

REVIEW

Effects of preoperative smoking cessation on the incidence and risk of intraoperative and postoperative complications in adult smokers: a systematic review

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Objectives: To establish the effect of preoperative smoking cessation on the risk of postoperative complications, and to identify the effect of the timing of preoperative cessation.

Data sources: The Cochrane Library Database, PsycINFO, EMBASE, Medline, and CINAHL databases were searched, using the terms: "smoking", "smoking-cessation", "tobacco-use", "tobacco-abstinence", "cigarette", "complication", "postoperative-complication", "preoperative", "perioperative" and "surg". Further articles were obtained from reference lists. The search was limited to articles on adults, written in English and published up to November 2005.

Study selection: Prospective cohort designs exploring the effects of preoperative smoking cessation on postoperative complications were included. Two reviewers independently scanned abstracts of relevant articles to determine eligibility. Lack of agreement was resolved through discussion and consensus. Twelve studies met the inclusion criteria.

Data extraction: Methodological quality was assessed by both reviewers, exploring validation of smoking status, clear definition of the period of smoking cessation, control for confounding variables and length of follow-up.

Data synthesis: Only four of the studies specified the exact period of smoking cessation, with six studies specifying the length of the follow-up period. Five studies revealed a lower risk or incidence of postoperative complications in past smokers than current smokers or reported that there was no significant difference between past smokers and non-smokers.

Conclusions: Longer periods of smoking cessation appear to be more effective in reducing the incidence/risk of postoperative complications; there was no increased risk in postoperative complications from short term cessation. An optimal period of preoperative smoking cessation could not be identified from the available evidence.

The link between smoking and postoperative complications is well documented across surgical specialities.¹ Not only is there an increased mortality risk, but also other complications including pulmonary, respiratory, wound infections, delayed wound healing and reduced bone fusion.² Smoking has been associated with increased length of time in intensive care, in recovery from surgery and on the ward.^{3–6} Despite this, a quarter of patients undergoing surgery continue to smoke up to, and after surgery,^{7, 8} with advice on smoking cessation varying from surgeon to surgeon.⁹ Warner *et al*¹⁰ revealed that only 58% of surgeons and 30% of anaesthetists routinely advise patients to stop smoking before undergoing a surgical procedure. This may be because of the lack of clarity on the effect of smoking cessation on surgical complications and concern that a brief period of cessation may have a negative effect on surgical outcome.

Smoking has a negative effect on surgical outcome, as the carbon monoxide (CO) and nicotine, inhaled from smoking a cigarette, increases heart rate and blood pressure and the body's demand for oxygen. Nicotine also causes vasoconstriction,¹¹ reducing the blood flow to certain parts of the body. Smoking causes the small airways in the lungs to narrow making them more prone to collapse and leading to increased susceptibility of infection, coughing, pulmonary complications and prolonged mechanical ventilation in smokers.¹² Smoking also inhibits immune responses involved in wound healing¹³ and increases the risk of blood clotting.¹⁴ It has also been found that smokers often require larger doses of muscle relaxants and other anaesthetics.^{15, 16} However, evidence

suggests that CO levels reduce significantly in as little as 12 hours^{17–21} and that although the half life of nicotine varies, nicotine is usually reduced after 120 minutes.^{22, 23} Therefore, there may be benefits to health from short-term smoking cessation, such as improved oxygen delivery to the patient.

Graham-Garcia *et al*²⁴ proposed that patients undergoing surgery may have increased motivation to stop smoking and may be more susceptible to advice about smoking cessation. With many hospitals becoming smoke-free environments and the availability of effective interventions to help people to stop smoking,^{25–27} the preoperative period is an ideal time to help smokers to quit before being admitted to hospital. Helping patients to stop smoking before surgery may also enhance their surgical outcome and thus help them to get the maximum benefit from their health-care.

