

Prescription opioid abuse among enrollees into methadone maintenance treatment

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Abstract

A multi-state survey of 5663 opioid dependent persons enrolling in 72 methadone maintenance treatment programs (MMTPs) was conducted to determine the prevalence of prescription opioid (PO) abuse, factors associated with PO abuse and sources for POs. Regions where PO abuse was believed to be prevalent were oversampled; primary opioid was defined as the drug used the most before coming to the MMTP. Among primary heroin abusers, 69% reported abusing POs. Opioid abuse frequencies among primary PO abusers were oxycodone (79%), hydrocodone (67%), methadone (40%), morphine (29%), heroin (13%), hydromorphone (16%), fentanyl (9%) and buprenorphine (1%). Correlates ($p \leq .01$) of PO abuse, using general estimating equations, were: low urbanicity (MMTPs located in comparatively low population density counties), white ethnicity, no history of injecting primary drug, no previous methadone treatment, younger age, chronic pain, and pain as a reason for enrollment. The most frequent sources of POs were dealer, friend or relative, and doctor's prescription; least frequent were Internet and forged prescription. One-third of PO abusers reported a history of injecting their primary drug. PO abuse is highly prevalent among MMTP patients. Future studies should describe HIV/HCV needle injection practices, characteristics that predict treatment outcomes, and factors that contribute to higher prevalence of persistent pain among PO abusers.

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1. Introduction

Several studies using different data sources (e.g., general population, treatment admissions, key informants, emergency room records) have reported an increase in the prevalence of prescription opioid (PO) abuse in the United States during the past decade (SAMHSA, 2004a,b, 2005, 2006a; Cicero et al., 2005). There have also been several thousand reports in the media and recently published books for the general public regarding abuse of these pain medications, especially for the controlled-release (CR) formulation of oxycodone, e.g., OxyContin® (Adler, 2003; Koppel, 2005; Meier, 2003; Roche, 2001). These increases may reflect,

in part, changes in available drug formulations and prescribing practices of opioid medications (Compton and Volkow, 2006).

The few studies that have been conducted on PO abuse among methadone patients indicate that there are differences between PO and heroin abusers. In an unpublished 2001 survey conducted on behalf of the Drug Enforcement Administration (DEA), several statewide methadone providers (primarily in the southeast) reported high rates of PO abuse among new admissions into methadone maintenance treatment programs (MMTPs) (AATOD, 2006). However, PO abuse is not restricted to the southeast (Banta-Green et al., 2005; SAMHSA, 2006b) although its prevalence does appear higher in non-urban compared with urban areas (SAMHSA, 2004b). In a retrospective chart review of patients presenting for MMT in Ontario, Canada, PO abusers compared with heroin abusers were older when they began to abuse opioids, more likely to have pain complaints, more likely to be in psychiatric treatment, less likely to be using non-opioid illicit drugs, and less likely to have risks associated

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with injection drug use (Brands et al., 2004). An association between pain and PO abuse by MMTP patients was also reported by Trafton et al. (2004). A study of Vermont MMTP patients reported that PO abusers compared with heroin abusers had greater social stability and less severe opioid use and injecting drug use (Sigmon, 2006).

The objectives of the current study were to determine lifetime and current PO abuse prevalence rates among MMTP enrollees, to identify factors associated with primary PO abuse, and to determine sources for abused POs. This study was conceived and executed under the auspices of the Researched Abuse, Diversion and Addiction-Related Surveillance (RADARS®) System. The RADARS® System, which was initiated through a dialogue between the Food and Drug Administration (FDA) and Purdue Pharma, is a proactive surveillance program that monitors and characterizes the abuse and diversion of opioid pain medication (Cicero et al., 2005).

2. Methods

2.1. Setting and procedures

Data were collected from January 2005 through December 2005 in 72 MMTPs located in 33 states. Not all programs began study participation in January; 54 (75%) MMTPs participated for 10 or more months; 9 (12.5%) participated for 7–9 months; and 9 (12.5%) for 1–6 months. Once programs enrolled in the study they continued their participation through 2005. All of these programs were federally approved opioid agonist treatment programs and followed federal methadone treatment protocols that require an opioid-dependence diagnosis and an addiction history of at least 1 year (Rettig and Yarmolinsky, 1995). However, formal DSM-IV criteria may not have been used to determine dependence since assessment methods varied across programs. The research protocol was approved by the Institutional Review Board of the National Development and Research Institutes, Inc., and oral informed consent was obtained from the study patients. The respondents in this study include treatment seeking persons who reported abusing opioids in the past 30 days and were not in methadone treatment in the previous 30 days.

