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# Cigarette Smoking in Opioid-Using Patients Presenting for Hospital-Based Medical Services

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*Little is known about cigarette smoking among opioid users who are not in substance abuse treatment. The study examined cigarette smoking in out-of-treatment opioid users presenting at a hospital who participated in drug abuse research. Participants exhibited a high rate of smoking (92%) at baseline that remained unchanged at one year and were moderately nicotine-dependent. Nineteen percent preferred unfiltered cigarettes. Women were more likely to smoke menthol cigarettes; men were more likely to smoke unfiltered cigarettes. Caucasians tended to smoke more than other ethnicities and exhibited greater dependence. Out-of-treatment drug users continue to be at high risk for continued smoking. (Am J Addict 2008;17:65–69)*

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Cigarette smoking is a significant problem among substance users and is common in heroin users. Rates of concurrent smoking and opioid use are estimated to be between 85–98%,<sup>1</sup> at least four times higher than the general U.S. population.<sup>2</sup> Not surprisingly, these differences in prevalence translate to differences in success rates in smoking cessation programs as well. Rates of smoking cessation among heroin users are several times lower than rates for the general U.S. population.<sup>1</sup>

Information on smoking in heroin users is relatively limited, and the published studies have focused on examining smoking practices, cessation, and nicotine craving for persons already committed to a treatment regimen, like methadone maintenance.<sup>3,4</sup> Research indicates that smoking rates for people in methadone treatment are over 90%.<sup>5</sup> Clemmey and colleagues<sup>6</sup> conducted a study of smoking practices among methadone maintenance patients and found that 92% of clients

were current smokers, and of those clients, 61% planned to quit within the next six months. In two studies of cigarette smoking among methadone maintenance patients, Stark and Cambell<sup>7</sup> found that ongoing methadone treatment was not associated with an increase in smoking levels. Additionally, methadone doses were not significantly correlated with smoking levels. In addition, there is some evidence that style of smoking (ie, “chipper” versus regular user) is related to heroin use, with regular smokers using more heroin and requiring higher doses of methadone per day relative to chippers and nonsmokers.<sup>8</sup> Little is known about nicotine use of individuals who are not in substance abuse treatment. The authors are not aware of studies that have documented patterns of smoking prior to treatment entry (including methadone) or incidental changes in smoking that may occur as a positive consequence of entry into drug treatment (including methadone maintenance) when smoking cessation is not provided as a formal intervention.

Additionally, gender and ethnic differences in the smoking behaviors of heroin users are understudied. Previous research on smoking practices has focused more on gender and ethnic differences broadly rather than on sub-groups.<sup>9–12</sup> Regarding gender differences, Mermelstein and Borrelli<sup>11</sup> note that research examining quit rates for men and women has been mixed. Although large population-based survey research has shown little difference between men and women for quit rates, some clinical research outcomes suggest otherwise.<sup>10</sup> Finally, although smoking cessation for men and women is desirable due to deleterious effects on health caused by smoking, it is particularly needed for women as they incur health problems specific to the gender. For example, smoking increases risk of cervical cancer, early menopause, decreased fertility, osteoporosis, and if pregnant, the risk of low birth weight and mortality for the fetus.<sup>11</sup> Regarding ethnic differences, although Caucasians smokers smoke more cigarettes per day than ethnic minorities, they do not bear the greatest health burden or mortality rate.<sup>13,14</sup> Additionally, in a study of smoking cessation spanning forty years, Gilpin and

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Pierce<sup>9</sup> discovered that African Americans consistently had lower quit rates than Caucasians. In short, research is needed on gender and ethnic differences among heroin users who smoke.

The current study sought to evaluate the following: cigarette smoking practices in opioid-dependent patients who were interested but not enrolled in substance abuse treatment, as they presented for non-psychiatric medical services; and any incidental changes in smoking that occurred in these patients a year after baseline and completion of the substance abuse treatment services linkage research program. It was expected that baseline rates of cigarette smoking would be comparable to those reported in studies with methadone maintenance patients, and that participation in a program providing linkages to substance abuse services would instigate change in other positive behaviors, specifically that entry into methadone and other treatment would effect a reduction in smoking behaviors. Secondary analyses were also conducted to examine gender and ethnic differences in smoking patterns in this population, as well as provide qualitative information about smoking practices, including the kinds of cigarettes smoked.

