



NOVA

University of Newcastle Research Online

nova.newcastle.edu.au

Wolfenden, Luke; Wiggers, John; Campbell, Elizabeth; Knight, Jenny; Kerridge, Ross; Spiegelman, Allan (2009) "Providing comprehensive smoking cessation care to surgical patients: the case for computers". Originally published in Drug and Alcohol Review Vol. 28, Issue 1, p. 60-65

Available from:

<http://dx.doi.org/10.1111/j.1465-3362.2008.00003.x>

This is the peer reviewed version of the following article: WOLFENDEN, L., WIGGERS, J., CAMPBELL, E., KNIGHT, J., KERRIDGE, R. and SPIGELMAN, A. (2009), Providing comprehensive smoking cessation care to surgical patients: The case for computers. Drug and Alcohol Review, 28: 60–65, which has been published in final form at <http://dx.doi.org/10.1111/j.1465-3362.2008.00003.x>

This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Self-Archiving.

Accessed from: <http://hdl.handle.net/1959.13/916788>

TITLE: Providing comprehensive smoking cessation care to surgical patients: the case for computers

AUTHORS

Luke Wolfenden, Ph.D; Research Fellow, Hunter New-England Population Health and Conjoint Lecturer, University of Newcastle.

John Wiggers, Ph.D; Director of Hunter New-England Population Health and Associate Professor, University of Newcastle.

Elizabeth Campbell, Ph.D; Projects Manager Hunter New-England Population Health and Conjoint Lecturer, University of Newcastle.

Jenny Knight, M.Med. Sci (HP); Projects Manager Hunter New-England Population Health and Conjoint Lecturer, University of Newcastle.

Ross Kerridge, M.B B.S., FRCA, FANZCA; Director of Preoperative Services, John Hunter Hospital.

Allan Spigelman MD FRACS FRCS; Professor of Surgery, UNSW St Vincent's Clinical School and Director of Cancer Services, St Vincents & Mater Health Sydney

Word count: 2734.

Key Words: Smoking cessation, Surgery, Preoperative, Computer

CORRESPONDING AUTHOR AND ADMINISTERING INSTITUTION

Dr Luke Wolfenden

Hunter New England Population Health

Locked Bag No. 10

Wallsend NSW 2287, AUSTRALIA

Tel: +61 2 4985 5168; Fax: +61 2 4924 6215; Email: luke.wolfenden@hnehealth.nsw.gov.au

LEGENDS TO FIGURES

Figure 1: Computer-based comprehensive smoking cessation care

ABSTRACT

Introduction and Aims: The provision of smoking cessation care to surgical patients prior to admission can reduce post-operative complications and encourage long-term smoking cessation. Our aim was to demonstrate how a comprehensive computer-based smoking cessation intervention, developed to enhance smoking cessation care to surgical patients, addresses barriers to care provision.

Design and Methods: Consultations with preoperative clinic staff and reviews of the scientific literature were conducted and identified the following barriers to the provision of effective smoking cessation care: a lack of organisational support; perceived patient objection; a lack of systems to identify smokers; a lack of staff time and skill; perceived inability to change care practices; a perceived lack of efficacy of cessation care; and the cost of providing care. Based on positive findings of a pilot trial, a comprehensive computer-based smoking cessation intervention was implemented in a preoperative clinic. Data from previous evaluations of the intervention were used to assess the extent to which the intervention addressed clinician barriers to care. **Results:** The computer-based intervention was found to provide a means to accurately and systematically identify smokers, it required little clinical staff time or skill, it was considered an acceptable form of care by staff and patients, it was effective in encouraging patient cessation and it was inexpensive to deliver relative to other surgical costs. Furthermore, the computer-based intervention continues to operate in the preoperative clinic in the absence of ongoing research support. **Discussion and Conclusions:** The implementation of such a model of care should be considered by clinical services interested in reducing the smoking related morbidity and mortality of patients.

INTRODUCTION AND AIMS

Smoking is a significant risk factor for operative and post-operative complications due to its adverse effects on cardiopulmonary function, the immune system and wound healing [1]. These risks can be substantially reduced if the patient remains abstinent from tobacco prior to surgery [2]. The provision of smoking cessation care may also have important longer term public health benefits in reducing the burden of smoking in the community if effective interventions are delivered on a routine basis [3]. Given the adverse effect of tobacco use on surgical outcomes and the potential public health benefits of permanent smoking cessation, the provision of smoking cessation advice is recognised as a core element of care for the preoperative management of surgical patients [4].

