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E-cigarette Knowledge, Attitudes, and Use in Opioid Dependent Smokers

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ABSTRACT

Individuals in treatment for opioid dependence have smoking rates 3–5 times greater than the U.S. prevalence rate. Traditional smoking cessation strategies have been ineffective in this population. Novel approaches are needed as well as harm reduction avenues. E-cigarettes (e-cigs) may provide such a novel harm reduction and cessation opportunity, but little is known about the knowledge of, attitudes about, and usage of e-cigs in opioid dependent smokers. The current study enrolled 315 opioid dependent smokers (164 methadone, 151 buprenorphine), treated in the same health system in Fall River, Massachusetts. The sample was 49.7% male and 85.1% non-Latino White. Overall 98.7% had heard of e-cigs, 73.0% had ever tried e-cigs, and 33.8% had used e-cigs in the past 30 days. The most common reasons for use were curiosity (41.4%) and to quit all nicotine (26.0%). The proportion of opioid dependent smokers that had ever tried e-cigs and used them in the past month was substantially greater than that found in recent general population surveys. While e-cigs have been used to quit smoking, how to optimize their utility as a cessation tool remains undefined. E-cigs should be a part of smoking cessation discussions with this vulnerable, difficult-to-treat population.

1. Introduction

Cigarette smoking is the leading preventable cause of morbidity and mortality in the US, and its health consequences remain particularly high in persons with drug use disorders (McCool & Paschall Richter, 2003). With smoking rates far exceeding the general population, opioid-dependent smokers experience high rates of tobacco-related health consequences (Centers for Disease Control and Prevention, 2007; Hser, McCarthy, & Anglin, 1994; Hurt et al., 1996; Nahvi, Richter, Li, Modali, & Arnsten, 2006; Okoli et al., 2010; Richter, Gibson, Ahluwalia, & Schmelzle, 2001). Of the estimated 2.5 million opioid abusers in the United States, over 300,000 persons are enrolled in outpatient opioid replacement therapy at any given time (Substance Abuse and Mental Health Services Administration, 2013). Smoking prevalence rates of 66–97% have been found among patients in the two types of opioid replacement therapy, methadone-maintenance treatment (MMT) (Best et al., 1998; Clarke, Stein, McGarry, & Gogineni, 2001; Richter, Ahluwalia, Mosier, Nazir, & Ahluwalia, 2002; Richter et al., 2001; Stark & Campbell, 1993) and office-based buprenorphine treatment (Harrell, Montoya, Preston, Juliano, & Gorelick, 2011; Lee, Grossman, DiRocco, & Gourevitch, 2009; Nahvi, Blackstock, Sohler, Thompson, & Cunningham, 2014; Pajusco et al., 2012), in marked contrast to the US smoking prevalence of less than 20%. Hurt et al., (Hurt et al., 1996) found that 51% of deaths in an opioid dependent cohort could be attributed to tobacco-related causes. Hser et al., (Hser, Hoffman, Grella, & Anglin, 2001) demonstrated that after controlling for a wide array of health-risk behaviors, tobacco use, even in a sample of long-term narcotic addicts, was one of the lifestyle markers most strongly correlated with subsequent mortality, with death rates four times higher than among non-smokers.

Over the past decade, researchers have evaluated smoking cessation treatment for opioid-dependent persons using behavioral and pharmacological treatment in conjunction with pharmacotherapy. All of the smoking cessation pharmacotherapies that have been tested in clinical trials with opioid dependent persons have produced far lower quit rates than those reported in non-drug users (Hurt et al., 1994; Mooney et al., 2008; Okoli et al., 2010; Reid et al., 2008; Shoptaw et al., 2002; Stead, Perera, Bullen, Mant, & Lancaster, 2008; Stein et al., 2006; Stein et al., 2013). Novel cessation treatment strategies are needed, and tobacco harm reduction may be warranted as well.

