Clinician-delivered Intervention to Facilitate Tobacco Quitline Use by Surgical Patients

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ABSTRACT

Background: Telephone quitlines that provide counseling support are efficacious in helping cigarette smokers quit and have been widely disseminated; currently, they are underused. Surgery represents a teachable moment for smoking cessation, which can benefit surgical outcomes; however, few surgical patients receive smoking cessation interventions. This study developed and tested a clinician-delivered intervention to facilitate quitline use by adult patients scheduled for elective surgery.

Methods: After formative work involving patients and clinicians, a brief intervention was designed to facilitate telephone quitline use. It was then evaluated in a randomized trial of 300 adults scheduled for elective surgery. A control standard brief stop-smoking intervention served as a comparator, with both interventions delivered by clinicians. The primary outcome was the use rate of a quitline accessed through a dedicated toll-free telephone number, with *use* defined as completing at least one full counseling session. Secondary outcomes included self-reported abstinence from cigarettes at 30 and 90 days postoperatively.

Results: Subject characteristics were similar between the two groups. Records from the designated quitline documented that 29 of 149 subjects (19.5%) in the quitline intervention group and 0 of 151 subjects in the control group completed the first full counseling session ($P < 0.0001$). There were no significant differences in the self-reported point-prevalent and continuous abstinence rates between groups at either 30 or 90 days postoperatively, although rates tended to be higher in the quitline intervention group.

Conclusions: Clinicians can effectively facilitate quitline use by surgical patients. Further work is necessary to evaluate the efficacy of this approach in terms of long-term abstinence from cigarette smoking.

What We Already Know about This Topic

- Busy clinicians can encourage smoking cessation by referring patients to telephone-based tobacco quitlines, but this approach has not been tested in the preoperative period.

What This Article Tells Us That Is New

- In a controlled trial, a brief clinician-delivered intervention to facilitate quitline use significantly increased the proportion of surgical patients receiving telephone counseling for smoking cessation.

IN addition to its detrimental effects on long-term health, cigarette smoking by surgical patients increases the risk of perioperative complications, such as wound infections and pneumonia, in addition to its detrimental effects on long-term health.[1] Surgery represents a teachable moment for smoking cessation (*i.e.*, an event that motivates individuals to adopt health behaviors that reduce risk),[2,3] and there are many opportunities for clinicians who provide surgical care to deliver tobacco interventions to their patients.[4] A US Public Health Service clinical practice guideline on tobacco use and dependence[5] urges that all smokers who come in contact with the health care system receive tobacco intervention as an integral part of their routine clinical care. The guideline recommends an evidence-based technique codified as the "5As" approach: *A*sk about tobacco use, *A*dvise them to quit, *A*ssess willingness to quit, *A*ssist quitting attempts, and *A*rrange for follow-up. However, some of the elements of the 5As, especially Assist and Arrange, have often proved difficult, if not impossible, for busy clinicians to implement in their prac-

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tices; this was specifically shown for surgeons and anesthesiologists.[6] This has prompted increased interest in using telephone quitlines, now available in all 50 states and the District of Columbia, to provide assistance and follow-up to smokers attempting to quit.[7] Some have recommended that rather than trying to provide all elements of the 5As themselves, clinicians should ask their patients about tobacco use, advise them to quit, and refer them to a telephone quitline.[8] Conceptually, this approach has the potential advantages of being easier to implement by clinicians compared with the full 5As approach (because it does not require them to provide specialized assistance and follow-up) and of improving the reach of existing quitlines, which are of proven efficacy.[7] However, no attention has been directed toward the actual content of an Ask–Advise–Refer intervention provided by clinicians. For example, successful implementation of an Ask–Advise–Refer approach requires an effective referral process that results in an intervention being delivered. Faxed referrals to quitlines can be effective[9] but still require clinicians to sufficiently motivate patients that they will accept such referrals to quitline services and actually use the quitlines when contacted. The clinician's intervention should also prepare patients for what they will encounter with the quitline. If patients are informed regarding the content and format of quitline services, they may be more willing to use these services. Thus, the role of the clinician becomes that of a quitline facilitator, rather than a tobacco interventionist. Quitline facilitation as a specific goal of a clinician-delivered tobacco use intervention represents a novel approach, and brief clinician-delivered interventions of any kind have never been evaluated in the setting of surgery.

The goal of this project was to develop and test a clinician-delivered intervention to facilitate quitline use by adult patients who smoke cigarettes and are scheduled for elective surgery. In the first phase, portions of which have been previously reported,[10] formative work, including patients and practitioners, was used to develop the brief (approximately 5-min) intervention. In the second phase, a randomized clinical trial was performed in a preoperative clinic, comparing the quitline facilitation intervention with a standard 5As approach, to test the hypothesis that the rate of quitline use by surgical patients (the primary outcome) would be greater in those patients receiving the quitline facilitation intervention. As secondary outcomes, smoking behavior was assessed at 30 and 90 days postoperatively.