Despite being a core component of care, international research suggests that the provision of even basic preoperative smoking cessation care to surgical patients is not systematic. A Canadian study reported that preoperative clinic staff do not provide smoking cessation counselling or self help materials to patients routinely [5]. In Wales, an audit of preoperative anaesthetic records found that documentation of patient smoking history was evident in just 25% of patient records [4], and Australian research suggest that just 39% of smokers receive quit advice from their anaesthetist during the preoperative assessment [6]. The provision of such advice by surgeons or GPs appears to be even less frequent [7-8]. A variety of barriers are commonly cited which hinder the provision of smoking cessation care to patients, including a lack of staff and skill, the costs associated with care, and a belief that intervention is ineffective [4, 7, 9-11].

Locally, an audit of surgical services suggested that the provision of smoking cessation care at the preoperative clinic of a teaching and referral hospital in New South Wales, Australia, was similarly constrained. In 1999, the local Population Health Unit and the preoperative service responsible for the management of the preoperative clinic were tasked with addressing the lack of systematic preoperative

smoking cessation care to patients. Over a five year period between 1999 and 2003, the Population Health Unit and Preoperative Services collaboratively developed and conducted a series of evaluations of a computer facilitated smoking cessation intervention implemented in a preoperative clinic. The aim of this paper was to synthesise the collaboration's research findings and demonstrate how a comprehensive computer-based intervention developed to enhance smoking cessation care, can address barriers to care provision.

DESIGN AND METHODS

Procedure

Identification of barriers to smoking cessation care

A series of informal interviews were conducted with the director, nurse unit manager and preoperative clinic staff to identify perceived barriers to the provision of smoking cessation care during preoperative clinic appointments. The identified barriers were consistent with those identified in a review of the literature and included a lack of organisational support, perceived patient objection to care provision, a lack of systems to identify smokers, a lack of staff time and skill, perceived inability to change care practices, a perceived lack of efficacy of cessation care, and the cost of providing cessation interventions [4, 7, 9-15].

Identification of effective cessation care

A review of the scientific literature was conducted to identify effective strategies to encourage patient smoking cessation [16]. Given the limited evidence regarding preoperative cessation interventions for surgical patients, the review focused on interventions for hospital patients more broadly. The review found that in order to be effective in encouraging long-term smoking cessation, interventions need to be intensive, have several components, and incorporate extended follow-up cessation support for smokers

[16]. Furthermore, the review suggested that interventions incorporating multiple contacts, several providers and various intervention modalities were most likely to maximise intervention efficacy.

Piloting of a computer-based intervention

Providing smoking cessation care to surgical patients that was consistent with such evidence, and in a way which addresses the reported barriers to smoking cessation care in the preoperative clinic presented a considerable challenge. Given previous research demonstrating the potential for computer programs to screen and provide preventive care to patients [17-19], a touchscreen computer program was piloted to identify and provide tailored behavioural cessation counseling to smokers attending the preoperative clinic. The 20 minute computerised counseling was tailored to patient stage of change and incorporated a number of behavioural strategies including contracting, stimulus control, increasing social support, and positive reinforcement. The pilot study found that the use of the computer-based system was feasible and acceptable and had the potential to increase patient cessation rates [20].

Development of a comprehensive smoking cessation intervention for surgical patients

Based on the positive findings of the pilot study, a computer-based system was developed to provide and to facilitate the provision of comprehensive cessation care to preoperative smokers. The intervention was modified based on feedback from staff and patients following the pilot and further trials. The computer-based intervention was designed to reflect evidence of best practice [16] and as such, provides multicomponent care – incorporating brief advice, behavioural counselling, NRT and follow-up telephone support – over several occasions (preoperatively, on ward and post-discharge) by various health professionals (nursing, anaesthetic and trained counselling staff), and utilising multiple modalities (face to face, touch-screen computer, and telephone). The comprehensive smoking cessation intervention is described in Figure 1.