During the data collection period, patients enrolling into a MMTP were given an information sheet explaining the rationale and procedures of the study and that the study was voluntary and anonymous. Consenting patients were asked to complete a one-page survey instrument and were compensated with a \$5 food coupon. The methadone programs were instructed to have patients complete the survey on their first day of admission but no later than 1 week after admission. Each week, on an assigned day of the week, the programs faxed the completed surveys to the study's research office using a toll-free number. The cover sheet indicated the number of surveys included in the fax transmission; programs were instructed to fax the cover sheet even if there were no surveys included in the transmission. In order to reinforce adherence to these procedures, each of the participating programs signed a letter of agreement that specified these study protocols and identified a liaison staff person who served as the principal contact between the MMTP and the study's project director (C. Maxwell). The programs also received a stipend (\$250 every 6 months) for their participation. Program participation was further reinforced by sending quarterly reports to each program of their data and an aggregate report of all study data. The faxed surveys were read by an automated form-driven data capture software program (Teleform Version 8.2, Verity, Inc., Sunnyvale, CA). The data manager (C. Fong) reviewed and edited the data, e.g., correcting misread responses such as an endorsement mark that was partially inside a box and misread as a "no" response.

Based on the 2002 AATOD (2006) survey, the experiential knowledge of one of the co-authors (M. Parrino), and treatment admission rates of the general population of opioid abusers (SAMHSA, 2004b), MMTPs were selected to primarily represent regions in the U.S. where PO abuse was believed to be prevalent, e.g., non-urban areas, especially those in the Appalachian region. Some MMTPs

were located in major metropolitan areas such as San Francisco and New York City, where PO abuse among MMTP patients is believed to be relatively less prevalent. The number of study programs by U.S. region, as delineated by the U.S. Census Bureau (2006), was 18 in the Northeast, 30 in the Southeast, 10 in the Midwest, and 14 in the West. Thirty-nine of the programs were in counties coded as high density areas (population > 1 million); 22 in moderately populated counties ($\geq 250,000$ and < 1 million residents), and 11 in low populated counties (< 250,000 residents); these three categories were determined by a modified version of the Beale Urbanicity Code (USDA, 2003).

2.2. Study instrument

The one-page questionnaire included no identifying information and was designed to minimize response burden.² Demographic items were age, gender, race/ethnicity, and major source of income. Remaining items solicited information related to opioid drug use and pain. A checklist of separate opioid drugs captured lifetime and past 30 day use. The opioid drug abuse checklist included heroin and seven PO drugs (buprenorphine, fentanyl, hydrocodone, hydromorphone, oxycodone, methadone and morphine). Separate items on the checklist were used to collect information on CR and immediate-release (IR) oxycodone. The checklist was introduced with the question, "Which of the following drugs have you ever used to get high?" Two separate items asked respondents to: (1) indicate their primary opioid drug ("drug you used the most to get high with before coming to this methadone program") and (2) whether they had ever injected their primary drug. Response options for primary drug were the same as for the checklist, plus an option to endorse, "Other opioid drug". Sources for primary opioid drug were obtained with a checklist (e.g., dealer, forged prescription, prescribed by a doctor, emergency room). Items representing drug craving and pain due to drug withdrawal were embedded in the sentence, "Which word below best describes your [. . .] in the past week." Craving was phrased as, "urge to use your primary drug." Response categories were: none, very mild, moderate, strong, very strong. Withdrawal-associated pain was phrased as, "drug withdrawal pain in the past week". Response categories were: none, very mild, moderate, severe, very severe. Non-withdrawal pain severity was phrased as, "Other than drug withdrawal pain, what word best describes how much bodily pain you have felt in the past week?" Response categories were the same as for withdrawal pain. A six item checklist ranging from "less than 1 month" to "more than 1 year" was used to record the response to the pain duration item, "Other than drug withdrawal pain, for how long have you had any bodily pain?" This item gave an opportunity to indicate, "I have no pain." The questionnaire was pilot tested with a focus group of staff and patients in a MMTP and field tested at five MMTPs to improve its content validity and the data collection protocols. Changes to the final survey represented clarification of item wording and addition of certain items.

