

# Temporary Perioperative Tobacco Cessation: A Literature Review



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## ABSTRACT

Perioperative tobacco cessation decreases rates of surgical complications associated with the use of tobacco. The link between patient outcomes and reimbursement to health care providers and systems is another important motivating factor supporting temporary pre- and postoperative tobacco cessation to improve surgical patient outcomes. The optimal time frame for tobacco cessation to improve surgical outcomes has not been definitively established. We examined the literature from June 1989 to July 2017 regarding various tobacco cessation time frames for perioperative patients, searching MEDLINE, the Cumulative Index to Nursing and Allied Health (CINAHL), the Cochrane Collaboration, and various online-only journals accessed through Google Scholar. We reviewed evidence from 15 studies that report wide variability in recommended time frames (eg, four to six months) for perioperative tobacco cessation. *AORN J* 106 (November 2017) 415-423. © AORN, Inc, 2017. <http://dx.doi.org/10.1016/j.aorn.2017.09.001>

Key words: *tobacco use, tobacco cessation, surgical complications, perioperative tobacco cessation time.*

**T**obacco use is the leading cause of preventable death in the United States.<sup>1</sup> Tobacco-related deaths outnumber the fatalities from HIV, illicit drug use, alcohol use, motor vehicle injuries, and firearm-related incidents combined.<sup>1</sup> The adverse effects of tobacco use are widely associated with multiple chronic illnesses, many types of cancers, and premature death. These effects account for more than 400,000 deaths annually in the United States.<sup>1</sup> Tobacco use adversely affects every organ of the human body and secondarily affects fetuses and those subjected to second-hand smoke.<sup>1</sup>

Despite a growing public awareness of the consequences of direct and indirect tobacco use, more than 15.1% of adults (ie, 36.5 million people) in the United States used tobacco products in 2015.<sup>2</sup> Chaiton et al<sup>3</sup> reported that those who

attempted to cease using tobacco did so up to 30 times, and many were not successful. Hughes et al<sup>4</sup> reported that tobacco cessation is a more chronic, complex, and dynamic process than is implied in many theories or treatments.

At present, health care providers and institutions are evaluated based on the success rates of treatments, complication rates, lengths of hospital stay, and readmission rates; when outcomes fall short of accepted standards, reimbursement is jeopardized.<sup>5</sup> For example, when a patient develops a surgical site infection (SSI) that requires readmission, the hospital is not compensated for the care connected to the infection (eg, antibiotic therapy) or the additional hospitalized days if the patient is insured by Medicare or Medicaid.<sup>6</sup> The justification for withholding funding for the treatment and care is that SSIs are considered to be preventable complications.<sup>6</sup>

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In the United States, SSIs contribute to patients spending more than 400,000 extra days in hospitals at an additional cost of \$10 billion per year.<sup>6</sup> Urban<sup>7</sup> estimated that superficial SSIs cost an additional \$400 per occurrence, and serious organ or body cavity infections were responsible for costs exceeding \$30,000 per occurrence in 2006. In 2013, Shepard et al<sup>8</sup> reviewed the costs of treatment and the costs of readmission associated with SSIs and calculated that a cost savings of \$34,407 could be achieved with each SSI that is prevented.

Tobacco use is linked to adverse outcomes of surgical treatments including infections, delayed wound healing, and slowed or failed bone healing and fusion.<sup>9,10</sup> Kamath et al<sup>11</sup> estimated an 11% higher cost of care for surgical patients who smoke than for those who do not. In 2006, Little et al<sup>12</sup> retrospectively evaluated 64 patients who underwent open reduction and internal fixation of the scaphoid bone and had adequate follow-up data. Of the 17 patients whose scaphoid bone failed to heal, 13 were active tobacco users.<sup>12</sup>

At present, physicians are permitted to control patient selection to include only those patients who abstain from tobacco, particularly in semielective and elective surgeries.<sup>13</sup> Candidates for spine surgery who use tobacco comprise a group that has been excluded from surgery.<sup>13,14</sup> Luca et al<sup>13</sup> showed that the percentage of nonunion or pseudarthrosis (a type of incomplete union) after spinal fusion was up to four times greater in smokers than nonsmokers. Other possible effects of tobacco at the cellular level include altered calcitonin resistance and impaired osteoblastic function.<sup>13</sup>

The Joint Commission identified a reduction of the incidence of surgical complications as a National Patient Safety goal.<sup>14</sup> The collective evidence pertaining to the negative effects of smoking on surgical outcomes and the benefits of tobacco cessation in surgical patient populations supports temporary perioperative tobacco cessation, regardless of the success of long-term tobacco cessation.<sup>14</sup>

## PURPOSE OF THE LITERATURE REVIEW

The purpose of this systematic review is to examine the effect of tobacco use in the perioperative patient population and to assess recommendations for time frames for temporary perioperative tobacco cessation. The studies included investigated the risks and benefits of tobacco cessation in the surgical patient population.<sup>15-29</sup> Researchers compared complications for surgical candidates who actively used tobacco to nonusers and former tobacco users. In some of the studies, patients ceased tobacco use and were supported with nicotine replacement therapy, psychotherapy, or support groups.

Temporary tobacco cessation decreases surgical complication rates, but the optimal time frames for tobacco cessation are unclear.<sup>15-29</sup> We conducted this review to examine the evidence on the effects of the various durations of preoperative tobacco cessation on surgical outcomes.

## METHODS

We included literature published from June 1989 to July 2017 in this review. The literature search terms included *smoking, tobacco, perioperative smoking cessation time frames, surgical complications, and causes of surgical complications*. We used MEDLINE, the Cumulative Index to Nursing and Allied Health (CINAHL), Google Scholar, and the Cochrane Collaboration search engines for this literature review. The search *tobacco and surgery* from June 1989 through July 2017 produced 55,736 articles. Limiting the search we found

- 36,108 peer-reviewed journal articles;
- 35,937 peer-reviewed journal articles in English;
- 6,232 perioperative tobacco articles;
- 369 perioperative tobacco cessation articles;
- 37 temporary perioperative tobacco cessation articles; and
- 15 reviews of abstracts, summaries, articles, and levels of evidence.

Our article selection process is shown in [Figure 1](#). We used Polit and Beck's Quick Guide to an Evidence Hierarchy to appraise the level of evidence critically in the selected articles.<sup>30</sup> The evidence ratings for the literature we reviewed ranged from level I (ie, the strongest level of evidence) to level IV (ie, the weakest) on the Quick Guide to an Evidence Hierarchy grading system. We included articles with levels of evidence that ranged from level I to level III. Seven studies are systematic reviews,<sup>18,20,22-24,26,28</sup> five are retrospective studies,<sup>15-17,19,29</sup> one is a nonrandomized prospective study, and two are prospective randomized studies.<sup>21,27</sup>

## FINDINGS

We included 15 studies conducted by researchers representing the following disciplines: six anesthesia,<sup>19-21,26-28</sup> two psychology,<sup>22,23</sup> and seven surgery.<sup>15-18,23,25,29</sup> Few studies that examined smoking cessation time frames were available.<sup>16,18-21,23,27-29</sup> Although the researchers examined the effects of tobacco globally, most focused on their area of specialty in their conclusions.

The lack of time frame recommendations to discontinue tobacco preoperatively in six studies<sup>15,17,24-26</sup> and the need for additional research to clarify time frames in seven studies reflect the lack of evidence supporting a specific protocol

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