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Transitions from injecting to non-injecting drug use: potential protection against HCV infection

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Abstract

Transitions from injecting to non-injecting drug use have been reported from many different areas, particularly in areas with large human immunodeficiency virus (HIV) epidemics. The extent to which such transitions actually protect against HIV and HCV has not been determined. A cross-sectional survey with HIV and hepatitis C (HCV) testing was conducted with 322 former injectors (persons who had injected illicit drugs but permanently transitioned to non-injecting use) and 801 current injectors recruited in New York City between 2007 and 2012. There were no differences in HIV prevalence, while HCV prevalence was significantly lower among former injectors compared to current injectors. Years injecting functioned as a mediating variable linking former injector status to lower HCV prevalence. Transitions have continued well beyond the reduction in the threat of AIDS to injectors in the city. New interventions to support transitions to non-injecting drug use should be developed and supported by both drug treatment and syringe exchange programs.

Keywords

HIV; HCV; drug use; substance abuse; non-injecting drug use; injecting drug use

1. Introduction

Transitions from one drug to another and from one route of drug administration to another are common components of drug use careers. As an individual drug user's tolerance increases, the transitions often involve using drugs in ways that produce stronger drug effects and/or that will be more cost effective. Initiation into injecting drug use is perhaps the most important of these transitions, and has been a classic focus in drug use research, (Agar, 1973; Des Jarlais et al., 1991) studied in a variety of countries including Australia, (Day et al., 2005) Vietnam, (Clatts et al., 2011) and the US Mexican border (Volkmann et al., 2012).

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Recently there has been increasing interest in “reverse transitions,” that is, transitions from injecting drug use to non-injecting use of the same drugs. Such reverse transitions have been observed in New York City, (Des Jarlais et al., 2007) New Haven, (Schottenfeld et al., 1993) Baltimore, (Genberg et al., 2011) Amsterdam, (Buster et al., 2009) Brazil, (Inciardi et al., 2006) China (Li et al., 2011) and Malaysia (Tejani et al., 2011). There are multiple potentially important health benefits of a transition from injecting to non-injecting drug use, including reduced likelihood of overdose and bacterial infections. The most important health benefit, however, would possibly be a reduced likelihood of acquisition and transmission of blood-borne viruses such as human immunodeficiency virus (HIV) and hepatitis C virus (HCV). Persons who were not infected and switched to non-injecting drug use would be less likely to become infected, and persons who were already infected and switched would be less likely to transmit the viruses to others. There is evidence from Amsterdam (van Ameijden & Coutinho, 2001) and Brazil (Inciardi et al., 2006) that transitions from injecting to non-injecting drug use contributed to reductions in HIV transmission in those areas.

We report here on a sample of “former injectors” (persons who transitioned from injecting to non-injecting use of heroin and/or cocaine) from New York City and estimate the net protective effect of transitioning from injecting to non-injecting drug use on avoiding infection with HIV and/or HCV. There are multiple causal factors that determine the likelihood of an individual becoming infected with HIV or HCV through drug injecting, including biological factors, behavioral factors (frequency of sharing injection equipment), and risk networks (HIV and HCV prevalence in an individual’s drug injecting and sexual networks) (Aitken et al., 2008; Barnabas et al., 2011; Booth et al., 1993; Hagan et al., 2010; Hook, 1989; Kipke et al., 1996; Koram et al., 2011). There is also a “duration of risk behavior” causal factor. A single injection with a needle and syringe that has been used by someone who is infected with HIV or HCV does not guarantee virus transmission will occur. But repeated risk behavior over time increases the likelihood that a person will become infected with HIV or HCV. Duration of injecting (years injecting) is probably the most consistent factor associated with being HCV seropositive (Hagan et al., 2007).

In this report we examine relationships between transitions from injecting to non-injecting drug use, and whether years injecting functions as a mediating variable on a causal pathway linking injecting status (current versus former injector) to being HIV and/or HCV seropositive.

2. Materials and methods

The findings reported here are derived from data collected from drug users entering the Beth Israel Medical Center drug detoxification program in New York City. The methods for this “Risk Factors” study have been previously described in detail (Des Jarlais et al., 1989; Des Jarlais et al., 1994), so only a summary will be presented here. The Beth Israel Medical Center detoxification program serves the city as a whole, and approximately half of its patients live in Manhattan, one quarter in Brooklyn, one-fifth in the Bronx, and the remainder (about 5%) live elsewhere. Patients enter the program voluntarily.

