MONASH University

System Change Interventions for Smoking Cessation in Hospitalised Patients

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I dedicate this thesis to my family

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Abstract

Background

Many smoking cessation interventions have proven efficacy in clinical trials, however they have not been adequately translated into routine clinical practice. Previous reports suggest that smoking cessation support in Australian hospitals is sub-optimal. This warrants cost-effective, pragmatic, and sustainable smoking cessation interventions tailored to the hospital environment. This PhD aimed to systematically review the evidence for system change interventions for smoking cessation, develop and evaluate a pharmacist-led smoking cessation intervention for inpatients, and develop and validate an instrument to assess challenges associated with quitting smoking.

Methods

A systematic review was undertaken with the Cochrane Tobacco Addiction Group to identify system change interventions for smoking cessation and to evaluate their effectiveness on both cessation and practice change outcomes. Studies were identified from databases: MEDLINE, EMBASE, CINHAL, PsycINFO, CENTRAL and Cochrane Tobacco Addiction Group Register, and also from grey literature and by hand searching of bibliographies of relevant publications. Each study was evaluated for risk of bias according to the Cochrane handbook and categorised as high, low or unclear risk of bias. The primary endpoint was abstinence from smoking at the longest follow-up. Secondary endpoints included assessment and documentation of smoking status, provision of quitting advice or counselling, prescribing cessation medications, and referral and enrolment in Quitline

services. A narrative synthesis was used to describe the study findings due to the presence of significant heterogeneity between studies.

A randomised controlled trial (RCT) was designed and conducted in three tertiary public hospitals in Australia to evaluate the effectiveness of a pharmacist-led system change smoking cessation program (GIVE UP FOR GOOD) compared with usual care. In-patients 18 years of age or older, who were self-reported current (daily or occasional) smokers at the time of hospital admission and available for 12 months of follow-up were eligible. Potential participants were identified from the hospital records by a trained research assistant (RA) or referred by the ward staff. A baseline survey assessed the quitting experiences and preferences for a future quit attempt among participants. The multicomponent intervention comprised behavioural counselling (provided during hospital stay and on discharge, with a one month post-discharge telephone follow-up) alone or in combination with the patient preferred pharmacotherapy (free supply during hospital stay and up to one month post-discharge) which included a range of nicotine replacement therapy (NRT) products (patch, gum, inhaler, lozenge and micro tab) and non-NRT prescription medications (bupropion and varenicline). All the intervention participants were offered the counselling sessions and encouraged to use pharmacotherapy. Hospital pharmacists had the authority to initiate NRT products or recommend non-NRT medications. Although the support from the hospitals was restricted to one month due to the pragmatic nature of the intervention (could easily be implemented in routine practice using minimum resources), the participants were referred to Quitline services and primary health care professionals (general practitioners and community pharmacists) for additional and ongoing support beyond one month. Smoking status was assessed at baseline, discharge, one, six and 12 months by a masked RA. Two

primary endpoints were assessed in the intention-to-treat population using logistic regression analyses: carbon monoxide (CO) validated one month sustained abstinence at the six month follow-up and verified six months sustained abstinence at the 12 month follow-up. The participants who met the abstinence criteria at six (one month sustained abstinence) and 12 months (six months sustained abstinence) follow-ups were requested to perform the CO verification of smoking status. CO levels were measured by a trained RA using a hand-held device during a hospital or home visit. A participant with CO ≤ 6 parts per million (ppm) was considered abstinent.

The item pool for Challenges to Stopping Smoking scale (CSS-21) was generated from a literature search, existing scales, expert opinion, and interviews with smokers and ex-smokers. The questionnaire was administered to participants of GIVE UP FOR GOOD trial at final follow-up. Exploratory factor analysis was performed to identify sub-scales in the questionnaire. Internal consistency, validity and stability of the sub-scales were evaluated.

Key findings

The systematic review included seven cluster RCTs. The overall quality of evidence was low. Although the evidence for the primary endpoint – smoking cessation – was uncertain, significant improvements were observed in outcomes such as documentation of smoking status (1 study), Quitline referral (2 studies) and Quitline enrolment (2 studies). The provision of smoking cessation counselling as a result of system change interventions improved in the majority of studies (3 of the 4 studies evaluated). Other system level outcomes such as assessing smoking status and advising smokers to quit also showed some potential. The evidence for prescribing NRT was equivocal.

The RCT included 600 smokers (43% participation rate) from three participating hospitals. Participants had a mean (± SD) age of 51±14 years and 64% were male. The common reasons for hospital admission self-reported by participants were disorders of the circulatory system (135, 22.5%), musculoskeletal system and connective tissue (97, 16.2%), respiratory system (75, 12.5%), digestive system (67, 11.2%) and nervous system (65, 10.8%). Majority were daily smokers and had smoked on an average of 18.8±10.8 cigarettes per day. On a scale of 1(low) to 10 (high), current motivation to quit smoking was high (median 9; interquartile range [IQR] 6.5, 10), but confidence was modest (median 5; IQR 3, 8). Of the 386 (64.3%) participants who had attempted quitting in the previous 12 months, 270 (69.9%) had used at least one method to assist their quit attempt. More than half (222, 57.5%) used NRT and almost a quarter (94, 24.4%) used varenicline during their previous quit attempts. Over 80% (n=311) reported experiencing withdrawal symptoms in their previous quit attempts. Among the users of NRT or prescription medications (249), more than half (141, 56.6%) experienced side effects. Most participants (351, 58.5%) believed medications (NRT 322, 53.7%; varenicline 186, 31.0%) would assist them to quit in the future.

The GIVE UP FOR GOOD intervention was well accepted among inpatient smokers; 98% of intervention participants received at least one session of the intervention and 79% received all three sessions. Retention rates at six and 12 months were 74% and 72%, respectively. A higher proportion of intervention participants compared to control participants reported 'satisfaction' (88.7% vs. 72.1%; $p<0.001$) with the services received during their hospital stay. However, the use of pharmacotherapy was not adequate; only a minority received any support from Quitline or community health professionals after

discharge. The primary endpoints, verified abstinence rates at six (11.6% vs. 12.6%; OR 0.91, 95%CI 0.55 to 1.50) and 12 months (11.6% vs. 11.2%; OR 1.04, 95%CI 0.63 to 1.73) were similar in both groups.

The CSS-21 scale was validated in a sub-sample of 182 participants (mean age 55±12.8 years, 70.3% current smokers) from the RCT. Factor analysis of the 21-item instrument resulted in a 2-factor solution representing items measuring intrinsic (9 items) and extrinsic challenges (12 items). All fit indices were acceptable for the 2-factor model (root mean square error of approximation 0.062, comparative fit index 0.948 and Tucker-Lewis index 0.935). Cronbach's alpha coefficients for the intrinsic and extrinsic sub-scales were 0.86 and 0.82, respectively. The instrument has content and construct validity, was stable in various analyses and has a sound and meaningful factorial structure.

Conclusions

The systematic review identified gaps in the literature and the need for well-powered randomised trials of systems level approach to improve the provision of smoking cessation care and cessation outcomes. The RCT demonstrated that a pharmacist-led smoking cessation intervention during hospital stay was feasible but did not achieve long-term abstinence. System change interventions of high intensity with more active post-discharge follow-up, active involvement of primary health professionals and a free supply of a full course of pharmacotherapy might produce more favourable effects. The CSS-21 should be a useful tool to guide smoking cessation support for smokers. The findings of this research will inform smoking cessation interventions for hospitalised smokers, and guide further research in this area.

General Declaration

Declaration for thesis based or partially based on conjointly published or unpublished work. In accordance with Monash University Doctorate Regulation 17.2 Doctor of Philosophy and Research Master's regulations the following declarations are made:

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes five original papers published in peer reviewed journals and one original paper submitted and under review in a peer reviewed journal. The core theme of the thesis was system change interventions for smoking cessation in hospitalised patients. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the Centre for Medicine Use and Safety under the supervision of Dr Johnson George, Prof Michael Abramson and Prof Billie Bonevski.

The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research.

In the case of chapters 2, 3, 4, 5 and 6, my contribution to the work involved the following:

Thesis chapter	Publication title	Publication status	Extent of candidate's contribution
2	System change interventions for smoking cessation (review protocol)	Published	80%
2	System change interventions for smoking cessation (Cochrane systematic review)	Under review	80%
3	A pharmacist-led system change smoking cessation intervention for smokers admitted to Australian public hospitals (GIVE UP FOR GOOD): study protocol for a randomised controlled trial.	Published	60%
4	Quitting experiences and preferences for a future quit attempt: a study among inpatient smokers.	Published	70%
5	Integrating smoking cessation into routine care in hospitals – a randomised clinical trial	Published	60%
6	The development and validation of a 21-item Challenges to Stopping Smoking scale (CSS-21).	Published	70%

I have not renumbered sections of submitted or published papers in order to generate a consistent presentation within the thesis.

Student signature: [redacted] Date: 14/03/2016

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student and co-authors' contributions to this work.

Main Supervisor signature: [redacted] Date: 14/03/2016

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Publications and Presentations

Publications (Peer Reviewed Journal)

Published

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. A pharmacist-led system-change smoking cessation intervention for smokers admitted to Australian public hospitals (GIVE UP FOR GOOD): study protocol for a randomised controlled trial. *Trials* 2013;14(1):148.

Thomas D, Abramson MJ, Bonevski B, George J. System change interventions for smoking cessation (review protocol). *Cochrane Database Syst Rev* 2013: CD010742.

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. Quitting experiences and preferences for a future quit attempt: a study among inpatient smokers. *BMJ Open* 2015;5(4):e006959.

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Paul E ,Weeks GR, Dooley MJ, George J. Integrating smoking cessation into routine care in hospitals - a randomised clinical trial. *Addiction* 2015:111(4):714-23.

Thomas D, Mackinnon A, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. The development and validation of a 21-item Challenges to Stopping Smoking scale (CSS-21). *BMJ Open* 2016: 6(3):e011265.

Under review

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Conference presentations

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. A pharmacist initiated smoking cessation program for in-patients: baseline data from a randomised controlled trial. Smokefree Oceania Conference 2013, New Zealand (Oral presentation).

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. A pharmacist initiated smoking cessation program for in-patients: baseline data from a randomised controlled trial. Higher Degree by Research Symposium 2013, Melbourne (Oral presentation).

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. Quitting experiences and preferences of smokers admitted to Australian public hospitals participating in a randomised controlled trial. World Cancer Congress 2014, Melbourne (Electronic Poster presentation).

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, Eldho Paul, George J. Integrating smoking cessation into routine care in hospitals - a randomised controlled trial of a pharmacist-led intervention. Society for Research on Nicotine and Tobacco (SRNT) 21st annual meeting 2015, Philadelphia (Poster presentation).

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, Eldho Paul, George J. Pharmacist-led multicomponent smoking cessation intervention in Victorian public hospitals - a randomised controlled trial. The Thoracic Society of Australia and New Zealand (TSANZ) annual scientific meeting 2015, Gold Cost (Oral presentation).

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, Eldho Paul, George J. Integrating smoking cessation into routine care in hospitals - a randomised controlled trial of a pharmacist-led intervention. Higher Degree by Research Symposium 2015, Melbourne (Poster presentation).

Other publications during enrolment

Published

George J, **Thomas D**. Tackling tobacco smoking: opportunities for pharmacists. *Int J Pharm Pract* 2014; 22(2):103-4.

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Glossary of Terms and Abbreviations

Term/Abbreviation	Meaning
5As	Ask, Advise, Assess, Assist and Arrange follow-up
AAC	Ask, Advise and Connect
AAR	Ask, Advise and Refer
AHCPR	Agency for Health Care Policy and Research
AHRQ	Agency for Healthcare Research and Quality
BCS	Barriers to Cessation Scale
CENTRAL	Cochrane Central Register of Controlled Trials
CFI	Comparative Fit Index
CHART	Consortium of Hospitals Advancing Research on Tobacco
CI	Confidence Interval
CINAHL	Cumulative Index to Nursing & Allied Health
CO	Carbon Monoxide
COPD	Chronic Obstructive Pulmonary Disease
CSS	Challenges to Stopping Smoking
CVD	Cardiovascular Disease
EMBASE	Excerpta Medica dataBASE
EFA	Exploratory Factor Analysis
EPOC	Effective Practice and Organisation of Care
EQ	Expert Quit
FTND	Fagerström Test for Nicotine Dependence
FTQ	Fagerström Tolerance Questionnaire
FTQ	Fax to Quit
GCP	Good Clinical Practice
HSI	Heaviness of Smoking Index
IQR	Interquartile Range
ITS	Interrupted Time Series
ITT	Intention to Treat
LHPC	Lung Health Promotion Centre
MI	Motivational interviewing
N	Number
nAChRs	Nicotinic Acetylcholine Receptors
NHMRC	National Health and Medical Research Council
NICE	National Institute for Health and Care Excellence
NRT	Nicotine Replacement Therapy
NSW	New South Wales

OBS	Observation Only Group
OR	Odds Ratio
PBS	Pharmaceutical Benefits Scheme
PCC	Primary Care Centre
PHQ	Patient Health Questionnaire
RA	Research Assistant
RACGP	The Royal Australian College of General Practitioners
RCT	Randomised Controlled Trial
RMSEA	Root Mean Square Error of Approximation
RR	Relative Risk
SCN	Thiocyanate
SD	Standard Deviation
SF-8	Short Form-8
SHPA	Society of Hospital Pharmacists of Australia
SRNT	Society for Research on Nicotine and Tobacco
TLI	Tucker Lewis Index
UK	United Kingdom
USA	United States of America
VAMC	Veterans Affairs medical Centre
VAS	Visual Analogue Scale
WHO	World Health Organization
WLSMV	Weighted Least Squares Means and Variance adjusted

Introduction

Problem Statement

A large body of research exists regarding the consequences of smoking, the benefits of smoking cessation and the effectiveness of various smoking cessation interventions (including both pharmacological and non-pharmacological treatments). Despite the evidence, tobacco smoking continues to be the leading cause of preventable morbidity and mortality worldwide.[1] One-third to one-half of all smokers die prematurely.[2] The majority of smokers want to quit,[3] but only a small fraction are able to do so unassisted due to a number of social, physical and behavioural factors.[1 4] Previous studies have suggested that most health professionals underperform in helping smokers to quit.[5-9] Time constraints, lack of training, lack of financial incentives, fear of losing patients, pessimism about the effectiveness of smoking cessation treatments and their own smoking status are some of the reasons for health professionals being unable to help smokers quit.[10] This situation warrants further exploration of effective, sustainable and pragmatic tobacco control measures which are acceptable to both smokers and healthcare providers.

Aim and Objectives

The overall aim of this thesis was to develop and evaluate an effective and sustainable smoking cessation intervention which could be easily integrated into routine clinical practice in hospitals. Addressed through a series of studies including a systematic literature review, a randomised controlled trial (RCT) and scale development, the specific objectives of this thesis were:

1) To examine the effectiveness of system change interventions in achieving smoking cessation;
2) To assess the quitting experiences and preferences for future quit attempts among inpatient smokers;
3) To assess the effectiveness of a pharmacist-led system change smoking intervention in achieving long-term abstinence amongst hospitalised smokers; and
4) To develop and validate a questionnaire to assess the challenges that are associated with quitting smoking.

Thesis Outline

This thesis by publication is composed of seven chapters including six manuscripts. At the time of submission of this thesis, five of the six manuscripts have been published in peer-reviewed journals, and the last one is under peer review. A brief description of each chapter is provided below.

Chapter 1 outlines the background information to the research project, the importance of the topic and the research questions, and the rationale for the study approach.

Chapter 2 is a systematic review of the effectiveness of system change interventions for smoking cessation. This review has been conducted under the auspices of the Cochrane Collaboration's Tobacco Addiction Review group, and includes two publications: the protocol (published) and review findings (under review).

Chapter 3 is the published protocol for the RCT 'GIVE UP FOR GOOD', which evaluated the effectiveness of a pharmacist-led smoking cessation intervention for smokers admitted to three Australian public hospitals. The intervention components, methods and outcome measures are detailed in this chapter. This study protocol was published in the journal *Trials.*

Chapter 4 presents baseline results of the GIVE UP FOR GOOD trial, describing the quitting experiences and preferences of the trial sample of inpatient smokers. Participants' tobacco use behaviour, previous quit attempts and outcomes, methods used in the past 12 months to assist quitting, difficulties experienced during previous quit attempts, and the motives and preferred methods for a future quit attempt are detailed in this chapter. The results were published in the journal *BMJ Open.*

Chapter 5 describes the findings of the GIVE UP FOR GOOD trial. This chapter provides a detailed discussion on the findings of the trial with reference to the initial objectives and existent literature, and strengths and the limitations of the study. The results were published in the journal *Addiction.*

Chapter 6 describes the development and psychometric validation of the new 21-item Challenges to Stopping Smoking Scale (CSS-21) which was conducted with a sample of GIVE UP FOR GOOD trial participants. The manuscript was published in the journal *BMJ Open.*

Chapter 7 presents an overall discussion of the study findings, implications for practice and policy and recommendations for future research. This chapter ends with an overall conclusion of this thesis.

Chapter 1
Literature Review

1.1 Preface

The purpose of this chapter is to provide general background information about the significance of the research topic and the study population. It begins with a snapshot of the epidemic of tobacco use and associated health and economic burdens, followed by a discussion regarding the mechanisms of nicotine addiction and the benefits of quitting smoking. The subsequent section discusses different methods for assessing tobacco use and cessation. This section is followed by an overview of smoking cessation interventions, including both pharmacological and non-pharmacological treatments. The main foci of this thesis (system change smoking cessation interventions, hospital-based interventions and pharmacist provided interventions) are presented in the following sections. This is followed by current recommendations for the treatment of tobacco dependence and an evaluation of challenges associated with quitting smoking. The chapter ends with a summary of the current evidence and rationale for the proposed projects as part of the PhD.

1.2 Tobacco Smoking Globally

Around one billion people smoke tobacco worldwide, including around 800 million men and 200 million women.[11] Globally, almost six trillion cigarettes are consumed every year.[12] Many nations including the United States of America (USA), the United Kingdom (UK), Canada, Australia, New Zealand, Western Europe, Denmark and Iceland have significantly reduced their smoking prevalence during the last decade. However, in some

countries in Asia, South America and Africa, the prevalence of smoking is still increasing. Currently, China is the largest consumer of tobacco in the world.[12] [13] The other top five consumers are Russia, USA, Indonesia, Japan and Germany.[12] The global tobacco market also continues to grow; China is the fastest growing market followed by the Eastern Mediterranean region.[12] Patterns of tobacco use vary widely within countries and are largely associated with low socio-economic status even in low and middle income countries.[12]

1.3 Tobacco Smoking in Australia

Since 1991, the prevalence of smoking has continued to decline in Australia (figure 1.1).[14] Although the proportion of regular smokers has almost halved in the past two decades, 2.5 million (12.8% of people aged 14 years or older) Australians still smoke daily.[14] Moreover, the rate remains particularly high among certain populations such as indigenous Australians (32.0%), people of low socio-economic status (19.9%) and people living in remote areas (22.0%).[14]

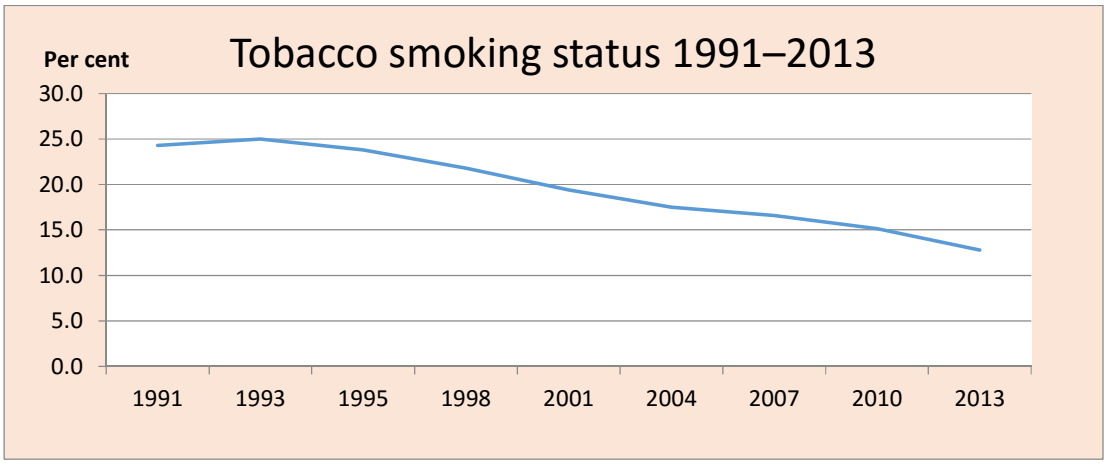

Figure 1.1: Tobacco smoking status in Australia among people aged 14 years or older (per cent). Source: National Drug Strategy Household Survey detailed report 2013[14]

1.4 Tobacco-related Burden of Disease

The morbidity and mortality rates attributed to tobacco smoking are substantial and smoking remains the leading preventable cause of premature death in the world.[12] Tobacco smoke contains more than 7,000 chemicals, hundreds of which are toxic and deleteriously affect the health of a smoker. Around 70 chemicals in tobacco smoke can cause cancer and the tobacco smoke itself is a known carcinogen.[15] Smoking affects almost all organs of the body. More than 24 different smoking related diseases have been identified, including cardiovascular diseases (CVD), respiratory diseases, cataracts, peptic ulcers, low bone density, hip fractures, reduced fertility and 10 different forms of cancer.[16] [17] Nearly one-third of all cancer deaths are directly linked to smoking.[15] Lung cancer, ischemic heart disease and chronic obstructive pulmonary disease (COPD) are the three leading causes of death due to smoking.[18] The chance of a regular smoker dying prematurely from a smoking related disease is almost 50%.[19] On average, smokers die 10 years earlier than non-smokers.[2]

Globally, tobacco use killed 100 million people in the 20th century and if the current trend continues it will kill around one billion in the 21st century.[12] In Australia, smoking causes a higher burden of disease than any other behavioural risk factor, representing 9.6% and 5.8% of the total burden of disease in men and women, respectively. Tobacco smoking contributes to more than 15,500 deaths every year and is responsible for 20% of all cancer mortality.[10] The healthcare costs attributed to tobacco use was more than $300 million in Australia between 2004 and 2005.[20]

1.5 Nicotine Dependence and Withdrawal Symptoms

Evidence suggests that many biological, genetic and psycho-social factors play a role in tobacco dependence. Nicotine is the main psychoactive substance in tobacco which is responsible for addiction.[21] [22] When cigarette smoke is inhaled, the nicotine is rapidly absorbed reaching the brain in a few seconds, where it binds to nicotinic acetylcholine receptors (nAChRs). This leads to the release of dopamine, which induces pleasure, stimulation, mood modulation, and a reduction in stress and anxiety.[22] [23] Repeated use of nicotine leads to neuroadaptation and desensitisation of receptors leading to tolerance and dependence.[24] [25] Craving and withdrawal symptoms begin in smokers when previously inactivated nAChRs become unoccupied and recover to a responsive state during a period of abstinence or night time sleep, driving smokers to the next cigarette.[25] Thus, nicotine binding and desensitisation of these receptors during smoking may alleviate craving and withdrawal symptoms.[23]

Genetic factors also play a major role in nicotine withdrawal symptoms, tobacco use behaviour, difficulty in quitting and response to smoking cessation therapies. Thus, smokers vary widely in their tobacco use pattern and ability to quit.[26] [27] Some specific psychological stimuli which are associated with tobacco use such as the taste and smell of tobacco products, a particular mood, situations, and environmental factors may also induce an urge to smoke. In addition, smokers who are attempting to quit encounter difficulties in terms of changing the behaviour that they have developed as part of the smoking process, such as smoking after meals.[28] [29]

Withdrawal symptoms emerge 24-48 hours after quitting smoking. Abrupt nicotine withdrawal is characterised by anger and irritability, anxiety, a depressed mood, restlessness, insomnia, an increased appetite, dysphoria (a state of feeling unwell or unhappy), hedonic dysregulation (feeling that little pleasure in life and activities that were once rewarding are no longer enjoyable) and craving for nicotine.[23 30] If untreated, nicotine withdrawal can produce an increase in mood disturbance similar to that observed in general psychiatric patients.[31] Highly dependent smokers have been reported to have more severe withdrawal symptoms and early relapse than light smokers.[32] Assessing the extent and severity of nicotine dependence may help in planning an appropriate strategy to treat withdrawal symptoms and thereby to prevent relapse.

1.6 Health Benefits of Quitting Smoking

Quitting smoking not only leads to significant and immediate health improvements but also decreases most of the related risks within a few years of cessation.[1] Early benefits include better pulmonary function and exercise tolerance which occur within a few weeks after quitting.[33] The risk of myocardial infarction falls sharply within a year of abstinence. The risk of stroke drops to the level of a non-smoker within 2-5 years after cessation.[15] The all-cause death rate declines in the first two years of cessation.[34] Quitting for more than five years reduces the risk of cancer of the mouth, throat, oesophagus, and bladder by 50%, and a decade of abstention drops the mortality due to lung cancer by half.[15] In addition to the extra years of life that can be gained, an improvement in quality of life is another important benefit of cessation.[35] Furthermore, quitting smoking is associated with reduced depression, anxiety and stress, and a positive mood compared with continuing smoking.[36]

Therefore, quitting smoking is the most important step that a smoker can take for their health and wellbeing. Thus, the measures that prevent the uptake of smoking and increase cessation rates have the potential to reduce morbidity, mortality and the economic burden of tobacco use.

1.7 Assessment of Tobacco Use and Cessation

1.7.1 Evaluating Nicotine Dependence

The magnitude of nicotine dependence may be assessed by a range of questionnaires, including Fagerström Test for Nicotine Dependence (FTND),[37] the Cigarette Dependence Scale,[38] Nicotine Dependence Syndrome Scale,[39] and Wisconsin Inventory of Smoking Dependence Motives.[40]

The most commonly used inventory is the FTND, a 6-item questionnaire, which evolved from the original 8-item Fagerström Tolerance Questionnaire (FTQ).[41] A short version of the FTND is also available – Heaviness of Smoking Index (HSI).[42] The HSI is a 2-item scale which assesses the time to the first cigarette of the day after waking up and the number of cigarettes smoked per day. It has been suggested that these items are the most useful and powerful indicators of nicotine dependence.[42 43] Each item is scored on a 4-point scale (0-3) and the total score ranges from 0 to 6. A HSI score ≤ 2 is considered as low dependence, 3-4 moderate dependence and ≥ 5 heavy dependence.[44]

1.7.2 Biochemical Markers of Tobacco Use

A number of biomarkers can be used as indicators of tobacco use, including nicotine, cotinine, thiocyanate (SCN) or carbon monoxide (CO).[45] The cheapest, easiest and most

simple method of verifying tobacco use is measuring the CO level in the exhaled air. It has both sensitivity and specificity around 90%, but the sensitivity is limited to less than a day due to its short half-life. The Society for Research on Nicotine and Tobacco (SRNT) recommends a CO value between 8-10 ppm in exhaled air as a cut-off point for differentiating smokers from non-smokers.[45] Cotinine has a fairly long half-life (it can be used to validate up to seven days of abstinence) and has excellent sensitivity and specificity when it is measured in biological specimens such as plasma, saliva or urine. SRNT recommends cut-off points of 15 ng/ml for plasma and saliva cotinine and 50 ng/ml for urinary cotinine. However, the use of nicotine replacement therapy (NRT) interferes with the cotinine assay.[45] Other markers such as nicotine and SCN are not commonly used due to the cost and low specificity, respectively.[45] Biochemical markers can be used to validate self-reported abstinence. Biochemically verified abstinence is considered as the 'gold standard' in smoking cessation studies.[46]

1.7.3 Measures of Abstinence

A variety of different measures are available to assess self-reported abstinence. The most commonly used measures are described below;[47 48]

1) **Point prevalence abstinence:** this refers to the prevalence of abstinence during a time window immediately preceding a follow-up. The most common periods of abstinence used to describe point prevalence are 24 hours or seven days. One of the advantages of the point prevalence measure is the potential for validation by using biochemical measures. Secondly, when used in intervention studies it allows lapses and relapses which usually occur following treatment, and hence it can capture the

delayed effect of an intervention. However, it is a poor predictor of long-term abstinence as the duration of abstinence required to fulfil the criterion is small. It includes a broad range of ex-smokers, ranging from people who have not smoked for years to those who have recently stopped. Some of the recent quitters at a long follow-up might have done so due to factors other than the tested interventions (i.e. environmental factors or other interventions). Hence, the point prevalence rate may overestimate the intervention effect.

2) **Continuous abstinence:** abstinence between quit day and a follow-up time. Continuous abstinence is the most rigorous and conservative measure of abstinence. One argument against continuous abstinence is the lack of a grace period. Although most smokers who lapse during initial abstinence return to regular smoking,[49] a small proportion eventually quit for their lifetime even if they had a few lapses during the early phase of quitting.[50] Hence continuous abstinence may underestimate the treatment effect. Also, continuous abstinence cannot be validated using biochemical markers.
3) **Prolonged abstinence:** sustained abstinence after an initial grace period or a period of sustained abstinence between two follow-ups. It reflects a combination of point prevalence and continuous abstinences. It includes people who make delayed or repeated quit attempts following an intervention. However, as in continuous abstinence the self-report cannot not be validated using biochemical markers.

1.8 Treating Tobacco Use and Dependence: An Overview of the Evidence

Nicotine addiction is now referred to as 'tobacco use disorder' in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).[51] The US Surgeon General's report of 2000 stated: *'tobacco dependence is in fact best viewed as a chronic disease with remission and relapse'* thus requiring repeated cessation treatments and ongoing care.[52] A variety of non-pharmacological and pharmacological treatments are available to treat tobacco use and dependence. An overview of these interventions and supporting evidence is provided in the following sections.

1.8.1 Non-pharmacological Interventions

The following non-pharmacological smoking cessation interventions have been proven to be effective.

1.8.1.1 Motivational Interviewing

Motivational interviewing (MI) is defined by Rollnick and Miller as a *'directive, client-centred counselling style for eliciting behaviour change by helping clients to explore and resolve ambivalence'.*[53] MI helps people to explore and resolve ambivalence about behavioural changes. Smokers who are unwilling to make a quit attempt during a clinic visit may respond to a brief motivational intervention.[54] It can be applied both as a stand-alone treatment or with other interventions, and in a range of settings. Individual, group and telephone formats are available.[55] The four underlying principles of MI process are detailed in table 1.1.[54 56]

Evidence suggests that MI enhances future quit attempts. A recent Cochrane meta-analysis, which compared MI with brief advice or usual care, found a modest improvement in abstinence rate in favour of MI [Relative Risk (RR) 1.26; 95% Confidence Interval (CI) 1.16 to 1.36; 28 trials; 16,803 participants].[55] Quit rates across the intervention groups ranged from 0% to 59.7% and in control groups 0% to 34.1%. This review included only studies which had follow-ups of at least six months. Of the 28 included studies, 15 had more than 400 participants each. Only one study had less than 100 participants. All of the included trials were conducted in developed countries (except one in Brazil) and most used counsellors or psychologists to provide the intervention, hence limiting generalisability to under developed countries and other healthcare professionals. Also, caution should be taken while interpreting the results due to the presence of high heterogeneity (I^2 = 49%), variations in treatment fidelity, the low quality of the included studies and the possibility of publication bias.[55] Moreover, the pooled RR did not reach statistical significance when only biochemically validated studies were included in the analysis (RR 1.12; 95%CI 0.98 to 1.29; 16 trials; N = 7,858).

Table 1: Principles of motivational interviewing [54 56]

Principle	Detail
Expressing empathy	• Respectful listening and understanding the feelings and perspectives without judging, criticising or blaming. • Normalise feelings and concerns and respond to perspectives in an understandable and non-confrontational manner. • Support smokers' right to choose or reject change. • The attitude of acceptance and respect builds smokers' self-esteem, which further promotes change.
Developing discrepancy	• This is the gap between present behaviour and important personal goals or values. • Discrepancy may be generated by the awareness of the cost of the current state of behaviour and by the perceived advantage of behavioural change. • Change is more likely to occur when a habit is seen as conflicting with an important personal goal such as one's own health, family happiness, success or positive self-image.
Rolling with resistance	• Back off and use reflection when the smoker expresses resistance (avoid arguing for change). • Smokers may be invited to consider new information and perspectives, but these should not be imposed on them. • Resistance is also a signal for a shift approach.
Supporting self-efficacy	• Enhance smoker's confidence in their ability to cope with obstacles and to succeed in change. • Encourage the smoker based on the success of others or by their own past success in changing behaviour. • Offer smokers options for achievable small steps toward change.

1.8.1.2 Advice-based Interventions

Clinicians' advice for smoking cessation is effective. Such advice may be brief or part of more intensive interventions. Stead et al.[57] evaluated the effectiveness of physicians' advice to stopping smoking in a Cochrane systematic review, which included 42 trials and more than 31,000 smokers. A meta-analysis of 28 trials showed that brief (RR 1.66; 95%CI 1.42 to 1.94; 17 trials) and intensive (RR 1.84, 95%CI 1.60 to 2.13; 11 trials) advice is effective in terms of achieving permanent cessation. However, only three studies that were included in the meta-analysis verified self-reported abstinence, thereby limiting its validity.

5As Model for Smoking Cessation

One of the most commonly used brief advice approaches, the 5As (Ask, Advise, Assess, Assist and Arrange follow-up) model was originally proposed by the US Clinical Practice Guideline[52] and has now been adopted by many countries, including Australia.[10] This is an evidence-based approach which includes sequential strategies for providers to use with their smoking clients. This model includes identification of all smokers and provision of appropriate support to each smoker based on their willingness to quit. The components of the 5As are described in figure 1.2.

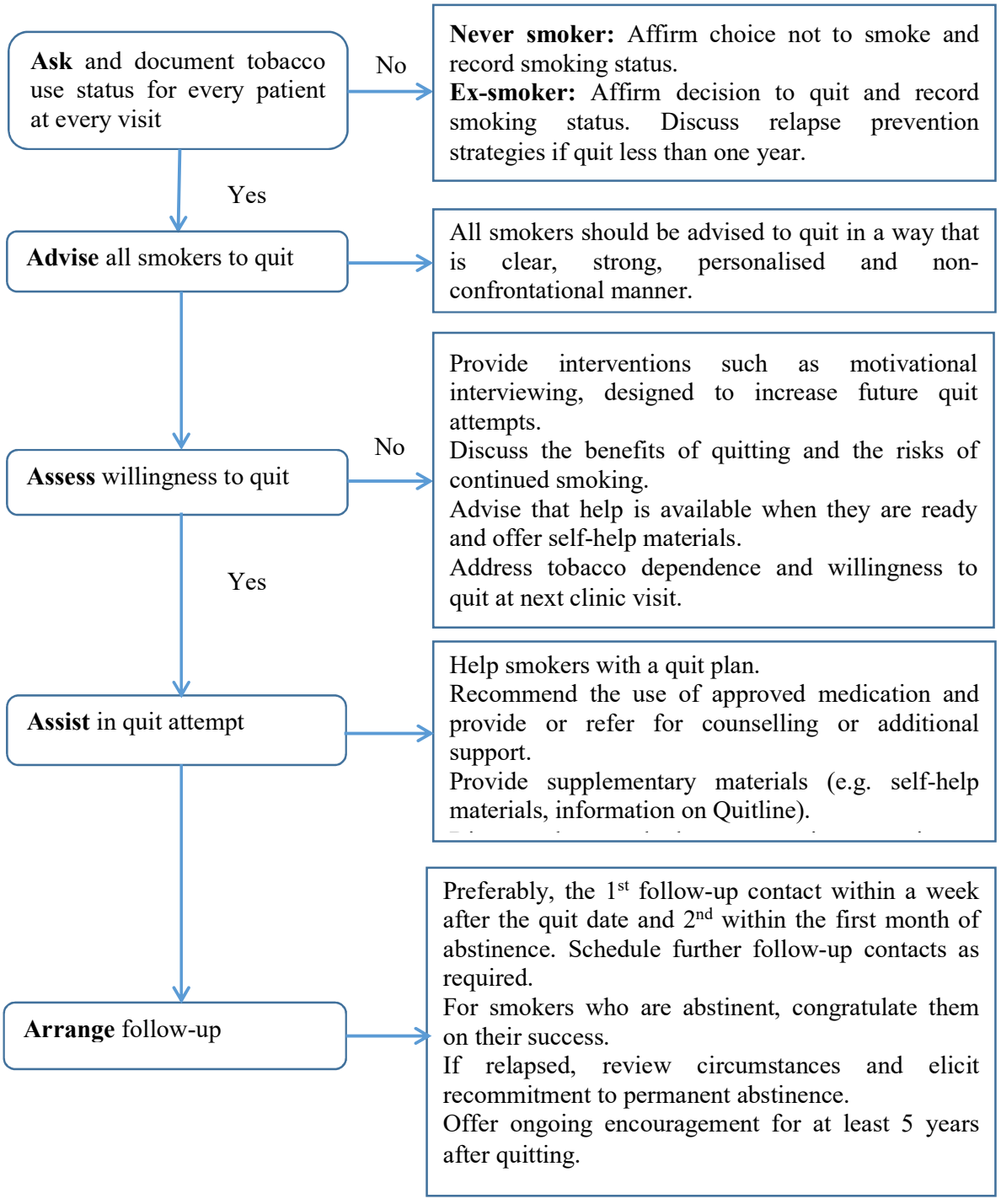

Figure 1.2: 5As for smoking cessation[10 54]

However, the 5As approach may not be feasible in every clinical situation. Time constraints, lack of training, lack of knowledge or lack of confidence may hinder clinicians from offering tailored interventions such as the 5As. Hence, brief variants of the 5As model have been developed: AAR (Ask, Advise and Refer)[58] and AAC (Ask, Advise and Connect).[59] AAR involves asking all patients about tobacco use, advising all identified smokers to quit and referring tobacco users to an intensive cessation programme (e.g. Quitline). In the AAC model, instead of referring, smokers are connected to a cessation service. Connections are made by clicking an automated link in the electronic health records (EHR) that links smokers to cessation services. Although these models are recommended as alternatives for the 5As model where detailed smoking cessation interventions by a clinician is not possible, the gold standard for tobacco cessation assistance remains the 5As model.[54]

1.8.1.3 Individual and Group Behavioural Therapy

Typically, individual therapy involves a face-to-face meeting between the smoker and a trained counsellor and then further follow-up support either face-to-face or over the telephone. Group therapy involves scheduled meetings where smokers receive advice, information, and assistance from a trained counsellor to quit smoking. Both of these therapies can be either brief or intensive interventions.[60 61]

Research suggests that both individual therapy (RR 1.39; 95%CI 1.24 to 1.57; 22 trials; 9,572 participants)[61] and group therapy (RR 1.98; 95%CI 1.6 to 2.46; 13 trials; 4,375 participants)[60] improve cessation rates. Restricting the analysis only to studies reporting validated cessation (15 in individual therapy review and five in group therapy review) did

not change the estimates in both reviews. In the former, the control situations ranged from usual care to up to 10 minutes of advice and in the latter the control groups were self-help programmes. Both of these approaches incorporated pharmacotherapy and/or MI techniques, as required.[60 61]

1.8.1.4 Telephone Counselling

Telephone counselling is one of the principal strategies used to deliver one-to-one cessation advice and support. It is shown to be effective when used as a supplement or substitute to face-to-face counselling or provided as an adjuvant to self-help materials or pharmacotherapy.[62] Telephone services may offer information, recorded messages, personal counselling or a mixture of components to assist people to quit smoking. It can be either proactive (counsellor-initiated calls) or reactive (client-initiated calls). A Cochrane meta-analysis found a modest but significant benefit for proactive telephone counselling (RR 1.29; 95%CI 1.20 to 1.38; 45 trials; 24,811 participants). Most studies of this review were conducted in North America. Twelve studies had fewer than 200 participants and six studies had less than 100 participants. The length of follow-ups ranged from six months to 30 months. The validity of the individual studies included in this review may be limited as many of them used self-reported abstinence data. Nine studies that evaluated the effect of multi-session proactive support after an initial call from a client (reactive) also reported a modest benefit (RR 1.37; 95%CI 1.26 to 1.50; 24,904 participants).[62]

More than 40 countries, including Australia now use Quitline services to help people to quit smoking.[63] Quitline offers specialised telephone information and counselling services for smokers who are interested in quitting. It offers smokers access to the most appropriate

support, provides one-off or extended assistance and relapse prevention support, can be tailored according to the tobacco use behaviour of each smoker and is accessible to all smokers who are seeking support. In Australia, the first widely accessible state-based telephone Quitline service was established in Victoria in 1985. The services are now available from a toll-free number and involve providing evidence-based information in a single call or multiple calls from a trained counsellor.[64]

1.8.2 Pharmacotherapy for Smoking Cessation

Three forms of medicines are mainly available to assist quitting, NRTs, varenicline and bupropion. The efficacy of these medicines has been proven in meta-analyses of RCTs.[65]

Nicotine Replacement Therapy (NRT)

Several forms of NRT– gum, transdermal patch, inhaler, nasal/oral spray, lozenge and sublingual tablet – are currently available to assist quitting. A Cochrane systematic review of 150 studies concluded that all commercially available NRTs are effective in promoting smoking cessation.[66] NRT increased long-term quit rates (at six to 24 months) by 50-70% regardless of the setting, the duration of the therapy or the intensity of any additional support provided (pooled analysis of all forms of NRT: RR 1.6; 95%CI 1.53 to 1.68; 117 trials). Each of the six forms of NRT significantly increased the rate of cessation compared to placebo or no NRT. Biochemically validated abstinence data were used in most of the included studies (86%). The overall quality of evidence of the review was deemed to be high (i.e. further research is very unlikely to change the estimate of the effect). However, these conclusions are limited to smokers with high levels of nicotine dependence and who were motivated to quit. Of the 117 studies included in this analysis, 56 used nicotine gum

and 43 used nicotine patches. There was no significant difference between the different forms of NRT in abstinence rate (RR 0.92; 95%CI 0.78 to 1.07). Six studies were included in this pooled analysis – three studies comparing lozenges vs patches, two comparing nasal sprays vs patches and one comparing inhalers vs patches. Combinations of nicotine patch with a rapid delivery form of NRT such as gum, nasal spray, inhaler or lozenge were more effective than a single form of NRT (RR 1.34; 95%CI 1.18 to 1.51; 9 trials).[66]

Varenicline and bupropion

The effectiveness of varenicline and bupropion has been established.[67] [68] Varenicline is a nicotine receptor partial agonist that works by counteracting (mimicking) the effects of nicotine on the nAChRs.[69] The exact mechanism of action of bupropion as a smoking cessation aid is unknown. However, it is believed that this action is mediated by noradrenergic and/or dopaminergic mechanisms.[70] A Cochrane network analysis reported that at the standard dose, varenicline improved quit rates more than two fold compared to placebo (RR 2.27; 95%CI 2.02 to 2.55, 14 trials, 6,166 participants).[67] All of the included studies were multicentre (except one) and reported biochemically validated abstinence either at six months (5 studies) or at 12 months (9 studies). All except a small study (79 participants) found statistically significant results in favour of the intervention. Likewise, another Cochrane review confirmed the effectiveness of bupropion.[68] When used as monotherapy, bupropion improved long-term abstinence (six to 12 months) by 60% compared to placebo or control (RR 1.62; CI 1.49 to 1.76; 44 trials; 13,728 participants). Although in most of the included studies (N=41) the proportion of smokers who quit smoking was higher in the bupropion group, only 15 had statistically significant results.

The majority of the studies were conducted in North America or Europe. All studies except four used biochemical verification to confirm self-reported abstinence. The quality of evidence was deemed to be high.

Cahill et al.[65] conducted a review of Cochrane systematic reviews and a network meta-analysis (multiple pharmacotherapies were compared using both direct comparisons of interventions within trials and indirect comparisons across trials based on a common comparator) of various pharmacological interventions for smoking cessation. All of the included reviews (n=12) were classified as of 'high quality'. This review found that all forms of NRT, bupropion and varenicline were effective in improving the chances of quitting without producing any major adverse events. Varenicline was more effective than bupropion (three trials; direct comparisons) or any single form of NRT (indirect comparisons among trials), but was not more effective than combination NRTs (indirect comparison between varenicline and various combinations of NRT trials).[65 67] Head-to-head comparisons between bupropion and NRT monotherapy have shown that both are equally effective.[65 71]

One of the major concerns regarding the use of varenicline and bupropion are their neuropsychiatric safety. However, a recent large-scale clinical trial (EAGLES study) established that varenicline and bupropion are safe to use in smokers with and without psychiatric disorders.[72] This four-arm study (varenicline, bupropion, nicotine patch or placebo) recruited 8,144 participants from 16 countries and included two cohorts of participants: participants with pre-specified psychiatric diagnoses (N=4,116) and participants without pre-specified psychiatric diagnoses (N=4,028). Varenicline or

bupropion did not increase neuropsychiatric adverse events compared to nicotine patch or placebo in either group. In this study, varenicline was more effective than bupropion (OR 1.75; 95% CI 1.52 to 2.01), nicotine patch (OR 1.68; 95% CI 1.46 to 1.93) and placebo (OR 3.61; 95% CI 3.07 to 4.24). However, the study was funded by a pharmaceutical company and the authors had potential conflicts of interest with a history of grants or honorarium from the pharmaceutical industry.[72]

An Australian study (STOP study) which included 392 inpatient smokers with smoking related illness, compared the safety and efficacy of the combination of varenicline and Quitline counselling to Quitline counselling alone.[73] [74] This study did not raise any safety concerns with the use of varenicline and reported a significantly higher quit rate in the intervention arm (RR 1.45; 95% CI 1.03 to 2.03, p=0.03). However, this study used participant self-reported outcomes and had no objective measure of abstinence for all participants. Another recent multi-country study (EVITA) evaluated the efficacy of varenicline for smoking cessation in hospitalised patients with acute coronary syndrome.[75] This study recruited 302 smokers from the USA and Canada. Biochemically verified 7-day point prevalence abstinence at 24 weeks was superior in the intervention arm compared to placebo (47.3% vs 32.5%; p=0.012). Although this study was funded by a pharmaceutical company, it was an investigator initiated trial and the funding bodies had no role in the design, conduct, analysis and interpretation of data.

Other pharmacotherapy options

Other pharmacotherapy options such as nortriptyline (RR 2.03; 95%CI 1.48 to 2.78; 6 trials; 975 participants) and cytisine (RR 3.98; 95%CI 2.01 to 7.87; 2 trials; 937

participants) improved the chances of quitting with minimum risks of harm.[65] Clonidine also increased abstinence (RR 1.63; 95% CI 1.22 to 2.18); however, dose-dependent adverse events may limit its widespread use.[65]

In summary, varenicline is considered as the most effective proven pharmacotherapy (level 1 evidence) currently available for smoking cessation treatment, followed by combination NRTs and bupropion.[54] Clinical assessments, context, previous quit experiences and smokers' preferences are important in selecting the pharmacotherapy that is most likely to assist smokers to quit smoking. Factors such as the possibility of adverse events, the probability of drug interactions, previous experiences with pharmacotherapy and costs should also be considered.[10]

1.8.3 Other Potential Interventions for Smoking Cessation

Self-help materials: Standard non-tailored self-help materials improved abstinence by 19% in a Cochrane systematic review (used as a sole intervention and compared with usual care).[76] There was no evidence of an effect when used as an adjunct to face-to-face advice from a healthcare provider. This review included 11 trials and 13,241 smokers. All of the included studies had more than 200 participants. However, the validity of the individual studies may be compromised as the majority used self-reported abstinence data (seven studies).[76]

Mobile phone-based interventions: Mobile phone-based interventions (text messaging or video messaging) improved the cessation rate by 71% at six months follow-up.[77] This systematic review included five trials and over 9,000 smokers. All of the included studies had at least 200 participants, but only two studies found statistically significant results in

favour of the intervention. There was also substantial statistical heterogeneity between the studies (I^2=79%), which may limit the applicability of the pooled result.[77] Another potential technology-based intervention may be using mobile phone applications. Although the results from a few uncontrolled/pilot studies evaluating the efficacy of mobile applications are promising,[78 79] well-powered randomised controlled studies are lacking.

Internet-based interventions: Interactive and individually tailored internet-based interventions increased cessation rates by 48% at six to 12 months.[80] This systematic review included 3,631 smokers. However, a high risk of bias and the presence of heterogeneity may limit the validity and generalisability of these findings. Moreover, only three studies were included in this pooled analysis.[80] Another recent large study conducted in the UK, which included 4,613 smokers reported beneficial effects for smokers of low-socio-economic status, but not for smokers of high socio-economic status at the six months follow-up. In this study, participants were recruited from smokers visiting a website ('SmokeFree') which helps smokers to quit; hence, the sample may represent a population of smokers who are motivated to quit.[81]

1.8.4 Summary

Many smokers need encouragement, assistance and guidance to quit successfully. Various interventions have effects of varying degrees on smoking behaviour. As tobacco use and dependence are complex phenomena, multiple treatment modalities may be required to assist quitting. Interventions such as intensive counselling, NRT and other types of pharmacotherapy have a strong impact on smoking cessation. Combinations of these strategies may produce additional benefits. A combination of behavioural counselling and

pharmacotherapy can produce abstinence rates of up to 25-30% and is considered as the most effective treatment strategy.[82] On the other hand, only 3-5% of unassisted quit attempts are successful.[83] Support is especially important for those smokers who are highly addicted, experienced various withdrawal symptoms in previous quit attempts and who have tried multiple times without long-term success.[10]

1.9 Tobacco Control Measures

To aid countries in rolling out evidence-based comprehensive tobacco control programmes, the World Health Organization (WHO) developed MPOWER, a package of the six most effective tobacco control policies, including: **M**onitoring tobacco use and prevention policies; **P**rotecting people from second-hand smoke; **O**ffering help to quit smoking; **W**arning about the dangers of tobacco; **E**nforcing bans on tobacco advertising and sponsorship; and **R**aising taxes on tobacco products.[84] This thesis mainly focuses on 'offering help to quit smoking', particularly health-system-based initiatives to support smokers such as system change interventions for smoking cessation, hospital-based interventions and pharmacist-initiated smoking cessation programmes. A detailed description of these interventions are provided in the following sections. These interventions mainly utilise one or more of the aforementioned treatment options.

1.9.1 System Change Interventions for Smoking Cessation

Clinical practice guidelines for treating tobacco use and dependence recommend a system change approach to tackle tobacco use and dependence.[54] System change interventions are policies and practices designed to integrate smoking cessation treatments into the routine healthcare system. These involve systematic identification of smokers and provision of

evidence-based treatments at every clinical encounter.[54 85] These interventions are focused on both clinicians and patients and are designed to work synergistically with both informed clinicians and patients interacting in a seamless system which facilitates the treatment of tobacco use and dependence.

1.9.1.1 System Change Strategies

Various institutional policies to facilitate system change interventions are described below.[54 85]

1. **Implement an office-wide system to identify all smoking clients and document their smoking status**

The aim of this policy is to ensure that tobacco use is addressed at every clinical encounter for all tobacco-using patients. This can be achieved by modifying the vital sign stamp, electronic health records or paper charts to include tobacco use status. Such prompts have the potential to improve the rate and intensity of clinicians' interventions with smokers.[86] A Cochrane systematic review[86] found that adding tobacco use as an electronic vital sign increased clinicians' recommended actions such as documentation of smoking status, giving advice to quit, assessing interest in quitting and providing assistance. This review included both randomised (three cluster RCTs) and non-randomised (N=8) studies. Most non-randomised studies adopted a 'before and after' study design (N=5) and used convenience sampling methods, which might have introduced selection bias and compromised the validity of the findings. Ahluwalia and colleagues[87] assessed whether a smoking status stamp would prompt physicians to address smoking-related issues in 2,595 African-American patients. In this study, clinician activities such as asking about tobacco

use, advising to quit and arranging follow-up significantly improved in the interventions group. Although the study benefited from large sample size, it was limited by a single site and absence of a separate control group which limits the generalisability and validity of the findings. Fiore et al.[88] found significant improvements in identification of smokers and provision of advice to quit after expanding the vital sign stamp to include smoking status. This study benefited from an acceptable sample size (N=1,864); however, the 'before and after design' without a control group may have compromised its validity.

2. Offering education, resources and feedback to promote provider intervention

Education/training: training on tobacco dependence treatments should be offered to all staff on a regular basis and participation in such training programmes should be incentivised. A Cochrane systematic review[89] of 17 studies reported that clinicians who had received such training were more likely to offer smoking cessation treatments, including asking patients to set a quit date, making follow-up appointments, providing counselling and self-help materials and discussing a quit date. Training of clinicians also improved both point prevalence and continuous abstinence in the study populations. Although the pooled analyses reached statistical significance, of the eight studies which evaluated continuous abstinence, only one reported a statistically significant effect in favour of the intervention and only four out of 13 studies demonstrated significant effectiveness in terms of point prevalence abstinence. These findings suggest that additional system level changes (e.g. treatment) may be needed to produce more positive results.[89]

Resources: sufficient resources should be readily available for clinicians to facilitate tobacco dependence treatments. Resources may include ready access to Quitline and other

community resources, self-help materials and information about effective treatments, including both pharmacological and non-pharmacological support.[54]

Feedback: it is necessary to provide feedback to healthcare providers about their performance. Feedback data can be obtained from chart audits, electronic medical records or patient databases. Previous studies suggest that providing feedback can improve the provision of smoking cessation treatments.[90 91] Bentz and colleagues[91] conducted a cluster RCT to test the impact of electronic health record-generated provider-specific monthly feedback to improve tobacco cessation support based on the 5As model in primary care. Rates of advice, assessments, and assistance were significantly higher in the intervention group compared with the control clinics at the 12 months follow-up. Although the study benefited from a rigorous design and an adequate sample size, it was conducted in healthcare clinics addressing tobacco use has been a priority for over a decade; hence, limiting the generalisability.

A Cochrane review of 140 studies found that audit and feedback generally lead to small but potentially important improvements in professional practice. The effectiveness of audit and feedback appears to depend on baseline performance and how the feedback was provided.[92] Kisuule et al.[90] tested the effectiveness of feedback to clinicians to improve hospitals' performance in tobacco dependence counselling and found that the documentation of cessation counselling improved in both progress notes and discharge summaries. This study included 30 hospitals in the USA. However, the lack of a control group ('before and after design') limits the validity of the results.