Moller and Villebro²⁷ recently completed a systematic review of the effectiveness of interventions to help patients to stop smoking before surgery. Four randomised controlled trials were identified and the authors concluded that the interventions were effective in helping people to stop smoking preoperatively. However, only two studies explored the incidence of surgical complications as an outcome measure, with heterogeneous results. As the recommended period of preoperative smoking cessation is unclear from randomised controlled trials, and prospective cohort studies are useful to explore the causal effect of one thing on another, the present review aims to explore the findings from prospective cohort studies that have specifically focused on exploring the effect of preoperative smoking cessation on the

incidence and risk of surgical complications. The findings and methodological quality of this evidence is explored to inform preoperative advice to patients and preoperative stop smoking interventions.

Objectives

The objectives of the review were to establish the effect of preoperative smoking cessation on the risk of postoperative complications, and to identify the effect of the timing of preoperative cessation.

Criteria for inclusion

Study design

Prospective cohort studies.

Participants

Non-smokers, current cigarette smokers and people who have stopped smoking within the year before undergoing a surgical procedure.

Types of outcome measures

The outcome measures were the incidence or risk of different types of postoperative complications including: sputum volume, respiratory complications including bronchospasm, atelectasis and pneumonia, pulmonary complications including myocardial infarction and angina, wound infection, mortality, and duration of hospital stay. The term "complications" was defined in this instance as a secondary disease or a negative reaction occurring during the course of, or after, surgery. Studies that did not explore the risk of postoperative complications after a period of preoperative smoking cessation were excluded from the review.

Search strategy for identification of studies

Electronic databases was examined using the KA24 (Knowledge Access 24 hours a Day) internet based resource. The databases that were searched included The Cochrane Library Database, CINAHL (1982–2005), PsycINFO (1984–2005), Medline (1966–2005) and EMBASE (1988–2005) using relevant major descriptors and subheadings for each database from the search terms: 1 "smoking"; 2 "smoking-cessation"; 3 "tobacco-use"; 4 "tobacco-abstinence"; 5 "cigarette\$"; 6 "#1 OR #2 OR #3 OR #4 OR #5"; 7 "complication\$"; 8 "postoperative-complication\$"; 9 "preop\$"; 10 "periop\$"; 11 "surg\$"; 12 "#7 OR #8 OR #9 OR #10 OR #11"; 13 "6 AND 12". The symbol \$ at the end of the search terms represents truncation to enable all variations of the word ending to be elicited.

The search was refined in step 13, by searching for participant characteristics AND an outcome characteristic as recommended by Glaziou *et al.*²⁸ Search terms were selected based on common key terms identified in the initial search of the literature and related reviews conducted in the area. The search terms were not exploded due to the large volume of articles elicited from the standard search. Reference lists were checked to ensure all relevant articles had been identified and included in the review. It was deemed that any articles not identified by this search strategy would not significantly affect the conclusions drawn by the review.²⁹

Articles were also identified through reference lists and a general internet search using the Google search engine. A hand search of journals was not completed as articles were mainly elicited from disease specific journals and therefore a key journal was not identified to be hand searched.

METHODS

One reviewer screened the articles elicited from the search against the inclusion criteria. Full text versions of potentially relevant studies identified from the abstracts were obtained for

more detailed analysis. Two reviewers checked the studies for possible relevance for inclusion. Lack of agreement was resolved through discussion and consensus. Studies were excluded if the participants did not undergo a surgical procedure under general anaesthesia (for example, patients undergoing a biopsy were excluded from the analysis) and if the period of smoking cessation was more than one year before surgery. The search elicited a total of 11 258 articles. After excluding duplicates and studies that were not deemed to be relevant through reading the abstract, 147 full text articles were obtained. As this was a review of the literature, ethical approval was not necessary. Based on the criteria for inclusion, including study design, duration of preoperative smoking cessation and outcome measures, 135 articles were excluded.

Assessment of the observed effect of smoking cessation on postoperative complications was based on the methodological quality of the study and percentage incidence of postoperative complications or relative risk between the smoking status groups reported by the studies. As the aim of the review was to explore the effect of smoking cessation before surgery on the risk of postoperative complications, only data making comparison between either non-smokers or current smokers, with patients who stopped smoking preoperatively, were tabulated.