Materials and Methods

This study was reviewed and approved by the Mayo Clinic Institutional Review Board, Rochester, Minnesota; and written informed consent was obtained from all participants.

Intervention Development

Based on formative research reported elsewhere[10] involving interviews and focus groups with patients and clinicians, a brief (approximately 5-min) quitline intervention was developed. The prototype intervention was video recorded using an investigator to deliver the intervention and a mock patient. This recording was then reviewed by clinicians using both an individual interview format (seven anesthesiologists and surgeons) and a focus group of five anesthesiologists and surgeons. It was also reviewed by eight surgical patients individually. Interviews and the focus group were facilitated using a semistructured format. Based on the results of these interviews, the prototype intervention required only minor further revision (the final intervention is included in the appendix). The intervention included the following: (1) advice to quit smoking for as long as possible before and after surgery, with emphasis that "fasting" (*i.e.*, abstinence) from cigarettes the morning of surgery was of particular importance; (2) a description of quitline services; and (3) distribution of a brochure that included the dedicated quitline telephone number that the subject could call to initiate a consultation and the option of a faxed referral to the quitline from the provider.

To provide a control condition, a brief (approximately 5-min) comparison intervention was developed based on the 5As approach (also included in the appendix). It consisted of the following: (1) advice to quit; (2) the potential benefits of quitting to surgical outcomes; (3) a brief review of techniques to aid a quit attempt, including the quitline (except its services were not described); and (4) distribution of a brochure reemphasizing the points of the control intervention and the dedicated quitline telephone number. The primary difference between the comparison and quitline interventions was that the former aimed primarily to provide assistance in quitting, whereas the latter aimed primarily to facilitate quitline use rather than to provide direct assistance in quitting.

Educational materials and procedures, including presentations, written materials, and video examples of patient–clinician interactions, to train clinicians in both interventions were developed.

Randomized Trial

Recruitment. For this second phase, subjects were recruited from patients evaluated at the Mayo Clinic Rochester Pre-Operative Evaluation Center (POE) in preparation for elective surgery. Approximately 15% of adult patients undergoing a wide variety of surgical procedures at Mayo Clinic Rochester are seen in the POE (other surgical patients are evaluated preoperatively using other mechanisms). Eligibility criteria included aged 18 yr and older and *current smoking* before the scheduling of surgery, defined as more than a 100-cigarette lifetime consumption[11] and self-report of smoking either every day or some days. Exclusion criteria included current receipt of pharmacotherapy and/or behavioral therapy for smoking cessation. During recruitment, subjects were informed that the purpose of the study was to examine methods of how best to provide them information about smoking and surgery, with the aim of including a heterogeneous group of study subjects, including those who did not intend to quit smoking for the long-term. Recruit-

ment was performed on a convenience basis when the appropriate research and clinical personnel were available. Subjects were recruited irrespective of their state of residence.

Procedure. After enrollment, subjects were randomized to receive either the quitline or a comparison intervention, delivered by one of four clinicians in the POE trained in the intervention (three physician assistants and one physician). Randomization was stratified according to anticipated type of surgery (inpatient *vs.* outpatient) using blocks of size 4 because it was previously shown that type of surgery is an important factor determining postoperative smoking behavior.[12] For each stratum, a randomization schedule was generated by the Mayo Clinic Division of Biostatistics. At enrollment, group assignment was determined according to the appropriate stratum using sealed envelopes. Selected interactions between the clinicians and subjects were audiotape at least monthly so that study personnel could provide ongoing feedback to the clinicians regarding fidelity to the intervention being studied.

Quitline Services. Quitline services for study subjects were provided by the Mayo Clinic Tobacco Quitline using a dedicated toll-free number provided to both intervention conditions so that use could be tracked, although subjects could use other quitline services. After an initial intake process conducted by an engagement specialist that collected basic demographic and smoking behavior information, subjects were immediately offered an initial session with a quitline counselor of approximately 45-min duration. This initial session could be scheduled for a later time at the subject's discretion. After the initial session, up to eight subsequent proactive sessions (*i.e.*, the counselor scheduled a follow-up and called the subject) were provided according to the treatment plan determined by the subject and the counselor. Four weeks of free nicotine replacement therapy (*i.e.*, patches, gum, or lozenges) were offered, with the option for an additional 4 weeks if the subject was still engaged in the quitting process; the medication was mailed directly to the subject. The counselors were briefed by the study team regarding the purposes and procedures of the study; otherwise, the counseling itself was not specifically tailored for surgical patients and conformed to usual quitline practices.