Andrews et al.[93] evaluated the effectiveness of both education and feedback in improving primary care providers' adherence to the 4As (ask, advise, assist and arrange) in a multiphase study. Baseline data were collected during phase 1, a single education session was provided during phase 2 and individual and team feedback were provided during phase 3. The authors found that education sessions alone (phase 2) had no significant impact on provider performance. Additional feedback resulted in significant improvement in advise, assistance and follow-up arrangements. However, limitations such as quasi-experimental design and single intervention and control sites may have introduced bias. The study was conducted in Veterans Affairs Medical Centres, which may reduce generalisability of the findings.

3. Dedicating staff to provide tobacco dependence treatment

This policy ensures that a staff member (champion) is designated as a coordinator of tobacco control measures in the organisation. The responsibilities of a tobacco dependence treatment coordinator may include ensuring the systematic identification of smokers, training clinicians on a regular basis, ensuring ready access to evidence-based cessation treatments and scheduling follow-up visits. The champion should communicate to each staff member (e.g. nurse, physician, medical assistant, pharmacist, or other clinician) about their responsibilities in the delivery of tobacco dependence treatments and coordinate the activities between various health professionals.[54] In Bentz and colleagues' study[91] (discussed in point 2), the presence of a champion significantly improved Quitline referrals (OR 3.44; 95%CI 2.35 to 5.03).

4. **Promote hospital policies that support and provide tobacco dependence services**

The intent of this effort is to provide tobacco dependence treatment to all smokers who are admitted to hospitals. Strategies may include implementing a tobacco user identification system, training health professionals, expanding hospital formularies to include approved tobacco dependence medications, identifying a champion (a dedicated person to coordinate tobacco control activities) and complying with various practice guidelines.[54]

5. **Include evidence-based tobacco dependence treatments – both behavioural and pharmacotherapies**

The goal of this strategy is to provide free tobacco dependence treatment to all tobacco users. Approaches such as subsidising tobacco dependence treatments as part of health insurance packages or removing barriers to treatments (e.g. avoiding co-payment) could be implemented. All clinicians should be educated about the availability of subsidised tobacco dependence treatments (both counselling and medication) and encourage patients to use these services.[54] The effectiveness of various evidence-based tobacco dependence treatments are discussed in **Section 1.8**.

6. **Reimburse healthcare providers for delivering effective tobacco dependence treatments.**

Lack of reimbursement has been identified as one of the barriers in providing effective smoking cessation care.[94] Reimbursing clinicians for their efforts may improve the delivery of tobacco dependence treatments. A recent systematic review reported that financial incentives have the potential to improve recording of smoking status, provision of cessation

advice and referrals to stop smoking services. Of the 18 studies included in the review, only five evaluated the impact of financial incentives on quit rates and reported mixed results. The validity of the review is limited due to the presence of a large number of observational studies (N=15).[95]

In summary, the fundamental principle of system change interventions is to ensure that all tobacco users are identified and offered evidence-based tobacco dependence treatment each time they present to the healthcare system. To achieve this goal the health system should consider implementing various strategies as discussed above. Levy et al. estimated that widespread implementation of such strategies could reduce smoking prevalence rates in the population by 2%-3.5%.[96] Few studies have evaluated system change interventions for smoking cessation in various healthcare settings. Details of such interventions are presented in **Chapter 3** as part of the systematic review.

1.9.2 Hospital-based Interventions

Hospitalisation provides a potential 'teachable moment' for behavioural interventions such as smoking cessation.[97] [98] At the time of perceived vulnerability to negative health outcomes, people may become more aware about the risks of unhealthy habits such as smoking and they may more easily convinced to quit.[99] [100] Moreover, most hospitals in developed countries are smoke-free.[101-103] In Australia, smoking within enclosed areas of hospitals and health facilities is no longer permitted in any jurisdiction.[104] Some Australian states and territories, such as South Australia and Western Australia, have adopted total smoking bans within the grounds of public health facilities. In other states and territories, smoking is permitted in designated outdoor areas.[104] This 'smoke-free' environment may

help people to quit smoking as they are away from the usual environmental cues of smoking. Simultaneously, a smoking-related hospital admission may boost their motivation to quit and receptivity to smoking cessation messages.[105] Two recent surveys reported high motivation among inpatients to stop smoking.[5] [106] A survey in Australia conducted by George et al.[5] found high motivation among inpatient smokers to quit smoking (median motivation of eight on a scale of 1 to of 10, where 10 suggested the highest motivation). Internal validity and generalisability of this survey results were compromised by the small sample size (N=125), convenience sampling method and single study site. Another survey conducted in the USA also reported similar results. Although this study recruited 513 smokers, the single study site and convenience sampling limit the generalisability and validity of findings.[106] High motivation among smokers and smoke-free environment may boost the effectiveness of cessation interventions for inpatients.

A copious body of research exists regarding the effectiveness of smoking cessation interventions for inpatient smokers. Different studies have reported varying magnitudes of effects based on the intensity of intervention. Rigotti et al.[107] conducted a Cochrane systematic review of studies which evaluated hospital-based smoking cessation interventions. A total of 50 studies – randomised (N=44) and quasi-randomised (N=6) – were included in this review. Advice and/or behavioural counselling were provided in all studies. The duration of counselling ranged from five minutes to two hours. Forty eight studies used a nurse or a counsellor to provide cessation counselling. Twelve studies provided additional physician advice to quit and, in three studies, patients' charts were stamped to prompt physician advice. Most studies included self-help materials and follow-up support. The duration of follow-up support ranged from one week to 12 months post-

discharge. Twelve studies included pharmacotherapy options. The study follow-up ranged from six to 12 months. Biochemical validation was used in 32 studies. The authors divided the studies based on intensity of intervention into four categories: intensity 1 – up to 15 minutes single contact in hospital without follow-up support; intensity 2 – one or more contacts in hospital lasting in total more than 15 minutes with no follow-up support; intensity 3 – any hospital contact plus follow-up support of up to one month; and intensity 4 – any hospital contact plus follow-up support of more than one month.

Only one study (N=1341) evaluated the effect of intensity 1 intervention and this was not efficacious (RR 1.14; 95%CI 0.82 to 1.59). Of the nine studies which evaluated intensity 2 interventions only one had a statistically significant result in favour of the intervention. Similarly, of the six studies which evaluated intensity 3 interventions, only a single study significantly favoured the intervention. The pooled analysis of both intensity 2 and 3 interventions did not reach statistical significance (intensity 2: RR 1.10; 95% CI 0.96 to 1.25; intensity 3: RR 1.07; 95% CI 0.93 to 1.24). However, a pooled analysis of 25 high intensity interventions (intensity 4) found a significant improvement in smoking cessation rates by 37% at 6-12 months after discharge (RR 1.37; 95%CI 1.27 to 1.48). Among the studies which evaluated high intensity interventions, all favoured the intervention except for a small study (N=40) and eight reported statistically significant results in favour of the intervention. Adding NRT to an intensive counselling intervention increased smoking cessation rates compared with intensive counselling alone by 54% (six trials).[107] The findings of the review may not be generalisable to low-income countries as most studies were conducted in developed countries.

Randomised studies which were not included in the Cochrane systematic review

A recent RCT[105] in the USA evaluated the effectiveness of a post-discharge intervention – sustained care (automated interactive voice response telephone calls and patients' choice of free smoking cessation medication for up to 90 days) compared with standard care. This study recruited 397 inpatient smokers who received smoking cessation counselling in a hospital. Biochemically validated 7-day point prevalence abstinence at six months was higher in the sustained care group compared to the standard care group (26% vs. 15%; RR 1.71; 95%CI 1.14 to 2.56). Self-reported continuous abstinence also favoured the intervention. However, this study included only those who were interested in quitting and the results may not be applicable to smokers who are not yet interested in quitting. Also, interactive voice response telephone calls may not be appropriate for smokers of low-socio-economic status. Additionally, the single study site further compromised its generalisability. A multicentre study evaluating the same intervention by the same research group is currently underway in three hospitals.[108] Another study[109] by the same research group evaluated the effectiveness of a 'call back' option offered through an interactive voice response system did not improve cessation rates. This study was limited by the single site, short follow-up (12 weeks) and absence of biochemical verification of self-report.

Murray et al.[110] performed a six months cluster RCT in a UK secondary care setting among 493 inpatient smokers. In this study the researchers identified smokers and provided one-to-one support including counselling and pharmacotherapy. On discharge, all participants were offered referral to a community smoking cessation service for further support and followed-up by telephone by the researcher at least once. Validated cessation at six months

was achieved by 19% of intervention and 9% of usual care patients, but the difference was not statistically significant (p=0.37). The study was limited by the single site and baseline imbalance in the length of hospital stay among participants (a longer median length of stay among the intervention group). Using hospital wards as the unit of randomisation might have also affected the results. For example, in this study all patients on the respiratory ward were randomised to usual care and all patients on the cardiac ward were randomised to the intervention.

The STOP[73] and EVITA[75] studies (previously described under **section 1.8.2**) evaluated the safety and efficacy of varenicline in hospitalised smokers (STOP: inpatient smokers with smoking related admissions; EVITA: inpatient smokers with acute coronary syndrome) and have reported positive findings.

1.9.2.1 Hospitalisation: A Missed Opportunity for Tobacco Control

Despite the potential to provide smoking cessation interventions in hospitals, previous reports suggest that healthcare providers are not providing adequate level of support to their smoking clients. George et al.[5] (discussed above in **Section 1.9.2**) found that almost half of the inpatient smokers in Australia are interested in starting a smoking cessation programme whilst they are in hospital. Despite this, only one in five had discussions with health professionals regarding the available options to assist them to quit smoking. Freund et al.[111] performed a systematic review and a meta-analysis of studies which reported levels of smoking care delivery in hospitals. This review included 33 studies conducted mostly in the USA (15 studies), the UK (five studies) and Australia (three studies). The meta-analysis found that smoking status was assessed in 60% of patients (six studies), 42% were advised or counselled to quit (19 studies), 14% were provided with or advised to use NRT (two

studies), and 12% were given referrals or follow-up appointments (four studies). Significantly fewer patients received follow-up or referrals than those who were assessed for their smoking status or received advice or counselling to quit. Almost 81% of health professionals reported that they assessed smoking status, 70% advised or counselled patients to quit, 13% provided NRT or advised on its use, and 39% made referrals or follow-up appointments. These findings suggest that the level of smoking cessation care in hospitals is less than optimal.

1.9.2.2 Barriers to Provide Smoking Cessation Care in Hospitals

Few studies have evaluated the barriers to the provision of smoking cessation care in hospitals. The frequently reported barriers included a lack of staff time and skills, lack of training, lack of confidence, lack of organisational support, perceived patient objections, lack of systems to identify smokers, perceived inability to change practices, perceived lack of efficacy of cessation care and the cost of providing care.[112-114]

1.9.2.3 Summary

This section **(Section 1.9.2)** established that high intensity interventions initiated during hospital stay with more than one month follow-up support are effective in smoking cessation but are not routinely provided. Most of the previously evaluated hospital-based interventions were predominantly delivered by physicians, nurses or counsellors and many barriers limit their implementation in inpatient settings. Newer strategies are required to integrate smoking cessation interventions into routine inpatient care. Hence, it is important to develop simple interventions which can also be delivered by other health professionals such as pharmacists. The next section discusses about the potential role of pharmacists in smoking cessation activities.

1.9.3 Tackling Tobacco Smoking: Scope of Pharmacists

The role of pharmacists in chronic disease management is evolving. From the role of compounder and dispenser of medicine, a pharmacist's role has now expanded to encompass a wide range of clinical and pharmaceutical care services.[115] Many developed countries (e.g. the USA, the UK and Australia) have recognised the roles of pharmacists in the multidisciplinary provision of healthcare.[116 117]

Community pharmacists are in an ideal position to provide smoking cessation support due to their expertise in drug therapy, accessibility to the public, interaction with large diverse patient populations and presence at the point of purchase of NRT products.[118 119 120] They are knowledgeable about the mechanisms of tobacco addiction, nicotine withdrawal, NRT and other pharmacotherapies, and the impact of quitting on current medications (e.g. theophylline clearance) and disease states.[118] Unlike most other health professionals, consultation with a pharmacist does not require an appointment or consultation fee in most countries, including Australia.

In Australia, hospital pharmacists are an integral part of the clinical care team in hospitals. They are the medicines experts and usually provide pharmaceutical care, including bedside counselling, to inpatients. The Society of Hospital Pharmacists of Australia (SHPA) Standards of Practice for Clinical Pharmacy have specifically mentioned the importance of hospital pharmacist participation in the design, planning and implementation of public health education programmes such as smoking cessation.[121] Many studies have evaluated the effectiveness of pharmacist interventions for smoking cessation, which are described below.

Community-pharmacy-based interventions

Few randomised studies show the value of pharmacist involvement in smoking cessation services in community settings. Bock et al.[122] conducted a study involving 299 smokers from two community pharmacies in the USA. This study evaluated two pharmacy-based interventions (Intervention 1 (EQ): brief counselling based on 'Expert_Quit' (EQ) software that provides tailored reports for the pharmacist to help guide cessation counselling. Intervention 2 (EQ+): in addition to intervention 1, EQ+ included an eight week supply of nicotine patches) with an observation only group (OBS). Compared with the OBS, those in the EQ (OR 1.49; 95%CI 1.2 to 3.6) and EQ+ groups (OR 3.3; 95%CI 1.9 to 5.2) were more likely to report biochemically verified 7-day point prevalence abstinence at six months follow-up. This study confirmed the effectiveness of pharmacist-led interventions for smoking cessation and the added benefits of combining pharmacotherapy with counselling on the quit rates. However, the validity and generalisability of these findings may be limited because of the small number of pharmacies involved, small sample size (100 in each arm) and non-randomised study design (only intervention arms randomised, OBS participants were recruited in a different phase and were not included in the randomisation process).

Maguire et al.[123] conducted a RCT in 484 smokers recruited from 51 community pharmacies in the UK. The intervention was delivered by a pharmacist and consisted of a structured counselling programme, weekly follow-up visits for four weeks, then monthly follow-up visits for three months, an information leaflet and NRT, as appropriate. The control group received the usual pharmaceutical care provided at pharmacies and NRT.

Biochemically validated continuous abstinence at 12 months was significantly higher in the intervention group compared to the usual care group (14.3% vs. 2.7%; $p<0.001$). Although the study benefited from a large number of study sites and an acceptable sample size, the possibility of contamination between groups cannot be ruled out as the same pharmacists were involved in both the intervention and control group activities. A cluster randomised trial would have been a better design to avoid such contamination. It is also noted that of the 124 pharmacies initially agreed to participate, 56% did not recruit even a single participant. This reflects the lack of interest of some pharmacies to take part in the study and deliver the intervention.

Another study evaluated the effectiveness of a training programme for community pharmacy personnel to improve smoking counselling compared to no training.[124] In this cluster RCT, 492 self-referred smokers were recruited from 62 community pharmacies in Scotland. Intervention group pharmacists and pharmacy assistants received a 2-hour training programme to improve their smoking cessation counselling skills based on the stages of change model. At nine months, the continuous abstinence rate was 12% for the intervention group and 7.4% for the control group by self-report ($p=0.089$). The study was underpowered to detect a small difference as it failed to reach the recruitment target (only half of the required number of smokers were recruited). In this study, the participants were recruited from those who were seeking help with smoking cessation from community pharmacy personnel and, hence, the sample may represent only motivated smokers. The study used self-reported data on abstinence, which may have affected the validity of the findings.

A large study[120] (which included 6,987 smokers from 98 pharmacies in Canada) compared three counselling sessions delivered by a pharmacist with one session (that was also delivered by a pharmacist) found that cessation outcomes were higher in the former group (OR 1.72; 95%CI 1.53 to 1.94) at five weeks follow-up. The limitations of this study were high attrition rates (57% dropped out at five to 12 weeks post-intervention visits), a short-term assessment (5 weeks), a lack of biochemical verification for the primary outcome and the possibility of recruitment bias (participants were recruited through the internet and, hence, the programme may not have reached those who had no access to internet or not motivated).

Although many uncontrolled studies have also reported the benefits of pharmacist provided smoking cessation interventions,[119] these results may not be reliable due to the absence of a control group.

Outpatient-based interventions

Dent et al.[125] conducted an open label RCT of 101 smokers recruited from a community-based outpatient clinic in the USA. A pharmacist provided face-to-face group programme (three sessions) was compared with a brief, standard care session delivered by a pharmacist over the telephone. At six months after the quit date, the biochemically confirmed 7-day point prevalence abstinence rate was 28% in the intervention and 11.8% in the standard care group ($p < 0.041$). Limitations such as a single site, small sample size and the inclusion of mostly male participants (93%) limit the generalisability and validity of the findings.

Hospital-based interventions

Only two small studies have evaluated pharmacist provided hospital-based smoking cessation interventions. Vial et al.[126] evaluated the effectiveness of a smoking cessation programme, which linked inpatient smokers to community pharmacies or to an outpatient clinic after discharge for follow-up support. A total of 102 participants were enrolled in this three arm RCT conducted in Australia. Two interventions (a hospital-based programme and a community-based programme) were tested against a minimal intervention arm (advice only). Smokers in both intervention arms received counselling from the research pharmacist during their hospital stay and were given nicotine patch. After discharge, one group was followed up weekly in an outpatient clinic and the other group by a community pharmacist. At 12 months, 30-day sustained abstinence rate was 38% for the hospital intervention arm, 24% for the community pharmacy arm, and 4.6% for the minimal intervention arm ($p=0.031$). The continuous abstinence rates were 24%, 19% and 4.6%, respectively ($p>0.05$). The very low number of study participants compromised the statistical power of the study, which might have contributed to the non-significant results for continuous abstinence. The inclusion criteria such as wanting to quit (i.e. motivated smokers) and smoking at least 10 cigarettes per day limited the generalisability of study findings. Another small (N=41), recent study evaluated a clinical pharmacist's role in implementing a smoking cessation intervention in a Swiss hospital and reported that a trained clinical pharmacist can play a major role in smoking cessation activities.[127] Limitations such as small sample size, single site, absence of a control group, and single pharmacist compromised the internal validity and generalisability of the study findings. Whilst these studies showed some positive trends for pharmacist provided inpatient smoking cessation

interventions, the results may not be reliable due to serious methodological flaws.

The results of the abovementioned studies suggest that interventions for smoking cessation provided by pharmacy personnel could be beneficial. The results also suggest that multiple session interventions are better than single session interventions.

1.9.3.1 Pharmacists role in smoking cessation: perceptions, knowledge, attitude and barriers

A few studies have evaluated pharmacists' views, knowledge, attitudes and barriers in providing smoking cessation support for their smoking clients.[128-131] A recent survey in Qatar[131] found that the majority of pharmacists (84%) were interested in providing smoking cessation support to their smoking clients. Most (>80%) believed that smoking cessation counselling was an important activity for pharmacists, was an efficient use of their time, and improved the pharmacist-patient relationship. However, only 21% of respondents reported that they routinely asked their patients about their smoking status. When a smoker was identified, advising quitting and assessing readiness to quit were performed by more than half of the respondents. However, only 15% arranged a follow-up with smokers and 22% made smoking cessation referrals. More than 80% agreed on the adverse effects of smoking and also agreed that smoking cessation could decrease the risk of these effects. Lack of time, patient interest and educational materials were identified as main barriers to providing smoking cessation support. However, a small sample size (N=127), a low response rate (40%), and the convenience sampling method may limit the validity of the findings.

Another survey in the USA[130] also reported the positive attitude of pharmacists in providing smoking cessation support. Most pharmacists reported that they were knowledgeable in providing counselling, but fewer than 25% had received training or were aware of the national guidelines. Those who had received formal training or recently attended an educational programme on smoking cessation were significantly more likely to counsel smokers. The main barriers to providing smoking cessation support include a lack of time, difficulties in identifying smokers, low patient demand and a lack of reimbursement. Although this survey benefited from random sampling, a small sample size (N=129), a low response rate (38%) and inclusion of only urban pharmacies may limit its validity and generalisability.

Ashley et al.[128] found that knowledge and skills with respect to smoking cessation, and attitudes and perceptions about professional role in tobacco control are strongly related to the provision of smoking cessation interventions by pharmacists. Hence, any intervention which could improve pharmacists' knowledge level has the potential to improve smoking cessation activities provided by pharmacists. This postal survey was conducted among a random sample of Canadian pharmacists and the response rate (72%) and sample size (N=996) were acceptable.

Margolis et al.[129] conducted a survey in the USA to quantify tobacco control related activities by pharmacists. Only 12.2% routinely asked about the smoking status of their patients. Once a patient's smoking status was known, 32.4% of pharmacists often advised them to quit. The majority (71%) agreed that counselling patients regarding smoking cessation is an important activity and almost half (44.7%) agreed that counselling is an

efficient use of their time. Barriers to providing smoking cessation support included time demands, lack of reimbursement and a perceived ineffectiveness of smoking cessation interventions. Limitations such as a small sample size (n=188) and a low response rate (11.7%) may reduce its validity and generalisability.

A recent Australian study of simulated patients which tested two scenarios (scenario 1: a 28-year old pregnant female presents with a request for help in quitting smoking; scenario 2: a 22-year old female requesting a quit smoking product for her 55-year old father with cardiovascular problems) in randomly selected 100 pharmacies reported that although pharmacist counselling about smoking cessation aids was satisfactory, further training is required to improve the practice standards.[132]

1.9.3.2 Summary

Many RCTs have demonstrated the effectiveness of pharmacist interventions in community settings. Pharmacists possess positive attitudes and knowledge in providing smoking cessation support. However, barriers such as time constraints, lack of reimbursement and lack of resources limit their involvement in tobacco control activities. Moreover, no large-scale studies have evaluated pharmacist-led smoking cessation interventions in a hospital setting.

1.10 Guideline Recommendations

There are a number of clinical practice guidelines; for example, the Department of Health and Human Service guidelines 'Treating tobacco use and dependence' in the USA,[54] National Institute for Health and Care Excellence (NICE) guidelines 'Smoking cessation in secondary care: acute, maternity and mental health services' in the UK[133] and the Royal Australian College of General Practitioners' (RACGP) guidelines 'Supporting smoking cessation: a guide for health professionals' in Australia. All these guidelines recommend addressing tobacco use at every clinical encounter. In any health system, all patients should routinely be screened for tobacco use and their smoking status should be documented. At least a minimal intervention should be offered to those who are identified as smokers. This may include strong advice to quit, assessment of willingness to make a quit attempt, assisting those who are willing to try to quit smoking and arranging follow-up contact for additional and ongoing support. Smokers unwilling to make a quit attempt should be offered a brief motivational intervention and their tobacco use should be addressed in the subsequent clinic visit. Smokers interested in quitting should be informed of the variety of treatment options (both pharmacological and non-pharmacological interventions) that are available even if they do not intend to use them. Assistance should be provided in selecting the most appropriate support strategies based on patients' circumstances and needs. Intensive interventions can also be provided by referral to a specialist smoking cessation clinic. Efforts to integrate tobacco treatment into routine clinical practice require the active involvement of clinicians, health systems, insurers and health insurance clients. Such a systems-level approach represents an opportunity to increase rates of delivering smoking cessation treatments, quit attempts and successful smoking cessation.[10 54]

1.11 Challenges to Stopping Smoking

Most smokers who are aware of the dangers of tobacco want to quit,[134] [135] but quitting is often difficult due to tobacco addiction and the chronic nature of the disorder.[1] The majority of smokers cycle through multiple attempts with relapse and remission before achieving long-term abstinence.[135]

Previous studies have identified a variety of barriers to quit smoking. Twyman and colleagues[136] reviewed the existent literature exploring barriers in six vulnerable groups, including participants from a low socio-economic background (24 studies), the indigenous population (16 studies), those with mental illness (18 studies), homeless persons (four studies), prisoners (two studies) and at-risk youths (one study). A total of 65 studies were included in this systematic review, including 54 qualitative, eight quantitative and three mixed method studies. The authors classified barriers into four broad categories: individual and lifestyle; social and community; living, working and cultural conditions; and socio-economic and environmental factors.

The individual and lifestyle barriers include physical addiction, behavioural habits, low confidence and the perceived difficulty of quitting, previous failed attempts, low motivation, stress, perceived mental health and cognitive benefits, loneliness, a sense of autonomy, enjoyment, positive image of smoking, fear of weight gain, perceived low individual risk of harm from smoking, competing priorities and other substance use. The social and community barriers include a lack of social support, a lack of support from health professionals, maintaining social relationships and the high prevalence and acceptability of smoking in the community. The barriers attributed to living and working

conditions include stressful situations, lack of access to cessation services due to geographical isolation, boredom, limited structure in day-to-day life, difficulties in accessing resources to quit (e.g. the cost of NRT and other pharmacotherapies), the belief that smoking cessation medication does not work and a fear of side effects from smoking cessation medications. The socio-economic and environmental factors include cultural norms, maintaining identity and socio-economic factors. Among these barriers, smoking for stress management, enjoyment, nicotine addiction, habit, the social acceptability of smoking, a lack of support to quit, a lack of access to quitting resources, boredom, stressful life factors, living environment, cultural norms and socio-economic status were most commonly reported. Barriers such as stress, a lack of support from healthcare providers and the high prevalence and acceptability of smoking were common among all sub-groups. The majority of the included studies used qualitative methods to identify barriers and most quantitative studies used convenience sampling, hence limiting the validity.[136]

Some other studies also evaluated self-reported barriers among the general smoking population. In a recent qualitative study, Carter-Pokras et al.[137] conducted five focus groups with 55 partciapnts (34 current smokers and 21 ex-smokers). Barriers such as environmental temptations (spouse, co-workers and friends smoking), social factors (alcohol use and social gatherings), emotional pressure (feeling anxious, stressed, depressed and lonely), addiction and habitual behaviour were identified in the focus groups. Participants mostly relied on themselves for cessation, with little use of cessation products and a lack of awareness of available support services. The findings from this qualitative study are limited by a small, convenience sample of Latino Americans from a confined area which reduces its validity and generalisability. It is also unknown whether data saturation

was reached.

A telephone survey conducted in the USA[138] reported barriers such as breaking the habit, stress, fear of weight gain, being around other smokers and stressful situations. One-third of participants reported discontinuing pharmacotherapy due to adverse events. Convenience sampling and small sample size (N=150) may limit its validity and generalisability.

Gierisch et al.[139] conducted three focus groups among 20 participants to explore issues on tobacco use and smoking cessation for Iraq- and Afghanistan-era veterans. Several situational, behavioural, and environmental triggers were identified in this qualitative study. Barriers such as boredom, being around smokers and breaking the habit were frequently reported. Depression, irritability, anger and sleeplessness were also mentioned. Some experienced side effects from using NRT and other cessation pharmacotherapies, which prompted relapse. The main limitations of this study were small sample size and the specific study population which reduce generalisability. Poor description of the conduct of the focus groups and the analysis methodology make it difficult to interpret the quality of the results.

White et al.[140] conducted a qualitative study (interviews and focus groups) of 73 participants including smokers, ex-smokers and smokers' relatives from Bangladesh and Pakistan. This study identified barriers such as being tempted by others, everyday stress and withdrawal symptoms. The small sample size and convenient sampling may limit its validity and generalisability. It is also unknown whether data saturation was reached.

Fiddler and colleagues[141] identified self-perceived smoking motives in a large cross-sectional survey conducted in the UK which included 2,133 smokers. The most commonly

reported motives were enjoyment and stress relief (reported by around half of the participants). Other motives such as weight control, keeping engaged, and the positive smoker identity were reported by more than 10% of participants. This study benefited from a large sample size and a random sampling method; however, the high chance of recall bias limits its validity.

The studies discussed above reveal that smokers experience a variety of challenges while trying to quit smoking. Identifying the various challenges associated with quitting may guide the selection of appropriate cessation strategies that are more likely to be successful in future quit attempts.

1.11.1 Assessing Challenges to Stopping Smoking

Few structured and quantitative scales examining the challenges associated with smoking cessation exist and are detailed below.

Barriers to cessation scale (BCS Scale):[142] this 19 item scale was developed by Macnee and Talsma in 1995 and was tested in three different studies in the USA. The first study included 92 smokers who were trying to quit. The second was a 12 week longitudinal study, which examined the impact of barriers on perceived well-being and success on cessation of a sample of 25 participants. The third was a six month longitudinal study which examined the ability of perceived barriers to predict future quit attempts and success of a sample of 156 participants. Internal reliability and consistency were established in studies 1 and 3, and internal consistency (Cronbach's alpha) ranged from 0.81 to 0.87. Content validity was established in study 2 by asking the participants for any additional barriers to quitting. Predictive validity was established in studies 2 and 3. There were

significant differences in the barriers to cessation scores among those who were continuing to smoke, trying to quit and those who had successfully quit.

The instrument comprised three sub-scales measuring addiction, external and internal barriers, respectively. However, the BCS scale did not include beliefs and views about smoking cessation medications and treatments, and challenges associated with obtaining support. A scale developed 20 years ago may not capture some of the current barriers associated with quitting. Specifically, this scale does not measure some of the barriers reported in the more recent literature such as stress, boredom, fear of weight gain, lack of support from health professionals, cost of smoking cessation medications, use of other substances and easy availability of cigarettes.

Perceived risks and benefits questionnaire:[143] this 39 item questionnaire was developed in 2005 and was validated in two studies (573 & 93 participants; Cronbach's alpha ranged from 0.61 to 0.90). The instrument comprises two parts. The first part measures some barriers associated with quitting such as concerns about weight gain, stress and irritability, inability to concentrate, social ostracism, loss of enjoyment and craving. It does not measure other barriers reported in the literature.

Other scales assessing barriers have not been validated.[144-146] These scales have used a list of barriers from the literature to assess smokers without applying any validation methods.

In summary, smokers experience various challenges while quitting. Identifying and addressing those challenges may improve cessation outcomes. Although a few scales exist for assessing the challenges to cessation, they are either outdated or not validated. A comprehensive scale for assessing barriers to quitting is warranted.

1.12 Summary and Scope of the PhD Project

Tobacco use is responsible for a large proportion of global illness and death. WHO emphasises the importance of scaling up tobacco control measures and giving higher priority to smoking cessation programmes.[1] The positive impact of smoking cessation on morbidity and mortality has been established. Given the high prevalence of smoking, even minor improvement in smoking cessation rates could potentially translate to major health and economic benefits.

Although smoking is considered a chronic disease, it is largely neglected in clinical practice.[147] Evidence-based smoking cessation treatments and treatment policies exist but are under-utilised. Physician-delivered advice to stop smoking is effective, but several barriers limit their involvement in smoking cessation activities. Only a large increase in adult cessation will rapidly reduce smoking prevalence at a population level. More efforts are needed to coordinate efficient dissemination and implementation of effective treatments and policies. The development of a pragmatic, effective intervention to provide support to all inpatient smokers is warranted.

Clinical practice guidelines recommend system-level changes to address problems associated with smoking care provision. System level interventions may vary significantly in their nature and currently there is no summary of evidence available to inform the most effective strategy for Australian hospitals to adopt.

Having a dedicated and trained professional for coordinating tobacco control activities in hospitals may be an effective approach. Adequately trained pharmacists may be in an ideal

position to assist people to quit smoking. Such interventions are known to be feasible and efficacious in community settings.[122 125 148] However, no large-scale studies have evaluated the efficacy of pharmacist interventions among inpatient smokers. Research is currently underway in the USA within the Consortium of Hospitals Advancing Research on Tobacco (CHART) network which includes assessing the effectiveness and cost-effectiveness of a number of projects initiated during hospitalisation and continued after discharge. This project is expected to include 10,000 inpatient smokers from 20 hospitals in the USA.[149] However, there is no significant pharmacist involvement in these projects.

In summary, the efficacy of system change smoking cessation interventions has not been evaluated in systematic reviews. Also, no RCTs have been conducted to evaluate the effectiveness of pharmacist-led interventions for smokers admitted to hospitals. Moreover, no comprehensive scale exists to assess current challenges associated with quitting. Against this background, a series of studies have been proposed to develop and evaluate an effective, pragmatic, sustainable smoking cessation intervention for hospitalised smokers in the Australian setting and explore the challenges to quitting smoking amongst an inpatient sample.

Chapter 2
System change interventions for smoking cessation
A Cochrane Systematic Review

2:1 Preface

The previous chapter provided an overview of evidence in the literature relating to various interventions for smoking cessation and also highlighted the importance of system change interventions. The review identified several gaps in the literature, including the lack of a systematic review appraising the efficacy of system change interventions in smoking cessation. It is important to have a systematic review as it is considered level 1 (highest) in the hierarchy of evidence. Hence, this chapter presents a systematic evaluation of studies that investigated efficacy of system change interventions for smoking cessation in different healthcare settings.

2:2 Publications

Thomas D, Abramson MJ, Bonevski B, George J. System change interventions for smoking cessation (review protocol). *Cochrane Database Syst Rev* 2013: CD010742.

Thomas D, Abramson MJ, Bonevski B, George J. System change interventions for smoking cessation. *Cochrane Database Syst Rev* (under review).

2:3 Appendices

Appendix 1: Search strategies (EMBASE, CENTRAL, PsycINFO and CINAHL)

Declaration for Thesis Chapter 2

Declaration by candidate

In the case of Chapter 2, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Reviewed literature; designed methodology; developed search strategies; identified and screened relevant titles, abstracts and full texts; extracted and analysed data; and prepared manuscripts	80%

The following co-authors contributed to the work as follows:

Author name	Nature of contribution
Dr Johnson George	Assisted in development of methodology, screening of articles, data extraction and manuscript preparation
Prof Michael Abramson	Assisted in development of methodology and manuscript preparation
Prof Billie Bonevski	Assisted in development of methodology and manuscript preparation

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work.

Candidate signature		Date 14/03/2016
Main supervisor's signature		Date 14/03/2016

System change interventions for smoking cessation (Protocol)

Thomas D, Abramson MJ, Bonevski B, George J

This is a reprint of a Cochrane protocol, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2013, Issue 9

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[Intervention Protocol]

System change interventions for smoking cessation

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ABSTRACT

This is the protocol for a review and there is no abstract. The objectives are as follows:

To assess the effectiveness of system change interventions within healthcare settings, for increasing smoking cessation.

BACKGROUND

Description of the condition

The consequences of tobacco use are increasingly recognised and understood, and the benefits of smoking cessation are well documented (Critchley 2004; Ebbert 2005; Peto 2000; Taylor 2002). Quitting smoking can reduce the risk of morbidity and mortality for smokers. Smoking cessation leads to significant health benefits immediately and also decreases most of the related risks within a few years of quitting (WHO 2011). Even patients who quit later in life gain benefits. For example, among smokers who quit at the age of 65 years, on average, men gain two years of life and women gain three (Taylor 2002). Quitting smoking is associated with a 36% reduction in risk of all-cause mortality among patients with coronary heart disease, which is significant when compared with other secondary preventive therapies such as cholesterol lowering (Critchley 2004). Given the high prevalence of smoking, even minor improvement in smoking cessation rates could potentially translate to major health and economic benefits.

Description of the intervention

"System change smoking cessation interventions describe specific strategies that health care administrators, managed care organisations, and purchasers of health plans can implement to treat tobacco dependence" (AHRQ 2012).They involve systematic identification of smokers and subsequent offering and receipt of evidence-based cessation treatments (Fiore 2007). Fiore et al suggested six system-level strategies to facilitate treatment of tobacco dependence: 1) implement a system for identifying smokers and documenting the tobacco use status in every clinic and hospital; 2) provide education, resources and feedback to promote provider intervention; 3) dedicating staff to provide smoking cessation treatment and assess its delivery in staff performance evaluations; 4) promote hospital policies that support and provide smoking cessation services; 5) include tobacco dependence treatments (both counselling and phar-

macotherapy) identified as effective; and 6) reimburse providers for the delivery of effective tobacco dependence treatments and include these services among the defined duties of them (Fiore 2007).

How the intervention might work

Addressing tobacco use requires clinical, program, and system level changes. According to clinical practice guidelines for treating tobacco use and dependence, all healthcare institutions should develop plans to support the consistent and effective identification, documentation and treatment of tobacco smokers (Fiore 2008). As a minimum requirement, all clinicians should ask the tobacco use status of their clients, briefly advise all smokers to quit, and refer them to Quitline or other smoking cessation services (Revell 2005).

Even though there are guidelines and evidence to provide smoking cessation services at every clinical encounter, some reports suggest that healthcare providers are not delivering recommended levels of support to their patients who smoke (Braun 2004). Prior studies have reported sub-optimal rates of smoking cessation services by different types of healthcare professionals in different healthcare settings (Aquilino 2003; Braun 2004; Thorndike 1998). The levels of smoking cessation support in hospitals are also low (Freund 2005; Freund 2008). It is evident that current healthcare systems, even of developed countries, are not well organised to address the issue of smoking.

The barriers to providing effective smoking cessation include a lack of support from the organisation, perceived objections from patients, a lack of systems for identifying smokers, a lack of staff time and skill, perceived inability to change practices, a perceived lack of efficacy of tobacco dependence treatments and the cost of providing care (Wolfenden 2009). A strategic system change approach may be effective in addressing these multidimensional factors associated with low smoking care provision. Outcomes for chronically ill patients will really improve only when health care systems reconfigure themselves to address the needs and concerns of patients (Wagner 1998). Tobacco smoking is a chronic relapsing condition that often requires ongoing medical and behavioural interventions, thus it is considered a chronic health condition (Hudson 2010). Therefore a system level change might be essential in dealing with the issue.

Why it is important to do this review

The system change interventions may vary significantly in their nature and it is not clear if this approach is effective; and in particular which types of approaches are more effective than the others. A summary of this evidence is critical as, to our knowledge, a systematic review assessing the effectiveness of such interventions has not yet been published. This review is intended to identify various system change interventions for smoking cessation and to evaluate the effectiveness of such approaches in different healthcare settings.

OBJECTIVES

To assess the effectiveness of system change interventions within healthcare settings, for increasing smoking cessation.

METHODS

Criteria for considering studies for this review

Types of studies

Randomised controlled trials, cluster randomised controlled trials with at least two intervention sites and two comparator sites, quasi-randomised trials and interrupted time series studies (ITS) with a clearly defined point in time when the intervention occurred and at least three data points before and after the intervention.

Types of participants

People who smoke and are receiving care in a healthcare delivery setting.

Types of interventions

System change interventions for smoking cessation are policies and practices designed by organisations to integrate the identification of smokers and the subsequent offering and receipt of evidence-based tobacco dependence treatments into the usual care (Fiore 2007). Thus interventions which have been developed for identifying people who smoke, documenting smoking status and providing tobacco dependence treatment at different healthcare settings (primary, secondary or tertiary care settings) will be included in the review.

Studies utilising the components of Fiore et al's model will be considered (Fiore 2007).

1. Implement a system for identifying smokers and documenting the tobacco use status in every clinic and hospital;
2. Provide education, resources and feedback to promote provider intervention;
3. Dedicating staff to provide smoking cessation treatment and assess its delivery in staff performance evaluations;
4. Promote hospital policies that support and provide smoking cessation services;

5. Include tobacco dependence treatments (both counselling and pharmacotherapy) identified as effective; and
6. Reimburse providers for the delivery of effective tobacco dependence treatments and include these services among the defined duties of them.

Those studies focusing only on training health professionals or identification of smokers (electronic health records) or smoking cessation counselling without a system change approach will not be considered. It should be designed for integrating the provision of smoking cessation services within the routine delivery of health care. Each potential study will be reviewed by two authors, including a content expert before including in the review.

Types of outcome measures

Primary outcomes

Following the standard methodology of the Cochrane Tobacco Addiction Group, the primary outcome will be abstinence from smoking at the longest follow-up, assessed as point prevalence (defined as prevalence of abstinence during a time window immediately preceding the follow-up) and/or continued or prolonged abstinence (defined as abstinence between quit day or predetermined grace period and a follow-up time). The strictest available criteria to define abstinence will be used; thus continuous or prolonged abstinence will be preferred over point prevalence, and biochemically validated abstinence over self reported abstinence. We will distinguish between short term abstinence, assessed less than six months from the initiation of intervention with a patient, and long term abstinence, assessed after six months or longer.

Studies that do not assess smoking cessation will be eligible for inclusion if they report any secondary outcome and meet other inclusion criteria. The classification of primary and secondary outcomes in each included study will be examined and reported.

Secondary outcomes

Increase in the provision of smoking cessation support services as a part of routine care measured as either organisational or patient or health professional level strategies.

Organisational level outcome measures may include number of smokers identified and smoking status documented, and number of health professionals trained or dedicated to provide cessation support.

Patient level outcome measures may include number of smokers who were counselled, given self help materials, offered nicotine replacement therapy (NRT) or other pharmacotherapy, nominated a quit date and given follow-up appointment.

Health professional level outcome measures may include number of referrals made to other health professionals and/or to local smoking cessation services.

We will present the main outcomes of the review in a Summary of Findings table.

Search methods for identification of studies

Electronic searches

We will search the following databases:

- Cochrane Central Register of Controlled Trials (CENTRAL);
- MEDLINE (1946 to present);
- EMBASE (1947 to present);
- PsycINFO (1806 to present); and
- CINAHL (1938 to present).

The search strategies will be developed to comprise searches both for key words and Medical Subject Headings/Emtree. We will aim to identify articles reporting randmised control trials (RCTs), cluster RCTs, Quasi RCTs and ITS studies that comprise intervention and a measure of the effect on system change approach. No language restriction will be employed. The strategy for MEDLINE is presented in Appendix 1.

Searching other resources

Studies will also be identified by screening references given in relevant reviews and identified studies (citation tracking). Personal bibliographies and communication with experts in the field will also be considered to identify any hidden studies.

Data collection and analysis

Selection of studies

DT will implement the search strategy and the search results will be merged using reference management software (EndNote®). The titles and abstracts of the studies will be reviewed for possible inclusion, and those selected will be subjected for full text assessment. Multiple reports of the same study will be linked together. Two authors (DT and JG) will independently assess all the full text articles retrieved, and those studies meeting the inclusion criteria will be included in the review. Any discrepancies will be resolved by discussing with the third author who will act as an arbiter. A content area expert (BB) will act as an arbiter for disagreement about the intervention or content of the study. Methodological discrepancies will be checked by another arbiter (MA) who is an expert in clinical trials and meta-analysis. Characteristics of the studies excluded, (after full text assessment) including the reason for exclusion, will be listed and reported.

Data extraction and management

Two authors (DT and JG) will extract data independently and categorise trials for subgroup analysis. A pre-tested (pilot tested), standardised data collection form will be employed. Data from the data collection forms will be entered into RevMan 5.2 for analysis. Authors of the studies where data are not available or unclear will be contacted by e-mail. The following information will be extracted from each of the selected studies:

- lead and corresponding authors' information;
- date of publication;
- location and setting;
- methods of recruitment and inclusion criteria;
- methods of randomisation, allocation, concealment and blinding;
- study design, duration and follow-up details;
- characteristics of participants (e.g. age, sex and smoking status);
- specific details of the intervention (type, duration, content, format and delivery of intervention, use of pharmacotherapy, adherence to therapy and information about the providers);
- control group component;
- number of participants in each arm;
- outcome measures and definitions including any biochemical validation, and time point at which they are measured and reported;
- results: estimate of effect with confidence intervals and subgroup analysis (summary data of intervention and control group will be entered separately into RevMan, where effect estimates can be calculated) and missing data;
- funding, and declaration of interest for the primary investigators;
- conclusion of the authors; and
- additional comments and information.

If studies are reported in more than one publication (e.g. different time points of the study) the data from all publications will be extracted in separate data collection forms and combined. If there is one full journal article and multiple conference abstracts are available, only the journal article will be considered. Any disagreement in the data collection process will be resolved by discussing with a third author (MA).

Assessment of risk of bias in included studies

Two review authors (DT and JG) will independently assess the risk of bias of included studies, with any disagreements resolved by discussion and consensus, and by consulting a third review author, where necessary.

The following criteria for assessing risk of bias will be implemented:

- Studies with a separate control group (RCTs, cluster RCTs and quasi RCTs) will be assessed using the nine standard criteria developed by the Cochrane EPOC Group (EPOC 2013) that include:
  - sequence generation;
  - allocation concealment;
  - blinding;
  - baseline characteristics;
  - baseline outcome measurement;
  - incomplete outcome data;
  - selective outcome reporting;
  - protection against contamination; and
  - other bias.
- ITS studies will be assessed using the seven standard criteria for ITS studies developed by the Cochrane EPOC Group (EPOC 2013) that include:
  - intervention independent of other changes;
  - pre-specified effect shape;
  - intervention unlikely to affect data collection;
  - blinding;
  - incomplete outcome data;
  - selective outcome reporting; and
  - other bias.

Each criterion will be judged on a 3-point scale for bias 'low risk', 'high risk' and 'unclear risk' (Higgins 2011) and a risk of bias table will be constructed.

1. 'Low risk' when there is a low risk of bias across all key domains.
2. 'Unclear risk' when there is an unclear risk of bias in one or more of the key domains.
3. 'High risk' when there is a high risk of bias in one or more of the key domains.

For each included study, a summary assessment of risk of bias will be provided.

Measures of treatment effect

Wherever possible, a risk ratio (quitters in treatment group/total randomised to the treatment group)/(quitters in control group/total randomised to the control group) will be provided for the outcome of each trial.

Unit of analysis issues

In the case of trials with repeated observations, the longest follow-up will be considered for the analysis (Higgins 2011).

In the case of cluster RCTs, an adjusted estimate of the required effect measure will be extracted from an analysis that properly accounts for the cluster design. Where such data are unavailable, an approximate analysis will be performed if the required information can be obtained (Higgins 2011). If a comparison is re-analysed, the P value will be annotated with a comment 're-analysed'.

In the case of trials with multiple arms, only arms that meet the eligibility criteria will be included in the review. If there are more than one eligible intervention arms, all the relevant experimental groups will be combined to create a single pair-wise comparison to avoid the problem of including same group of participants twice in the same meta-analysis. If multiple intervention arms are eligible and not comparable, each pair-wise comparison will be included separately, but with shared intervention arms divided out approximately evenly among the comparisons (Higgins 2011).

Dealing with missing data

The number of participants lost to follow-up will be reported by group, where available. If required, we will contact the study authors for more information. For quit rates, an intention to treat analysis will be followed. This assumes that people lost to follow-up continued smoking and will be included in the denominator for calculating relative risk.

Assessment of heterogeneity

Heterogeneity will be explored visually using tables and forest plots comparing effect sizes of studies grouped according to potential effect modifiers. This will include:

1. type of intervention (e.g. identification of smokers, documentation of smoking status, treatment, training of health professionals, feedback of services etc.);
2. intensity of intervention (e.g. counselling, pharmacotherapy, both counselling and pharmacotherapy, number of follow-ups etc.);
3. type of health professional involved;
4. settings (primary, secondary and tertiary);
5. study design (RCTs, cluster RCTs, quasi-RCTs and ITS studies); and
6. quality of studies.

If sufficient number of homogenous studies are available, statistical heterogeneity between study results will be assessed using Chi^2 test for homogeneity (with significance defined at the alpha-level of 10%) and any statistical heterogeneity will be quantified using I^2 statistic. Pooling of data using a meta-analysis will be considered if the heterogeneity is less than 50% (Higgins 2011).

Assessment of reporting biases

The publication bias will be assessed using funnel plots if there are sufficient number of studies.

Data synthesis

A narrative synthesis of the included studies will be presented. The major characteristics and results will be reported. We will group the studies under different definitions of system change. If studies or groups of studies are sufficiently similar in terms of participants, intervention, outcome and/or methodology, we will consider pooling the data statistically. If meta-analysis is appropriate, a random effects model will be used as we suspect clinical and/or methodological heterogeneity between studies sufficient to suggest that intervention effects may differ between trials. If there is a substantial heterogeneity and formal meta-analysis techniques are not possible, the median (IQR - interquartile range) effect size will be calculated to quantify the expected magnitude of improvement.

Subgroup analysis and investigation of heterogeneity

We will categorise trials according to different system change interventions and type of studies identified. We may consider the following categories based on the nature of identified studies:

1. studies in different health care settings (primary, secondary and tertiary);
2. studies which followed 'Russell Standards' - a common standard for reporting outcome criteria in smoking cessation studies. 'Russell Standards' include six criteria describing abstinence, duration of abstinence, biochemical verification, intention to treat analysis, protocol violations and blinding in smoking cessation studies (West 2005);
3. randomised controlled studies and non-randomised studies;
4. studies using self report alone and biochemically verified abstinence; and
5. studies with minimal (less than three components) and intensive system change intervention (three or more components).

If there is an appropriate number of studies, we will consider the pooling of data and conducting analyses to determine any differential effect between different types of interventions.

Sensitivity analysis

If there are sufficient data to conduct a meta-analysis, we will consider whether the results are sensitive to the exclusion of trials judged to have a high risk of bias. We will also consider doing sensitivity analysis if there are issues identified during the review. For example, heterogeneity due to the presence of one or two outlying studies. In such cases we will consider doing analyses both including and excluding these studies. If conducted, the results of the sensitivity analyses will be reported in summary tables.

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* *Indicates the major publication for the study*

APPENDICES

Appendix 1. MEDLINE search strategy

	Searches	Results
1	smoking cessation.mp. or exp Smoking Cessation/	25369
2	"Tobacco-Use-Cessation"/	734
3	"Tobacco-Use-Disorder"/	8264
4	Tobacco-Smokeless/	2820
5	exp Tobacco-Smoke-Pollution/	10511
6	exp Tobacco-/	24134
7	exp Nicotine-/	21574
8	((quit$ or stop$ or ceas$ or giv$) adj5 smoking).ti,ab.	10464
9	exp Smoking/pc, th [Prevention & Control, Therapy]	16407
10	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9	89620
11	(education adj5 (smok* or tobacco)).mp.	5014
12	(dedicat* adj2 staff*).mp.	250
13	(hospital adj2 policy).mp.	706
14	fee-for-service plans/ or reimbursement, incentive/	5507
15	organizational policy/	12526
16	"delivery of health care, integrated"/ or health care reform/ or health services accessibility/ or patient care team/ or patient-centred care/	140824
17	health system chang*.mp.	313
18	(system* adj2 chang*).mp.	11151
19	(system* adj2 intervention*).mp.	2306
20	(integrat* adj6 (smok* or tobacco)).ti,ab.	493

(*Continued*)

21	(Organi?ation* adj2 intervention*).mp.	434
22	Organi?ation* structure*.mp.	2584
23	(organi?ation* adj2 chang*).mp.	2903
24	(system* adj2 approach*).mp.	14755
25	((system* adj2 reform) or (Organi?ation* adj2 reform*)).mp.	1017
26	((system* adj modif*) or (Organi?ation* adj2 modif*)).mp.	1177
27	decision making, organizational/ or organizational innovation/ or patient identification systems/	31556
28	inservice training/	16829
29	((Identif* adj3 (smok* or tobacco*)) or (Document* adj3 (smok* or tobacco*))).mp	2906
30	11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29	238853
31	(animals not humans).sh.	3909032
32	10 and 30	4519
33	**32 not 31**	**4453**
34	RANDOMIZED-CONTROLLED-TRIAL.pt.	379026
35	CONTROLLED-CLINICAL-TRIAL.pt.	88620
36	CLINICAL-TRIAL.pt.	498196
37	Meta analysis.pt.	45250
38	exp Clinical Trial/	775048
39	Random-Allocation/	80474
40	randomized-controlled trials/	94219
41	single-blind-method/	18947
42	double-blind-method/	128607

(*Continued*)

43	placebos/	33227
44	Research-Design/	79501
45	((clin$ adj5 trial$) or placebo$ or random$).ti,ab.	857854
46	((singl$ or doubl$ or trebl$ or tripl$) adj5 (blind$ or mask$)) .ti,ab	127194
47	(volunteer$ or prospectiv$).ti,ab.	544492
48	exp Follow-Up-Studies/	489384
49	exp Retrospective-Studies/	477181
50	exp Prospective-Studies/	363771
51	exp Evaluation-Studies/ or Program-Evaluation.mp.	240380
52	exp Cross-Sectional-Studies/	173497
53	exp Behavior-therapy/	51856
54	exp Health-Promotion/	53929
55	exp Community-Health-Services/	490586
56	exp Health-Education/	135292
57	exp Health-Behavior/	97652
58	34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57	3347297
59	**33 and 58**	**2781**

CONTRIBUTIONS OF AUTHORS

DT wrote the first and subsequent drafts of the protocol. All authors contributed to conceptualising and designing the protocol, and provided comments on drafts of the protocol.

DECLARATIONS OF INTEREST

Dr George, Prof Abramson and A/Prof Bonevski have received an investigator-initiated grant from Pfizer for the "Give Up For Good" study which aims to evaluate the effectiveness of a pharmacist-driven multidisciplinary system-change smoking cessation program at three Australian hospitals. Pfizer has no involvement in the proposed review, nor have they influenced our decision to undertake this systematic review. Prof Abramson was a member of the Scientific Committee for a workshop on an unrelated topic that was sponsored by GlaxoSmithKline, but did not receive any honorarium.

Cochrane Library

Cochrane Database of Systematic Reviews

System change interventions for smoking cessation (Review)

Thomas D, Abramson MJ, Bonevski B, George J

Thomas D, Abramson MJ, Bonevski B, George J.
System change interventions for smoking cessation.
Cochrane Database of Systematic Reviews 2016, Issue 3. Art. No.: CD010742.
DOI: 10.1002/14651858.CD010742.pub2.

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[Intervention Review]

System change interventions for smoking cessation

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ABSTRACT

Background

System change interventions for smoking cessation are policies and practices designed by organisations to integrate the identification of smokers and the subsequent offering and receipt of evidence-based nicotine dependence treatments into usual care. Such strategies have the potential to improve the provision of smoking cessation support in healthcare settings and cessation outcomes among their clients.

Objectives

To assess the efficacy of system change interventions on smoking cessation and system level outcomes.

Search methods

We searched databases including MEDLINE, EMBASE, CINAHL, Cochrane Central Database of Controlled Trials (CENTRAL), Cochrane Tobacco Addiction Group Register and PsycINFO in February 2016. We also searched the grey literature and hand searched bibliographies of relevant papers and publications.

Selection criteria

Randomised controlled trials, cluster randomised trials, quasi-randomised trials and interrupted time series studies that evaluated a system change intervention and included identification of all smokers and subsequent offering of evidence-based nicotine dependence treatment.

Data collection and analysis

Using a standardised form we extracted data from eligible studies on study settings, participants, interventions and outcomes of interest (both cessation and system level outcomes). For cessation outcomes, the strictest available criteria to define abstinence were used. System level outcomes included assessment and documentation of smoking status, provision of advice to quit or cessation counselling, referral and enrolment in Quitline services, and prescribing of cessation medications. Risk of bias was assessed according to the Cochrane handbook and each study was categorised as high, low or unclear risk of bias. A narrative synthesis was used to describe the effectiveness of the interventions on various outcomes due to the presence of significant heterogeneity among studies.