Research staff visited the general admission wards of the program in a preset order and examined all intake records of a specific ward to construct lists of all patients admitted within the prior three days. All of the patients on the list for the specific ward were then asked to participate in the study. Among patients approached by our interviewers, willingness to participate was more than 95%. After all of the patients admitted to a specific ward in the three-day period had been asked to participate and interviews had been conducted among those who agreed to participate, the interviewer moved to the next ward in a preset order. As there was no relationship between assigning patients to wards and the

order that the staff rotated through the wards, these procedures would yield an unbiased sample of persons entering the detoxification program.

A structured questionnaire covering demographic characteristics and drug injection history was administered by a trained interviewer to each patient. Most drug use and HIV risk behavior questions referred to the six month period prior to the interview. Subjects were asked if they had ever injected illicit drugs, and if yes, their age at first injection and how long it had been since their last injection. “Former injectors” were operationally defined as subjects who 1) had injected drugs at some point in their lives, 2) had not injected within the last six months, and 3) continue to use drugs through non-injecting routes of administration (intranasal use and/or smoking). “Current injectors” were operationally defined as persons who had injected drugs in the six months prior to the interview. Heroin and cocaine, both individually and in combination (speedball) were the most commonly used drugs by both former and current injectors. Other drug and alcohol use was documented among subjects, but was not an inclusion or exclusion criteria for the sample.

After completing the interview, each participant was seen by an HIV counselor for pretest counseling for HIV and HCV, along with specimen collection. HIV testing was conducted at the New York City Department of Health laboratory by using a commercial, enzyme-linked, immunosorbent assays (EIA) test with Western Blot confirmation (BioRad Genetic Systems HIV-1-2+0 EIA and HIV-1 Western Blot, BioRad Laboratories, Hercules, CA). Samples were tested for HCV antibody with the Ortho HCV enzyme immunoassay (EIA) 3.0 (Ortho-Clinical Diagnostics, Inc., Raritan, NJ). Samples with optical density values of > 8.0 were considered positive, samples with values of 1.0 to 8.0 were confirmed positive with radio-immuneblotting assay (RIBA) (Chiron RIBA HCV 3.0 Strip Immunoblot Assay, Novartis Vaccines & Diagnostics, Inc. Emeryville, CA) and samples with values < 1.0 were considered negative.

Serial cross-sectional data have been collected for the project since 1990. We did permit individuals to participate in the study in different years. For the analyses reported here we used only the first interview from persons who participated more than once.

We used “historical period of first injection” as an analytic variable for examining differences in HIV and HCV seroprevalence. The HIV/AIDS epidemic among persons who inject drugs (PWID) in New York City began in the late 1970s; HIV prevalence reached approximately 50% by the early 1980s (Des Jarlais et al., 1989) and remained at this level until the early-mid 1990s when it declined to approximately 15% by 2005. Implementation of large-scale syringe exchange programs in the mid-1990s was followed by very substantial reductions in both HIV prevalence and incidence (Des Jarlais et al., 2005). Therefore, we used 1995 as the year for distinguishing the two historical periods in the HIV/AIDS epidemic in New York City. Antiretroviral treatment became widely available for PWID in the late 1990s, so that the 1995 and later period can be considered as an environment of “combined HIV prevention programming” for PWID in New York City (Des Jarlais et al., 2010).

STATA 12 (StataCorp, College Station, TX), was used for analyses and for generating graphs. We utilized the Epanechnikov kernel density estimates for smoothing curves in the graphs. We used the logic of a mediating variable (Baron and Kenny, 1986; Olson, 2004) to assess whether years injecting might function as a mediating variable in a causal pathway linking the independent variable of injecting status (former vs. current injector) to the outcome variable of HCV serostatus. In a simple three variable mediation case: 1) there is a strong relationship between the independent variable and the outcome variable, 2) there are strong relationships between the independent variable and the potential mediating variable

and between the potential mediating variable and the outcome variable, and 3) when the mediating variable is included in a model with the independent variable and the outcome variable, there is a substantial reduction in the strength of the relationship between the independent variable and the outcome variable.