Assessments. At enrollment in the POE, demographic information and comorbidity were recorded, and a baseline smoking history (including the Fagerström Test for Nicotine Dependence[13]) was obtained. On the morning of surgery, smoking behavior since the last assessment was determined, with recent smoking assessed using expired carbon monoxide measurements (Micro 4 Smokerlyzer; Bedfont, Rochester, United Kingdom). At 30 and 90 days after surgery, assessments *via* telephone were conducted by study personnel to determine smoking behavior and self-reported quitline use and satisfaction. *Continuous abstinence* was defined as not smoking at all since the surgery, and *point-prevalent abstinence* was defined as not smoking within the 7 days before assessment (at 30 and 90 days).[14] Those subjects who could not be contacted were assumed to be smoking. Records from the Mayo Clinic Tobacco Quitline were also obtained directly to determine quitline use.

Data Analysis. The primary outcome was *quitline use*, defined as the successful completion of the first full counseling session after the initial intake interview. All randomized subjects were included in the primary outcome analysis. Characteristics assessed at enrollment and on the morning of surgery were compared between treatment groups using the Wilcoxon rank sum test for continuous variables and the Fisher exact test for categorical variables. Quitline use and abstinence outcomes were assessed at 30 and 90 days after surgery and compared between groups using the Fisher exact test. For abstinence outcomes, subjects who could not be contacted were assumed to be smoking. For self-reported quitline use, missing data were imputed using the approach of last value carried forward. Thus, if someone self-reported using a quitline at the 30-day assessment, this information was retained and used as a surrogate response if the patient had missing data at 90 days. The primary use end point was successful completion of the first full counseling session. Because this end point was directly obtained from the records of the Mayo Clinic Tobacco Quitline, there were no missing data for this end point. In all cases, two-sided tests were used, with $P \leq 0.05$ considered statistically significant. The sample size for this study was determined *a priori* based on the assumptions that the primary outcome of quitline use would be lower than 10%, the intervention would increase this rate by at least 15 percentage points, and there would be approximately 10% sample attrition for reasons such as cancelled surgery. For these assumptions, a sample size of 150 per group provided more than 90% statistical power (two-tailed $\alpha = 0.05$). All analyses were conducted using computer software (SAS version 9.1; SAS Institute Inc., Cary, NC).

Results

From August 2007 to October 2009, 300 subjects were randomized in the clinical trial, with 149 receiving the quitline intervention and 151 receiving the comparison intervention in the POE (fig. 1). All randomized subjects received the assigned intervention and underwent surgery.

There were no significant differences between groups in baseline subject characteristics (table 1). Of the subjects, 82 (27.3%) were scheduled for outpatient procedures, with similar proportions among groups. The median time from POE assessment to surgery was 1 day (table 2). At the baseline assessment in the POE, 109 (73.2%) in the quitline group and 111 (73.5%) in the control group ($P = 0.90$) were planning to maintain abstinence for at least some time after discharge from the hospital facility; 258 subjects (86%) had made at least one previous quit attempt (table 1). Most subjects reported that smoking had not been previously discussed with them as a part of their preparations for surgery, and most were not highly dependent on nicotine (with *high dependency* defined by a Fagerström score of ≥ 6[13]). In the quitline intervention group, 25 subjects (16.8%) accepted fax referral to the quitline.