Main results

Seven cluster randomised controlled studies were included in this review. The quality of evidence was rated as very low or low (dependent on the outcome) according to the GRADE standard. Evidence of efficacy was equivocal for abstinence from smoking at the longest follow-up (four studies), and for the secondary outcome - prescribing of smoking cessation medications (two studies). Four studies evaluated changes in provision of smoking cessation counselling and three favoured the intervention. There were significant improvements in documentation of smoking status (one study), Quitline referral (two studies) and Quitline enrolment (two studies). Other secondary endpoints, such as asking about tobacco use (three studies) and advising to quit (three studies) also indicated some positive effects.

Authors' conclusions

The available evidence suggests that system change interventions for smoking cessation may not be effective in achieving increased cessation rates, but have been shown to improve documentation of smoking status, provision of cessation counselling and referral to smoking cessation services. However, as the research available is limited we are not able to draw strong conclusions and there is a need for additional high-quality research to explore the impact of system change interventions on both cessation and system level outcomes.

PLAIN LANGUAGE SUMMARY

Do organisational changes to stop smoking support improve services and help more people to quit?

Background

Smoking is a cause of many health problems including cancers, heart and lung diseases. Health professionals (e.g., doctors, nurses, pharmacists, dentists etc.) may be able to reduce this harm by helping smokers to quit during a clinic visit. However, it may be difficult for physicians to recognise smokers. They may also feel they cannot deliver good support as they do not have enough time, skills, training, budget or supplies. A change within health professional's wider organisation may help to improve their involvement in care to help people to stop smoking, and in turn improve the chances of their patients quitting smoking. These changes may include introducing a system to identify smokers, providing training, budget or supplies to help health professionals offer support, identifying a dedicated staff member to provide quitting support, introducing advice to quit smoking into routine care and paying health workers for delivering cessation support.

Study characteristics

A search identified seven studies which investigated changes made to the way organisations offered stop smoking support in healthcare settings.

Key results

It was unclear whether any of the changes to stop smoking services within organisations helped more people to quit smoking. However, activities such as counselling to quit, recording smoking status in patient records, and referring smokers to an outside stop smoking clinic improved after changes were made.

Quality of the evidence

In summary, there is some evidence that changing the delivery of stop smoking care in healthcare organisations can improve the delivery of this care, but it is unclear whether this helps more people to quit. However, the small number of studies identified and problems with some studies makes it difficult to form firm conclusions.

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

System change interventions for tobacco control

Patient or population: Patients with smoking
Settings: Any healthcare delivery setting
Intervention: System change

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
Cessation outcome Self-reported/verified abstinence Follow-up: 6 to 24 months	7142 (4 studies)	⊕◯◯◯ **very low**[1,2]	Two of the four studies favoured intervention. Low quality evidence; impossible to draw any conclusions
Provision of cessation counselling Proportion of smokers counselled to quit	10949 (4 studies)	⊕⊕◯◯ **low**[3,4,5]	Three of the four studies favoured intervention. Low quality evidence; impossible to draw any conclusions
Asking about tobacco use Proportion of smokers asked about tobacco use	2615 (3 studies)*	⊕⊕◯◯ **low**[3,5]	Two of the three studies favoured intervention. Low quality evidence; impossible to draw any conclusions
Provision of cessation advice Proportion of smokers advised to quit	3003 (3 studies)*	⊕⊕◯◯ **low**[3,5]	Two of the three studies favoured intervention. Low quality evidence; impossible to draw any conclusions
Quitline referral Proportion of smokers referred to Quitline	3006 (3 studies)*	⊕◯◯◯ **very low**[3,5]	Of the three studies, all favoured the intervention. However, low quality evidence and hence impossible to draw any conclusions
Quitline enrolment Proportion of smokers enrolled in Quitline	1191 (2 studies)*	⊕◯◯◯ **very low**[3,5]	Of the two studies evaluated both favoured the intervention. Low quality evidence; impossible to draw any conclusions
Prescription of NRT or other pharmacotherapy Proportion of smokers received NRT prescription	2615 (2 studies)	⊕⊕◯◯ **low**[3,5]	Of the two studies, one favoured the intervention. Mixed effect and low quality evidence; impossible to draw any conclusions

Note: Illustrative comparative risks and relative effects columns have been removed as only narrative syntheses were conducted due to the presence of significant heterogeneity among studies
*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Self-reported abstinence was verified only in one study, and one study reported higher drop-out rate in one group
[2] High heterogeneity among included studies, outcomes are measured at different time points, different settings.
[3] Included studies had high risk of detection bias
[4] Large difference in effect size between studies
[5] High heterogeneity among included studies- different settings, providers and intervention
*not included data from one study as the data collected as counts (no denominator)

BACKGROUND

Description of the condition

The consequences of tobacco use are well recognised and understood, as are the benefits of smoking cessation (Critchley 2004; Ebbert 2005; Peto 2000; Taylor 2002). Smoking cessation not only leads to significant and immediate health benefits, but also decreases most of the related risks within a few years of quitting (WHO 2011). Even patients who quit later in life gain benefit. For example, among smokers who quit at the age of 65 years, men gain two years of life on average and women gain three (Taylor 2002). Quitting smoking is associated with a 36% reduction in risk of all-cause mortality among patients with coronary heart disease, which is significant when compared with other secondary preventive therapies such as lowering cholesterol (Critchley 2004). Given the high prevalence of smoking, even modest improvement in smoking cessation rates could potentially translate to major health and economic benefits.

Addressing tobacco use within a healthcare setting requires clinical, program, and system level changes. According to clinical practice guidelines for treating tobacco use and dependence, all healthcare organisations should develop plans to support consistent and effective identification, documentation and treatment of tobacco smokers (Fiore 2008). As a minimum requirement, all healthcare providers should ask the tobacco use status of their clients, briefly advise all smokers to quit, and refer them to Quitline or other smoking cessation services (Revell 2005).

Even though there is evidence and guidelines to provide smoking cessation services at every clinical encounter, reports suggest that healthcare providers are not delivering recommended levels of support to their patients who smoke (Braun 2004). Prior studies have reported sub-optimal rates of smoking cessation services by different types of healthcare professionals in various healthcare settings (Aquilino 2003; Braun 2004; Thorndike 1998). The levels of smoking cessation support in hospitals are also low (Freund 2005; Freund 2008). It is evident that even in developed countries, current healthcare systems are not well organised to address the issue of smoking.

Description of the intervention

"System change smoking cessation interventions describe specific strategies that healthcare administrators, managed care organisations, and purchasers of health plans can implement to treat tobacco dependence" (AHRQ 2012).They involve systematic identification of smokers and subsequent offering and receipt of evidence-based cessation treatments (Fiore 2007). Fiore 2007 suggested six system-level strategies to facilitate treatment of tobacco dependence: 1) implement a system for identifying smokers and documenting tobacco use status in every clinic and hospital; 2) provide education, resources and feedback to promote provider interventions; 3) dedicate staff to provide smoking cessation treatment and assess its delivery in staff performance evaluations; 4) promote hospital policies that support and provide smoking cessation services; 5) provide evidence-based tobacco dependence treatments (both counselling and pharmacotherapy); and 6) reimburse providers for the delivery of effective tobacco dependence treatments and include these services among the defined duties of them.

How the intervention might work

The barriers to providing effective smoking cessation support include: lack of support from the organisation, perceived objections from patients, lack of systems for identifying smokers, lack of staff time and skill, perceived inability to change practices, perceived lack of efficacy of tobacco dependence treatments and the cost of providing care (Wolfenden 2009). A strategic system change approach may be effective in addressing these multidimensional factors associated with low smoking care provision. Outcomes for chronically ill patients will improve only when healthcare systems reconfigure themselves to address the needs and concerns of patients (Wagner 1998). Tobacco smoking is a chronic relapsing condition that often requires ongoing medical and behavioural interventions, thus it is considered a chronic health condition (Hudson 2010). Therefore, a system level change might be essential in dealing with the issue.

Why it is important to do this review

System change interventions are multi-component, and may vary significantly in their intensity, content and delivery. It is not clear which types of approaches are more effective than others. A summary of this evidence is critical as, to our knowledge, a systematic review assessing the effectiveness of such interventions has not yet been published. This review is intended to identify various system change interventions for smoking cessation and to evaluate the effectiveness of such approaches in various healthcare settings.

OBJECTIVES

To assess the effectiveness of system change interventions within healthcare settings, for increasing smoking cessation and/or the provision of smoking cessation care.

METHODS

Criteria for considering studies for this review

Types of studies

Randomised controlled trials (RCTs), cluster RCTs with at least two intervention sites and two comparator sites, and quasi-randomised trials. Interrupted time series studies (ITS) are also eligible for inclusion if they have a clearly defined point in time when the intervention occurred and at least three data points before and after the intervention.

Types of participants

People who smoke and are receiving care in a healthcare setting; and health professionals who provide smoking cessation care.

Types of interventions

System change interventions for smoking cessation are policies and practices designed by organisations to integrate the identification of all smokers and the subsequent offering and receipt of evidence-based smoking cessation treatments (pharmacological and/or non-pharmacological) into the routine delivery of healthcare (Fiore 2007). Thus interventions which have been developed for identifying people who smoke, documenting smoking status and providing tobacco dependence treatment at various healthcare settings (primary, secondary or tertiary care settings) are included in this review.

Studies utilising the components of the system change model of Fiore et al. were considered (Fiore 2007):

1. Implementation of a system for assessing and documenting tobacco smoking status in every clinical encounter;
2. Provision of education, resources and feedback to staff to promote provider intervention;
3. Dedicating staff to provide smoking cessation treatment and assessing its delivery in staff performance evaluations;
4. Promotion of hospital policies that support smoking cessation and provide smoking cessation services;
5. Inclusion of tobacco dependence treatments (both counselling and pharmacotherapy) identified as effective; and
6. Reimbursement of providers for the delivery of effective tobacco dependence treatments and inclusion of these services among their defined duties.

Those studies focusing only on training health professionals, identification of smokers (electronic health records) or smoking cessation counselling, without a system change approach were not considered. Interventions with substantial involvement of research personnel or studies targeting a single type of health professional within the health service (unless the organisation included only one health profession - e.g., a pharmacy employing only pharmacists) were also excluded. The system change intervention should be designed to integrate the provision of smoking cessation services within the routine delivery of health care.

Types of outcome measures

Primary outcomes

Following the standard methodology of the Cochrane Tobacco Addiction Group, the primary outcome was abstinence from smoking at longest follow-up, assessed as point prevalence (defined as prevalence of abstinence during a time window immediately preceding the follow-up) and/or continued or prolonged abstinence

(defined as abstinence between quit day or predetermined grace period and a follow-up time). We used the strictest available criteria to define abstinence; thus continuous or prolonged abstinence was preferred over point prevalence abstinence, and biochemically validated abstinence over self-reported abstinence.
Studies that did not assess smoking cessation were also eligible for inclusion if they reported any secondary outcome and met the other inclusion criteria. The classification of primary and secondary outcomes in each included study were examined and reported.

Secondary outcomes

Increase in the provision of smoking cessation support services as part of routine care at either an organisational, patient or health professional level, defined as follows at each level:

- Organisational level outcome measures include the number of smokers identified and smoking status documented, organisational policies to promote smoking cessation, and number of health professionals trained or dedicated to provide cessation support.
- Health professional level outcome measures include number of referrals made to other health professionals and/or to local smoking cessation services.
- Patient level outcome measures include number of smokers counselled, given self- help materials, offered nicotine replacement therapy (NRT) or other pharmacotherapy, nominated a quit date, referred to specialist smoking cessation services (such as telephone Quitline support) and given a follow-up appointment.

Search methods for identification of studies

Electronic searches

We searched the following databases:

- Cochrane Central Register of Controlled Trials (CENTRAL) 2016 Issue 1;
- Cochrane Tobacco Addiction Group Register 1st February 2016;
- MEDLINE/ MEDLINE In Process (via OVID) 1946 to 15th February 2016;
- EMBASE (via OVID) 1947 to 15th February 2016;
- PsycINFO (via OVID) 1806 to 15th February 2016; and
- CINAHL (via EBSCO) 1938 to 15th February 2016.

Search strategies included both key words and Medical Subject Headings/Emtree. We aimed to identify articles reporting RCTs, cluster RCTs, quasi RCTs and ITS studies that investigated a system change intervention and measured the effect of this approach. No language restrictions were employed. The search strategy for MEDLINE is presented in Appendix 1.

Searching other resources

Studies were also identified by screening references of relevant reviews and identified studies (citation tracking). Personal bibliographies and communication with experts in the field were also used to identify any hidden studies.

Data collection and analysis

Selection of studies

DT implemented the search strategy and search results were merged using reference management software (EndNote®, Thomson Reuters). The titles and abstracts of studies were reviewed for possible inclusion, and those selected were subjected to full text assessment. Multiple reports of the same study were linked together. Two authors (DT and JG) independently assessed all the full text articles retrieved, and those studies meeting the inclusion criteria were included in the review. Any discrepancies were resolved by discussing with the third author (BB), a content area expert who acted as an arbiter for disagreement about the intervention or content of the study. Methodological discrepancies were checked by another arbiter (MJA), who is an expert in clinical trials and meta-analysis. Characteristics of the studies excluded (after full text assessment), including the reason for exclusion, were noted.

Data extraction and management

Two authors (DT and JG) independently extracted data. A pre-tested (pilot tested) standardised data collection form was employed. Data from the data collection form were entered into RevMan 5.3. Authors of the studies were contacted by e-mail, where data were not available or unclear.
The following information was extracted from each of the selected studies:

- lead and corresponding authors' information;
- date of publication;
- location and setting;
- methods of recruitment and inclusion criteria;
- methods of randomisation, allocation concealment and blinding;
- study design, duration and follow-up details;
- characteristics of participants (e.g., age, sex and smoking status);
- specific details of the intervention (type, duration, content, format and delivery of intervention, use of pharmacotherapy, adherence to therapy and information about the providers);
- control group component;
- number of participants in each arm;
- outcome measures and definitions including any biochemical validation, and time point at which they were measured and reported;

- Results: estimate of effect with confidence intervals and subgroup analysis (summary data of intervention and control group were entered separately into RevMan) and missing data;
- funding and declarations of interest for the primary investigators;
- authors' conclusions; and
- additional comments and information.

If studies were reported in more than one publication (e.g., different time points of the study), the data from all publications were extracted onto separate data collection forms and combined. If there was one full journal article and multiple conference abstracts available, only the journal article was considered. Any disagreements in the data collection process were resolved by discussion with a third author (MJA).

Assessment of risk of bias in included studies

Two review authors (DT and JG) independently assessed the risk of bias in included studies, with any disagreements resolved by discussion and consensus, and by consulting a third review author (MJA), where necessary.

The following criteria for assessing risk of bias were implemented:

- Studies with a separate control group (RCTs, cluster RCTs and quasi RCTs) were assessed using the seven standard criteria embedded in RevMan:
  - sequence generation;
  - allocation concealment;
  - blinding of participants and personnel;
  - blinding of outcome assessment;
  - incomplete outcome data;
  - selective outcome reporting; and
  - other bias.

Each criterion was judged for bias on a 3-point scale 'low risk', 'high risk' and 'unclear risk' (Higgins 2011) and a risk of bias table was constructed.

1. 'Low risk' when there was a low risk of bias across all key domains.
2. 'Unclear risk' when there was an unclear risk of bias in one or more of the key domains.
3. 'High risk' when there was a high risk of bias in one or more of the key domains.

For each included study, a summary assessment of risk of bias is provided.

Measures of treatment effect

The intervention effect for each outcome is presented descriptively. Nominal variables were summarised using numbers and proportions. Wherever possible, a risk ratio (quitters in treatment group/total randomised to the treatment group) / (quitters in control group/total randomised to the control group) was provided for the outcome of each individual trial.

Unit of analysis issues

In the case of trials with repeated observations, the longest follow-up was considered for the analysis (Higgins 2011). All reported secondary outcomes were assessed only at a single time point.

Dealing with missing data

The number of participants lost to follow-up was reported by group, where available. For the primary outcome, an intention to treat analysis approach was used. This assumes that people lost to follow-up continue smoking (West 2005).

Assessment of heterogeneity

Heterogeneity was explored visually using tables and forest plots, by comparing the effect sizes of studies grouped according to potential effect modifiers. This included:

1. type of intervention (e.g., identification of smokers, documentation of smoking status, treatment, training of health professionals, feedback of services etc.);
2. intensity of intervention (e.g., counselling, pharmacotherapy, both counselling and pharmacotherapy, duration of intervention etc.);
3. type of health professional involved;
4. setting (primary, secondary and tertiary);
5. study design (RCTs, cluster RCTs, quasi-RCTs or ITS studies); and
6. quality of studies.

Statistical heterogeneity was assessed using the χ^2 test for homogeneity (with significance defined at the alpha-level of 10%) and quantified using the I^2 statistic (Higgins 2011). Pooling of data using a meta-analysis was considered where the heterogeneity was less than 50% (Higgins 2011).

Assessment of reporting biases

Publication bias was not systematically assessed in the current review due to the limited number of studies included, in accordance with the Cochrane Handbook (Higgins 2011).

Data synthesis

A meta-analysis was performed using a random effects model. However, due to the presence of significant heterogeneity (I^2= 78%), it was deemed inappropriate to present pooled effects, and therefore we present a narrative synthesis of the included studies. Major characteristics and results are reported for each trial. Meta-analyses results are incorporated as additional figures (Analysis 1.1 & 1.2).

Subgroup analysis and investigation of heterogeneity

No subgroup analyses were carried out for the current review due to the limited number of included studies and the decision not to pool these.

Sensitivity analysis

No sensitivity analyses were performed for the current review due to the limited number of included studies and the decision not to pool these.

RESULTS

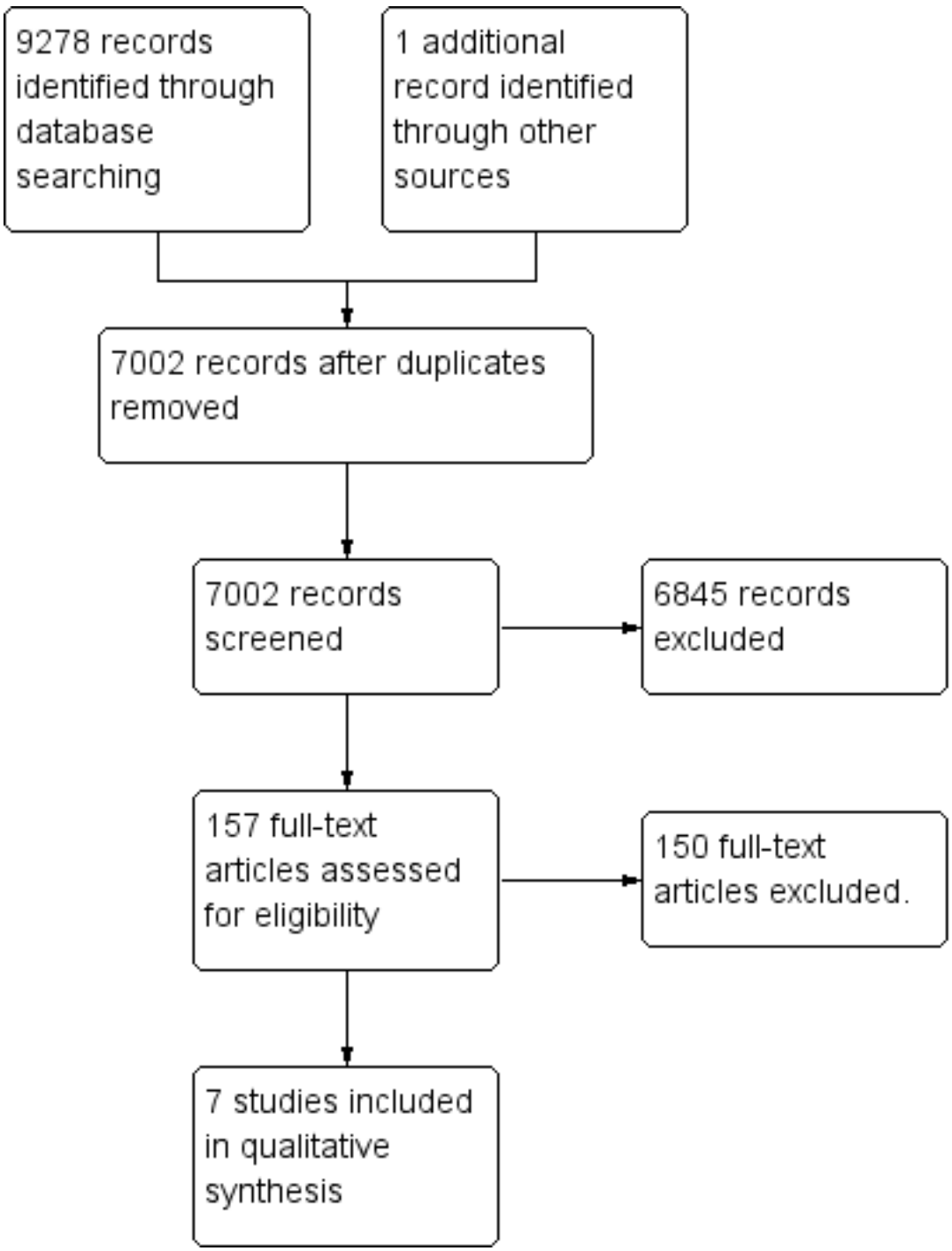
Description of studies

See: Characteristics of included studies; Characteristics of excluded studies

Results of the search

The database search yielded 9,278 titles. One additional study was found through hand searching. After removing duplicates, 7,002 titles and abstracts were screened, 157 full-text articles were reviewed and 40 studies shortlisted. Of those, 33 were excluded after thoroughly reviewing the full text with reasons recorded in the Characteristics of excluded studies table. See Figure 1 for an illustration of eligibility decisions.

Figure 1. Study flow diagram.



Included studies

Studies were included if the intervention was designed to integrate the identification of smokers and the subsequent offering and receipt of evidence-based tobacco dependence treatment into routine care.

This review included seven cluster RCTs. All the studies, except one (Cabezas 2011 in Spain) were conducted in the United States of America. The settings of the studies included were: two in primary care clinics (Cabezas 2011; Rothemich 2010), two in dental clinics (Gordon 2010; Little 2009), and one each in a community pharmacy (Patwardhan 2012), a Veterans Affairs medical centre (Joseph 2004) and a paediatric practice (Winickoff 2014). Winickoff 2014 focused on parents attending an outpatient paediatric practice. None evaluated a system change intervention for inpatient smokers. One study had two reports (Winickoff 2013 and Winickoff 2014) which were collated and included in this report as Winickoff 2014.

Intervention

All included studies utilised the services of existing staff to provide the intervention. None of the studies incorporated all six system change strategies. Five studies implemented four system level strategies and two studies implemented three strategies. Identifying all smoking clients, training staff and providing evidence-based treatment were components of all seven studies.

Four studies (Rothemich 2010; Little 2009; Winickoff 2014; Patwardhan 2012) implemented a system of identifying smokers. Rothemich 2010 used a vital sign stamp to mark paper patient records; Little 2009 used a new field in the electronic health record; and Winickoff 2014 used a specific action sheet attached to medical records to identify smokers. In Patwardhan 2012, dental technicians identified smokers by asking about their tobacco use and documented the status on a form that was then attached to their prescription to notify pharmacists. In Joseph 2004, various strategies were recommended for implementation across intervention sites to improve identification of smokers and documentation of smoking status by health professionals including the 'smoking as a vital sign' approach, use of an electronic clinical reminders system and adaptation of a note template to include smoking status. Finally, in two studies (Cabezas 2011; Gordon 2010) smokers were identified by either office staff or clinicians, who asked about tobacco use, however methods of documentation were not reported.

All included studies provided clinicians with training. The duration of training ranged from 30 minutes to 20 hours. Two studies (Little 2009; Rothemich 2010) provided feedback to the clinicians and practices. Little 2009 derived data from electronic health records on rates of tobacco use assessment, advice, counselling, referral offers and referral acceptances, which were used to deliver feedback, and provided monthly performance feedback at provider, clinic and cross-clinic levels. In Rothemich 2010, feedback was provided by the quitline service at both patient and prac-tice levels. Patient level feedback included number of counselling sessions completed by the patient, smoking status at last contact, difficulties in contacting patients and reasons for any unsuccessful enrolment or early termination. Practice level feedback was provided quarterly and included volume of referrals and summary data, such as readiness to quit, quit attempts and smoking status. None of the studies had an intervention where a champion coordinated tobacco dependence services. However, a core implementation group, which included study staff, professional leaders and administrators of each of the intervention clinics, was present in Little 2009 to facilitate the implementation of intervention components.

All the studies included provision of cessation advice by clinicians to all identified smokers, except one (Patwardhan 2012) that did not provide cessation advice to those who had already decided to quit smoking. Smokers were instead referred to a specialist quitline service. Five studies in total (Gordon 2010; Little 2009; Patwardhan 2012; Rothemich 2010; Winickoff 2014) referred smokers to smoking cessation services external to the organisation. All seven studies included pharmacotherapy (NRT and/or prescription medications) in the intervention.

In four studies (Cabezas 2011; Gordon 2010; Joseph 2004; Winickoff 2014) pharmacotherapy was provided from the clinic setting. In other studies, the provision of pharmacotherapy was coordinated from smoking cessation services external to the organisation.

None of the included studies reported reimbursement to the providers for delivery of smoking cessation care.

Outcomes

Primary outcomes

Four studies (Cabezas 2011; Gordon 2010; Joseph 2004; Winickoff 2014) reported cessation outcomes. All these studies used self-reported cessation, except for Winickoff 2014, which used cotinine validated abstinence. Two studies (Cabezas 2011; Gordon 2010) reported both continuous/prolonged and point prevalence abstinence.

Secondary outcomes

All the studies, except one (Cabezas 2011), reported system level outcomes. One study (Gordon 2010) assessed system level outcomes only for the intervention patients, and another (Patwardhan 2012) collected system level outcome data from healthcare providers. Reported system level outcomes included the number of patients asked about tobacco use, number of smokers advised to quit and the result of more intensive interventions, such as number of smokers counselled to quit, number of smokers referred to a specialised smoking cessation clinic and provision of pharmacotherapy.

Excluded studies

Studies were excluded if the study design did not meet the criteria for inclusion, if there was substantial involvement of research personnel in the provision of smoking cessation care, or if the intervention was targeted at a single health professional (or profession in the case of multidisciplinary health services) within the service. Studies were also excluded if the intervention was targeted at a specific population instead of providing support to all smokers attending the clinic. Specific reasons for exclusion can be found in the Characteristics of excluded studies table.

Risk of bias in included studies

The risk of bias assessment for included studies is presented in the Risk of bias table, under each individual Characteristics of included studies table. These results are also presented in graphical form in Figure 2 and Figure 3.

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

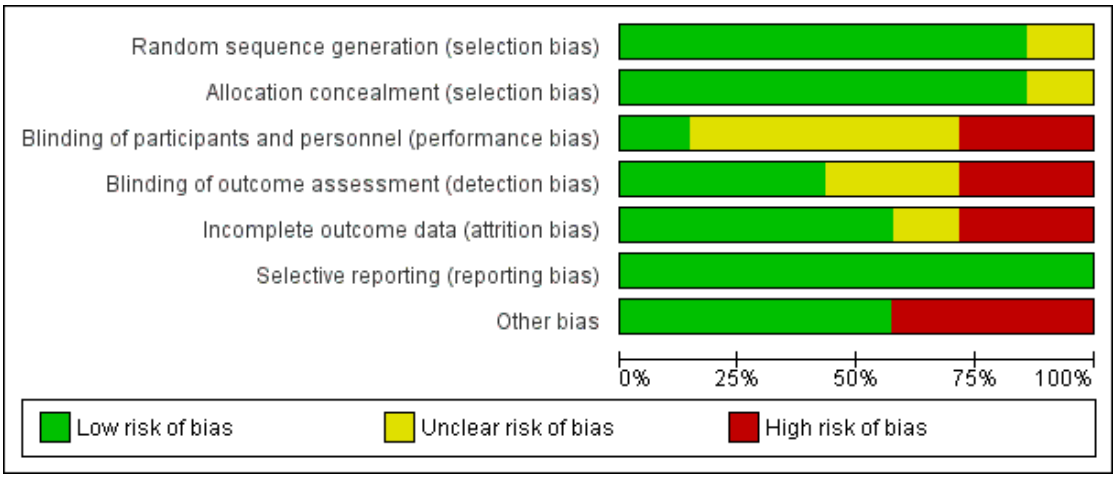
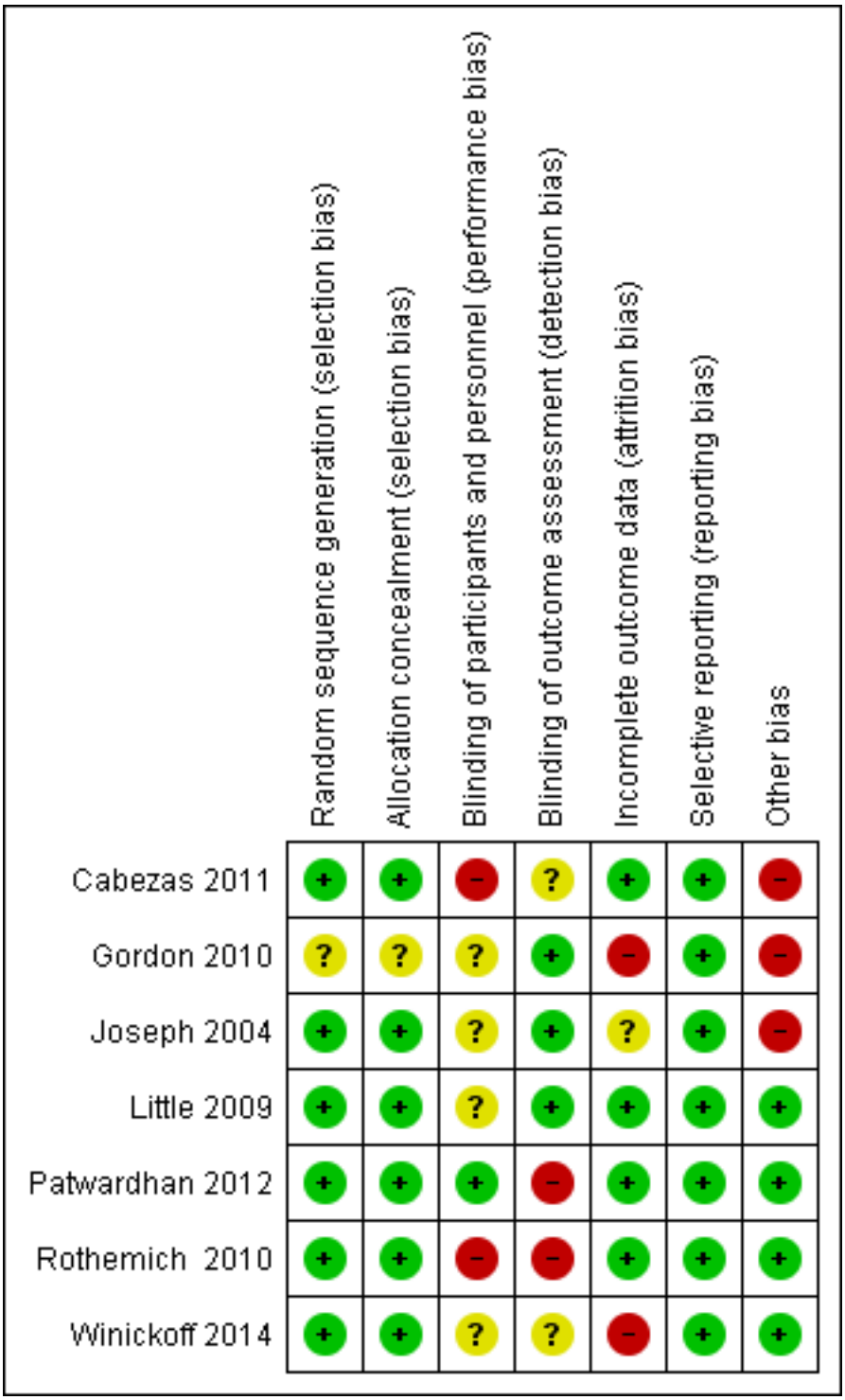


Figure 3. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



Allocation

Five (Cabezas 2011; Joseph 2004; Patwardhan 2012; Rothemich 2010; Winickoff 2014) of the seven studies (71%) adequately described the random sequence generation and were considered to have low risk of bias for this criterion.

Blinding

Blinding of both participants and personnel (to avoid performance bias) was not possible due to the study design in any of the included studies, except Patwardhan 2012 where the study personnel were not aware of the existence of two groups and therefore were considered to be effectively blinded. Three studies (Joseph 2004; Little 2009; Gordon 2010) were considered at low risk of detection bias. Joseph 2004 assessed outcomes using a blinded outcome assessor; Little 2009 collected data from electronic health records; and Gordon 2010 collected outcome data using a postal survey.

Incomplete outcome data

Four studies (Cabezas 2011; Gordon 2010; Joseph 2004; Winickoff 2014) reported cessation outcomes and included follow-up data. In Cabezas 2011, although the dropout rate was high, it was similar in both groups (43.3% in intervention and 44.8% in control) and hence considered as low risk of bias. Gordon 2010 reported moderate dropout rates, but the rate was higher in the intervention group (30.7% vs. 26.1%; p<0.01), hence this study was considered to be at high risk of bias for this criterion. Although not statistically significant, the follow-up rate in Winickoff 2014 was marginally higher in the control group (64.5% vs. 72.4%; p= 0.11) and hence considered as a potential high risk of bias. Joseph 2004 did not report dropout rates by group and hence we considered this to be an unclear risk of bias.

Three studies (Little 2009; Patwardhan 2012; Rothemich 2010) which reported only system level outcomes were also been considered to have low risk of bias as there were no follow-ups involved.

Selective reporting

Selective reporting was not evident in any of the included studies.

Other potential sources of bias

Three studies which reported cessation outcomes used unverified self-report data.

Effects of interventions

See: **Summary of findings for the main comparison** System change interventions for tobacco control

See: Summary of findings for the main comparison for a summary of the main comparisons in this review.

Primary outcome

Four studies (Cabezas 2011; Gordon 2010; Joseph 2004; Winickoff 2014) evaluated the effect of a system change intervention on smoking cessation. Of these, two studies (Cabezas 2011; Gordon 2010) found the quit rate was higher in the system change intervention group than the control group. In Cabezas 2011, the primary endpoint, 1-year self-reported continuous abstinence at 2-year follow-up, was significantly higher in the intervention than control group (8.1% vs. 5.8%, RR 1.41 95%CI 1.07 to 1.86). Gordon 2010 reported significant improvement in both point prevalence (11.3% vs. 6.8%; RR 1.66 95%CI 1.28 to 2.15) and prolonged abstinence (5.3% vs. 1.9%; RR 2.79 95%CI 1.74 to 4.46) at 6-month follow-up. In Joseph 2004 and Winickoff 2014, the intervention did not result in better cessation rates at 1-year follow-up (11.4% vs. 13.2%; RR 0.86 95%CI 0.56 to 1.34, and 4.3% vs. 4.1%; RR 1.06 95%CI 0.60 to 1.86 respectively).

Secondary outcomes

A summary of secondary outcomes are also provided as an additional table (Table 1)

Asking about tobacco use

Of the three studies (Joseph 2004; Patwardhan 2012; Winickoff 2014) that evaluated the effect of a system change intervention on identification of smokers, two reported significant improvements in the intervention group. In Patwardhan 2012, a total of 636 (measured as counts; no denominator) clients were screened for tobacco use in all experimental group pharmacies compared with five in all control pharmacies (p<0.001). Winickoff 2014 also favoured intervention (59.4% vs. 32.6%; p<0.001). However, in Joseph 2004, the intervention did not improve the identification of smokers (76.0% vs. 74.3%; p=0.71).

Tobacco screening was part of standard care for both groups in two studies (Little 2009; Rothemich 2010) with similar screening rates across the intervention and control groups prior to the commencement of the studies.

Documentation of smoking status

One study (Joseph 2004) reported the effect of the system change intervention on documentation of smoking status. Before intervention, control sites were significantly more likely to document smoking status than intervention sites (63.1% vs. 55.7% respectively; p=0.0001). However, the direction of this difference was reversed after the intervention was implemented (60.7% vs. 67.0% respectively; p=0.0007).

Advice to quit

Of the three studies (Patwardhan 2012; Rothemich 2010; Winickoff 2014) that evaluated the effect of a system change intervention on the number of smokers advised to quit, two reported significant improvements in the intervention group. In Patwardhan 2012, a total of 25 smokers (measured as counts; no denominator) were advised to quit in the experimental group pharmacies compared with three in the control group (p<0.01). Winickoff 2014 also favoured intervention (50.5% vs. 26.9%; p<0.001). However, in Rothemich 2010, the intervention did not improve the rate of advice, with no significant difference in quitting advice across groups (58.2% intervention vs. 55.3% control; p=0.39).
In one study (Little 2009), the provision of advice to quit was standard practice for both groups prior to the start of the study and pre-study rates were similar across groups.

Counselling to quit

Four studies (Joseph 2004; Little 2009; Rothemich 2010; Winickoff 2014) evaluated the effect of an intervention on the number of smokers subsequently counselled to quit. One study (Little 2009) reported the combined effect on both counselling and referral to Quitline services. Rothemich 2010 reported the effect on the discussion of methods to quit. Three of these studies (Little 2009, Rothemich 2010, Winickoff 2014) reported significant improvements in the rate of counselling in the intervention group; (69% intervention vs. 3% control; p<0.01), (34.4% intervention vs. 27.7% control; p=0.001), and (54.7% intervention vs. 19.2% control; p<0.001), respectively. However, in Joseph 2004 the intervention did not improve counselling rate (73.9% intervention vs. 71.8% control; p=0.60).

Initiation of NRT or other pharmacotherapy

Two studies (Winickoff 2014; Joseph 2004) evaluated the effect of a system change intervention on the prescription of NRT. Winickoff 2014 reported a significant improvement in the intervention group versus control (18.5% vs. 2.4% respectively; p<0.001). However, Joseph 2004 reported no significant difference between groups (14.7% intervention vs. 18.0% control; p= 0.38).

Quitline referral and enrolment

Rates of quitline referral were assessed by three studies (Rothemich 2010, Patwardhan 2012; Winickoff 2014) and all reported significantly higher rates in the intervention arm. In Rothemich 2010 (21.4% intervention vs. 8.7% control; p<0.001) and in Winickoff 2014 (37.2% intervention vs. 9.3% control; p<0.001), higher proportions of intervention participants were referred to a quitline. In Patwardhan 2012, 240 intervention patrons received a quitline card compared to 85 control patrons (p=0.02).
Two studies which evaluated quitline enrolment also favoured the intervention. In Winickoff 2014, a higher proportion of intervention participants were enrolled in a quitline programme following intervention (4.1% intervention vs. 1.1% control; p<0.01). In Patwardhan 2012, 81 intervention patrons were enrolled in a quitline compared to eight patrons in the control group (p<0.001).

Provided self-help materials

One study (Gordon 2010) assessed the rate of receipt of reading materials among intervention patients (66.5% received reading materials), however this was not measured in control participants so no between group comparison can be made.

DISCUSSION

Summary of main results

This review included seven cluster RCTs evaluating the effect of system change interventions on cessation and/or system level outcomes. Three studies evaluated both primary and secondary outcomes. The seven studies were heterogeneous with regard to types of settings, interventions, providers and outcome measures. When we attempted meta-analysis this was corroborated by significant statistical heterogeneity, and therefore we do not report pooled effect estimates for any outcomes.
On the basis of available evidence, it is difficult to draw any firm conclusions about the success of system change interventions in changing cessation practice or enhancing quit rates. The evidence for the primary outcome - smoking cessation - was equivocal. However, all studies which evaluated secondary outcomes, such as documentation of smoking status, quitline referral and enrolment favoured the intervention. Three of the four studies which evaluated the provision of cessation counselling, also supported the intervention. Outcomes such as asking about tobacco use and advising to quit also had promising results. The evidence for recommending NRT as part of a system change intervention was uncertain.

Overall completeness and applicability of evidence

The results should be interpreted with caution for the following reasons: 1) only seven studies could be included in this review, of which only four evaluated the primary outcome and only a few evaluated each of the secondary outcomes; 2) clinical practice guidelines for treating tobacco use and dependence (AHRQ 2012) recommend implementing all components of the system change approach, however, none of the included studies implemented all the components of the system change intervention; 3) although, all studies included some components of a system change intervention, such as assessment of smoking status, training clinicians and assisting smokers, the intensity and extent varied widely among studies; 4) none reported reimbursing clinicians or dedicating a staff member to the provision of smoking cessation care; 5) although guidelines (AHRQ 2012) recommend educating and training all staff on a regular basis on providing smoking cessation support, none of the included studies provided ongoing education, and the duration of smoking cessation training also varied widely across studies.

The majority of studies were conducted in the USA and none were conducted in low- or middle-income countries. Hence, the generalisability of the findings to low- and middle-income countries is unknown.

Quality of the evidence

The quality of evidence for all the outcomes, including the primary outcome, was low or very low as summarised in Summary of findings for the main comparison, hence no robust conclusions can be drawn regarding how useful system change interventions are. A high risk of bias was present in many studies. Four studies evaluated cessation outcomes, but only one had biochemical verification of the self-report data. Inconsistency was present in most of the outcomes evaluated, which is likely to be due to differences in settings, populations, providers and interventions. Effect size also differed largely between studies. Therfore, we judge that overall, the quality of evidence from the included studies was low.

Potential biases in the review process

The search strategy used in this review was carefully developed, and reviewed by experts in the field, including the review group search coordinator. A comprehensive search of a large number of databases was conducted. One review author went through all references identified by the electronic searches, excluding papers that clearly were not eligible, and two review authors independently assessed all potentially eligible titles and abstracts against the eligibility criteria to ensure that no important references were missed. We also searched reference lists of included studies. Despite all of this, we cannot rule out the possibility of missing some important studies. There is always a potential risk of publication bias. Unfortunately, because too few studies were identified for inclusion in this review, we could not systematically assess publication bias.

Agreements and disagreements with other studies or reviews

Various components of the system change approach, such as training health professionals, using electronic health records for identifying smokers, advising and counselling smokers to quit and providing pharmacotherapy have been evaluated separately in other Cochrane reviews. However, none of these reviews evaluated the effectiveness of a system change approach. Levy 2004 estimated that such strategies could reduce smoking prevalence by 2 - 3.5% on a population level. AHRQ 2012 guidelines also promote the use of a system change approach to address tobacco smoking. However, the evidence is incomplete and more studies are required to draw a firm conclusion.

AUTHORS' CONCLUSIONS

Implications for practice

The review of system change interventions for smoking cessation could not draw any firm conclusions as only a handful of relatively low quality studies were available. However, there was some evidence for the effect of system change interventions on secondary outcomes such as asking about tobacco use, documentation of smoking status, advising to quit, provision of cessation counselling, referral to and enrolment in Quitline. There is a need for additional high-quality research to explore the impact of system change interventions on biochemically verified abstinence and system level outcomes.

Implications for research

Despite the potential of a system change approach to address tobacco use, only limited evidence of relatively low quality is presently available. Well powered cluster RCTs are essential to fill in this knowledge gap. Future studies should include all the components of a system change approach, as recommended by Fiore 2007, to make up the intervention. As clinicians frequently cite lack of reimbursement as the barrier for providing smoking cessation support (Wolfenden 2009), it is important to include such components in the intervention. It is also important to include both biochemically validated cessation and system level outcomes in every study. As yet there is also no evidence for hospital-based system change interventions for inpatient smokers and so future research should address this deficit. Controlled trials from low and middle income countries are also required to fill the knowledge gap.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Cabezas 2011

Methods	Design: Cluster randomised clinical trial Setting: 176 Primary Care Centres (PCC) in Spain Intervention providers: Physicians and nurses Data collection: Baseline survey at the clinic and then telephone follow-up interviews Study duration: 24 months
Participants	2,827 subjects, age (mean ± SD) 42.8±13.6 years, 50.0% male, cigarettes per day (mean ± SD) 20.4±10.8. Intervention group: 1,345 subjects from 82 PCCs; control group: 1482 subjects from 94 PCCs
Interventions	1) Intervention • Identification of smokers: All individuals accessing the PCC were asked about the smoking status. The method of documentation of smoking status was not described. • Training/resources/feedback: All health professionals received 20 hours of training; no feedback was provided. • Dedicated staff for smoking cessation treatment: Not included • Promote hospital policies that support smoking cessation: None mentioned • Tobacco dependence treatment: Tailored intervention based on 'stages of change' ○ Pre-contemplation and contemplation: brief motivational intervention plus self-help leaflet ○ Preparation and action (not interested in support): brief advice, self-help leaflet, offer/prescription of NRT and one follow-up ○ Preparation and action (interested in support): Intensive intervention consisting of nine follow-up visits over six months consisting of behavioural and pharmacological support (NRT or bupropion) and self-help leaflet ○ Maintenance stage: reinforcement advice • Reimbursement to clinicians: Not included 2) Control: Usual care that included brief quitting advice for disease related to smoking. Some control group smokers used cessation medications
Outcomes	One year continuous abstinence at 2-year follow-up Six months continuous abstinence at 2-year follow-up Six months continuous abstinence at 1-year follow-up Point prevalence abstinence at 2-year follow-up Point prevalence abstinence at 1-year follow-up
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Cabezas 2011 (*Continued*)

Random sequence generation (selection bias)	Low risk	Independent statistician blinded to the sites' identities generated random sequence using a computer program
Allocation concealment (selection bias)	Low risk	Centralised randomisation, PCCs were informed about their allocation only after giving final consent
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not feasible with the study design
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	The clinical part of the questionnaire was administered by the clinicians involved in the study and non-clinical part was administered by a blinded interviewer
Incomplete outcome data (attrition bias) All outcomes	Low risk	43.3% in the intervention and 44.8% in the control group lost to follow-up, included as smokers. Similar dropout rate in both groups
Selective reporting (reporting bias)	Low risk	The study protocol is available and all of the pre-specified outcomes that are of interest in the review have been reported in the pre-specified way
Other bias	High risk	Only 37.3% ex-smokers confirmed their smoking status biochemically

Gordon 2010

Methods	Design: Cluster randomised clinical trial Setting: 14 community health centre dental clinics in three states in the USA Intervention providers: Dentists, dental hygienists and dental assistants Data collection: Baseline survey at the clinic and then mailed follow-up survey Study duration: 6 months
Participants	2,549 subjects, aged (mean ± SD) 40.5±12.6 years, 42.8% male, average cigarettes per day (mean ± SD) 16.1±10.4. Intervention group: 1,394 subjects; control group: 1,155 subjects
Interventions	1) Intervention • Identification of smokers: asked tobacco use status of all patients at every clinic visit. The method of documentation of smoking status was not described • Training/resources/feedback: Intervention providers received a 3-hour in-service workshop; resources such as nicotine patches/lozenges and printed self-help materials were provided to each practice to facilitate the assist component; feedback was not part

Gordon 2010 (*Continued*)

	of the intervention • Dedicated staff for smoking cessation treatment: Not included • Promote hospital policies that support smoking cessation: None mentioned • Tobacco dependence treatment: Intervention consisted of ○ Asking all patients about smoking, advising them to quit by relating the oral effects of smoking to their oral health status and assessing their readiness to quit ○ Interested smokers were assisted with setting a quit date, use of pharmacotherapy, and received free NRT and self-help materials ○ Arrange follow-up: Patients who set a quit date received follow-up support (mail or phone) • Reimbursement to clinicians: Not included 2) Control: Practitioners in the control group continued to provide usual care
Outcomes	7-day point prevalence abstinence and prolonged abstinence at 6 weeks and 7.5 months follow-up
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Method of randomisation not specified
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not described
Blinding of outcome assessment (detection bias) All outcomes	Low risk	No blinding of outcome assessment, but the review authors have judged that the outcome assessment is not likely to be biased as a mail survey was used to collect follow-up data
Incomplete outcome data (attrition bias) All outcomes	High risk	Higher dropout rate in intervention group (30.7 vs 26.1; p<0.01). Multiple imputation to replace missing data
Selective reporting (reporting bias)	Low risk	None apparent; all outcomes outlined in the methods reported
Other bias	High risk	No biochemical verification of smoking status

Joseph 2004

Methods	Design: Cluster randomised clinical trial Setting: 20 Veterans Affairs medical centres (VAMCs) in the USA Intervention providers: Physicians, nurses, psychologists and pharmacists Data collection: Telephone survey among three cohorts of patients; 1) baseline cross-sectional survey; 2) a second cross-sectional survey 1 year after initiation of the intervention and 3) follow-up survey of smokers identified in the baseline survey; data were also collected from medical records Study duration: 12 months
Participants	• Baseline survey: 4,254 subjects - 2,112 intervention (mean age 64.6 years, 96.1% male, 22.6% current smokers and 53.8% ex-smokers) and 2,142 control (mean age 63.1 years, 95.3% male, 24.6% current smokers and 52.8% ex-smokers). Follow-up survey: 575 smokers (280 intervention and 295 control) completed a follow-up survey one year later. • Post-intervention: 1,424 subjects - 641 intervention (mean age 64.9 years, 95.8% male, 24.0% current smokers and 48.7% ex-smokers) and 783 control (mean age 63.8 years, 98.0% male, 24.7% current smokers and 50.7% ex-smokers.
Interventions	1) Intervention • Identification of smokers: Various methods have been used to identify smokers and document smoking status in the medical record. Strategies included 'smoking as a vital sign' approach, use of electronic reminder system and adaptation of note template to include smoking status • Training/resources/feedback: 2-day training; no feedback was provided • Dedicated staff for smoking cessation treatment: Not present. The interventionist (a registered nurse trained in smoking cessation methods) made a 2- to 3-day visit to each of the intervention sites during the first 6 months of the intervention period • Promote hospital policies that support smoking cessation: Increased the availability of pharmacotherapy • Tobacco dependence treatment: Promoted brief intervention and liberal use of smoking cessation medications • Reimbursement to clinicians: Not included 2) Control: provided five copies of AHCPR smoking cessation guideline to each control clinic
Outcomes	Cessation outcomes: Self-reported smoking status at 1 year follow-up Process outcomes: Improvement in documentation of tobacco use, delivery of treatment to all smokers, and use of pharmacotherapy collected by participant surveys and from medical records
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	'The study sites (n=20) were randomly assigned to the intervention or control group using simple (not stratified or block) randomisation'

Joseph 2004 (*Continued*)

Allocation concealment (selection bias)	Low risk	'The remaining 20 sites were randomised.' Presumably randomised all clusters at once
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not described
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Blinded interviewer
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Group-wise dropout rate not given
Selective reporting (reporting bias)	Low risk	None apparent; all outcomes outlined in the methods reported
Other bias	High risk	No biochemical verification of smoking status

Little 2009

Methods	Design: Cluster randomised clinical trial Setting: 14 dental clinics in the USA Intervention providers: Dentist, office staff and hygienist Data collection: From electronic health records Study duration: 14 months
Participants	Electronic health record generated data (asking, advising and referral) included all patients visiting the participating clinics which included 66,516 patients (32,802 intervention and 33,714 control)
Interventions	1) Intervention • Identification of smokers: Dental staff asked about tobacco use and documented smoking status in the electronic health record • Training/resources/feedback: Staff received a 2-hour orientation and training. Brief refresher training also was included after the project commenced. Resources such as handouts and referral forms were stocked at each facility and identified a semiprivate area for making calls (to an outside smoking cessation clinic for further assistance). Monthly performance feedback at the provider, office and cross-office levels was provided to intervention sites • Dedicated staff for smoking cessation treatment: A dedicated staff was not present, however, a core implementation group was established that included the project investigator, intervention director, study staff, health plan leaders, administrators and professional leaders of each of the intervention site • Promote hospital policies that support smoking cessation: Changes were made to the standard visit encounter form and electronic dental record to facilitate tracking of smoking status and feedback to staff

Little 2009 (*Continued*)

	• Tobacco dependence treatment: It was a team approach in which the dental staff, usually the hygienist, asked about tobacco use and provided brief advice to quit. The dentist reinforced the importance of quitting and provided brief, clear and respectful advice to quit. The staff then encouraged smokers to talk briefly by telephone with a health plan tobacco counsellor. Smokers could either call from the dental office or request a call back option. The health plan counsellor also arranged cessation medications as part of their covered benefit • Reimbursement to clinicians: Not included 2) Control: Standard care
Outcomes	Number of patients counselled and/or referred
Notes	Only secondary outcomes were evaluated

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	'Matched pairs of facilities were then randomly assigned to intervention or control. ' Presumably done the randomisation
Allocation concealment (selection bias)	Low risk	Presumably randomised all clusters at once
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not specified
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Relevant data were generated from electronic health records (objective assessment)
Incomplete outcome data (attrition bias) All outcomes	Low risk	No follow-up involved
Selective reporting (reporting bias)	Low risk	None apparent; all outcomes outlined in the methods reported
Other bias	Low risk	

Patwardhan 2012

Methods	Design: Cluster randomised clinical trial Setting: 16 community chain pharmacies in the USA Intervention providers: Pharmacists and technicians Data collection: from pharmacy staff using feedback form. Staff were instructed to check off relevant items (asked, advised, provided Quitline cards) for the activity performed. Referral data were obtained from Quitline reports Study duration: 1 month data collection
Participants	32 pharmacists and 48 technicians
Interventions	1) Intervention • Identification of smokers: Technicians identified smokers by asking about the tobacco use and documented the status on a form which was attached to the prescription • Training/resources/feedback: 30 minutes on-site training and a support visit from the research team in the first week of implementation; no feedback was provided • Dedicated staff for smoking cessation treatment: Not feasible with the setting • Promote clinic policies that support smoking cessation: Changed work-flow to integrate Ask, Advice and Refer (AAR) component • Tobacco dependence treatment: Technicians asked about tobacco use and pharmacists subsequently advised tobacco users to quit and referred them to Quitline. If smokers had already decided to quit, pharmacist did not advise them to quit, instead referred them to Quitline. Technicians faxed completed forms to Quitline. Quitline services included free counselling and medications • Reimbursement to clinicians: Not included 2) Control: Control group pharmacies received an informal presentation on Quitline services, Quitline cards and enrolment in Fax to Quit (FTQ) services, a free service
Outcomes	Number of patrons asked about tobacco use Number of tobacco users advised to Quit Number of tobacco users enrolled for Quitline service Number of Quitline cards given
Notes	Data collected form the pharmacy staff

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	'Sixteen pharmacies were randomly assigned to a control group or experimental group using block randomisation, which involved random assignment into groups after matching on a block covariate'
Allocation concealment (selection bias)	Low risk	'Random assignment was carried out by research assistants blinded to the study goal. The authors were not involved in the assignment process'

Patwardhan 2012 (*Continued*)

Blinding of participants and personnel (performance bias) All outcomes	Low risk	Pharmacy staff were not aware of the existence of two groups in the study. The primary author who conducted staff training was blinded to pharmacists' self-efficacy scores
Blinding of outcome assessment (detection bias) All outcomes	High risk	The outcome data was directly obtained from the providers using a self-filled documentation form
Incomplete outcome data (attrition bias) All outcomes	Low risk	No follow-up in the study
Selective reporting (reporting bias)	Low risk	None apparent; all outcomes outlined in the methods reported
Other bias	Low risk	

Rothemich 2010

Methods	Design: Cluster randomised clinical trial Setting: 16 primary care practices in the USA Intervention providers: Physicians, nurses and medical assistants Data collection: Patient self-report via an exit survey Study duration: 9 months data collection
Participants	All patients visiting the participating clinics which included 10,395 patients (5,669 intervention and 4,726 control). Tobacco user population: 1815 adult smokers (857 intervention and 958 control)
Interventions	1) Intervention • Identification of smokers: Identified and documented using an expanded tobacco use 'vital sign' stamp which also assessed the delivery of cessation advice and readiness to quit smoking in the next 30 days. • Training/resources/feedback: 1-hour training to implement study procedures. Quarterly performance feedback was provided to the intervention practices. • Dedicated staff for smoking cessation treatment: Not present • Promote clinic policies that support smoking cessation: Implemented a vital sign stamp to identify and document smoking status • Tobacco dependence treatment: Fax referral of preparation stage smokers to Quitline. Quitline offered four proactive telephone counselling sessions. When indicated, Quitline contacted patient's physician to request a prescription of bupropion, the only prescription cessation medication covered by most health plans at the time of the study. • Reimbursement to clinicians: Not included 2) Control: Traditional tobacco use vital sign stamp (only smoking status recorded)

Rothemich 2010 (*Continued*)

Outcomes	Number of patients asked about tobacco use Number of patients advised to quit Number of patients received in-office cessation support (primary endpoint) Number of patients discussed about the ideas and plans to quit smoking Number of patients referred to Quitline
Notes	36% of potentially eligible patients did not participate in the survey, however, the participation proportion did not differ between study groups

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	'A random number generator was used to randomise practices within the strata to intervention and control arms'
Allocation concealment (selection bias)	Low risk	'From the potential pool of 51 sites, 29 practices were targeted for recruitment and 16 were enrolled.' Presumably randomised all clusters at once
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not feasible with study design
Blinding of outcome assessment (detection bias) All outcomes	High risk	No blinded outcome assessor
Incomplete outcome data (attrition bias) All outcomes	Low risk	No follow-up in the study
Selective reporting (reporting bias)	Low risk	None apparent; all outcomes outlined in the methods reported
Other bias	Low risk	

Winickoff 2014

Methods	Design: Cluster randomised clinical trial Setting: 20 paediatric practices in the USA Intervention providers: Paediatricians, nurses and medical assistants Data collection: Telephone survey Study duration: 12-month
Participants	1,980 parent smokers; Intervention: 999 smokers (average age 30 years ranged between 18-78 years and 78.6% female). Control: 981 smokers (average age 30.6 years ranged

Winickoff 2014 (*Continued*)

	between 18-65 years and 77.9% female)
Interventions	1) Intervention • Identification of smokers: Routine screening for parental tobacco use using a special action sheet and documentation in child's health record • Training/resources/feedback: All intervention providers attended approximately three hours of training; no feedback was provided. • Dedicated staff for smoking cessation treatment: Not present • Promote clinic policies that support smoking cessation: Incorporated a special action sheet to capture tobacco use status of the parents of paediatric patients and documented their smoking status in paediatric medical records • Tobacco dependence treatment: Ask, Assist and refer approach which included motivational messaging, recommendation and possible provision of NRT (nicotine patch or gum), and enrolment in the free Quitline service • Reimbursement to clinicians: Not included 2) Control: Usual care
Outcomes	Biochemically validated parental smoking cessation rates Number of parents asked about tobacco use Number of parents advised and counselled to quit Number of parents prescribed cessation medication Number of parents referred to the state Quitline
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	'A random generator was used to generate a sequence of group assignments within each of the 6 blocks created by combining the 2 strata'
Allocation concealment (selection bias)	Low risk	'The first 22 practices that responded were enrolled and randomly assigned to intervention or control groups.' Presumably randomised all clusters at once
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not described
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	Although not statistically significant, the follow-up rate was marginally higher in the

Winickoff 2014 (*Continued*)

		control group (64.5% vs. 72.4%; p=0.11) and hence considered as high risk of bias
Selective reporting (reporting bias)	Low risk	None apparent; all outcomes outlined in the methods reported
Other bias	Low risk	

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Amemori 2013	No evidence that all smokers accessing the system were identified and treated
Anders 2011	No evidence that treatment was offered to every smoker accessing the system. Only non-urgent emergency department patients were targeted
Bentz 2007	No evidence that treatment was offered to every smoker accessing the system. Just added feedback option to the existing electronic health records
Campbell 2006	No evidence that treatment was offered to every smoker accessing the system
Cooke 2001	No evidence that treatment was offered to every smoker accessing the system
Davies 2005	Included hospitalised African American smokers only
Fellows 2012	No evidence that all smokers accessing the system were identified and treated
Ferketich 2014	Only Medicaid-enrolled smokers were included in the study; Research assistant identified participants, not clinic staff
Fisher 2005	Controlled before and after study - not meeting study design requirements
Freund 2009	Controlled before and after study. Not meeting study design
Hennrikus 2005	Research assistants identified smokers
Katz 2004	Telephone follow-up counselling was done by a researcher
Kendrick 1995	No evidence that all smokers accessing the system were identified and treated. Interventions were different at various sites
Kim 2005	Only those randomised to the intervention arm received assistance and follow-up support, which were provided by a researcher; tailored only for Korean patients

(*Continued*)

Mahabee-Gittens 2008	Research staff provided the intervention
Maizlish 2006	Before and after study. Not meeting study design.
Manfredi 1999	Research staff provided adjunct interventions (motivational call and reminder letter); only brief advice provided by the clinic staff
Manfredi 2000	Research staff provided adjunct interventions (motivational call and reminder letter); only brief advice provided by the clinic staff
Manfredi 2004	Research staff provided adjunct interventions (motivational call and reminder letter); only brief advice provided by the clinic staff
Manfredi 2011	Research staff provided telephone counselling service
McFall 2010	No evidence that treatment was offered to every smoker accessing the system
Murray 2013	Research team was involved in the delivery of the intervention. Not all smokers were identified and treated
Pbert 2004	No evidence that treatment was offered to every smoker accessing the system
Rindal 2013	The intervention was provided only during recall dental visits. No training was provided
Roski 1998	Quasi-experimental research design. No evidence that all smokers accessing the system were identified and treated
Sherman 2008	Intervention mainly consisted of referring to an onsite counselling program, clinicians were not involved in the intervention
Szpunar 2006	No random selection of sites (controlled before-after study). Not meeting study design
Unrod 2007	Research staff identified smokers. Not all smokers received intervention
Vidrine 2013	Research team was involved in delivering the intervention
Vidrine 2013a	Research team was involved in delivering the intervention
Walsh 1997	Not all smokers received intervention
Wolfenden 2005	Not all smokers received intervention; Smokers were identified by a researcher
Yano 2008	No evidence that all smokers accessing the system were identified and treated

DATA AND ANALYSES

Comparison 1. System change vs. usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Cessation outcome	4	7142	Odds Ratio (M-H, Random, 95% CI)	1.40 [0.87, 2.25]
2 Smoking cessation counselling	4	10949	Odds Ratio (M-H, Random, 95% CI)	3.77 [0.72, 19.75]

Analysis 1.1. Comparison 1 System change vs. usual care, Outcome 1 Cessation outcome.