## METHOD

### Participants

Study participants consisted of 126 heroin-using individuals (mean age = 43.0 years,  $SD = 8.20$ ; 77% male) who presented for medical services at San Francisco General Hospital (SFGH) between June 2000 and October 2002. SFGH is the largest public hospital in San Francisco. Participants in this study were racially mixed, with 48% Caucasian, 29% African-American, 10% Hispanic, 2% Asian or Pacific Islander, and 13% other/mixed. Participants had been using heroin for a mean 17.9 years ( $SD = 10.60$ ). A high proportion (83%) were homeless at entry into the study. Regarding reasons for becoming hospital patients, 79% were in the hospital for bacterial infections, 18% for non-drug use related medical problems, 2% for drug problems (eg, withdrawal), and 1% unknown. Additionally, 82% of the participants were in the hospital for drug-related medical problems, per the classification of "drug-related" that was developed in the prior work of Masson et al.<sup>15</sup>

### Procedure

Data were collected as part of a larger project examining two service linkage interventions (transitional case management and vouchers for free methadone treatment) for opioid-addicted patients presenting for medical services at a large public hospital. All study procedures were approved by the University of California, San Francisco Institutional Review Board. Study participants were recruited from various hospital departments, including the emergency room, the outpatient Integrated Soft Tissue Infection Service (ISIS), and inpatient units. In total, 314 individuals were screened for the study.

Recruitment rate was 40%, with 218 of the 314 individuals screened meeting eligibility criteria and 126 consented for participation and included in the study. Eligibility and enrollment rates did not differ as a function of gender or ethnicity.<sup>16</sup>

More detail regarding the larger treatment linkages study is presented elsewhere.<sup>17</sup> In brief, all participants were adults, receiving medical treatment at SFGH at time of recruitment, and interested in enrolling in case management or methadone maintenance treatment (MMT). They all also met the California state eligibility requirements for MMT and provided informed consent to participate in the 18-month long study. Participants were excluded from the study if they were unable to provide informed consent, expecting incarceration or a move out of the area, already in case management or substance abuse treatment, using heroin less than 15 days out of the past 30 days, or participating in a similar research study.

Participants completed a baseline intake interview and were assigned to one of four linkage strategies aiming to connect them with drug abuse treatment services: 1) case management, 2) voucher for six months of free methadone treatment, 3) case management plus voucher, or 4) usual care (brief contact and referral). Although smoking cessation is highly beneficial, it is unlikely to have occurred with any of the linkage strategies, as smoking behavior was not specifically targeted. In all conditions, linkage activities lasted six months, with participants followed for one year post-treatment. Follow-up rates were good, with 85% of participants completing the 12-month assessment.

### Measures

#### Cigarette Use

Cigarette use was assessed via self-report and biological verification at baseline and again at the 12-month follow-up. At both assessments, participants were asked about their current use (past seven days), including number of cigarettes smoked per day, brand smoked, and frequency of cigarette use. Self-report data were verified by expired CO. Participants who self-reported no smoking in the past seven days and produced expired CO readings of 10ppm or less were coded as abstinent.<sup>18</sup> Participants were also asked type of cigarette they typically smoked, including preferred brands and use of filtered or mentholated cigarettes.

#### Nicotine Dependence

Nicotine dependence was assessed at baseline and the 12-month follow-up using the Fagerstrom Test of Nicotine Dependence (FTND).<sup>19</sup> The FTND is a six-item measure assessing smoking behaviors related to physical dependence and is a revision of the widely used Fagerstrom Tolerance Questionnaire.<sup>19</sup> It is routinely used in smoking cessation research and has good construct validity and internal consistency. Prior studies indicate that it can be used in a variety of populations and correlates well with biological indices of nicotine use, like salivary cotinine.<sup>20</sup>

### Addiction Severity Index (ASI)

Descriptive information about other substance use and related problems was obtained at baseline using the ASI,<sup>21</sup> with questions asked assessing current and past use.

### Beck Depression Inventory (BDI)

The BDI, a 21-item self-report measure assessing depressive symptomatology during the past week, was administered at baseline to evaluate current depressive symptoms.<sup>22</sup>

### Self-Report Information

Background information, including age, ethnicity, and gender, were obtained from a standard demographic questionnaire administered at baseline.