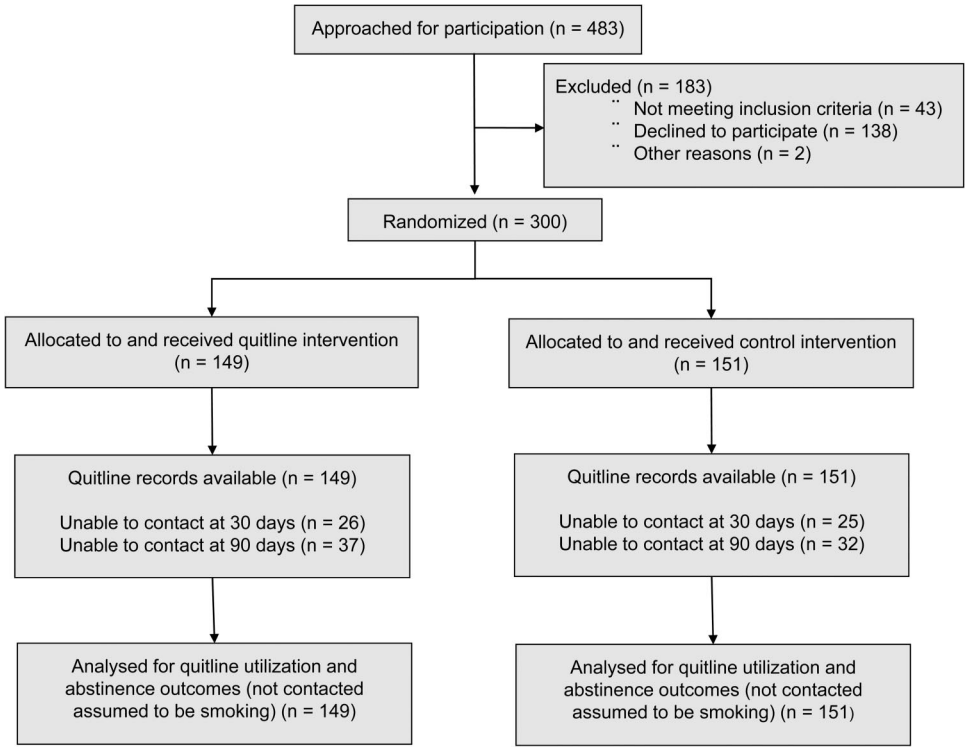

Fig. 1. Flow diagram showing the study process.

At the assessment on the morning of surgery, there were no differences between groups in the time from last cigarette to this assessment, the exhaled carbon monoxide concentration, or the proportion of subjects who reported abstinence since the baseline assessment in the POE (table 2). Those receiving the quitline intervention tended to express stronger agreement that the information received in the POE during their intervention was useful, but this difference was not statistically significant ($P = 0.072$). Six subjects (4.0%) in the quitline intervention group and 0 subjects in the control group reported receiving quitline counseling preoperatively, subsequent to their POE visit ($P = 0.014$). There was no difference in the proportion of subjects who used nicotine replacement medications preoperatively.

By 30 days postoperatively, 22 subjects (14.8%) in the quitline intervention group and 2 subjects (1.3%) in the control group self-reported having received quitline counseling ($P < 0.0001$) (table 3). At 90 days postoperatively, 29 subjects (19.5%) in the quitline intervention group and 4 subjects (2.6%) in the control group self-reported having received quitline counseling ($P < 0.0001$). Records from the designated quitline documented that 29 subjects (19.5%) in the quitline intervention group and 0 subjects in the control group completed the first full counseling session, suggesting that control group subjects contacted a different quitline service or did not accurately report their experience. According to quitline records, an additional 11 subjects (7.4%) in the group that received the quitline intervention completed an initial intake call but did not complete the first full counseling session. Of the 25 subjects who accepted faxed referral to the quitline, 13 (52.0%) completed at least one full counseling session. For those who completed at least one full counseling session, the median (interquartile range) number of sessions completed was 4 (2–5). The rate of quitline use was similar between inpatients and outpatients; in subjects receiving the quitline intervention, 21 (19.4%) of the 108 inpatients and 8 (19.5%) of the 41 outpatients had documented counseling with the designated quitline. Satisfaction with quitline services was high, with 87.1% of those who self-reported quitline use rating it as either excellent or very good. All either strongly or somewhat agreed that the quitline is a useful aid to help surgical patients quit smoking, and all would definitely or probably recommend the quitline to other patients undergoing surgery. Nineteen subjects (65.5% of those with documented quitline use) received free nicotine replacement therapy by mail from the quitline.

At 30 and 90 days postoperatively, 17% and 23% of subjects, respectively, could not be contacted by telephone and were assumed to be smoking. There were no significant differences in the self-reported point-prevalent and continuous abstinence rates between groups at either 30 or 90 days, although rates tended to be higher in the quitline intervention group (table 3). Point-prevalent and continuous abstinence rates at 30 and 90 days tended to be higher in those subjects with documented quitline use, but these differences were not statistically significant. For example, in subjects receiving the quitline intervention, 11 (37.9%) of 29 with documented quitline use reported point-prevalent abstinence at 90 days postoperatively compared with 29 (24.2%) of 120 who did not use the quitline ($P = 0.16$).