Review: System change interventions for smoking cessation

Comparison: 1 System change vs. usual care

Outcome: 1 Cessation outcome

Study or subgroup	Intervention n/N	Control n/N	Odds Ratio M-H,Random,95% CI	Weight	Odds Ratio M-H,Random,95% CI
Cabezas 2011	120/1482	78/1345		29.1 %	1.43 [1.07, 1.92]
Gordon 2010	74/1394	22/1155		24.5 %	2.89 [1.78, 4.68]
Joseph 2004	32/280	39/295		24.1 %	0.85 [0.51, 1.40]
Winickoff 2014	24/556	26/635		22.4 %	1.06 [0.60, 1.86]
Total (95% CI)	**3712**	**3430**		**100.0 %**	**1.40 [0.87, 2.25]**

Total events: 250 (Intervention), 165 (Control)

Heterogeneity: $Tau^2 = 0.18$; $Chi^2 = 13.52$, df = 3 (P = 0.004); $I^2 = 78\%$

Test for overall effect: Z = 1.39 (P = 0.17)

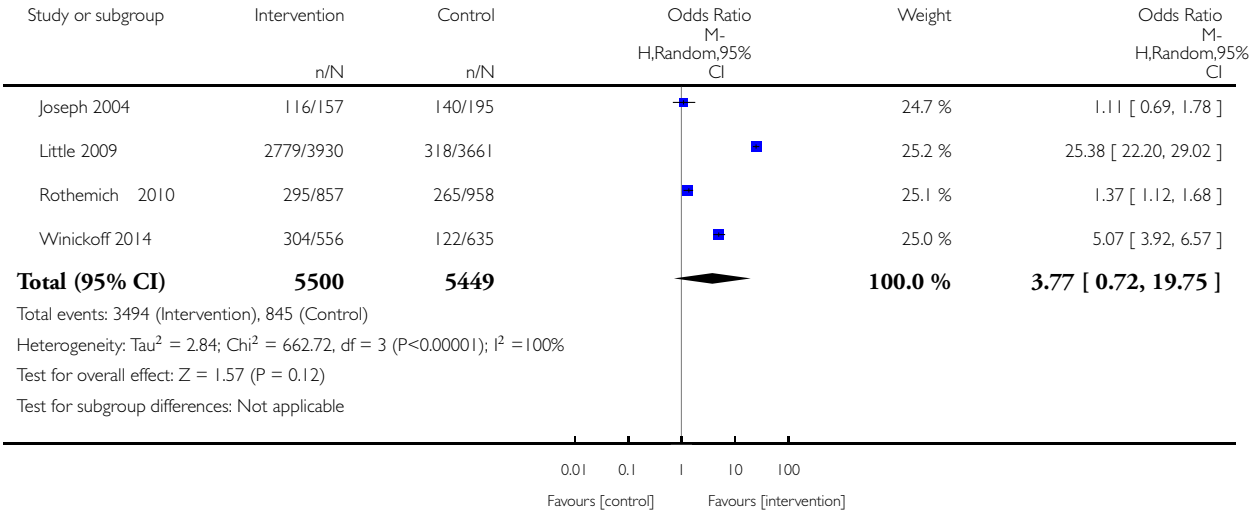
Test for subgroup differences: Not applicable

Analysis 1.2. Comparison 1 System change vs. usual care, Outcome 2 Smoking cessation counselling.

Review: System change interventions for smoking cessation

Comparison: 1 System change vs. usual care

Outcome: 2 Smoking cessation counselling



ADDITIONAL TABLES

Table 1. Table of secondary outcomes

Study	Asking about tobacco use	Documentation of smoking status	Advice to quit	Counselling to quit	Initiation of NRT or other pharmacotherapy	*Quitline referral*	*Quitline enrolment*
Cabezas 2011	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed
Gordon 2010	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed
Joseph 2004	No difference between groups (76.0% vs. 74.3%; p=0.71).	Favoured intervention (60.7% vs. 67.0%; p<0.001) .	Not assessed	No difference between groups (73.9% vs. 71.8%; p=0.60)	No difference between groups (14.7% vs. 18.0%; p=0.38)	Not assessed	Not assessed
Little 2009	Not assessed	Not assessed	Not assessed	Favoured intervention (69% vs. 3%;	Not assessed	Not assessed	Not assessed

Table 1. Table of secondary outcomes (*Continued*)

				p<0.01)			
Patwardhan 2012*	Favoured intervention (636 vs. 5; p<0.001)	Not assessed	Favoured intervention (25 vs. 3; p<0.01).	Not assessed	Not assessed	Favoured intervention (240 vs. 85; p=0.02)	Favoured intervention (81 vs. 8; p<0.001)
Rothemich 2010	Not assessed	Not assessed	No difference between groups (58.2% vs. 55.3%; p=0.39).	Favoured intervention (34.4% vs. 27.7%; p=0.001)	Not assessed	Favoured intervention (21.4% vs. 8.7%; p<0.001)	Not assessed
Winickoff 2013	Favoured intervention (59.4% vs. 32.6%; p<0.001)	Not assessed	Favoured intervention (50.5% vs. 26.9%; p<0.001) .	Favoured intervention (54.7% vs. 19.2%; p<0.001)	Favoured intervention (18.5% vs. 2.4%; p<0.001)	Favoured intervention (37. 2% vs. 9.3%; pp<0.001),	Favoured intervention (4.1% vs. 1.1%; p<0.01)

*data collected as counts (no denominator)

APPENDICES

Appendix 1. MEDLINE search strategy

Database: Ovid MEDLINE(R) 1946 to Present with Daily Update

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1 RANDOMIZED-CONTROLLED-TRIAL.pt. (406684)
2 CONTROLLED-CLINICAL-TRIAL.pt. (90068)
3 PRAGMATIC-CLINICAL-TRIAL.pt. (243)
4 CLINICAL-TRIAL.pt. (496740)
5 Meta analysis.pt. (61477)
6 exp Clinical Trial/ (723676)
7 Random-Allocation/ (85490)
8 randomized-controlled trials/ (100862)
9 double-blind-method/ (133088)
10 single-blind-method/ (21336)
11 placebos/ (33028)
12 Research-Design/ (86981)
13 ((clin$ adj5 trial$) or placebo$ or random$).ti,ab. (932222)
14 ((singl$ or doubl$ or trebl$ or tripl$) adj5 (blind$ or mask$)).ti,ab. (131807)
15 (volunteer$ or prospectiv$).ti,ab. (597284)
16 exp Follow-Up-Studies/ (534630)
17 exp Retrospective-Studies/ (563374)
18 exp Prospective-Studies/ (404707)

19 exp Evaluation-Studies/ or Program-Evaluation.mp. (258074)
20 Comparative study/ (1723981)
21 smoking cessation.mp. or exp Smoking Cessation/ (27521)
22 "Tobacco-Use-Cessation"/ (831)
23 "Tobacco-Use-Disorder"/ (8920)
24 Tobacco-Smokeless/ (3056)
25 exp Tobacco-/ (25853)
26 ((quit$ or stop$ or ceas$ or giv$) adj5 smoking).ti,ab. (11154)
27 exp Smoking/pc, th [Prevention & Control, Therapy] (17140)
28 (animals not humans).sh. (4157323)
29 (educat* adj5 (smok* or tobacco)).mp. (6922)
30 (dedicat* adj2 staff*).mp. (287)
31 (hospital adj2 policy).mp. (777)
32 organizational policy/ (12876)
33 "Delivery of Health Care, Integrated"/ (9336)
34 Health Care Reform/ (29384)
35 Health Services Accessibility/ (56182)
36 Patient Care Team/ (55495)
37 Patient-Centered Care/ (12691)
38 health system chang*.mp. (344)
39 (system* adj2 chang*).mp. (12033)
40 (system* adj2 intervention*).mp. (2627)
41 (integrat* adj6 (smok* or tobacco)).ti,ab. (529)
42 (Organi?ation* adj2 intervention*).mp. (482)
43 Organi?ation* structure*.mp. (2802)
44 (organi?ation* adj2 chang*).mp. (3192)
45 (system* adj2 approach*).mp. (16490)
46 ((system* adj2 reform) or (Organi?ation* adj2 reform*)).mp. (1118)
47 Decision Making, Organizational/ (10649)
48 Organizational Innovation/ (21745)
49 Patient Identification Systems/ (1920)
50 inservice training/ (18138)
51 ("environmental change" or "environmental changes").mp. (7253)
52 ("environmental intervention" or "environmental interventions").mp. (682)
53 "re?engineering".mp. (814)
54 exp Hospital Restructuring/ (7364)
55 "Practice change".mp. (731)
56 ((Identif* adj3 (smok* or tobacco*)) or (Document* adj3 (smok* or tobacco*))).mp. (3017)
57 Patient Education as Topic/ (73925)
58 "Referral and Consultation"/ (55276)
59 Guideline Adherence/ or Guideline/ or Practice Guideline/ (50669)
60 Health Services Research/ (32145)
61 ((system* adj2 modif*) or (Organi?ation* adj2 modif*)).mp. (5533)
62 or/1-20 (4169369)
63 or/21-27 (71503)
64 62 and 63 (18983)
65 or/29-61 (459365)
66 64 and 65 (2685)
67 66 not 28 (2682)

CONTRIBUTIONS OF AUTHORS

All authors contributed to conceptualising and designing the review. DT extracted the data with input from JG. DT wrote the first and subsequent drafts of the review with input from all other authors. All authors reviewed and approved the final manuscript.

DECLARATIONS OF INTEREST

Dr George, Prof Abramson and Prof Bonevski have received an investigator-initiated grant from Pfizer for the "Give Up For Good" study which aims to evaluate the effectiveness of a pharmacist-driven system-change smoking cessation program at three Australian hospitals. They also hold an IIR grant from Boehringer-Ingelheim for an unrelated study. MJA has undertaken an unrelated consultancy for AstraZeneca. He received an honorarium for speaking at a Novartis Respiratory Symposium, assistance with attendance at the European Respiratory Society Congress from Boehringer-Ingelheim and the World Health Summit from Sanofi. BB is supported by an Australian National Health and Medical Research Council Career Development Fellowship (GNT1063206) and a Faculty of Health and Medicine, University of Newcastle Gladys M Brawn Career Development fellowship.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The current risk of bias criteria table embedded in RevMan was used instead of the previous version specified in the protocol.

Chapter 3
A pharmacist-led system-change smoking cessation intervention for smokers admitted to Australian public hospitals (GIVE UP FOR GOOD trial) The Protocol

3:1 Preface

Chapters 1 and 2 highlighted the importance of developing and evaluating new interventions for helping smokers to stop smoking. Having a trained and dedicated hospital staff for providing and coordinating smoking cessation activities in hospitals may be an effective approach. In Australia, the role of hospital pharmacist in smoking cessation is still an emerging concept. A pharmacist-led smoking cessation intervention for hospitalised smokers using the components of a system change approach was developed.

The intervention was evaluated in a randomised controlled study (GIVE UP FOR GOOD trial) and this chapter describes the trial design and protocol.

3:2 Publication

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. A pharmacist-led system-change smoking cessation intervention for smokers admitted to Australian public hospitals (GIVE UP FOR GOOD): study protocol for a randomised controlled trial. *Trials* 2013; 14(1):148.

3: 3 Appendices

Appendix 2: Institutional Ethics Approvals

Appendix 3: Participant Information and Consent Forms

Appendix 4: Case Report Forms

Declaration for Thesis Chapter 3

Declaration by candidate

In the case of Chapter 3, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Reviewed literature; developed methodology and study materials; coordinated conduct of the study; involved in data management; conducted data analysis and prepared manuscript	60%

The following co-authors contributed to the work as follows:

Author name	Nature of contribution
Dr Johnson George	Conceived idea; established collaborations; obtained grant; reviewed study materials and manuscript
Prof Michael Abramson	Developed methodology; involved in grant proposal; reviewed study materials and manuscript
Prof Billie Bonevski	Developed methodology; involved in grant proposal; reviewed study materials and manuscript
Dr Simone Taylor	Involved in grant proposal; coordinated participant recruitment; reviewed study materials and manuscript
Ms Susan Poole	Involved in grant proposal; coordinated participant recruitment; reviewed study materials and manuscript
Dr Gregory Weeks	Involved in grant proposal; coordinated participant recruitment; reviewed study materials and manuscript
Prof Michael Dooley	Involved in grant proposal; reviewed study materials and manuscript

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work.

Candidate signature	[redacted]	Date 14/03/2016
Main supervisor's signature	[redacted]	Date 14/03/2016

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http://www.trialsjournal.com/content/14/1/148

TRIALS

STUDY PROTOCOL Open Access

A pharmacist-led system-change smoking cessation intervention for smokers admitted to Australian public hospitals (GIVE UP FOR GOOD): study protocol for a randomised controlled trial

Dennis Thomas[1], Michael J Abramson[2], Billie Bonevski[3], Simone Taylor[4], Susan Poole[1,5], Gregory R Weeks[6], Michael J Dooley[1,5] and Johnson George[1*]

Abstract

Background: Intensive smoking cessation interventions initiated during hospitalisation are effective, but currently not widely available. Strategies are needed to integrate smoking cessation treatment into routine inpatient care. Pharmacist-led interventions for smoking cessation are feasible and efficacious in both ambulatory and community pharmacy settings. However, there is a lack of evidence from large scale studies of the effectiveness of pharmacist guided programs initiated during patient hospitalisation in achieving long-term abstinence. This study aims to evaluate the effectiveness of a pharmacist-led system change intervention initiated during hospitalisation in Australian public hospitals.

Methods/design: A multi-centre, randomised controlled trial will be conducted with 12 months follow-up. Smokers, 18 years or older, will be recruited from the wards of three Victorian public hospitals. Participants will be randomly assigned to a usual care or intervention group using a computer generated randomisation list. The intervention group will receive at least three smoking cessation support sessions by a trained pharmacist: the first during the hospital stay, the second on or immediately after discharge and the third within one month post-discharge. All smoking cessation medications will be provided free of charge during the hospital stay and for at least one week after discharge. Participants randomised to usual care will receive the current care routinely provided by the hospital. All measurements at baseline, discharge, one, six and 12 months will be performed by a blinded Research Assistant. The primary outcome measures are carbon monoxide validated 7-day point prevalence abstinence at six and 12 months.

Discussion: This is the first large scale study to develop and test a pharmacist-led system change intervention program initiated during patient hospitalisation. If successful, the program could be considered for wider implementation across other hospitals.

Trial registration: Australian New Zealand Clinical Trial Registry ACTRN12612000368831.

Keywords: Smoking, Tobacco dependence, Quitting, Hospital, Randomised controlled trial, Pharmacist, System change

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Full list of author information is available at the end of the article

Background

Tobacco smoking continues to be the leading cause of preventable morbidity and mortality worldwide [1]. According to the World Health Organisation, tobacco use claims almost six million lives every year and, if the current trend continues, by 2030 tobacco will cause more than eight million deaths per year worldwide [1]. Smoking contributes to more than 15,500 deaths (11.7% of total deaths) and 7.8% of the total burden of disease and injury in Australia [2]. The annual smoking-related costs to the society are estimated at $31.5 billion [3]. Despite this, one in seven Australians 14 years old and over continues to smoke every day [4].

Hospitalisation may provide an ideal opportunity for health professionals to assist people to quit smoking and it is a potential teachable moment for smoking cessation [5,6]. At a time of perceived vulnerability to negative health outcomes, individuals may want to be more aware about the health risks. They may also be more receptive to smoking cessation messages and interventions [7,8]. Many Australian hospitals have implemented policies whereby smoking is not permitted indoors or within their boundaries outdoors [9]. Health benefits to the community are likely to be more pronounced if smoking bans are accompanied by supportive services to assist smokers to quit [10].

Clinical practice guidelines for treating tobacco use and dependence recommend that healthcare institutions develop plans to support the consistent and effective identification, documentation and treatment of tobacco users [11]. Ginn *et al*. has described the initiatives of an interdisciplinary group at an urban academic medical centre in the United States of America (USA) in the development and implementation of a tobacco cessation protocol [12]. The protocol focused on admission assessment, education, and provision of standing orders for medication treatment for nicotine withdrawal and/or tobacco cessation therapy during the inpatient encounter and referral for outpatient counselling on discharge.

High intensity behavioural interventions that are initiated during the hospital stay and include at least one month of follow-up after discharge have been found to increase smoking cessation among hospitalised patients by 37% [13]. Despite the availability of evidence to support high intensity behavioural interventions and best practice guidelines on cessation support for hospital inpatients, low levels of smoking cessation care are provided [9,14,15]. For example, a survey of patients with a smoking history admitted to a Victorian tertiary hospital found that almost half were interested in starting a smoking cessation program whilst in hospital. Despite this, only one in five had had any discussion with a health professional regarding options to assist with quitting in hospital [16]. The barriers to providing effective smoking cessation include a lack of support from the organisation, perceived patient objections, a lack of systems to identify smokers, a lack of time and skill, perceived inability to change care practices, a perceived lack of efficacy of smoking cessation treatments and the cost of providing care [17].

Other initiatives are required that include a system change approach to address the multidimensional problems associated with smoking care provision [18]. Having a dedicated and trained professional for screening, documenting and providing smoking cessation support may be an effective approach. Such initiatives are currently not available in Australia.

Pharmacist-led interventions for smoking cessation have been shown to be feasible and efficacious in both hospital outpatient and community pharmacy settings [19-22]. However, there is no evidence from large scale studies for the effectiveness of pharmacy interventions initiated in hospitalised patients that achieve long-term abstinence. Work has commenced in the USA with the Consortium of Hospitals Advancing Research on Tobacco (CHART) network assessing the effectiveness and cost-effectiveness of a number of projects initiated during hospitalisation and continued post-discharge. This project is expected to include 10,000 hospitalised smokers from 20 hospitals in the USA [10]. However, this project does not include an intervention with significant pharmacy involvement.

We hypothesise that a multi-disciplinary, system change, high intensity behavioural intervention led by hospital pharmacists offering pharmacotherapy and non-pharmacotherapy as needed, that begins during a hospital stay with at least one month of supportive contact after discharge has the potential to achieve long-term abstinence.

Objectives

The primary aim of the study is to determine the effectiveness of a pharmacist-led system change intervention ('GIVE UP FOR GOOD') compared to usual care on biochemically verified 7-day point prevalence abstinence at six months and 12 months.

The secondary objectives are

1. To evaluate the effectiveness of the 'GIVE UP FOR GOOD' intervention compared to usual care on self-reported continuous abstinence at discharge and at one, six and 12 months post-discharge.
2. To evaluate the effectiveness of the 'GIVE UP FOR GOOD' intervention compared to usual care on self-reported 24 hour, 7-day and 30-day point prevalence abstinence at one, six and 12 months post-discharge.

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http://www.trialsjournal.com/content/14/1/148

Methods/design

This is a randomised, multi-centre, single blinded study. Participants will be recruited from the inpatient wards of three Victorian public hospitals: The Alfred, Austin Health and Barwon Health. Each participant will be screened for eligibility at baseline. Eligible participants will be randomised to either the intervention or usual care group, and complete four additional follow-up interviews over a period of 12 months. The 'GIVE UP FOR GOOD' intervention will be delivered over the course of at least three sessions (Figure 1: Study Flow Diagram).

Inclusion and exclusion criteria

Patients eligible for the trial are 18 years old or older, are smokers at the time of hospital admission, and are available for follow-up on discharge, and up to 12 months post-discharge. Exclusion criteria include physical or mental inability to participate in the study, inability to provide written informed consent, inability to communicate in English, terminal illness, pregnancy or on another active smoking cessation therapy or program at the time of hospital admission (pharmacotherapy including nicotine replacement therapy (NRT) or active involvement in a smoking cessation program in the last

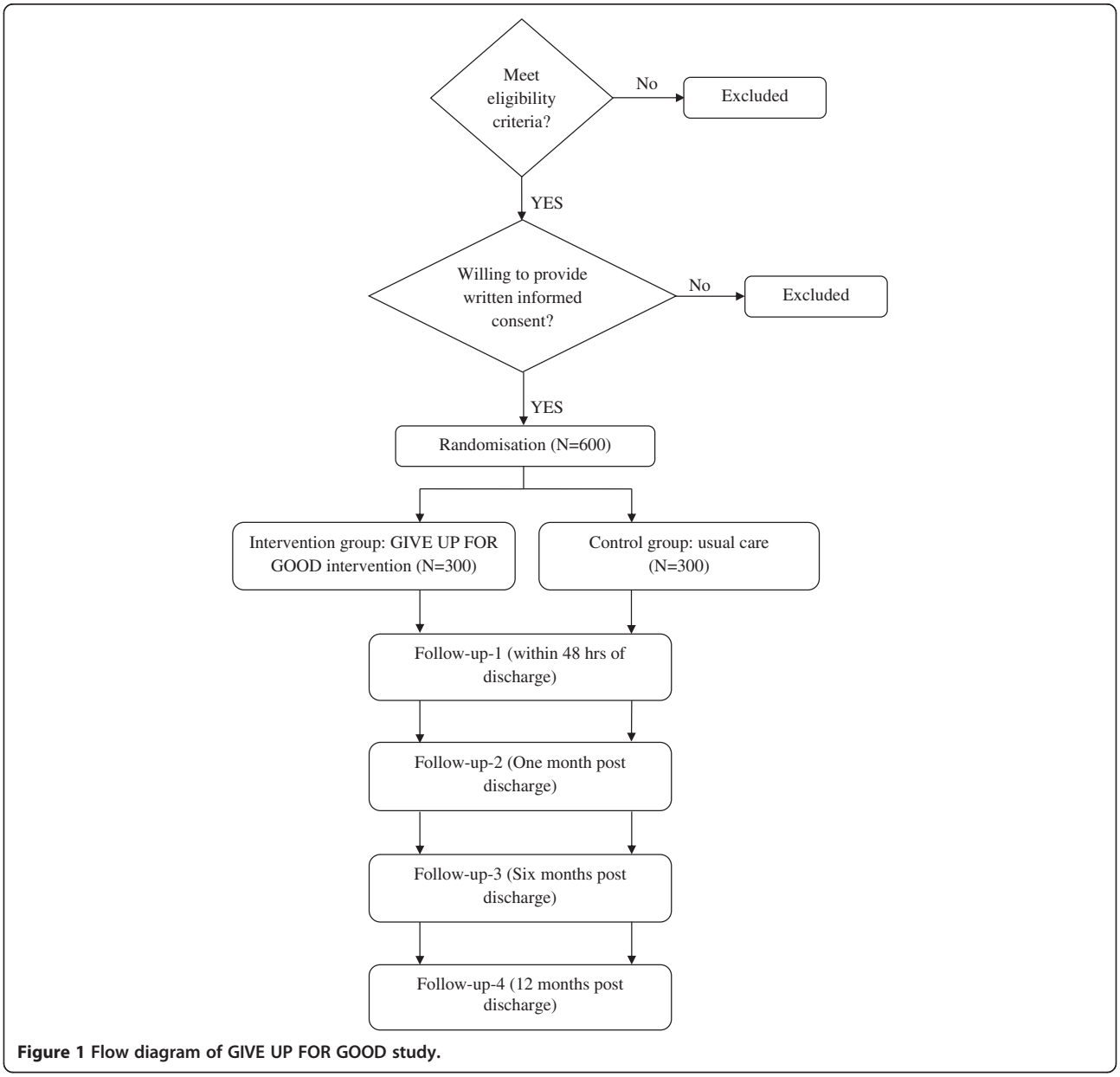

Figure 1 Flow diagram of GIVE UP FOR GOOD study.

seven days prior to the hospital admission with support from a trained counsellor, health professional or service provider).

Study conduct

Eligible participants will be identified through active screening of admission, nursing and medical notes by a Research Assistant (RA) employed at each site. Ward staff, including doctors, nurses, pharmacists and physiotherapists will be informed of the research project and asked to refer all patients identified as current smokers to the RA. The RA will describe the project to each potential participant, provide a plain language statement and answer any questions. If he/she is interested in participating, written informed consent will be sought before proceeding with the baseline interview. All participants will be referred to a study pharmacist for randomisation after baseline data collection.

Randomisation: allocation, concealment and sequence generation

At each site, patients meeting all the entry criteria will be randomised by the study pharmacist to either of the study arms, using a computer generated randomisation list. Stratified, block randomisation with random block sizes of four and eight will be used. The study pharmacist will be kept unaware of block length to avoid the predictability of treatment allocation. Participants will be stratified into two groups using the Heaviness of Smoking Index (HSI) [23]: heavy smokers (HSI score ≥4) and light smokers (HSI Score ≤3). Equal proportions of heavy and light smokers will be approached.

Sealed opaque envelopes will be used for the concealment of allocation. The study pharmacist will assess the participants' nicotine dependence using HSI and categorise them into the respective stratum. The study pharmacist will then sequentially select and open an envelope corresponding to the stratum to identify treatment allocation and the randomisation number, unique for each participant.

Usual care group

Participants randomised to the usual care (control) group will continue to receive routine care provided by the hospital. They may receive brief counselling by hospital staff and/or free NRT or pharmacotherapy during their hospital stay as per hospital policy. All three participating hospitals have a 'smoke free' policy; however, there may be differences between sites in the extent to which staff offer support to smokers to quit as part of routine care. The support provided to the usual care group at each site will be recorded and reported.

Intervention group

Participants randomised to the intervention group will receive the 'GIVE UP FOR GOOD' smoking cessation intervention coordinated by the study pharmacist. The conceptual framework for the intervention is based on the systems change approach of Fiore *et al*. [24], which has six systems-level strategies to facilitate treatment of tobacco dependence:

1. Implement a system of identifying smokers;
2. Provide education and resources to promote provider intervention;
3. Dedicate staff to provide smoking cessation services;
4. Promote hospital policies that support and provide tobacco dependence services;
5. Include tobacco dependence treatments (both counselling and pharmacotherapies) identified as effective; and
6. Reimburse health care providers for delivery of effective tobacco dependence treatments and include these services among their defined duties.

In GIVE UP FOR GOOD, trained and dedicated hospital pharmacists take the lead role in providing smoking cessation support to inpatients at each participating hospital. The pharmacist will record each participant's smoking status in the medical records and provide cessation support including counselling and pharmacotherapy.

Intervention procedures

All the intervention pharmacists will complete a two day smoking cessation training program for health professionals conducted by the Lung Health Promotion Centre (LHPC) at The Alfred, Melbourne, Australia. Participants randomised to the 'GIVE UP FOR GOOD' program will receive a series of smoking cessation counselling sessions by one of the two specially trained pharmacists at each hospital over the course of at least three sessions: the first during the hospital stay, the second on discharge or immediately after discharge and the third within one month post-discharge. The consistency of intervention across the sites will be maintained by using standardised treatment algorithms and procedures, and regular discussions. Pharmacists will also be regularly attending smoking cessation update sessions conducted by the LHPC at approximately six month intervals.

Intervention 1 (after baseline data collection)

Study pharmacists will review the participants' medical and medication history in conjunction with their smoking history, nicotine addiction, stages of change, comorbidities, quit attempts and outcomes in the past. The study pharmacist will then discuss with each participant the available options for quitting, including

cognitive and behavioural strategies and/or pharmacotherapy. Following motivational interviewing, a QUIT Plan [25] will be prepared for each participant. Resources such as QUIT Pack®, QUIT Line® and QUIT Coach® and referral to other staff such as doctors, nurses and dieticians will be used, where appropriate. If prescription medications are required to assist smoking cessation, this will be discussed with the treating medical staff and provided free of charge during the hospital stay. Over-the-counter NRT products may be initiated by the study pharmacists as required and at the patient's discretion. Intervention 1 will take approximately 30 minutes.

Intervention 2 (immediately before or after hospital discharge)

The study pharmacist will reinforce the importance of quitting, and discuss relapse and relapse prevention strategies with the participant. A smoking treatment summary and the discharge plan will be sent to the participant's general practitioner and community pharmacist with instructions for post-discharge management (including non-pharmacological treatment). An appointment with the primary healthcare professionals will be made on the participant's behalf. If participants required pharmacotherapy for smoking cessation during their hospital stay, they will receive at least one week's supply free of charge at the time of discharge. Intervention 2 will take approximately 15 minutes.

Intervention 3 (within one month after hospital discharge)

The study pharmacist will follow-up the participant approximately four weeks post-discharge (by telephone or mail) to emphasise the importance of long-term abstinence and remind those who have not been reviewed by their primary health professionals after discharge to seek ongoing smoking cessation support. Intervention 3 will take approximately 10 minutes.

Data collection and follow-up

Baseline data collection will be at the time of recruitment. All participants will be followed up for a period of 12 months from hospital discharge. Telephone, mail or face-face follow-up interviews will be conducted at one, six and 12 months post-discharge.

General demographics including age, gender, nationality, language, education, employment, marital status, income, living arrangement and possession of any concession card will be collected at baseline. Medical and medication history will be obtained from the patients' notes. Smoking-related information including current smoking status (daily or occasional smoker), age at which smoking started and smoking habits of friends and housemates also will be captured. In addition, smoking-related data, such as smoking habits, money spent on cigarettes, previous smoking cessation attempts and outcomes, methods used for cessation and difficulties faced during past quit attempts, will be collected. Preferred methods of cessation, medications, strategies and facilitators to assist quitting, discussions about smoking cessation with health professionals during the present hospitalisation and in the past, motivation and confidence to give up smoking will also be determined. Participant's satisfaction with the current services received will be evaluated using a five point scale (1- very dissatisfied to 5- very satisfied). Charlson's Co-morbidity Index [26] will be used for assessing the co-morbid conditions.

The study will use the following validated scales:

- Heaviness of smoking index (HSI): [23] This is a two item scale to assess nicotine dependence based on time to first cigarette of the day and number of cigarettes smoked per day.
- Patient Health Questionnaire (PHQ-2): [27] This two item scale will be used to assess the frequency of depressed mood and inability to experience pleasure. Each item will be scored on a four point scale ranging from 'not at all' to 'nearly every day'.
- Smoking self-efficacy scale: [28] Self-efficacy will be assessed using nine items, in order to determine temptation to smoke in various situations. Each item is answered on a five point scale ranging from 'Not at all tempted' to 'Extremely tempted' to smoke. Higher scores indicate greater smoking temptation.
- Readiness to quit ladder: [29] This scale has 10 response options that assess motivation along a continuum, from 'not considering quitting in the near future' to 'have already quit smoking'. Higher scores suggest greater motivation to quit smoking.
- Short Form (SF-8) quality of life questionnaire: [30] This eight item scale will be used to assess general health-related quality of life. The scale has domains on physical and mental health. The items represent physical functioning, role-physical (role limitations due to physical health problems), bodily pain, general health, vitality, social functioning, role-emotional (role limitations due to personal or emotional problems) and mental health. A higher score indicates better health.
- Visual Analogue Scales (VAS) for motivation and confidence: These scales will be used to assess participants' motivation and confidence to give up smoking on a 10 point scale, with one being 'very low' and 10 being 'very high'.

The readiness to quit ladder and HSI will be used at each follow-up. The smoking self efficacy scale and PHQ-2 will be used at each follow-up, except follow-up 1. The

quality of life (SF-8) will be assessed at baseline and at the end of the study.

Blinding

All assessments will be conducted by a RA blinded to treatment allocation. All possible measures will be taken to prevent the revealing of treatment allocation to the RA. Any accidental unblinding (for example, participant revealing details of the intervention during a follow-up interview) will be documented and reported.

Primary endpoint

The primary endpoints are biochemically verified 7-day point prevalence abstinence at six and 12 months. Participants who self-report abstinence of at least seven consecutive days (7-day point prevalence) at six and 12 months will be asked to perform a carbon monoxide (CO) breath test. It will be measured using a hand-held piCO+ Smokerlyzer (Bedfont Scientific, Maidstone, Kent, England) [31]. Participants will be requested to inhale and hold their breath for 15 seconds before exhaling into the analyser. An exhaled CO level of six ppm is recommended by the manufacturer for distinguishing smokers and non-smokers. A non-smoker is expected to have a CO level of 0 to 6 ppm, a mildly dependent smoker 7 to 15 ppm and a strongly addicted smoker over 15 ppm. The instrument will be calibrated regularly according to the manufacturer's specifications.

Participants who report having smoked more than five cigarettes in the previous 30 days at the six month follow-up or in the previous six months at the 12 month follow-up will be regarded as smokers and will be excluded from the CO breath test. A participant with a CO level ≤6 ppm will be considered abstinent. If there is a conflict between self-reported smoking status and the CO breath test result, the latter will be taken as the 'gold standard'. Participants who fail to complete a follow-up will be considered to be continuing smokers at that point.

Secondary endpoints

The secondary outcome measures are 1) Participant self-reported continuous abstinence (defined as abstinence between quit day and a follow-up point) at one, six and 12 months. 2) Self-reported 24-hour, 7-day and 30-day point prevalence abstinence (defined as prevalence of abstinence during a time window immediately preceding the follow-up) at one, six and 12 months. 3) Self-reported cigarette consumption at baseline, one, six and 12 months. 4) Self-reported spending on cigarettes at baseline, one, six and 12 months. 5) Response to the various validated scales including HSI, PHQ-2, smoking self-efficacy scale, readiness to quit ladder, SF-8 and VAS.

Sample size

The abstinence rate at six months was 28% in studies where trained community pharmacists offered counselling in conjunction with pharmacotherapy, whereas it ranged between 8% and 11.8% in the control group [20,21]. Using a conservative approach based on these findings, with 250 participants per group, this trial will have 95% power to detect a 13% difference in the proportion of quitters (25% versus 12%) with a two sided *P*-value of 0.05. To allow for a potential drop-out of 20%, 600 patients will be recruited in total. Our aim is to recruit the required number of participants from three Victorian hospitals over 12 months, 200 smokers from each hospital (that is, 100 usual care and 100 intervention).

Statistics and data analysis

Data will be assessed for normality and analysed using appropriate statistical tests. The baseline demographic and clinical characteristics will be summarised using proportions, mean and standard deviation, or median and interquartile range, as appropriate.

Base-line comparisons: characteristics of study participants in the intervention and usual care groups will be compared using the chi-square test for categorical variables and the Student's *t*-test or a non-parametric equivalent (for example, the Mann–Whitney *U* test) for continuous and discrete variables.

Comparisons between the intervention and usual care group will be performed (both adjusted and unadjusted) for the known confounders. Analysis of primary outcome will involve comparing the changes in quit rates between the two groups. Multivariable analysis will be used to compare outcomes between the two treatment groups while adjusting for prognostic variables and potential confounders. Analysis of secondary outcomes will be conducted using standard statistical procedures applicable to the categorical, continuous or discrete variables. All the statistical tests will be interpreted with a significance level of 5% (two-tailed).

Data will be analysed according to intention-to-treat (ITT) principles. All randomised participants will be included in the analysis and those lost to follow-up will be regarded as smokers. Participants who die during the study will be excluded from the analysis [32]. In addition to ITT analysis, a per protocol analysis also will be performed.

Ethics

The trial will be conducted in compliance with the protocol, the principles of Good Clinical Practice (GCP) [33], the National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human Research (2007) [34] and the Australian Code for the Responsible Conduct of Research (2007) [35].

This study has been approved by the Human Research Ethics Committees of all three participating hospitals and Monash University. Written informed consent will be obtained from each participant at the time of enrolment.

Discussion

This is the first multi-centre study to develop and evaluate a pharmacist-led system change intervention program in hospitalised patients. This is also the first large scale study to explore the effectiveness of pharmacist interventions in achieving long-term abstinence among inpatients in Australian hospitals. This project is endorsed by the Chief Executive Officers and the Directors of Pharmacy of the participating hospitals which will ensure support from hospital staff, thus facilitating the recruitment of participants and conduct of the study. The three participating hospitals have prohibited smoking in their premises. Such a smoke free environment will promote cessation in both usual care and intervention groups equally. Smoking bans with supportive services to assist smokers to quit with or without pharmacotherapy are likely to produce more health benefits to the community.

Experience from the implementation and evaluation of the 'GIVE UP FOR GOOD' intervention at three sites will guide the provision of smoking cessation support for hospital inpatients. If cost effective, the findings of this study could influence policy changes leading to allocation of more resources to support smoking cessation initiatives through public hospitals in Australia. If successful, the program could be implemented across other hospitals in Australia and overseas with minimal or no changes.

Trial status

The trial is currently in the recruitment phase.

Abbreviations

CO: Carbon monoxide; HSI: Heaviness of smoking index; ITT: Intention-To-Treat; LHPC: Lung Health Promotion Centre; NRT: Nicotine replacement therapy; PHQ: Patient Health Questionnaire; RA: Research assistant; VAS: Visual analogue scale.

Competing interests

The study is supported by an investigator initiated research (IIR) grant from Pfizer. However, Pfizer was not involved in the design of the study, protocol development or implementation and will not be involved in the analysis and publication of findings. Recommendations for pharmacotherapy will be evidence-based and according to guidelines based on a participant's nicotine dependence and participant preference. Professor Abramson was a member of the Scientific Committee for a workshop on an unrelated topic that was sponsored by GlaxoSmithKline, but did not receive any honorarium.

Authors' contributions

JG conceived the research idea and developed it with input from the other chief investigators, MA, BB, ST, SP, GW and MD, and secured research funding. DT is a PhD scholar working on the project under the supervision of JG, MA and BB. All the investigators contributed to all phases of the study including study design, protocol development and finalisation of manuscript. All authors have reviewed this manuscript and have approved the final protocol.

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Chapter 4
Quitting experiences and preferences for a future quit attempt (GIVE UP FOR GOOD trial) Baseline survey findings

4:1 Preface

This chapter presents the baseline data from the GIVE UP FOR GOOD trial. Each smoker may have different experiences with previous quit attempts. Likewise, smokers may have different views on their future quit attempts. Understanding those experiences and preferences may assist in the interpretation of the trial outcomes, and, if necessary, aid in the development of a more effective smoking cessation intervention. Previous experiences regarding quitting smoking and the preference for a future quit attempt among the GIVE UP FOR GOOD participants are presented in this chapter.

4:2 Publication

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. Quitting experiences and preferences for a future quit attempt: a study among inpatient smokers. *BMJ Open* 2015;5(4):e006959.

Declaration for Thesis Chapter 4

Declaration by candidate

In the case of Chapter 4, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Reviewed literature; involved in data management; performed analysis; and prepared manuscript	70%

The following co-authors contributed to the work as follows:

Author name	Nature of contribution
Dr Johnson George	Assisted in analysis and reviewed manuscript
Prof Michael Abramson	Assisted in analysis and reviewed manuscript
Prof Billie Bonevski	Assisted in analysis and reviewed manuscript
Dr Simone Taylor	Coordinated data collection and reviewed manuscript
Ms Susan Poole	Coordinated data collection and reviewed manuscript
Dr Gregory Weeks	Coordinated data collection and reviewed manuscript
Prof Michael Dooley	Reviewed manuscript

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work.

Candidate signature	[redacted]	Date 14/03/2016
Main supervisor's signature	[redacted]	Date 14/03/2016

BMJ Open

Quitting experiences and preferences for a future quit attempt: a study among inpatient smokers

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ABSTRACT

Objective: Understanding smokers' quit experiences and their preferences for a future quit attempt may aid in the development of effective cessation treatments. The aims of this study were to measure tobacco use behaviour; previous quit attempts and outcomes; methods used to assist quitting; difficulties experienced during previous attempts; the motives and preferred methods to assist quitting in a future attempt; identify the factors associated with preferences for smoking cessation.

Design: Face-to-face interview using a structured questionnaire.

Setting: Inpatient wards of three Australian public hospitals.

Participants: Hospitalised smokers enrolled in a smoking cessation trial.

Results: Of 600 enrolled patients (42.8% participation rate), 64.3% (n=386) had attempted quitting in the previous 12 months. On a scale of 1 (low) to 10 (high), current motivation to quit smoking was high (median 9; IQR 6.5–10), but confidence was modest (median 5; IQR 3–8). Among 386 participants who reported past quit attempts, 69.9% (n=270) had used at least one cessation aid to assist quitting. Nicotine replacement therapy (NRT) was most commonly stated (222, 57.5%), although the majority had used NRT for <4 weeks. Hypnotherapy was the most common (68, 17.6%) non-pharmacological treatment. Over 80% (n=311) experienced withdrawal symptoms; craving and irritability were commonly reported. Most participants (351, 58.5%) believed medications, especially NRT (322, 53.7%), would assist them to quit in the future. History of previous smoking cessation medication use was the only independent predictor of interest in using medications for a future quit attempt.

Conclusions: The majority of smokers had attempted quitting in the previous 12 months; NRT was a popular cessation treatment, although it was not used as recommended by most. This suggests a need for assistance in the selection and optimal use of cessation aids for hospitalised smokers.

Trial registration number: Australian and New Zealand Clinical Trials Registry: ACTRN12612000368831.

Strengths and limitations of this study

- Previous quitting experiences, and motives and preferences for a future quit attempt were assessed in a large sample of hospitalised smokers from three Australian public hospitals.
- Findings were based on self-report, which had limited validity and reliability. However, attempts were made to collect the most accurate information using trained research assistants who collected all the data face-to-face using a well-constructed and validated questionnaire.
- Participants rated highly on the readiness-to-quit ladder, and reported high motivation to quit, which may not be generalisable to all hospitalised patients. The study sample may represent a subset of hospitalised smokers eligible and interested in participating in a smoking cessation clinical trial.

INTRODUCTION

Hospitalisation provides an ideal opportunity for smokers to attempt to quit smoking. In Australia, many hospitals have implemented policies where smoking is not permitted indoors or within outdoor boundaries.[1] This smoke-free environment gives patients an opportunity to attempt quitting away from their usual environmental smoking cues. At a time of feeling vulnerable regarding their health, patients may be motivated to quit smoking and become more receptive to smoking cessation messages and interventions. There is also substantial evidence to support the effectiveness of hospital-based smoking cessation interventions.[2] A cross-sectional study of hospitalised smokers found that many were interested in starting a smoking cessation intervention while in hospital.[3]

Clinical practice guidelines for treating tobacco use and dependence within the hospital setting recommend the use of evidence-based smoking cessation aids to assist the quitting process.[4] Despite the fact that

smoking cessation treatments, including counselling,[5] nicotine replacement therapy (NRT)[6] and other pharmacotherapies[7] can significantly improve the odds of quitting, the use of such smoking cessation aids is modest.[8] Only 3–5% of unaided quitting attempts are successful at 6 months,[9] with smokers often relapsing because of withdrawal symptoms.[4 10]

Most smokers undertake numerous quit attempts.[4] Understanding the process of quitting is important to optimise interventions. Additionally, there is a need to explore smokers' motives and preferences for methods to assist quitting, as many options and a wide range of products are available.[11] Knowledge about previous quitting experiences and preferences for any future quit attempts could guide the selection of an appropriate strategy that is likely to help smokers quit, thus ensuring efficient use of clinicians' time and limited healthcare resources.

The main objective of this study was to explore the quitting experiences and preferences of smokers admitted to Australian public hospitals who volunteered to participate in a trial of a smoking cessation intervention targeting hospitalised smokers. Specifically, the study aimed: (1) to examine: (a) tobacco use behaviour, including previous quit attempts and outcomes; (b) methods used in the past 12 months to assist quitting; (c) self-reported difficulties experienced during previous quit attempts and side effects of pharmacotherapies; (d) the motives and preferred methods to assist quitting in any future quit attempts and (2) to identify the factors associated with preferences for smoking cessation.

METHODS

Baseline data were obtained from inpatients who were smokers at the time of hospital admission and enrolled in a randomised controlled trial (RCT) evaluating a smoking cessation intervention for hospitalised patients. Participants were recruited between April 2012 and June 2013 from inpatient wards of three Australian public hospitals in Victoria: The Alfred, Austin Health and Barwon Health. The detailed protocol of the RCT has been published elsewhere.[12]

Briefly, participants were 18 years of age or older, self-reported current (daily or occasional) smokers at the time of hospital admission, and available for 12 months of follow-up. Patients who were too ill (physically or mentally) to provide written informed consent or participate in the trial, unable to communicate in English, with a terminal illness, pregnant or already receiving active smoking cessation therapy at the time of hospital admission were excluded.

Potential participants were identified by active screening of hospital notes by a trained research assistant (RA) employed at each hospital. Pharmacists and other ward staff were informed about the research project and asked to refer all patients identified as current smokers, either from hospital records or from discussions with patients or other staff. The RA confirmed smoking status, assessed eligibility to participate, and provided a plain language statement describing the project to each potential participant. Written informed consent was obtained before proceeding with data collection. All information was collected face-to-face by the RA, using a pretested structured data collection form which incorporated validated scales. Data on comorbid conditions were extracted from hospital records. Age, sex, nicotine dependence and reason for non-participation were collected from non-consenting patients.

Survey instruments

Data were collected using a 32-item questionnaire. Items relevant to this study are as follows.

Sociodemographic characteristics and comorbid conditions

Sex, age, country of birth, education, employment and marital status, and current living arrangement were collected. Comorbid conditions were assessed using Charlson's comorbidity index,[13] in which a weighted score was assigned to each of the 19 clinical conditions based on the relative risk of 1-year mortality. Higher scores indicated greater risk of death from comorbid conditions. The reason for hospital admission was obtained from the participants. The number of medications (both regular and as needed) at the time of hospital admission was collected from hospital records.

Tobacco use and quitting behaviours

Smoking status at the time of hospital admission (daily or occasional smoker) and age at which smoking was started were assessed. Previous quit attempts were determined by asking: 'Have you quit smoking for at least 1 day in the past 12 months?' If yes, the number of serious quit attempts (defined as smoke-free for at least 24 h) in the past 12 months and the number of days smoke-free on the most recent quit attempt were assessed. Additionally, smoking habits of friends and housemates were explored.

Nicotine dependence was measured using the two-item Heaviness of Smoking Index (HSI), which assessed time to first cigarette after waking and number of cigarettes per day.[14] The scores range from 0 to 6 with a score of 3 or less indicating 'light smokers', and 4 or more indicating 'heavy smokers'.

Stage of change was assessed using the readiness-to-quit ladder with 10 response options.[15] The stages were summarised as 'precontemplation'—not interested in quitting smoking in 6 months; 'contemplation'—interested in quitting in 6 months; 'preparation'—interested in quitting in 1 month or already made changes in smoking habits; 'action'—already quit smoking.

Situational temptation to smoke was assessed using the nine-item smoking self-efficacy scale.[16] Each situation was answered on a five-point Likert-type scale ranging from 'not at all tempted' to 'extremely tempted' to

smoke, with scores ranging from 9 to 45. Higher scores indicated greater smoking temptation.

Motivation to give up smoking was captured using a 10-point visual analogue scale (VAS)[17] with 1 being 'very low' and 10 being 'very high'. Confidence in a participant's own ability to quit smoking was also measured using a 10-point VAS,[17] with 1 being 'very low' and 10 being 'very high'.

