

RESEARCH LETTERS

Clearing the Air: Inpatient Providers' Knowledge, Perspectives, and Experience With Electronic Cigarettes

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Electronic cigarettes are increasingly prevalent battery-operated devices that heat a solution to generate an inhalable nicotine-containing aerosol.^{1,2} Despite a diverse array of devices on the market, the US Food and Drug Administration (FDA) has only recently proposed expanding its regulatory ability to include electronic cigarettes.³ States, municipalities, and institutions have enacted variable regulations on electronic nicotine delivery systems.^{4,5} Advocates of electronic cigarettes propose that they are a less-toxic alternative to tobacco cigarettes, with potential for use as a nicotine replacement therapy (NRT).^{6–8} Opponents argue that electronic cigarettes may undermine tobacco cessation goals and potentially expose nonusers to secondhand nicotine vapor.^{9,10}

Hospital providers frequently care for nicotine-dependent patients.¹¹ We investigated inpatient healthcare providers' knowledge, perceptions, and experience with electronic cigarettes, with the goals of informing educational efforts and guiding policy decisions around hospital-based use of electronic nicotine delivery systems.

METHODS

The study was conducted at a 183-bed urban safety-net medical center affiliated with a residency training program using a cross-sectional survey to query a diverse array of inpatient providers (Table 1). Respondents who had not cared for an inpatient in the past 5 years were excluded. Surveys were designed based on prior literature, personal experience, and expert suggestions.¹² Surveys were disseminated in March 2014 via e-mail, with embedded informed consent and a link that connected anonymously to the online survey (Qualtrics, Provo, UT). We did not collect unique identifiers and offered no incentive for participation. Data were downloaded to a secure

database and analyzed using Microsoft Excel 2010 (Microsoft Corp., Redmond, WA) and GraphPad Prism version 6.04 (GraphPad Software, Inc., La Jolla, CA). The study was approved by the institutional review board.

RESULTS

Study Participants

There were 242 survey respondents (response rate of 41%), of whom 100 were excluded based on study criteria. The median age of the 142 included participants was 34.0 years. There were significantly more female respondents (69%, $P = 0.001$, χ^2 test), equally over-represented across all inpatient provider groups. Only 1.4% of all respondents reported personal active tobacco use, whereas 24.6% of study participants reported prior tobacco use. Tobacco use history was similar across inpatient provider groups and gender. Respondents over 50 years of age demonstrated a higher rate of current or prior tobacco use compared with participants from other age groups combined (53% vs 23%, $P = 0.01$, χ^2 test).

Electronic Cigarette Familiarity and Patient Requests

Of the participants, 95.8% reported familiarity with electronic cigarettes, without differences across age or gender. Of all of the providers, 19.0% reported being asked by a hospitalized patient for permission to use an electronic cigarette in the hospital. Registered nurses were significantly more likely to have been asked by patients compared to all other study participants (43% vs 11%, $P < 0.001$, χ^2 test).

Electronic Cigarettes as NRT

Whereas 22.5% of study participants felt that electronic cigarettes could serve as a viable in-hospital NRT, 48.6% felt that electronic cigarettes should not be used, and 28.9% were unsure (Table 1), irrespective of demographics or personal tobacco use history. One-third of respondents would allow an inpatient under their care to use an electronic cigarette. Groups most likely to permit use were faculty (34.4%) and resident physicians (45.5%), though this difference was not statistically significant.

Perspectives on Exposure

Only 18.3% of study participants would agree to share a hospital room with a patient using an electronic

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TABLE 1. Provider Perspectives on Electronic Cigarettes

Group (No.)	Do you know what an electronic cigarette is?*	Has a hospitalized patient ever asked you if he or she could use an electronic cigarette on hospital grounds?*	Do you see electronic cigarettes as a nicotine replacement option for hospitalized patients?†	If you were caring for a patient, would you be okay with the patient using an electronic cigarette while hospitalized?†	If you were hospitalized in a shared hospital room, would you be okay with your roommate using an electronic cigarette?†	Should electronic cigarettes be banned from healthcare settings?‡	Should electronic cigarettes be banned in the same locations as traditional cigarettes?‡	Should electronic cigarettes be regulated by the US Food and Drug Administration?‡
Faculty MD (32)	96.9%	12.5%	28.1%	34.4%	12.5%	37.5%	53.1%	100%‡
Resident MD (33)	97.0%	9.1%	27.3%	45.5%	24.2%	45.5%	36.4%	93.9%‡
Registered nurse (35)	94.3%	42.9%§	25.7%	28.6%	25.7%	40.0%	54.3%	68.6%§
Rehabilitation staff (18)	88.9%	11.1%	11.1%	5.6%	5.6%	66.7%	55.6%	88.9%
Social worker (6)	100%	33.3%	16.7%	16.7%	0.0%	50.0%	50.0%	83.3%
Pharmacist (18)	100%	5.6%	11.1%	27.8%	22.2%	61.1%	50.0%	83.3%
All respondents (142)	95.8%	19.0%	22.5%	30.3%	18.3%	47.2%	49.3%	86.6%