Table 1. Baseline Characteristics

Characteristics/Questions	Control Group (n = 151)	Quitline Group (n = 149)	*P* Value
Age, yr*	49.4 ± 14.1	49.1 ± 12.6	0.859
Male Sex	93 (61.6)	86 (57.7)	0.556
Body Mass Index, kg/m^2*	28.4 ± 6.22	29.0 ± 6.72	0.593
Medical History			
Diabetes Mellitus (Takes Insulin)	8 (5.3)	6 (4.0)	0.786
Hypertension (Takes Medication)	40 (26.5)	43 (28.9)	0.699
Coronary Artery Disease (Takes Medication)	13 (8.6)	9 (6.0)	0.508
Past Myocardial Infarction	7 (4.6)	7 (4.7)	1.000
Asthma/COPD (Takes Medication)	18 (11.9)	17 (11.4)	1.000
During the Past 6 Months, Approximately How Many Cigarettes Did You Smoke per Day?			
Mean ± SD	17.5 ± 9.4	18.1 ± 9.2	0.565
Median	20	20	
Interquartile Range	10–20	10–20	
Minimum and Maximum Range	2–50	2–50	
How Many Serious Attempts Have You Made to Stop Smoking?			
0	20 (13.2)	22 (14.8)	0.221
1	21 (13.9)	31 (20.8)	
2–5	93 (61.6)	73 (49.0)	
6–10	12 (7.9)	14 (9.4)	
>10	5 (3.3)	9 (6.0)	
As Part of Your Preparation for Surgery before this Appointment, Has Anyone at Mayo Clinic Talked to You about Your Smoking?			
No	89 (58.9)	89 (59.7)	1.000
Fagerström Score			
Median	4	4	0.893
Interquartile Range	2–5	2–6	
Minimum and Maximum Range	0–10	0–10	

Data are given as number (percentage) of each group unless otherwise indicated.

* Data are given as mean ± SD.

COPD = chronic obstructive pulmonary disease.

Discussion

For the first time to our knowledge, this study demonstrated that a clinician-delivered intervention can increase the use of telephone quitline counseling services by patients scheduled for elective surgery. Moreover, it represents the first demonstration that the Ask–Advise–Refer approach increases the use of referral services (in this case, a telephone quitline) relative to the clinical practice guideline–supported 5As.[5]

In most settings, the most accessible resource for providing extended contacts to support quit attempts is a telephone quitline.[7,15] There are multiple providers of quitline services throughout the United States.[16] Although there is variation by state regarding funding mechanisms, services are generally available at low or no cost to patients. Quitlines are efficacious compared with minimal or no counseling or self-help (odds ratio, 1.6 in meta-analysis[5]) and also improve the efficacy of pharmacotherapy alone. Despite these desirable features, the current use of quitlines is low,[16] with a median annual use rate among eligible smokers of 1.2% in 2008 (North American Quitline Consortium Annual Survey of Quitlines; oral personal communication, 2009, Jessie Saul, Ph.D., Director of Research, North American Quitline Consortium, Phoenix, AZ); and increasing their reach has proved challenging. Given the many smokers undergoing elective surgery each year in the United States,[3] and the challenges of introducing tobacco interventions into a busy clinical environment in which such interventions are rare,[6] the Ask–Advise–Referral to quitline method is potentially attractive. In this study, we proposed and developed the novel approach that this method should focus on clinicians facilitating the use of quitlines in the surgical setting, rather than providing direct assistance to quitting.

Of those receiving the quitline intervention, one in five had documented completion of at least one full counseling session, receiving a median of four sessions. In the absence of an intervention designed specifically to facilitate quitline use, no patient received counseling from the dedicated quitline; however, four control subjects did report quitline contact, likely with another quitline provider, such as those available through the national 1–800-QUIT-NOW telephone number. Thus, implementing the quitline intervention dramati-

Table 2. Assessment the Morning of Surgery

Variable	Control Group (n = 151)	Quitline Group (n = 149)	*P* Value
Time from Last Cigarette to Surgery, h			
No. Missing	5	5	0.603
Median	10.0	9.5	
Interquartile Range	2.0–15.0	2.5–14.0	
Minimum and Maximum Range	1.0–526.0	1.0–433.0	
Time from Preoperative Evaluation to Surgery, d			
Median	1	1	0.638
Interquartile Range	1–4	1–4	
Minimum and Maximum Range	0–46	0–154	
Since You Were Interviewed in the Preoperative Examination Clinic, Have You Smoked Cigarettes, Even a Puff?			
No. Missing	1	3	0.165
No. (%)	18 (12.0)	10 (6.8)	
Since Leaving the Preoperative Clinic, Have You Used Any Nicotine Replacement Medications?			
No. Missing	2	2	1.000
Yes, No. (%)	17 (11.4)	16 (10.9)	
Expired Carbon Monoxide Concentration (Morning of Surgery), ppm			
No. Missing	4	2	0.358
Mean ± SD	11.5 (10.2)	12.4 (10.3)	
Median	9.0	10.0	
Interquartile Range	4.0–17.0	5.0–17.0	
Minimum and Maximum Range	0.0–69.0	0.0–68.0	
Please Indicate Your Agreement with the Following: The Information I Received about Smoking in the Preoperative Clinic Was Useful			
No. Missing	2	2	0.072
Strongly Agree, No. (%)	28 (18.8)	44 (29.9)	
Somewhat Agree, No. (%)	94 (63.1)	80 (54.4)	
Do Not Know, No. (%)	23 (15.4)	22 (15.0)	
Somewhat Disagree, No. (%)	1 (0.7)	1 (0.7)	
Strongly Disagree, No. (%)	3 (2.0)	0	

