Published in final edited form as:
Drug Alcohol Depend. 2008 September 1; 97(1-2): 122–129. doi:10.1016/j.drugalcdep.2008.03.026.

A COMPARISON OF ONE-YEAR SUBSTANCE ABUSE TREATMENT OUTCOMES IN COMMUNITY SYRINGE EXCHANGE PARTICIPANTS VERSUS OTHER REFERRALS

Karin Neufeld[*], **Van King**, **Jessica Peirce**, **Ken Kolodner**, **Robert Brooner**, and **Michael Kidorf**
Addiction Treatment Services, Department of Psychiatry, Johns Hopkins School of Medicine, 5510 Nathan Shock Drive Suite 1500, Baltimore, Maryland 21224 USA

Abstract

This longitudinal cohort study of 324 consecutive admissions to methadone maintenance treatment between 08/1994–09/1997 compared one-year outcomes of opioid-dependent patients referred from a Syringe Exchange Program (SEP; n = 81) versus other sources (n = 243). All participants received stepped-based counseling. The Addiction Severity Index was completed upon admission. Treatment outcomes were assessed using weekly urine testing and days in treatment. GEE regression models were used to evaluate the association between baseline variables and treatment outcomes. SEP referrals were older, included more males and African Americans, reported greater unemployment and heavier heroin, cocaine, and injection drug use at admission. During treatment, SEP referrals used more opioids (OR 2.57; 95% CI 1.86–3.56) and cocaine (OR 2.77; 95% CI 1.93–3.95), and were less likely to complete one year (35%) compared to other referrals (56%; Hazard Ratio 1.88; 95% CI 1.35–2.62). Nevertheless, referral source was not significantly associated with outcome when adjusted for baseline characteristics. Greater baseline frequency of substance and injection drug use, and younger age were positively associated with ongoing opioid and cocaine use. African American race and baseline unemployment were also associated with ongoing cocaine use. Younger age and greater baseline cocaine use were associated with poorer retention at one year. The poorer treatment response of SEP referrals is likely due to higher baseline problem severity. Specialized interventions may be required to reduce drug use and improve retention in this population.

Keywords

syringe exchange; treatment; outcomes; methadone substitution

1.0 INTRODUCTION

The balance of available evidence supports the view that community-based syringe exchange programs (SEPs) substantially reduce high-risk syringe sharing behaviors by providing drug users with a readily accessible and medically safe environment to replace used equipment with sterile syringes and related paraphernalia (Bluthenthal et al., 2000; Des Jarlais et al., 1996; Gibson et al., 2001, 2002; National Academy of Sciences, 2006; Wodak & Cooney, 2006;

*Corresponding Author: Karin Neufeld MD MPH, Addiction Treatment Services, Johns Hopkins Bayview Medical Center, 5510 Nathan Shock Drive Suite 1500, Baltimore, Maryland 21224 USA, Telephone 410-550-0147, Fax: 410-550-2957, Email: kneufel2@jhmi.edu.

WHO, 2004). While these programs do not appear to be associated with increases in frequencies of drug injection, they also are not related to reductions in drug use (Fisher et al., 2003), and the continuing high rates of injection drug use in this population remain a substantial public health threat. SEP participants report more drug use severity than other populations of treatment-seeking or out-of-treatment opioid users (Brooner et al., 1998; Bruneau et al., 1997; Hahn et al., 1997; Henderson et al, 2003). They also exhibit a high prevalence of Axis I and II psychiatric comorbidity (Brienza et al., 2000; Kidorf et al., 2004), problems that are independently associated with high-risk injection behaviors in drug users (Brooner et al., 1993; Disney et al., 2006). The combination of these factors render this group of people more susceptible to transmission of HIV and other blood-borne diseases despite the notable reductions in use of non-sterile injection equipment associated with participation in syringe exchanges.

