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Protocol for a systematic review of economic evaluations of preoperative smoking cessation interventions for preventing surgical complications

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ABSTRACT

Introduction The short-term economic benefit of embedding best practice tobacco dependence treatment (TDT) into healthcare services prior to surgery across different populations and jurisdictions is largely unknown. The aim of this systematic review is to summarise the cost-effectiveness of preoperative smoking cessation interventions for preventing surgical complications compared with usual care. The results will provide hospital managers, clinicians, healthcare professionals and policymakers with a critical summary of the economic evidence on providing TDT routinely before surgery, aiding the development and dissemination of unified, best practice guidelines, that is, implementation of article 14 of the WHO Framework Convention on Tobacco Control.

Methods and analysis A comprehensive search of peer-reviewed literature will be conducted from database inception until 23 June 2021 (Cochrane, Econlit, Embase, Health Technology Assessment, Medline Complete, Scopus). Published, English-language articles describing economic evaluations of preoperative smoking cessation interventions for preventing surgical complications will be included. One researcher will complete the searches and two researchers will independently screen results for eligible studies. Any disagreement will be resolved by the third researcher. A narrative summary of included studies will be provided. Study characteristics, economic evaluation methods and cost-effectiveness results will be extracted by one reviewer and descriptive analyses will be undertaken. A second reviewer will review data extracted for accuracy from 10% of the included studies. Reporting and methodological quality of the included studies will be evaluated independently by two reviewers using the Consolidated Health Economic Evaluation Reporting Standards statement and the Quality of Health Economic Studies Instrument checklist, respectively.

Ethics and dissemination This research does not require ethics approval because the study is a planned systematic review of published literature. Findings will be presented at health economic, public health and tobacco control conferences, published in a peer-reviewed journal and disseminated via social media.

Trial registration number CRD42021257740.

Strengths and limitations of this study

- This review will, for the first time, summarise and assess the evidence on the cost-effectiveness of preoperative smoking cessation interventions for preventing complications compared with usual care across different surgical populations.
- The search strategy was developed by an experienced health liaison librarian.
- The systematic review is registered with the International Prospective Register of Systematic Reviews and the protocol is reported according to the recommendations of the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols statement.
- Two authors will independently screen the search results and assess the reporting and methodological quality of the included studies.
- The total number of studies evaluating the cost-effectiveness of preoperative smoking cessation interventions for preventing surgical complications may be small; economic evaluation methods may be heterogeneous; and cost-effectiveness estimates may be derived from diverse health financing systems, limiting the generalisability of findings.

INTRODUCTION

Despite substantial progress in the reduction of tobacco use, smoking remains a leading preventable cause of premature mortality and morbidity globally.[1–3] In 2003, the WHO established the WHO Framework Convention on Tobacco Control (FCTC), an international treaty promoting the implementation of evidence-based measures to reduce tobacco use and exposure to tobacco smoke.[4] Signatories are obligated, among other things, to provide treatment for tobacco dependence as set out in article 14.[5] However, best practice tobacco dependence treatment (TDT)—combining approved pharmacotherapy with multisession behavioural support—is not systematically embedded in the healthcare system of some countries such as Australia.[5–7]

A hospital admission provides a 'teachable moment' for health education and smoking cessation counselling, particularly for surgical patients.[8 9] Despite this, hospital policies on the provision of TDT vary across jurisdictions and hospitals.[10–12] Those who smoke are at higher risk of surgical complications with significantly higher odds of complications leading to further surgery and readmission compared with non-smokers (15% vs 12%, respectively).[6 13] Smokers are also at higher risk of poor postoperative healing compared with non-smokers including surgical site infections (SSIs) (OR 1.79, 95% CI 1.57 to 2.04), wound complications (OR 2.27, 95% CI 1.82 to 2.84) and delayed healing and wound separation (OR 2.07, 95% 1.53 to 2.81).[14] Postsurgical complications increase morbidity and mortality, reduce quality of life, prolong hospitalisation, increase healthcare costs and result in lost productivity.[6 15 16]

Quitting smoking significantly improves surgical outcomes, shortens hospital stays and reduces cancer recurrences and deaths.[17] Abstaining from smoking just 4 weeks before surgery significantly reduces the risk of complications such as SSIs and pulmonary complications.[15] Undergoing surgery can provide motivation to quit smoking[8] and interventions delivered presurgery increase the likelihood of success.[18 19]