cally increased the reach of the quitlines (above the baseline rate of approximately 1–2% of eligible smokers[16]), demonstrating that preoperative evaluation provides an excellent opportunity to connect smokers with these services. Perhaps because of the relatively short time available for preoperative use (a median of 1 day from the POE visit to surgery), most (79%) of initial subject contacts with the quitline were made postoperatively, suggesting that many surgical patients remain motivated to seek assistance even after surgery. Satisfaction with quitline services was high, which is encouraging given that this service was not specifically tailored to the unique circumstances of the perioperative setting. Both inpatients and outpatients were equally likely to use quitline services. Faxed referral to the quitline appeared to be a useful option because more than half of those accepting faxed referrals completed at least one counseling session. The high recruitment rate (nearly three-quarters of eligible patients were enrolled) suggests that a representative sampling of patients presenting for preoperative evaluation was examined, not just those interested in participating in a stop-smoking program. At 90 days, for those patients who could be contacted and who reported smoking (n = 152), 40% planned to initiate a sustained quit attempt within 30 days, 38% planned to quit within 6 months, and 22% did not plan to initiate a quit attempt within 6 months; these proportions were similar to those present in the general population.[17] Consistent with previous studies, at the preoperative evaluation, many subjects were willing to contemplate at least some period of postoperative abstinence,[6] given that elective surgery can serve as a powerful teachable moment for smoking cessation[3]; this may have contributed to the high enrollment rate.

This study was not designed to be powered to detect differences in abstinence rates between groups; indeed, no significant differences were observed. This is not surprising considering that one in five subjects in the quitline referral group received quitline counseling. The trends in abstinence outcomes were favorable; those receiving quitline counseling tended to be more likely to report tobacco abstinence. However, a larger study will be necessary to evaluate these outcomes. Indeed, we cannot exclude that both brief interventions themselves were efficacious because even the comparison group received brief advice to quit smoking, which is of proven efficacy in primary care settings.[5] If the comparison intervention was also efficacious in terms of ab-

Table 3. Quitline Use and Postoperative Smoking Behavior

Variable	Control Group (n = 151)	Quitline Group (n = 149)	*P* Value
Day 30 Assessment			
Any Self-reported Quitline Counseling	2 (1.3)	22 (14.8)	<0.0001
Point-prevalent Abstinence	37 (24.5)	45 (30.2)	0.301
Continuous Abstinence	29 (19.2)	37 (24.8)	0.266
Day 90 Assessment			
Any Self-reported Quitline Counseling	4 (2.6)	29 (19.5)	<0.0001
Rating of Quitline Support Among those Self-Reporting Quitline Counseling			
No. Missing	1	1	NA
Excellent	2 (66.7)	13 (46.4)	
Very good	1 (33.3)	11 (39.3)	
Good	0	3 (10.7)	
Fair	0	1 (3.6)	
Point-prevalent Abstinence	39 (25.8)	40 (26.8)	0.896
Continuous Abstinence	23 (15.2)	26 (17.4)	0.642
Dedicated Quitline Records			
First Counseling Session Completed	0	29 (19.5)	<0.0001
Documented No. of Counseling Sessions (for Those Receiving at Least One Counseling Session)			
1	NA	4 (13.7)	NA
2	NA	5 (17.2)	
3	NA	3 (10.3)	
4	NA	4 (13.7)	
5	NA	6 (20.7)	
≥6	NA	7 (24.1)	

Data are given as number (percentage) of each group unless otherwise indicated.
NA = not applicable.

stinence outcomes, this would minimize any differences between groups. Compared with a previous observational study in the same setting,[12] at the preoperative assessment the median time since the last cigarette was substantially greater (10 *vs.* 1.5 h), suggesting that the advice given to both groups to not smoke the morning of surgery may have been efficacious. Follow-up of smoking behavior was not available for some subjects, but they were assumed to be smoking, which may also reduce differences between groups.[18] Finally, quitline efficacy in this setting cannot be fully evaluated because use of quitline counseling may simply be a marker for those patients more motivated to quit.