### Data Analyses

Standard descriptive statistics were used to characterize the measures of smoking at baseline and at the 12-month assessment. Comparisons of proportions were conducted using Pearson's chi-square test. Means were compared for continuously distributed measures using t-tests and one-way ANOVA models. Change between baseline and the 12-month assessment was tested by computing the simple change in value and comparing that change among gender and ethnic groups. The low number of participants in some ethnic groups resulted in collapsing the Hispanics, Asian or Pacific Islanders, and those responding "multiple" into an "other" category to allow for analysis.

## RESULTS

### Smoking Behaviors at Study Baseline

Consistent with prior studies examining smoking in heroin users, the prevalence of cigarette use was high. Ninety-two percent of participants reported that they smoked in the seven days prior to entry into the research study. As shown in Table 1, the average participant smoked fewer than fifteen cigarettes per day. Participants who smoked were moderately nicotine-dependent based on FTND scores (see Table 1), although the majority (55%) reported having their first cigarette within five minutes of waking (not shown). There was no significant relationship between depression symptoms at baseline, as measured by the BDI, and number of cigarettes smoked per day ( $r = .18, p = .05$ ), and no relationship between the number of different drugs used in the past 30 days and daily smoking quantity ( $r = -.09, p < .40$ ).

No differences between the genders were found on these measures. Regarding ethnic differences on the measures, as the lower section of Table 1 illustrates, Caucasian participants, on average, smoked 4–5 more cigarettes per day than African-Americans or the remaining ethnic grouping ( $F(2,115) = 3.97, p = 0.02$ ). They also had greater mean FTND scores ( $F(2,122) = 4.31, p = 0.015$ ). No other ethnic differences were seen on these measures.

The preference for brands and types of cigarette displayed several differences by gender and ethnicity. Brand preference was as follows: 23.8% Marlboro, 14.3% Camel, 11.9%

**TABLE 1.** Gender and ethnic differences in baseline smoking behaviors

Characteristic	Total sample* <i>N</i> = 126	Men <i>n</i> = 97	Women <i>n</i> = 29
Cigarettes smoked per day ( <i>M, SD</i> )	14.2 (9.10)	14.9 (9.54)	11.7 (6.95)
FTND <sup>†</sup> score ( <i>M, SD</i> )	4.6 (2.05)	4.7 (2.07)	4.4 (2.02)
Expired CO ( <i>M, SD</i> )	13.5 (7.20)	13.4 (7.00)	13.8 (7.97)
% Smoking unfiltered cigarettes <sup>‡</sup>	18.8%	22.0%	7.7%
% Smoking menthol cigarettes (e.g., Newport, Kool) <sup>‡</sup>	20.5%	14.3%	42.3%
Ethnic differences in baseline smoking behavior			
Characteristic	African-American <i>n</i> = 34	Caucasian <i>n</i> = 55	Other <i>n</i> = 28
Cigarettes smoked per day ( <i>M, SD</i> ) <sup>§</sup>	12.4 (7.98)	16.5 (9.90)	11.7 (7.79)
FTND* score ( <i>M, SD</i> ) <sup>§</sup>	3.8 (1.99)	5.3 (1.96)	4.3 (1.94)
Expired CO ( <i>M, SD</i> )	13.5 (6.67)	14.1 (7.90)	12.4 (6.51)
% Smoking unfiltered cigarettes <sup>§</sup>	11.8%	20.0%	25.0%
% Smoking menthol cigarettes <sup>§</sup> (e.g., Newport, Kool)	41.2%	9.1%	17.9%

\*Total sample reflects individuals who reported some smoking at baseline; abstainers were not included.

<sup>†</sup>Fagerstrom Test of Nicotine Dependence.

<sup>‡</sup>Denotes significant gender difference,  $p < .05$ .

<sup>§</sup>Denotes significant ethnic difference,  $p < .05$ .

Newport, 20.6% generic, 16.7% other, and 12.7% unknown. When asked which type they smoked (yes or no) regardless of brand, 20.5% said they smoked mentholated, 22.0% said unfiltered, and 16.2% said generic. Gender differences for cigarette preference were as follows: significantly more women endorsed mentholated use relative to men,  $\chi^2(1, N = 110) = 8.4, p = .004$ , whereas unfiltered cigarette use occurred more in men,  $\chi^2(1, N = 110) = 3.2, p = .07$  (means appear in Table 1). Rates of mentholated use were especially high in African-American women relative to other ethnicities—72.7%, compared to 0% for Caucasian women and 37.5% for other women,  $\chi^2(2, N = 26) = 9.4, p = .009$ . A higher percentage of African-Americans preferred mentholated cigarettes compared to other ethnicities,  $\chi^2(2, N = 110) = 13.4, p = .001$  (means appear in Table 1). No ethnic differences were found for other brand preferences.