2.3. Statistical analysis

We calculated the prevalence of abuse of different opioid drugs for primary PO and primary heroin abusers. We also used multivariate analysis to compare the characteristics of respondents who abused POs (with or without heroin) with those who abused only heroin.

2.3.1. Coding and operational definitions. Respondents who reported a PO as their primary drug were coded as primary PO abusers while those reporting heroin as their primary drug were coded as primary heroin abusers. As noted in Section 2.1, population density of the respondent's MMTP was coded as low, moderate or high (USDA, 2003). Chronic pain was operationally defined as pain that was moderate to very severe in intensity and that has persisted for 6 or more months. Similar questions for categorizing pain severity have been used previously with MMTP samples (Ilgen et al., 2006; Rosenblum et al., 2003; Trafton et al., 2004). To present percentages and more interpretable odds ratios (ORs), the craving variable was recoded so that "none" and "very mild" = 0; and

² A copy of the questionnaire is available at <http://www.ndri.org/ctrs/itsr/OpioidSurvey.pdf>.

Table 1
Opioid abuse among MMTP enrollees, by primary drug of choice

	Prescription opioid (<i>n</i> = 2174) (%)		Heroin (<i>N</i> = 2988) (%)	
	Ever	Past 30 days	Ever	Past 30 days
Heroin	33	13	100	96
Prescription opioids	100	99	69	39
Oxycodone, any formulation	89	79	39	19
CR-Oxycodone (e.g., OxyContin®)	89	71	39	15
IR-Oxycodone (e.g., Percocet®)	81	59	36	13
Hydrocodone (e.g., Vicodin®)	88	67	44	16
Methadone	58	40	41	16
Morphine	59	29	28	8
Hydromorphone (e.g., Dilaudid®)	37	16	20	4
Fentanyl	30	9	15	4
Buprenorphine	5	1	8	2
Ever injected primary drug	33	<i>n/a</i>	78	<i>n/a</i>

CR: controlled-release; IR: immediate release. Sums to 5162 rather than 5663 because 501 did not select a unique primary opioid; 80 (1.4%) did not report a primary opioid and 421 (7.4%) endorsed more than one opioid as their primary drug.

“moderate,” “strong” and “very strong” = 1. Withdrawal pain was recoded so that “none” and “very mild” = 0 and “moderate,” “severe” and “very severe” = 1.

2.3.2. Multivariate analysis and missing data. Generalized estimating equations (GEE) were used to take into account clustering of patients in programs (Hardin and Hilbe, 2003). The percentages reported are the actual percentages; the odds ratios (ORs) were calculated from estimates (Betas) generated by GEE. To identify characteristics uniquely associated with primary PO abusers and PO abuse in the past 30 days, variables were force-entered into the GEE model. Variables that were correlated with the dependent variables at $p \leq .05$ were selected for entry into the multivariate model. Because of the large *N*, significance in the GEE model was set at $p \leq .01$ (99% confidence interval). Missing data in the GEE model were handled by multiple imputation in SAS Version 9.0 (Cary, NC)—modules PROC MI and PROC MIANALYZE. SAS software was also used to run GEE (PROC GENMOD).

3. Results

3.1. Patient demographics and treatment history

Among the 5663 respondents, the mean (S.D.) age was 35.0 (10.6); 36.6% were women, 73.1% were white, 13.0% were black, and 11.7% were Hispanic. The majority (59.3%) of respondents attended MMTPs in counties with >1 million residents, 31.4% in moderately populated areas (250,000 to <1 million), and 9.3% in relatively low density areas (<250,000). The three major sources of income (mutually exclusive) were employment (46.7%), friends or family (21.1%), and public assistance (20.7%). More than one-third (38.7%) met criteria for chronic pain and 33.5% reported that physical pain was a reason for enrolling in methadone treatment. Close to one half (47.3%) of the respondents had never been in methadone treatment before.