Description of studies

The search of the databases identified 12 articles meeting the inclusion criteria. Nine studies were undertaken in the United States,^{17 30 32–36 38 40} and of the remainder, one in each of the following countries: Japan,⁴¹ Australia³⁹ and Israel.³⁷

Sample sizes ranged from 128–5437 participants in total. Due to the nature of cohort designs there were not equal numbers between the participant groups. The exact number of current smokers, past smokers and non-smokers was not clear from the information presented in one study.³⁷ All the studies had comparatively low attrition rates and participants were lost to follow-up as a result of cancelled operations, death, unplanned surgical complication intervention, and one study identified three "past smokers" who commenced smoking post-surgery. Periods of follow-up ranged from seven days up to 16 years, although six studies did not specify the follow-up period.^{17 32–34 36 37} One study did not include a comparison group of current smokers³⁸ and two studies merged the past smokers' data in with another participant group.^{36 39} One study looked at the affect of postoperative smoking cessation in addition to preoperative smoking cessation.³⁵

Most studies included many exclusion criteria specific to the nature of the surgery being explored. For example, patients undergoing surgery for lung cancer were excluded if they had a concomitant pleural resection.³⁰ As all studies in the review explored different types of surgery, these exclusion criteria were difficult to compare. Three studies did not specify any exclusion criteria.

Methodological quality

The methodological quality of the studies included in the review were assessed against the relevant quality criteria for critical appraisal of cohort studies proposed by the Centre for Research and Dissemination³¹ and against criteria relevant to the nature of the studies explored, such as a clearly defined period of smoking cessation before surgery and validation of smoking cessation status (table 1).

Most of the studies clearly outlined the participant characteristics including information on age, sex, body mass index (BMI), health status and medical history. Eight studies highlighted that there were differences in the sample characteristics between patients who continued to smoke, those who gave up, and non-smokers. For example, current smokers were of a younger age and had higher incidence of chronic obstructive pulmonary disease (COPD), coughing

Table 1 Characteristics of studies included in the review

| Authors | Type of surgery | No. of patients | Preoperative smoking cessation period | Length of follow-up | Clear definition of period of cessation | Cessation validated | Main findings | Percentage risk/relative risk |
|--|---|-----------------|---|------------------------------------|---|---------------------|--|--|
| Barrera <i>et al.</i> , 2005 ³⁰ | Thoracotomy/lung cancer resection | 300 300 | PS <2 mths (13%) >2 mths (62%) CS (4%) NS (21%) | 30 days | Yes | No | No significant increase in pulmonary complications among those who quit within 2 months and CS. Incidence of pneumonia was lower in NS compared to PS or CS but there was no significant difference between PS and CS | Total complications PS = 19% RQ = 23% NS = 8% Pneumonia PS = 10% RQ = 15% NS = 3% Atelectasis PS = 5% RQ = 3% NS = 0% Pulmonary embolism PS = 2% RQ = 3% NS = 2% Respiratory failure PS = 1% RQ = 3% NS = 0% Mean length of stay CS = 9 days PS = 8 days RQ = 8 days NS = 6 days |
| Bluman <i>et al.</i> , 1998 ³² | General, orthopaedic, cardiac | 410 | PS (46%) <1 wk ≥1 wk <2 wks ≥2 wks <4 wks ≥1 mth CS reduced <4 wks CS (34%) NS (20%) | Not stated | Yes | No | CS had a 6×-increased risk of pulmonary complications. There was no significant increase in risk of pulmonary complications in PS in comparison to NS. Reducing cigarette consumption <1 month preoperatively did not reduce the risk of pulmonary complications | Atelectasis or worsening CS = 8% PS = 7% NS = 0% Pulmonary infection CS = 3% PS = 1% NS = 0% Mortality CS = 1% PS = 1% NS = 0% Total PCs (95% CI) <1 wk = 3.5%; 10.6 (1.6 to 69.6) <2 wks = 7.1%; 4.7 (1.2 to 19.0) <4 wks = 7.8%; 4.0 (1.0 to 15.7) ≥1 mth = 6.4%; 14.2 (3.2 to 63.6) CS = 74.5% 1.0 |
| Chang <i>et al.</i> , 2000 ³³ | TRAM flap breast reconstruction | 718 | PS ≤4 wks (67%) CS (13%) NS (67%) | Not stated | No | No | CS had a higher incidence of complications than NS with no significant differences between NS and PS. Heavier smokers had a higher overall complication risk than lighter smokers | Overall flap complication CS = 31.1% PS = 25.3% NS = 22.6% |
| Goodwin <i>et al.</i> , 2005 ³⁴ | Tissue expander/implant breast reconstruction | 515 | PS >4 wks (15%) CS (11%) NS (75%) | Not stated | No | No | There were significantly more complications in PS than NS. There was no significant difference in complication rates between PS and CS. There was an 80% increased risk of complications for each pack increase in cigarettes per day | Wound infection CS = 9.1% NS = 2.9% Total PCs CS = 37.9% NS = 15.1% |
| Hasdai <i>et al.</i> , 1997 ³⁵ | Coronary revascularisation | 5437 | PS >6 mths (42%) QPS (8%) CS (14%) NS (37%) | Up to 16 years (average 4.5 years) | No | No | Long-term risk of mortality was 44% greater in CS in comparison to PS. Cessation before or after surgery was beneficial | Mortality QPS = 1.2 (0.87–1.70) PS = 1.3 (1.14–1.57) NS = 1.0 Myocardial infarction QPS = 1.4 (0.64 to 3.11) PS = 1.28 (0.77 to 2.16) NS = 1.0 Severe angina QPS = 0.91 (0.76 to 1.08) PS = 0.99 (0.90 to 1.09) NS = 1.0 |

