Implementing Smoking Cessation Interventions in a Preoperative Clinic

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Cigarette smoking has negative health implications for surgical patients. Smoking cessation before surgery reduces complications; however, information on the risks of smoking and benefits of quitting on surgical outcomes are not regularly provided to patients. It is especially important for smokers to quit now because they are at increased risk of serious complications of coronavirus disease 2019 (COVID-19). The purpose of this project was to develop and implement a program for smoking cessation in a preanesthesia clinic associated with a southwestern medical center to increase motivation to quit smoking. The evidence-based program involved development of a provider toolkit, a referral process, provider education, and program evaluation. After provider education, the program commenced. Of the 134 current smokers encountered over a 16-week period, most were ready to quit within 30 days (n = 92, 68.66%). Of the smokers who were ready to quit, 50 (37.31%) accepted referral for smoking cessation counseling, treatment, or both. Only 13 (9.70%) of the 134 smokers were already receiving treatment. This program enabled providers to feel more comfortable discussing the implications of smoking, advising smokers to quit, providing education materials, and offering referral services at the appropriate stage of readiness for behavior change.

Keywords: Smoking, smoking cessation, smoking cessation interventions, Transtheoretical Model.

In the United States, an estimated 8 to 10 million surgical procedures requiring anesthesia are performed in cigarette smokers annually.1 Active smokers are at increased risk of perioperative cardiovascular, pulmonary, and wound complications, which can result in sequelae such as wound dehiscence, reintubation, repeated surgery, and increased length of hospital stay.2 Also important at this time is that smokers are at increased risk of serious complications of coronavirus disease 2019 (COVID-19).3

Smoking cessation before surgery reduces smoking-related complications.1 However, information on the effects of smoking and benefits of smoking cessation on surgical outcomes are not routinely provided to patients in preoperative settings.2,4 The preanesthesia clinic is an excellent opportunity to introduce and provide effective smoking cessation interventions. This article describes a preanesthesia clinic’s educational intervention developed for providers to administer to smokers preoperatively.

Literature Review
An estimated 45.3 million people smoke tobacco in the United States, with the highest prevalence of smoking in the Midwest (19 of every 100 adults) and lowest in the West (12 of every 100 adults).5

The impact of smoking on surgical patients is substantial. Four chemicals in cigarettes (nicotine, carbon monoxide, hydrogen cyanide, and nitric oxide) are purported to contribute to smoking-related surgical complications.6,7 These toxins negatively affect tissue perfusion, oxygenation, and wound healing.7 Nicotine increases sympathetic activity, causing vasoconstriction, and carbon monoxide displaces oxygen on hemoglobin, which can elevate blood pressure and heart rate.6,7 Additionally, smoking damages the mucus transport mechanism in the airways, resulting in impaired mucus transport, airway hyperactivity, and susceptibility to infection or pneumonia.7

As many as 70% of smokers have an interest in quitting, but few (3%-10%) are able to do so on their own.8-10 Although cigarette smokers who receive assistance are more likely to quit, less than half receive smoking cessation assistance from primary care clinicians.11,12 In fact, Healthy People 2020 objectives included taking steps to increase quit attempts for adolescents as well as increasing screening and smoking cessation efforts for adults in outpatient settings.13

Practice guidelines and models can guide providers in assisting smokers toward cessation. Two models are commonly used in smoking cessation research and programs. The US Public Health Service recommends screening and management according to the 5 A’s framework (ask about smoking, advise to stop, assess readiness to quit, assist with a plan, arrange follow-up).12,14-16 There is evidence supporting the effectiveness of smoking cessation counseling using the 5 A’s.17 Prochaska and Velicer18 developed the Transtheoretical Model (TTM) to assist cigarette smokers toward abstinence. The TTM identifies
5 stages of smoking cessation readiness (Table 1).

During precontemplation, people are likely unaware, not interested, or unwilling to take action within the next 6 months. In contemplation, people are planning to take action or make a change within the next 6 months. At the preparation stage, people have decided and intend to take action or make a change within the next month. Action is a stage in which people have taken action or changed their behavior within the past 6 months. Finally, during the maintenance stage, people work to maintain the behavior change. The longer individuals remain in this stage, the greater the likelihood of preventing relapse. Relapse can occur once treatment is discontinued, or from abrupt loss of support from family, friends, or counselors. Without intervention, smokers are more likely to stay in early stages (precontemplation, contemplation) because of decreased motivation. Incorporating the stages of readiness with the 5 A’s framework can guide providers with subsequent interventions.