NOTE: Percentages indicate percent of respondents within each group responding "yes" to the stated question. Further breakdown of answer responses are presented in the text. Abbreviations: MD, medical doctor. *Denotes a question with yes/no answer choices. †Denotes a question with yes/no/unsure answer choices. ‡ $P < 0.005$ using a χ^2 test for faculty and resident physicians compared to all other respondents. § $P < 0.001$ using a χ^2 test for nurses compared to all other respondents.

cigarette. Of all participants, 47.2% and 49.3% felt that electronic cigarettes should be banned from health-care settings and from the same locations as traditional cigarettes, respectively. There were no significant differences in perspectives when stratified by age or gender. Current or prior tobacco users were more likely to be accepting of the use of electronic cigarettes in health-care settings compared to nonusers (50% vs 29%, $P = 0.02$, Fisher exact test).

FDA Regulation

Of all study participants, 86.6% responded that electronic cigarettes should be regulated by the FDA. Physicians most strongly agreed with this statement compared with all other provider groups (97% vs 78%, $P = 0.004$, χ^2 test). Conversely, registered nurses were least likely to feel that electronic cigarettes should be FDA-regulated compared to all other provider groups (69% vs 93%, $P < 0.005$, χ^2 test).

DISCUSSION

Our study is the first to provide hospital-based providers' experience and perspectives surrounding electronic cigarette use. The vast majority of participants reported familiarity with electronic cigarettes, consistent with prior findings.¹³ Though electronic cigarettes have yet to achieve a use in the hospital setting, 19% of our respondents reported receiving requests from hospitalized patients to use these devices. With increasing patient demand for electronic cigarettes, hospitals will need to update their tobacco policies to include these novel devices as well as target educational efforts toward front-line providers, such as nurses, who receive the majority of requests.

Participants perceived traditional cigarettes to be significantly more harmful than electronic cigarettes, while established forms of NRT were felt to be less harmful than electronic cigarettes (data not shown). Concern about the health effects of electronic ciga-

rettes is further reflected in providers' hesitancy to view these devices as an NRT option in the hospital, reluctance to consider sharing a room with an electronic cigarette user, and near majority opinion that electronic cigarettes should be banned from health-care settings altogether. Current regulation by the US Department of Transportation bans electronic cigarette use on airplanes, whereas a host of states currently ban electronic cigarette use in similarly enclosed spaces such as correctional facilities and commuter trains.¹⁴ More knowledge is needed on the health effects of electronic cigarettes on the primary user, secondhand exposure range, and their potential to aid in short- and long-term nicotine cessation before providers and hospitals can make an informed risk-benefit analysis for appropriate inpatient use. As current or past tobacco users were more accepting of the use of electronic cigarettes in hospital settings, these providers' opinions should be sought for a unique understanding of the interplay between electronic cigarettes and the healthcare environment.

Concern over the unknown safety effects can also be seen in the overwhelming provider support for FDA regulation. Healthcare advocacy groups, such as the American Heart Association, the American Lung Association, and the Legacy Foundation already support federal regulation.¹⁵⁻¹⁷ FDA regulation may lead to the ability to standardize device content, regulate purchasing and marketing requirements, and ensure that claims to health effects are supported by scientific evidence, though agency involvement may also slow the process of integration into hospital use. Perhaps reflective of the immediacy of the problem, nurses who receive the majority of requests for electronic cigarettes from patients are least likely to want FDA regulation. Until more is known, patients and staff may benefit from pairing vaporizing patients in shared rooms or providing users with designated inhaling spaces.

Nicotine addiction is a strong driving force and, due to a strict no-smoking policy at our institution, we have witnessed patients making unsafe decisions to leave the hospital (in some cases against medical advice) in an effort to continue smoking. Patients may be starting to look toward electronic cigarettes as an NRT option that more closely satisfies nicotine cravings as well as the ritualistic and tactile components of cigarette use. Electronic cigarettes could have the potential to act as a harm reduction method for nicotine-dependent inpatients by decreasing the nicotine-withdrawal related impetus for unsafe hospital discharges. Institutions should take this into account when formulating new policy.

Our study has several limitations. First, it was a single-center study that may not be representative of provider perspectives at other institutions. Second, the survey was a cross-sectional sample, missing providers who did not receive the e-mail during the enrollment period. Third, responses may not accurately reflect perspectives of smaller responding groups such as social workers. Fourth, the survey did not include all types of physicians who deal with smoking cessation, though internal and family medicine physicians provide the majority of care for hospitalized patients at our institution. Fifth, we recorded self-reported familiarity with electronic cigarettes and did not formally test providers' knowledge of the subject.

Our study provides new perspectives and data on electronic cigarettes to inform future research as well as hospital and healthcare policy. Hospitals should educate patients and front-line providers around the paucity of health information on these novel devices, while formulating policy that acknowledges patient demand for electronic cigarettes and their potential for cessation therapy and harm reduction. Further research should focus on the effects of nicotine vapor inhalation on patients, the consequences of secondhand nicotine vapor, and the potential for electronic nicotine delivery systems to act as a novel NRT for hospital use.

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