Difficulties experienced during the past quit attempts

Participants were asked 'Have you experienced any difficulties during your past quit attempt?' If yes, they could choose one or more from the following options: increased appetite, poor concentration, urges to smoke, irritability or aggression, depression, mouth ulcers, restlessness, nighttime awaking and others. Participants were asked about any side effects from any of the smoking cessation medications they had used during past quit attempts. These questions were asked of only those who had attempted quitting in the previous 12 months.

Methods used for cessation

Participants were asked 'Have you used anything to assist quitting in the past?' If yes, specify, and the following options were listed: NRT, bupropion, varenicline, acupuncture, counselling, DVD or books, hypnotherapy, online programme, Quitline, quit smoking group and other. Use of different forms of NRT (patch, gum, lozenge, mini/microtab and inhaler) and dosage were also measured. These questions were only asked of those who had attempted to quit in the previous 12 months.

Motives and preferences for a future quit attempt

This was assessed by asking 'Which of the following would motivate/assist you to quit smoking?' with the following options listed: acupuncture, counselling, cash incentive, hypnotherapy, increasing prices of cigarettes, information on the amount of nicotine in your body, medication (bupropion, varenicline or NRT), plain packaging of cigarettes, personal contact with a healthcare professional, Quitline, smoking cessation groups and others. The preferred form of medication was assessed using the question 'If you had a choice of treatment to assist you to quit smoking, which form of medication would you prefer?' with the following options listed: tablet, sublingual tablet, patch, chewing gum, lozenge, inhaler, e-cigarette, unsure, 'I am not interested in medications' and other. Participants were also asked about the preferred strategy to quit smoking: 'If you decided to give up smoking now, which strategy would you adopt?' the options were: I am not thinking of quitting, I want to reduce gradually; 'cold turkey', I want to quit with the help of medicines, or other.

Data analysis

All analyses were conducted using the Statistical Package for Social Sciences (SPSS) (V.20.0; IBM, Armonk, New York, USA). The sociodemographic characteristics, tobacco use behaviour, methods used to assist in previous quit attempts, difficulties experienced, and motives and preferences for a future quit attempt were analysed descriptively and presented as mean (±SD) or median (IQR) or number (%) based on type and distribution of data.

The demographic characteristics (age, sex, employment status, marital status, living arrangements, living with a smoker, having a smoker as a friend) of those who had tried quitting were compared with their counterparts, using χ^2 or Student t test. The age, sex and nicotine dependence of participants were compared with non-participants using χ^2 or t tests.

A logistic regression model was used to test the associations between participant characteristics (age, sex, education level, number of medications on admission, nicotine dependence, Charlson's index score, motivation to quit smoking, previous quitting failures, previous use of smoking cessation medications and experience of withdrawal symptoms during a previous quit attempt) and interest in using medications for a future quit attempt. All these variables were tested in univariable analyses first, and potential variables ($p<0.1$) were entered into a multivariable model to test their independent associations. A higher α level (10%) was used in univariable analyses to identify all potential confounding variables. Preferences for a future quit attempt of various subgroups stratified by sex, age, nicotine dependence were tested using χ^2 test. A p value <0.05 was considered statistically significant.

RESULTS

The mean participation rate in the RCT was 42.8% across the three sites (participation rates at the individual hospitals ranged from 35.4% to 49.6%) giving a final sample size of 600 participants (figure 1). Non-participants were more likely to be light smokers (72.0% vs 52.7%, $p<0.001$) and slightly older (53.1±16.7 vs 51.0±14.1 years, $p=0.012$) than participants. The demographic characteristics of the study participants are presented in table 1.

The common reasons for hospital admission self-reported by participants were disorders of the circulatory system (135, 22.5%), musculoskeletal system and connective tissue (97, 16.2%), respiratory system (75, 12.5%), digestive system (67, 11.2%) and nervous system (65, 10.8%). The median Charlson's index score was 1 (IQR 0–2) and the median number of medications used at the time of hospital admission was 4 (IQR 1–7).

Tobacco use and quitting behaviour

Tobacco use behaviours are outlined in table 2. The majority of participants were daily smokers and the median age at which smoking was started was 15 (IQR 13–18) years. Three-quarters of participants were either in the 'preparation' or 'action stage' on the readiness-to-quit ladder. Motivation to quit smoking was high (median 9; IQR 6.5–10), although confidence

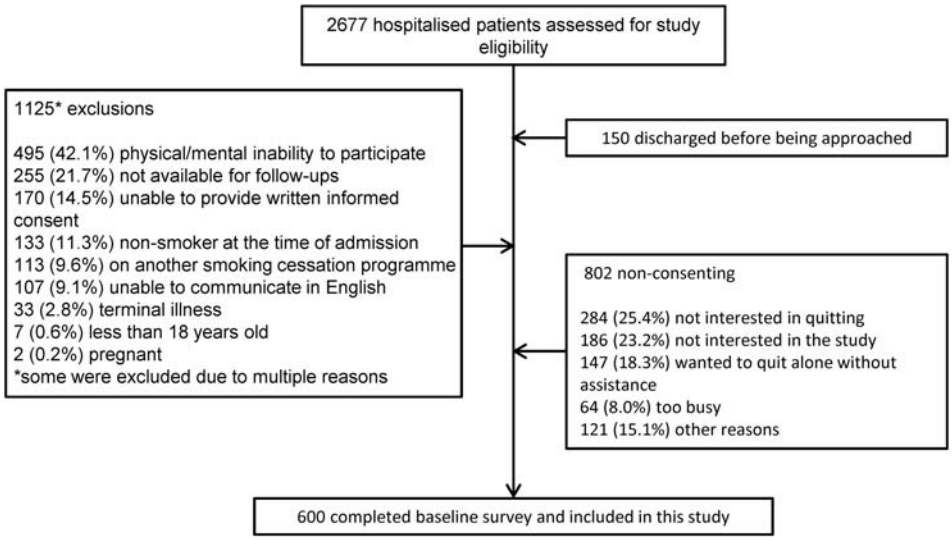

Figure 1 Diagram outlining patient recruitment.

was modest (median 5; IQR 3–8). The mean self-efficacy score, evaluating temptation to smoke, was 33.03 (±7.86).

Almost two-thirds (386, 64.3%) of participants had tried quitting at least once during the previous 12 months; 43.2% reported multiple quit attempts. The median number of serious quit attempts (abstinent for 24 h or longer) in the previous 12 months was 2 (IQR 1–4) and the median number of days smoke-free on the most recent attempt was 4 (IQR 2–14). There were no statistically significant differences between the characteristics of those who had at least one quit attempt and those who did not.

Difficulties experienced during quit attempts in the past 12 months

Of the 386 participants who tried quitting in the previous 12 months, 80.6% (n=311) reported experiencing at least one difficulty or withdrawal symptom during their quit attempts; 67.1% (n=259) reported having multiple difficulties. Self-reported difficulties are detailed in table 3. Among the users of NRT, varenicline or bupropion (n=249), more than half (141, 56.6%) had experienced side effects.

Methods used to quit smoking

Of those who tried quitting in the previous 12 months (n=386), 69.9% had used at least one method (either

Table 1

		Hospital 2 (n=200)	Hospital 3 (n=200)	Overall (n=600)
Age, mean (±SD) years	49.6 (±14.4)	52.3 (±14.0)	51.14 (±13.8)	51.0 (±14.1)
Sex, male	142 (71.0%)	122 (61.0%)	120 (60.0%)	384 (64.0%)
Born in Australia	148 (74.0%)	162 (81.0%)	171 (85.5%)	481 (80.2%)
Mainly speaks English at home	183 (91.5%)	191 (95.5%)	196 (98.0%)	570 (95.0%)
Education				
Primary school or below	6 (3.0%)	9 (4.5%)	8 (4.0%)	23 (3.8%)
Secondary school	108 (54.0%)	120 (60.0%)	136 (68.0%)	364 (60.7%)
Technical or further education	47 (23.5%)	30 (15.0%)	40 (20.0%)	117 (19.5%)
University	39 (19.5%)	41 (20.5%)	16 (8.0%)	96 (16.0%)
Employment status				
Employed–full/part time	94 (47.0%)	92 (46.0%)	92 (46.0%)	278 (46.3%)
Retired/pensioner	48 (24.0%)	50 (25.0%)	49 (24.5%)	147 (24.5%)
Unemployed/home duties/student	35 (17.5%)	41 (20.5%)	24 (12.0%)	100 (16.7%)
Disabled/unable to work	23 (11.5%)	17 (8.5%)	35 (17.5%)	75 (12.5%)
Marital status				
Married/de-facto/engaged	78 (39.0%)	89 (44.5%)	97 (48.5%)	264 (44.0%)
Never married/single	62 (31.0%)	44 (22.0%)	28 (14.0%)	134 (22.3%)
Separated/divorced/widowed	60 (30.0%)	67 (33.5%)	75 (37.5%)	202 (33.7%)
Current living arrangements				
Family household	111 (55.5%)	148 (74.0%)	140 (70.0%)	399 (66.5%)
Single-person household	66 (33.0%)	41 (20.5%)	48 (24.0%)	155 (25.8%)
Group household	21 (10.5%)	8 (4.0%)	8 (4.0%)	37 (6.2%)
Residential facility	2 (1.0%)	3 (1.5%)	4 (2.0%)	9 (1.5%)

Table 2

	or Median (IQR)
Daily smokers	575 (95.8)
Heavy smokers (HSI ≥3)	284 (47.3)
Number of years of smoking, median (IQR)	35 (24–45)
Have a smoker as friend	519 (86.5)
Lives with a smoker	236 (39.3)
Position on readiness-to-quit ladder†	
Pre-contemplation	103 (17.2)
Contemplation	40 (6.7)
Preparation	338 (56.3)
Action*	117 (19.5)
Current motivation to give up smoking, Median (IQR)‡	9 (6.5–10)
Current confidence in giving up smoking, Median (IQR)§	5 (3–8)

*Participants began their quit period once admitted to hospital.
†Have missing values two participants.
‡Have missing values five participants.
§Have missing values six participants.
HSI, Heaviness of Smoking Index.

pharmacological or non-pharmacological support) to assist their quit attempts. More than half (57.5%) had tried at least one form of NRT; one in five participants (20.0%) had tried different forms of NRT. Almost one-third (29.3%) had used prescription smoking cessation medications (varenicline or bupropion) to assist quitting; varenicline was the most frequently used (24.4%). Hypnotherapy (17.6%) was the most commonly tried non-pharmacological method, followed by contacting Quitline (13.2%).

Among users of NRT (n=222), patches were the most used form. Of the 75 participants who provided information about the duration of NRT usage (nicotine patch), over 80% (n=61) used them for less than 4 weeks, and 56% (n=42) reported using them for 1 week or less. Only 14.7% (n=11) used NRT for the recommended duration of 8 weeks or more. Different methods used to assist quitting are presented in table 4.

Table 3

rticipants experiencing difficulties*	311 (80.6)
Urge to smoke	229 (59.3)
Irritability/aggression	201 (52.1)
Restlessness	183 (47.4)
Increased appetite	155 (40.2)
Nighttime awakenings	126 (32.6)
Depression	101 (26.2)
Poor concentration	91 (23.6)
Mouth ulcers	23 (6.0)
Anxiety	7 (1.8)
Weight gain	5 (1.3)
Night sweats	3 (0.8)
Others	24 (6.3)

*Some experienced more than one difficulty.

Table 4

cement therapy	222 (57.5)
Patch	196 (50.8)
Gum	75 (19.4)
Lozenge	27 (7.0)
Inhaler	24 (6.2)
Sublingual tablet	19 (4.9)
Prescription medication	113 (29.3)
Varenicline	94 (24.4)
Bupropion	31 (8.0)
Non-pharmacological treatment	
Hypnotherapy	68 (17.6)
Quitline	51 (13.2)
Acupuncture	22 (5.7)
Counselling	18 (4.7)
e-cigarette	17 (4.4)
DVD or books	15 (3.9)
Online programme	7 (1.8)
Quit smoking group	7 (1.8)
Other methods	16 (4.1)

*Some participants used more than one method in their past quit attempts.

Motives and preferences for a future quit attempt

More than half the participants (58.5%) believed that medication would assist them to quit; the most cited

Table 5

therapy	322 (53.7)
Varenicline	186 (31.0)
Bupropion	159 (26.5)
Cash incentive	268 (44.7)
Hypnotherapy	251 (41.8)
Personal contact with healthcare provider	207 (34.5)
Acupuncture	179 (29.8)
Increasing prices of cigarettes	169 (28.2)
Counselling	159 (26.5)
Information on amount of nicotine in body	158 (26.3)
Smoking cessation group	123 (20.5)
Quitline	110 (18.3)
Health benefit	74 (12.3)
Plain packaging of cigarettes	41 (6.8)
Others	73 (12.2)

Some participants reported multiple motives/preferences for a future quit attempt.
*Data missing for two participants.

Table 6

			Value	OR (95% CI)
Sex				
Female	133 (61.6%)	83 (38.4%)		
Male	218 (56.8%)	166 (43.2%)	0.201	0.80 (0.57 to 1.13)
Age (years)				
≤51	178 (59.1%)	123 (40.9%)		
>51	173 (57.9%)	126 (42.1%)	0.751	0.95 (0.69 to 1.31)
Nicotine dependence				
Light smokers	173 (54.7%)	143 (45.3%)		
Heavy smokers	178 (62.7%)	106 (37.3%)	0.049	1.39 (1.001 to 1.93)
Education				
No education or below year 12	241 (62.3%)	146 (37.7%)		
Above year 12 or technical education	110 (51.6%)	103 (48.4%)	0.012	0.65 (0.46 to 0.91)
Previous use of medication				
No	191 (54.4%)	160 (66.4%)		
Yes	160 (64.3%)	89 (45.6%)	0.016	1.51 (1.08 to 2.10)
Previous withdrawal symptoms				
No	34 (47.9%)	37 (52.1%)		
Yes	183 (58.8%)	128 (41.2%)	0.094	1.56 (0.93 to 2.61)

*Nicotine replacement therapy, bupropion or varenicline.

medication was NRT (table 5). Nearly half the participants were interested in cash incentives. Hypnotherapy and acupuncture were also popular options.

Almost two-thirds of past NRT users and 42% of non-NRT medication (bupropion, varenicline) users were interested in reusing those medications in their future quit attempts. Previous quitting failures, number of medications on admission, Charlson's index score or current motivation to quit smoking were not associated with interest in using smoking cessation medications for a future quit attempt (data not shown). Likewise, age, sex and previous withdrawal symptoms were not associated with preferences in using medications for a future quit attempt. Interest in using medications for a future quit attempt of various subgroups is presented in table 6. In a multivariable model, only previous use of smoking cessation medication (OR 2.21; CI 1.43 to 3.42; p<0.001) was independently associated with interest in using medications for a future quit attempt.

Significantly higher proportions of women compared with men reported interest in using hypnotherapy (48.1% vs 38.5%, p=0.023), acupuncture (35.0% vs 27.1%, p=0.042), Quitline (25.2% vs 14.6%, p=0.001), and having personal contact with a healthcare provider (40.7% vs 31.3%, p=0.02) for a future quit attempt. Likewise, a higher proportion of younger smokers (≤51 years) compared with older smokers (>51 years) were interested in hypnotherapy (48.3% vs 35.6%, p=0.002), acupuncture (36.7% vs 23.2%, p<0.001), and cash incentives (51.7% vs 37.9%, p=0.001) for a future quit attempt.

The most widely selected strategy to give up smoking was 'quit with the help of medicines' (49.5%), followed by 'cold turkey' (33.5%), and 'reduce gradually' (13.3%). Nicotine patches (54.2%) were the preferred form to assist quitting, followed by tablets (45.0%), inhalers (40.8%), lozenges (34.7%), electronic 'cigarettes' (e-cigarette) (32.3%), chewing gum (27.0%) and sublingual tablets (23.0%).

DISCUSSION

This paper describes the baseline characteristics of a diverse sample of hospitalised smokers enrolled in a multicentre RCT of a smoking cessation intervention. Almost two-thirds of our study population were male. The majority of participants had high motivation to quit, despite failing in their past quit attempts, and experiencing various withdrawal symptoms. Most smokers in this study were interested in using some form of smoking cessation support in a future quit attempt. Previous use of smoking cessation medication use was the only factor independently associated with interest in using medications for a future quit attempt.

Hospitalisation is an ideal opportunity for health professionals to assist people to quit smoking. Previous studies have reported high motivation among inpatients to quit smoking.[3 18] These motivated smokers may be more receptive to smoking cessation messages and more likely to quit than their counterparts. A hospitalised smoker will be under the care of multiple health professionals who could provide quitting assistance. According to a survey of past smokers, being asked about smoking by two or more types of health professionals substantially increased the odds of quitting and readiness to quit.[19] When patients are in hospital, health professionals can make use of the opportunity to offer pharmacotherapy and/or non-pharmacotherapy cessation modalities. The smoke-free policies of hospitals should include cessation support to every patient. Smoking cessation support services should be included in the designated duties of health professionals.

More than half of our participants wanted to try medications in their future attempts to quit. This included past users of NRT and non-NRT medications. A previous study conducted in emergency departments also reported similar magnitude of interest in medications to assist in future quit attempts.[20] However, one-third of our study participants wanted to quit 'cold turkey', without any aids. Although two-thirds to three-quarters of ex-smokers eventually stop unaided, this is associated with some of the lowest success rates.[9 21] The clinical practice guidelines for treating tobacco use and dependence recommend offering counselling and medication to all smokers willing to quit, as this combination can double the chances of quitting.[4] Even though many of our study participants had used medications during their previous quit attempts, only a few used them for the recommended duration. Moreover, the majority experienced difficulties or withdrawal symptoms during their past quit attempts, and more than half experienced side effects from medications. Consistent with a previous report,[22] most participants reported relapsing within 1 week of their most recent quit attempt. These highlight the importance of coupling pharmacotherapy with counselling and behavioural strategies for dealing with withdrawal symptoms. Within the hospital setting, behavioural counselling could be offered opportunistically by health professionals, trained smoking cessation counsellors, or through referral to other services such as the telephone Quitline. Patients can also be closely monitored for any side effects from smoking cessation medications.

Complementary and alternative therapies such as hypnotherapy and acupuncture are yet to prove their efficacy[23 24] in smoking cessation, but were popular smoking cessation methods especially among women and younger participants. Almost 18% of participants reported using hypnotherapy in the past, and 42% were interested to use it in their future quit attempts. There is insufficient evidence to recommend hypnotherapy as a smoking cessation treatment.[23] Similarly only a small proportion had used acupuncture in past attempts, but a larger proportion was interested to use this in their future quit attempts. The effectiveness of acupuncture is inconclusive and likely to be less than nicotine gum.[24] Despite the proven effectiveness of brief-intensive counselling,[5] only about one-quarter of participants were interested in counselling. A substantial proportion of participants were interested in personal contact with healthcare providers, information about the amount of nicotine in the body, and joining smoking cessation groups. The benefits of evidence-based treatments need to be reinforced to patients.

Interest in the use of e-cigarettes to help the quitting process is increasing.[25] Although less than 5% of our sample reported using e-cigarettes in their previous quit attempts, almost one-third reported an interest in using e-cigarettes in their future attempts. A recent study comparing the effectiveness of e-cigarettes and nicotine patches found similar abstinence rates at 6 months.[26] However, the role of e-cigarettes in tobacco control is uncertain, especially in countries such as Australia where retailing of e-cigarettes is prohibited.[27] In the UK and European Union, their use is being regulated[28] partly due to an increase in their uptake among non-smoking adolescents.[29] Long-term safety data are still emerging. Further evidence is required before promoting e-cigarettes for smoking cessation.

Many participants believed that increasing the price of cigarettes would motivate them to quit. Increasing prices is recognised as the most effective way to control tobacco consumption.[30] In Europe, a 5–7% decrease of cigarette consumption was observed with a 10% increase in the price of cigarettes.[31] Similar trends have been observed in Australia[32] and the USA.[33] Nearly half of the smokers were interested in cash incentives. Even though a large RCT confirmed the long-term effectiveness of incentives in smoking cessation,[34] more research is required before its adoption into routine clinical practice, as these interventions may work only in certain situations.[35]

Findings from our study suggest that smokers have different preferences, and many of them are interested in assistance with their future quit attempts. Individually tailoring interventions to match smokers' needs and preferences may enhance treatment outcomes.[11] Healthcare providers should consider the experiences of smokers in past quit attempts, discuss available options to assist quitting, and consider patient preferences before recommending a therapy. There is a clear need for patient education regarding evidence-based treatments, and the implications of using unproven treatments should also be explained.

To the best of our knowledge, this is the first, large-scale, multicentre study assessing previous quitting experiences, and motives and preferences for a future quit attempt among hospitalised smokers. However, the study has some limitations. These results should be interpreted with some caution as the study participation rate was less than 50% and the sample may not represent all hospitalised smokers. Smokers with acute psychiatric conditions, or who were critically ill, were excluded from the study. The rate of self-reported quit attempts in the previous 12 months in our cohort was more than double the national average of 29%.[36] This may be due to participation bias, as the study sample might have had a greater interest in quitting. Our participants rated highly on the readiness-to-quit ladder, and reported high motivation to quit. Also, many of them were admitted for cardiorespiratory disorders for which smoking is a major risk factor, which may have increased their motivation to quit. Of the 802 patients who declined to participate in the study, 284 declined because they were not interested in quitting, suggesting low motivation among these patients. Our results, therefore, may not be generalisable to smokers disinterested in quitting. However, interest in quitting was not an eligibility criterion for our study. Moreover, 103 of the 600 participants were in the

precontemplation stage and had not yet decided whether they wanted to quit smoking. It is also possible that there was a degree of social desirability bias among participants given all the data were collected by self-report. Inaccuracies in some measures may also have occurred due to recall bias. However, data were collected by trained research assistants who were not involved in the care of participants, and attempts were made to use well-constructed and validated self-report items.

CONCLUSION

The majority of hospitalised smokers had attempted quitting in the previous 12 months. NRT was a popular cessation treatment prior to hospitalisation, although it was frequently not used as recommended. High motivation, but modest confidence to quit among smokers and a history of withdrawal symptoms and side effects from smoking cessation medications during past quit attempts, suggests the need for greater support for hospitalised smokers interested in quitting. This reinforces the importance of appropriate use of smoking cessation aids and assistance from suitably trained health professionals at the time of initiating smoking cessation medications and in their ongoing monitoring. Screening the smoking status of all patients, initiation of appropriate smoking cessation intervention and adequate post-discharge follow-up should be integrated into routine clinical practice at hospitals implementing a 'smoke-free' policy.

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Chapter 5
Integrating smoking cessation into routine care in hospitals (GIVE UP FOR GOOD trial)
Trial results

5:1 Preface

Having described the study protocol (Chapter 3) and baseline data (Chapter 4) in previous chapters, this chapter presents the key findings of the GIVE UP FOR GOOD study.

5:2 Publication

Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole S, Paul E ,Weeks GR, Dooley MJ, George J. Integrating smoking cessation into routine care in hospitals - a randomised clinical trial. *Addiction* 2015:111(4):714-23.

5: 3 Appendices

Appendix 5: Study intervention guide

Appendix 6: Topics covered: Smoking Cessation Facilitators Course

Declaration for Thesis Chapter 5

Declaration by candidate

In the case of Chapter 5, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Reviewed literature; coordinated conduct of the study; involved in the data management; performed analysis; and prepared manuscript	60%

The following co-authors contributed to the work as follows:

Author name	Nature of contribution
Dr Johnson George	Assisted in study conduct; data management; and reviewed manuscript
Prof Michael Abramson	Assisted in study conduct; interpretation of analysis; and reviewed manuscript
Prof Billie Bonevski	Assisted in study conduct and reviewed manuscript
Dr Simone Taylor	Coordinated data collection and reviewed manuscript
Ms Susan Poole	Coordinated data collection and reviewed manuscript
Mr Eldho Paul	Assisted in data analysis
Dr Gregory Weeks	Coordinated data collection and reviewed manuscript
Prof Michael Dooley	Reviewed manuscript

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work.

Candidate signature	[redacted]	Date 14/03/2016
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ADDICTION

Integrating smoking cessation into routine care in hospitals—a randomized controlled trial

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ABSTRACT

Aims To evaluate the effectiveness of a pharmacist-led multi-component smoking cessation programme (GIVE UP FOR GOOD) compared with usual care in hospitalized smokers. **Design** Randomized, assessor-blinded, parallel-group trial. **Setting** Three tertiary public hospitals in Australia. **Participants** A total of 600 adult in-patient smokers [mean ± standard deviation (SD), age 51 ± 14 years; 64% male] available for 12 months follow-up. **Interventions** Multi-component hospital pharmacist-led behavioural counselling and/or pharmacotherapy provided during hospital stay, on discharge and 1 month post-discharge, with further support involving community health professionals (n = 300). Usual care comprised routine care provided by hospitals (n = 300). **Measurements** Two primary end-points were tested using intention-to-treat analysis: carbon monoxide (CO)-validated 1-month sustained abstinence at 6-month follow-up and verified 6-month sustained abstinence at 12-month follow-up. Smoking status and pharmacotherapy usage were assessed at baseline, discharge, 1, 6 and 12 months. **Findings** Sustained abstinence rates for intervention and control groups were not significantly different at both 6 months [11.6% (34 of 294) versus 12.6% (37 of 294); odds ratio (OR) = 0.91, 95% confidence interval (CI) = 0.55–1.50] and 12 months [11.6% (34 of 292) versus 11.2% (33 of 294); OR = 1.04, 95% CI = 0.63–1.73]. Secondary end-points, self-reported continuous abstinence at 6 and 12 months, also agreed with the primary end-points. Use of pharmacotherapy was higher in the intervention group, both during hospital stay [52.3% (157 of 300) versus 42.7% (128 of 300); P = 0.016] and after discharge [59.6% (174 of 292) versus 43.5% (128 of 294); $P < 0.001$]. **Conclusions** A pharmacist-led multi-component smoking cessation intervention provided during hospital stay did not improve sustained abstinence rates at either 6 or 12 months compared with routine hospital care.

Keywords Hospitals, pharmacists, randomized controlled trial, smoking cessation.

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INTRODUCTION

Hospitalization provides an ideal opportunity for health-care providers to assist smokers to quit. Guidelines in various countries, including Australia, recommend offering tobacco cessation treatments at every clinical encounter [1–3]. Hospital admission, especially for a smoking-related disease, may boost patients' motivation to quit and receptivity to tobacco-cessation messages [4,5]. Temporary abstinence enforced by smoke-free hospital policies and the break in routines that occurs with a hospital stay may aid cessation efforts. Moreover, many smokers are interested in starting a smoking cessation programme while in hospital [6]. High-intensity behavioural interventions that began during a hospital stay and included at least 1 month of relapse prevention strategies increased cessation rates 1.37-fold at 6–12 months after discharge (abstinence rate ranges were 8–70% for high-intensity interventions and 5–53% for controls) [7].

Despite the guidelines [1–3] for treating tobacco use in in-patient smokers and evidence to support behavioural interventions, low levels of smoking cessation support are provided in hospitals [6,8,9]. The interventions, which have proven efficacy in clinical trials, have not been translated adequately into routine clinical practice. To date, smoking cessation interventions in hospitals have been

sporadic, delivered primarily by physicians, nurses or counsellors [7] and many barriers limit implementation in the in-patient setting [10]. Efforts to integrate tobacco dependence treatment into routine in-patient care require a systems-level approach [1]. Having a dedicated and trained health professional for screening, documenting and providing smoking cessation support may be effective [1].

Hospital pharmacists are an integral part of the clinical care team in many developed countries, including Australia [11,12], and provide pharmaceutical care [13] to in-patients, including bedside counselling. Practice standards mention specifically the importance of hospital pharmacist participation in the design, planning and implementation of health education programmes such as smoking cessation [12,14]. Pharmacists have a good understanding of the mechanisms of nicotine addiction, effects of nicotine withdrawal, nicotine replacement therapy (NRT) and other pharmacotherapies, and the impact of smoking cessation on current medications and health conditions [15]. Pharmacist-delivered smoking cessation interventions are effective in both hospital out-patients and community pharmacies [16,17], but no studies have evaluated the effectiveness of pharmacist-led multi-component smoking cessation care for in-patients.

Developing and evaluating an effective, pragmatic and sustainable intervention that can be integrated into routine care, using the limited health-care resources to provide support to all smokers during the hospital stay and after discharge, is central to improving smoking cessation rates. This study evaluated the effectiveness of a pharmacist-led multi-component smoking cessation programme (GIVE UP FOR GOOD) in three public hospitals in Australia. Specifically, the study aimed to assess two primary end-points: (1) biochemically verified 1-month sustained abstinence at 6-month follow-up; and (2) biochemically verified 6-month sustained abstinence at 12-month follow-up. The secondary objectives were: (a) self-reported continuous abstinence at 1-, 6- and 12-month follow-up; (b) the proportion of participants reducing cigarette consumption by 50%; (c) the use of smoking cessation treatments after discharge; and (d) patient satisfaction of smoking cessation services received during the hospital stay.

METHODS

Study design and participants

This parallel-group, single-blinded, randomized controlled trial was conducted between April 2012 and June 2014 at three tertiary hospitals (The Alfred, Austin Health and Barwon Health) in Australia. Ethics committees of all participating hospitals and Monash University reviewed and approved the study in accordance with the National Statement on Ethical Conduct of Human Research [18]. The detailed protocol is available elsewhere [19]. All adult patients who self-reported current smoking at the time of hospitalization (at least one cigarette in the previous week) and available for 12-month follow-up were eligible to participate. Patients with physical or mental inability to participate, unable to communicate in English or provide written informed consent, with a terminal illness, pregnant or already receiving smoking cessation therapy at the time of admission, were excluded. Patients from all wards were eligible, irrespective of the reason for admission. Potential participants were identified from the hospital records by a trained research assistant (RA) or referred by the ward staff. The RA subsequently approached each patient at the bedside, confirmed eligibility and obtained written informed consent.

Randomization and blinding

Following baseline data collection by the RA, participants were randomized by the study pharmacist at each hospital to a study arm using a computer-generated block randomization list created by an independent statistician at a 1 : 1 ratio. Random block sizes of four and eight were used to avoid the predictability of treatment allocation. Participants were stratified by nicotine dependence (included as a factor in the randomization) using the Heaviness of Smoking Index (HSI) to ensure equal distribution of heavy (HSI score ≥ 4) and light smokers (≤ 3) between groups, as the intervention might act differently among these subgroups [20]. Treatment allocations concealed in sequentially numbered sealed envelopes within corresponding stratum were opened by the pharmacist at each hospital on enrolment of each smoker into the trial. The RAs responsible for data collection used the unique study ID and had no knowledge of group allocation.

Usual care

Participants randomized to the usual care group received the routine smoking cessation support provided by each hospital. All participating hospitals had adopted the state-wide 'smoke-free' policy which prohibited smoking within hospital grounds and buildings. The policy recommended free smoking cessation medications available to all patients during their hospital stay, which was not always offered systematically to all in-patient smokers. Patients interested in receiving pharmacological cessation support had the opportunity to choose from a range of NRTs (patch, gum, lozenge, microtab, mouth spray or inhaler) and non-NRT prescription medications (bupropion or varenicline). Ward pharmacists and nurses at each hospital had authority to recommend/initiate NRT products. Brief counselling was also provided in some wards/units at staff discretion. A subsidized (with a co-payment) supply of nicotine patches, bupropion or varenicline for 28 days on discharge was

available through the Pharmaceutical Benefits Scheme (PBS) [21] to those eligible [22] and interested. Usual care at each hospital is summarized in the Supporting information, Table S1.

Intervention

The conceptual framework for the multi-component intervention was based on the system-change approach of Fiore *et al.* [23], and comprised the following:

- Staff training: two pharmacists at each hospital completed a 2-day smoking cessation training programme for health professionals. They also attended update sessions conducted at approximately 6-month intervals.
- Behavioural counselling: participants randomized to the intervention received a series of smoking cessation counselling sessions by a study pharmacist who followed a study intervention guide (Supporting information, text S1) based on the 5As framework [1]. The intervention comprised best-evidence smoking cessation treatments incorporating both behavioural counselling and pharmacotherapy [24,25]. At least three sessions were provided to each participant: during the hospital stay, on or immediately after discharge and 1 month post-discharge.
- Pharmacotherapy: all intervention participants were encouraged to use pharmacotherapy. Those interested received a free course during hospital stay and for at least 1 week after discharge (regardless of their PBS eligibility). Participants eligible for PBS subsidy were offered a free supply of pharmacotherapy (nicotine patch, bupropion or varenicline) for up to 28 days from discharge (i.e. the patient copayment was waived).
- Educational resources: participants were also provided with printed materials, such as the QUIT brochures [26] and information on NRT [26].
- Referral to specialized smoking cessation services: those interested were referred to telephone Quitline [27] services for additional and ongoing support.
- Ongoing support beyond 1 month: if participants consented, smoking treatment summaries and discharge plans were sent to their general practitioners (GP) and community pharmacists with instructions regarding post-discharge smoking cessation support. Community pharmacists and GPs were not trained or incentivized for providing smoking cessation support.

During the first session of behavioural counselling (face-to-face at hospital) the study pharmacist reviewed participants' medical and medication history, tobacco use behaviour and previous quit attempts and outcomes. Smoking triggers, likes and dislikes, difficulties with quitting and preferred strategies for quitting were also explored. The pharmacist discussed with each participant the available options for quitting, including cognitive behavioural strategies and different forms of pharmacotherapy. Motivational interviewing techniques alone were used for those not interested in quitting.

The second session was conducted either face-to-face in hospital, or via telephone or e-mail if participants were discharged before this session. The pharmacist reinforced the importance of quitting and discussed relapse prevention strategies with those who had already quit smoking.

The third session (telephone/e-mail) was conducted approximately 4 weeks after discharge. It emphasized the importance of long-term abstinence and reminded those who had not been reviewed by their primary health professionals after discharge to seek ongoing smoking cessation support.

Study pharmacists maintained a record of intervention delivery which included participants' smoking behaviour, previous quit attempts and outcomes, smoking triggers, likes and dislike, preferences for a future quit attempt, details of the intervention provided, future plans and time spent for each session.

Follow-ups

Participants were followed-up within 48 hours after discharge and at 1, 6 and 12 months post-discharge. All follow-up assessments were conducted via telephone by an RA blinded to the treatment allocation. The RA conducting follow-up assessments adhered to a protocol which instructed participants at the outset of each interview to not discuss treatment allocations or intensity of services received during hospital stay. Several attempts were made to contact participants at 6 and 12 months, after which a postal survey was sent.

Measures and assessments

Baseline data were collected by the RAs using a pre-tested structured case record form which incorporated validated scales. Demographic data included age, sex, country of birth, education, employment, marital status, income and living arrangements. Smoking data were collected, such as age at which smoking started, previous quit attempts and outcomes and nicotine dependence (using the two-item HSI; scores ranged from 0 to 6, with ≤ 3 indicating 'light smokers' and ≥ 4 indicating 'heavy smokers') [28], self-efficacy (using the nine-item smoking self-efficacy scale; scores ranged from 9 to 45 and a higher score indicated greater temptation) [29], current motivation and confidence in giving up smoking (on a 1–10 visual analogue scale, with one being 'very low' and 10 being 'very high') and smoking habits of friends/housemates and position on the readiness-to-quit ladder (10 response options from 'decided to continue smoking' to 'already quit smoking') [30]. In addition, data were collected on the reason for hospital admission, comorbidities (using Charlson's

comorbidity index with 19 clinical conditions; higher score indicated greater risk of death from comorbid conditions) [31], depression (using the two-item patient health questionnaire; scores ranged from 0 to 6; higher scores indicating higher likelihood of depression) [32] and quality of life [using 8-item Short Form Health Survey (SF-8) with physical health and mental health domains; higher scores indicated better health] [33]. The use of pharmacotherapy during hospital stay and any subsequent admissions were obtained from hospital notes.

Outcome measures

The primary outcomes were carbon monoxide (CO)-validated 1-month sustained abstinence at 6 months post-discharge and CO-validated 6-month sustained abstinence at 12 months post-discharge. Participants who self-reported smoking up to five cigarettes during the abstinence period were also eligible for the CO breath test if they had not smoked a puff during the 7 days prior to the 6-month follow-up or 30 days prior to the 12-month follow-up. CO levels were measured by RAs using a hand-held piCO +Smokerlyzer (Bedfont Scientific, Maidstone, Kent, UK) [34] during a hospital or home visit. A participant with CO $\leq$ 6 parts per million (p.p.m.) was considered abstinent. Participants received no reimbursement or remuneration for completing the test. Secondary outcomes were self-reported continuous abstinence at 1, 6 and 12 months (i.e. not smoking even a puff between baseline and a follow-up point). Other outcome measures included proportion of participants reducing tobacco smoking by 50%, use of pharmacotherapy or other cessation treatments after discharge and participants' satisfaction about the smoking cessation services received during the hospital stay (assessed using a five-point scale from 'very dissatisfied' to 'very satisfied').

As recommended by the Russell Standard [35], all randomized patients were accounted for in the analysis [intention-to-treat (ITT) population]. Patients with missing outcomes at follow-up or whose self-reported abstinence was not validated biochemically were counted as smokers. Deceased participants were excluded from effectiveness analyses.

Process evaluation

Data on intervention delivery (number of participants who received each session of intervention and time spent for each session) were collected from intervention records. The use of pharmacotherapy and other cessation treatments were captured at each follow-up interview. Support from community health professionals and information about Quitline usage were obtained at the final follow-up interview.

Statistical analysis

Previous studies have reported 28% abstinence rates where trained pharmacists offered cessation assistance in conjunction with pharmacotherapy, whereas in the control group it ranged between 8 and 12% [17,36]. A sample size of 500 participants would have 95% power to detect a 13% difference (25% in the intervention group versus 12% in usual care) at an alpha level of 0.05. Allowing approximately 17% attrition, 600 smokers were recruited. To consider the intervention to be effective both primary end-points should be met, and analyses were carried out at an alpha level of 0.05. Data were entered initially into a local database at each hospital with regular auditing and then transferred to a database at Monash University for analysis.

Logistic regression analyses were used to examine the effectiveness of intervention on both primary outcomes, after determining no evidence of heterogeneity between hospitals using a random-effects meta-analysis. A per-protocol analysis was also carried out for both primary outcomes, in which participants with major protocol violations (withdrawals, lost to follow-up and unavailable for CO tests) were excluded. The effect of intervention on sustained abstinence at 12 months was also tested in pre-specified subgroups (per hospital, heavy versus light smokers, motivated versus unmotivated smokers and men versus women), using models fitted for each subgroup containing the main effects for intervention and subgroup and an interaction between them. Post-estimation commands were used to assess the effect of intervention in each of the selected subgroups. To account for the large number of comparisons made, a reduced two-sided *P*-value of 0.01 was used in these subgroup analyses.

Analyses were conducted using the Statistical Package for Social Sciences (SPSS), version 20.0 (IBM, Armonk, NY, USA) or Stata version 11 (StataCorp, College Station, TX, USA).

RESULTS

Characteristics of participants

A total of 600 participants [mean (±SD) age 51±14 years; 64% male] were recruited from three hospitals, 200 smokers from each (100 intervention and 100 control). Almost two-thirds had tried quitting in the previous year. Participants reported high motivation and modest confidence to quit smoking (Table 1).

Figure 1 shows the flow of participants through the trial. Nearly half the eligible patients declined to participate. The most common reasons reported were lack of interest in quitting or in the study, wanted to quit without help or being too busy. The overall retention rates at 6 and 12 months post-discharge were 74 and 72%, respectively, with no imbalance in dropouts between groups. Fourteen participants, eight in the intervention

Table 1 Baseline characteristics of participants by treatment groups.

	Intervention arm	*Usual care arm*
	Number (%)	*Number (%)*
	n = 300	*n = 300*
Age in years mean (± SD)	49.9 ± 13.6	52.2 ± 14.5*
Male	191 (63.7%)	193 (64.3%)
Born in Australia	246 (82.0%)	235 (78.3%)
Education below year 12	190 (63.3%)	197 (65.7%)
Employed: full/part-time	135 (45.0%)	143 (47.7%)
Married/*de-facto*/engaged	139 (46.3%)	125 (41.7%)
Current living arrangements		
Family household	207 (69.0%)	192 (64.0%)
Lone person household	70 (23.3%)	85 (28.3%)
Group household	19 (6.3%)	18 (6.0%)
Residential facility	4 (1.3%)	5 (1.7%)
Average annual household income		
AU$29 999 or less	104 (34.7%)	113 (37.7%)
AU$30 000–59 999	59 (19.7%)	46 (15.3%)
AU$60 000+	55 (18.3%)	64 (21.3%)
Not disclosed	82 (27.3%)	77 (25.7%)
SF-8 mean (± SD)[a]		
Physical health component	36.45 ± 12.29	36.78 ± 11.91
Mental health component	40.97 ± 13.75	40.82 ± 12.85
Charlson's comorbidity index, median (IQR)	1 (0, 2)	1 (0, 2)
Depression score, median (IQR)[b]	2 (0, 4)	1.5 (0, 3)
Reason for hospital admission		
Cardiovascular disorder	64 (21.3%)	71 (23.7%)
Respiratory disorder	43 (14.3%)	32 (10.7%)
Musculoskeletal disorders	40 (13.3%)	57 (19.0%)
Digestive system disorders	32 (10.7%)	35 (11.7%)
Nervous system disorders	38 (12.7%)	27 (9.0%)
Tobacco use		
Age smoking started, median (IQR)	15 (14, 18)	15 (13, 18)
Number of years of smoking, mean (SD)	33.6 ± 13.9	35.6 ± 14.8
At least 1 quit attempt in the past 12 months[c]	189 (63.2%)	197 (65.7%)
Lives with other smokers	123 (41.0%)	113 (37.7%)
Have a smoker as friend	261 (87.0%)	258 (86.0%)
Heavy smokers (HSI ≥ 4)	142 (47.3%)	142 (47.3%)
Self-efficacy to quit, mean (SD)[d]	33.0 ± 8.2	33.1 ± 7.5
Motivation to give up smoking, median (IQR)[e]	8 (6.5, 10)	9 (7, 10)
Confidence in giving up smoking, median (IQR)[f]	5 (2, 8)	5 (3, 8)
Position on readiness to quit ladder[g]		
Pre-contemplation stage	53 (17.7%)	50 (16.7%)
Contemplation stage	20 (6.7%)	20 (6.7%)
Preparation stage	172 (57.5%)	166 (55.5%)
Action stage	54 (18.1%)	63 (21.1%)
Hospitalization		
Length of index admission, median days (IQR)	5 (3, 8)	5 (3, 8)
Discharged to home	266 (88.7%)	262 (87.3%)
Subsequent overnight hospital admissions (within 6 months post-discharge)	83 (27.7%)	86 (28.7%)
Total length of overnight admissions, median days (IQR)	5 (2, 14.5)	6 (2, 17)

[a]Nine participants missing; [b]three missing; [c]one missing; [d]32 missing; [e]five missing; [f]six missing; [g]two missing. *$P = 0.047$. HSI = Heaviness of Smoking Index; IQR = interquartile range; SD = standard deviation; SF-8 = 8-item Short Form Health Survey.

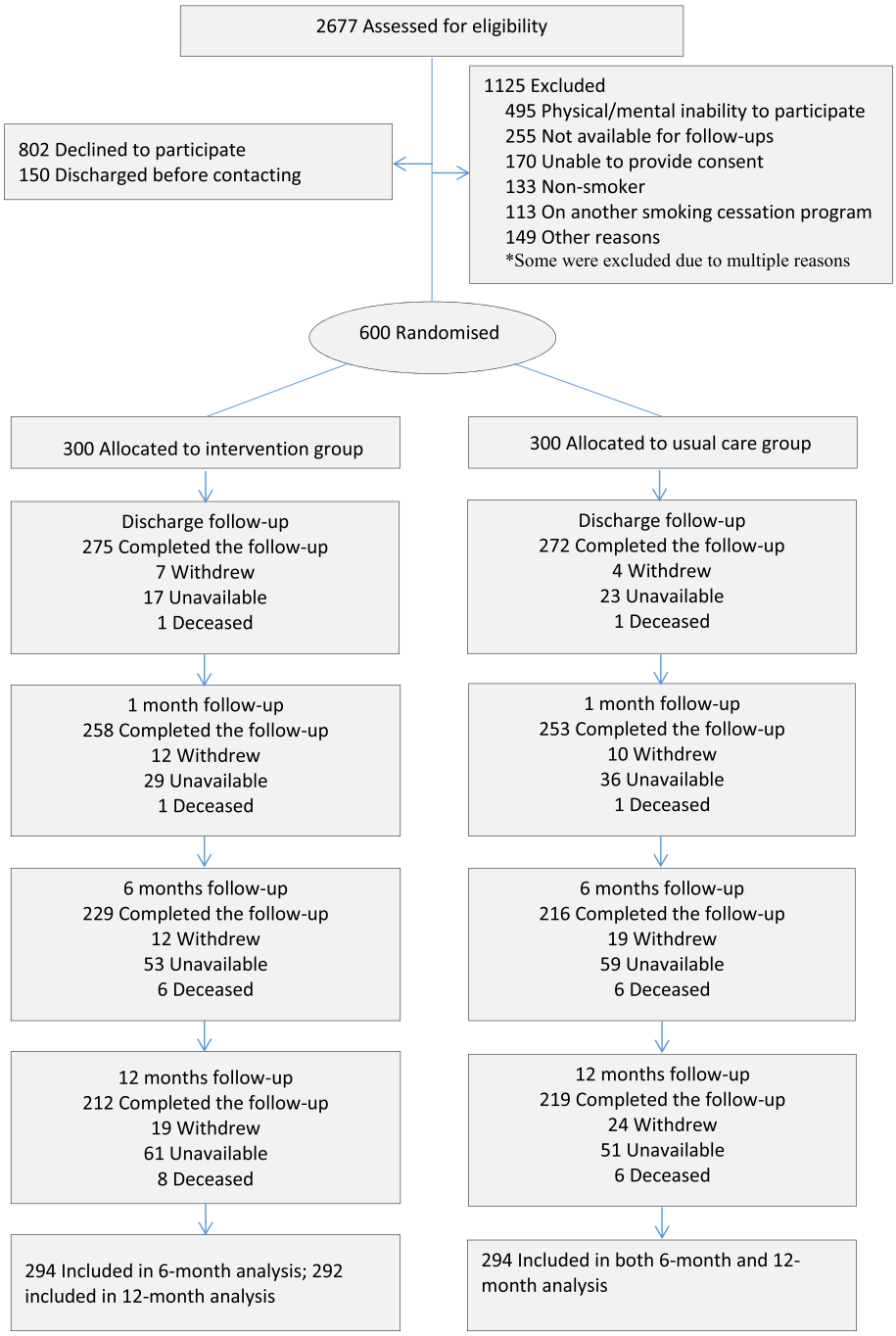

Figure 1 Flow of participants through the study. Withdrawals and deceased are cumulative data. Some participants who were unavailable at a particular visit became available again at a subsequent visit

and six in the usual care arm, died during the course of the study for unrelated reasons.

Outcomes

Cessation rates did not differ between intervention and usual care at 6 (11.6 versus 12.6%) or 12 months (11.6 versus 11.2%). Self-reported continuous abstinence at all follow-up visits were also in agreement with primary end-points (Table 2). A significantly greater proportion of participants in the intervention group reduced daily cigarette consumption by at least 50% at 1 month post-discharge compared to those in the usual care group [73.6 versus 63.2%, odds ratio (OR) 1.62, 95% confidence interval (CI) = 1.11–2.37, $P = 0.012$). However, the differences were not significant at either 6 (54.2 versus 50.5%) or 12 months (50.2 versus 48.4%). A higher proportion of participants in the intervention arm reported 'satisfaction'

Table 2 Tobacco abstinence rates after discharge by treatment groups.

	Intervention arm	*Usual care arm*	*Odds ratio (95% CI)*	*Adjusted odds ratio (95%CI)*[a]
One month sustained abstinence at 6-month follow-up				
Verified abstinence	34/294 (11.6%)	37/294 (12.6%)	0.91 (0.55–1.50)	1.01 (0.60–1.71)
Self-reported abstinence	66/294 (22.4%)	50/294 (17.0%)	1.41 (0.94–2.13)	1.68 (1.08–2.63)
Per-protocol analysis[b]	34/201 (16.9%)	37/203 (18.2%)	0.91 (0.55–1.53)	1.12 (0.64–1.96)
Six months sustained abstinence at 12-month follow-up				
Verified abstinence	34/292 (11.6%)	33/294 (11.2%)	1.04 (0.63–1.73)	1.13 (0.66–1.93)
Self-reported abstinence	46/292 (18.8%)	43/294 (14.6%)	1.09 (0.70–1.71)	1.23 (0.76–1.98)
Per-protocol analysis	34/201 (16.9%)	33/210 (15.7%)	1.09 (0.64–1.89)	1.27 (0.70–2.29)
Secondary end-points: self-reported continuous abstinence				
1 month	86/299 (28.8%)	70/299 (23.4%)	1.32 (0.92–1.91)	1.56 (1.05–2.33)
6 months	50/294 (17.0%)	41/294 (13.9%)	1.26 (0.81–1.98)	1.47 (0.91–2.39)
12 months	38/292 (13.0%)	36/294 (12.2%)	1.07 (0.66–1.75)	1.21 (0.72–2.03)

Deceased participants at each time-point were excluded from those specific analyses (two participants at 1 month, 12 participants at 6 months and 14 participants at 12 months).[a]Adjusted for baseline age, sex, motivation to quit smoking, living with other smokers, presence of depression and cardiovascular diseases.[b]Per-protocol analysis excluding all lost to follow-ups and missing carbon monoxide (CO) values. CI = confidence interval.

or 'very high satisfaction' with the services they received during their hospital stay (244 of 275; 88.7% versus 196 of 272; 72.1%, $P < 0.001$).

Subgroup analyses

Subgroup analyses stratified by hospital, HSI, motivation to quit smoking and sex showed no significant differences in verified 6-month sustained abstinence at 12-month follow-up (Supporting information, Table S2).

Process evaluation

Almost all (n = 294 of 300) intervention participants received at least one session of intervention and the majority (n = 238 of 300) received all three sessions. The median time spent by the pharmacist for the first session was 30 [interquartile range (IQR) = 20–35] minutes. For the second and third sessions, it was 5 minutes each (IQR = 5–10).

Use of smoking cessation pharmacotherapy after hospital discharge was significantly higher in the intervention group [59.6% (174 of 292) versus 43.5% (128 of 294); $P < 0.001$] (Table 3). During the index hospital stay, 52.3% (157 of 300) of intervention and 42.7% (128 of 300) of usual care participants used pharmacotherapy ($P = 0.016$). A significantly higher proportion of intervention participants were also discharged on pharmacotherapy [48.3% (145 of 300) versus 30.0% (90 of 300), $P < 0.001$]. The support from a general practitioner [20.8% (44 of 212) versus 23.3% (51 of 219)], community pharmacist [3.3% (seven of 212) versus 4.6% (10 of 219)] and use of Quitline [4.2% (nine of 212) versus 6.8% (15 of 219)] was similar in both groups during the course of study.

DISCUSSION

This study assessed the effectiveness of a hospital pharmacist-led multi-component smoking cessation programme which included behavioural counselling and pharmacotherapy, with 1-month post-discharge telephone support from the pharmacist and potential ongoing support from primary health-care providers. The programme was offered to all smokers regardless of their reason for admission or interest in quitting, and included a wide range of socio-demographic groups to replicate a 'real-world' scenario. However, there was no evidence that the intervention affected smoking cessation rates.

Previous studies have reported varying magnitudes of effect from interventions designed for hospitalized smokers [7]. High-intensity interventions with more than 1-month follow-up support (classified as intensity 4) improved abstinence in a Cochrane meta-analysis [7]. Low-intensity interventions without follow-up support (intensities 1 and 2) or with follow-up supports up to 1 month (intensity 3) did not improve abstinence rates. Our main goal was to develop and evaluate an intervention for in-patient smokers that could be implemented easily and sustainable in routine clinical practice. Hence, our intervention targeted all hospitalized smokers and limited the post-discharge follow-ups to 1 month. To provide cessation support beyond 1 month, we linked patients with community pharmacists and GPs, which is usual practice in Australia. We also tried to connect the participants to Quitline. However, only a minority reported receiving any help from their GP or community pharmacist and using Quitline. Hence, our intervention may not be more effective than intensity 3 interventions. The quit rate observed (11.6%) was lower than observed in the pooled analysis of six intensity 3 studies (14.9%) [7]. A better system to link discharged patients with

Table 3 Self-reported use of smoking cessation treatments.

	Intervention arm	*Usual care arm*	*P-value*
1-month follow-up (n = 598)			
Smoking cessation medication[a]	5 (1.7%)	5 (1.7%)	1.0
Nicotine replacement therapy	129 (43.1%)	86 (28.8%)	< 0.001
Non-pharmacological assistance[b]	26 (8.7%)	16 (5.4%)	0.110
6-month follow-up (cumulative) (n = 588)			
Smoking cessation medication	18 (6.1%)	14 (4.8%)	0.467
Nicotine replacement therapy	158(53.7%)	99 (33.7%)	< 0.001
Non-pharmacological assistance	40 (13.6%)	22 (7.5%)	0.016
12-month follow-up (cumulative) (n = 586)			
Smoking cessation medication	24 (8.2%)	18 (6.1%)	0.325
Nicotine replacement therapy	162 (55.5%)	119(40.5%)	< 0.001
Non-pharmacological assistance	57 (19.5%)	41 (13.9%)	0.071

Deceased participants at each time-point were excluded from those specific analyses (two participants at 1 month, 12 participants at 6 months and 14 participants at 12 months). Participants lost to follow-up or with missing data were counted as no treatment. [a]Smoking cessation medication included bupropion and varenicline; [b]non-pharmacological assistance included acupuncture, hypnotherapy, quit smoking group, etc.

primary health-care providers may improve the follow-up support and cessation outcomes. Training and incentivizing primary health-care providers may also improve the delivery of smoking cessation care.

The null effect observed in this study also can be examined on the basis of evidence from two recent US studies. The first, which included automated calls and a call-back option for additional support after discharge, did not demonstrate a significant improvement in abstinence rate [37]. Like ours, this study enrolled all hospitalized smokers regardless of their intention to quit, and provided support with an in-patient counselling session followed by 1 month of support post-discharge. A subsequent study by the same group targeting only motivated smokers, which extended the automated calls up to 3 months and provided 90 days free supply of pharmacotherapy, demonstrated a significant improvement in cessation rates (26 versus 15%) at 6 months [38]. Even though pharmacotherapy was offered to all our intervention participants, half of them did not take up the offer and those who did used it for only a short period. This suggests that longer-term abstinence requires more intensive pharmacological assistance and a longer duration of follow-up support than was provided.