### Incidental Changes in Smoking at One Year

Analyses were conducted to determine if there were any changes in smoking frequency (including cessation) during the months following treatment linkage. Results indicated a small, but statistically significant, reduction in the number of cigarettes smoked per day at the one-year follow-up. Among the individuals who smoked at baseline, there was a 16% reduction in the number of daily cigarettes smoked,  $t(98) = -3.7, p < .001$  (baseline:  $M = 14.2, SD = 9.10$ , follow-up:  $M = 11.0, SD = 9.24$ ). However, only two individuals reported seven-day point prevalence abstinence at the one-year assessment, and of those, only one had a CO level consistent with abstinence.<sup>18</sup> There were no statistical differences by gender or ethnicity.

## DISCUSSION

The present study provided preliminary data on cigarette smoking practices in opioid users presenting for medical services. In general, the current study found the prevalence of smoking to be comparable to that reported in methadone treatment samples<sup>1,5</sup> and that smoking practices remained relatively stable throughout the year despite access to a variety of substance abuse treatment resources. Though there was a modest decline in the number of cigarettes used per day at the one-year assessment, only one smoker reported biologically verified seven-day point prevalence abstinence (determined by the CO level). Overall, results highlight the high prevalence of tobacco use and that access to opioid treatment did not coincide with significant changes in smoking practices. There were no gender differences in the quantity and frequency with which cigarettes were smoked; however, men and women preferred different types of cigarettes—unfiltered and mentholated, respectively. Caucasians tended to smoke more than other ethnic groups and exhibited greater dependence. This finding regarding ethnicity was consistent with prior research.<sup>13,14</sup>

What is not overt from the results are the health and social implications for this pattern of smoking within the heroin-abusing population. Some of the participants may have a

greater level of risk than others. For example, more women and African Americans reported using mentholated cigarettes compared to other participants. Mentholated cigarettes have additional health risks and have been associated with higher rates of mouth and esophagus cancers.<sup>23</sup> Likewise, the rates of unfiltered cigarette use were high; the risks of smoking these kinds of products are well documented.

The findings are also interesting in the larger context of tobacco control and addiction issues. Nicotine treatment is not commonly incorporated into methadone or other substance abuse treatment programs.<sup>24</sup> As such, nicotine dependence is typically not addressed within the larger context of addiction treatment; many substance abusers continue to smoke during and after formal drug treatment. In some treatment facilities, smoking is condoned, even encouraged, as some providers believe that quitting smoking may jeopardize the success of treatment for other drugs. Furthermore, other social influences may exert pro-smoking influences like peer pressure. In sum, it appears as if there are multiple issues working against cessation. Additionally, opportunities for smoking cessation are missed, given that nicotine dependence is not typically addressed in drug treatment programs, such as methadone clinics. Collectively, these influences place opioid users at high risk for continued smoking and the probability of sustaining adverse health effects as a consequence.

This study has limitations that could be explored in further research. A primary issue is that data were collected in a larger treatment linkages study.<sup>17</sup> As such, the small sample was a sub-group of heroin users seeking treatment, containing only those who were motivated to obtain methadone treatment and were not enrolled in substance abuse treatment at baseline. Questions that may have been particularly relevant for homeless individuals were not asked, such as the frequency of smoking partial cigarettes or butts. Smoking assessments were limited to two time points (baseline and one-year) and did not provide detail necessary to evaluate fluctuations within the study period. In addition, the study did not ask about smoking cessation efforts the participants may have had during the time period (formal or self-initiated). Lastly, measures relied largely on self-report, as resources did not permit for other kinds of biological verification, like urinary cotinine or anabastine assays, which would have been useful. Future studies addressing this topic would want to include more sensitive measures of smoking and cessation activities in their assessments; however, data from this study did provide preliminary information about smoking behaviors and changes in use during a program that encouraged treatment engagement.

In conclusion, this study highlights that opioid users are a particularly high-risk group for continued smoking. It also highlights the need for treatment programs to include smoking cessation in their interventions, given that individuals in our study did not appear to change their smoking practices.

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