Prior studies have clearly documented remarkably low rates of opioid agonist or other current substance abuse treatment involvement in opioid injection drug users participating in community syringe exchange programs (Heimer, 1998; Kidorf et al., 2005). Successful referral of syringe exchange participants to substance abuse treatment has enormous potential to enhance the substantial harm reduction benefits already achieved through participation in SEPs (Heimer, 1998; Metzger and Navaline, 2003; Van Den Berg et al., 2007). Opioid agonist treatment is clearly associated with reduction of both heroin and other drug use (McLellan et al., 2000, WHO 2004) and decreases in injection use and HIV seroconversion (Marsch, 1998; National Academy of Sciences, 2006; Sorensen and Copeland, 2000). The overall acceptability and feasibility of referring SEP participants to opioid agonist treatment has been established in several studies (Hagan et al., 2000; Kidorf and Brooner, 2006; Strathdee et al., 2006) and is now part of routine practice in many SEP sites (Heimer, 1998; Paone et al., 1999). In fact, 86% of the syringe exchange programs in the United States refer participants to substance abuse treatment (Center for Disease Control and Prevention, 2007). Little is known about the clinical response of people referred from SEPs into treatment. This is a particularly relevant question in view of the clinical profile of syringe exchange participants and the negative associations reported between high drug use severity and treatment prognosis. Prior research has shown that greater pre-treatment opioid and other drug use is often associated with poorer overall response to opioid agonist and other substance abuse treatment settings and interventions (Kidorf et al., 1998; Magura et al., 1998; Morral et al., 1999).

Only one study could be found that directly compares the clinical response to opioid agonist treatment in drug users that were or were not participating in a community syringe exchange program prior to referral. Brooner and coauthors (1998) compared syringe exchange participants (n = 82) and other (n = 243) referrals to opioid agonist treatment on baseline drug use and psychiatric characteristics, and short-term (90-day) treatment outcomes. Although SEP participants exhibited greater baseline severity of drug use and more days of injecting and sharing needles, they achieved reductions in drug use that were comparable to those referred from other sources over the first 30 days of treatment. Nevertheless, SEP participants submitted a higher proportion of opioid (49% vs. 29%) and cocaine (54% vs. 32%) positive urine samples, and were less likely to complete 90-days of treatment (76% vs. 88%).

The present study extends these findings by evaluating outcomes from all subjects in the same cohort (Brooner et al., 1998) after one year of treatment. The outcome measures are urinalysis test results (opioid, cocaine, any drug use) and retention. This study also evaluates the association of several baseline variables, in which SEP and other referrals differed at baseline, with eventual treatment outcome. Some of these variables, including drug use severity and employment, have been frequently associated with treatment response in previous studies with other populations of drug users (Kidorf et al., 1998; Magura et al., 1998; Morral et al., 1999;

Platt, 1995). This analysis aims to identify factors that are associated with the relatively poorer response to treatment of opioid users referred from a syringe exchange program.

2.0 METHOD

2.1 Participants

Study participants were drawn from 324 consecutive admissions to Addiction Treatment Service (ATS) from August 1994 to September 1997. ATS is a publicly-funded, community-based substance abuse treatment program on the Johns Hopkins Bayview Medical Center campus. Individuals are eligible for admission if they are opioid dependent and meet Center for Substance Abuse Treatment requirements for opioid agonist maintenance (CSAT, 2001). A total of 82 of these admissions were referred by the Baltimore SEP. One individual did not return to the ATS program following the admission day, leaving 81 referrals from the syringe exchange for this set of analyses. This sample was compared to the remaining 243 admissions from other referral sources, referred into treatment by self, family, friends, other health care workers, and social service agencies. Approximately 75%–90% are considered "self-referred", while the remainder are referred from other health care providers, community-based organizations, or the criminal justice system. Most applicants do not have health insurance and are eligible for the "sliding-fee-schedule" issued by the state of Maryland, reducing the payment obligations to $5.00 per week during the time of the study.

The SEP referral group examined in this analysis represented 52% of the syringe exchangers who were referred to ATS during this time; the remainder (n = 78) did not present for treatment. No significant differences in demographic variables were observed between those who presented and those who did not present to ATS for treatment (Brooner et al., 1998).

Many of the baseline demographic and drug use characteristics of each referral condition were reported by Brooner and colleagues (1998) and are presented in Table 1. The SEP referral admissions were older, more likely male and African-American, and more likely unemployed than the participants from other referral sources. This group also reported more days of heroin use, cocaine use, and injection drug use in the past month at baseline.

The Johns Hopkins Institutional Review Board (IRB) exempted the presentation of these data from IRB review based on US Department of Health and Human Services regulations governing the public presentation of existing clinical data when such information is re-recorded in a manner that eliminates all links to individual patient records and identifiers.