Although most of our participants received all three sessions of intervention, the time spent on the second and third sessions was less than planned in the protocol [19]. Participant defiance and pharmacists' failure to convince smokers to take up the intervention components might have resulted in this deviation. However, the abstinence rate observed in our control group also was lower than reported in many hospital-based studies, hence the participants may represent a 'hard-to-change' population. The majority of participants had tried quitting in the previous month and had used various types of support, including medications [39]. Although the median motivation to quit smoking was high, confidence was modest. These factors might also have affected the uptake of the intervention and its effectiveness. Findings of our study have to be interpreted in the context of usual care in Australian hospitals. All participating hospitals had a 'smoke-free' policy and all in-patients had free access to smoking cessation medications during their hospital stay. Moreover, many of our participants were admitted for cardiorespiratory disorders where smoking is a risk factor, which also might have influenced their motivation to quit with strong physician endorsement.

This study had some methodological strengths. ITT analyses were used to assess the effect of intervention where participants missing a follow-up were considered to be continuing smokers. Also, self-reported abstinence was verified biochemically. Limitations include that the pharmacists delivering the intervention might have contaminated the usual care group inadvertently due to their involvement in other clinical responsibilities at the hospital. A cluster-randomized trial would have been a better design to avoid such contamination. A mixed-methods process evaluation using qualitative and quantitative methods would have given deeper insight into the null findings. A 'Hawthorne effect' might have affected the tobacco use behaviour of usual care participants. Moreover, pharmacist-led interventions may not be applicable in places where pharmacists are not based in hospitals. Finally, the variations in usual care between participating hospitals might have been another confounding factor; however, there was no statistical heterogeneity observed between hospitals.

Despite failing to confirm the primary end-points, this study identified few challenges associated with implementing a pharmacist-led multi-component smoking cessation programme for in-patients. An intervention focusing on motivated smokers with more active follow-up involving their primary health-care providers, along

with free supply of a full course of pharmacotherapy, may produce more favourable effects.

Declaration of interests

J.G., M.J.A. and B.B. hold an IIR grant from Boehringer-Ingelheim. M.J.A. has undertaken an unrelated consultancy for AstraZeneca. He received an honorarium for speaking at a Novartis Respiratory Symposium, assistance with attendance at the European Respiratory Society Congress from Boehringer-Ingelheim and the World Health Summit from Sanofi. No other disclosures are reported.

Trial registration

Australian and New Zealand Clinical Trial Registry, http://www.anzctr.org.au/ Identifier: ACTRN12612000368831.

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Supporting information

Additional supporting information may be found in the online version of this article at the publisher's web-site:

Table S1 Usual care at each hospital
Table S2 Subgroup analysis of primary outcome at 12 months follow-up
Text S1 Study Intervention Guide
Figure S1 GIVE UP FOR GOOD Algorithm
Figure S2 Counselling algorithm by Hughes et al (2007)
Figure S3 Algorithm for integrating a patient's smoking status and readiness to quit (LeFoll et al 2007)
Table S1 Guide for using the algorithm in Figure 1
Table S2 Pharmacotherapy used for smoking cessation

Additional discussion

This section provides more details regarding the intervention, limitations of the study and the economic evaluation.

Intervention

This study evaluated a pragmatic intervention that could easily be implemented in routine clinical practice, which could be sustained using limited healthcare resources. Hence, the support from the hospital was limited to one month (the minimum duration suggested in the Cochrane review[107]). However, considering the chronic relapsing nature of tobacco addiction, we tried to transfer cessation responsibilities to community health professionals (general practitioners and community pharmacists) and Quitline for providing ongoing support beyond one month.

To ensure the intervention's sustainability, we identified and trained motivated hospital pharmacists to facilitate smoking cessation treatments for inpatient smokers (two pharmacists from each hospital; see appendix six for the topics covered during the two-day smoking cessation facilitators' course conducted by the Lung Health Promotion Centre [LHPC] at The Alfred, Melbourne). All intervention components were provided by the hospital staff and the research personnel were not involved in delivery of the intervention. The pharmacotherapies were also supplied by the hospital.

Limitations of the study

Although the participants were referred to community healthcare providers and Quitline, only a few utilised this opportunity and received any help from them. One of the main problems in transferring responsibilities from a hospital setting to community health

providers is a lack of a proper link (i.e. an established network or partnership) between them, especially between hospitals and community pharmacies. A qualitative study involving health professionals from both primary and tertiary care settings to identify the barriers and facilitators of continuity of care would be beneficial.

Another limitation of the study was the low uptake of intervention components by the study participants. We offered free pharmacotherapy including a range of NRT and non-NRT medications. The intervention pharmacist followed a treatment algorithm (see appendix 5) which included recommendations to commence pharmacotherapy (either monotherapy or combination medicines) based on the participant's history of smoking and previous quitting experiences, and explained the benefits of using medications including varenicline and combination NRTs. However, only half of the participants used any medication at least once. Moreover, very few participants used the most effective pharmacotherapies – varenicline (21 participants in the intervention arm and 17 participants in the control arm) or combination NRTs (27 participants in the intervention arm and 11 participants in the control arm).

Moreover, the average times spent on the second and third counselling sessions were also less than anticipated. As we recruited all smokers irrespective of their motivation to quit, some participants were unmotivated smokers who might not have been interested in receiving counselling sessions or using pharmacotherapy. In a further analysis, we found that motivated smokers were more likely to use pharmacotherapy during and after hospitalisation. Targeting the interventions only to motivated smokers or those who are admitted for a smoking-related disease may help to improve the uptake of intervention components. Smoking cessation is a very complex treatment, especially the behaviour

component of the intervention. Motivational interviewing requires a good amount of skill and practice; hence, a more comprehensive training may improve the delivery of intervention components by the pharmacist. Also, we did not assess the pharmacists' understanding and learning about smoking cessation treatments after completing the training. Furthermore, there was no quality control process for checking the appropriateness of intervention or pharmacotherapy prescribed to participants by an independent expert, even in a random sample. However, all the non-NRT prescriptions were reviewed and discussed with clinicians.

Finally, although the research assistants (RAs) conducting the follow-up interviews followed a protocol which instructed the participants to avoid any discussion about treatment allocations or intensity of services received during their hospital stay or after discharge, disclosure of treatment allocations to the RA during the interview cannot be completely ruled out. However, no such incidence was reported by the RA.

Economic evaluation

An economic evaluation using a Markov model was part of the original study protocol. We therefore collected information such as: professional time (time spent on each intervention), use of pharmacotherapy, materials used and overheads (fax, telephone and print materials) and training costs. However, the null effect of the intervention made an economic evaluation moot.

Supplementary files

Table S1: Usual care at each hospital

Hospital name	Usual care at the time of the study				
	Overview	**Hospital tobacco control policy**	**Staff involvement**	**Pharmacotherapy options for inpatients**	**Support after discharge**
The Alfred	The Alfred is the main provider of health services to people living in the inner south-eastern suburbs of Melbourne and a major provider of state-wide specialist services to the people of Victoria. It provides services in the ambulatory, inpatient, home and community settings, and has around 700 inpatient beds.	It is a 'smoke-free'* hospital. The hospital policy recommends brief intervention advice and free nicotine replacement therapy be provided to all inpatient smokers. The clinical management process was supported by any relevant healthcare professional; however, the primary leadership was the responsibility of pharmacist and they worked in collaboration with medical and nursing staff.	For all inpatients**,** pharmacists asked patients about their smoking status, assessed nicotine dependence, and provided support and management of nicotine withdrawal and smoking cessation attempts. Clinical pharmacists had the ability to prescribe clinically appropriate nicotine replacement therapy (NRT) on satisfactory completion of a credentialing program. Medical officers also prescribed.	NRT products such as patch, gum, inhaler, lozenge, micro tab and mouth spray were available free of charge to all inpatients.	A subsidised supply of smoking cessation medications (NRT products) for 28 days on discharge was available to those who were interested. Pharmaceutical Benefit Scheme (PBS) supply of patches was provided for 28 days plus two repeats to those eligible[#] and interested.

Austin Health	Austin Health is the major provider of tertiary health services in the north eastern suburbs of Melbourne and operates 980 beds across acute, sub-acute, rehabilitation and mental health units.	It is a 'smoke-free'* hospital. The hospital policy recommends support and free smoking cessation medications be provided to all inpatient smokers. However, the policy was not systematically offered to inpatient smokers in all wards.	There was no dedicated health professional providing smoking cessation support for inpatients. Some inpatients on some wards might have received brief counselling from doctors or nurses during their hospital stay. Ward pharmacists and nurses had the authority to initiate NRT products or recommend non-NRT medications.	NRT products (patch, gum, inhaler, lozenge and micro tab) and non-NRT medications (bupropion or varenicline) were available free of charge to all inpatients.	A subsidised supply of nicotine patch, bupropion or varenicline for 28 days on discharge was available through the PBS to those eligible[#] and interested.
Barwon Health	Barwon Health is the largest major teaching hospital in regional Victoria with 600 beds across the acute and sub- acute campuses	It is a 'smoke-free'* hospital. The hospital policy recommends support and free smoking cessation medications be provided to all inpatient smokers. However, the policy was not systematically offered to inpatient smokers in all wards.	There was no dedicated health professional providing smoking cessation support for inpatients. Some inpatients on some wards might have received brief counselling from doctors or nurses during their hospital stay. Ward pharmacists and nurses could request medical staff to prescribe smoking cessation medications for inpatients.	NRT products (patch, gum, inhaler and lozenge) or non-NRT medications (bupropion or varenicline) were available free of charge to all inpatients.	A subsidised supply of nicotine patch, bupropion or varenicline for 28 days on discharge was available through the PBS to those eligible[#] and interested. Patients could also be referred to a smoking cessation community program after discharge.

*smoking is prohibited within hospital grounds and buildings

Patient must have indicated they are ready to cease smoking; Patient must have entered a comprehensive support and counselling program; Only one PBS-subsidised treatment at any time; Only one course of PBS-subsidised treatment authorised per 12 months, but no waiting period before initiating bupropion or varenicline after trying nicotine patch.

Table S2: Subgroup analysis of primary outcome at 12 months follow-up

	Intervention arm	Usual care arm	P value	Odds ratio (95% CI)*
Hospital				
Hospital 2	10/98 (10.2%)	11/97 (11.3%)	0.818	0.90 (0.36 to 2.22)
Hospital 3	12/98 (12.2%)	13/99 (13.1%)	0.831	0.91 (0.39 to 2.11)
Heaviness of smoking index				
Heavy smokers (HSI≥4)	12/139 (8.6%)	13/139 (9.4%)	0.834	0.92 (0.40 to 2.08)
Light smokers (HSI≤3)	22/153 (14.4%)	20/155 (12.9%)	0.740	1.12 (0.58 to 2.14)
Motivation to quit smoking				
Unmotivated smokers	10/146 (6.8%)	10/137 (7.3%)	0.898	0.94 (0.38 to 2.34)
Sex				
Male	25/185 (13.5%)	22/189 (11.6%)	0.614	1.17 (0.64 to 2.16)
Female	9/107 (8.4%)	11/105 (10.5%)	0.609	0.79 (0.31 to 1.98)

HSI- Heaviness of smoking index, VAS- Visual analogue scale

Chapter 6
The Development and Validation of a 21-item Challenges to Stopping Smoking scale (CSS-21)

6:1 Preface

Chapter 1 discussed various barriers associated with quitting smoking and emphasised the importance of developing a new tool in order to identify current challenges associated with smoking cessation. Findings from Chapter 4 also supported the need for an instrument to assess challenges to smoking cessation, since many smokers were unsuccessful in quitting smoking even after multiple quit attempts. Moreover, they had reported failed quit attempts even after trying both pharmacological and nonpharmacological methods to assist quitting. They had also reported various difficulties associated with quitting and smoking cessation medications.

The difficulty of quitting smoking is evident from Chapter 5. Many smokers who quit smoking during the initial phase of the trial relapsed during the subsequent visits, confirming the addictive nature of tobacco. All these findings support the need for identification of various challenges associated with quitting and tailoring the intervention according to the smoker's needs. However, currently there is no comprehensive tool available to assess current challenges associated with quitting. Thus, a comprehensive tool 'Challenges to Stopping Smoking scale (CSS-21)' for assessing current challenges associated with quitting smoking has been developed and validated, and the process and validation results are presented in this chapter.

6:2 Publication

Thomas D, Mackinnon A, Abramson MJ, Bonevski B, Taylor S, Poole S, Weeks GR, Dooley MJ, George J. The development and validation of a 21-item Challenges to Stopping Smoking scale (CSS-21). *BMJ Open* 2016: 6(3):e011265.

6:3 Appendices

Appendix 7: Institutional ethics approvals

Appendix 8: Patient invitation letter and CSS-21 questionnaire

Declaration for Thesis Chapter 6

Declaration by candidate

In the case of Chapter 6, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Reviewed literature; developed study documents; obtained HREC approvals; collected data; involved in data management; performed statistical analysis; and prepared manuscript	70%

The following co-authors contributed to the work as follows:

Author name	Nature of contribution
Dr Johnson George	Reviewed study documents and manuscript
Prof Andrew Mackinnon	Assisted in analysis and reviewed manuscript
Prof Michael Abramson	Reviewed study documents and manuscript
Prof Billie Bonevski	Reviewed study documents and manuscript
Dr Simone Taylor	Reviewed study documents and manuscript
Ms Susan Poole	Reviewed study documents and manuscript
Dr Gregory Weeks	Reviewed study documents and manuscript
Prof Michael Dooley	Reviewed study documents and manuscript

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's and co-authors' contributions to this work.

Candidate signature		Date 14/03/2016
Main supervisor's signature		Date 14/03/2016

Open Access Research

BMJ Open

Development and validation of a 21-item challenges to stopping smoking (CSS-21) scale

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ABSTRACT

Objective: Identification of challenges associated with quitting and overcoming them may improve cessation outcomes. This study describes the development and initial validation of a scale for measuring challenges to stopping smoking.

Methods: The item pool was generated from empirical and theoretical literature and existing scales, expert opinion and interviews with smokers and ex-smokers. The questionnaire was administered to smokers and recent quitters who participated in a hospital-based smoking cessation trial. Exploratory factor analysis was performed to identify subscales in the questionnaire. Internal consistency, validity and robustness of the subscales were evaluated.

Results: Of a total of 182 participants with a mean age of 55 years (SD 12.8), 128 (70.3%) were current smokers and 54 (29.7%) ex-smokers. Factor analysis of the 21-item questionnaire resulted in a 2-factor solution representing items measuring intrinsic (9 items) and extrinsic (12 items) challenges. This structure was stable in various analyses and the 2 factors accounted for 50.7% of the total variance of the polychoric correlations between the items. Internal consistency (Cronbach's α) coefficients for the intrinsic and extrinsic subscales were 0.86 and 0.82, respectively. Compared with ex-smokers, current smokers had a higher mean score (±SD) for intrinsic (24.0±6.4 vs 20.5±7.4, p=0.002) and extrinsic subscales (22.3±7.5 vs 18.6±6.0, p=0.001).

Conclusions: Initial evaluation suggests that the 21-item challenges to stopping smoking scale is a valid and reliable instrument that can be used in research and clinical settings to assess challenges to stopping smoking.

Strengths and limitations of this study

- This study explored the reliability, validity and factorial structure of the 21-item challenges to stopping smoking (CSS-21) scale.
- The CSS-21 scale has potential use in clinical practice and research and can be used as a self-administered or interviewer-administered tool to measure challenges associated with quitting smoking.
- The sample was drawn from hospitalised smokers participating in a smoking cessation trial and hence may not represent the general smoking population.
- The scale requires further validation such as test–retest reliability and predictive validity.

INTRODUCTION

Tobacco smoking is a leading risk factor for chronic disease and death, including many types of cancer, respiratory conditions and cardiovascular diseases.[1] The probability of a lifelong smoker dying prematurely from a smoking-related disease is almost 50%.[2] Smoking cessation leads to significant health benefits immediately and also decreases most of the related risks within a few years of cessation.[2]

Most smokers want to quit,[3] but quitting is difficult, and multiple quit attempts are frequently required before long-term abstinence is achieved.[4] Over half (52%) of the smokers in the USA,[3] 30% in Australia[5] and 26% in the UK[6] reported unsuccessful attempts to give up smoking in the previous 12 months. Even though smoking is considered a chronic disease, it is largely neglected in clinical practice.[7] Despite multiple attempts to quit, few smokers use the currently available range of treatment options.[8] Only 3–5% of unaided quit attempts are successful 6–12 months later[9] and even the best available treatment options produce only 25–30% success rate.[10] People smoke for different reasons, and a variety of barriers prevent smokers from quitting. Using a patient-centred treatment approach may improve outcomes.[11]

Social cognitive theory (SCT) explains how individuals acquire and maintain certain

behavioural patterns.[12 13] It also provides a useful framework for designing, implementing and evaluating health promotion interventions. According to the SCT, behavioural patterns are influenced by environmental and personal factors.[12] Environment refers to the physical (availability or presence of certain substances) and the social (family members, friends and colleagues) environments. Personal factors may include cognitive, affective and biological elements.

A considerable body of research exists examining challenges to quitting smoking. Personal barriers including withdrawal symptoms, addiction, higher levels of perceived stress and doubting ability to quit are frequently cited in the literature. In addition, environmental factors such as concern about weight gain, poor knowledge and scepticism about the available support, cost of nicotine replacement therapy, lack of support from health professionals, social pressure to smoke and perceived social exclusions after quitting and absence of peer support are also often noted.[14–23] Most of these findings are from qualitative studies. Few structured and quantitative scales for examining the challenges to quitting exist.[24–27]

In 1995, Macnee and Talsma[24] developed an inventory to assess barriers to cessation (BCS). Their instrument comprised three subscales measuring addiction, and external and internal barriers to quitting smoking. However, this scale may not reflect current barriers as many aspects, especially tobacco availability, restrictions on tobacco use and treatment options for nicotine, have changed in the past two decades. Many countries have introduced population-wide tobacco control measures and new evidence-based treatments have become available.[28 29] Moreover, smoking has become less acceptable in many societies, which in turn might have changed the environmental factors affecting smoking. Additionally, the BCS scale does not measure some of the specific barriers reported in the recent literature. For example, stress has been identified as a barrier to quitting in many studies,[21] but it was not captured in the BCS. Likewise, boredom, fear of weight gain, lack of support from health professionals, cost of smoking cessation medications, use of other substances and easy availability of cigarettes were also not included in the BCS.[21] Other scales assessing barriers have not been validated[25–27] or do not assess barriers experienced during a quit attempt.[30 31]

Identifying various personal and environmental factors affecting smoking behaviour may guide the selection of appropriate smoking cessation support strategies that are more likely to be successful in future attempts, thus ensuring efficient use of clinicians' time and limited healthcare resources. The current study aimed to develop a comprehensive questionnaire to assess personal and environmental factors affecting smoking cessation. We sought to establish the measurement properties of this questionnaire including reliability, and face and construct validity.

MATERIALS AND METHODS

Construct development

Item generation

The initial item pool of the questionnaire was based on the 19-item BCS scale.[24] The SCT framework was used to conceptualise the items. A comprehensive literature review identified personal and environmental factors associated with smoking. The items were reviewed for appropriateness of content by a team of experts (2 smoking cessation researchers and 2 behavioural scientists) and 16 researchers working in public health and health services. In addition, consumer consultation was conducted with 12 smokers and 2 ex-smokers. Consumer consultation involved completion of the questionnaire, followed by a face-to-face interview with a research assistant to identify any additional challenges to quitting smoking and feedback concerning clarity, appropriateness and comprehension of items, and ease and acceptability of instructions and format. Items of the BCS scale were combined or eliminated to avoid redundancy (see online supplementary table S1). A few items were rephrased to improve clarity, and 13 new items were added. The initial inventory derived from these steps included 23 items. A four-point scale was used for recording responses. The scale instructions read 'The following statements refer to different challenges or problems associated with stopping smoking. Please rate how much of a challenge each one of them was in your most recent attempt to stop smoking. Please indicate your responses on a scale of 1 (not a challenge); 2 (minor challenge); 3 (moderate challenge) or 4 (major challenge) by circling the appropriate number for each statement'.

The development sample was also asked to identify any additional challenges for smoking cessation. The responses to this question were reviewed by two investigators (DT and JG) to determine whether those subjective responses should be considered for inclusion in the scale.

Administration of the questionnaire to the validation sample

Participants

Participants were recruited from a randomised controlled trial (RCT) evaluating the effectiveness of a hospital-based smoking cessation intervention (GIVE UP FOR GOOD; Australian and New Zealand Clinical Trial Registry registration number: ACTRN12612000368831).[32] Participants were 18 years or older, self-reported current (daily or occasional) smokers at the time of hospital admission and available for 12-month follow-up. Patients who were too ill (physically or mentally) to provide written informed consent or participate in the trial, unable to communicate in English, with a terminal illness, pregnant or already receiving active smoking cessation therapy at the time of hospital admission were excluded.

Procedures

GIVE UP FOR GOOD participants were informed about the survey during their final follow-up interview at

12 months after the index hospital admission. All individuals interested in participating in the survey had it mailed to them within 1 month after the final trial interview. A reminder was sent to all non-respondents 2 weeks after the initial mail out.

Analyses

All analyses were conducted using Statistical Package for Social Sciences (SPSS) (V.20.0; IBM, Armonk, New York, USA) and Mplus (V.7.2; Los Angeles, California, USA).[33] The sociodemographic characteristics of the participants were analysed descriptively and presented as mean (±SD) or number (percentage (%)) based on type of data. The demographic characteristics (age, sex, educational status, employment status and marital status) of the respondents were compared with non-respondents, using χ^2 or Student t test.

Factor analysis

Items were subjected to exploratory factor analysis (EFA) using methods implemented in Mplus. Mplus accommodates ordered response categories by estimating interitem polychoric correlation coefficients. A robust weighted least squares estimator (WLSMV) was used. Factors were rotated using geomin rotation (oblique)[34] resulting in solutions yielding increasing numbers of factors. These were examined and compared on the basis of the change in the χ^2 goodness-of-fit test due to adding an additional factor (a non-significant χ^2 probability indicated a good fit) and the values of fit indices. Fit indices included the root mean square error of approximation (RMSEA), comparative fit index (CFI) and Tucker-Lewis index (TLI). An RMSEA value <0.08[35] and CFI and TLI values >0.90 indicated a good fit of the data to the model.[36] After performing the EFA on the full item set, the analysis was performed using a subset of items from which ambiguously or poorly performing items were removed for the purposes of scale development.

Scale formation

Items with factor loadings >0.3 were retained on the scales. Items were assigned to either subscale according to their loadings in factor analysis. If an item loaded in more than one factor, it was included on the scale with the highest loading factor.

Stability of the factor structure

To assess the robustness of the factor structure, analysis was repeated excluding all participants who had reported quitting smoking at the time of survey. The pattern of loadings was assessed in this subgroup. Formal comparison of the factor structure of the items for current smokers and ex-smokers was not feasible owing to the small number of ex-smokers. The stability of the factor structure was also assessed by including and excluding from analysis potentially ambiguous items and those that appeared to be inapplicable to some participants.

Scale properties

Total score of the scale

Scores for items in each subscale were added up to create two composite challenges scores. A higher score indicated greater challenges. Missing values were replaced with the mean of answered items for participants with ≤20% items missing. Participants with >20% missing data were excluded from the analysis.

Reliability

Internal consistency was tested using Cronbach's coefficient α. An α level of ≥0.7 was considered acceptable.[37] The item–scale partial correlations were also assessed (ie, correlations of each item with its subscale excluding this item).

Construct validation

There are two subtypes of validity that make up the construct validity: convergent validity (two measures of constructs that are supposed to be related are in fact related) and discriminant validity (concepts or measurements that are supposed to be unrelated are, in fact, unrelated). To assess construct validity, hypotheses about the associations between challenges to stopping and other variables were tested. It was hypothesised that self-efficacy[38] would be lower among those who have more challenges to quitting smoking (convergent validity). Likewise, ex-smokers were expected to have fewer challenges than current smokers (discriminant validity). Student t test was used to compare the factor scores between ex-smokers and current smokers and Cohen's d[39] was used as an index of effect size (d=0.2, small effect; d=0.5, moderate effect; d=0.8, large effect).

RESULTS

Sample characteristics

A total of 437 questionnaires were sent to participants in the GIVE UP FOR GOOD study (total number of participants was 600; however, the remaining either dropped out or declined to participate in this substudy); 188 responses were received (43% response rate). The demographic characteristics of the respondents were balanced with the non-respondents except that respondents were older (55.0±12.8 vs 49.1±13.6, p<0.001). Six participants were excluded owing to considerable missing information (more than four items left unanswered). Of the remaining 182 respondents, 70.3% were current smokers. The demographic and smoking characteristics of study participants are presented in table 1.

Structure of the inventory

The EFA on all 23 items identified two underlying factors. Although the χ^2 goodness-of-fit test remained

Table 1 Characteristics of participants

	Number (%)		
	Current smoker (n=128)	Ex-smoker (n=54)	Overall (n=182)
Age in years mean (±SD)	55.7±12.7	53.6±13.3	55.0±12.8
Male	85 (66.4)	35 (64.8)	120 (65.9)
Born in Australia	109 (85.2)	45 (83.3)	154 (84.6)
Education			
Primary school/no qualification	6 (4.7)	1 (1.9)	7 (3.8)
Secondary school	72 (56.3)	37 (68.5)	109 (59.9)
Technical education	28 (21.9)	8 (14.8)	36 (19.8)
University education	22 (17.2)	8 (14.8)	30 (16.5)
Employment status			
Employed full/part time	57 (44.5)	27 (50)	84 (46.2)
Retired/pensioner	42 (32.8)	14 (25.9)	56 (30.8)
Disabled/unable to work	17 (13.3)	9 (16.7)	26 (14.3)
Unemployed/student/home duties	12 (9.4)	4 (7.4)	16 (8.8)
Marital status			
Married/de facto	57 (44.5)	32 (59.3)	89 (48.9)
Widowed/divorced/separated	52 (40.6)	10 (18.5)	62 (34.1)
Never married	19 (14.8)	12 (22.2)	31 (17.0)
Average annual household income			
$A29 999 or less	51 (39.8)	16 (29.6)	67 (36.8)
$A30 000 to $A59 999	22 (17.2)	8 (14.8)	30 (16.5)
$A60 000 or more	23 (18.0)	16 (29.6)	39 (21.4)
Not disclosed	32 (25.0)	14 (25.9)	46 (25.3)
Reason for hospital admission			
Cardiovascular disorders	26 (20.3)	21 (38.9)	47 (25.8)
Musculoskeletal disorders	24 (18.8)	8 (14.8)	32 (17.6)
Respiratory disorders	14 (10.9)	8 (14.8)	22 (12.1)
Nervous system disorders	14 (10.9)	7 (13.0)	21 (11.5
Digestive system disorders	15 (11.7)	2 (3.7)	17 (9.3)
Other	35 (27.3)	8 (14.8)	43 (23.6)
Smoking characteristics*			
Age smoking started, median (IQR)	15.5 (14, 18)	15 (13.75, 17)	15 (14, 18)
Number of years of smoking, median (IQR)	40 (31.25, 48)	38.5 (26, 46.25)	39 (29, 48)
At least one quit attempt in the past 12 months	91 (71.1)	32 (59.3)	123 (67.6)
Lives with a smoker	48 (37.5)	20 (37.0)	68 (37.4)
Have a smoker as friend	110 (85.9)	46 (85.2)	156 (85.7)
Heavy smokers† (HSI≥4)	62 (48.4)	20 (37.0)	82 (45.1)
Motivation to give up smoking, median (IQR)‡	8.5 (7, 10)	9 (8, 10)	9 (7, 10)
Confidence in giving up smoking, median (IQR)‡	5 (2, 8)	6.5 (5, 9)	5.5 (3, 8)
Self-efficacy to quit, mean (±SD)§	32.2±8.0	32.7±8.4	32.3±8.1

*At the time of enrolment in the clinical trial.
†Measured using two-item Heaviness of Smoking Index (scores ranging from 0 to 6 with a score of 3 or less indicating 'light smokers' and 4 or more indicating 'heavy smokers').
‡Measured using 10-point visual analogue scale (1 being 'very low' and 10 being 'very high').
§Measured using nine-item smoking self-efficacy scale (score ranging from 9 to 45, higher scores indicated greater smoking temptation).
HSI, Heaviness of Smoking Index.

significant (p<0.001), there was substantial improvement over the one-factor model. Adding an extra factor (three-factor solution) only marginally improved the model and only one item loaded substantially (>0.5) on the additional factor. A scree plot of the eigenvalues also suggested a two-factor solution (see online supplementary figure S1). Moreover, the theoretical construct was also based on two factors.

Once the two-factor solution was adopted, the performance of items was examined and ambiguous and irrelevant items were removed. One item—'having doubt in the health benefits of stopping smoking'—did not load on any of the factors and was not strongly correlated with the other items in the scale. Also, the majority of participants reported this item was 'not a challenge' (79.7%, n=145). Hence, it was eliminated from the final scale. Another item—'no support or encouragement at work to stop smoking'—was not completed by 14 (7.7%) respondents and 'not a challenge' was noted as the response by 127 (69.8%) participants, leading to its elimination from the final inventory.

A second factor analysis was performed on the 21 items retained in the final inventory. This produced an almost identical pattern of loadings to the initial analysis (table 2). Extraction of two factors accounted for 50.7% of the total variance of the polychoric correlations between the items. Eight items loaded substantially (>0.5) on factor one and one item had a modest loading (>0.3). Twelve items loaded on factor two with eight substantial loadings and four modest loadings. Three items ('easy availability of cigarettes', 'fear of failing to stop smoking' and 'belief that I can stop smoking in the future if I need to') loaded modestly on both factors.

All fit indices were acceptable for the two-factor model: RMSEA=0.062 (90% CI 0.050 to 0.074), p close fit (RMSEA≤0.05)=0.053, CFI=0.948 and TLI=0.935. There was significant improvement from the single-factor model (RMSEA=0.102, CFI=0.841, TLI=0.824). A model with three factors improved the fit only marginally (RMSEA=0.057, CFI=0.961, TLI=0.946).

The factor structure was stable and produced similar results when only current smokers were included in the analysis. The factors were only modestly correlated (r=0.33); hence, they measured different constructs of the challenges to stopping smoking.

Scale properties

The nine items of the first subscale were predominantly related to personal (physical, psychological or cognitive) aspects of quitting. Hence, the first subscale was labelled 'intrinsic factors'. The 12 items that loaded on the second subscale were predominantly related to social or environmental aspects of quitting. Hence, it was labelled 'extrinsic factors'. This two-dimensional 21-item scale was called the 'challenges to stopping smoking scale' (CSS-21).

The mean total (SD) scores of the intrinsic and extrinsic subscales were 22.89 (±6.85) and 21.25 (±7.26), respectively. The total scores of the 'intrinsic scale' ranged from 9 to 36 and the 'extrinsic scale' from 12 to 43. The scores of the 'intrinsic scale' were almost normally distributed (skewness=−0.13), whereas the extrinsic scores were positively skewed towards lower values (skewness=0.82). Only around 5% of participants obtained the lowest possible score for both scales (3.8% for intrinsic scale and 6.0% for extrinsic scale). Likewise, only 2.2% of participants obtained the highest possible score for the 'intrinsic scale'. No participant had the highest possible score for the 'extrinsic scale'.

Content validity

Of the 17 responses obtained from 13 participants about additional challenges, 14 were regarded as variations of items already present in the CSS-21 scale. This indicated saturation of ideas and thus further confirmed the content validity. The three remaining additional

Table 2 Factor loading for the items in the two subscales of the CSS-21

Subscales and items		Loading on factor 1	2
Factor 1			
1	Withdrawal symptoms (eg, depression, anxiety, restlessness, irritability, sleeplessness, craving, etc) when I tried to stop smoking	0.83*	−0.06
2	Feeling lost without cigarettes	0.82*	−0.08
3	Being addicted to cigarettes	0.77*	0.00
4	Having strong emotions or feelings such as anger, or feeling upset when I tried to stop smoking	0.74*	0.08
5	Something stressful happened when I was trying to stop smoking	0.66*	0.00
6	Thinking about never being able to smoke again after I stop smoking	0.65*	0.15
7	Getting bored when I was trying to stop smoking	0.56*	0.29*
8	Seeing things or people which reminded me of smoking	0.55*	0.24*
9	Easy availability of cigarettes	0.43*	0.34*
Factor 2			
10	Difficulty in finding someone to help me to stop smoking	−0.07	0.92*
11	Lack of support or encouragement from health professionals to stop smoking	−0.02	0.75*
12	The cost of stop-smoking medicines such as nicotine replacement therapy	0.06	0.65*
13	Fear of side effects from stop-smoking medicines	0.16	0.63*
14	Lack of encouragement or help from family or friends to stop smoking	0.13	0.61*
15	Fear of weight gain if I stopped smoking	−0.06	0.55*
16	Family members or friends encouraging me to smoke	−0.02	0.53*
17	Fear of failing to stop smoking	0.49*	0.51*
18	Belief that medicines to stop smoking do not work	0.22*	0.48*
19	Fear that stopping smoking may interrupt social relationships	0.30*	0.46*
20	Belief that I can stop smoking in the future, if I need to	0.36*	0.44*
21	Use of other substances such as cannabis, alcohol, etc	0.09	0.37*

*Significance at 5% level.

challenges ('health problems', 'personal worries' and 'lonesome') may require further investigation.

Reliability

The item and scale characteristics are presented in table 3. Cronbach's α for the intrinsic and extrinsic scales were 0.86 and 0.82, respectively. Item–scale correlations were high except for one item in the 'extrinsic scale' which was nevertheless retained to preserve content validity.

Construct validity

Intrinsic and extrinsic scales were negatively correlated with the self-efficacy score (r=−0.42, p<0.001 and −0.25, p=0.013). Also, compared with ex-smokers, current smokers had a higher mean score for intrinsic (24.0±6.4 vs 20.5±7.4, p=0.002) and extrinsic (22.3±7.5 vs 18.6±6.0, p=0.001) scales. The magnitude of the difference in the means was modest for intrinsic (mean difference 3.5, 95% CI 1.3 to 5.6, Cohen"s d 0.49) and extrinsic (mean difference 3.7, 95% CI 1.4 to 6.0, Cohen"s d 0.57) scales.

DISCUSSION

A self-administered tool for measuring challenges to stopping smoking—the CSS-21 scale—was developed and evaluated. The item pool was generated from literature, expert opinion and interviews with smokers and ex-smokers. The final CSS scale contained 21 items that measured two dimensions of challenges: intrinsic and extrinsic factors. The CSS-21 scale has content and construct validity, was stable in various analyses, has high internal consistency and a sound factorial structure. All fit indices were acceptable and the two factors were meaningful and interpretable.

Two meaningful subscales were found within the larger CSS construct. Theoretically, they reflect different types of challenges: 'intrinsic scale'—personal factors and 'extrinsic scale'—environmental factors. Most of the items were loaded as originally categorised based on the theoretical model. However, three items that were loaded on more than one factor may need reconsideration. The item 'easy availability of cigarette' was originally proposed to be part of the extrinsic subscale but loaded highly on the 'intrinsic scale'. Likewise, items such as 'fear of failing to stop smoking' and 'belief that I can stop smoking in the future, if I need to' were originally proposed as a part of intrinsic subscale but loaded highly on the 'extrinsic scale'.

Predictably, the intrinsic subscale was correlated with self-efficacy such that those with greater intrinsic challenges reported lower self-efficacy. The extrinsic subscale was not correlated with self-efficacy, which was conceptually logical as self-efficacy is an internal belief and may not be necessarily related to the external environment. The differential analysis of ex-smokers and current smokers also confirmed the validity of construct.

The CSS-21 scale has potential use in clinical practice and research. It is easy to administer, can be completed and scored quickly (approximately 5 min to complete)

Table 3 Item and scale characteristics

	Subscales and abbreviated items	Mean±SD*	Item–total correlation
Intrinsic factors (n=181)			
1	Withdrawal symptoms	2.77±1.03	0.64
2	Feeling lost without cigarettes	2.60±1.05	0.66
3	Being addicted to cigarettes	3.09±1.06	0.59
4	Having strong emotions or feelings	2.46±1.07	0.64
5	Something stressful happened	2.66±1.17	0.57
6	Thinking about never being able to smoke again	2.10±1.08	0.59
7	Getting bored	2.46±1.12	0.60
8	Seeing things/people which reminded me of smoking	2.37±1.15	0.56
9	Easy availability of cigarettes	2.38±1.27	0.46
Extrinsic factors (n=178)			
10	Difficulty in finding someone to help me to stop smoking	1.65±1.03	0.66
11	Lack of support from health professionals to stop smoking	1.56±0.94	0.48
12	The cost of stop-smoking medicines	1.85±1.19	0.53
13	Fear of side effects from stop-smoking medicines	1.61±0.94	0.56
14	Lack of encouragement from family or friends to stop smoking	1.76±1.00	0.49
15	Fear of weight gain if I stopped smoking	2.03±1.15	0.38
16	Family members or friends encouraging me to smoke	1.37±0.81	0.33
17	Fear of failing to stop smoking	2.38±1.19	0.60
18	Belief that medicines to stop smoking do not work	1.81±1.04	0.49
19	Fear that stopping smoking may interrupt social relationships	1.58±0.95	0.43
20	Belief that I can stop smoking in the future if I need to	2.08±1.13	0.47
21	Use of other substances such as cannabis, alcohol, etc	1.54±0.98	0.27

*Mean of response to individual items on a four-point (1–4) scale, where 1=not a challenge and 4=major challenge.

by the patient or clinician and is easily interpretable. The clinical utility of individual items in the CSS-21 scale needs to be explored in future studies. However, the CSS-21 scale could potentially be used to identify challenges smokers have experienced during their previous quit attempts. Responses to the CSS-21 scale could also be used to develop an individualised approach in facilitating smoking cessation and to reduce the chance of relapse. Items rated as 'moderate' or 'major' challenges may warrant special attention as these may become the basis for relapse. The CSS-21 scale is suitable to assess changes in challenges over time, to develop tailored interventions or to determine the effect of interventions on various challenges.

The CSS-21 scale possesses several advantages over the existing tool[24] for identifying challenges to stopping smoking. The CSS-21 scale comprises a comprehensive list of current barriers relevant to today's smokers. It includes beliefs and views about smoking cessation medications and treatments, and challenges associated with obtaining support. This is particularly important as many smoking cessation aids are now available.[29] This scale also incorporates other potential areas identified in current literature such as smoking for stress management, easy availability of cigarettes, interrupting social relationships and fear of weight gain. A number of items in the BCS were rephrased for clarity. Ambiguity was minimised by removing the 'not applicable' option of the BCS scale, which many of our participants confused with 'not a challenge'.

The study has some limitations. The participants were recruited from a smoking cessation trial for hospitalised smokers which largely included motivated smokers. Involvement in a smoking cessation trial may have affected participants' perceptions of barriers to stopping smoking. Even though participants were recruited 12 months after their index hospitalisation, the sample may not represent a general community sample. Further evaluation with smokers from other settings is warranted. Also, many of the participants were admitted for cardiorespiratory disorders for which smoking is a major risk factor, which might have influenced their answers to the questionnaire. While the sample size was acceptable for the type of analyses undertaken, the response rate was only modest, which may also limit the wider applicability of the scale. Further studies with larger samples are needed to explore the usefulness of the subscales. Additionally, the scale requires further evaluation including test–retest reliability and predictive validity in a range of contexts. Finally, no direct comparison between CSS-21 and BCS scales was made to avoid replication of similar items within the same questionnaire and to minimise missing data due to inclusion of irrelevant and/or ambiguous items from BCS.

To conclude, the CSS-21 scale provides a robust, self-administered or interviewer-administered tool to measure challenges associated with quitting smoking. Given that it is based on current evidence, has strong psychometric properties and is brief, the CSS-21 scale offers significant promise for application in clinical practice and research.

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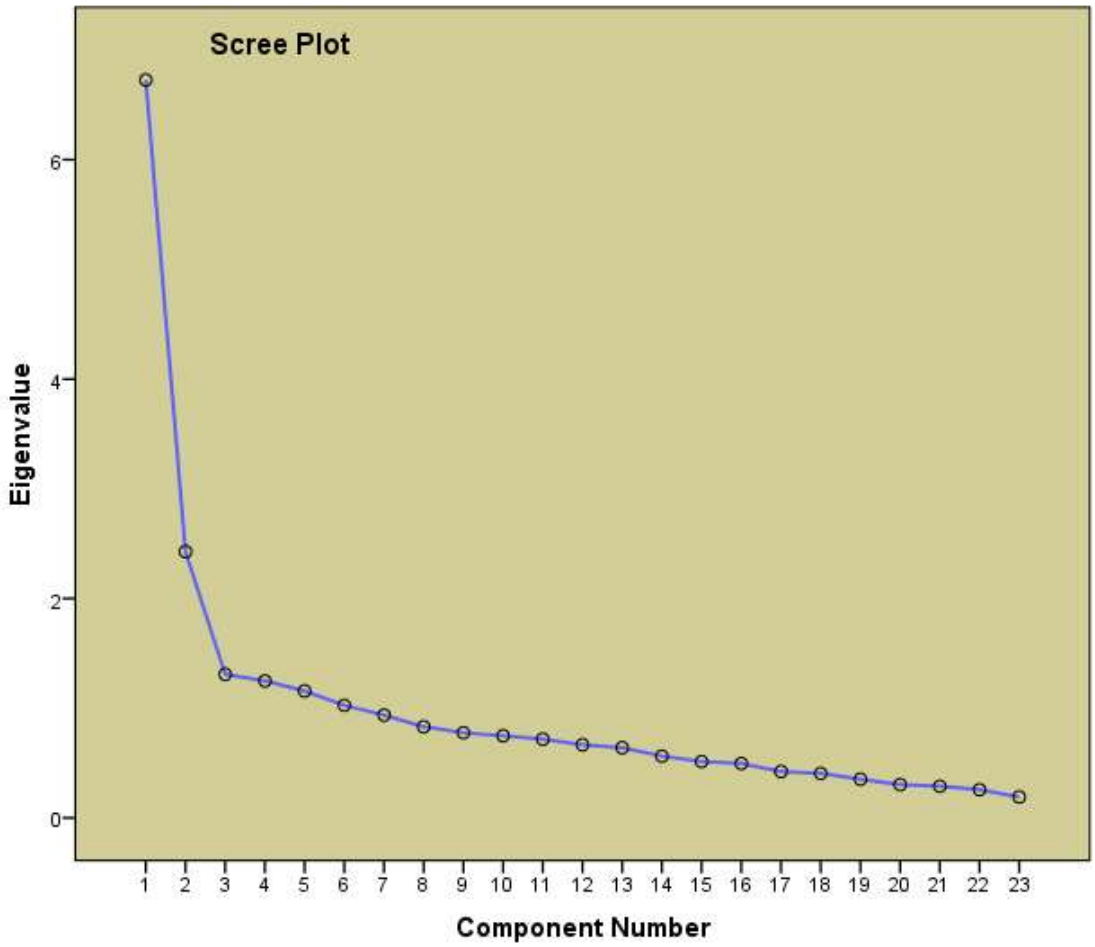
Supplementary Files

Supplementary table 1: Items derived from the BCS scale

BCS Scale	CSS-21 Scale
Addiction barriers	
1. Withdrawal symptoms	Rephrased and retained
2. Miss the companionship of cigarettes	During initial testing, it was found that this item is measuring the same concept as item 8, and hence removed from the CSS-21 scale
3. Thinking about never being able to smoke again	Rephrased and retained
4. Thinking about cigarettes all the time	During initial testing, it was found that this item is measuring the same concept as item 8, and hence removed from the CSS-21 scale
5. Not knowing for how long it will be very hard not to smoke	During initial testing, this item was found to be redundant and/or difficult to understand, and hence removed from the CSS-21 scale
6. Being addicted to the cigarettes	Retained
7. Fear of failing to quit	Rephrased and retained
8. Feeling lost without cigarettes	Retained
External Barriers	
9. No encouragement or help from friends	During initial testing, it was found that this item is measuring the same concept as item 11, and hence removed from the CSS-21 scale.
10. Family members or significant others encouraging you to smoke	Rephrased and retained
11. No encouragement or help from family members or significant others	Rephrased and retained
12. Friends encouraging you to	During initial testing, it was found that this item is measuring the same concept

smoke	as item 10, and hence removed from the CSS-21 scale.
13. No encouragement at work for not smoking	Rephrased and retained
14. Lack of understanding from family and significant others about what it is like to quit smoking	During initial testing, this item was found to be redundant and/or difficult to understand, and hence removed from the CSS-21 scale.
15. Seeing things or people which remind you of smoking	Rephrased and retained
Internal Barriers	
16. Having strong feelings such as anger or feeling upset when you are by yourself	Rephrased and retained
17. Feeling less in your control of your moods	During initial testing, it was found that this item is measuring the same concept as item 16, and hence removed from the CSS-21 scale.
18. Having strong feelings such as anger, or feeling upset when you are with other people	Rephrased and combined with item 16
Item not loaded in any subscale	
19. Fear of weight gain	This item was not loaded on any subscales in the BCS scale, but was included in CSS-21 scale.

Supplementary figure 1: Screeplot of eigenvalues



Chapter 7
General Discussion, Future Directions and Conclusions

7.1 Preface

The overall aim of this thesis was to develop and evaluate an effective, pragmatic and sustainable smoking cessation intervention for hospitalised smokers. To achieve this goal, a series of studies were undertaken including a Cochrane systematic review of system change interventions, a randomised controlled trial of a pharmacist-led smoking cessation intervention targeting hospitalised smokers, and the development and validation of a scale to assess the barriers associated with quitting. The rationale, methods, findings and limitations of each study have been presented in detail in previous chapters. The final section of this thesis will summarise the overall findings in relation to the thesis objectives and discuss the practice implications and future research directions.

7.2 General Discussion

Smoking cessation support in hospitals is inadequate,[5 111] which warrants a major shift in the nature and delivery of cessation care. The systematic review (Chapter 2) evaluated various system change interventions for smoking cessation and gave valuable insights into their efficacy and quality. This review was the first of its kind that compiled studies from a range of health care settings involving various healthcare professionals, consumers and organisations. The review highlighted the diversity and complexity of system change interventions. Although the review included seven cluster randomised controlled studies,

none had utilised all the six components of system change interventions as recommended by Fiore et al.[85] (*viz.* assessment and documentation of smoking status; training, resource and feedback to clinicians; dedicated staff to provide cessation treatment; promoting policies to support cessation; evidence based treatments; and reimbursing clinicians). The number of components implemented and the extent of implementation of each component varied substantially among studies. Although heterogeneity between studies and low quality evidence did not allow meta-analysis and firm conclusions, the review found some promising results.

A number of outcomes were evaluated in this review. The evidence for the cessation outcome was uncertain. The average quit rate observed in this review (6.7%) was lower than that previously observed in the pooled analysis of high intensity hospital based interventions (29.3%) involving more than one month follow-up.[107] Only one study in this review provided an intensive intervention (6-month duration) and reported a significant improvement in abstinence rate (8.1% vs. 5.8%; p=0.01). Evidence for interventions targeting assessment and documentation of smoking status, advising and counselling to quit, and Quitline referral and enrolment were generally favourable. System change interventions have the potential to improve the delivery of smoking cessation care in healthcare settings, however may not translate to higher abstinence rates. High intensity system change interventions providing cessation care to a wide range of smokers are warranted and should be evaluated in further higher quality studies. Evidence from such studies will be helpful in designing health system based interventions for smoking cessation and also will inform policy and clinical practice.

Chapters 3 and 5 describe the development and evaluation of an innovative pharmacist-led

intervention (GIVE UP FOR GOOD) for all hospitalised smokers that could be implemented in routine clinical practice. The GIVE UP FOR GOOD intervention used some components of system change intervention in which a trained and dedicated hospital pharmacist coordinated all smoking cessation activities in the hospital including assessment and documentation of smoking status, evidence-based treatment and post-discharge follow-ups. As described in chapter 4, the pharmacist explored smokers' previous quitting experiences and preferences before recommending a treatment. Hospital policies also supported smoking cessation (e.g. smoke-free hospitals and documentation of smoking status in the medical records) and provided resources (e.g. pharmacotherapy, referral facilities and self-help materials) to support smoking cessation activities. This was the first large-scale, multicentre, randomised controlled study that evaluated the effectiveness of a pharmacist-initiated multicomponent smoking cessation intervention for inpatient smokers. The post-discharge follow-ups from hospitals were limited to one month to include the maximum number of smokers in the program utilising limited resources. This study also explored the possibility of linking tertiary care facilities with primary care settings to provide ongoing cessation support. However, only a few participants received any help or support from their primary health providers and the intervention did not improve long-term abstinence rates.

A recent US study[105] demonstrated better outcomes with an intervention provided for a longer duration (6-month) and with the free supply of a full course (3-month) of smoking cessation medication. However, the resource intensity of such interventions may prevent the hospitals from implementing it. Novel technologies such as mobile phone text messaging or interactive voice response systems are other alternatives to deliver ongoing

support,[105] however, their feasibility and effectiveness have not been evaluated in Australian settings. Another option to improve follow-up support is to develop a better system to link hospitals with community-based health services such as general practitioners and pharmacists. For example, an automated referral system using electronic health records may efficiently link smokers across health service providers.

Although an economic evaluation was planned for the GIVE UP FOR GOOD intervention, the lack of efficacy made such an evaluation moot. The intervention was well accepted among smokers and a higher proportion of intervention participants reported 'satisfaction' with the services received during hospital stay. A complete system change approach by including all the health professionals in the system might have been more effective. Interventions provided by multiple health professionals are known to be more effective than by a single health professional.[150]

Smoking care delivery in hospitals should be rationalised and optimised. This can be achieved through development and provision of patient centred interventions.[151] The research presented in Chapter 4 highlighted the importance of tailored interventions. It was found that hospitalised smokers had diverse past quitting experiences including various withdrawal symptoms and side effects from smoking cessation medications. Most smokers were not successful in their previous attempts to quit smoking even after trying multiple times using various methods. This highlights the challenges of quitting. Hence identifying the challenges to cessation and addressing them, especially those challenges experienced during the previous quit attempts, may further improve cessation outcomes.

However, there is no comprehensive scale presently available to capture the current challenges associated with quitting. Chapter 6 discussed the development and evaluation of an instrument (CSS-21) to assess the specific challenges associated with quitting. This was the first comprehensive tool which incorporated difficulties associated with accessing cessation support. The scale was developed based on social cognitive theory and was validated in a sample of smokers who had been previously admitted to a hospital.

The CSS-21 could be a valuable tool to assess various challenges associated with quitting including both personal and environmental challenges. It is a simple questionnaire that could be easily administered and quickly completed with applications in both clinical practice and research. While providing an intensive smoking cessation intervention to hospitalised patients, response to the items in the scale could be used to personalise treatments after taking previous quitting experiences into consideration. However, future studies should evaluate its validity in other settings and populations. Further testing such as test-retest reliability and predictive validity are also required.

Aggressive tobacco control measures are required to meet the policy target of reducing national smoking rate to 10% by 2018.[152] A system change approach incorporating high intensity interventions tailored to the needs of individuals may produce more favourable results and help achieve the proposed targets.

7.3 Practice Recommendations

- System change interventions has the potential to improve smoking cessation care in healthcare settings, and implementation of such interventions is necessary to provide cessation care to a vast range of smokers.
- Strong leadership and commitments combined with better collaboration and involvement from various health care professionals are essential to integrate smoking cessation care in different healthcare settings and also to link various health systems. Such systems may have the potential to improve follow-up support by linking smokers with different health service providers, but more evidence is needed about their effectiveness.
- Health care providers should consider the experiences of smokers during their past quit attempts, discuss available support options to assist quitting and consider smokers' preferences before recommending treatments.
- It is important to educate smokers about the proper use of cessation medications, especially the importance of choosing an appropriate form of medication and adhering to the therapy, as recommended.
- Patient-centred and personalised interventions for smoking cessation are warranted. Identifying challenges experienced during previous quit attempts and overcoming them have the potential to improve smoking cessation rates and save clinicians' time.

7.4 Future Research Directions

Future research should endeavour to do the following;

- Consult stakeholders such as hospital staff, community health professionals and patients, and undertake a qualitative study to explore the barriers associated with transferring cessation responsibilities to community health professionals and also to find out methods to overcome the barriers. Also, explore the possibility of training and incentivising community health professionals to improve the uptake of smoking cessation services.
- Strengthen the GIVE UP FOR GOOD intervention using information from qualitative studies and re-evaluate its efficacy in a well-powered RCT. Electronic algorithms could be developed to assist hospital pharmacists in taking clinical decisions and standardising cessation treatments. Newer technologies such as photo ageing software[153] could also be considered for inclusion in the multicomponent smoking cessation intervention to motivate unmotivated smokers. Better training of pharmacists may improve the delivery of intervention components and subsequent cessation rates. Also, using multidisciplinary inputs (from psychiatrists, addiction experts, social workers/sociologists etc.) may help pharmacists in developing and providing a comprehensive treatment plan for hard to change smokers. The cost-effectiveness of such interventions should be explored. Other low-cost methods to improve follow-up support to smokers may include interactive voice response systems, mobile phone applications, and online and mobile phone text messaging interventions.[77 105]

- Conduct a large-scale RCT to evaluate the effectiveness of a high intensity system change intervention for smoking cessation in improving both quit rate and system level outcomes.
- Validate the applicability of CSS-21 and its sub-scales in a larger hospitalised sample and other populations. Such a study should include different populations from various settings and conduct additional evaluations such as test-retest reliability and predictive validity in various contexts. Clinical utility of CSS-21 also should be further evaluated.

7.5 Conclusions

Collectively, the work in this thesis has addressed several important gaps in knowledge in areas of tobacco control in hospitalised patients. The thesis highlighted the importance of system change interventions and the relevance of knowledge on past quitting experiences, challenges to cessation and preferences for a future quit attempt when providing smoking cessation support. High intensity patient centred interventions may be required to improve abstinence rates. Overall, this thesis contributes to clinical practice and policy in the area of smoking cessation support for hospitalised smokers. The findings should facilitate informed decision making by clinical practitioners and healthcare policy makers about cessation support in hospitals, and also guide further research in this area.