Preoperative smoking cessation can provide immediate reduction in carboxyhemoglobin and nicotine levels in the bloodstream and enable patients to work toward long-term smoking cessation. Half-lives of nicotine and carbon monoxide are approximately 1 and 4 hours, respectively. Malhotra et al reported a mean carboxyhemoglobin level in smokers of 3.81 ± 2.17 g/dL compared to 2.95 ± 1.33 g/dL in nonsmokers. Interventions or counseling (≥20 minutes plus >1 follow-up visit) that include pharmacotherapy at least 3 weeks before surgery have resulted in decreased postoperative complications as well as increased success with long-term smoking cessation. Less intense interventions contribute to smoking cessation but do not have a significant effect on reducing postoperative complications. In one study, patients who received brief counseling, were offered smoking cessation medications, and were referred to smokers’ helplines were more interested in quitting than those who received only minimal counseling. The ideal intensity for preoperative smoking cessation intervention is not known. However, smoking cessation 4 or more weeks before surgery can decrease postoperative respiratory complications, and smoking cessation 3 or more weeks before surgery can decrease wound healing complications.

As a major life event, surgery can serve as a catalyst for engaging in smoking cessation strategies and for smoking abstinence before surgery, with the potential for a long-term health impact. Brief interventions, those less than 10 minutes (eg, counseling, self-help materials, pharmacotherapy prescription, smokers’ helplines), can significantly increase motivation to quit and smoking cessation outcomes. Smokers who understand the risks of smoking are more likely to quit and maintain longer periods of cessation. Counseling should then focus on the benefits of smoking cessation and perioperative risks.

Yousefzadeh et al showed that connecting patients with counseling services by way of electronic referrals in patients’ health records increased their enrollment 13-fold. This approach facilitates moving patients into more intensive counseling and pharmacotherapy, which can improve cessation rates. Online or smokers’ helplines are another mode of counseling; one study demonstrated high satisfaction with helplines, with 87.1% of users rating them as excellent or very good. Smoking cessation rates are greatly improved when a combination of counseling and pharmacologic therapy (eg, bupropion, varenicline) is used. Nicotine replacement therapy is also an effective way to manage the effects of nicotine abstinence.

Factors such as low socioeconomic status and living with another smoker can hamper a smoker’s success toward abstinence. Low socioeconomic status is associated with lower levels of education and health literacy; these smokers may be less receptive to smoking cessation interventions and may need additional information and support.

### Methods

- **Pilot Program.** To increase preoperative smoking cessation at our institution, we introduced an evidence-based**
A clinical intervention algorithm based on the 5 A’s was developed for providers (Figure 1). The assess component was augmented by incorporating the TTM. A Sample Script for Smoking Cessation was developed as a guide for providers when discussing smoking cessation (Appendix). In addition, the Pathophysiology and Perioperative Risks of Smoking/Benefits of Quitting, an evidence-based information sheet guided providers with patient education and counseling. A Guide for Smoking Cessation Patient Education Materials, which described available educational handouts, was available for providers to determine the best educational material to attach to the after-visit patient summary. Available handouts were “Benefits of Living Smoke Free,” “Why Do You Smoke,” “Smoking Cessation,” “Getting Support for Quitting Smoking,” “Planning to Quit Smoking,” “Staying Smoke Free,” and “Coping With Smoking Withdrawal.” California Smokers’ Helpline brochures were also provided in the clinic’s examination rooms. The toolkit was built into the PACE website (maintained by the PACE director), and links were established enabling providers to refer patients to the university Center for Health Promotion and the California Smokers’ Helpline. Anesthesia residents and nurse practitioners attended a required 60-minute presentation by the lead author (J.R.E.) on smoking cessation, the toolkit, referral processes, and documentation in the EMR. The presentation is now part of the new provider orientation.

Before implementation, PACE patients received screening only for current tobacco use. Now, providers screen patients for smoking history. If patients are current or recent smokers, providers use the algorithm to guide them through the appropriate steps and interventions. Current smokers are advised to quit and assessed for stage of readiness. Those in the precontemplation, contemplation, or preparation stages receive counseling with emphasis on perioperative risks of smoking and the benefits of quitting. Appropriate educational materials are provided/attached to the after-visit summary and may include a California Smokers’ Helpline brochure. Smokers in the preparation stage are further assisted by offering and arranging referral to the Center for Health Promotion or the California Smokers’ Helpline. Recent smokers, those who quit within the past 12 months (eg, action or maintenance stage), receive encouragement or support and educational materials if needed. This information is documented in the revised tobacco assessment.
section of the standardized documentation. No action is needed for those who quit more than 5 years ago.

Effectiveness of Change. Although smoking and smoking cessation data were not routinely collected before implementing the program, data were collected during the pilot phase to determine effectiveness of the program, and feedback from providers was collected following the program to determine ease of use. Data were collected over a 4-month period (August-December 2017) using a newly developed collection tool. When a provider encountered a current smoker or recent smoker (within 12 months), he or she completed the tool/document. This information was entered into a spreadsheet (Microsoft Excel) and analyzed for descriptive statistics (using Tableau version 9.3, Tableau Software LLC; and Intellectus Statistics online computer software). At the close of the data collection period, 10 program evaluation forms consisting of 7 questions were distributed to PACE nurse practitioners.