2.2 Substance abuse treatment

All study participants received similar substance abuse treatment service at ATS, which included daily methadone dosing, weekly individual, and group counseling, and referral to other services as needed. Patients were started at 30 mgs of methadone and stabilized at a therapeutic dose (about 70 mgs) by the end of the fourth week of treatment. Counseling services were delivered using a motivated stepped care (MSC) service delivery model (Brooner and Kidorf, 2002; Brooner et al., 2004) that adjusts intensity of care to the patients' ongoing clinical response to treatment. At the time of this evaluation, the MSC treatment approach included Step 1 (1 individual session per week; 0.5 hours), Step 2 (3–4 hours of individual and group sessions per week), and Step 3 (5–6 hours of individual and group sessions per week). Bachelors-level counselors conducted individual counseling using motivational and cognitive-behavioral techniques to help patients reduce drug use and engage in pro-social and therapeutic behaviors (e.g., finding employment; attending self-help groups). Masters and doctoral level staff led manual-guided relapse prevention, coping skills, and non-manual guided cognitive behavioral therapy groups (Brooner and Kidorf, 2002; Kidorf et al., 2006).

2.3 Study measures

Patients completed the Addiction Severity Index (ASI-5th edition; McLellan et al., 1992) on the day of admission; this included an assessment of days of drug use and injections over the past 30-days. Changes in ASI severity scores over time were reported in our previous report and are not repeated here; self-reported drug use at baseline is used in the present study to predict treatment outcome. Treatment outcome was assessed using urinalysis test results and days of treatment. Patients left a urine specimen one time per week on a random schedule under staff observation. Urine samples were tested for opioids, cocaine, and sedatives.

2.4 Data analyses

General Estimating Equations (GEEs) were used to compare participant outcomes referred from the SEP and other sources on proportion of opiate, cocaine, and any drug-positive urine samples during the 1-year observation period. Results are reported as odds ratios, with 95% confidence intervals (CI). Survival analyses were conducted using the Cox proportional hazards regression, with an "event" defined as leaving treatment and not returning for one month. All others were censored at the end of the year. Results are reported as hazards ratios, with 95% confidence intervals. Finally, GEE was used to examine baseline predictors of opioid and cocaine positive urine samples over the one-year follow-up period, while Cox-proportional hazards regression evaluated predictors of "time to drop-out". The following baseline variables were used for these analyses: age, gender, race, employment status, days of drug use (heroin and cocaine use over past 30 days), and days of injecting over the past 30 days. Age (≤38 vs. > 38), number of days of heroin use (0–29 vs. 30), days of cocaine use (0–29 vs. 30), and days of injecting (0 vs. 1–30) were coded as dichotomous variables based on the distribution. Each variable was evaluated as an independent predictor (using unadjusted odds or hazards ratios and 95% CI) and entered together with all other variables in the same regression model (using adjusted odds or hazards ratios and 95% CIs). These analyses used all available data without imputing values for missing data. Additional GEE analyses conducted after recoding all missing urinalysis data as drug-positive generated a similar pattern of results and are not presented here.

3.0 RESULTS

3.1 Comparison of outcomes

3.1.1 Opioid, cocaine, and any drug use—As shown in Table 2, SEP referrals submitted a lower percentage of opioid-negative and cocaine-negative urine samples than other referrals. SEP referrals also submitted a lower percentage of "any drug-negative" urine samples than other referrals.

3.1.2. Treatment retention—Table 2 shows that SEP referrals were less likely to complete both 6 months and one year of treatment in the program.

3.2 Baseline variables associated with treatment outcomes

3.2.1 Opioid and cocaine use—Table 3 examines baseline variables associated with drug use during treatment separately and combined in GEE models. In addition to referral condition, three variables were associated with opioid-negative urine samples while in treatment: less pre-treatment days of opioid use, less pre-treatment days injecting drugs, and employment. When the baseline variables were analyzed together using GEE, days of pre-treatment opioid use and injecting remained significant. Age, greater than 38 years, became significant, while referral condition and employment status were no longer so.

A similar pattern of results was obtained using cocaine-positive urine samples as the dependent measure. Unadjusted analyses showed that white race, employment, referral source other than SEP, less pre-treatment days of cocaine use and days of injecting, were associated with less cocaine use in treatment. Each of these variables, with the exception of referral status, remained significant in an adjusted model. Older age became significant in this analysis.