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Appendices

Appendix 1: Chapter 2 — Search strategies

- EMBASE
- Cochrane Central Register of Controlled Trials
- PsycINFO
- CINAHL

EMBASE (Via OVID)

---

1 exp randomized controlled trial/ (395509)
2 randomized controlled trial.mp. (495457)
3 exp controlled clinical trial/ (535320)
4 exp pragmatic clinical trial/ (395509)
5 exp clinical trial/ (1073117)
6 exp meta analysis/ (104542)
7 exp random allocation/ (69547)
8 exp double blind method/ (128771)
9 exp single blind method/ (21547)
10 exp placebos/ (283206)
11 ((clin$ adj5 trial$) or placebo$ or random$).ti,ab. (1385327)
12 ((singl$ or doubl$ or trebl$ or tripl$) adj5 (blind$ or mask$)).ti,ab. (187661)
13 (volunteer$ or prospectiv$).ti,ab. (913620)
14 exp Follow Up Studies/ (1004593)
15 exp Retrospective Studies/ (448063)
16 exp Prospective Studies/ (322449)
17 exp Evaluation Studies/ (29734)
18 exp Program Evaluation/ (8175)
19 exp Comparative study/ (1102285)
20 exp Smoking Cessation/ or smoking cessation.mp. (48191)
21 "Tobacco-Use-Cessation"/ (43380)
22 "Tobacco-Use-Disorder"/ (1933)
23 Tobacco-Smokeless/ (3240)
24 exp Tobacco-/ (37932)
25 ((quit$ or stop$ or ceas$ or giv$) adj5 smoking).ti,ab. (15323)
26 exp Smoking/pc, th [Prevention & Control, Therapy] (7908)
27 (educat* adj5 (smok* or tobacco)).mp. (11045)
28 (dedicat* adj2 staff*).mp. (556)
29 (hospital adj2 policy).mp. (2584)
30 organizational policy/ (71659)
31 "Delivery of Health Care, Integrated"/ (6686)
32 Health Care Reform/ (140150)
33 Health Services Accessibility/ (119047)
34 Patient Care Team/ (153111)
35 Patient-Centered Care/ (108462)
36 health system chang*.mp. (378)
37 (system* adj2 chang*).mp. (16227)
38 (system* adj2 intervention*).mp. (4231)
39 (integrat* adj6 (smok* or tobacco)).ti,ab. (704)
40 (Organi?ation* adj2 intervention*).mp. (939)
41 Organi?ation* structure*.mp. (4918)
42 (organi?ation* adj2 chang*).mp. (4302)
43 (system* adj2 approach*).mp. (24825)
44 ((system* adj2 reform) or (Organi?ation* adj2 reform*)).mp. (1421)
45 Decision Making, Organizational/ (116340)

46 Organizational Innovation/ (99298)
47 Patient Identification Systems/ (7674)
48 inservice training/ (13635)
49 ("environmental change" or "environmental changes").mp. (12116)
50 ("environmental intervention" or "environmental interventions").mp. (946)
51 "re?engineering".mp. (1024)
52 exp Hospital Restructuring/ (32988)
53 "Practice change".mp. (1217)
54 ((Identif* adj3 (smok* or tobacco*)) or (Document* adj3 (smok* or tobacco*))).mp. (4185)
55 Patient Education as Topic/ (80064)
56 "Referral and Consultation"/ (53405)
57 Guideline Adherence/ or Guideline/ or Practice Guideline/ (269358)
58 Health Services Research/ (28894)
59 ((system* adj2 modif*) or (Organi?ation* adj2 modif*)).mp. (7491)
60 or/1-19 (4650418)
61 or/20-26 (94009)
62 60 and 61 (25211)
63 or/27-59 (1056990)
64 62 and 63 (4385)
65 exp nonhuman/ (4693135)
66 64 not 65 (4276)
67 limit 66 to embase (3284)

Cochrane Central Register of Controlled Trials (CENTRAL) (Via OVID)

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1 exp Smoking Cessation/ (2991)
2 exp "Tobacco Use Disorder"/ (788)
3 exp "Tobacco Use Cessation"/ (3050)
4 exp Tobacco/ (137)
5 Tobacco-Smokeless/ (110)
6 'smoking cessation'.ti,ab. (4080)
7 ((quit$ or stop$ or ceas$ or giv$) adj5 smoking).ti,ab. (2007)
8 (educat* adj5 (smok* or tobacco)).mp. (681)
9 (dedicat* adj2 staff*).mp. (11)
10 (hospital adj2 policy).mp. (61)
11 organizational policy/ (66)
12 Delivery of Health Care/ (469)
13 Health Care Reform/ (22)
14 Health Services Accessibility/ (452)
15 Patient Care Team/ (1259)
16 Patient-Centered Care/ (288)
17 (system* adj2 chang*).mp. (1157)
18 (system* adj2 intervention*).mp. (642)
19 (integrat* adj6 (smok* or tobacco)).ti,ab. (85)
20 (Organi?ation* adj2 intervention*).mp. (144)
21 Organi?ation* structure*.mp. (37)
22 (organi?ation* adj2 chang*).mp. (161)
23 (system* adj2 approach*).mp. (378)
24 ((system* adj2 reform) or (Organi?ation* adj2 reform*)).mp. (8)
25 ((system* adj2 modif*) or (Organi?ation* adj2 modif*)).mp. (286)
26 'Organi?ational Decision Making'.mp. (2)
27 Organizational Innovation/ (80)
28 Patient Identification Systems/ (13)
29 inservice training/ (541)
30 ("environmental change" or "environmental changes").mp. (93)
31 ("environmental intervention" or "environmental interventions").mp. (113)
32 ("re engineering" or "re*engineering").mp. (14)
33 exp Hospital Restructuring/ (7)
34 "Practice change".mp. (68)
35 ((Identif* adj3 (smok* or tobacco*)) or (Document* adj3 (smok* or tobacco*))).mp. (329)
36 Patient Education as Topic/ (6596)
37 "Referral and Consultation"/ (1352)
38 Guideline Adherence/ or Guideline/ or Practice Guideline/ (735)
39 Health Services Research/ (620)
40 1 or 2 or 3 or 4 or 5 or 6 or 7 (5771)
41 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 (15176)
42 40 and 41 (945)

PsycINFO (Via OVID)

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1 exp clinical trials/ (9369)
2 exp Meta Analysis/ (3785)
3 exp Placebo/ (4442)
4 exp Intervention/ (76577)
5 Random Sampling/ (678)
6 ((clin* adj5 trial*) or placebo* or random*).ti,ab. (183718)
7 ((singl* or doubl* or trebl* or tripl*) adj5 (blind* or mask*)).ti,ab. (22034)
8 (volunteer* or prospectiv*).ti,ab. (82385)
9 exp Followup Studies/ (12343)
10 exp Retrospective Studies/ (376)
11 Prospective Studies/ (484)
12 exp Program Evaluation/ (17837)
13 'Evaluation-Studies'.mp. (1064)
14 'Comparative study'.mp. (10521)
15 exp Smoking Cessation/ (10500)
16 exp Tobacco Smoking/ (25903)
17 Smokeless Tobacco/ (657)
18 ((quit* or stop* or ceas* or giv*) adj5 smoking).ti,ab. (5520)
19 'smoking cessation'.ti,ab. (8385)
20 (educat* adj5 (smok* or tobacco)).mp. (2328)
21 (dedicat* adj2 staff*).mp. (85)
22 (hospital adj2 policy).mp. (159)
23 Organizational Change/ (8585)
24 'organi?ational policy'.mp. (265)
25 Health Care Delivery/ (18257)
26 Health Care Reform/ (1820)
27 'Health Services Accessibility'.mp. (35)
28 'Patient Care Team'.mp. (33)
29 Client Centered Therapy/ (2735)
30 health system chang*.mp. (53)
31 (system* adj2 chang*).mp. (5321)
32 (system* adj2 intervention*).mp. (2125)
33 (integrat* adj6 (smok* or tobacco)).ti,ab. (271)
34 (Organi?ation* adj2 intervention*).mp. (1121)
35 Organizational Structure/ (5829)
36 (organi?ation* adj2 chang*).mp. (12125)
37 (system* adj2 approach*).mp. (9728)
38 ((system* adj2 reform) or (Organi?ation* adj2 reform*)).mp. (727)
39 ((system* adj2 modif*) or (Organi?ation* adj2 modif*)).mp. (896)
40 'Organi?ational Innovation'.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (409)
41 Inservice Training/ (606)
42 ("environmental change" or "environmental changes").mp. (1997)
43 ("environmental intervention" or "environmental interventions").mp. (507)
44 "re?engineering".mp. (237)

45 'Hospital Restructuring'.mp. (25)
46 'Practice change'.mp. (312)
47 ((Identif* adj3 (smok* or tobacco*)) or (Document* adj3 (smok* or tobacco*))).mp. (1128)
48 ('Referral and Consultation').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (1255)
49 Guideline.mp. (4299)
50 'Practice Guideline'.mp. (494)
51 'Guideline Adherence'.mp. (173)
52 'Health Services Research'.mp. (1010)
53 'Patient Education'.ti,ab. (2360)
54 'Organi?ational Decision Making'.mp. (435)
55 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 (360336)
56 15 or 16 or 17 or 18 or 19 (30610)
57 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 (73937)
58 55 and 56 and 57 (813)

CINAHL (via EBSCOhost)

	Query	Results
S54	S51 AND S52 AND S53	1,209
S53	S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50	236,767
S52	S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18	811,258
S51	S1 OR S2 OR S3 OR S4	24,283
S50	(MH "Health Services Research")	10,706
S49	(MH "Guideline Adherence") OR (MH "Practice Guidelines")	57,316
S48	(MH "Referral and Consultation")	24,277
S47	(MH "Patient Education")	51,677
S46	"Practice change"	603
S45	(MH "Hospital Restructuring")	963
S44	're#engineering'	327
S43	'environmental intervention' or 'environmental interventions'	831
S42	'environmental change' or 'environmental changes'	1,068
S41	'Organi?ational Innovation'	204
S40	'inservice training'	109
S39	(MH "Patient Record Systems")	6,805
S38	(MH "Decision Making, Organizational")	2,873
S37	(MH "Patient Centered Care")	18,292
S36	(MH "Health Care Delivery, Integrated")	6,708
S35	'health care reform'	26,644

S34	Document* N3 (smok* or tobacco*)	404
S33	Identif* N3 (smok* or tobacco*)	961
S32	(system* N2 modif*) or (Organi?ation* N2 modif*)	763
S31	(system* N2 reform) or (Organi?ation* N2 reform*)	784
S30	(system* N2 approach*)	4,823
S29	(organi?ation* N2 chang*)	10,913
S28	(MM "Organizational Structure")	1,937
S27	(Organi?ation* N2 intervention*)	511
S26	(integrat* N6 (smok* or tobacco))	248
S25	(system* N2 intervention*)	2,078
S24	(system* N2 chang*)	3,348
S23	'health system change'	1,114
S22	(MH "Organizational Policies") OR (MH "Hospital Policies")	14,383
S21	(hospital N2 policy)	5,646
S20	(dedicat* N2 staff*)	177
S19	(educat* N5 (smok* or tobacco))	2,933
S18	(MH "Placebos")	9,639
S17	(MH "Meta Analysis")	24,128
S16	(MH "Comparative Studies")	83,541
S15	(MH "Evaluation Research")	22,274
S14	(MH "Program Evaluation")	26,091
S13	(volunteer* or prospectiv*)	345,622
S12	((singl* or doubl* or trebl* or tripl*) N5 (blind* or mask*))	49,727
S11	(clin* N5 trial*) or placebo* or random*	325,201
S10	(MH "Prospective Studies")	278,691
S9	(MH "Retrospective Design")	146,000

S8	(MH "Single-Blind Studies") OR (MH "Triple-Blind Studies") OR (MH "Double-Blind Studies")	42,604
S7	(MH "Random Assignment")	40,570
S6	(MH "Clinical Trials")	122,179
S5	(MH "Randomized Controlled Trials")	40,858
S4	AB 'smoking cessation'	5,583
S3	(quit* OR stop* OR ceas* OR give*) N3 smoking.	4,194
S2	(MH "Tobacco") OR (MH "Tobacco, Smokeless") OR (MH "Tobacco Abuse (Saba CCC)") OR (MH "Tobacco Abuse Control (Saba CCC)")	6,519
S1	(MH "Smoking Cessation") OR "smoking cessation" OR (MH "Smoking Cessation Programs") OR (MH "Smoking Cessation Assistance (Iowa NIC)")	17,970

Appendix 2: Chapter 3 — Institutional Ethics Approvals

- Monash University Human Research Ethics Committee
- Austin Health Human Research Ethics Committee
- The Alfred Human Research Ethics Committee
- Barwon Health Human Research Ethics Committee

MONASH University
Monash University Human Research Ethics Committee (MUHREC)
Research Office

Confirmation of Registration

This is to certify that the project below is now registered with the Monash University Human Research Ethics Committee under the Memorandum of Agreement with the Alfred HREC.

Project Number	CF15/4533 - 2015001961
Project Title	Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals
Chief Investigator	Dr Johnson George
Date Approved:	1 December 2015 **Valid until:** 1 December 2020

Terms:

1. **Registration** is valid whilst you hold a position at Monash University and approval at the primary HREC is current.
2. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
3. **End of project:** Notification should be provided at the conclusion of the project. MUHREC should also be notified if the project is discontinued before the expected date of completion.
4. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to the project in accordance with The *Australian Code for the Responsible Conduct of Research*.

[redacted]

Professor Nip Thomson
Chair, MUHREC

cc: Prof Michael Abramson, Dr Billie Bonevski, Prof Michael Dooley, Dr Simone Taylor, Ms Susan Poole, Mr Gregory Weeks, Mr Dennis Thomas

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Human Research Ethics Committee
Research Ethics Unit
Henry Buck Building
Austin Hospital

TO:	**Dr Johnson George** **Monash University** **381 Royal Parade, Parkville**
PROJECT:	Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals.
PROTOCOL NO:	
PROJECT NO:	H2011/04438
FROM:	**Ms Jill Davis, Research Ethics Unit Manager**
DATE:	1 December 2011
RE:	**Protocol Version 2 dated 10 October 2011** **Participant Information and Consent Form Version 4 dated 18 November 2011**
Approval Period:	**1 December 2011 to 1 December 2014**

Agenda Item: 5.1

Further to my letter dated 27 October 2011 concerning the above detailed project, I am writing to acknowledge that your response to the issues raised by the Human Research Ethics Committee at their meeting on 20 October 2011 is satisfactory. This project now has full ethical approval for a period of three years from the date of this letter.

Before the study can commence you must ensure that you have:

- A signed Clinical Trial Agreement
- Signed indemnities
- A copy of the CTN acknowledgment from the TGA. Please note a copy of the acknowledgement is to be forwarded to the Research Ethics Unit.
- For trials involving radiation it is your responsibility to ensure the research is added to the Austin Health Management Licence issued by Department of Human Services – Radiation Safety Section prior to study commencement should it be required (check your Medical Physicist Report). The HREC must be notified when the research has been added to the licence.
- It is a requirement that a progress report is submitted to the Committee annually, or more frequently as directed. Please note a final report must be submitted for all studies. Should you plan for your study to go beyond the 3-year ethics approval, please request in writing an extension of ethics approval prior to its lapsing. If your study will not commence within 12 months, a request must be forwarded to the HREC justifying the delay beyond 12

months. Should such a request not be received, ethics approval will lapse and a resubmission to the HREC will then be necessary.

- After commencement of your study, should the trial be discontinued prematurely you must notify the HREC of this, citing the reason.
- Any changes to the original application will require a submission of a protocol amendment for consideration as this approval only relates to the original application as detailed above.
- Please notify the HREC of any changes to research personnel. All new investigators must be approved prior to performing any study related activities.
- It is now your responsibility to ensure that all people (i.e. all investigators, sponsor and other relevant departments in the hospital) associated with this particular study are made aware of what has been approved.

The Committee wishes to be informed as soon as practicable of any untoward effects experienced by any participant in the trial where those effects in degree or nature were not anticipated by the researchers. The HREC has adopted the NHMRC Australian Health Ethics Committee (AHEC) Position Statement 'Monitoring and reporting of safety for clinical trials involving therapeutic products' May 2009

Please ensure you frequently refer to the Research Ethics Unit website http://www.austin.org.au/Page.aspx?ID=415 for all up to date information about research and ethical requirements.

DETAILS OF ETHICS COMMITTEE:
It is the policy of the Committee not to release personal details of its members. However I can confirm that at the meeting at which the above project was considered, the Committee fulfilled the requirements of the National Health and Medical Research Council in that it contained men and women encompassing different age groups and included people in the following categories:

Chairperson Ethicist Lawyer Lay Man Lay Woman Person fulfilling a Pastoral Care Role Person with Counselling Experience Person with Research Experience		**Additional members include:** • Chairs of all sub committees, or nominees • Other persons as considered appropriate for the type/s of research usually being considered

I confirm that the Principal Investigator or Co-Investigators were not involved in the approval of this project. I further confirm that all relevant documentation relating to this study is kept on the premises of Austin Health for more than three years.

The Committee is organised and operates according to the National Statement on Ethical Conduct in Human Research (NHMRC The National Statement) and the Note for Guidance on Good Clinical Research Practice (CPMP/ICH/135/95) annotated with

TGA comments (July 2008) and the applicable laws and regulations; and the Health Privacy Principles in The Health Records Act 2001.

PLEASE NOTE: The Committee requests that the Research Ethics Unit ethics@austin.org.au) is informed of the actual starting date of the study as soon as the study commences. A written notice (e-mail, fax or letter) is considered the appropriate format for notification.

[redacted]

This HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human Research (2007), NHMRC and Universities Australia Australian Code for the Responsible Conduct of Research (2007) and the CPMP/ICH Note for Guidance on Good Clinical Practice. The process this HREC uses to review multi-centre research proposals has been certified by the NHMRC.

TheAlfred

ETHICS COMMITTEE CERTIFICATE OF APPROVAL

This is to certify that

Project No: 314/11

Project Title: Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals

Principal Researcher: Dr Johnson George

Participant Information and Consent Form version 2.0 **dated:** 15-Aug-2011

was considered by the Ethics Committee on ***25-Aug-2011*** *and* ***APPROVED*** *on* **25-Aug-2011**

It is the Principal Researcher's responsibility to ensure that all researchers associated with this project are aware of the conditions of approval and which documents have been approved.

The Principal Researcher is required to notify the Secretary of the Ethics Committee, via amendment or progress report, of

- Any significant change to the project and the reason for that change, including an indication of ethical implications (if any);
- Serious adverse effects on participants and the action taken to address those effects;
- Any other unforeseen events or unexpected developments that merit notification;
- The inability of the Principal Researcher to continue in that role, or any other change in research personnel involved in the project;
- Any expiry of the insurance coverage provided with respect to sponsored clinical trials and proof of re-insurance;
- A delay of more than 12 months in the commencement of the project; and,
- Termination or closure of the project.

Additionally, the Principal Researcher is required to submit

- A Progress Report on the anniversary of approval and on completion of the project *(forms to be provided)*;

The Ethics Committee may conduct an audit at any time.

All research subject to the Alfred Hospital Ethics Committee review must be conducted in accordance with the National Statement on Ethical Conduct in Human Research (2007).

The Alfred Hospital Ethics Committee is a properly constituted Human Research Ethics Committee in accordance with the National Statement on Ethical Conduct in Human Research (2007).

SPECIAL CONDITIONS

None

SIGNED: [redacted]
Chair, Ethics Committee (or delegate)

R. FREW
SECRETARY
ETHICS COMMITTEE

Please quote Project No and Title in all correspondence

Corporate Office
Ryrie Street
Geelong, 3220
PO Box 281
Geelong, 3220
[redacted]
ABN 45 877 249 165

Mr Greg Weeks
Pharmacy
Barwon Health

20 October 2011

Dear Greg

Study title: Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals

Barwon Health reference: 11/91
Protocol number: n/a
Research Team:

Thank you for submitting the above for our consideration. Your project was approved by the Research Review Committee (RRC), sub committee to the Barwon Health Human Research Ethics Committee (HREC) as low risk as stated in the National Statement section 2.1.6 in which the only foreseeable risk is one of discomfort. This decision was ratified by the Chair of the Barwon Health HREC and was approved based on the prior ethical approval by The Alfred's HREC.

This approval will be forwarded to the HREC for endorsement at the upcoming meeting. In the interim, however, you may start the project from the date of this letter.

The site to which this approval pertains includes: Barwon Health

Please note that in addition to the HREC approval, site specific authorisation is required at all sites participating in the project before the project commences. Please submit the signed SSA or Module 6 together with this letter to the Research Governance Officer/ site delegate for authorisation. This applies to each site participating in the study under the auspices of this approval.

Your obligations under this approval include notifying the Committee of any intent to deviate from the approved protocol and of the occurrence of any untoward events.

It is now your responsibility to undertake the following:

1. To inform the relevant personnel of this approval
2. To ensure, if applicable, that accurate documentation of the consent process is recorded in the participant's Barwon Health history and that a copy of the participant information and consent form is also placed in the Barwon Health history.
3. To advise the Committee, in writing, of any changes and the rationale for the changes you wish to make to the running of the project, including extending beyond the anticipated completion date or any discontinuation prior to the expected date.
4. To advise the Committee, in writing, of any adverse events that impact upon the site
5. To supply written annual reports on the anniversary of your approval advising of the

progress of the project and a final report advising of completion

6. Please note: Research projects to be undertaken at private institutions are not covered by the Barwon Health Medical Malpractice Policy.

   In the case of medical research, care should be taken to ensure that the investigator's medical insurance policy is current and the institute in which the research is conducted is adequately insured. It is the responsibility of the investigator to ensure adequate coverage in the event of litigation

Please note that template forms for reporting changes to the project and annual reports may be obtained from the Barwon Health website
http://www.barwonhealth.org.au/research/default.aspx

Barwon Health may conduct as audit of your project at any time.

Should you require any further information concerning the Committee's approval of your research or have any concerns regarding the reporting requirements please contact the Office for Research, on [redacted]

Finally, in all future correspondence regarding your study please quote the Barwon Health reference number and full title of your research project.

On behalf of the Committee, best wishes for your project.

[redacted]

Chair
Research Review Committee

Appendix 3: Chapter 3 — Participant Information and Consent Forms

- Austin Health
- The Alfred
- Barwon Health

Austin Health

Version 4.0
Date: 18 Nov2011

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FAH018178

PARTICIPANT INFORMATION AND CONSENT FORM

Participant Information and Consent Form
Version 4.0, Dated 18/11/2011
Project No. H2011/04438
Protocol No. Version 2 dated 10 October 2011

Participant Information and Consent Form
Austin Health

Full Project Title: Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals

Principal Researcher: Dr Johnson George

Associate Researchers: Prof Michael Abramson, Dr Billie Bonevski, Prof Michael Dooley, Ms Susan Poole, Dr Simone Taylor, Mr Greg Weeks

1. Introduction

You are invited to take part in this research project. This is because your medical records indicate that you smoke and your health professionals thought that you may match the entry criteria for this study. This research project aims to evaluate a smoking cessation program, and commences while you are an inpatient in hospital and continues for 12 months after you return home.

This Participant Information and Consent Form tells you about the research project. It explains what is involved to help you decide if you want to take part. Please read this information carefully. Please feel free to ask questions on anything that you don't understand or want to know more about. Before deciding whether or not to take part, you might want to talk about it with a relative, friend or your local health worker. Participation in this research is voluntary. If you don't wish to take part, you don't have to.

If you decide you would like to take part in the research project, you will be asked to sign the consent section. By signing this you are telling us that you:

- understand what you have read;
- consent to take part in the research project;
- consent to be involved in the procedures described;
- consent to the use of your personal and health information as described.

You will be given a copy of this Participant Information and Consent Form to keep.

Austin Health

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Date: 18 Nov2011

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2. What is the purpose of this research?

Most Australian hospitals are 'smoke free' meaning patients, staff and visitors are not permitted to smoke on the hospital grounds. However, there are no set processes for helping patients to not smoke when they are admitted to hospital and after they are discharged. We don't know whether having hospitals 'smoke free' helps patients to stop smoking in the longer-term. This study will compare a smoking cessation program (GIVE UP FOR GOOD) to the support currently provided to people who are admitted to hospital. This project will help us work out the best way to support patients to give up smoking when they are admitted to Australian hospitals and potentially reduce smoking-related illness, death and healthcare costs.

600 participants from three Victorian hospitals (Alfred Health, Austin Health and Barwon Health) will be recruited for this project over 12 months. In total, 300 participants will receive routine care and 300 will receive the smoking cessation program GIVE UP FOR GOOD. You have a random chance of being in one of these two groups (like tossing a coin). That means, around 200 smokers will be recruited from each hospital – 100 will receive the current routine care and 100 will receive the new program. The main outcome that we are interested in is your report as to whether you have quit or are still smoking when you are discharged from hospital and at 1, 6 and 12 months after hospital discharge.

This research has been funded by the Australian Research Council and an investigator-initiated grant from Pfizer. This research will be used by Dennis Thomas to obtain a Doctor of Philosophy degree at Monash University.

3. What does participation in this research involve?

Participation in this project involves a series of interviews with a trained Research Assistant (employed by the research team) about you, your smoking, attempts to quit and attitudes to smoking cessation. Interviews will be organized during your hospital stay, at the time of hospital discharge, and 1, 6 and 12 months after discharge. The initial face to face interviews will take place at your bedside (if there is privacy) or in a private room in the ward or hospital. The face to face interviews after discharge will take place in a private room in the pharmacy department at the hospital or at a mutually convenient place. Interviews after you leave hospital could also take place over the phone or through a mail survey. Each interview will take approximately 15 minutes; the follow-up interviews will be shorter. If you report that you have quit smoking at 6 months and 12 months after discharge, you may be asked to do a carbon monoxide breath test to confirm your smoking status. The breath test involves blowing into a machine, a bit like doing a random alcohol breath test.

If you are assigned to the new smoking cessation program "Give up for Good", you will receive a series of smoking cessation counselling sessions from a pharmacist employed by the research team after the initial interview with the research assistant. Each counselling session may take 10-15 minutes. If you require prescription medications to assist smoking cessation, this will be discussed with your treating doctors(s) who may prescribe those medications for you. All smoking cessation medications during your hospital stay and one week supply for use after hospital discharge will be provided free of charge. If you require further supply of these medications you may need to contact your primary care professionals such as general practitioner and/or community pharmacist. The study pharmacist will also discuss with you the importance of long-term quitting and strategies to minimise temptation to restart smoking. They may contact you after one week and then after one month to reinforce the importance of smoking cessation. All the details regarding smoking cessation will be documented and transferred to your primary care professionals. Appointments with primary care professionals will also be made on

your behalf for further assistance with relapse prevention strategies. You may also be reminded to seek support from your primary health professionals for ongoing smoking cessation support.

If you are assigned to the routine care group, you may receive smoking cessation supports provided by your doctors, nurses and other hospital staff. These staff may offer you counselling sessions, medications such as nicotine replacement to suit your current level of smoking. These staff may communicate your smoking cessation plan in their routine communication with your general practitioner after you leave hospital. You still need to attend interviews with the research assistant.

You will not be paid for your participation in this research. However, any travel expenses for follow-up interviews or data collection will be reimbursed.

4. What are the possible benefits?

We cannot guarantee or promise that you will receive any benefits from this research. This study may inform the development of smoking cessation services in the future for patients attending Victorian hospitals.

5. What are the possible risks?

We do not foresee any risks or discomforts from your participation in this research other than time commitments. If you are assigned to the routine care group you will continue to receive routine care from your health care providers and will not receive the "Give up for Good" program.

Your health professionals may recommend medications to assist quitting as part of routine care or the smoking cessation program. Some medications to assist quitting have been shown to cause mild short-term side effects in some people. See below some of the side effects reported for each medication. These effects are those that may occur when these medications are used as part of this study or as part of routine care:
Nicotine patch: Skin sensitivity and irritation (up to 40% initially, but usually resolves within 48 hours), abnormal dreams, insomnia (up to 6%), nausea, dyspepsia

Nicotine inhaler: Mild local irritation of mouth and throat, coughing, rhinitis that may decline with continued use

Nicotine gum: Mouth soreness, hiccups, dyspepsia, jaw ache

Nicotine lozenge: Nausea, hiccups, heartburn, headache, coughing, mouth or throat irritation

Nicotine nasal spray: Mild nasal/throat irritation

Bupropion (Zyban): Insomnia, dry mouth, headache, nausea, dizziness, anxiety, skin rash, seizures (less than 0.1%),

Varenicline (Champix): nausea (almost 30% initially), headache, insomnia, sleep disturbance, abnormal/vivid/strange dreams (about 13%).

The hospital study pharmacist and other health professionals will explain these side effects to you before recommending those medications and you can decide whether to use those medications or not. Any prescription medication (if required) will be prescribed by your treating doctors after discussion with you. The study pharmacist may also consult with your GP and community pharmacist regarding the treatment options and inform them of the treatment you select whilst in hospital.

Austin Health

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The duration of each interview will be approximately 15 minutes and will be organised at a place and time convenient for you. Participation may make you think about the harmful effects of smoking and may prompt you to quit smoking.

If you become upset or distressed as a result of your participation, the researcher will be able to arrange for counselling or other appropriate support. Any counselling or support will be provided by staff who are not members of the research team.

6. What if new information arises during this research project?

During the research project, new information about the risks and benefits of the project may become known to the researchers. If this occurs, you will be told about this new information and your doctor will discuss whether this new information affects you.

7. Can I have other treatments during this research project?

It is important to tell your doctor and the research staff about any treatments or medications you may be taking, including over-the-counter medications, vitamins or herbal remedies, acupuncture or other alternative treatments. You should also tell your doctor about any changes to these during your participation in the research.

8. Are there alternatives to participation?

Participation in this research is not your only option. Your other options may include: asking your hospital doctor, pharmacist or nurse for some assistance to help you not to smoke during your hospital stay and asking your General Practitioner or community pharmacy for assistance after you leave hospital. You may also contact the QUIT program on telephone number 131 848 or at www.quit.org.au to find out about assistance that they are able to provide you. Discuss these options with your doctor, pharmacist or other hospital health professionals before deciding whether or not to take part in this research project.

9. Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at a later stage.

If you do not take part in the project, support for smoking cessation can be obtained through other health practitioners such as your general practitioner or community pharmacist.

Your decision whether to take part or not, or to take part and then withdraw, will not affect your relationship with the researchers or Austin Health or Monash University.

10. What if I withdraw from this research project?

If you decide to leave the project, the researchers would like to keep the personal and health information about you that has already been collected. This is to help them make sure that the results of the research can be measured properly. If you do not want them to do this, you must tell them before you withdraw from the research project.

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11. Could this research project be stopped unexpectedly?

We do not anticipate that this project will be stopped unexpectedly.

12. What will happen when my participation in this research project ends?

You can continue to see your local General Practitioner and other community health professionals who can help you quit smoking. If you are given some medication to help you stop smoking when you leave hospital, once this medication is used, you will be responsible for obtaining and paying for ongoing supplies.

13. How will I be informed of the results of this research project?

You may obtain a copy of the summary of the study findings when the research project is completed, by contacting Dr George in approximately 2 years or by going to the University website http://www.pharm.monash.edu.au/staff/jgeorge.html.

14. What else do I need to know?

- **What will happen to information about me?**

  All information collected as part of the project will be stored securely in locked filing cabinets and/or password protected computers at The Pharmacy Department of Austin Health. Only the researchers will have access to the data during this period and, after 15 years, it will be destroyed.

  Any information obtained for the purpose of this research project during interviews or from medical records that can identify you will be treated as confidential and securely stored. It will be disclosed only with your permission, or in compliance with the law. Once the study is complete, your name and any information that can be traced back to you will be removed from the study records. In any publication of the project results, there will be no way that you could be identified.

- **How can I access my information?**

  In accordance with relevant Australian and/or Victorian privacy and other relevant laws, you have the right to access the information collected and stored by the researchers about you. Please contact one of the researchers named at the end of this document if you would like to access your information.

  Further, in accordance with regulatory guidelines, the information collected in this research project will be kept for at least 15 years. You must be aware that the information will become non-identifiable at some point and access to information about you after this point will not be possible.

- **Is this research project approved?**

  The ethical aspects of this research project have been approved by the Human Research Ethics Committees of Austin Health.This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

Austin Health

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Date: 18 Nov2011

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FAH018170

15. Consent

I have read, or have had this document read to me in a language that I understand, and I understand the purposes, procedures and risks of this research project as described within it.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project, as described.

I understand that I will be given a signed copy of this document to keep.

Participant's name (printed) .....

Signature Date

Declaration by researcher: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) .....

Signature Date

Witness' name (printed) .....

Signature Date

Note: All parties signing the consent section must date their own signature.

I would like to receive a copy of the study findings ☐

Austin Health

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Date: 18 Nov2011

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16. Who can I contact?

The person you may need to contact will depend on the nature of your query. Therefore, please note the following:

For further information or appointments:
If you want any further information concerning this project or if you have any medical problems which may be related to your involvement in the project (for example, any side effects), you can contact:

Name: Dr. Johnson George

Role: Principal Investigator

[redacted]

Name: Simone Taylor

Role: Chief Investigator and 24 hour medical contact

[redacted]

For complaints:

If you wish to contact someone, independent of the study, about ethical issues or your rights or to make a complaint, you may contact Jill Davis, Manager Research Ethics Unit, Austin Health , [redacted]

Participant Information and Consent Form
The Alfred

Full Project Title: **Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals**

Principal Researchers: Dr Johnson George, Prof Michael Abramson, Dr Billie Bonevski, Prof Michael Dooley, Ms Susan Poole, Dr Simone Taylor, Mr Greg Weeks

1. Introduction

You are being invited to take part in this research project. This is because your health records indicate that you smoke and your health professionals thought that this project might be suitable for you. This research project aims to evaluate a smoking cessation program, and commences while you are an inpatient in hospital and continues for 12 months after you return home.

This Participant Information and Consent Form tells you about the research project. It explains what is involved to help you decide if you want to take part. Please read this information carefully. Please feel free to ask questions on anything that you don't understand or want to know more about. Before deciding whether or not to take part, you might want to talk about it with a relative, friend or your local health worker. Participation in this research is voluntary. If you don't wish to take part, you don't have to.

If you decide you would like to take part in the research project, you will be asked to sign the consent section. By signing this you are telling us that you:

- understand what you have read;
- consent to take part in the research project;
- consent to be involved in the procedures described;
- consent to the use of your personal and health information as described.

You will be given a copy of this Participant Information and Consent Form to keep.

2. What is the purpose of this research project?

Most Australian hospitals are 'smoke free' meaning patients, staff and visitors are not permitted to smoke on the hospital grounds. However, there are no set processes for helping patients to not smoke when they are admitted to hospital and after they are discharged. We don't know whether having hospitals 'smoke free' helps patients to stop smoking in the longer-term. This study will compare a special smoking cessation program (GIVE UP FOR GOOD) to the support currently provided to people who are admitted to hospital. This project will help us work out the best way to support patients to give up smoking when they are admitted to Australian hospitals and potentially reduce smoking-related illness, death and healthcare costs.

600 participants from three Victorian hospitals (Alfred Health, Austin Health and Barwon Health) will be recruited for this project over 12 months. In total, 300 participants will receive routine care and 300 will receive the smoking cessation program GIVE UP FOR GOOD. You have a random chance of being in one of these two groups (like tossing a coin).That means, around 200 smokers will be recruited from each hospital – 100 will receive the current routine care and 100 will receive the new program. The main outcome that we are interested in is your report as to whether you have quit or are still smoking when you are discharged from hospital and at 1, 6 and 12 months after hospital discharge.

This research has been funded by the Australian Research Council and an investigator-initiated grant from Pfizer.

3. What does participation in this research project involve?

Participation in this project involves a series of interviews with a trained Research Assistant about yourself, your smoking, attempts to quit and attitudes to smoking cessation. Interviews will be organized during your hospital stay, at the time of hospital discharge or soon after discharge, and 1, 6 and 12 months after discharge. Post-discharge data collection could be over the phone, face-to-face or through a mail survey. Each interview will take approximately 15 minutes; the follow-up interviews will be shorter. You may be asked to do a breath test or a saliva test at 6 months and 12 months to confirm your smoking status. The breath test involves blowing into a machine, a bit like doing a random alcohol breath test. The saliva test involves wiping a swab stick on the inside of your cheek.

During your hospital stay you may receive smoking cessation support from a pharmacist and nurse or other health professionals. You may be offered counseling sessions, medications such as nicotine replacement to suit your current level of smoking, according to approved guidelines. Each session with a health professional will last approximately 10 minutes. The number of sessions and their duration will depend on your interest in the support offered and your requirements. When you are discharged from hospital, the pharmacist may communicate with your General Practitioner and community pharmacist about further smoking cessation support.

You will not be paid for your participation in this research. However, any travel expenses for follow-up interviews or data collection will be reimbursed.

4. What are the possible benefits?

We cannot guarantee or promise that you will receive any benefits from this research. However, possible benefits may include receiving smoking cessation support during hospital stay and after hospital discharge. This study may inform the development of smoking cessation services in the future for patients attending Victorian hospitals.

5. What are the possible risks?

We do not foresee any risks or discomforts from your participation in this research other than time commitments. Some medications to assist quitting have been shown to cause mild side effects in small proportions of people. The pharmacist and other health professionals will explain these side effects to you before initiating those medications and you can decide whether to use those medications or not. The duration of each interview will be approximately 15 minutes and will be organised at a place and time convenient for you. Participation may make you think about the harmful effects of smoking and may prompt you to quit smoking.

If you become upset or distressed as a result of your participation, the researcher will be able to arrange for counselling or other appropriate support. Any counselling or support will be provided by staff who are not members of the research team.

6. Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at a later stage.

If you do not take part in the project, support for smoking cessation can be obtained through other health practitioners such as your general practitioner or community pharmacist.

If you decide to leave the project, the researchers would like to keep the personal and health information about you that has already been collected. This is to help them make sure that the results of the research can be measured properly. If you do not want them to do this, you must tell them before you withdraw from the research project.

Your decision whether to take part or not, or to take part and then withdraw, will not affect your relationship with the researchers or Alfred Health or Monash University.

7. How will I be informed of the final results of this research project?

You may obtain a copy of the summary of the study findings when the research project is completed, by contacting Dr George in approximately 2 years or by going to the University website http://www.pharm.monash.edu.au/staff/jgeorge.html.

8. What will happen to information about me?

All information collected as part of the project will be stored securely in locked filing cabinets and/or password protected computers at The Pharmacy Department of Alfred Health. Only the researchers will have access to the data during this period and, after 7 years, it will be destroyed.

Any information obtained for the purpose of this research project during interviews or from medical records that can identify you will be treated as confidential and securely stored. It will be disclosed only with your permission, or in compliance with the law. Once the study is complete, your name and any information that can be traced back to you will be removed from the study records. In any publication of the project results, there will be no way that you could be identified.

9. Can I access research information kept about me?

In accordance with relevant Australian and/or Victorian privacy and other relevant laws, you have the right to access the information collected and stored by the researchers about you. Please contact one of the researchers named at the end of this document if you would like to access your information.

Further, in accordance with regulatory guidelines, the information collected in this research project will be kept for at least 7 years. You must be aware that the information will become non-identifiable at some point and access to information about you after this point will not be possible.

10. Is this research project approved?

The ethical aspects of this research project have been approved by the Human Research Ethics Committees of Alfred Health, Austin Health, Barwon Health and Monash University.

This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

11. Consent

I have read, or have had this document read to me in a language that I understand, and I understand the purposes, procedures and risks of this research project as described within it.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project, as described.

I understand that my primary health care providers (general practitioner and/or community pharmacist) may me notified about my participation in the study and all my details about smoking cessation may be transferred to them.

I understand that I will be given a signed copy of this document to keep.

Participant's name (printed) .....

Signature Date

Declaration by researcher: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) .....

Signature Date

Witness' name (printed) .....

Signature Date

Note: All parties signing the consent section must date their own signature.

I would like to receive a copy of the study findings ☐

12. Who can I contact?

The person you may need to contact will depend on the nature of your query. Therefore, please note the following:

For further information or appointments:

If you want any further information concerning this project or if you have any medical problems which may be related to your involvement in the project (for example, any side effects), you can contact:

Name: Susan Poole

Role: Chief Investigator and 24 hour medical contact

[redacted]

For complaints:

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:

Name: Rowan Frew

Position: Ethics Manager, The Alfred

[redacted]

Participant Information and Consent Form
Barwon Health

Full Project Title: **Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals**

Principal Researchers: Dr Johnson George, Prof Michael Abramson, Dr Billie Bonevski, Prof Michael Dooley, Ms Susan Poole, Dr Simone Taylor, Mr Greg Weeks

1. Introduction

You are being invited to take part in this research project. This is because your health records indicate that you smoke and your health professionals thought that this project might be suitable for you. This research project aims to evaluate a smoking cessation program, and commences while you are an inpatient in hospital and continues for 12 months after you return home.

This Participant Information and Consent Form tells you about the research project. It explains what is involved to help you decide if you want to take part. Please read this information carefully. Please feel free to ask questions on anything that you don't understand or want to know more about. Before deciding whether or not to take part, you might want to talk about it with a relative, friend or your local health worker. Participation in this research is voluntary. If you don't wish to take part, you don't have to.

If you decide you would like to take part in the research project, you will be asked to sign the consent section. By signing this you are telling us that you:

- understand what you have read;
- consent to take part in the research project;
- consent to be involved in the procedures described;
- consent to the use of your personal and health information as described.

You will be given a copy of this Participant Information and Consent Form to keep.

2. What is the purpose of this research project?

Most Australian hospitals are 'smoke free' meaning patients, staff and visitors are not permitted to smoke on the hospital grounds. However, there are no set processes for helping patients to not smoke when they are admitted to hospital and after they are discharged. We don't know whether having hospitals 'smoke free' helps patients to stop smoking in the longer-term. This study will compare a special smoking cessation program (GIVE UP FOR GOOD) to the support currently provided to people who are admitted to hospital. This project will help us work out the best way to support patients to give up smoking when they are admitted to Australian hospitals and potentially reduce smoking-related illness, death and healthcare costs.

600 participants from three Victorian hospitals (Alfred Health, Austin Health and Barwon Health) will be recruited for this project over 12 months. In total, 300 participants will receive routine care and 300 will receive the smoking cessation program GIVE UP FOR GOOD. You have a random chance of being in one of these two groups (like tossing a coin).That means, around 200 smokers will be recruited from each hospital – 100 will receive the current routine care and 100 will receive the new program. The main outcome that we are interested in is your report as to whether you have quit or are still smoking when you are discharged from hospital and at 1, 6 and 12 months after hospital discharge.

This research has been funded by the Australian Research Council and an investigator-initiated grant from Pfizer.

3. What does participation in this research project involve?

Participation in this project involves a series of interviews with a trained Research Assistant about yourself, your smoking, attempts to quit and attitudes to smoking cessation. Interviews will be organized during your hospital stay, at the time of hospital discharge, and 1, 6 and 12 months after discharge. Post-discharge data collection could be over the phone, face-to-face or through a mail survey. Each interview will take approximately 15 minutes; the follow-up interviews will be shorter. You may be asked to do a breath test or a saliva test at 6 months and 12 months to confirm your smoking status. The breath test involves blowing into a machine, a bit like doing a random alcohol breath test. The saliva test involves wiping a swab stick on the inside of your cheek.

During your hospital stay you may receive smoking cessation support from a pharmacist and nurse or other health professionals. You may be offered counseling sessions, medications such as nicotine replacement to suit your current level of smoking, according to approved guidelines. Each session with a health professional will last approximately 10 minutes. The number of sessions and their duration will depend on your interest in the support offered and your requirements. When you are discharged from hospital, the pharmacist may communicate with your General Practitioner and community pharmacist about further smoking cessation support.

You will not be paid for your participation in this research. However, any travel expenses for follow-up interviews or data collection will be reimbursed.

4. What are the possible benefits?

We cannot guarantee or promise that you will receive any benefits from this research. However, possible benefits may include receiving smoking cessation support during hospital stay and after hospital discharge. This study may inform the development of smoking cessation services in the future for patients attending Victorian hospitals.

5. What are the possible risks?

We do not foresee any risks or discomforts from your participation in this research other than time commitments. Some medications to assist quitting have been shown to cause mild side effects in small proportions of people. The pharmacist and other health professionals will explain these side effects to you before initiating those medications and you can decide whether to use those medications or not. The duration of each interview will be approximately 15 minutes and will be organised at a place and time convenient for you. Participation may make you think about the harmful effects of smoking and may prompt you to quit smoking.

If you become upset or distressed as a result of your participation, the researcher will be able to arrange for counselling or other appropriate support. Any counselling or support will be provided by staff who are not members of the research team.

6. Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at a later stage.

If you do not take part in the project, support for smoking cessation can be obtained through other health practitioners such as your general practitioner or community pharmacist.

If you decide to leave the project, the researchers would like to keep the personal and health information about you that has already been collected. This is to help them make sure that the results of the research can be measured properly. If you do not want them to do this, you must tell them before you withdraw from the research project.

Your decision whether to take part or not, or to take part and then withdraw, will not affect your relationship with the researchers or Alfred Health or Monash University.

7. How will I be informed of the final results of this research project?

You may obtain a copy of the summary of the study findings when the research project is completed, by contacting Dr George in approximately 2 years or by going to the University website http://www.pharm.monash.edu.au/staff/jgeorge.html.

8. What will happen to information about me?

All information collected as part of the project will be stored securely in locked filing cabinets and/or password protected computers at The Pharmacy Department of Alfred Health. Only the researchers will have access to the data during this period and, after 7 years, it will be destroyed.

Any information obtained for the purpose of this research project during interviews or from medical records that can identify you will be treated as confidential and securely stored. It will be disclosed only with your permission, or in compliance with the law. Once the study is complete, your name and any information that can be traced back to you will be removed from the study records. In any publication of the project results, there will be no way that you could be identified.

9. Can I access research information kept about me?

In accordance with relevant Australian and/or Victorian privacy and other relevant laws, you have the right to access the information collected and stored by the researchers about you. Please contact one of the researchers named at the end of this document if you would like to access your information.

Further, in accordance with regulatory guidelines, the information collected in this research project will be kept for at least 7 years. You must be aware that the information will become non-identifiable at some point and access to information about you after this point will not be possible.

10. Is this research project approved?

The ethical aspects of this research project have been approved by the Human Research Ethics Committees of Alfred Health, Austin Health, Barwon Health and Monash University.

This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

11. Consent

I have read, or have had this document read to me in a language that I understand, and I understand the purposes, procedures and risks of this research project as described within it.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project, as described.

I understand that I will be given a signed copy of this document to keep.

Participant's name (printed) .....

Signature Date

Declaration by researcher: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) .....

Signature Date

Witness' name (printed) .....

Signature Date

Note: All parties signing the consent section must date their own signature.

I would like to receive a copy of the study findings ☐

12. Who can I contact?

The person you may need to contact will depend on the nature of your query. Therefore, please note the following:

For further information or appointments:

If you want any further information concerning this project or if you have any medical problems which may be related to your involvement in the project (for example, any side effects), you can contact:

Name: Greg Weeks

Role: Barwon Site Chief Investigator

[redacted]

For complaints:

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:

Name: Bernice Davies

Position: RGO/HREC Manager, Barwon Health

[redacted]

Appendix 4: Chapter 3

Case Report Form

Study ID: _____ *GIVE UP FOR GOOD©*

GIVE UP FOR GOOD©: Data Collection Form

Baseline

Name: _____

☐ Male ☐ Female

Affix Bradhma here

UR No: _____

Age in years: _____

Ward/Bed: _____

Address: _____

_____

_____

Contact Telephone Number: _____

Best day of week, or time of day to call: _____

Email address (optional):_____

Name of General Practitioner, Address & Contact details: _____

_____

_____

Name of Community Pharmacist, Address & Contact details: _____

_____

_____

Data entered by: _____

Date: ____/____/_____

Time: ____:_____

(Remove this page at the end of the interview and keep in the study folder in a locked cabinet)

Study ID: _____ *GIVE UP FOR GOOD©*

Part A: Some general questions about you

1. In which country were you born?

☐ Australia ☐ China ☐ Greece ☐ Italy ☐ Lebanon ☐ Malaysia
☐ Russia ☐ United Kingdom ☐ Vietnam ☐ Other (specify) _____

2. In what language do you mainly speak to your family members?

☐ English ☐ Other (specify) _____

3. What is your highest level of education?

☐ No formal schooling ☐ Primary school ☐ High school
☐ Technical/further education (including TAFE) ☐ University education
☐ Other (specify) _____

4. What is your current employment status?

☐ Employed (full-time) ☐ Employed (part-time) ☐ Retired/Pensioner
☐ Student ☐ Unemployed ☐ Home duties ☐ Disabled/unable to work

5. What is your marital status?

☐ Married ☐ De-facto ☐ Widowed
☐ Never married ☐ Separated/Divorced ☐ Other (specify) _____

6. What is your current living arrangement?

☐ Live with spouse or partner ☐ Live with friends ☐ Live alone at home
☐ Live in a residential facility ☐ Other, specify _____

7. What is your average annual household gross income in dollars?

☐ $29,999 or less ☐ $30,000 to $59,999 ☐ $60,000 or more
☐ Do not want to disclose

8. Do you have an Australian healthcare concession card? **(tick more than one, if relevant)**

☐ No concession card
☐ Healthcare card
☐ Pensioner concession card
☐ Commonwealth Seniors Health card
☐ Repatriation Health Card
☐ Repatriation Pharmaceutical Benefits card

Part B: Some questions about your health and well-being

9. What is the reason for your current hospital admission? _____

_____

10. Over the past two weeks, how often have you been bothered by any of the following problems?

Little interest or pleasure in doing things

☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day

Feeling down, depressed, or hopeless

☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day

Study ID: _____ *GIVE UP FOR GOOD©*

Part C: Questions about your smoking

11. Did you smoke tobacco up until your admission to hospital?

☐ Yes, daily

☐ Yes, occasionally

a. Have you smoked at least once in the last 7 days?

☐ Yes

☐ No (Patient should be excluded from study)

☐ No, I am an ex-smoker (Patient should be excluded from study)

☐ No, I have never smoked (Patient should be excluded from study)

12. At what age did you first start smoking? _____

13. Does anyone (excluding you) in your household smoke? ☐ Yes ☐ No ☐ Don't know

14. Do any of your friends smoke? ☐ Yes ☐ No ☐ Don't know

15. How soon after you wake up do you smoke your first cigarette*?

☐ Within 5 minutes ☐ 5–30 minutes ☐ 31–60 minutes ☐ After 60 minutes

16. How many cigarettes do you smoke each day/week?

**Number of cigarettes per day (if you smoke daily):.....

Number of cigarettes per week (if you smoke occasionally):.....

17. On average, how much money do you spend on cigarettes per day/week?

$ ...../day **OR** $...../ Week

FOR RESEARCH ASSISTANT USE ONLY

Heaviness of Smoking Index	Please tick (✓) one box for each question	
*How soon after you wake up do you smoke your first cigarette?	Within 5 mins 5 – 30 mins 31 – 60 mins 60+ mins	☐ 3 points ☐ 2 points ☐ 1 point ☐ 0 point
**How many cigarettes do you smoke each day?	10 or less 11 – 20 21 – 30 31 or more	☐ 0 point ☐ 1 point ☐ 2 points ☐ 3 points
	Total Score	3 or less – ☐ Light Smoker 4 or more – ☐ Heavy smoker

Study ID: _____ *GIVE UP FOR GOOD©*

18. Listed below are situations that lead some people to smoke. We would like to know HOW TEMPTED you may be to smoke in each situation. Please answer the following questions on a scale of 1 = 'Not at all tempted' to 5 = 'Extremely tempted' following five point scale.

Statements	Not at all tempted	Not very tempted	Moderately tempted	Very tempted	Extremely tempted
With friends at a party					
When I first get up in the morning					
When I am very anxious and stressed					
Over coffee while talking and relaxing					
When I feel I need a lift					
When I am very angry about something or someone					
With my spouse or close friend who is smoking					
When I realize I haven't smoked for a while					
When things are not going my way and I am frustrated					

19. Have you quit smoking for <u>at least 1 day</u> in the past 12 months?

☐ Yes ☐ No (if No, go to question 20)

a. How many times have you quit smoking for at least 1 day in the past 12 months? _____

b. How many days were you smoke-free on your most recent quit attempt? _____

c. Have you used anything to assist quitting in the past? ☐ Yes (specify below) ☐ No

☐ Nicotine replacement

☐ Patch Strength/Duration (24/16hr): _____
☐ Gum Strength/Dose: _____
☐ Lozenge Strength/Dose: _____
☐ Mini/Microtab Strength/Dose: _____
☐ Inhaler Strength/Dose: _____

☐ Bupropion (Zyban) ☐ Varenicline (Champix)

☐ Acupuncture ☐ Counselling ☐ DVD or books
☐ Hypnotherapy ☐ Online program ☐ Quitline ☐ Quit smoking group
☐ Other, please specify_____

d. Have you experienced any difficulties during your past quit attempt(s)?

☐ No, (go to question 19e)

☐ Yes, please **choose as many as are applicable from the list**

☐ Increased appetite ☐ Poor concentration ☐ Urges to smoke

☐ Irritability/ aggression ☐ Depression ☐ Mouth ulcers

☐ Restlessness ☐ Night time awakenings

☐ Others (please specify):.....

e. Have you experienced any side effects from any of the medications which you used during your past quit attempt(s)?

☐ Yes (please specify) _____

☐ No, I have not experienced any side effects

☐ No, I have not used any medication to assist quitting.

20. Which of the following would motivate you to quit smoking? (**choose as many as are applicable**)

☐ Acupuncture
☐ Counselling
☐ Cash incentive
☐ Hypnotherapy
☐ Increasing prices of cigarettes
☐ Information on the amount of nicotine in your body
☐ Medication

☐ Bupropion (Zyban) ☐ Varenicline (Champix) ☐ Nicotine replacement (patch, gum, lozenge, inhaler)

☐ Plain packaging of cigarettes
☐ Personal contact with a healthcare professional (specify who) _____
☐ Quitline
☐ Smoking cessation groups
☐ Other (specify) _____

21. If you had a choice of treatment to assist you to quit smoking, which form of medication would you prefer (**choose as many as are applicable**)?