3.2. Abuse of heroin and prescription opioids

More than two-thirds (70%) reported lifetime heroin abuse and 83% lifetime PO abuse. In the past 30 days, heroin was abused by 59% of the respondents and POs by 67%. Almost two-

fifths (38%) indicated that a PO was their primary drug, 53% reported heroin as their primary drug and 9% did not indicate a single primary drug. Prevalence of type of opioid abused in the past 30 days varied widely across the 72 MMTPs. The median prevalence of prescription opioid abuse across programs was 69% with an interquartile range of 50–98%. The median prevalence of heroin abuse was 69%, with an interquartile range of 28–90%.

Number of respondents in each program varied from 1 to 439; the median was 78 and interquartile range of number of respondents was 21–88. Table 1 shows lifetime and past 30 day nonmedical use of opioids among primary PO abusers and primary heroin abusers. Among primary PO abusers more than four-fifths reported lifetime abuse of oxycodone (89%)—either CR oxycodone (89%) or IR oxycodone (81%). The next most frequent ever abused opioids, among primary PO abusers, were: hydrocodone (88%), morphine (59%), and methadone (58%). One-third of the primary PO abusers reported that they had a lifetime history of injecting their primary drug. Among primary PO abusers, the most frequently abused POs in the past 30 days, were CR oxycodone (71%), hydrocodone (67%), IR oxycodone (59%), and methadone (40%). One-third (33%) of primary PO abusers reported lifetime abuse of heroin and 13% reported abusing it in the past 30 days.

Among primary heroin abusers (Table 1), PO abuse was reported by 69% for lifetime and 39% for past 30 days; 78% had a lifetime history of injecting heroin. The most frequently abused POs during the past 30 days were hydrocodone (16%), methadone (16%), CR oxycodone (15%) and IR oxycodone (13%).

Primary PO abusers were more likely to report using a greater diversity of opioid drugs than primary heroin abusers (HAs). During the past 30 days, frequencies for the number of different drugs used by PO abusers were 1 (22%), 2 (20%), 3 (22%), 4 (18%), 5–9 (18%). Among primary HAs, past 30 day abuse frequencies for number of different opioids abused were 1 (64%), 2 (18%), 3 (8%), and 4 (4%), 5–9 (6%). Lifetime

Table 2
Prescription opioids: primary drug and injection history ($N=2174$)

	Primary drug		Ever injected primary drug	
	%	95% CI	%	95% CI
Any prescription opioid	<i>n/a</i>		32.9	30.8–35.0
Oxycodone, any formulation	54.6	32.5–56.7	35.4	32.5–38.0
CR-Oxycodone (e.g., OxyContin®)	47.4	35.3–41.5	38.4	35.3–41.5
IR-Oxycodone (e.g., Percocet®)	7.1	6.1–8.2	14.8	8.8–20.9
Hydrocodone (e.g., Vicodin®)	24.0	5.2–25.8	7.6	5.2–10.1
Methadone	8.2	7.0–9.3	11.5	6.4–16.5
Morphine	6.3	5.3–7.3	85.0	78.5–91.5
Hydromorphone (e.g., Dilaudid®)	5.1	4.2–6.0	89.8	83.7–95.9
Fentanyl	0.9	27.5–1.3	57.1	27.5–86.8
Buprenorphine	0.1	0.0–0.2	0.0	<i>n/a</i>
Other opioid drug	0.8	10.9–1.2	37.5	10.9–64.1

CI: confidence interval; CR: controlled-release; IR: immediate release.

abuse of different opioids for primary PO abusers and primary HAs showed a similar pattern, although fewer respondents abused only one opioid: primary PO abusers (6%); primary HAs (31%).

Among primary PO abusers the most frequently cited primary opioids were CR oxycodone (47.4%), hydrocodone (24.0%), and methadone (8.2%); Table 2. The least frequently endorsed primary opioids were buprenorphine (0.1%), fentanyl (0.9%), and other opioid (0.8%). Primary POs most frequently cited as having been injected, were hydromorphone (89.8%), morphine (85.0%), and fentanyl (57.1%). Injection of other POs ranged from 38.4% (CR oxycodone) to 0% (buprenorphine).

3.3. Correlates of prescription opioid abuse

In bivariate analysis patients who abused POs in the past 30 days were significantly ($p \leq .01$) more likely to attend a MMTP in a low-densely populated area, to be younger, female, white, employed, have chronic pain, report pain as a reason for enrolling in methadone treatment, have no previous MMTP history, have stronger drug cravings, have more severe withdrawal pain, and to have no history of injecting their primary drug. Except for pain as a reason for enrolling in methadone treatment ($p = .03$) all of these same respondent characteristics were also significantly associated with identifying a PO as a primary choice for abuse.