3.2.2 Treatment retention—In addition to referral status, more pre-treatment days of heroin use, cocaine use, and injecting drug use, and unemployment status, were associated with 6-month attrition (see Table 4). Only pre-treatment days of heroin use and unemployed status remained significant using Cox-proportional hazards regression; referral condition was no longer significantly associated with retention at 6 months when adjusting for these other variables. The same factors associated with 6-month attrition were associated with 12-month attrition. The regression model adjusting for all of these variables, demonstrated that 1) age of less than 38 years and 2) more reported pre-treatment days of cocaine use remained significant predictors of 12-month attrition, with referral condition no longer significant.

4.0 DISCUSSION

Participants referred from the SEP experienced significantly worse drug use and retention outcomes than those referred from other sources, but referral condition was not associated with treatment outcome when it was added to a regression model that included other baseline variables. Baseline variables that were strongly associated with study outcomes (i.e., high drug use severity and unemployment) were more prevalent in the SEP referrals than the comparison group. The results add support to the view that SEP's are enrolling a particularly high-risk population of injection opioid users with a poorer substance abuse treatment prognosis than other samples of treatment-seeking opioid users.

4.1 Poorer treatment outcomes among SEP participants

Differences in drug use and retention outcomes between SEP and other referral sources observed by Brooner and colleagues (1998) following 30 and 90 days of opioid-agonist treatment were magnified over the one-year observation period. These findings suggest that efforts to assist this vulnerable population to enroll in treatment should occur in tandem with efforts to help them benefit from treatment (Kidorf and King, in press). Unremitting drug use, in the context of treatment, places these patients at continued risk for acquisition and transmission of HIV and other blood-borne diseases (Disney et al., 2006; Tyndall et al., 2003), thereby hindering the harm reduction effects of SEP participation. It is possible that syringe exchangers will benefit from interventions designed to provide better transition to the increased structure and demands of opioid-agonist treatments, perhaps by reducing some aspects of the treatment requirements early in the course of care (McCarty et al., 2007). At the very least, injecting drug users referred from the SEP should be encouraged to continue use SEP services until abstinence is attained (McNeely et al., 2006). Van Den Berg et al. (2007) showed that the combination of daily methadone and syringe exchange use was associated with lower risk of HIV infection when compared to either of these interventions alone.

4.2. Drug use severity is associated with worse treatment outcome

Results from the regression analyses suggest that syringe exchangers had poorer outcomes than standard referrals partly because of much higher drug use severity, as measured by rates of drug use and injection behavior at admission to treatment. The relationship between high drug use severity on admission and poor treatment outcome is well-known and often replicated (Ahmadi et al., 2006; Avants et al., 2000; Ciraulo et al., 2003; McKay et al., 2001; Simpson et al., 1999). This pattern of findings provides additional support that SEPs are doing an outstanding job in reaching a subset of drug users with particularly high drug use severity, and

that specialized interventions may be needed to help these individuals respond more favorably to treatment. It is possible that SEP participants might benefit from higher methadone doses in the induction phase of treatment; larger doses have been associated with reduced drug use and attrition in other samples of patients (Sees et al., 2000; Strain et al., 1999). More intensive behavioral approaches that provide incentives for reducing drug use, engaging in counseling services, and/or remaining in treatment might also be helpful (Kidorf et al., 2006; Stitzer et al., 2006). A randomized controlled trial of street-recruited injection drug users in Denver showing that higher methadone doses, access to free treatment, more clinic contact and counselor ratings of patient cooperation predicted better treatment retention provides support for these recommendations (Booth et al., 2004).

4.3 Other demographic variables associated with poor treatment outcome

Younger age was associated with poorer outcome, and this finding replicates that of other studies of treatment-seeking opioid users (e.g., Saxon et al., 1996). It might suggest that younger patients may not yet be experiencing the scope or intensity of personal or interpersonal problems that may motivate improved response to treatment. African-Americans had somewhat higher rates of cocaine use, perhaps due to the increased availability of this drug in Baltimore City neighborhoods where the majority of African American ATS clinic attendees reside (Sherman et al., 2005). The relationship between unemployment and poor outcome is supported by other studies (Platt, 1995), although the mechanisms responsible for this relationship, such as financial problems and lack of daily structure, remain speculative (Muller et al., 2005; Silverman and Robles, 1999). What is clear, however, is that unemployment in this population is modifiable, and changes in employment status are associated with better outcomes (Kidorf et al., 1998, 2004).

