Electronic-cigarette use by individuals in treatment for substance abuse: A survey of 24 treatment centers in the United States

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HIGHLIGHTS

- E-cigarette use was examined among 1113 patients enrolled in substance abuse treatment
- 55.5% reported lifetime use of e-cigarettes, 30.5% were current users (past 30 days)
- A majority (87.1%) of current e-cigarette users also currently smoked cigarettes
- E-cigarettes used for smoking cessation and times/places when smoking was prohibited
- Dual users may be heavier smokers trying to quit or reduce their cigarette smoking

ARTICLE INFO

ABSTRACT

Prevalence and reasons for using electronic cigarettes (e-cigarettes) was examined among patients enrolled in 24 substance abuse treatment centers in the United States (N = 1113). Prevalence of e-cigarette use was assessed for the full sample. Bivariate analyses and multivariate logistic regression were used to identify characteristics associated with e-cigarette use among current cigarette smokers (the majority of e-cigarette users). Overall 55.5% of the sample reported lifetime use of e-cigarettes, and 30.5% reported using e-cigarettes in the past 30 days (current users). The main reasons for using e-cigarettes were (a) at times/places when smoking was prohibited (53.5%), and (b) as a way to quit/reduce cigarette smoking (50.3%). Daily vs non-daily e-cigarette users were more likely to use e-cigarettes both as a way to reduce health risks, and as a way to quit/reduce cigarette smoking. A majority of e-cigarette users (87.1%) reported dual use of e-cigarettes and tobacco cigarettes during the past month. Among current cigarette smokers, those that also used e-cigarettes smoked more cigarettes per day, were more likely to have made a past year cigarette quit attempt, and to have tried nicotine replacement therapy compared to cigarette only smokers. There was a high rate of dual e-cigarette and cigarette use by persons enrolled in addiction treatment. E-cigarette users may be heavier cigarette smokers trying to quit or reduce their cigarette smoking. However, e-cigarettes were also used at times when individuals could not smoke cigarettes. Substance abuse treatment centers developing tobacco policies need to consider these potentially conflicting reasons for using e-cigarettes.

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1. Introduction

A high percentage of individuals with drug and alcohol dependence smoke cigarettes (Kozlowski et al., 1986; Lai et al., 2000; Marks et al., 1997; McKee & Weinberger, 2013). Individuals with psychiatric disorders, including drug and alcohol dependence, are estimated to smoke approximately 44% of all cigarettes smoked in US (Lasser et al., 2000). Compared to the general population, smokers with substance use co-morbidities tend to be heavier smokers, score higher on measures of nicotine dependence, and have poorer smoking cessation outcomes (Burling et al., 1997; Dawson, 2000; Hughes & Kalman, 2006; John et al., 2003). Among cigarette smokers with drug or alcohol dependence, the highest smoking rates have been reported for individuals who seek treatment for substance abuse; with low estimates at 65% and higher estimates up to 90%, significantly higher than the general population (Guydish et al., 2011, 2015; Richter & Arnsten, 2006). Individuals receiving treatment for substance use disorders also have high rates of mortality from tobacco related diseases (Bandiera et al., 2015; Hurt et al., 1996). In 2013 there were 21.6 million individuals with drug and alcohol dependence in the US, with 4.1 million receiving treatment for substance abuse in the past year (SAMHSA, 2013). Further, smoking cessation has been found to have either no effect or improve treatment

outcomes for substance abuse, with little evidence that it worsens outcomes (Baca & Yahne, 2009; Kalman et al., 2010; Prochaska et al., 2004; Thurgood et al., 2016). The very high rates of smoking among those in addiction treatment, together with the declining rates in the general population, makes this population important in continued efforts to reduce tobacco use in the US.

Electronic cigarettes (e-cigarettes) remain largely unregulated in the US, though the e-cigarette market is currently estimated to be a multi-billion dollar industry and their use continues to grow (Herzog & Gerberi, 2013). There is an ongoing debate concerning the potential benefits and risks of e-cigarette use. E-cigarettes may have potential for harm reduction among tobacco smokers, but remain unproven as a smoking cessation device (Bhatnagar et al., 2014; Kalkhoran & Glantz, 2016; McRobbie et al., 2014). In this context it is important to assess both the prevalence of and reasons for e-cigarette use in among individuals in treatment for substance abuse, a population that has been identified as vulnerable for tobacco use. This research may help to inform future product regulation regarding use of e-cigarettes by vulnerable populations and provide a better understanding of how and why e-cigarettes are being used.

This study was designed to: (1) assess the prevalence of e-cigarette use in a national sample of persons enrolled in substance abuse treatment; (2) assess reasons for e-cigarette use; and (3) to compare demographic and smoking characteristic of cigarette only smokers vs dual users (cigarette smokers who also use e-cigarettes).