"Electronic cigarettes" (e-cigs) contain liquid nicotine, a battery, and an atomizer, and look and feel like tobacco cigarettes. The liquid nicotine is heated, vaporized, and inhaled. These electronic nicotine delivery systems (ENDS) have gained worldwide attention, with awareness of electronic cigarettes, or e-cigarettes steadily growing in the United States every year (Adkison et al., 2013; Choi & Forster, 2013; King, Alam, Promoff, Arrazola, & Dube, 2013; Regan, Promoff, Dube, & Arrazola, 2013). In recent surveys 11% to 31% of current smokers have ever used e-cigs (Adkison et al., 2013; King et al., 2013; Pearson, Richardson, Niaura, Vallone, & Abrams, 2012; Vickerman, Carpenter, Altman, Nash, & Zbikowski, 2013). A recent study enrolling hospitalized smokers found nearly all were aware of e-cigs, and 46% reported e-cig

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use (Harrington et al., 2014). By 2010, Internet searches for e-cigarettes were more popular than for any other smoking cessation product, including nicotine replacement therapy and varenicline (Ayers, Ribisl, & Brownstein, 2011), despite federal regulations preventing e-cigarettes from being marketed or approved as a smoking cessation aid. Some analysts predict e-cig sales will surpass cigarettes sales within the decade (Ayers et al., 2011; The Economist, 2013), with total sales approaching $10 billion expected by 2017, up from $2 billion in 2013 (Herzog & Gerberi, 2013).

In surveys and interviews, users often report that e-cigs help them quit smoking tobacco cigarettes, or help them stay quit (Adkison et al., 2013; Carroll Chapman & Wu, 2014; Etter, 2010; Etter & Bullen, 2011; Goniewicz, Lingas, & Hajek, 2013; Kralikova, Novak, West, Kmetova, & Hajek, 2013), however there is limited evidence that e-cigs are efficacious as a smoking cessation aid (Bullen et al., 2013). E-cig users also believe e-cigs are less toxic than cigarettes (Etter & Bullen, 2011; Goniewicz et al., 2013; Pearson et al., 2012), will reduce cigarette craving and nicotine withdrawal symptoms (Etter & Bullen, 2011; McQueen, Tower, & Sumner, 2011), are cheaper than cigarettes (Etter & Bullen, 2011; McQueen et al., 2011), bother other people less, and can be used in places where smoking is forbidden (Etter & Bullen, 2011). Those who use e-cigs also report higher quitting self-efficacy, and more motivation to quit cigarette smoking (Pokhrel, Fagan, Little, Kawamoto, & Herzog, 2013). In a survey of US midwestern adults, among those who were aware of e-cigs, over a quarter believed that e-cigs were less addictive than regular cigarettes (Choi & Forster, 2013).

Given the modest health benefits of smoking reduction compared to cessation and the possibility that e-cigs may undermine cessation success, the overall health benefits of e-cigs (decreased toxicant exposure from less combustible nicotine use) remain uncertain. Little is known about the knowledge of, attitudes about, and usage of e-cigs in opioid dependent smokers. The purpose of the current study was to learn more about the usage patterns and perceptions of e-cigs among heavily smoking, vulnerable populations enrolled in methadone or buprenorphine opioid agonist treatment so as to plan novel tobacco use cessation interventions.

2. Methods

We approached consecutive persons receiving treatment between January and July 2014 at a non-profit methadone maintenance program and a buprenorphine maintenance program that are part of the same health system and located one mile apart in Fall River, Massachusetts. At the methadone site, individuals were approached during regular dosing hours, and asked to complete the brief, 10-minute questionnaire anonymously. Interested individuals provided verbal informed consent and answered the survey items in a private interview location with a trained research assistant. They were compensated with a $5 gift card to a local coffee shop for their time. Two percent of those approached refused participation.