There are several limitations of this study. Perhaps most important, the results are particular to patients seen in one preoperative clinic and may not apply to other settings. For example, in this preoperative clinic, most patients are seen 1 day before surgery, in part because Mayo Clinic is a major referral center and there is often a brief time from the scheduling of surgery to the surgery date. This provided little opportunity for them to use quitline services preoperatively. In other settings, preoperative evaluation may occur several days or weeks before surgery, which would provide greater opportunities for preoperative quitline use. In addition, patients may be more motivated to address their smoking before surgery to prevent complications,[2] although this has not been studied. Another limitation is that this study was not sufficiently powered to evaluate abstinence outcomes. These outcomes are difficult to interpret because several patients could not be reached postoperatively and biochemical validation of smoking status was not obtained. Potential strategies to improve the efficacy of this intervention in terms of abstinence outcomes in future work could include selecting only those patients who will make a sustained quit attempt and intervening when surgery is scheduled to maximize opportunities for preoperative quitline use.

In conclusion, it is efficacious for clinicians to facilitate quitline use by surgical patients using a brief intervention, with approximately one in five smokers accessing quitline counseling services. The potential feasibility of an Ask–Advise–Refer approach has been established already in a pilot study of anesthesiology practices,[19] suggesting that such an intervention could potentially be widely disseminated and implemented. Further work is necessary to evaluate the efficacy of this approach in terms of long-term abstinence from cigarette smoking.

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References

1. Warner DO: Perioperative abstinence from cigarettes: Physiologic and clinical consequences. ANESTHESIOLOGY 2006; 104:356–67
2. McBride CM, Emmons KM, Lipkus IM: Understanding the potential of teachable moments: The case of smoking cessation. Health Educ Res 2003; 18:156–70
3. Shi Y, Warner DO: Surgery as a teachable moment for smoking cessation. ANESTHESIOLOGY 2010; 112:102–7
4. Warner DO: Helping surgical patients quit smoking: Why, when, and how. Anesth Analg 2005; 101:481–7, table of contents
5. Fiore M, Jaen C, Baker T: Treating tobacco use and dependence: 2008 update, Clinical Practice Guideline. Rockville, US Department of Health and Human Services, Public Health Service, 2008:1–92
6. Warner DO, Sarr MG, Offord K, Dale LC: Anesthesiologists, general surgeons, and tobacco interventions in the perioperative period. Anesth Analg 2004; 99:1776–83
7. Anderson CM, Zhu SH: Tobacco quitlines: Looking back and looking ahead. Tob Control 2007; 16(suppl 1):i81–6
8. Schroeder SA: What to do with a patient who smokes. JAMA 2005; 294:482–7
9. Bentz CJ, Bayley KB, Bonin KE, Fleming L, Hollis JF, McAfee T: The feasibility of connecting physician offices to a state-level tobacco quit line. Am J Prev Med 2006; 30:31–7
10. Warner DO, Klesges RC, Dale LC, Offord KP, Schroeder DR, Vickers KS, Hathaway JC: Telephone quitlines to help surgical patients quit smoking: Patient and provider attitudes. Am J Prev Med 2008; 35:S486–93
11. Bondy SJ, Victor JC, Diemert LM: Origin and use of the 100 cigarette criterion in tobacco surveys. Tob Control 2009; 18:317–23
12. Warner DO, Patten CA, Ames SC, Offord K, Schroeder D: Smoking behavior and perceived stress in cigarette smokers undergoing elective surgery. ANESTHESIOLOGY 2004; 100:1125–37
13. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO: The Fagerström Test for Nicotine Dependence: A revision of the Fagerström Tolerance Questionnaire. Br J Addict 1991; 86:1119–27
14. Hughes JR, Keely JP, Niaura RS, Ossip-Klein DJ, Richmond RL, Swan GE: Measures of abstinence in clinical trials: Issues and recommendations. Nicotine Tob Res 2003; 5:13–25
15. McAfee TA: Quitlines a tool for research and dissemination of evidence-based cessation practices. Am J Prev Med 2007; 33:S357–67
16. Cummins SE, Hebert KK, Anderson CM, Mills JA, Zhu SH: Reaching young adult smokers through quitlines. Am J Public Health 2007; 97:1402–5
17. Velicer WF, Fava JL, Prochaska JO, Abrams DB, Emmons KM, Pierce JP: Distribution of smokers by stage in three representative samples. Prev Med 1995; 24:401–11
18. Nelson DB, Partin MR, Fu SS, Joseph AM, An LC: Why assigning ongoing tobacco use is not necessarily a conservative approach to handling missing tobacco cessation outcomes. Nicotine Tob Res 2009; 11:77–83
19. Warner DO; American Society of Anesthesiologists Smoking Cessation Initiative Task Force: Feasibility of tobacco interventions in anesthesiology practices: A pilot study. ANESTHESIOLOGY 2009; 110:1223–8