The study was approved by the Beth Israel Medical Center Institutional Review Board.

3. Results

3.1 Demographic characteristics

There were 322 former injectors and 801 current injectors interviewed between March 2007 and July 2012. Table 1 presents demographic characteristics (gender, race/ethnicity and age) and selected drug use behaviors (historical period of first injection, mean years injecting) for all subjects, and for current and former injectors, with tests of significant differences between the current and former injectors. The former injectors were significantly more likely to be Black, older, injected for a shorter time (from first to most recent injection), and were more likely to have begun injecting prior to 1995.

3.2 Historical periods of drug injecting in New York City

As noted in the methods section, we used 1995 as a dividing point for the two historical periods of drug injecting in New York City. Table 2 shows HIV and HCV prevalence and HCV prevalence among HIV seropositives for current and former injectors who first injected prior to 1995 and for current and former injectors who first injected in 1995 or later. HIV and HCV prevalence were both higher among subjects who began injecting prior to 1995 compared to those who began injecting in 1995 or later. Former injectors had significantly lower HCV prevalence than current injectors among subjects beginning to inject in each time period. As shown in the last column of Table 2, HCV prevalence among HIV seropositives was also significantly higher for subjects who began injecting prior to 1995 compared to those who began injecting in 1995 or later.

Because of the marked differences in HIV and HCV prevalence and in HCV prevalence among HIV seropositives between the two periods, further analyses were conducted separately for persons who began injecting in the two different historical periods.

3.3 Does duration of injecting mediate differences in HCV prevalence between former versus current injectors?

There were substantial differences in years injecting among the different groups of subjects. Among those who first injected prior to 1995, the former injectors reported a mean of 14 years injecting (sd = 11 years) and current injectors reported a mean of 26 years injecting (sd = 8 years). Among subjects who first injected in 1995 or later, the former injectors reported a mean of 3 years injecting (sd = 4 years) and the current injectors reported a mean of 7 years injecting (sd = 5 years). The differences in years injecting between current and former injectors were highly significant for both those who began injecting prior to 1995 ($p < .001$) and those who began injecting in 1995 or later ($p < .001$) and the effect sizes were large for those beginning to inject prior to 1995 (Cohen's $d = 1.27$), and for those beginning to inject in 1995 or later (Cohen's $d = 0.82$). The associations between transitioning to non-injecting drug use (former versus current injectors) and years injecting suggest that years injecting might function as a mediating variable in a causal pathway linking injecting status (former versus current) to HCV prevalence. Duration of injecting career (years from initial injection to ceasing to inject) is among the most consistent predictors of being HCV seropositive in the international research literature (Hagan et al., 2007).

As noted in the methods section, we used the logic of mediating variable analysis to assess whether years injecting might function as a mediating variable in a causal pathway linking the independent variable of injecting status (former vs. current injector) to the outcome variable of HCV serostatus. Tables 3a and 3b present univariate and multiple logistic models among injecting status (as an independent variable), years injecting (as a potential mediating variable) and HCV prevalence (as an outcome variable) separately for subjects who began injecting prior to 1995 (table 3a) and for subjects who began injecting in 1995 or later (Table 3b). All of the univariate relationships were statistically significant. As expected in mediation analyses, there are substantial reductions in the strength of the association between injecting status (independent variable) and HCV prevalence (outcome variable) when years injecting (mediating variable) is entered into the models. For subjects who began injecting prior to 1995, the odds ratio (OR) for injecting status and HCV serostatus is reduced from 2.17 (95% CI: 1.39–3.40) ($p = 0.001$) to 1.25 (95% CI: 0.71–2.20) ($p = 0.432$). For patients who began injecting in 1995 or later, the OR for injecting status and HCV prevalence is reduced from 1.74 (95% CI: 1.09–2.79) ($p = 0.02$) to 1.12 (95% CI: 0.68–1.84) ($p = 0.667$). The ORs for years injecting and HCV prevalence were essentially unchanged when injecting status was a factor in the multiple logistic models. Figure 1 shows potential causal pathways linking injecting status (current vs. former injector to HCV serostatus) with and without years injecting as a potential mediating variable for subjects who began injecting prior to 1995.