Table 1 Continued

| Authors | Type of surgery | No. of patients | Preoperative smoking cessation period | Length of follow-up | Clear definition of period of cessation | Cessation validated | Main findings | Percentage risk/relative risk |
|---|---|-----------------|--|----------------------------|---|---------------------|--|---|
| Lavernia <i>et al</i> , 1999 ³⁶ | Unilateral arthroplasty of hip or knee | 202 | PS <6 weeks CS (12%) NS (88%) | Not stated | No | No | NS combined with PS had significantly shorter surgery duration and needed less anaesthesia than CS. NS combined with PS had significantly shorter surgery duration and needed less anaesthesia than CS | Length of stay CS = 5.4 ± 3.9 PS = 5.3 ± 2.7 NS = 5.1 ± 2.6 Total PCs CS = 16% PS = 26.2% NS = 21.5% |
| Levin <i>et al</i> , 2004 ³⁷ | Onlay bone grafts, sinus lift | 128 | PS >6 mths CS: Mild <10 per day Heavy ≥10 per day NS* | Not stated | No | No | Significantly higher incidence of postoperative complications in CS in comparison to NS. No significantly increased risk of complications in PS | Total PCs NS = 23.1% CS = 50% No data obtainable for PS |
| Moore <i>et al</i> , 2005 ³⁸ | Pelvic reconstructive surgery | 887 | PS ≥1 mth (26%) NS (74%) | 1 mth | No | No | No significant difference in the incidence of postoperative complications in NS and PS | Total PCs PS = 26% NS = 29% |
| Myles <i>et al</i> , 2002 ³⁹ | Ambulatory Surgery | 489 | PS >28 days (24%) CS (41%) NS (35%) | 7 days | No | Yes | PS combined with NS had a significantly lower incidence of coughing, respiratory complications and wound infection than CS | Respiratory CS = 33.5% PS = 34.5% NS = 25.9% Wound infection CS = 3.7% PS = 2.6% NS = 0.6% |
| Warner <i>et al</i> , 1989 ⁴⁰ | Coronary artery bypass graft (CABG) | 192 | PS (69%) <2 mths >2 mths CS (9%) NS (22%) | 96 days | Yes | Yes | Smokers quitting <2 months before surgery had a 4× increased risk of pulmonary complications than those quit >2 months before surgery. Smokers who stopped smoking >6 months before surgery had the same risk of complications as NS | Total PCs <2 months = 57.1% >8 weeks = 11.8% >6 months = 11.1% CS = 33% NS = 11.9% |
| Woehlk <i>et al</i> , 1999 ¹⁷ | Non-emergency, non-cardiac and non-major vascular surgery | 740 | PS data included in with NS (62%) CS (37%)† | Not stated | No | Yes | CS had more complications than PS or NS | Data unobtainable |
| Yamashita <i>et al</i> , 2004 ⁴¹ | Minor | 1008 | PS (37%) <1 wk >1 wk <2 wks >2 wks <2 mths >2 mths CS (16%) NS (48%) | 30 days or up to discharge | Yes | No | CS and PS significantly more likely to have increased intraoperative sputum volume than NS. No significant differences in postoperative complications between PS, CS and NS | Increased sputum; RR (95% CI) <1 wk = 22.9%; 2.4 (1.6 to 3.6) <2 wks = 22.9%; 2.4 (1.2 to 4.8) <2 mths = 18.8%; 2.0 (0.9 to 4.3) >2 mths = 11.0%; 1.2 (0.7 to 2.0) CS = 18.2%; 1.9 (1.3 to 3.0) NS = 9.3% 1.0 Total PCs >24 hours = 1.4% CS = 1.9% NS = 1.7% |