Individuals receiving buprenorphine treatment were approached during a routine monthly visit by a trained research assistant or member of the program staff affiliated with the research study. Buprenorphine patients were asked to complete the identical, 10-minute questionnaire anonymously. Interested individuals provided verbal informed consent and answered the survey items in a private interview location with a trained research assistant. They were not compensated for the survey. Seven percent of those approached refused participation (demographic data from study refusers are not available). All procedures were approved by the Butler Hospital Institutional Review Board.

2.1. Measures

The 10-minute survey included questions related to demographics, opioid treatment method and dose, smoking history, including past quit attempts and medications used, and general health questions. We specifically asked if they had heard of e-cigs, had ever tried e-cigs, why they had used e-cigs, and whether they had friends or family who had tried e-cigs. We asked for level of agreement with six statements about e-cigs adapted from prior surveys (Adkison et al., 2013; Choi & Forster, 2013), for example, “E-cigarettes are a lot less harmful than cigarettes”, or “E-Cigarettes have nicotine”; response categories on a five-point scale ranged from “strongly agree” to “strongly disagree.”

2.2. Analytical methods

We present descriptive statistics to summarize the characteristics of the sample. Participants recruited from buprenorphine and MMT clinics are separately described and statistically compared using t-tests for differences in means and the Pearson χ2-test of independence.

3. Results

Participants averaged 37.3 (±10.7) years of age and 11.8 (±2.1) years of education; 156 (49.7%) were male, and 268 (85.1%) were non-Latino White (Table 1). The mean number of cigarettes smoked/day was 15.2 (±8.7). Nearly all (98.7%) participants reported that they had heard of e-cigarettes, 227 (73.0%) reported they had ever tried e-cigs, and 105 (33.8%) had used e-cigs within the past month. Curiosity (41.4%) was the most frequently reported reason respondents said they last used an e-cig. Other reasons were to quit all nicotine (26%), to replace regular tobacco cigarettes (11.9%), to reduce use of regular cigarettes (10.6%), and because they could use e-cigs in environments where smoking was not allowed (6.2%). On average participants reported 16.5 (±43.2) days of e-cigarette use during their last use episode. Just over 80% said that they were willing to try e-cigs to help quit smoking.

Forty (12.7%) participants had ever called a smoking quit line (Table 1). Among those reporting a successful past year quit attempt (n = 163), 44 (26.8%) said they had been aided by nicotine replacement therapy, 12 (7.3%) said they had used other medications, 17 (10.4%) reported using e-cigarettes, 66 (40.5%) quit cold turkey, and 49 (29.9%) reported they had a 24-hour quit because they were in a non-smoking environment.

Participants' beliefs about e-cigarettes were assessed (Table 1). Just over two-thirds (68.2%) agreed or strongly agreed that e-cigs contain nicotine, 73.6% believed e-cigs could help people quit regular cigarette use, 79.1% said they could help reduce use of regular cigarettes, 65.6% believed they were less harmful than regular cigarettes, 71.6% said they could be used in non-smoking environments, and 41.8% believed they were less addictive than tobacco cigarettes.

Table 1 also presents data specific to persons in buprenorphine and methadone-maintenance treatment. Overall, the profiles of persons in these treatment modalities are quite similar. Compared to those in MMT, persons receiving buprenorphine were also significantly more likely (83.8% v. 63.2%) to have ever tried an e-cig, significantly less likely (44.7 v. 58.5%) to report a successful 24+ hour quit attempt in the past year, significantly more likely (17.9% v. 5.2%) to report that a 24+ hour quit attempt was aided by e-cig use, and significantly less likely (34.5% v. 48.5%) to believe e-cigs are less addictive than regular cigarettes. They also tend to be less likely than those in MMT (19.4% v. 34.0%) to report they last used an e-cigarette to quit all nicotine. Participants recruited from buprenorphine and MMT clinics did not differ significantly with respect to any of the other characteristics evaluated in Table 1.

4. Discussion

The current study enrolled a sample of opioid-dependent individuals receiving either buprenorphine or methadone-maintenance treatment. Nearly everyone enrolled in this heavy-smoking population had heard of e-cigs, and almost three-quarters had tried e-cigs. This is a