We conducted additional analyses, adding demographic characteristics to the models to assess whether these factors might strengthen the relationships between injecting status and HCV prevalence or reduce the associations between injecting years and HCV seroprevalence. Injecting years remained highly significant and injecting status was not significant in all of these models (data not presented, available from the first author).

3.4 Injecting careers, history of the AIDS epidemic, and transitions from injecting to non-injecting drug use

To further understand the transitions from injecting to non-injecting drug use, we examined two aspects of the timing of the transition: the length of injecting careers before transition and within a year of last injection (time of transition).

Many former injectors reported injecting careers (time between first and last injection) of substantial length, with a mean of 11 years ($sd = 11$) and a median of 8 years (inter-quartile range: 1 to 18 years). Figure 2 shows the distribution of lengths of injecting careers prior to transitions from injecting to non-injecting drug use. The length of injecting career was operationalized as time from first to last drug injection. Epanechnikov kernel density estimates were used for smoothing to adjust for memory rounding by patients (e.g., rounding to the nearest 10 years) when recalling time since last injection. There was a group with very short injecting careers—25% had an injecting career of a year or less, and who might be considered persons who only experimented with injecting—but the majority had substantial injecting careers, with no specific career length being particularly common.

Figure 3 shows the distribution of numbers of subjects transitioning to non-injecting drug use by year of last injection. With respect to transitions to non-injecting drug use and the HIV/AIDS epidemic among PWID in New York City, there were a number of subjects who transitioned prior to 1980 (AIDS was first observed among PWID in New York City in 1981). Substantial numbers of subjects then transitioned during the extended height of the HIV/AIDS epidemic (1980 through 1995, when prevalence was 40% or greater) (Des Jarlais et al., 2011b). The largest numbers of the subjects in this study, however, reported transitioning relatively recently, from 2005 to 2011, after the large-scale implementation of

syringe exchange programs (Des Jarlais et al., 2011b) and the provision of antiretroviral therapy, which had greatly reduced the threat of AIDS to PWID in the city.

4. Discussion

4.1 Transitions and potential protection against acquisition of HIV and HCV

One potential critical health benefit of transitioning from injecting to non-injecting drug use would be a reduction in the likelihood of infection with blood borne viruses such as HIV and HCV. In this study, we compared HIV and HCV seroprevalence among former injectors (persons who had transitioned from injecting to non-injecting drug use) to current injectors (persons who continued to inject drugs) among persons who first injected in two different environments: partial HIV prevention programming (up to 1995) and “combined” HIV prevention programming (1995 and later). Among persons who did continue to use drugs, lower HIV and/or HCV prevalence would be an indication that transitions to non-injecting reduced the likelihood of becoming infected with HIV and/or HCV.

We found no statistically significant differences in HIV prevalence between former and current injectors for persons who began injecting in either of the two historical periods. HIV seroprevalence was approximately 50% among current injectors for the decade prior to 1995 (Des Jarlais et al., 2011b), and has since fallen to approximately 15%. Deaths from AIDS have undoubtedly been a major factor in the reduction in HIV prevalence since the mid 1990s. The declining HIV seroprevalence among PWID would make it difficult to detect any possible protective effect of transitioning from injecting to non-injecting drug use—the decline over time in seroprevalence would presumably serve to reduce differences in HIV prevalence between former and current injectors.

The epidemiological situation for persons who began injecting in 1995 or later was substantially different. Combined prevention programming provided much better access to sterile injection equipment, and the provision of ART greatly reduced deaths from AIDS among PWID. Deaths among PWID due to AIDS declined from 1303 in 2002 to 629 in 2011 (New York City Department of Health and Mental Hygiene, 2013). With respect to a potential protective effect against HIV among persons who began injecting in 1995 or later, studies of HCV, herpes simplex virus type 2 (HSV-2) and HIV indicate that the majority of HIV infections among persons who began injecting in 1995 or later are from sexual and not injecting drug use transmission (Des Jarlais et al., 2011a; Des Jarlais et al., 2009).

