Published in final edited form as:

J Addict Med. 2017 ; 11(6): 494–497. doi:10.1097/ADM.0000000000000356.

Use of smoking cessation methods among patients receiving office-based buprenorphine maintenance treatment

Pooja A. Shah, BS¹, Chinazo O. Cunningham, MD, MS², Mia T. Brisbane, MPH², Joseph P. DeLuca, MD², and Shadi Nahvi, MD, MS²

¹University of California, San Francisco School of Medicine, 513 Parnassus Avenue, San Francisco, CA 94143, USA

²Albert Einstein College of Medicine & Montefiore Medical Center, 111 East 210th Street, Bronx, NY 10467, USA

Abstract

Objectives—Provision of smoking cessation treatment is limited in office-based buprenorphine maintenance treatment (BMT) settings. This study describes smoking and smoking cessation behaviors among patients receiving office-based BMT.

Methods—Cross-sectional study of patients receiving office-based BMT at a community health center in the Bronx, NY. We interviewed patients assessing sociodemographic, substance use and tobacco use characteristics, including methods used for smoking cessation. We report simple frequencies and explored associations of BMT characteristics with smoking behaviors.

Results—Of 68 patients, 87.7% were current cigarette smokers, 7.9% were former smokers and 4.4% had never smoked. Of lifetime smokers, 83.1% reported at least one prior quit attempt; 78.5% had used medication (75.4% used nicotine replacement therapy, 29.2% varenicline, and 9.2% bupropion). Ten patients (15.4%) reported using electronic cigarettes to try to quit smoking. Stopping “cold turkey” (40.0%) and gradually decreasing the number of cigarettes smoked (32.3%) were non-pharmacological methods of quitting tried most often. Use of behavioral support, including stop smoking programs and counseling, was low. Higher dose and longer duration of BMT was associated with greater smoking frequency.

Conclusions—Patients receiving BMT have a high prevalence of cigarette smoking, though most have tried to quit, and have prior experience with pharmacotherapy for smoking cessation. Efforts to optimize smoking cessation treatments among BMT patients are needed.

Keywords

smoking cessation; buprenorphine; opioid use disorder; nicotine use disorder; community health center

Introduction

Tobacco use has declined over the past 50 years, but high rates of smoking persist among individuals with opioid use disorders (OUD). Among patients receiving methadone maintenance treatment (MMT), tobacco use ranges from 77% to 92% (Clemmey et al., 1997; Nahvi et al., 2006; Richter et al., 2001), while estimates among patients in buprenorphine maintenance treatment (BMT) fall between 66% and 93% (Chisolm et al., 2013; Nahvi et al., 2014; Pajusco et al., 2012). These rates far exceed the population-wide prevalence of 15% (Jamal et al., 2016). In addition, research shows increased risk of relapse to substance use disorder and high tobacco-related mortality among smokers with substance use disorder (Hser et al., 1994; Hurt et al., 1996; Weinberger et al., 2017).

Without evidence-based treatment, tobacco cessation rates among patients receiving treatment for OUD are negligible (Reid et al., 2008). Tobacco cessation treatments have modest efficacy among patients in MMT (Miller and Sigmon, 2015), but only one trial has tested their effects among patients in buprenorphine treatment (Mooney et al., 2008). Though some studies have described tobacco use characteristics among BMT patients (Chisolm et al., 2013; Pajusco et al., 2012), none to date have described smoking cessation treatment experience in this group. With a shorter duration of substance use disorders than their MMT counterparts (Sullivan et al., 2005), it is possible that evidence-based cessation treatments could have greater efficacy among BMT patients. Unlike MMT, office-based BMT can be delivered in the context of primary care, and therefore provides a unique opportunity to provide tobacco cessation treatment. Despite the potential treatment benefits, the primary care treatment infrastructure and the large number of BMT patients who are smokers, a previous study found that assessment of tobacco use and provision of smoking cessation treatment in office-based BMT are limited (Nahvi et al., 2014). However, that retrospective analysis of medical records did not allow for assessment of patients' experiences with the full range of potential smoking cessation methods.