There is a substantial body of evidence on the long-term costs and benefits of TDT[20–23] but the health and economic benefits of routinely providing smoking cessation in the shorter term are less well known. A recent cost analysis suggests, all else being equal, reducing the 2016 maternal smoking rate from 8.4% to 6.4% could have saved 106 Victorian public hospital neonatal intensive care cot-days ($A276 000)[24] in 1 year. Further, 3580 (95% uncertainty interval (UI) 2312 to 5178) SSIs could have been prevented, and 8985 (95% UI 4094 to 19 153) hospital bed-days and $A19.1M (95% UI $A7.7M to $A42.5M) saved in Australia if the 2016 surgical smoking rate had reduced from 23.9% to 10%.[25] However, these analyses only partially consider the range of costs and benefits associated with increasing smoking cessation rates. For example, the costs of providing TDT are not included in the estimates.

Economic evaluations systematically compare the costs and benefits of competing interventions and thus provide information on how best to improve outcomes within funding constraints.[26 27] Targeted and accessible economic information for hospital decision-makers, about the costs and benefits of routinely providing TDT for surgical populations could help promote the implementation of evidence-based practice in hospitals.[28] Jiménez-Ruiz *et al* recently estimated for every Euro invested in providing smoking cessation before surgery in Spain returns an estimated €1.29.[29] Thus far, there is no systematic review providing an overview of the cost-effectiveness of preoperative smoking cessation to prevent complications in different surgical populations and jurisdictions to inform service providers, clinicians, funders and policymakers. Consequently, the aim of this systematic review is to summarise and assess the evidence on the costs and benefits of preoperative smoking cessation interventions for preventing surgical complications compared with usual care across different populations. The findings will help inform the development of appropriate policies, programmes and strategies for embedding TDT in hospital settings, assisting the implementation of article 14 of the WHO FCTC.

Review questions

This systematic review addresses three related research questions:

1. What is the cost-effectiveness of preoperative smoking cessation interventions for preventing surgical complications versus usual care across different populations and jurisdictions?
2. Which preoperative smoking cessation interventions are the most cost-effective versus usual care?
3. What is the reporting and methodological quality of peer-reviewed, published health economic evaluations of preoperative smoking cessation interventions for preventing surgical complications?

METHODS AND ANALYSIS

The protocol is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.[30]

Eligibility criteria

The eligibility criteria are summarised in table 1. Published, peer-reviewed, English-language articles reporting full economic evaluations of preoperative smoking cessation to prevent complications in surgical populations will be eligible for inclusion in the systematic review. Health services costing studies, partial economic evaluations, editorials, comment or discussion papers, qualitative studies, reviews, case reports, case series, book chapters and conference articles will be excluded.

Search strategy

The search strategy will be devised, tested and adapted for the different databases by the Deakin University Health Liaison Librarian (JH) in conjunction with the lead researcher (NMC). Search terms, that is, key words and subject headings, will be based on the research question, population (smokers), intervention type (preoperative), study design (economic evaluation), outcome (complications) and previous systematic reviews of preoperative smoking cessation interventions to prevent surgical complications.[14 17 31 32]

A search will be conducted from database inception until 23 June 2021 in the following electronic databases: Cochrane library; Econlit; EMBASE; Health Technology Assessment; Medline Complete; and Scopus. The databases were chosen based on the experience of the librarian and the recommendations by Arber *et al*.[33] A scoping search of the grey literature will be conducted using Google search engine to determine whether a more

Table 1 Study eligibility criteria

PICOS	Inclusion criteria	Exclusion criteria
Population	Adult patients* from any jurisdiction undergoing any type of elective surgery and are current smokers	Patients undergoing emergency surgery
Intervention	All smoking cessation interventions, including brief advice, behavioural support, pharmacotherapy (nicotine replacement therapy, varenicline, bupropion), individually or in combination.	Details of smoking cessation intervention not provided, for example, brief advice plus nicotine replacement therapy (NRT) where the type of NRT is not described.
Control	Usual care	No usual care comparator, for example, compares alternative smoking cessation interventions only
Outcome	Surgical complications† Incremental cost-effectiveness ratio	No costing data provided.
Study type	Cost-benefit analysis, cost-utility analysis, cost-effectiveness analysis, cost-consequences analysis. Trial-based or modelled analyses.	Health services costing studies, partial economic evaluations, editorials, comment or discussion papers, qualitative studies, reviews, case reports, case series, book chapters and conference articles.