In the GEE model (Table 3), patient characteristics that were most strongly associated (ORs ≥ 4 or $< .25$) with past 30 day abuse of POs were low urbanicity (i.e., MMTPs located in counties with relatively low population density) and non-white race. Other covariates significantly associated with recent PO abuse were younger age, chronic pain, pain as a reason for seeking methadone treatment, first episode of methadone treatment, and no history of injecting primary drug. Patient characteristics that were most strongly associated with primary PO abuse (in the GEE model) were low urbanicity, non-white race and injection history. Other covariates significantly associated with primary PO abuse were employment, chronic pain, pain as a reason for MMTP enrollment, and first MMT episode.

3.4. Opioid abuse and urbanicity

For heuristic purposes we examined the prevalence of PO and heroin abuse in the past 30 days among respondents attending MMTPs in low, moderate or high population density areas. There was an inverse relationship between PO and heroin abuse across the three geographical areas. Among patients ($N=526$) in the least densely populated areas 91.4% reported abusing POs and 29.1% reported abusing heroin. Among patients ($N=1781$) in moderately populated counties 86.8% abused POs and 34.4% abused heroin. And among patients ($N=3356$) in the most densely populated counties 52.7% abused POs while 77.2% abused heroin. Since MMTPs located in low urbanicity areas were overly represented in the Southeast (89% were in counties with ≤ 1 million residents compared with 4.3% in the Northeast, 20.6% in the Midwest, and 30.0% in the West) we examined the association between low urbanicity and PO abuse within the four regions of the U.S. We found the correlation between PO abuse and low urbanicity was significant ($p \leq .001$) within each quadrant: Northeast ($r = .17$); Southeast [South] ($r = .07$); Midwest ($r = .26$); and West ($r = .17$).

3.5. Sources of prescription opioids

Among respondents who report that their primary opioid drug for abuse is a PO ($N=2174$), the most frequent sources of this drug are dealer (86%), friends or relatives (54%), a doctor's prescription (28%), emergency room (13%) and theft (7%). Few reported that they got their primary opioid drug from internet sales (3%), forged prescriptions (3%); or other ways (2%). These patterns are similar when sources are examined for individual POs. Nearly three-fifths (59%) of the respondents reported two or more sources for their primary drug (mean = 1.96; S.D. = 1.07). Two drug sources were significantly associated with chronic pain: Patients with chronic pain compared with patients without chronic pain were less likely to report dealer as a source (82% versus 89%, $p < .01$) and were more likely to report a doctor's prescription as a source (31% versus 25%, $p \leq .002$). These same drug sources were also significantly

Table 3
Association between respondent characteristics and prescription opioid abuse among patients enrolling in methadone maintenance treatment ($N=5663$)

	No. of patients ^c	Prescription opioids, past 30 days ^a			No. of patients ^c	Prescription opioid, primary drug ^b		
		%	OR	99% CI		%	OR	99% CI
Urbanicity								
>1 million	3356	52.7	1.00		3110	21.9	1.00	
250,000 to 1 million	1781	86.8	4.07	3.23–5.13	1573	71.4	7.27	5.75–9.21
<250,000	526	91.4	6.08	3.90–9.50	479	77.0	7.84	5.36–11.46
Age (year)								
18–29	2095	78.1	1.00		1923	56.2	1.00	
30–43	1990	64.8	0.70	0.56–0.88	1805	39.6	0.79	0.62–1.00
44–83	1435	54.6	0.68	0.52–0.87	1311	25.4	0.77	0.58–1.02
Sex								
Male	3545	65.3	1.00		3241	40.6	1.00	
Female	2050	70.2	1.04	0.86–1.26	1863	45.2	1.06	0.85–1.32
Race								
White	4086	79.1	1.00		3686	56.8	1.00	
Black	726	35.5	0.26	0.20–0.34	692	4.8	0.08	0.05–0.13
Hispanic	656	29.1	0.20	0.05–0.13	626	2.6	0.08	0.05–0.13
Other	123	55.3	0.41	0.24–0.70	104	17.3	0.35	0.18–0.66
Employment								
No	2824	60.7	1.00		2598	31.9	1.00	
Yes	2470	74.3	1.21	0.99–1.47	2246	54.2	1.53	1.22–1.91
Chronic pain								
No	3380	60.2	1.00		3131	36.2	1.00	
Yes	2132	78.2	2.11	1.71–2.60	1901	52.0	1.73	1.38–2.17
Pain a reason for enrollment								
No	3637	65.0	1.00		3386	41.0	1.00	
Yes	1836	70.5	1.34	1.09–1.65	1622	44.2	1.47 ^d	1.16–1.86
First MMT episode								
No	2546	52.4	1.00		2367	22.3	1.00	
Yes	2832	80.6	1.92	1.58–2.33	2549	61.3	2.44	1.97–3.02
Urge								
Low	779	58.9	1.00		712	30.3	1.00	
High	4829	68.4	1.16	0.88–1.52	4410	43.9	1.32	0.96–1.83
Withdrawal								
Low	1695	64.4	1.00		1565	37.6	1.00	
High	3896	68.3	0.97	0.87–1.40	3542	44.1	1.10	0.87–1.40
Ever injected primary drug								
No	2089	81.2	1.00		1888	68.6	1.00	
Yes	2961	55.8	0.38	0.31–0.47	2794	22.7	0.14	0.11–0.18