Data-collection and Measures

We synthesised the collaboration's published findings to illustrate the extent to which the following barriers to care provision in the preoperative clinic had been addressed by the intervention:

1. A lack of organisational support
2. Perceived patient objection to cessation intervention
3. A lack of supportive systems to identify smokers
4. A lack of staff time to provide extended intervention, and a lack of skill in delivering effective cessation care
5. Perceived inability to change care
6. Perceived lack of efficacy of cessation care
7. The cost of providing smoking cessation care

INSERT FIGURE 1 HERE

RESULTS

Lack of organisational support

A number of initiatives were undertaken to enhance organisational support. Presentations describing the rationale and supporting evidence for the need to improve smoking cessation care were delivered to all levels of preoperative services during staff meetings. The computer-based intervention was formally endorsed by the director and nurse unit manager of preoperative services and an advisory group was established with representation from the population health unit, preoperative services, surgical services and smoking cessation experts. Training sessions were held with preoperative clinic nursing and anaesthetist staff to demonstrate how the computer-based intervention would integrate with existing

preoperative clinic systems, as well as provide staff with information and skills to assist in the provision of brief advice.

Perceived patient objection to cessation intervention

To assess how amenable patients were to smoking cessation care, the research team examined the characteristics of 421 smokers attending the preoperative clinic. The study found that 79% were contemplating or preparing to quit and 90% or more thought it would be appropriate for preoperative clinic staff to discuss their smoking with them and to offer them NRT during their preoperative consultation [3].

To investigate the acceptability of specific computer-based care components a series of patient acceptability surveys was conducted following receipt of the intervention. Over 80% of smoking patients considered the computerised counseling easy to use and helpful, and the provision of brief clinician advice and NRT acceptable [20,21]. Lower levels of acceptability were found for post-discharge telephone counseling by the Quitline, with 65% of smokers who received counseling indicating that the information provided was relevant and 78% indicating that they felt comfortable speaking with Quitline staff [22].

A lack of supportive systems to identify smokers

All patients attending the preoperative clinic were referred to the computer program by reception staff. The use of a computer-based program to assess patient smoking status prior to the preoperative clinic consultation provided a systematic means of identifying smokers to clinic staff. Consistent with previous research on touchscreen smoking assessments [23], a validity study with 1004 preoperative clinic patients using carbon monoxide as the criterion measure for tobacco use found the assessment to be highly accurate with sensitivity and specificity of 93% and 95% respectively [21]. Furthermore, a

survey completed by all five nursing staff and 10 of 12 anaesthetists working in the preoperative clinic over a one month period, found that all the nurses and nine of 10 anaesthetists agreed that the program was an appropriate means to assess smoking status. All the nurses and seven of 10 anaesthetists found that the computer prompts, which identified smokers, were helpful in providing smoking cessation care for patients [6, 21].

Lack of staff time to provide extended intervention, and a lack of skill in delivering effective cessation care

Despite the intensity of the computer-based intervention, the bulk of specialised support was provided by the touchscreen computer program or a community based Quitline. Staff surveys conducted by the research team suggested that the intervention may address many of the staff time and skill barriers to providing care within the preoperative clinic. Of the five nurses and 10 anaesthetists who completed acceptability questionnaires, all nurses and seven anaesthetists found the provision of computer care prompts was helpful when providing cessation advice and assistance; all nurses and eight anaesthetists indicated that it was not difficult to find time to offer patients NRT, and all nurses and anaesthetists reported that the intervention would be an appropriate method of care provision for other preoperative clinics [6]. However, in a separate acceptability survey of nursing staff investigating the referral process of the Quitline, two of the four staff completing the survey indicated that completion of the referral form was too time consuming, despite taking less than two minutes of staff time [22].

Perceived inability to change care

In a randomised controlled trial, the computer-based model of care was combined with other practice change strategies including: staff training, the provision of performance feedback, executive support and leadership from the director of preoperative services, and consensus processes among staff regarding the computer-based model of care [6]. Relative to a usual care comparison condition, these

strategies enhanced the provision of brief advice by clinic nurses (47% vs 79%) and anaesthetists (39% vs 60%). They also enhanced the provision of preoperative NRT (8% vs 82%) and the prescription of NRT for use on the ward (0% vs 86%) [6]. While the effect of the practice change intervention on staff referral for post-discharge counselling, or the provision of telephone counselling prior to admission by preoperative service staff was not investigated, the inclusion of these components of care in the practice change intervention may be expected to similarly improve their provision.