Understanding BMT patients' smoking and smoking cessation behaviors can guide cessation interventions in the setting of office-based BMT. Therefore, we describe tobacco use and smoking cessation treatment experience among patients with OUD receiving office-based BMT.

Methods

We conducted a cross-sectional study of persons with OUD receiving office-based BMT at an urban community health center to examine smoking and smoking cessation methods. The affiliated Institutional Review Board approved this study and all patients provided informed consent.

Setting

We interviewed patients with OUD receiving BMT in a Bronx, NY community health center. Briefly, the BMT program includes nine general internists who work closely with a clinical pharmacist to provide BMT in the context of primary care (Cunningham et al., 2008). Counseling on tobacco use is provided as part of routine clinical care at the health

center, but the BMT program has no specific policies on the provision of smoking cessation treatment. In a prior study in this setting, we found that 17% of smokers were prescribed cessation medication (Nahvi et al., 2014).

Sample

Patients were eligible if they were: 1) 18 years old, 2) currently receiving BMT in the community health center, 3) fluent in English or Spanish. Because this was an unfunded project, our resources were limited, and thus recruitment was limited to January – June 2013. Over this period, all BMT patients were invited by their BMT provider to participate in a research study about BMT, and referred to the study coordinator.

Data Collection and Measures

Interviews were conducted using computer-assisted self-interview technology in English or Spanish. Questions were displayed on a computer screen while an audio recording of the question was played, and subjects entered responses directly on the computer. Subjects were compensated with \$15. We collected data on demographic characteristics, substance use, buprenorphine dose and duration of treatment, nicotine dependence, past smoking cessation attempts and interest in quitting smoking.

Substance use information was collected using the Addiction Severity Index (McLellan et al., 1992), including whether patients had used marijuana, cocaine, heroin, methadone, or other opiates in the previous 30 days (active substance use) and in their lifetime. We used the Alcohol Use Disorders Identification Test (AUDIT-C) to collect data about alcohol consumption; an AUDIT-C score of 4 or higher in men, and 3 or higher in women identified patients with hazardous alcohol use (Bradley et al., 2007).

Patients reported lifetime cigarette smoking, current cigarette smoking, and frequency and duration of past quit attempts. We identified prior quit attempts by asking current and former smokers if they had ever stopped smoking cigarettes for at least one day, to quit smoking. Current and former smokers were asked which pharmacologic and non-pharmacologic methods they had ever used for smoking cessation. For patients who reported currently smoking cigarettes, we determined time to first daily cigarette and nicotine dependence using the Fagerström Test of Nicotine Dependence (FTND). FTND scores of 6 or higher were classified as high nicotine dependence (Heatherton et al., 1991). Readiness to quit, importance of quitting, and confidence in ability to quit were assessed using 10-point scales (Biener and Abrams, 1991).

Analysis

We described subjects' sociodemographic characteristics, history of substance use, history of cigarette smoking and smoking cessation; we used simple frequencies for categorical variables, and means or medians for continuous variables with normal and non-normal distributions, respectively. In exploratory analyses, we examined the association between buprenorphine dose and duration of BMT and smoking and smoking cessation behaviors, using Mann-Whitney U tests, one-way ANOVA and logistic regression as appropriate. Analyses were conducted in STATA v.11 (College Station, TX).

Results

All 73 BMT patients who had clinic visits during the study period were referred to the study; 70 (95.9%) enrolled, and 68 (93.1%) completed the survey. The three patients who declined participation reported time constraints. Two participants initiated but did not complete the survey, one due to technical difficulties, and one due to time constraints.

Of the 68 subjects with complete survey data, mean age was 48.6 years, and most were male (69.1%), Hispanic (67.6%) or non-Hispanic black (23.5%), and had a high school diploma or equivalent (55.9%). The median length of time receiving office-based BMT was 36.5 months (Interquartile range [IQR]=20.2,53.2), and the median dose of buprenorphine/naloxone was 24/6 mg. Approximately one-half (48.5%) of patients reported active drug use; current heroin (22.1%), marijuana (20.6%) and cocaine (17.6%) use were reported most commonly.