4.4 Study limitations

The SEP sample was drawn from one northeastern city in the United States, and includes only about half of those individuals initially referred to treatment at ATS, limiting the generalizability of the findings. Syringe exchangers who utilized referral to ATS did not differ in any baseline variables assessed in the present study when compared to syringe exchangers who did not utilize treatment referral (Brooner et al., 1998); however they may have differed in other variables that were not evaluated but may have affected treatment outcome, such as treatment readiness (Henderson et al., 1998). Second, the present study used follow-up data from a study published nearly a decade ago, and variables associated with outcome in this treatment-seeking sample of patients may not generalize to people entering treatment in more recent years. Nevertheless, the baseline variables identified as predictors of drug use and retention in this study have good face validity and dovetail with findings from other samples of treatment-seeking drug users. The findings are relevant due to the lack of previous studies on long-term outcomes of treatment-seeking syringe exchangers and in allaying concerns that the substantial harm reduction efforts of SEPs reduce motivation to seek more demanding treatment (Bluthenthal et al., 2001; Henderson et al., 2003).

A third limitation concerns the sparse distributions of several of the variables within the SEP referral condition. This limited statistical power to detect between-group differences and to test for interactions between referral condition and baseline variables. Still, several of the variables with sparse distributions within the SEP referral condition were statistically significant in GEE models. Finally, the present study relied only on objective measures of outcome (i.e., urinalysis data and retention), and future studies would likely benefit from employing other outcomes, including self-report drug use and problem severities and prior treatment experiences, to provide a more comprehensive assessment of response to substance abuse treatment.

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TABLE 1

Baseline demographics and drug use self report at admission intake

Baseline Variable	SEP[1] (n= 81) %	Other[2] (n= 243) %	Total (n= 324) %	Unadjusted OR[3] (95% CI[4])
Age (years)				
≤38	31	54	48	**2.62 (1.54–4.46)[5]**
>38	69	46	52	
Gender				
Male	70	44	50	**3.07 (1.79–5.27)**
Female	30	56	50	
Race				
African American	85	50	59	**5.80 (2.99–11.25)**
White	15	50	41	
Currently married				
No	94	87	89	2.31 (0.87–6.13)
Yes	6	13	11	
Education (years)				
<12	32	42	40	1.56 (0.91–2.65)
12+	68	58	60	
Employment status				
Employed	6	29	23	**6.15 (2.39–15.85)**
Unemployed	94	71	77	
Days of heroin use in month prior to intake				**11.76 (5.43–25.64)**
0–29 days	10	56	45	
30 days	90	44	55	
Days of cocaine use in month prior to intake				**6.10 (3.16–11.76)**
0–29 days	65	92	76	
30 days	35	8	24	
Days of injecting drugs in month prior to intake				**6.83 (2.85–16.38)**
0 days	8	37	30	
1–30 days	92	63	70	

[1] SEP: Syringe Exchange Program referral source

[2] Other: Referral from sources other than SEP

[3] OR: Odds Ratio

[4] CI: Confidence Interval

[5] Bolded text indicates statistically significant relationship

TABLE 2

Drug use and treatment retention for participants referred from syringe exchange programs compared to participants from all other sources

Treatment Outcome	Referral Source		Statistic	
	SEP[1] (n= 81) %	Other[2] (n=243) %	Unadjusted OR[3] (95% CI[4])	Crude HR[5] (95% CI[4])
Urinalysis Results				
Opioid-negative	63	78	**2.57 (1.86–3.56)**[6]	--
Cocaine-negative	57	75	**2.77 (1.93–3.95)**	--
Drug-negative	45	62	**2.48 (1.77–3.49)**	--
Retention				
Completed 182 days of treatment	57	75	--	**1.92 (1.26–2.90)**
Completed 365 days of treatment	35	56	--	**1.88 (1.35–2.62)**

