MAYO CLINIC

BRIEF REPORT

Attitudes, Beliefs, and Practices Regarding Electronic Nicotine Delivery Systems in Patients Scheduled for Elective Surgery

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Abstract

Smokers are at increased risk of postoperative complications. Electronic nicotine delivery systems (ENDS; or electronic cigarettes) could be a useful tool to reduce harm in the perioperative period. This pilot study examined the attitudes, beliefs, and practices of smokers scheduled for elective surgery regarding ENDS. This was a cross-sectional survey of current cigarette smokers who were evaluated in a preoperative clinic before elective surgery at Mayo Clinic. Measures included demographic characteristics, smoking history, 2 indices assessing the perception of how smoking affected health risks, ENDS use history, and 3 indices assessing interest in, perceived benefits of, and barriers to using ENDS in the perioperative period. Of the 112 smokers who completed the survey, 62 (55%) had tried ENDS and 24 (21%) reported current use. The most commonly stated reason for using ENDS was to quit smoking. Approximately 2 in 3 participants would be willing to use ENDS to help them reduce or eliminate perioperative cigarette use, and similar proportions perceived health benefits of doing so. Of the factors studied, only attempted to quit within the last year was significantly associated with increased interest in the perioperative use of ENDS (P=.03). Compared with participants who had tried ENDS (n=62), those who had never tried ENDS (n=50) had a significantly increased interest in the perioperative use of ENDS. A substantial proportion of patients scheduled for elective surgery had tried ENDS and would consider using ENDS to reduce perioperative use of cigarettes.

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Cigarette smoking is a risk factor for postoperative cardiac, respiratory, and wound-related complications. Abstinence from smoking reduces this risk.[1,2] Although the duration of abstinence needed to reduce risk has not been defined, physiological and other evidence reveals that even a brief period of abstinence may be beneficial.[3] Although recent randomized trials of practical tobacco interventions show promise in promoting perioperative abstinence from tobacco,[4,5] it is still difficult for many patients to abstain, with a substantial proportion of individuals reporting smoking even on the morning of their surgical procedure.[6] Clearly, new strategies are needed to reduce exposure to cigarette smoke in the perioperative period.

Electronic nicotine delivery systems (ENDS; or electronic cigarettes) have recently gained popularity.[7,8] These systems have been promoted in part as harm-reduction devices to reduce or eliminate cigarette use,[9] and at least some cigarette smokers are using ENDS for this purpose.[10-13] Given that the use of ENDS prevents smokers from inhaling many harmful constituents of tobacco smoke that result from the combustion of tobacco leaf, substituting ENDS for conventional cigarettes may reduce harm.[14] However, public health effects of the widespread use of ENDS are unknown, and their potential impact (for good or for bad) is debatable.[15] We and others have reported that nicotine replacement therapy (NRT) is safe and effective in helping to maintain perioperative abstinence[4,16,17] It is possible that ENDS, as a form of NRT, could be useful in helping smokers reduce or eliminate their smoking in the perioperative period.

The aim of this pilot study was to determine attitudes, beliefs, and practices of smokers scheduled for elective surgery regarding ENDS. Exploratory analyses also examined the relationship between interest in using ENDS and factors such as smoking history and perception of health risks.

PATIENTS AND METHODS

This protocol was approved by the Mayo Clinic Institutional Review Board.

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Setting

The study was conducted in the Mayo Clinic Rochester Preoperative Evaluation Center. Approximately 15% of surgical patients at Mayo Clinic (~8000 patients per year) are seen in this facility, providing a representative sampling of the elective surgical population at Mayo Clinic.

Inclusion and Exclusion Criteria

Inclusion criteria included patients 18 years or older scheduled for elective noncardiac surgery who were current smokers, defined as self-report of smoking every day or most days. Eligible patients were identified by clinical personnel from self-reported information obtained for clinical purposes. Study personnel approached eligible patients on a convenience basis and obtained oral informed consent.

Measures

All measures were administered via tablet computer (iPad, Apple Inc) and completed by the participants and recorded in the Research Electronic Data Capture system (version 3.6.7, Vanderbilt University). The following measures were included:

- *Demographic characteristics*: These included age, sex, education, and race or ethnicity.
- *Smoking history*: This included daily use of cigarettes, duration of smoking, previous quit attempts, and the Fagerstrom Test for Nicotine Dependence.
- *Perception of health risks:* Two assessments were administered: (1) the surgical risk index, which assesses the knowledge of health risks of smoking to surgery and is a 4-item scale developed and validated in our previous work[18]; and (2) a 3-item health concern index, which assesses the level of concern about how smoking may affect health. Items included "How much do you think your health would benefit if you were to quit smoking for good?" "How worried are you, if at all, that smoking will damage your health?" and "How worried are you, if at all, that smoking will cause problems with your surgery?" with responses including "not at all," "a little," and "very much."
- *Items of ENDS*: Four categories of assessments related to ENDS use were administered: (1) items related to current use (adapted from Zhu et al[13] and Dawkins et al[19]) for those who had used ENDS and additional items to query the reasons for use and perceived benefits; (2) 4 items to assess interest in using ENDS to reduce perioperative cigarette use; (3) 4 items to assess perceived benefits of perioperative ENDS use; and (4) 4 items to assess perceived barriers to perioperative ENDS use. The latter 3 were assessed using 5-point Likert scales.

Statistical Analyses

Demographic characteristics and smoking history were summarized using descriptive statistics, as were descriptors of ENDS-related items.

Indices were calculated from the items described above, including the surgical risk index, the health concern index, and 3 ENDS-related indices assessing interest in, perceived benefits of, and barriers to perioperative use. For the surgical risk index, the number of "yes" responses was summed. For the health concern index, each response was assigned a numerical value, with higher values indicating greater concern. For ENDS-related indices, a score was calculated by averaging the numerical values assigned to each Likert response. All indices were scaled so that the maximum possible score was 100. The factor structure of ENDS-related indices was characterized by conducting principal component factor analysis with varimax rotation and Kaiser criterion for normalization. The internal consistency of scales was quantified by calculating Cronbach α. This analysis revealed an acceptable loading of each indicator used to derive each index onto a single factor (factor loadings$\geq$.71 for each) and excellent internal consistency for both interest and perceived benefit indices (α>.90 for each), with an acceptable internal consistency for the barrier index (α=.56).

A *t* test or Mann-Whitney *U* test was used to compare categorical variables, and a simple regression model was used to examine relationships between continuous variables. All tests were performed using JMP software, version 9 (SAS Inc), and P<.05 was defined as statistically significant.

RESULTS

A total of 210 potentially eligible patients were approached for participation and 128 enrolled.

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