The majority of patients (87.7%) currently smoked cigarettes, 7.9% were former smokers and 4.4% never smoked. Of current smokers, 81.5% smoked menthol cigarettes. The median FTND score was 5 (IQR=3,6), and more than half of current smokers (54.3%) had high nicotine dependence. Half of current smokers (50.9%) reported smoking their first cigarette within five minutes of waking. On a 10-point scale, patients attributed a median score of 9 (IQR=7,10) to the importance of quitting smoking, and a median score of 6 (IQR=4,8) to confidence in their ability to quit. The median score on the contemplation ladder was 6 (IQR=4,8), which corresponds to interest in quitting in the next six months.

Of lifetime smokers, 83.1% reported at least one prior quit attempt and 78.5% reported using medication to try to quit; 75.4% used one or more forms of nicotine replacement therapy (NRT), 29.2% used varenicline, and 9.2% used bupropion. Of those using NRT, nicotine patch (63.1%) and gum (47.7%) were used most frequently. Ten patients (15.4%) reported using electronic cigarettes to try to quit smoking. Stopping “cold turkey” and gradually decreasing the number of cigarettes smoked in a day were the non-pharmacological methods of quitting tried most often, by 40.0% and 32.3% of patients respectively. Twelve percent of patients attended a stop smoking clinic or program. Few patients used one-on-one counseling (6.2%) or a telephone quit line (1.2%) for smoking cessation.

More frequent smoking was significantly associated with higher BMT dose and longer BMT duration. Specifically, daily (vs. non-daily) smokers had higher median BMT dose (24/6 mg vs 16/4 mg, $p < 0.05$), and longer median duration of BMT (32.9 months vs. 26.5 months, $p < 0.05$).

Discussion

Among patients receiving office-based BMT in a Bronx community health center, 95.6% were current or former cigarette smokers. More than three-quarters had tried to quit; most had used pharmacotherapy for smoking cessation, but few had quit successfully.

These findings extend the limited research that has examined smoking and smoking cessation behaviors among patients with OUD receiving BMT. Prior studies have described

cigarettes smoked per day and nicotine dependence among smokers with OUD treated with buprenorphine (Mooney et al., 2008; Patrick et al., 2014) or compared tobacco use characteristics of buprenorphine- and methadone-treated patients (Chisolm et al., 2013; Pajusco et al., 2012). In these studies, like ours, patients had moderate to high levels of nicotine dependence. None of these studies described smoking cessation treatment experience among BMT patients. While studies have examined smoking cessation treatment experience within MMT settings, to our knowledge, this is the first study to examine BMT patients' experiences with a broad array of smoking cessation methods. As office-based BMT continues to expand and is optimally positioned to address smoking cessation, and with the majority of BMT patients currently smoking, it is important to first understand BMT patients' smoking cessation behaviors, which can then inform smoking cessation interventions.

Given that patients receiving office-based BMT tend to have better occupational functioning than patients receiving MMT (Sullivan et al., 2005), we hoped to see higher rates of smoking cessation in our sample of BMT patients than in previous reports of MMT patients. Although 83.1% of smokers in our sample had tried to quit, and most attributed high importance to smoking cessation, the quit ratio (percent of ever smokers who have quit) was only 12.3%. This quit ratio is consistent with findings among MMT patients (Richter et al., 2001), and markedly lower than the 55% quit ratio in the general U.S. population (Agaku et al., 2014). In addition, many patients who had not quit successfully had used evidence-based treatment in the past. The disparity between the number who had tried to quit smoking and the number who had quit successfully highlights the need to optimize smoking cessation treatment strategies in the setting of office-based BMT.