^a 3797 reported that they had used a prescription opioid during the past 30 days to get “high”.

^b Respondents classified by primary drug of abuse; 2174 reported a prescription opioid as their primary drug; 2988 reported heroin as their primary drug; 501 did not select one drug as their primary drug.

^c Numbers may not sum to 5663 (past 30 days column) or 5162 (primary opioid column) because not all respondents answered all questions. Missing data for the multivariate GEE model are handled by multiple imputation. Urbanicity represents the population density of the county in which the MMTP is located. Chronic pain defined as pain at moderate or higher intensity that has persisted for at least 6 months.

^d The apparent discrepancy between the relatively small difference between the “No” and “Yes” percentages (41.0 and 44.2, respectively) and the comparatively high OR (1.47) may be due to a suppressor effect that emerged when other variables were included in the model.

associated with pain as a reason for enrolling in a MMTP; 82% versus 88% ($p = .001$) for dealer as source, and 32% versus 26% ($p = .006$) for doctor’s prescription as a source.

4. Discussion

In this nationwide survey of persons enrolling into MMTPs, abuse of prescription opioids (POs) is highly prevalent. Even among MMTP patients who identified heroin as their primary

drug, more than two-thirds reported lifetime PO abuse and more than one-third reported PO abuse in the past 30 days. In contrast, abuse of heroin by primary PO abusers was less frequent. Among PO abusers, the three most frequently abused opioids in the past 30 days were CR oxycodone, hydrocodone, and IR oxycodone. CR oxycodone (47%) and hydrocodone (24%) were also the two most frequently cited primary POs. IR formulations of oxycodone were endorsed by only 7% of primary PO abusers as a primary drug. The higher rate of endorsement of CR oxycodone

as a primary drug, compared with IR oxycodone, may possibly be attributed to its higher dosage of oxycodone. IR oxycodone (as well as hydrocodone) may be less preferable because more pills would be required to achieve a desired self-dosing level.

The comparatively lower prevalence of heroin abusers in less densely populated U.S. counties suggests that heroin may be less available in these areas, possibly due to a weaker infrastructure of heroin dealing in suburban and rural areas (Frank, 2001; Golub and Johnson, 2005; Sifaneck and Neaigus, 2001). Also, legitimate access to POs for pain complaints is limited in minority urban areas (Morrison et al., 2000; Green et al., 2005). Consistent with findings of a previous study conducted in a single treatment program, PO abuse was strongly associated with white ethnicity (Miller and Greenfeld, 2004). Although there was a higher concentration of white enrollees living in less urban areas, population density did not entirely account for the association between ethnicity and PO abuse, since urbanicity and ethnicity were each significantly associated with PO abuse when both were entered into the GEE model.

The relatively younger age of the PO abusers is consistent with reports that the sharpest increase in misuse of prescription drugs is among 18–25 year olds (Colliver et al., 2006). The recent increase in the availability of stronger POs (Compton and Volkow, 2006), as well as an increase in methadone programs in regions where PO abuse is prevalent (Alford, 2003), may account for the association between entering methadone treatment for the first time and PO abuse.