Perceived lack of efficacy of cessation care

The research team conducted two trials to assess the effectiveness of the comprehensive computer-based intervention. In the first, a small randomised controlled trial was conducted of all intervention components except post-discharge Quitline support. The RCT found the intervention significantly increased preoperative abstinence compared with a usual care control group (78% vs 65% $p=.04$) [24]. At a three month follow-up, the intervention significantly increased cessation rates of nicotine dependent patients (18% vs 5% $p=.03$). In a second, unpublished study, a non-randomised pilot trial was conducted to assess the effectiveness of the intervention with the addition of post-discharge Quitline counselling. Twenty five percent of intervention patients in this trial were abstinent at a six month follow-up compared with 12% of a usual care control ($p=.07$).

The cost of providing smoking cessation care

The utilisation of computer technology and the community Quitline to provide smoking cessation care reduces the costs of intervention on clinical services. The direct costs to preoperative services of delivering the intervention (excluding follow-up telephone support, a cost incurred by the Quitline) was examined [24]. The study utilised data from staff employment records and project budgeting procedures and found that the annual cost in 2003 Australian dollars of providing the intervention to 294 nicotine dependent patients (excluding development costs) was \$A18,376. The incremental cost of

delivering the intervention, above usual care, was \$A17,404 or \$A58 per dependent smoker. The incremental cost per additional dependent patient abstinent three months following the preoperative clinic visit (above the usual care cessation rate) was \$A458.

The cost of providing cessation care was low compared with the costs associated with surgery [25]. Furthermore, research indicating that even brief periods of preoperative abstinence can have important surgical benefits for patients suggests that the intervention may reduce clinical care costs for hospitals [1].

DISCUSSION AND CONCLUSIONS

Given the association between smoking and surgical complications and outcomes [1], a capacity for longer-term public health benefits arising from permanent smoking cessation, and known patient desire for cessation assistance [3], preoperative clinics are important settings for the provision of smoking cessation care. From the perspective of the preoperative clinician, the intensity of the recommended intervention for hospital patients [16] may appear overwhelming given numerous perceived barriers to the provision of preventive care in clinical settings such as hospitals [9-15]. The findings of this study suggest that such comprehensive cessation care, consistent with best practice recommendations, can be delivered to surgical patients in a way which addresses these barriers.

The findings highlight the potential value and utility of computer technology in the provision of care aimed at improving health behaviours. Continuing advances in technology provide opportunities to further improve and streamline the delivery and enhance the efficacy of such interventions. Since the initial development of the computer-based cessation care system described here, hospitals and other health care organisations have accelerated a move towards the electronic management of patient information and the use of patient point of care data collection and reporting systems [26-28]. In

addition, electronic information systems have been developed to support clinical decision making, to improve access to patient information and to automate medication orders [27,28]. Integration of the touchscreen computer-based model of care with such systems may provide the opportunity to further facilitate the provision of care to patients, and enhance the effectiveness of smoking cessation care.

While the design of comprehensive smoking cessation intervention described in this paper is sensitive to the barriers to care cited by preoperative clinic staff, the intervention was implemented with the assistance of research support. Nevertheless, the comprehensive computer-based intervention (with the exception of preoperative telephone support) continues to be part of routine care for surgical patients at the preoperative clinic, three years since research funding ceased and following clinic caseload expansion and a restructure of preoperative services, suggesting that such care can be maintained in the absence of research investment. The provision of preoperative telephone counseling, which was delivered exclusively by research staff, could potentially be delivered by preadmission clerical staff who routinely contact patients by telephone prior to surgery. The acceptability and efficiency of this approach was not investigated and warrants further study. Similarly, a qualitative investigation into why some components of the intervention were less acceptable to staff than others may provide further opportunities for intervention refinement. The findings support the adoption of computer-based smoking cessation services in pre-operative surgical clinics.

ACKNOWLEDGEMENTS

The authors acknowledge the funding support provided by the National Heart Foundation, the Cancer Council NSW, and NSW Health through the Hunter Medical Research Institute. The authors are also grateful for the contribution of research assistants Ruth Gay and Beverley Parker, and staff of Preoperative Services.