Our findings suggest multiple potential challenges to cessation that may explain this low quit ratio. First, nicotine dependence was high. Second, the majority of smokers used menthol cigarettes, which is associated with lower rates of cessation than non-menthol cigarettes (Smith et al., 2014). Finally, buprenorphine dose and length of BMT were higher among daily smokers compared to non-daily smokers. This is consistent with findings that suggest interaction between opioid agonist treatment and nicotine dependence among smokers with opioid use disorder (Elkader et al., 2009; Patrick et al., 2014; Richter et al., 2007), which may require attention in design of future interventions.

This low quit ratio is even more concerning given the well-documented gaps in the provision of evidence-based smoking cessation treatments and general lack of treatment provision in opioid treatment settings (Friedmann et al., 2008; Hunt et al., 2012; Knudsen et al., 2010; Nahvi et al., 2014). Thus, interventions to improve treatment provision at the systems level, as well as to employ a more aggressive treatment approach at the patient level, are necessary. Our findings of high rates of tobacco use despite prior pharmacotherapy experience, and very limited utilization of behavioral treatments suggest two intervention targets—optimizing pharmacotherapy effects and increasing provision of behavioral treatments.

This study has limitations. Our results are based on a small convenience sample of patients receiving BMT at one urban community health center, limiting generalizability of our results. All data were by self-report, and data regarding duration, dose, and method of

obtaining pharmacotherapy were unavailable. Though we identified few patients who had used behavioral support for smoking cessation, data regarding barriers to accessing behavioral support, and receipt of smoking cessation counseling in the BMT setting were unavailable. Finally, we did not collect data on patients' interest in specific smoking cessation treatments.

Conclusions

In summary, patients receiving office-based BMT have a high prevalence of cigarette smoking despite most patients having tried to quit and attributing importance to smoking cessation. Smokers receiving office-based BMT have considerable prior experience with pharmacotherapy for smoking cessation but limited utilization of behavioral treatments. Improved strategies are necessary to optimize smoking cessation treatment and success with evidence-based treatment among smokers receiving office-based BMT.

Acknowledgments

This work was supported by the National Institutes of Health (K23DA025736, K24DA036955, R25DA023021, R01DA032110, and R34DA031066). The funding sources had no role in the design and conduct of the study; collection, management, analysis and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

References

- Agaku IT, King BA, Dube SR. Centers for Disease, C., Prevention. Current cigarette smoking among adults - United States, 2005–2012. *MMWR Morb Mortal Wkly Rep.* 2014; 63(2):29–34. [PubMed: 24430098]
- Biener L, Abrams DB. The Contemplation Ladder: validation of a measure of readiness to consider smoking cessation. *Health Psychol.* 1991; 10(5):360–365. [PubMed: 1935872]
- Bradley KA, DeBenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a brief screen for alcohol misuse in primary care. *Alcohol Clin Exp Res.* 2007; 31(7):1208–1217. [PubMed: 17451397]
- Chisolm MS, Fitzsimons H, Leoutsakos JMS, Acquavita SP, Heil SH, Wilson-Murphy M, Tuten M, Kaltenbach K, Martin PR, Winklbaur B, Jansson LM, Jones HE. A Comparison of Cigarette Smoking Profiles in Opioid-Dependent Pregnant Patients Receiving Methadone or Buprenorphine. *Nicotine & Tobacco Research.* 2013; 15(7):1297–1304. [PubMed: 23288871]
- Clemmey P, Brooner R, Chutuape MA, Kidorf M, Stitzer M. Smoking habits and attitudes in a methadone maintenance treatment population. *Drug Alcohol Depend.* 1997; 44(2–3):123–132. [PubMed: 9088784]
- Cunningham C, Giovannelli A, Sacajiu G, Whitley S, Mund P, Beil R, Sohler N. Buprenorphine treatment in an urban community health center: what to expect. *Fam Med.* 2008; 40(7):500–506. [PubMed: 18928077]
- Elkader AKP, Brands BP, Selby PM, Sproule BAP. Methadone-Nicotine Interactions in Methadone Maintenance Treatment Patients. *J Clin Psychopharmacol.* 2009; 29(3):231–238. [PubMed: 19440076]
- Friedmann PD, Jiang L, Richter KP. Cigarette smoking cessation services in outpatient substance abuse treatment programs in the United States. *J Subst Abuse Treat.* 2008; 34(2):165–172. [PubMed: 17509809]
- Heatherton T, Kozlowski L, Frecker R, Fagerström K. The Fagerström Test of Nicotine Dependence: A revision of the Fagerström tolerance questionnaire. *Br J Addict.* 1991; 86:1119–1127. [PubMed: 1932883]