Appendix: Quitline Intervention

Preamble

- I recommend that my patients stop smoking before surgery and stay off cigarettes for at least 1 week after surgery.
- Just like you should not eat the morning of surgery, you should not smoke the morning of surgery.
- The longer you can quit smoking both before and after surgery, the better – starting now, if you can – because this will help you have the best possible results for this surgery.
- For example, if you quit smoking, you decrease the chances that you will have problems with healing after surgery, such as a wound infection. Quitting also quickly improves the function of your heart and lungs - within about 12 h.
- Many people find that having surgery is also an excellent opportunity to quit not just for the time around surgery, but for good.
- I know that quitting can be difficult, but you don't have to do this on your own. One thing that many smokers have found helpful is a telephone quitline. . .Have you ever heard about tobacco quitlines? *[if yes - What have you heard about them?]* If it's OK with you, let me tell you *[some more]* about them.

Quitline information

- The quitline is free and uses a toll-free number
- You talk with a specialist who has been trained to help people quit smoking. They take the time to understand your situation, and work with you to devise a specific plan that is right for you.
- They can also arrange to have stop-smoking medications delivered to you completely free of charge. Medication options include nicotine gum, patches, or lozenges.
- The first call to the quitline is just a brief call to schedule a time that works for you to have the specialist to call you back.
- Even if you don't have time to call the quitline before surgery, the specialist can still help you after surgery. They are also there to help you stay off cigarettes if you have already quit.

I'd like to give you this additional information, telling you more about the reasons that we are asking you to quit smoking for your surgery, and more about the quitline *[distribute quitline intervention brochure]*

Action

Many people have successfully quit with the help of the quitline, but it can be hard taking that first step. Let me give you three options.

- First, if you would like, we can help you make that first call right now just to schedule a time to talk with the specialist. This will only take a few minutes.
- Second, if you don't have time right now, with your permission we can send the quitline your phone number, and they can call you later to schedule a time for the specialist to call you. If you are not interested when they call, just tell them and they will not call again.
- Finally, you can call the quitline on your own any time, including after your surgery.

Can we help you by making that first call to schedule a time right now?

[*if no*]. . .Would it be OK if we sent the quitline your phone number so that they can call you later to schedule a time for the specialist to call?

[*if no*]. . .That's OK, it's up to you. Remember that you can still call the Quitline number at any time.

And I just want to remind you that even if you're not sure you want to stop smoking for good right now, please stop smoking stop smoking before surgery and stay off cigarettes for at least one week after surgery.

Control Intervention

Preamble

I recommend that all my patients stop smoking. Here are some reasons why.

- Most people find that they feel better right away and have more energy.
- Smoking increases your chances of developing diseases such as cancer, heart disease, and lung disease. If you quit, your risk of these diseases decreases almost immediately. Your body starts to heal from the effects of smoking within 12 h of quitting.
- Quitting smoking can also reduce the chances that you will have problems with healing after surgery or other problems. It's especially important that you not smoke the morning of surgery.
- Smoking also is expensive – the average one pack a day smoker spends about $1,400 a year on cigarettes. Your health insurance rates may also go down if you quit smoking.
- Your smoking can also affect the health of those people who breathe in the smoke from your cigarettes. If you can quit smoking, it will make both you and the people around you more healthy.

Stop smoking techniques

I know that quitting can be difficult, but here are some things you can do that may help you quit

- Decide for sure that you want to quit, and think about reasons that you want to quit.
- Set a date to quit. Quitting before your surgery is best, but any time is a good time to quit smoking, even if you wait until after your surgery.
- Tell your friends and family that you plan to quit. Their support can be very important.
- Remove cigarettes and other tobacco products from your home, car and work.
- When you quit, don't take even a single puff.
- When you stop smoking, you may expect feelings of nicotine withdrawal, although not everyone has these feelings. These feelings can include feeling anxious and craving a smoke. It is your body's way of telling you it's learning to be tobacco-free.
- There are medications that can help you with nicotine withdrawal, including nicotine patches, gum or lozenges that you can get without a prescription. Many people find that these medications are very helpful when they have urges to smoke.

Additional information

Here is some information that people have found helpful as they think about quitting smoking.*[distribute control brochure]* It is based on the best available evidence of what works to help people quit smoking. It includes information about free resources such as telephone quitlines that are available to help you quit, with a number that you can call if you want to try it. Please take a few minutes after you leave to look over this material. Do you have any questions that I can answer for you?