2. Methods

2.1. Participants and recruitment procedure

The sample consisted of 1113 participants recruited from 24 substance abuse treatment centers (10 residential, 7 methadone maintenance, and 7 outpatient clinics) affiliated with the NIDA Clinical Trials Network (CTN). All sites had at least 60 active patients and the number of participants recruited per clinic ranged from 28 to 53, with a median of 50. Directors from each clinic were asked about the size of active number of patients. Our survey sampled 1113 individuals from a total estimated population of 6801 total participants. A detailed description of the criterion and selection of clinic sites is reported in Guydish et al. (in press). Because each drug and alcohol treatment center has unique characteristics, and there are a number of obstacles to surveying this population, the goal of this study was to survey a large sample of individuals in the United States currently in treatment for substance abuse from a range of clinic types and geographic locations. The clinics sampled were selected to be representative of drug treatment centers in the NIDA CTN within the United States, however, data was collected as a convenience sample within each clinic site, and for this reason the sample may not necessarily be a nationally representative. All clients at each center (regardless of smoking status) were eligible to participate in the survey as long as they were physically present the day of the site visit and had been in treatment at that center for at least 10 days. All participants provided informed consent and completed the survey. The number recruited per clinic ranged from 28 to 53, and each participant received a $20.00 gift card. Each treatment program received a $2000 program incentive following the site visit. All procedures were approved by the Institutional Review Board of the University of California, San Francisco.

2.2. Procedure & measures

Surveys were prepared using Qualtrics software and self-administered during an onsite visit (between May 2014 and February 2015) at each clinic using iPads linked to a secure university server where data were stored.

Survey items used in the current analysis included questions assessing demographic information (age, gender, race/ethnicity, and education), and primary drug for which the client sought treatment.

Based on the distribution among participants, the racial groups used in the current analyses were African American/Black, White, or other race. Being Hispanic or Latino was assessed with a separate question. Individuals were characterized as current, former, or never cigarette smokers. Current smoking status was defined as persons who reported smoking at least 100 cigarettes during their lifetime and reported currently smoking cigarettes. Current smokers reported the number of cigarettes smoked per day (CPD), time to first cigarette after waking (TTFC), number of past year serious quit attempts (lasting at least 24 h), and use of smoking cessation products. Having a past year serious quit attempt, and ever use of nicotine replacement therapy (NRT) were analyzed as dichotomous variables (yes/no). Readiness to quit smoking cigarettes was assessed by categorizing participants into one of three pre-action stages of change based on Prochaska & DiClemente (1983): (a) Precontemplation – no intention to quit smoking within the next 6 months, (b) Contemplation – intention to quit smoking within the next sixth months, and (c) Preparation – intention to quit within the next 30 days.

All participants were asked to report lifetime use of e-cigarettes. Those reporting lifetime e-cigarette use were then asked whether they had used e-cigarettes in the past 30 days (characterized as current users). Those reporting past 30-day e-cigarette use were then asked about frequency of use (daily, weekly, or < weekly). Participants also reported reasons for using e-cigarettes with the following response options: (1) at times you cannot smoke, (2) as a way to reduce health risks, (3) as a tool to reduce or quit smoking, or (4) for a "different" reason; individuals were instructed to select all that apply.

2.3. Data analysis

Overall cigarette and e-cigarette prevalence data were analyzed for the full sample. Bivariate analyses were used to compare dual users (current cigarette smokers who used e-cigarettes in the past 30 days) versus cigarette only smokers for demographic variables and tobacco use characteristics. Significant differences between daily and non-daily e-cigarette users have been reported (Hitchman et al., 2015), and reasons for using e-cigarettes were also compared between these two groups. T-tests were used for continuous variables, and Pearson's chi-square tests for categorical variables. Next, we conducted an exploratory analysis, such that variables associated with the outcome (dual users vs. cigarette only users) at $p < 0.10$ were then included in a multivariate logistic regression, to estimate the association of each predictor controlling for key demographic variables (Bursac et al., 2008). The $p < 0.10$ level for the multivariate logistic regression model was used to avoid missing variables that might be associated with the outcome by being too strict, as recommended by Hosmer and Lemeshow (2000). The predictors identified thought the bivariate analyses and included in the regression model were primary drug, smoking days/week, average cigarettes per day, past year cigarette quit attempts, and ever use of nicotine replacement therapy. Two additional variables (stage of change, and weeks in current treatment program) were included in the model to control for readiness to quit smoking and treatment duration. The demographic variables included in the regression model were age, sex, and ethnicity. Because primary drug for which patients were in treatment was related to type of treatment clinic (i.e. methadone, outpatient, residential), primary drug but not clinic type was used in the analyses. Associations were considered significant at an alpha level of 0.05 or less. Means are presented ± standard deviation (SD). All statistical analyses were performed using SPSS 22 (IBM Corporation, Armonk, NY, USA).

3. Results

3.1. Demographics characteristics

A detailed breakdown of the demographic and descriptive statistics of the full sample are reported in Guydish et al. (in press). The sample