[1] SEP: Syringe Exchange Program

[2] Other: Referral from sources other than SEP

[3] OR: Odds Ratio

[4] CI: Confidence Interval

[5] HR: Hazard Ratio

[6] Bolded text indicates statistically significant relationship

TABLE 3

Baseline variables associated with opioid and cocaine use during treatment

Variable	Opioid Use During Treatment			Cocaine Use During Treatment		
	Opioid-negative urine samples %	Unadjusted OR[1] (95% CI[3])	Adjusted OR[2] (95% CI[3])	Cocaine-negative urine samples %	Unadjusted OR[1] (95% CI[3])	Adjusted OR[2] (95% CI[3])
Age						
≤38	72	1.17 (0.87–1.57)	**1.76 (1.27–2.45)**[6]	69	1.09 (0.80–1.49)	**1.57 (1.10–2.25)**
>38	77			72		
Gender						
Female	76	1.11 (0.83–1.50)	1.18 (0.80–1.73)	73	1.10 (0.80–1.50)	1.24 (0.83–1.87)
Male	73			69		
Race						
African American	73	1.35 (1.00–1.83)	1.16 (0.82–1.63)	68	**1.59 (1.16–2.18)**	**1.48 (1.04–2.11)**
White	77			75		
Employment status						
Employed	80	**1.68 (1.19–2.38)**	1.10 (0.75–1.62)	80	**2.18 (1.52–3.14)**	**1.63 (1.07–2.48)**
Unemployed	73			68		
Referral source						
SEP[4]	63	**2.57 (1.86–3.56)**	1.46 (0.96–2.20)	57	**2.76 (1.93–3.95)**	1.43 (0.94–2.19)
Other[5]	78			75		
Days of heroin use in month prior to intake						
0–29 days	85	**3.51 (2.59–4.76)**	**2.81 (1.95–4.05)**	-	--	--
30 days	65			-		
Days of injecting heroin in month prior to intake						
0 days	86	**2.70 (1.85–3.93)**	**1.79 (1.14–2.82)**	-	--	--
1–30 days	70			-		
Days of cocaine use month prior to intake						
0–29 days	-	--	--	75	**4.19 (2.83–6.21)**	**2.58 (1.61–4.13)**
30 days	-			42		
Days of IV cocaine month prior to intake						
0 days	-	--	--	86	**3.67 (2.45–5.49)**	**3.15 (1.93–5.13)**
1–30 days	-			65		

[1] Unadjusted Odds Ratio

[2] Adjusted for all baseline variables listed in the table

[3] CI: Confidence Interval

[4] SEP: Syringe Exchange Program referral source

[5] Other: Referral from sources other than SEP

[6]Bolded text indicates statistically significant relationship.

TABLE 4

Baseline variables associated with retention at 6 and 12 months of treatment

Baseline Variable	% Completed 6 Months	Unadjusted HR[1] (95% CI[3])	Adjusted HR[2] (95% CI[3])	% Completed 12 Months	Unadjusted HR[1] (95% CI[3])	Adjusted HR[2] (95% CI[3])
Age						
≤38	67	1.27 (0.85–1.90)	1.52 (0.87–2.66)	47	1.22 (0.89–1.67)	**1.53 (1.02–2.29)**[6]
>38	73			54		
Gender						
Female	70	0.92 (0.61–1.37)	1.64 (0.88–3.06)	53	1.10 (0.81–1.50)	1.55 (0.99–2.42)
Male	71			49		
Race						
African American	67	1.42 (0.93–2.16)	1.18 (0.68–2.05)	48	0.82 (0.60–1.13)	1.00 (0.67–1.48)
White	75			55		
Employment						
Employed	88	**3.36 (1.69–6.67)**	**3.30 (1.36–8.02)**	64	**1.81 (1.20–2.74)**	1.49 (0.91–2.45)
Unemployed	65			47		
Referral source						
SEP[4]	57	**1.92 (1.26–2.90)**	1.39 (0.61–2.04)	35	**1.88 (1.35–2.62)**	1.23 (0.78–1.94)
Other[5]	75			56		
Days of heroin use in month prior to intake						
0–29 days	80	**2.00 (1.28–3.12)**	**2.19 (1.13–4.23)**	63	**1.87 (1.34–2.61)**	1.47 (0.93–2.32)
30 days	64			42		
Days of cocaine use in month prior to intake						
0–29 days	74	**1.98 (1.22–3.22)**	1.05 (0.55–2.01)	56	**2.40 (1.65–3.49)**	**1.71 (1.05–2.77)**
30 days	55			23		
Days of injecting drugs in month prior to intake						
0 days	79	**1.70 (1.03–2.82)**	1.45 (0.69–3.06)	66	**1.95 (1.31–2.89)**	1.72 (1.00–2.96)
1–30 days	67			44		

[1] Unadjusted Hazard Ratio

[2] Adjusted for baseline variables

[3] CI: Confidence Interval

[4] SEP: Referral from Syringe Exchange Program

[5] Other: Referral source other than SEP

[6] Bolded text indicates statistically significant relationship