*18 years and older.
†Complications may include necrosis, healing delay and dehiscence, surgical site infection, wound complications, pulmonary complications, hernia, lack of fistula or bone healing, readmission or mortality.

comprehensive search of the grey literature is warranted. Backwards and forwards citation tracing of included articles will be conducted for additional literature unidentified by the search. Search results will be stored in Thomson Reuters EndNote V. X9.2 (2019) libraries and Covidence software[34] will be used to manage records throughout the review. The final search strategies are presented in the online supplemental file.

Selection process

The titles and abstracts of the studies identified by the search will be screened independently by two researchers (NMC, AL) to determine eligibility for inclusion in the review. Full text articles will be retrieved for assessment when the abstract contains insufficient information. Subsequently, full-text articles for all potentially eligible records will be independently screened for inclusion in the review (NMC, AL) and reasons for exclusion will be recorded. Any disagreement will be resolved by the third researcher (JH). Results of the study selection process will be presented as a the PRISMA flow diagram and a list of excluded articles will be provided.

Risk of bias and quality appraisal

Methodological quality of the included studies will be evaluated independently by two researchers (NMC, AL) using the Quality of Health Economic Studies Instrument (QHES) checklist, one of the most widely applied economic evaluation checklists.[35–37] The QHES consists of sixteen 'yes/no' questions with each question assigned a weight based on importance and total scores range from 0 (poorest quality) to 100 (highest quality). Further, the QHES is a validated checklist with test-retest reliability.[35] Reporting quality of the included studies will also be evaluated independently by the two researchers using the commonly applied Consolidated Health Economic Evaluation Reporting Standards statement.[38 39] Any disagreement will be resolved by consensus among the team.

Data collection

A data extraction form will be developed in Excel based on previously reported systematic reviews of economic evaluations and will be piloted with two included studies by two reviewers (NMC, AL) and updated if necessary. Bibliographic (lead author, publication date, country), study (patient population, intervention, timing intervention commenced, comparator, outcome measures) and methodological (type of analysis, design, time horizon, perspective, reference year, currency, discount rate, resource use, costs, statistical analysis, methods of handling missing data, incremental cost-effectiveness ratio (ICER), uncertainty analysis) information will be extracted. One researcher (NMC) will extract the data from the included studies and a second researcher (AL) will check the data extraction. The views of the third researcher (JH) will be sought where there is ambiguity or disagreement.

Data synthesis

A critical, narrative summary of the included studies will be provided commensurate with guidance from the Cochrane Collaboration.[40] Characteristics and findings of the included studies will be summarised and presented for different types of surgery, different periods of time the preoperative intervention was commenced and alternative outcomes (where feasible). All relevant studies will be included in the review, that is, no study will be excluded on quality criteria, although an assessment of how the quality of the studies may affect the main results and outcome measures will be presented. The methodologies of the included studies will summarised and compared, together with the quality appraisals and risk of bias assessments. A meta-analysis will not be conducted as economic

evaluations are typically heterogenous.[41 42] The ICERs will be converted to 2021 Euros using the web-based tool developed by the Cochrane Campbell Economic Methods Group (CCEMG) and the Evidence for Policy and Practice Information and Coordinating Centre (EPPI-Centre) Cost Converter.[43 44]

Patient and public involvement

A consumer advisory panel of six members, representing broad and objective consumer perspectives, provided input into the development of the research programme which includes this review.

Ethics and dissemination

Ethics approval to conduct this research is not required because this study is a planned systematic review of published economic literature. The systematic review protocol is registered with the PROSPERO, registration number CRD42021257740. Findings will be presented at leading tobacco control and health economic conferences, published in a peer-reviewed journal and disseminated via website postings such as the Deakin University Institute for Health Transformation Linkedin website and social media channels such as Twitter (eg, @DHE_Deakin, @IHT_Deakin) and Facebook.

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Contributors NMC led the conception and design of the work with input from JH. NMC drafted the work and AL and JH revised the protocol and manuscript critically for content. All authors approved the final version to be published and are accountable for all aspects of the work. NMC is the guarantor for the overall content.

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Competing interests None declared.

Patient consent for publication Not applicable.

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