☐ Tablet ☐ Sub-lingual tablet (under the tongue tablet) ☐ Patch ☐ Chewing Gum
☐ Lozenge ☐ Inhaler ☐ e-cigarette

☐ Other (specify) _____

☐ Unsure ☐ I am not interested in any medications

Study ID: _____ *GIVE UP FOR GOOD©*

22. From the following options, choose the **ONE** that best describes your current status

- ☐ I have decided to continue smoking
- ☐ I do not think about quitting smoking
- ☐ I rarely think about quitting, and I have no plans to quit
- ☐ I sometimes think about quitting, but I have no plans yet
- ☐ I often think about quitting, but I have no plans yet
- ☐ I plan to quit smoking in the next 6 months
- ☐ I plan to quit smoking in the next 30 days
- ☐ I have begun to make changes in my smoking habits
- ☐ I have made changes in my smoking habits but I need to keep working at it
- ☐ I have already quit smoking

23. On a scale of **one to ten** rate your current motivation to give up smoking.

(Very low) **(Very high)**
1----2----3----4----5----6----7----8----9----10

24. On a scale of **one to ten** rate your current confidence in giving up smoking now, without assistance.

(Very low) **(Very high)**
1----2----3----4----5----6----7----8----9----10

25. How have your health care providers reacted to your cigarette smoking?

	Does not know about my smoking habits	**Fully accepts my cigarette smoking**	**Somewhat accepts my cigarette smoking**	**Neutral**	**Discourages my cigarette smoking**	**Strongly discourages my cigarette smoking**
General Practitioner						
Practice Nurse						
Community Pharmacist						
Dentist						
Other (specify)						
Other (specify)						

Mark "Not applicable" if smoking has not been discussed with the given type of health professional

Study ID: _____ *GIVE UP FOR GOOD©*

26. **During your current hospital visit or stay** has any health professional discussed with you the options for quitting?

☐ No

☐ Yes, Please choose from the following (**choose as many as are applicable**)

☐ Doctor ☐ Pharmacist ☐ Nurse ☐ Dietician

☐ Others, (please specify):.....

27. If you decide to give up smoking now, which strategy would you adopt?

☐ I am not thinking of quitting

☐ Reduce gradually

☐ Cold turkey (Quit at once)

☐ Quit with the help of medicines

☐ Other (specify) _____

28. If you had a choice of health professionals to provide you with smoking cessation support, which **three** health professionals would you prefer? (Please rank the health professionals in the order of your preference, 1 – most preferred, 2 the next most preferred, and 3 – the next most preferred after 2)

☐ No preferences

☐ General Practitioner ☐ Pharmacist ☐ Dentist

☐ Nurse ☐ Dietician ☐ Psychologist

☐ Physiotherapist ☐ Naturopath ☐ Alternative medicine practitioner

☐ Others (Specify)_____

Study ID: _____ *GIVE UP FOR GOOD©*

29. This survey asks for your views about your health. This information will help you keep track of how you feel and how well you are able to do your usual activities. Answer every question by selecting the answer as indicated. If you are unsure about how to answer a question, please give the best answer you can. For each of the following questions, please mark an [x] in the one box that best describes your answer.

1. Overall, how would you rate your health during the **past 4 weeks**?

Excellent	Very good	Good	Fair	Poor	Very poor
○	○	○	○	○	○

2. During the **past 4 weeks**, how much did physical health problems limit your usual physical activities (such as walking or climbing stairs)?

Not at all	Very little	Somewhat	Quite a lot	Could not do physical activities
○	○	○	○	○

3. During the **past 4 weeks**, how much difficulty did you have doing your daily work, both at home and away from home, because of your physical health?

None at all	A little bit	Some	Quite a lot	Could not do daily work
○	○	○	○	○

4. How much bodily pain have you had during the **past 4 weeks**?

None	Very mild	Mild	Moderate	Severe	Very Severe
○	○	○	○	○	○

5. During the **past 4 weeks**, how much energy did you have?

Very much	Quite a lot	Some	A little	None
○	○	○	○	○

6. During the **past 4 weeks**, how much did your physical health or emotional problems limit your usual social activities with family or friends?

Not at all	Very little	Somewhat	Quite a lot	Could not do social activities
○	○	○	○	○

7. During the **past 4 weeks**, how much have you been bothered by **emotional problems** (such as feeling anxious, depressed or irritable)?

Not at all	Slightly	Moderately	Quite a lot	Extremely
○	○	○	○	○

8. During the **past 4 weeks**, how much did personal or emotional problems keep you from doing your usual work, school or other daily activities?

Not at all	Very little	Somewhat	Quite a lot	Could not do daily activities
○	○	○	○	○

Thank you for completing these questions!

Study ID: _____ *GIVE UP FOR GOOD©*

Notes page for the Research Assistant

Date/Time of discharge: ____/____/_____

Follow-up dates:

Follow-up #1 (within 48 hrs post discharge):_____

Follow-up #2 (one month post discharge):_____

Follow-up #3 (6 months post discharge):_____

Follow-up #4 (12 months post discharge):_____

Study ID: _____ *GIVE UP FOR GOOD©*

Information to be extracted from patient clinical/medical notes

Current Health/Medical Conditions

Does the patient have any of following conditions?

Assigned weight	Conditions	Please ✓if present
1	Myocardial infarction	
	Congestive heart failure	
	Peripheral vascular disease	
	Cerebrovascular disease	
	Dementia	
	Chronic pulmonary disease	
	Connective tissue disease	
	Ulcer disease	
	Mild liver disease	
	Diabetes	
2	Hemiplegia	
	Moderate or severe renal disease	
	Diabetes with end organ damage	
	Any tumour	
	Leukaemia	
	Lymphoma	
3	Moderate or severe liver disease	
6	Metastatic solid tumour	
	AIDS	
Total Charlson's Index score		

Study ID: _____ *GIVE UP FOR GOOD©*

Current Medications (including dose and additional directions)

Data entered by: _____ **Date:** ____/_____/____ **Time:** _____

Study ID: _____ *GIVE UP FOR GOOD©*

Follow- up # 1: Within 48 hrs post-discharge

1. Have you smoked at all in the last 24 hours?

   ☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

2. How satisfied are you with the services you received during your recent hospital admission/stay to help you quit smoking on a scale of 1 (very dissatisfied) to 5 (very satisfied)?

   ☐ Very dissatisfied
   ☐ Somewhat dissatisfied
   ☐ Neither dissatisfied nor satisfied
   ☐ Somewhat satisfied
   ☐ Very satisfied

3. From the following options, choose the **ONE** that best describes your current status

   ☐ I have decided to continue smoking
   ☐ I do not think about quitting smoking
   ☐ I rarely think about quitting, and I have no plans to quit
   ☐ I sometimes think about quitting, but I have no plans yet
   ☐ I often think about quitting, but I have no plans yet
   ☐ I plan to quit smoking in the next 6 months
   ☐ I plan to quit smoking in the next 30 days
   ☐ I have begun to make changes in my smoking habits
   ☐ I have made changes in my smoking habits but I need to keep working at it
   ☐ I have already quit smoking

If the response is 'I have already quit smoking' answer question 4 and then STOP. Otherwise go to question 5 and continue

4. How many days/weeks/months ago did the current quit period start? _____
5. How many hours/days/weeks/months were you smoke-free on your most recent quit attempt? _____
6. How soon after you wake up do you smoke your first cigarette?

   ☐ Within 5 minutes ☐ 5–30 minutes ☐ 31–60 minutes ☐ After 60 minutes

Study ID: _____ *GIVE UP FOR GOOD©*

7. How many cigarettes do you smoke each day/ week?

   Number of cigarettes per day (if you smoke daily):.....

   Number of cigarettes per week (if you smoke occasionally):.....

8. On a scale of **one to ten** rate your current motivation to give up smoking.

   (Very low) (Very high)
   1----2----3----4----5----6----7----8----9----10

9. On a scale of **one to ten** rate your current confidence in giving up smoking now

   (Very low) (Very high)
   1----2----3----4----5----6----7----8----9----10

Note for the Research Assistant: Remind participant about the next follow-up and organise date/time

Data entered by: _____ **Date:** ____/_____/____ **Time:** _____:_____

Study ID: _____ *GIVE UP FOR GOOD©*

Follow- up # 2: One month post-discharge

1. Over the past two weeks, how often have you been bothered by any of the following problems?

Little interest or pleasure in doing things

☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day

Feeling down, depressed, or hopeless

☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day

2. Have you smoked at all in the last 24 hours?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

3. Have you smoked at all in the last 7 days?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

4. Have you smoked at all in the last 30 days*?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

The 30 days period starts from the designated quit date or allow a predefined 'grace period', e.g. 2 weeks' duration at the start of the quit attempt, after which the cessation period begins.

5. Since being discharged from hospital have you used anything to assist quitting?

☐ Yes (specify below) ☐ No

☐ Nicotine replacement

☐ Patch Strength/Duration (24/16hr): _____
☐ Gum Strength/Dose: _____
☐ Lozenge Strength/Dose: _____
☐ Mini/Microtab Strength/Dose: _____
☐ Inhaler Strength/Dose: _____

☐ Bupropion (Zyban) ☐ Varenicline (Champix)

☐ Acupuncture ☐ Counselling ☐ DVD or books
☐ Hypnotherapy ☐ Online program ☐ Quitline ☐ Quit smoking group

☐ Other, please specify_____

Study ID: _____ *GIVE UP FOR GOOD©*

6. From the following options, choose the **ONE** that best describes your current status

- ☐ I have decided to continue smoking
- ☐ I do not think about quitting smoking
- ☐ I rarely think about quitting, and I have no plans to quit
- ☐ I sometimes think about quitting, but I have no plans yet
- ☐ I often think about quitting, but I have no plans yet
- ☐ I plan to quit smoking in the next 6 months
- ☐ I plan to quit smoking in the next 30 days
- ☐ I have begun to make changes in my smoking habits
- ☐ I have made changes in my smoking habits but I need to keep working at it
- ☐ I have already quit smoking

If the response is 'I have already quit smoking' answer question 7 and then STOP. Otherwise go to question 8 and continue

7. How many days/weeks/months ago did the current quit period start? _____

8. Have you quit smoking for at least 1 day in the past one month?

☐ Yes ☐ No (go to question 9)

If Yes, how many times have you quit smoking for at least 1 day in the past one month?.....

9. How many hours/days/weeks/months were you smoke-free on your most recent quit attempt? _____

10. How soon after you wake up do you smoke your first cigarette?

☐ Within 5 minutes (3 points) ☐ 5–30 minutes (2 points) ☐ 31–60 minutes (1 point) ☐ After 60 minutes (0 points)

11. How many cigarettes do you smoke each day/ week?

Number of cigarettes per day (if you smoke daily):.....

Number of cigarettes per week (if you smoke occasionally):.....

12. On average, how much money do you spend on cigarettes per day/week?_

$...../ Day **or** $...../ Week

Study ID: _____ *GIVE UP FOR GOOD©*

13. Listed below are situations that lead some people to smoke. We would like to know HOW TEMPTED you may be to smoke in each situation. Please answer the following questions on a scale of 1 = 'Not at all tempted' to 5 = 'Extremely tempted' following five point scale.

Statements	Not at all tempted	Not very tempted	Moderately tempted	Very tempted	Extremely tempted
With friends at a party					
When I first get up in the morning					
When I am very anxious and stressed					
Over coffee while talking and relaxing					
When I feel I need a lift					
When I am very angry about something or someone					
With my spouse or close friend who is smoking					
When I realize I haven't smoked for a while					
When things are not going my way and I am frustrated					

14. On a scale of **one to ten** rate your current motivation to give up smoking.

(Very low) (Very high)
1----2----3----4----5----6----7----8----9----10

15. On a scale of **one to ten** rate your current confidence in giving up smoking now.

(Very low) (Very high)
1----2----3----4----5----6----7----8----9----10

Note for the Research Assistant: Remind participant about the next follow-up and organise date/time

Data entered by: _____ **Date:** ____/____/____ **Time:** _____:_____

Study ID: _____ *GIVE UP FOR GOOD©*

Follow- up # 3: Six months post-discharge

1. Over the past two weeks, how often have you been bothered by any of the following problems?

Little interest or pleasure in doing things

☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day

Feeling down, depressed, or hopeless

☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day

2. Have you smoked at all in the last 24 hours?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

3. Have you smoked at all in the last 7 days?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

4. Have you smoked at all in the last 30 days*?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

5. Have you smoked at all in the last 6 months?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

The 30 days period starts from the designated quit date or allow a predefined 'grace period', e.g. 2 weeks' duration at the start of the quit attempt, after which the cessation period begins.

If the response is 'No, not a puff' to item 2 & 3, and 'No, not a puff' or '1-5 cigarettes' to item 4, perform a CO breath test.

CO level in breath _____ ppm; Date of test ____/_____/____; Tested by: _____

6. Since discharge from hospital have you used anything to assist quitting?

☐ Yes (specify below) ☐ No

☐ Nicotine replacement

☐ Patch Strength/Duration (24/16hr): _____
☐ Gum Strength/Dose: _____
☐ Lozenge Strength/Dose: _____
☐ Mini/Microtab Strength/Dose: _____
☐ Inhaler Strength/Dose: _____

☐ Bupropion (Zyban) ☐ Varenicline (Champix)

☐ Acupuncture ☐ Counselling ☐ DVD or books
☐ Hypnotherapy ☐ Online program ☐ Quitline ☐ Quit smoking group
☐ Other, please specify_____

Study ID: _____ *GIVE UP FOR GOOD©*

7. From the following options, choose the **ONE** that best describes your current status

- ☐ I have decided to continue smoking
- ☐ I do not think about quitting smoking
- ☐ I rarely think about quitting, and I have no plans to quit
- ☐ I sometimes think about quitting, but I have no plans yet
- ☐ I often think about quitting, but I have no plans yet
- ☐ I plan to quit smoking in the next 6 months
- ☐ I plan to quit smoking in the next 30 days
- ☐ I have begun to make changes in my smoking habits
- ☐ I have made changes in my smoking habits but I need to keep working at it
- ☐ I have already quit smoking

If the response is 'I have already quit smoking' answer question 8 and then STOP. Otherwise go to question 9 and continue

8. How many days/weeks/months ago did the current quit period start? _____

9. Have you quit smoking for at least 1 day in the past five months?

☐ Yes ☐ No (if No, go to question10)

If Yes, How many times have you quit smoking for at least 1 day in the past five months?.....

10. How many hours/days/weeks/months were you smoke-free on your most recent quit attempt? _____

11. How soon after you wake up do you smoke your first cigarette?

☐ Within 5 minutes ☐ 5–30 minutes ☐ 31–60 minutes ☐ After 60 minutes

12. How many cigarettes do you smoke each day/ week?

Number of cigarettes per day (if you smoke daily):.....

Number of cigarettes per week (if you smoke occasionally):.....

13. On average, how much money do you spend on cigarettes?_

$..... / day **or** $...../ Week

Study ID: _____ *GIVE UP FOR GOOD©*

14. Listed below are situations that lead some people to smoke. We would like to know HOW TEMPTED you may be to smoke in each situation. Please answer the following questions on a scale of 1 = 'Not at all tempted' to 5 = 'Extremely tempted' following five point scale.

Statements	Not at all tempted	Not very tempted	Moderately tempted	Very tempted	Extremely tempted
With friends at a party					
When I first get up in the morning					
When I am very anxious and stressed					
Over coffee while talking and relaxing					
When I feel I need a lift					
When I am very angry about something or someone					
With my spouse or close friend who is smoking					
When I realize I haven't smoked for a while					
When things are not going my way and I am frustrated					

15. On a scale of **one to ten** rate your current motivation to give up smoking.

(Very low) (Very high)
1----2----3----4----5----6----7----8----9----10

16. On a scale of **one to ten** rate your current confidence in giving up smoking now.

(Very low) (Very high)
1----2----3----4----5----6----7----8----9----10

Note for the Research Assistant: Remind participant about the next follow-up and organise date/time

Data entered by: _____ **Date:** ____/_____/____ **Time:** _____:_____

Study ID: _____ *GIVE UP FOR GOOD©*

Follow- up # 4: One Year post-discharge

1. Over the past two weeks, how often have you been bothered by any of the following problems?

Little interest or pleasure in doing things

☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day

Feeling down, depressed, or hopeless

☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day

2. Have you smoked at all in the last 24 hours?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

3. Have you smoked at all in the last 7 days?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

4. Have you smoked at all in the last 30 days*?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

5. Have you smoked at all in the last 6 months?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

6. Have you smoked at all in the last 12 months?

☐ No, not a puff ☐ 1 – 5 cigarettes ☐ More than 5 cigarettes

The 30 days period starts from the designated quit date or allow a predefined 'grace period', e.g. 2 weeks' duration at the start of the quit attempt, after which the cessation period begins.

If the response is 'No, not a puff' to items 2, 3 & 4, and 'No, not a puff' or '1-5 cigarettes' to item 5, perform a CO breath test.

CO level in breath _____ ppm Date of test ___/____/___ Tested by: _____

Study ID: _____ *GIVE UP FOR GOOD©*

7. Since the last interview have you used anything to assist quitting?

☐ Yes (specify below) ☐ No

☐ Nicotine replacement

☐ Patch Strength/Duration (24/16hr): _____
☐ Gum Strength/Dose: _____
☐ Lozenge Strength/Dose: _____
☐ Mini/Microtab Strength/Dose: _____
☐ Inhaler Strength/Dose: _____

☐ Bupropion (Zyban) ☐ Varenicline (Champix)

☐ Acupuncture ☐ Counselling ☐ DVD or books
☐ Hypnotherapy ☐ Online program ☐ Quitline ☐ Quit smoking group
☐ Other, please specify_____

8. Since enrolment in the study, have you received any help or support to quit smoking from any of the following health professionals including:

a. General Practitioner : ☐ Yes ☐ No If Yes, Number of times:.....
b. Community Pharmacist : ☐ Yes ☐ No If Yes, Number of times:.....
c. Others : ☐ Yes ☐ No If Yes, Specify who and Number of times:.....

9. Since enrolment in the study, have you used the Quitline to assist quitting?

☐ Yes ☐ No If yes, number of times have you used it .....

Study ID: _____ *GIVE UP FOR GOOD©*

10. From the following options, choose the **ONE** that best describes your current status

- ☐ I have decided to continue smoking
- ☐ I do not think about quitting smoking
- ☐ I rarely think about quitting, and I have no plans to quit
- ☐ I sometimes think about quitting, but I have no plans yet
- ☐ I often think about quitting, but I have no plans yet
- ☐ I plan to quit smoking in the next 6 months
- ☐ I plan to quit smoking in the next 30 days
- ☐ I have begun to make changes in my smoking habits
- ☐ I have made changes in my smoking habits but I need to keep working at it
- ☐ I have already quit smoking

If the response is 'I have already quit smoking' answer questions 11, 17 and 21 and then STOP. Otherwise go to question 12 and continue.

11. How many days/weeks/months ago did the current quit period start? _____

12. Have you quit smoking for at least 1 day in the past six months?

☐ Yes ☐ No (go to question13)

If Yes, how many times have you quit smoking for at least 1 day in the past six months?.....

13. How many hours/days/weeks/months were you smoke-free on your most recent quit attempt?_____

14. How soon after you wake up do you smoke your first cigarette?

☐ Within 5 minutes ☐ 5–30 minutes ☐ 31–60 minutes ☐ After 60 minutes

15. How many cigarettes do you smoke each day/ week?

Number of cigarettes per day (if you smoke daily):.....

Number of cigarettes per week (if you smoke occasionally):.....

16. On average, how much money do you spend on cigarettes?

$..... / Day **or** $...../ Week

17. How many unplanned hospital admissions/emergency department visits have you had in the last 12 months (exclude the admission during which you were recruited into the study)? _____

Study ID: _____ *GIVE UP FOR GOOD©*

18. Listed below are situations that lead some people to smoke. We would like to know HOW TEMPTED you may be to smoke in each situation. Please answer the following questions on a scale of 1 = 'Not at all tempted' to 5 = 'Extremely tempted' following five point scale.

Statements	Not at all tempted	Not very tempted	Moderately tempted	Very tempted	Extremely tempted
With friends at a party					
When I first get up in the morning					
When I am very anxious and stressed					
Over coffee while talking and relaxing					
When I feel I need a lift					
When I am very angry about something or someone					
With my spouse or close friend who is smoking					
When I realize I haven't smoked for a while					
When things are not going my way and I am frustrated					

19. On a scale of **one to ten** rate your current motivation to give up smoking.

(Very low) (Very high)
1----2----3----4----5----6----7----8----9----10

20. On a scale of **one to ten** rate your current confidence in giving up smoking.

(Very low) (Very high)
1----2----3----4----5----6----7----8----9----10

Study ID: _____ *GIVE UP FOR GOOD©*

21. This survey asks for your views about your health. This information will help you keep track of how you feel and how well you are able to do your usual activities. Answer every question by selecting the answer as indicated. If you are unsure about how to answer a question, please give the best answer you can. For each of the following questions, please mark an [x] in the one box that best describes your answer.

1. Overall, how would you rate your health during the **past 4 weeks**?

Excellent	Very good	Good	Fair	Poor	Very poor
○	○	○	○	○	○

2. During the **past 4 weeks**, how much did physical health problems limit your usual physical activities (such as walking or climbing stairs)?

Not at all	Very little	Somewhat	Quite a lot	Could not do physical activities
○	○	○	○	○

3. During the **past 4 weeks**, how much difficulty did you have doing your daily work, both at home and away from home, because of your physical health?

None at all	A little bit	Some	Quite a lot	Could not do daily work
○	○	○	○	○

4. How much bodily pain have you had during the **past 4 weeks**?

None	Very mild	Mild	Moderate	Severe	Very Severe
○	○	○	○	○	○

5. During the **past 4 weeks**, how much energy did you have?

Very much	Quite a lot	Some	A little	None
○	○	○	○	○

6. During the **past 4 weeks**, how much did your physical health or emotional problems limit your usual social activities with family or friends?

Not at all	Very little	Somewhat	Quite a lot	Could not do social activities
○	○	○	○	○

7. During the **past 4 weeks**, how much have you been bothered by **emotional problems** (such as feeling anxious, depressed or irritable)?

Not at all	Slightly	Moderately	Quite a lot	Extremely
○	○	○	○	○

8. During the **past 4 weeks**, how much did personal or emotional problems keep you from doing your usual work, school or other daily activities?

Not at all	Very little	Somewhat	Quite a lot	Could not do daily activities
○	○	○	○	○

Study ID: _____ *GIVE UP FOR GOOD©*

Thank you for completing these questions!

Data entered by: _____ **Date:** ____/____/____ **Time:** _____:_____

Appendix 5: Chapter 5

Supplementary file

- Text S1: Study Intervention Guide

Text S1: Study Intervention Guide

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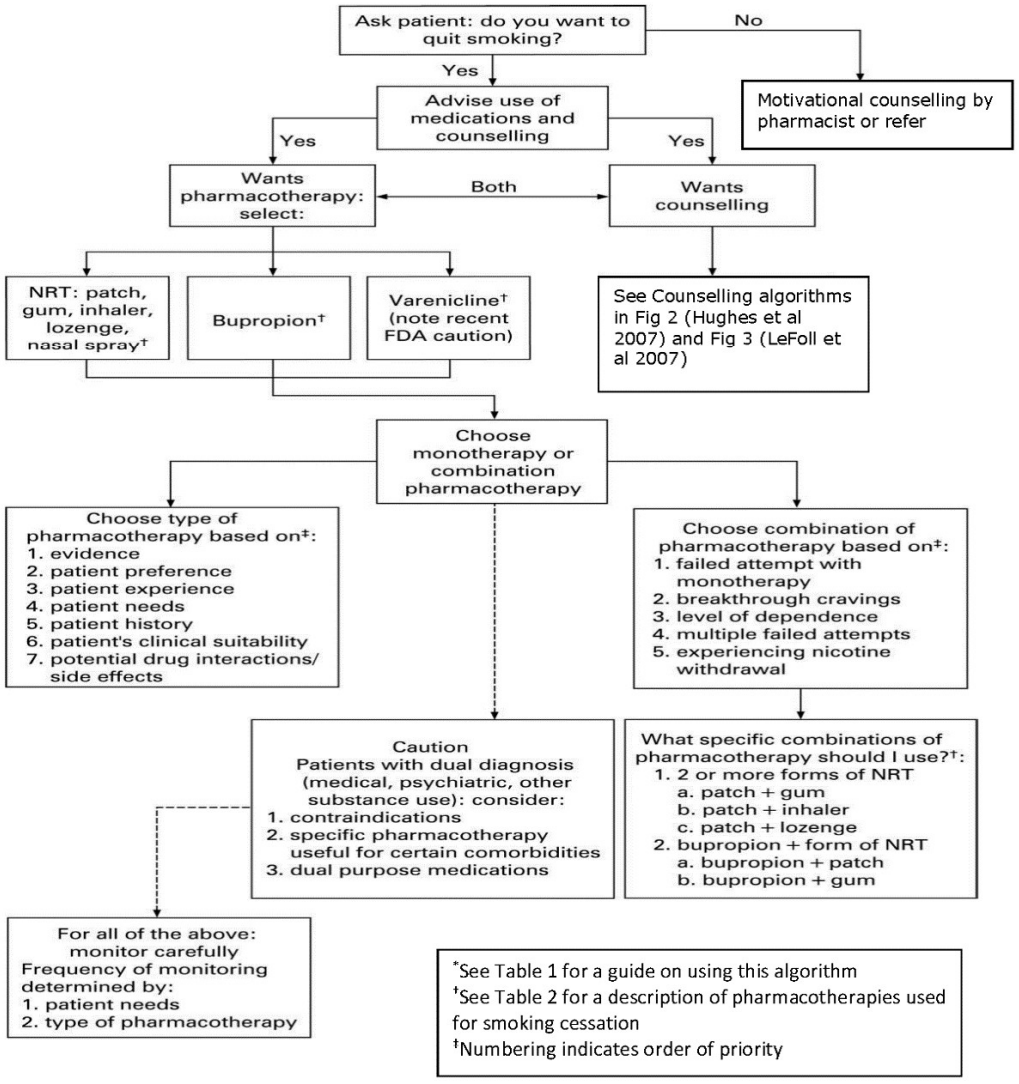

Fig 1: GIVE UP FOR GOOD Algorithm

1

Adapted from: Bader P. et al. Tob Control 2009;18:34–42; LeFoll BL et al. CMAJ 2007;177:1373–80; Hughes J et al. J Subst Abuse Treat 2008;34:426–32

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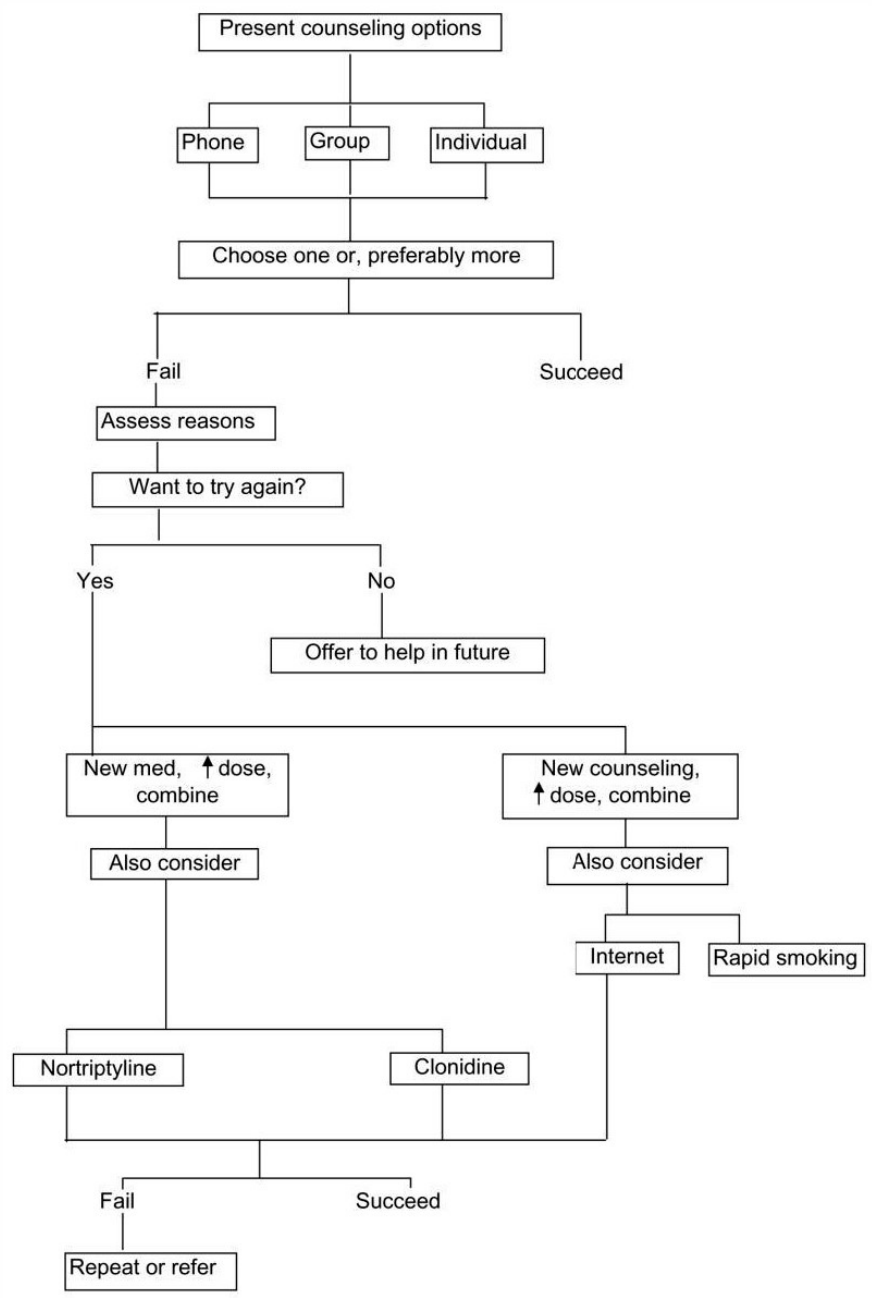

Fig 2: Counselling algorithm by Hughes et al (2007)

2

Adapted from: Bader P. et al. Tob Control 2009;18:34–42; LeFoll BL et al. CMAJ 2007;177:1373–80; Hughes J et al. J Subst Abuse Treat 2008;34:426–32

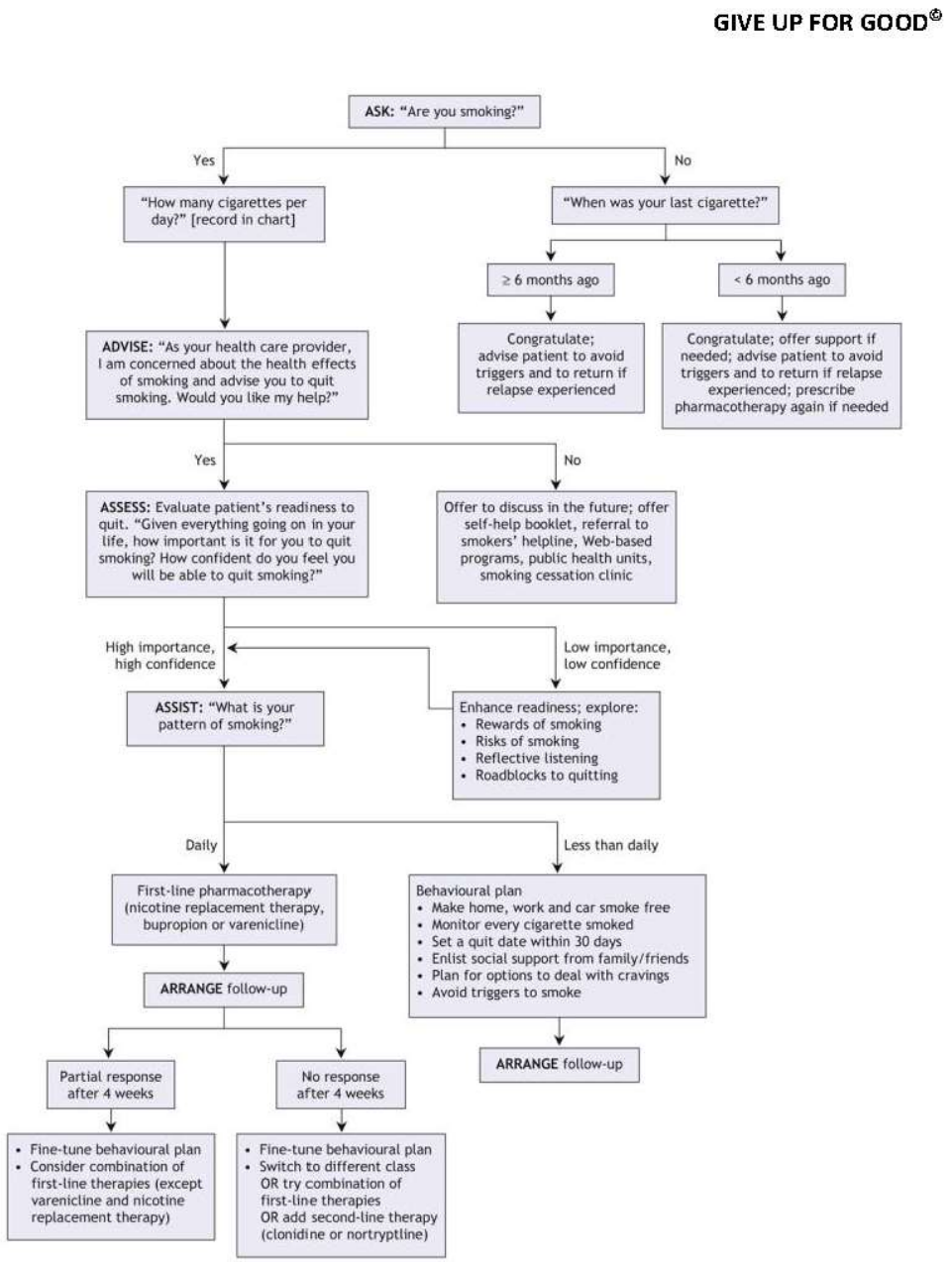

Fig 3: Algorithm for integrating a patient's smoking status and readiness to quit (LeFoll et al 2007)

3

Adapted from: Bader P. et al. Tob Control 2009;18:34–42; LeFoll BL et al. CMAJ 2007;177:1373–80; Hughes J et al. J Subst Abuse Treat 2008;34:426–32

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Table 1: Guide for using the algorithm in Figure 1

Factors to consider in prescribing pharmacotherapy

Three distinct types of pharmacotherapy have demonstrated efficacy for smoking cessation: (a) nicotine replacement therapy (including patch, gum, inhaler, lozenge, nasal spray), (b) bupropion and (c) varenicline (for a description of these pharmacotherapy, including dose and side effects/drug interactions, see Table 3) Selecting a particular type of pharmacotherapy should be guided by the following seven factors:

1. Evidence

The importance of evidence-based medicine is the top priority in considering which form of pharmacotherapy to prescribe or recommend to a patient. The decision to prescribe smoking cessation medications needs to be based on evidence of effectiveness and safety.

2. Patient preference

Patient preference is an important priority in facilitating adherence to the treatment protocol. There is no value in prescribing or recommending a medication that a patient will not take. "It is essential that the patient be comfortable with the decision, have reasonable expectations for product efficacy, and have confidence in their ability to use the medication appropriately". Preference is particularly important if a patient does not want to use a specific product. However, patient preference can be modified through an informed and shared decision-making process between the clinician and patient.

3. Patient experience

The patient's expectation of success is exceedingly important in determining actual success. Expectations are often informed by experience. Therefore, a patient's experience with smoking cessation attempts and use of pharmacotherapy needs to be a significant factor in influencing choice of pharmacotherapy. "A clinician must understand what the patient has tried and why the patient did not succeed". If the patient was successful with a particular medication for a period of time, it may be prudent to try the same medication again; if unsuccessful with a particular medication, then probably should not use again.

4. Patient needs

Because there is little evidence-based information to guide tailoring of specific pharmacotherapy to specific patients, patient needs are vital. Consideration of patient needs is important in determining their willingness to use medications, the ease of use of various smoking cessation products and likelihood of compliance. Other patient needs to take into account before prescribing or recommending a particular pharmacotherapy include: extent and severity of cravings, situations or times when cravings are strongest, triggers for smoking, specific hurdles to overcome, etc.

5. Patient history

"Patient history provides the framework within which I can prescribe". Many patients have comorbidities (medical, psychiatric, alcohol/drug abuse) which need to be taken into account. For example, a patient with a history of alcohol abuse or seizures would be excluded from bupropion use. Smoking history, past quit attempts and experience with pharmacotherapy are all factors influencing the decision of pharmacotherapy choice.

6. Patient clinical suitability for pharmacotherapy

Some patients may not be suitable for pharmacotherapy interventions and potential contraindications need to be considered. Generally, pharmacotherapy would not be recommended for patients having a low level of nicotine dependence. In addition, a patient may prefer a non-pharmacological approach to treatment.

7. Potential drug interactions/side effects

Issues of safety are fundamental in determining choice of pharmacotherapy. Contraindications, use of other medications, and the side effect profile all need to be considered. However, this is generally a minor problem with cessation drugs. "Potential drug interactions are a show-stopper when it is relevant, but it is rarely an issue, so it is important but infrequent".

Adapted from: Bader P. et al. Tob Control 2009;18:34–42; LeFoll BL et al. CMAJ 2007;177:1373–80; Hughes J et al. J Subst Abuse Treat 2008;34:426–32

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Combinations of pharmacotherapy

For some patients, choosing a combination of pharmacotherapy will increase their ability to stop smoking. Combination pharmacotherapy is indicated for patients based on five factors:

1. Failed attempt with monotherapy

Use of monotherapy which resulted in a failure to quit smoking is the top priority when considering use of combination pharmacotherapy. The general principle is that intensity of medications should be increased when monotherapy has resulted in relapse. A caveat is that the medication was used appropriately and that there was "a 'true' attempt to quit".

2. Patients with breakthrough cravings

Breakthrough cravings may be an indication that more treatment is needed. An additional form of NRT or an addition of NRT (as needed) to a non-NRT oral medication may be helpful. Combinations of NRT can be used for steady-state delivery (patch) and as needed (gum/lozenge).

3. Level of dependence

Highly dependent smokers are more likely to benefit from combination pharmacotherapy. It may be important to begin with combination pharmacotherapy for these individuals. Because this group has a difficult time in quitting smoking, combination therapy may facilitate increased success.

MODIFIED FAGERSTROM TEST FOR NICOTINE DEPENDENCE

Modified Fagerström Test for Nicotine Dependence	Please tick (✓) one box for each question	
How soon after you wake do you smoke your first cigarette?	Within 5 mins 5- 30 mins 31 – 60 mins 60 + mins	❑ 3 ❑ 2 ❑ 1 ❑ 0
How many cigarettes a day do you smoke?	10 or less 11 – 20 21 – 30 31 or more	❑ 0 ❑ 1 ❑ 2 ❑ 3
≤2 Very low; 3 Low; 4 Moderate; ≥5 High	Dependence Score	/6

4. Multiple failed attempts

Multiple failed attempts may be an indication that more intensive therapy is needed. "Careful assessment of previous attempts usually reveals complex situations which are more likely to be addressed with combination pharmacotherapy." However, it is important to keep in mind that failed attempts may also be based on patient lack of commitment rather than insufficient medication.

5. Patients with nicotine withdrawal

Patients experiencing nicotine withdrawal can be a trigger for their relapse to smoking. The combination of pharmacotherapies (for example, addition of NRT to another pharmacotherapy) can be a helpful response for managing nicotine withdrawal symptoms.

Specific combinations of pharmacotherapy

When prescribing or recommending combinations of pharmacotherapy, first select combinations of NRT. Then, prescribe a combination of bupropion and NRT for more heavily dependent patients.

1. Two more forms of NRT

The use of two or more forms of NRT has the strongest evidence base and is the most commonly used form of combination therapy. There is a high level of confidence that this combination can be used safely and effectively. "This approach permits optimal titration of NRT to meet nicotine needs and can be achieved easily and cheaply".

5

Adapted from: Bader P. et al. Tob Control 2009;18:34–42; LeFoll BL et al. CMAJ 2007;177:1373–80; Hughes J et al. J Subst Abuse Treat 2008;34:426–32

2. Bupropion + form of NRT

Bupropion plus a form of NRT can be effective for some patients. This combination is generally used in more heavily dependent patients.

Impact of comorbidities on selection of pharmacotherapy

When prescribing pharmacotherapy to patients having a dual diagnosis (that is, medical, psychiatric or other substance use in addition to smoking), specific attention should be given to:

1. Contraindications

Attention to contraindications is the top priority in the selection of type of pharmacotherapy in patients with comorbidities. Ensuring the safety of a patient is always of primary importance in prescribing or recommending medications. Contraindications are primarily an issue with use of bupropion (that is, history of seizures, alcohol problems) and with patients who are already taking other medications.

2. Specific pharmacotherapy useful for certain comorbidities

Specific pharmacotherapy may be useful for treatment of certain comorbidities in addition to smoking cessation. For example, bupropion may be a good choice for depressed patients who want to quit smoking. However, for patients with anxiety disorders or eating disorders, bupropion would not be a good choice.

3. Dual purpose medications

"It's nice to treat two things with one med so if I can do that I will". Most common is use of bupropion for depressed patients who want to quit smoking. Bupropion can also be useful for patients who do not want to gain weight. Dual purpose medications may have added value in enhancing compliance.

Frequency of monitoring

All patients taking pharmacotherapy should be monitored carefully. The frequency of monitoring should be determined by:

1. Patient need

The top priority for frequency of monitoring should be determined by patient needs. For example, patients with multiple or difficult quit attempts will likely require more support.

2. Type of pharmacotherapy

Some types of pharmacotherapy may require more frequent monitoring, particularly if there is potential for adverse events (for example, drug interaction, side effects).

Adapted from: Bader P. et al. Tob Control 2009;18:34–42; LeFoll BL et al. CMAJ 2007;177:1373–80; Hughes J et al. J Subst Abuse Treat 2008;34:426–32

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Table 2
Pharmacotherapy used for smoking cessation

Drug	Dose	Side effects/drug interactions	Comments
NRT: sustained release Nicotine transdermal patch	>20 cigarettes/day: 1 patch (21 mg/24 h) for 4–6 weeks, then taper to 14 mg/day for 2–4 weeks, then 7 mg per day for 2–4 weeks. If patient has cardiovascular disease, weighs less than 45 kg or smokes <½ pack/day begin with 14 mg/24 h×6 weeks then ↓ to 7 mg/24 h × 2 weeks NB: 16-h patches are available in some countries	**Side effects:** Skin sensitivity and irritation (most common); abnormal dreams; insomnia; nausea, dyspepsia	Start patch on quit date. Advise not to smoke cigarettes while using the patch, though this is generally safe and does not indicate treatment failure. Educate users on the signs and symptoms of nicotine toxicity
NRT: immediate release Nicotine inhaler	Available in 4 mg strength. Encourage patient to use at least six doses/day for the first 3–6 weeks. Max 12/day.Tapering: gradual reduction in use over next 6–12 weeks, stopping when reduced to 1–2/day	**Side effects:** Mild local irritation of mouth and throat, coughing, rhinitis that may decline with continued use	Not a true inhaler—the nicotine is delivered and absorbed buccally."Hand-mouth" activity from using the inhaler is preferred by some quitters while others find it to be a trigger. Useful in those with poor oral health or dentures and in those who cannot chew gum
NRT: immediate release Nicotine polacrilex gum	10–12 pieces per day initially (2 mg or 4 mg pieces) to maximum of 20 pieces per day, for 12 weeks. Tapering: 1 piece/day each week, as withdrawal symptoms allow	**Side effects:** Mouth soreness, hiccups, dyspepsia, jaw ache	Use 4 mg in heavily dependent smokers. May be used for temporary abstinence—eg, to comply with smoking restrictions on aeroplanes
NRT: immediate release Nicotine lozenge	1 lozenge (2 mg or 4 mg lozenges) every 1–2 h up to 6 weeks; weeks 7–9, every 2–4 h; weeks 10–12, every 4–8 h	**Side effects:** Nausea, hiccups, heartburn, headache, coughing	
NRT: immediate release Nicotine nasal spray	1.0 mg of nicotine per spray (10-ml bottle contains 100 mg nicotine) 1–2 doses/h up to 40 doses per day; for 3 months	**Side effects:** Mild nasal/throat irritation	

7

Adapted from: Bader P. et al. Tob Control 2009;18:34–42; LeFoll BL et al. CMAJ 2007;177:1373–80; Hughes J et al. J Subst Abuse Treat 2008;34:426–32

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Drug	Dose	Side effects/drug interactions	Comments
Antidepressant: Bupropion (Zyban)	150 mg daily × 3 days then 150 mg twice daily × 7–12 weeks. Begin 1–2 weeks before the selected quit date	**Side effects:** Insomnia, dry mouth **Drug interactions:** Clearance of bupropion may be ↓ by inhibitors (for example, ticlopidine) or ↑ by inducers (for example, phenobarbital, phenytoin, primidone) of CYP2B6. May ↓ clearance of other substrates of CYP2B6 (for example, cyclophosphamide, ketamine, promethazine, propofol, selegiline). MAOIs, levodopa, amantadine may ↑ toxicity. May be safely combined with NRT (monitor for treatment-emergent hypertension)	Not recommended in patients with conditions predisposing to seizures, history of seizures, current eating disorder or severe hepatic impairment. Least expensive of oral medications indicated for smoking cessation
Nicotine receptor partial agonists Varenicline (Champix)	0.5 mg daily for 3 days, then twice daily for 4 days then 1 mg by mouth twice daily for 12 weeks. Patient should quit smoking 1–2 weeks after starting the medication. Reassess if patient is still smoking 4 weeks after starting medication; can be continued for an additional 12 weeks if patient has benefited. No tapering necessary	Side effects: nausea, sleep disturbance, abnormal/vivid/strange dreams. Drug interactions: should not be combined with NRT therapy because of increased risk of adverse effects	Does not induce cytochrome P450 enzymes; excreted renally unchanged. Smokers considering use of varenicline should be screened for a history of psychiatric disorders, have close monitoring, and be advised to report any adverse effects they might experience. Care and close surveillance needs to be taken if prescribing to patients with psychiatric disorders

8

Adapted from: Bader P. et al. Tob Control 2009;18:34–42; LeFoll BL et al. CMAJ 2007;177:1373–80; Hughes J et al. J Subst Abuse Treat 2008;34:426–32

Appendix 6: Chapter 5

Topics covered: Smoking Cessation Facilitators Course

Smoking Cessation Facilitators Course

The 2-day training conducted by the Lung Health Promotion Centre (LHPC) at The Alfred, Melbourne comprised the following topics;

- Smoking in Australia – facts and figures
- Impact of smoking on health
- Effect of nicotine on body & brain
- Motivational interviewing
- Nicotine replacement therapy
- Nicotine withdrawal syndrome
- Measuring nicotine dependence
- Cue conditioning
- Treating symptom withdrawal
- Special groups – people with psychiatric disorders, diabetes, pregnancy, teenagers
- Behaviour modification/Cue Conditioning
- What works and what doesn't
- Setting up a smoking cessation clinic
- Case studies
- Evaluating the intervention

Appendix 7: Chapter 6

Institutional Ethics Committee Approvals

CSS-21 survey

Ethics Committee

Certificate of Approval of Amendments

This is to certify that amendments to

Project: **314/11 Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals**

Principal Researcher: **Dr Johnson George**

Amendment:
Addition of a postal survey

Attachment:
Explanatory statement and postal survey - version 1 dated 1-May-2013

have been approved in accordance with your amendment application dated **2-May-2013** on the understanding that you observe the National Statement on Ethical Conduct in Human Research.

It is now your responsibility to ensure that all people associated with this particular research project are made aware of what has actually been approved and any caveats specified in correspondence with the Ethics Committee. Any further change to the application which is likely to have a significant impact on the ethical considerations of this project will require approval from the Ethics Committee.

[redacted]

Chair, Ethics Committee (or delegate) Date: **29-May-2013**

R Frew
Secretary, Ethics Committee

All research subject to Alfred Hospital Ethics Committee review must be conducted in accordance with the National Statement on Ethical Conduct in Human Research (2007).

The Alfred Ethics Committee is a properly constituted Human Research Ethics Committee operating in accordance with the National Statement on Ethical Conduct in Human Research (2007).

Austin Health

Austin Hospital

145 Studley Road
PO Box 5555 Heidelberg
Victoria Australia 3084
[redacted]
www.austin.org.au

Date: 7 May 2013

To: **Dr Johnson George**
Monash University
381 Royal Parade
Parkville VIC 3052

Project: Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals.

Project No: H2011/04438

Re: Amendment approved out of session
Amendment Dr Johnson George dated 1 May 2013 RE: Explanatory statement and postal survey Version 01 dated 1 May 2013

I wish to inform you that out of session approval has been granted for the **Amendment** detailed above.

It should be noted that all requirements of the original approval still apply.

Yours sincerely,

[redacted]

Dr Sianna Panagiotopoulos, PhD
Manager, Office for Research

This HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research (2007), NHMRC and Universities Australia Australian Code for the Responsible Conduct of Research (2007) and the CPMP/ICH Note for Guidance on Good Clinical Practice annotated with TGA comments (July 2008) and the applicable laws and regulations; and the Health Privacy Principles in The Health Record Act 2001.* The process this HREC uses to review multi-centre research proposals has been certified by the NHMRC.

Human Research Ethics Committee
Office for Research, Level 6 HSB.
Phone: (03) 9496 4090
E-mail: ethics@austin.org.au

From: BERNICE DAVIES
Sent: Friday, 17 May 2013 4:49 PM
To: Greg Weeks
Subject: 11.91 Amendment 01/05/13

Dear Greg

RE: 11/91 Greg Weeks Smoking cessation program (GIVE UP FOR GOOD) for smokers admitted to public hospitals

Please accept this as formal notification that the following is approved from the date of this notification :

Amendment dated 1/05/2013

Addition of a postal survey with approximately 30 items after 12 month follow-up; advice that the data will from this study will also be used by Mr Dennis Thomas for the purposes of obtaining a PhD through Monash University.

The documents approved in relation to this amendment:

- Explanatory statement: version 2 dated 10.05.13
- Reminder letter version 1 dated 10.05.13

Kind regards

Bernice

Bernice Davies

A/Manager | Office for Research | Barwon Health

Appendix 8: Chapter 6

Patient invitation letter and CSS-21 Questionnaire

Date:

RE: GIVE UP FOR GOOD, smoking cessation study

Dear……

Thank you for taking part in the GIVE UP FOR GOOD smoking cessation study. As the final part of the research, we would like to get your feedback on factors that may have influenced your decision to stop or continue smoking. Your participation is entirely voluntary and will not affect any medical care you may be receiving. Please remember there are no right or wrong answers, we are simply interested in your experiences and opinions.

Please complete the attached questionnaire and return to us in the enclosed reply-paid envelope within the next 7 days. It will take less than 10 minutes to complete. Please provide your honest answer to every item. Your response will help us to plan smoking cessation services for patients attending hospitals. Findings from this study will also be used by me (Dennis Thomas) to obtain a PhD from Monash University. Your identity will remain anonymous in any publications resulting from the study.

If you have any questions about the research or the questionnaire, please do not hesitate to contact [redacted]

Thank you for your assistance.

Sincerely,

Dennis Thomas
PhD candidate
Faculty of Pharmacy and Pharmaceutical Sciences
Centre for Medicine Use and Safety
Monash University (Parkville Campus)
381 Royal Parade
VIC 3052

Please **tick** (✓) the appropriate boxes

1) Have you ever attempted to stop smoking?

- ☐ Yes ⟶ Go to NEXT question
- ☐ No ⟶ Go to question **5** on page **4**

2) How long ago was your last serious attempt to stop smoking?

- ☐ I have already stopped smoking ⟶ Go to question **4**
- ☐ In the last 30 days
- ☐ Between 1 and 3 months ago
- ☐ Between 3 and 6 months ago
- ☐ Between 6 and 12 months ago
- ☐ More than 12 months ago

3) How long did you remain a non-smoker when you last tried to stop smoking?

- ☐ Less than 1 day
- ☐ More than 1 day but less than a week
- ☐ 1 week or more, but less than 1 month
- ☐ 1 month or more, but less than 6 months
- ☐ 6 months or more

4) Challenges to Stopping Smoking

The following statements refer to different challenges or problems associated with stopping smoking. Please rate how much of a challenge each one of them was in your most recent attempt to stop smoking. Please indicate your responses on a scale of **1 = Not a challenge** to **4 = Major challenge** by circling the appropriate number for each statement.

		Not a Challenge	Minor Challenge	Moderate Challenge	Major Challenge
1.	Lack of encouragement or help from family or friends to stop smoking	1	2	3	4
2.	Having strong emotions or feelings such as anger, or feeling upset when I tried to stop smoking	1	2	3	4
3.	Withdrawal symptoms (e.g. depression, anxiety, restlessness, irritability, sleeplessness, craving etc.) when I tried to stop smoking	1	2	3	4
4.	Family members or friends encouraging me to smoke	1	2	3	4
5.	Feeling lost without cigarettes	1	2	3	4
6.	Thinking about never being able to smoke again after I stop smoking	1	2	3	4
7.	No support or encouragement at work to stop smoking	1	2	3	4
8.	Being addicted to cigarettes	1	2	3	4
9.	Fear of failing to stop smoking	1	2	3	4
10.	Seeing things or people which reminded me of smoking	1	2	3	4
11.	Something stressful happened when I was trying to stop smoking	1	2	3	4
12.	Getting bored when I was trying to stop smoking	1	2	3	4
13.	Fear of weight gain if I stopped smoking	1	2	3	4
14.	The cost of stop smoking medicines such as nicotine replacement therapy	1	2	3	4

		Not a Challenge	Minor Challenge	Moderate Challenge	Major Challenge
15.	Fear of side effects from stop smoking medicines	1	2	3	4
16.	Lack of support or encouragement from health professionals to stop smoking	1	2	3	4
17.	Difficulty in finding someone to help me to stop smoking	1	2	3	4
18.	Easy availability of cigarettes	1	2	3	4
19.	Fear that stopping smoking may interrupt social relationships	1	2	3	4
20.	Use of other substances like cannabis, alcohol etc.	1	2	3	4
21.	Having doubt in the health benefits of stopping smoking	1	2	3	4
22.	Belief that medicines to stop smoking do not work	1	2	3	4
23.	Belief that I can stop smoking in the future if I need to	1	2	3	4
	Others, please specify if any				
24.	.....	1	2	3	4
25.	.....	1	2	3	4
26.	.....	1	2	3	4

5) Since enrolment in the study, have you had any of the following

a) Long term health problem (of more than one month duration)

☐ Yes ⟶ Total duration of illness .....Months.....Weeks

☐ No

b) Rehabilitation as an in-patient

☐ Yes ⟶ Total length of stay.....Days .....Weeks .....Months

☐ No

c) Hospitalisation (excluding the admission during which you were recruited into the study)

☐ Yes ⟶ Total length of stay.....Days.....Weeks.....Months

☐ No

Thank you for completing the Questionnaire

Please return the completed questionnaire in the reply-paid envelope provided