*Information on the total number of participants in each group not provided.

†The exact number of participants in each group does not appear to match the total number in the sample reported.

CI, confidence interval; CS, current smokers; mths, months; PS, past smokers; NS, non-smokers; QPS, quit post-surgery; RR, relative risk; wks, weeks.

and coronary artery disease.³⁹ Younger age has been associated with improved surgical outcome in comparison to older smokers,⁴² although most studies controlled for these confounding variables in the analysis.

All studies used self-report of smoking cessation, and only three studies used objective measures,^{17 39 40} such as CO readings or cotinine levels (a metabolite of nicotine) to validate smoking cessation status. One study stated that the data were collected by a researcher blind to exposure status. This practice may have occurred in other studies, but was not directly specified.

Only four studies clearly defined the period of smoking cessation before surgery,^{30 32 40 41} with other studies providing broader criteria such as “those who stopped smoking for more than six months” before surgery, limiting the use of these findings to define a recommended period of smoking cessation.

RESULTS

The studies deemed to have good methodological quality will contribute more to the results of the review as recommended by Pettigrew and Gilbody.²⁹ Results were presented in terms

of percentage risk or relative risk of surgical complications, in comparison to patients who continued to smoke or were non-smokers.

Risk of total postoperative complications

Nine studies reported findings on the risk of overall postoperative complications.^{17 30 33 34 36–38 40 41} Five of the studies revealed the risk or incidence of overall postoperative complications in past smokers was significantly lower than current smokers or that there was no significant difference between past smokers and non-smokers.^{33 35 38 39 41}

One study revealed that there were significantly higher complications in patients who stopped smoking more than four weeks before breast reconstruction surgery in comparison to non-smokers, although there was no significant difference in postoperative complications between past smokers and current smokers.³⁴

Two studies revealed that patients who stopped smoking within two months of surgery had an increased risk of complications when compared with patients who stopped smoking more than two months preoperatively.^{30 40}

Five of the nine studies stated that current smokers had a significantly higher risk of overall complications than non-smokers.^{17 33 34 37 40} One study revealed that there were no significant differences in the incidence of postoperative complications between current smokers, past smokers and non-smokers in minor surgery⁴¹ and in the other study between current smokers and data combined from both past and non-smokers in hip or knee arthroplasty surgery.³⁶

Mortality

Two studies explored the effect of smoking cessation on mortality after surgery.^{32 35} One study revealed that there was no significant difference in the risk of death after orthopaedic surgery for patients who stopped smoking, continued to smoke or were non-smokers at follow-up (average follow-up was 4.5 years) although the number of events was low.³⁵ The other study stated that after controlling for confounding variables, patients who stopped smoking for more than six months preoperatively had a significantly reduced mortality risk when compared to patients who continued to smoke before and after surgery.³²

Risk of pulmonary complications

Four studies looked at the effect of smoking cessation on pulmonary complications.^{30 32 35 38} One study revealed that patients who stopped smoking less than four weeks before orthopaedic surgery had a lower incidence of all pulmonary complications than patients who continued to smoke, although a low number of major pulmonary events occurred.³² A further study reported that risk of myocardial infarction was lower in past smokers of more than six months than current smokers, although the risk of severe angina was similar for current, past and non-smokers.³⁵

