability in service provision is warranted, given over 60 million smokers

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have surgery annually [7], each having increased but modifiable peri-operative risk. Although it will not replace the need for individual surgeons, anaesthetists or primary care physicians to discuss their patient's smoking, well designed programs of mailed NRT could be a practical, cost-effective option in many health settings to increase surgical smokers' access and use of cessation support.

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Competing Interests

All authors declare no competing interests.

References

1. Khullar D, Maa J. The impact of smoking on surgical outcomes. *Journal of the American College of Surgeons* 2012; **215**: 418-26.
2. Mills GH. Respiratory complications of anaesthesia. *Anaesthesia* 2018; **73 (S1)**: 25-33.
3. Wong J, Chung F. Peri-operative cessation of smoking: time for anaesthetists to act. *Anaesthesia* 2015; **70**: 902-6.
4. Lumb AB. Pre-operative respiratory optimisation: an expert review. *Anaesthesia* 2019; **74 (S1)**: 43-8.
5. Pierre S, Rivera C, Le Maître B, et al. Guidelines on smoking management during the perioperative period. *Anaesthesia, Critical Care and Pain Medicine* 2017; **36**:

195-200.

6. Australian and New Zealand College of Anaesthetists. Guidelines on smoking as related to the perioperative period, 2014. ANZCA, Melbourne, Australia
<http://www.anzca.edu.au/documents/ps12-2013-guidelines-on-smoking-as-related-to-the.pdf> (accessed 14/08/2019)
7. Nolan MB, Warner DO. Perioperative tobacco use treatments: putting them into practice. *British Medical Journal* 2017; **358**: j3340.
8. Thomsen T, Villebro N, Møller AM. Interventions for preoperative smoking cessation. *Cochrane Database of Systematic Reviews* 2014: CD002294.
9. Webb A, Wilson AC. The addition of tick-boxes related to tobacco cessation improves smoking-related documentation in the anaesthesia chart. *Anaesthesia and Intensive Care* 2017; **45**: 52-7.
10. Webb AR, Robertson N, Sparrow M. Smokers know little of their increased surgical risks and may quit on surgical advice. *Australia and New Zealand Journal of Surgery* 2013; **83**: 753-7.
11. Ferketich AK, Khan Y, Wewers ME. Are physicians asking about tobacco use and assisting with cessation? Results from the 2001-2004 national ambulatory medical care survey. *Preventive Medicine* 2006; **43**: 472-6.
12. Aveyard P, Begh R, Parsons A, West R. Brief opportunistic smoking cessation interventions: a systematic review and meta-analysis to compare advice to quit and offer of assistance. *Addiction* 2012; **107**: 1066-73.
13. West R, Brown J. Smoking and Smoking Cessation in England 2011. Findings from the Smoking Toolkit Study. April 2012 London.
<http://www.smokinginengland.info/downloadfile/?type=report&src=4> (accessed 14/08/2019).
14. Hartmann-Boyce J, Chepkin SC, Ye W, Bullen C, Lancaster T. Nicotine replacement

- therapy versus control for smoking cessation. *Cochrane Database of Systematic Reviews* 2018; **5**: CD000146.
15. Shi Y, Warner DO. Surgery as a teachable moment for smoking cessation. *Anesthesiology* 2010; **112**: 102-7.
  16. VicHealth Indicators Survey (2015): Frankston. Wellbeing indicators by local government area (LGA). November 2016. VicHealth, Melbourne.
https://www.vichealth.vic.gov.au/-/media/VHIndicators/Outer-metro/Vic161_Frankston_indicator_v5.pdf?la=en&hash=E5A540DD6CE67E04F1B933B1FD7DE031C2F99E33 (accessed 14/08/2019)
  17. Webb AR, Robertson N, Sparrow M, Borland R, Leong S. Printed quit-pack sent to surgical patients at time of waiting list placement improved perioperative quitting. *Australia and New Zealand Journal of Surgery* 2014; **84**: 660-4.
  18. Goldstein AO, Gans SP, Ripley-Moffitt C, Kotsen C, Bars M. Use of expired air carbon monoxide testing in clinical tobacco treatment settings. *Chest* 2018; **153**: 554-62.
  19. Lindson N, Chepkin SC, Ye W, Fanshawe TR, Bullen C, Hartmann-Boyce J. Different doses, durations and modes of delivery of nicotine replacement therapy for smoking cessation. *Cochrane Database of Systematic Reviews* 2019; **4**: CD013308.
  20. Zwar N, Richmond R, Borland R, et al. Supporting smoking cessation: a guide for health professionals. Melbourne: Royal Australian College of General Practitioners [updated July 2014], 2011.
<https://www.racgp.org.au/download/documents/Guidelines/smoking-cessation.pdf>
 (Accessed 14/08/2019)
  21. Matkin W, Ordóñez-Mena JM, Hartmann-Boyce J. Telephone counselling for smoking cessation. *Cochrane Database of Systematic Reviews* 2019; **5**: CD002850.
  22. Nota SP, Strooker JA, Ring D. Differences in response rates between mail, e-mail, and telephone follow-up in hand surgery research. *Hand*. 2014; **9**: 504-10.