REFERENCES

1. Moller A, Tonnesen H. Risk reduction: perioperative smoking intervention. *Best Pract Clin Anaesthesiol* 2006;20(2):237-48.
2. Theadom A, Cropley M. Effects of preoperative smoking cessation on the incidence and risk of intraoperative and postoperative complications in adults smokers: a systematic review. *Tob Control* 2006;15:352-8.
3. Wolfenden L, Wiggers J, Knight J, Campbell E. Smoking and surgery: an opportunity for health improvement. [Letter] *Aust NZ J Public Health* 2007;31(4):386-7
4. Simmonds M, Petterson J. Anaesthetist's records of preoperative assessment. *Clin Perform Qual Health Care* 2000;8:22-7.
5. Ratner PA, Johnson JL, Richardson CG, et al. Efficacy of a smoking-cessation intervention for elective-surgical patients. *Res Nurs Health* 2004;27:148-61
6. Wolfenden L, Wiggers J, Knight J, et al. Increasing smoking cessation care in a preoperative clinic: a randomized controlled trial. *Prev Med* 2005; 41(1):284-90
7. Rissel C, Salmon A, Hughes AM. Evaluation of a (pilot) stage-tailored brief smoking cessation intervention among hospital patients presenting to a hospital pre-admission clinic. *Aust Health Rev* 2000;23:83-93.

8. Myles P, George I, Hunt JO, et al. Risk of respiratory complications and wound infection in patients undergoing ambulatory surgery: smokers versus non-smokers. *Anesthesiol* 2002;97(4):842-7.
9. Warner DO, Sarr MG, Offord KP, Dale LC. Anesthesiologists, General Surgeons, and tobacco interventions in the perioperative period. *Anesth Analg* 2004;99:1766-73.
10. France EK, Glasgow RE, Marcus AC. Smoking cessation interventions among hospitalized patients: what have we learned? *Prev Med* 2001;32:376-388.
11. Stanton WR, Balanda KP, Gillespie AM, Lowe JB. Barriers to health promotion activities in public hospitals. *Aust NZ J Public Health* 1996;20(5):500-504.
12. Ahluwalia JS, Gibson CA, Kenney RE, Wallace DD, Resnicow K. Smoking status as a vital sign. *J Gen Intern Med* 1999;14:402-408.
13. Nagle A, Schofield M, Redman, S. Australian nurses; smoking behaviour, knowledge and attitude towards providing smoking cessation care to their patients. *Health Prom Int* 1999;14(2):133-144.
14. McCarty MC, Zander KM, Hennrikus DJ, Lando HA. Barriers among nurses to providing smoking cessation advice to hospitalized smokers. *Am J Health Prom* 2001;16(2):85-7.
15. Cabana MD, Rand CS, Powe NR, et al. Why don't physicians follow clinical practice guidelines? *JAMA* 1999;282:1458-65.

16. Wolfenden L, Campbell E, Walsh R, Wiggers J. Smoking cessation interventions for in-patients: a selective review with recommendations for hospital-based health professionals. *Drug Alcohol Rev* 2003;22(4):437-52
17. Bonevski B, Sanson-Fisher RW, Campbell E, Carruthers A, Reid AL, Ireland M. Randomized controlled trial of a computer strategy to increase general practitioner preventive care. *Prev Med* 1999; 29:478-86.
18. Baratin GY, Campbell EM, Sanson-Fisher RW, Graham J, Cockburn J. Collecting cancer risk factor data from hospital outpatients: use of touch-screen computers. *Cancer Detect Prev* 2000; 24(6):501-7.
19. Revere D, Dunbar PJ. Review of computer-generated outpatient health behaviour interventions: clinical encounters “in absentia”. *J Am Med Inform Assoc* 2001;8(1):62-79.
20. Haile M, Wiggers J, Spigelman A, Knight J, Considine R, Moore K. A novel strategy to stop cigarette smoking in surgical patients. *Aust NZ J Surg* 2002;72(9):618-23
21. Wolfenden L, Dalton A, Bowman J, Knight J, Burrows S, Wiggers J. Computerised assessment of surgical patients for tobacco use: accuracy and acceptability. *J Public Health* 2007;29:183-5.
22. Wolfenden L, Wiggers J, Campbell E, et al. Feasibility, acceptability and cost of referring surgical patients for post-discharge cessation support from a Quitline. *Nicotine Tob Res*. In press.

23. Baratiny G, Campbell E, Sanson-Fisher R. Hospital patients receptive to quit smoking advice. *Health Prom J Aust* 2003;14:69.
24. Wolfenden L, Wiggers J, Knight J, et al. A programme for reducing smoking in pre-operative surgical patients: randomised controlled trial. *Anesth* 2005;60(2):172-9.
25. Shepperd S, Harwood D, Gray A, Vessey M, Morgan P. Randomised controlled trial comparing hospital at home care with inpatient hospital care: cost analysis. *BMJ* 1998;316(7147):1791-6.
26. Choi J, Chun J, Lee K, et al. Mobile nurse: hand held information system for point of nursing care. *Comput Methods Programs Biomed* 2004;74:245-54.
27. Gardner RM, Pryor AT, Warner M. The HELP hospital information system: update 1998. *Int Journal Med Inf* 1999;54:169-82.
28. Sittig DF, Stead WW. Computer-based physician order entry: state of the art. *J Am Inf Assoc* 1994;1:108-123.