- Hser YI, McCarthy WJ, Anglin MD. Tobacco Use as a Distal Predictor of Mortality among Long-Term Narcotics Addicts. *Preventive Medicine*. 1994; 23(1):61–69. [PubMed: 8016035]
- Hunt JJ, Cupertino AP, Garrett S, Friedmann PD, Richter KP. How is tobacco treatment provided during drug treatment? *J Subst Abuse Treat*. 2012; 42(1):4–15. [PubMed: 21831563]
- Hurt RD, Offord KP, Croghan IT, Gomez-Dahl L, Kottke TE, Morse RM, Melton LJ 3rd. Mortality following inpatient addictions treatment. Role of tobacco use in a community-based cohort. *JAMA*. 1996; 275(14):1097–1103. [PubMed: 8601929]
- Jamal A, King BA, Neff LJ, Whitmill J, Babb SD, Graffunder CM. Current Cigarette Smoking Among Adults — United States, 2005–2015. *MMWR Morb Mortal Wkly Rep*. 2016; 65:1205–1211. [PubMed: 27832052]
- Knudsen HK, Studts JL, Boyd S, Roman PM. Structural and Cultural Barriers to the Adoption of Smoking Cessation Services in Addiction Treatment Organizations. *J Addict Dis*. 2010; 29(3):294–305. [PubMed: 20635279]
- McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Pettinati H, Argeriou M. The fifth edition of the addiction severity index. *J Subst Abuse Treat*. 1992; 9(3):199–213. [PubMed: 1334156]
- Miller ME, Sigmon SC. Are Pharmacotherapies Ineffective in Opioid-Dependent Smokers? Reflections on the Scientific Literature and Future Directions. *Nicotine & Tobacco Research*. 2015; 17(8):955–959. [PubMed: 26180219]
- Mooney ME, Poling J, Gonzalez G, Gonsai K, Kosten T, Sofuoglu M. Preliminary Study of Buprenorphine and Bupropion for Opioid-Dependent Smokers. *Am J Addict*. 2008; 17(4):287–292. [PubMed: 18612883]
- Nahvi S, Blackstock O, Sohler NL, Thompson D, Cunningham CO. Smoking cessation treatment among office-based buprenorphine treatment patients. *J Subst Abuse Treat*. 2014; 47(2):175–179. [PubMed: 24912863]
- Nahvi S, Richter K, Li X, Modali L, Arnsten J. Cigarette smoking and interest in quitting in methadone maintenance patients. *Addictive Behaviors*. 2006; 31:2127–2134. [PubMed: 16473476]
- Pajusco B, Chiamulera C, Quaglio G, Moro L, Casari R, Amen G, Faccini M, Lugoboni F. Tobacco Addiction and Smoking Status in Heroin Addicts under Methadone vs. Buprenorphine Therapy. *International Journal of Environmental Research and Public Health*. 2012; 9(3):932–942. [PubMed: 22690174]
- Patrick ME, Dunn KE, Badger GJ, Heil SH, Higgins ST, Sigmon SC. Spontaneous reductions in smoking during double-blind buprenorphine detoxification. *Addict Behav*. 2014; 39(9):1353–1356. [PubMed: 24845165]
- Reid MS, Fallon B, Sonne S, Flammino F, Nunes EV, Jiang H, Kourniotis E, Lima J, Brady R, Burgess C, Arfken C, Pihlgren E, Giordano L, Starosta A, Robinson J, Rotrosen J. Smoking cessation treatment in community-based substance abuse rehabilitation programs. *J Subst Abuse Treat*. 2008; 35(1):68–77. [PubMed: 17951021]
- Richter KP, Gibson CA, Ahluwalia JS, Schmelzle KH. Tobacco use and quit attempts among methadone maintenance clients. *American Journal of Public Health*. 2001; 91(2):296–299. [PubMed: 11211643]
- Richter KP, Hamilton AK, Hall S, Catley D, Cox LS, Grobe J. Patterns of Smoking and Methadone Dose in Drug Treatment Patients. *Experimental and Clinical Psychopharmacology*. 2007; 15(2):144–153. [PubMed: 17469938]
- Smith SS, Fiore MC, Baker TB. Smoking cessation in smokers who smoke menthol and non-menthol cigarettes. *Addiction*. 2014; 109(12):2107–2117. [PubMed: 24938369]
- Sullivan LE, Chawarski M, O'Connor PG, Schottenfeld RS, Fiellin DA. The practice of office-based buprenorphine treatment of opioid dependence: is it associated with new patients entering into treatment? *Drug Alcohol Depend*. 2005; 79(1):113–116. [PubMed: 15943950]
- Weinberger AH, Platt J, Esan H, Galea S, Erlich D, Goodwin RD. Cigarette Smoking Is Associated With Increased Risk of Substance Use Disorder Relapse: A Nationally Representative, Prospective Longitudinal Investigation. *J Clin Psychiatry*. 2017; 78(2):e152–e160. [PubMed: 28234432]