23. Bold KW, Rasheed AS, McCarthy DE, Jackson TC, Fiore MC, Baker TB. Rates and predictors of renewed quitting after relapse during a one-year follow-up among primary care patients. *Annals of Behavioral Medicine* 2015; **49**: 128-40.
24. Borland R, Partos TR, Yong HH, Cummings KM, Hyland A. How much unsuccessful quitting activity is going on among adult smokers? Data from the International Tobacco Control Four Country cohort survey. *Addiction* 2012; **107**: 673-82.
25. Cunningham JA, Selby PL. Intentions of smokers to use free nicotine replacement therapy. *Canadian Medical Association Journal* 2008; **179**: 145-6.
26. Cunningham JA, Kushnir V, Selby P, Tyndale RF, Zawertailo L, Leatherdale ST. Effect of mailing nicotine patches on tobacco cessation among adult smokers: a randomized clinical trial. *Journal of the American Medical Association - Internal Medicine* 2016; **176**: 184-90.
27. Zawertailo L, Dragonetti R, Bondy SJ, Victor JC, Selby P. Reach and effectiveness of mailed nicotine replacement therapy for smokers: 6-month outcomes in a naturalistic exploratory study. *Tobacco Control* 2013; **22(3)**: e4.
28. Choi SW, Charlesworth M, Wong GTC. A good pilot to navigate troubled waters. *Anaesthesia* 2018; **73**: 512-4.

Table 1 Self-reported characteristics of smokers, at the time of listing for surgery, for participants randomised to either an offer of nicotine replacement therapy or control.

Values are number (proportion), mean (SD) or median [IQR (range)].

	Nicotine replacement therapy offer (n = 447)	Control (n = 153)
Female; n	236 (53%)	94 (61%)

Age; years	51.9 (14.0)	53.3 (15.9)
Cigarettes per day; n	15 [10-20 (10-50)]	15 [10-20 (10-50)]

Table 2 Self-reported characteristics of smokers on the day of surgery. Values are number (proportion), mean {SD} or median [IQR (range)].

	Acceptors of nicotine replacement therapy (n = 164)	Refusers of nicotine replacement therapy (n = 232)	Control (n = 135)
Female; n	88 (54%)	84 (62%)	122 (53%)
Age; years	50.3 (15.0)	53.1 (16.2)	55.4 (15.6)
Socioeconomic disadvantage*; n	81 (49.4%)	104 (44.8%)	59 (43.7%)
Cigarettes per day at time of listing; n	15 [10-20 (10-40)]	15 [10-20 (10-50)]	15 [10-20 (10-50)]
Number with severe nicotine dependence at time of listing**; n	59 (40%)	21 (17.5%)	54 (23.3%)
Number undergoing major surgery; n	45 (27.4%)	49 (21.1%)	24 (17.8%)

*Defined as receiving government benefits or possessing a low-income healthcare card

**Defined as smoking the first cigarette of the day within five minutes after waking

Table 3 Cessation outcomes on the day of surgery. Values are number (proportion).

Outcome	Nicotine replacement therapy offer (n = 296)	Control (n = 135)	Odds ratio
Cessation for four or more weeks prior to surgery; n	36 (9.1%)	8 (5.9%)	1.5 (95% CI 0.7-3.2)
Cessation for 24 or more hours prior to surgery*	63 (15.9%)	15 (11.1%)	1.4 (95% CI 0.8-2.4)
Any cessation attempt lasting for 24 or more hours, but smoking at the time of surgery	46 (11.6%)	5 (3.7%)	3.4 (95% CI 1.8-8.8)
Cessation for 24 or more hours at any time	109 (27.5%)	20 (14.8%)	1.9 (95% CI 1.2-2.9)

*Carbon monoxide breath testing corroboration was only possible for 49 and 10 participants in the nicotine replacement and control groups, respectively.

Captions for Figures

Figure 1 Participant flow chart

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