Another study reported that there was no significant difference in the incidence of pulmonary embolism between patients who stopped smoking for less than two months, more than two months before lung cancer surgery, current smokers and non-smokers.³⁰ A further study found that there was no significant increase in pulmonary complications in patients who stopped smoking four weeks before surgery in comparison to non-smokers.³⁸

Risk of respiratory complications

Five studies reported results for the effect of smoking cessation on respiratory complications.^{30 32 38 39 41} One study stated that there were more events of respiratory failure and hospital readmission due to pneumonia in the current smokers than patients who gave up smoking at or within

one month of general surgery and non-smokers, although the difference was not significant and the number of events was low.³² Similar results were also found in pelvic reconstructive surgery, as there was no significant difference in the incidence of pneumonia in patients who gave up one month before surgery and non-smokers.³⁸ One study revealed that there was no significant difference in the incidence of pneumonia in patients who stopped smoking less than or more than two months before lung cancer resection and patients who continued to smoke.³⁰ One study combined the data of current and past smokers so that the effect of preoperative smoking cessation could not be determined. Patients in the combined group did have a significantly higher incidence of coughing and respiratory complications than non-smokers.³⁹

Only one study looked at the effect of smoking cessation on sputum levels and respiratory complications in patients undergoing minor surgery.⁴¹ It was stated that past smokers and current smokers had an increased risk of increased sputum than non-smokers, although the risk decreased to the same sputum volume as current smokers, for smokers who stopped smoking more than two weeks before minor surgery.⁴¹ No studies looked at the effect of smoking cessation on sputum levels in major surgical procedures.

Wound infection

Only one study explored the effect of smoking cessation on wound infection; it was stated that current smokers and past smokers who stopped smoking more than 28 days before ambulatory surgery had a significantly higher incidence of wound infection than non-smokers, although as past smokers data were included with current smokers it is difficult to explore the effect of preoperative smoking cessation on postoperative complications from this study.³⁹

Length of stay

Two studies explored the effect of smoking cessation on length of postoperative stay.^{30 36} One study revealed that patients who stopped smoking before lung cancer resection surgery had a higher average length of stay than non-smokers, although this was lower than current smokers. Current smokers had a significantly higher length of stay than non-smokers.³⁰ The other study revealed that there appeared to be a relationship between current smokers and longer stay in hospital, although this finding was not significant.

DISCUSSION

This review was conducted with the aim of exploring the effect of preoperative smoking cessation on the risk of postoperative complications, and to identify the period of cessation needed to have a beneficial effect on improving surgical outcome.

The methodological quality of studies was often limited with essential information on follow-up duration, period of smoking cessation, the control of confounding factors and the outcome assessor being blind to exposure status often missing. Only three studies validated smoking cessation status and therefore some patients may have reported being abstinent from smoking but may have been smoking, as revealed by one study that did validate smoking cessation status.¹⁷ There were also significant differences between the sample characteristics and medical procedures in the groups of current smokers, past smokers and non-smokers which may limit the comparisons that can be made between the groups. For example, some aspects of surgical procedures such as wedge resections in thoracotomy surgery were more common in current smokers than past or non-smokers.³⁰ However, it is important that patients receive the medical

care most suitable for their individual needs and therefore this would be difficult to control.

The studies included in the review encompassed a wide range of surgical procedures, which is both a benefit in terms of the generalisability of the findings but also increases the difficulty in comparing results from studies and interpreting the findings. Myles *et al*³⁹ also highlighted that patients with more severe illness are more likely to reduce their consumption or stop smoking, which may influence the incidence of postoperative complications in past smokers from these studies. One study did not report the findings of patients who continued to smoke making comparisons more difficult.³⁸ Two studies did not provide data on the risk of complications in patients who stopped smoking preoperatively,^{17, 37} limiting the contribution of these studies to this review, and one study³⁸ did not provide data on current smokers making comparisons between studies difficult.

There is the possibility that publication bias may affect the results of this review, although it is postulated that due to the nature of the research, negative findings on the effect of smoking cessation may be perceived to be as important as positive findings. The evidence elicited from this review was limited by the lack of studies in this area. For example, only one study explored the effects of smoking cessation on sputum volume. This is important, as sputum volume often increases after a short period of smoking abstinence, with smokers less able to clear the sputum after surgery. Sputum has been linked to an increase in pulmonary complications after surgery and therefore this may have important implications for recommendations on the most beneficial period of smoking cessation for patients undergoing surgery.⁴¹ Further research is urgently needed to assess the effect of preoperative smoking cessation on sputum volume and its implications for clinical practice.