Results
Current smokers totaled 134, accounting for 2.2% of the adult clinic population (N = 5,979) seen during the pilot period. Less than 10% of patients were currently receiving care or treatment for smoking cessation at the time they presented to the PACE clinic. Ninety-four percent of the current smokers received counseling, and 64% received educational materials. After receiving counseling/educational materials, nearly 69% of current smokers (n = 92) were ready to quit smoking in 30 days or less. Of the remaining 31% (those not ready to quit, n = 42), women outnumbered the men by a ratio of 2:1 (Figure 2). Fifty of the 134 current smokers (37.3%) who were ready to accept referral for smoking cessation counseling services (Table 2).

Eight clinic providers gave feedback on the toolkit/program. Although explanation of and referral to the program required a few minutes of additional time, the providers found the program to be helpful, easy to understand, and user friendly. Electronic referral options were easily accessible. The providers reported having an enhanced ability to discuss smoking cessation and provide options. Additionally, they appreciated patient interest in smoking cessation and available resources. Difficulty was experienced at times with attaching educational materials to the after-visit patient summary or printing them.

Discussion
Results from this program indicate that smoking cessation intervention that includes advice to quit, counseling, and offering referral to tobacco cessation resources can be beneficial for patients as they prepare for surgery. As studies have shown, such interventions can significantly increase motivation to quit and positively affect smoking cessation outcomes. The Centers for Disease Control and Prevention reports that 7 of 10 cigarette smokers want to quit. Similarly, in our group of patients, 69% were ready to quit in 30 days or less. Notably, of those not ready to quit, women outnumbered the men. Researchers have found that women are less motivated and confident to quit, and fear weight gain.

Nearly all the current smokers received counseling and educational materials. Smokers who did not receive educational materials did not desire the materials, or providers who were pressed for time chose to forgo the additional steps required to choose and attach the materials to the after-visit summary. Woody et al reported that patients often have a desire to stop smoking and sometimes expect providers to speak with them about their smoking history and assist them with smoking cessation interventions. This was apparent on numerous occasions as providers reported patients’ interest in these discussions and were happy to have options to help their patients with smoking cessation. Additionally, patients were often surprised to learn about the risks of smoking and benefits of smoking cessation in preparation for surgery. Bottorff et al found that only half of the patients surveyed had knowledge that smoking up until the day of surgery put them at increased risk of surgical complications.

Connecting patients with counseling services using electronic referrals in the patient record has been shown to increase enrollment. In our clinic, an electronic referral was set up in the patient EMR, enabling patients to transition into more intensive counseling and pharmacotherapy. As a result, 50 of the 92 current smokers who were ready to quit accepted referrals for smoking cessation counseling.
Providers often forgo smoking cessation counseling or interventions because of lack of time or knowledge.\textsuperscript{7,27} Since the implementation of this program, providers in this clinic reported feeling more comfortable discussing the implications of smoking with patients, advising them to quit, and offering referral services at the appropriate stage of readiness.

- **Planned Changes to Program.** There is room for improvement in the program. Based on the data and provider comments, some changes to the program are anticipated. We plan to (1) work with the information technology department to streamline the steps required to choose and attach educational materials to the after-visit summary; (2) change the EMR for patient referrals relative to documentation of follow-up; and (3) develop and implement metrics to monitor outcomes (eg, audits).

- **Implications for Practice.** Enhanced Recovery After Surgery (ERAS) protocols adopted by many hospitals around the world include preoperative smoking cessation as one of the core components and have resulted in significant improvements in clinical outcomes (eg, decreased postoperative complications and length of stay) and cost savings.\textsuperscript{33} Because many patients are unaware that smoking up to the day of surgery can place them at increased risk of surgical complications, preoperative counseling should include a discussion of the perioperative risks of smoking and the benefits of smoking cessation. Theoretically based programs such as this one—with a toolkit, and electronic referral within the medical record—may enable providers to feel more comfortable initiating discussions with patients on the implications of smoking, advising them to quit, and offering referral services. This toolkit could be used in similar preoperative clinics or settings for current or recent smokers preparing for surgery. Preoperative anesthesia clinics and consultations are rising in popularity because they have been shown to be of benefit on perioperative outcomes and to reduce day-of-surgery cancellations.\textsuperscript{34}

**Conclusion**

Surgery, as a major life event, can serve as a motivator to quit smoking. Additionally, many smokers are unaware that smoking cessation can decrease postoperative complications. This program has revealed that preoperative smoking cessation interventions, perhaps not a focus in the primary care setting, can be practically applied and effective in the preoperative clinic. More research is needed to evaluate the effectiveness of such programs on perioperative and long-term smoking cessation and perioperative complications.

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