PO abusers were less likely than heroin abusers to report a history of injection, although a significant minority (33%) did report injecting their primary PO. A study of 184 rural PO abusers also found a high rate (44%) of lifetime injection of POs as well as unsafe needle practices among current injectors and a 14.8% self-reported HCV rate among those who had ever injected (Havens et al., 2007). Learning more about injection risk factors among PO abusers will help in designing targeted HIV and hepatitis C prevention efforts for this population.

Chronic pain was prevalent among both primary heroin and primary PO abusers, although significantly higher among PO abusers. The importance of learning how to manage chronic pain among methadone treatment patients is underscored by our finding that approximately one-third of all respondents reported non-withdrawal pain as a reason for enrolling in methadone treatment. It also speaks to the results of a prospective longitudinal study showing that MMTP patients with significant pain at enrollment continued to report high rates of pain 1 year later despite their declining opioid abuse (Ilgen et al., 2006).

Illicit methods of acquisition (dealer and friends/relatives) were the two most frequent sources of primary abused POs. Despite reports of Internet sales and concerns over forged prescriptions (CASA, 2006; Forman et al., 2006), only a small proportion of respondents reported these two methods of acquisition. However, we do not know the extent that dealers and friends relied on such sources to acquire POs. Non-forged prescriptions were reported by 29% of the respondents; it is unclear whether these prescriptions were issued in good faith by a prescriber for a legitimate medical purpose.

Our findings of comparatively higher pain prevalence and lower injection risk among PO abusers are consistent with the two previous studies of PO abuse among MMTP patients (Brands et al., 2004; Sigmon, 2006). However, unlike those studies we also found that PO abusers compared with heroin abusers were more likely to be entering MMT for the first time. We also observed that physicians were less likely to be a source of supply for prescription opioids than reported by Brands et al. (28% versus 61%) and that PO abusers were younger than heroin users.

Results of this study should be interpreted with caution for several reasons. Programs were invited to participate in the study based on their likely capability of participating in a research study, and programs were oversampled in regions believed to have high prevalence of PO abuse. These programs were also comparatively more likely to be located in non-urban areas. Nevertheless, the association between low urbanicity and PO abuse appears robust, since we found that PO abuse among individuals seeking treatment was more prevalent in less densely populated areas within each of the four U.S. regional census tracts. Use of a validated pain measure would have strengthened our study. The development of brief, validated pain measures for this population as well methods to categorize their pain syndromes would be a useful area of inquiry. PO use data were obtained with a checklist and did not include weak opioids such as codeine. It is possible that opioids not on the list may have also been abused. However, less than 1% reported “other” opioids as their primary drug. Therefore, the checklist does seem to have included the POs that were most frequently abused by this population. The PO abusers were restricted to patients seeking MMT and not the larger population of PO abusers. However, several of the correlates of PO abuse – ethnicity, employment, 1st episode of methadone maintenance; high prevalence of oxycodone and hydrocodone – parallel findings of a national evaluation study of opioid-dependent patients receiving buprenorphine treatment (McLeod et al., 2005). Although we were unable to formally document patient participation rates in the survey, we believe that few subjects were missed. Programs typically included our survey as part of their treatment admission protocol and when more than a dozen study MMTP directors were asked about patient refusals and missed patients, they estimated that it was less than 5%.

This study has several research, public health and policy implications. Prospective longitudinal follow-up studies are needed to determine the course of primary PO abuse to see whether it remains stable, remits, or whether PO abusers transition to heroin use. In U.S. regions where PO abuse is high and heroin use is low, there may be elevated risk of heroin abuse among long-term PO abusers should they find heroin less expensive and more easily available than POs (DOJ, 2006). Surveillance of PO and heroin abuse should be coupled, especially when targeted efforts are made to reduce diversion of POs in specific regions. It is important to determine the pathways of addiction to POs, e.g., to what degree has it been iatrogenic (a consequence of treatment for pain) or a consequence of recreational drug use? Finally, although it has been well-documented that methadone patients have high rates of psychiatric and phys-

ical comorbidities including infectious diseases such as HIV and hepatitis C (Strain and Stitzer, 2006), most of these studies have been conducted with heroin-using populations. Therefore it will be important to determine the prevalence of these comorbidities and develop methods to prevent and treat them among primary PO abusers.

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