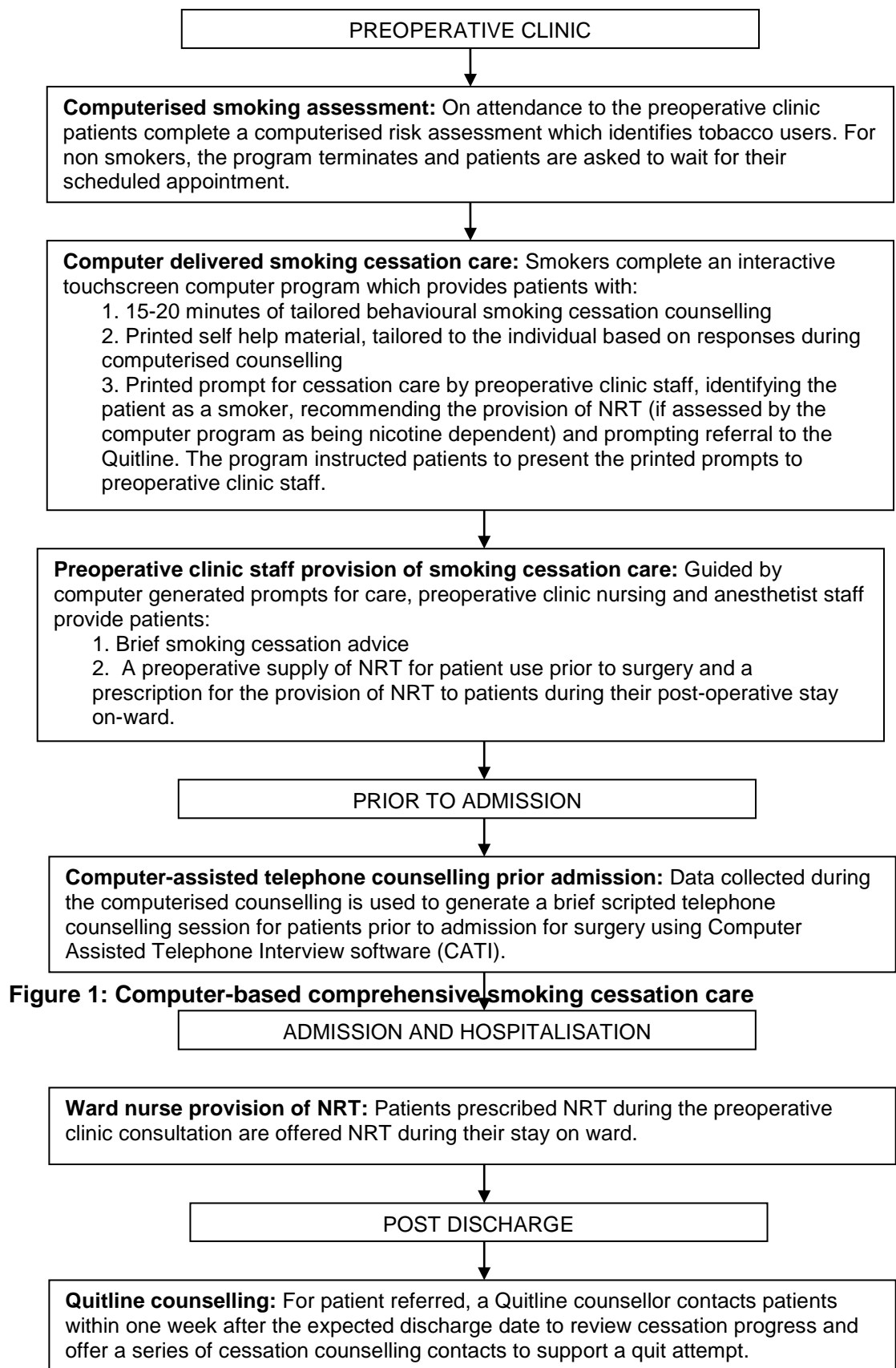


Figure 1: Computer-based comprehensive smoking cessation care