Despite these limitations, some common elements of the effects of smoking cessation on postoperative complications became evident. It is widely documented that stopping smoking before surgery has substantial health benefits in the longer term and should be recommended to every smoker in order for them to gain maximum benefit from their treatment. As expected, patients who continued to smoke before surgery did have a higher rate of postoperative complications than non-smokers. However, it also became evident that only one of the 12 studies found a significant increase in postoperative complications from short-term preoperative smoking cessation. In addition, five studies also revealed that the risk or incidence of postoperative complications was significantly lower in past smokers than current smokers or that there was no significant difference between past smokers and non-smokers. As only two studies specified the exact period of preoperative smoking cessation, identification of the optimal period of preoperative smoking cessation on postoperative complications could not be determined, although there did appear to be a trend towards reduced risk the longer the period of preoperative smoking cessation. It should also be considered that even a period of temporary short-term abstinence before surgery may also increase patients' confidence in their ability to quit smoking and may lead to a longer term quit attempt in the future. There does also appear to be a benefit from even postoperative smoking cessation on longer-term health outcomes in patients who have undergone a surgical procedure, although the methodological quality of the studies included in this review limits these findings.

Research providing clear definitions of the period of smoking cessation particularly within a few weeks of surgery is required, as only two studies with clear criteria were elicited by this review. If there are benefits to be gained from short-term abstinence, the role of passive smoking on

What this paper adds

The effect of smoking on the risk of postoperative complications has been well documented; however, the effect of stopping smoking before surgery remains unclear. There is currently high variability in the smoking cessation advice offered by consultants and anaesthetists to patients scheduled for surgery.

This systematic review explored the findings from 12 prospective cohort studies. It was revealed that short-term preoperative smoking cessation before surgery may reduce the risk of postoperative complications, although longer periods of cessation may provide the greatest health benefits. These findings have important implications for the advice given to smokers scheduled for surgery.

surgical complications also needs to be investigated to inform patients exposed to high levels of cigarette smoke.

Conclusions

From the evidence included in this review across surgical specialties, it appears that patients who undertake a period of short-term preoperative smoking cessation may reduce their risk of postoperative complications in comparison to patients who continue to smoke. There may be greater benefits to be gained from longer periods of preoperative smoking cessation, although shorter-term cessation should not be discouraged. A risk benefit analysis may need to be completed for patients at a high risk from a potential increase in complications, such as increased sputum volume.

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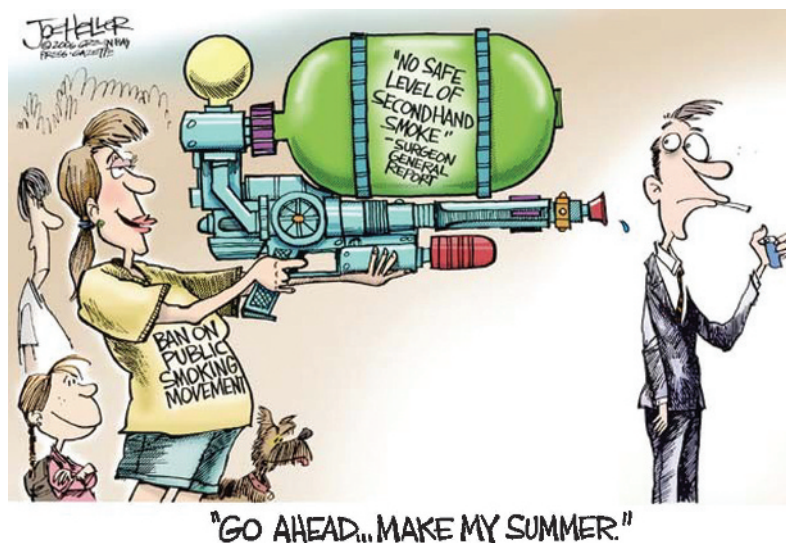
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The Lighter Side



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