Table 1

Participant Characteristics (N=68)

	N (%)
Demographic Characteristics	
Age (Mean $\pm$ Standard Deviation)	48.6 $\pm$ 9.4
Male	47 (69.1)
Race/ethnicity	
Hispanic	46 (67.6)
Non-Hispanic Black	16 (23.5)
Non-Hispanic White	6 (8.8)
Substance Use Characteristics	
Active drug use	33 (48.5)
Heroin	15 (22.1)
Methadone	4 (5.9)
Other opiates/analgesics	9 (13.2)
Cocaine	12 (17.6)
Marijuana	14 (20.6)
Median duration (months) receiving buprenorphine (Interquartile Range [IQR])	36.5 (20.2, 53.2)
Hazardous alcohol use	20 (29.4)
Median daily dose of buprenorphine/naloxone, mg (IQR)	24/6 (16/4, 24/6)
Smoking Characteristics	
Ever smoked cigarettes	65 (95.6)
Currently smoking cigarettes *	57 (87.7)
Usual cigarette brand is menthol *	53 (81.5)
Ever stopped smoking for >1 day to try to quit smoking *	54 (83.1)
High nicotine dependence (Fagerström Test for Nicotine Dependence score ≥ 6) †	31 (54.3)
Time to first daily cigarette ‡	
Within 5 minutes	29 (50.9)
Between 6 and 30 minutes	15 (26.3)
Between 31 and 60 minutes	5 (8.8)
More than 60 minutes	8 (14.0)
Any prior medication assisted quit attempt *	51 (78.46)
Medications used to quit smoking *	
Nicotine patch	41 (63.1)
Nicotine gum	31 (47.7)
Nicotine nasal spray	2 (3.1)
Nicotine inhaler	3 (4.6)
Nicotine lozenge	2 (3.1)

	N (%)
Bupropion	6 (9.2)
Varenicline	19 (29.2)
Methods used to quit smoking *	
Stopped all at once without any treatment	26 (40.0)
Gradually decreased the number of cigarettes smoked in a day	21 (32.3)
Electronic cigarettes	10 (15.4)
Stop smoking clinic or program	8 (12.3)
One-on-one counseling	4 (6.2)
Telephone quit line	1 (1.5)
Importance of quitting smoking completely on scale from 1 to 10 (IQR) †	9 (7, 10)
Confidence about ability to quit smoking on scale from 1 to 10 (IQR) †	6 (4, 8)
Readiness to quit smoking based on contemplation ladder (IQR) †	6 (4, 8)

* Sample size 65 (only subjects who ever smoked)

† Sample size 57 (only current smokers)