Transitioning from injecting to non-injecting drug use would not necessarily provide protection against sexual transmission of HIV, so that the lack of a statistically significant difference in HIV prevalence among former versus current injectors who began injecting in 1995 or later is not surprising. We would conclude that a transition from injecting to non-injecting drug use is not likely to provide a substantial protective effect against acquisition of HIV in an environment where there is little HIV transmission related to injecting drug use and unsafe sexual behavior is the dominant route of transmission. This may be particularly likely in areas with substantial sexual transmission of HIV related to use of stimulant drugs.

HCV is more readily transmitted than HIV through sharing of drug injecting equipment, and we did observe lower HCV prevalence among former injectors compared to current injectors among both subjects who first injected before 1995 and subjects who first injected in 1995 or later. Duration of injecting is well established as a risk factor for acquisition of HCV (Hagan et al., 2008), providing an extremely plausible causal mechanism for linking injecting status (current versus former injectors) to HCV serostatus. Adding years injecting as an additional predictor variable did substantially reduce the associations between injecting status and HCV serostatus.

We do not propose that transitioning/not transitioning to non-injecting drug use provides a complete explanation of HCV prevalence among the former or current injectors. Transitioning is clearly a self-selected behavior, and it is possible that the factors that led to transitioning might have led to reductions in acquisition of HCV if the former injectors had not transitioned to non-injecting drug use. Other factors, such as individual risk behaviors and HCV prevalence among an individual's injecting network are also likely to be important for acquisition of HCV. Nevertheless, duration of injecting is a very well established risk factor for acquisition of HCV, and years injecting functioned as a mediating variable linking injecting status and HCV serostatus among our subjects.

4.2 Transitions to Non-injecting drug use and HIV/AIDS epidemics

Several other aspects of the data presented here deserve comment. Many of the areas from which transitions from injecting to non-injecting drug use have been reported experienced high rates of HIV seroprevalence (30% or greater) among PWID, including the previous reports from New York City (Des Jarlais et al., 2007), New Haven (Schottenfeld et al., 1993), Baltimore (Genberg et al., 2011), Amsterdam (Buster et al., 2009), Brazil (Inciardi et al., 2006), China (Li et al., 2011) and Malaysia (Tejani et al., 2011). Concern about becoming infected with HIV was presumably an important consideration in transitions to non-injecting drug use in these areas (concern about HIV/AIDS was reported as the most frequent reason for the transition in the previous New York City study). However, transitions from injecting to non-injecting drug use in New York City actually began prior to the discovery of HIV/AIDS and have continued well beyond the reduction in the threat of AIDS. While concern about HIV/AIDS may be an important factor in transitions to non-injecting drug use, there clearly may be other important factors as well, including general health concerns, avoiding physical signs of drug use ("track marks"), concern about social relationships (Des Jarlais et al., 2007), and exhausting usable veins (Tejani et al., 2011).

There was substantial variation in the lengths of injecting histories prior to the transition to non-injecting drug use. A quarter of the sample reported short injecting histories—less than a year—and might be considered as persons who only experimented with injecting as a route of administration. The median length of injecting history, however, was 8 years (interquartile range 1 to 18 years), and there was no particular length of injecting history at which a transition became particularly likely. This substantial variation would suggest that there may be many different factors that lead injectors to transition to non-injecting drug use, from concerns about health, to changes in street drug purity, concerns about avoiding stigmatization associated with visible scars (track marks), and (for very long injecting careers) loss of usable veins for injecting.

The subjects in this study were relatively old for a population of heroin and cocaine users, with a median age of 48 years (interquartile range 42–54). Thus, those infected with HCV may have been chronically infected for a long time, and may be at risk of substantial liver damage and as a result in great need of treatment for HCV infection. Other age-related conditions may also require treatment in this population of former injectors.

4.3 Limitations

Several limitations of the study should be noted. Most importantly, this is a cross-sectional study, not a cohort study. We do not have information on dates of HIV or HCV infection for the subjects in the study, or on movements between injecting/non-injecting/cessation of drug use. Thus, we cannot calculate rates of infections or rates of transitions. Our cross-sectional study did, however, cover a very long historical period; subjects reported transitions to non-injecting drug use in the 1960s and 1970s as well as through 2012. Maintaining a cohort study of current and former drug injectors over such a time period would be logistically

quite difficult and extremely expensive. Retrospective studies and historical records may be the only practical methods for studying very long-term changes in community drug use patterns and the potential effects of those changes on HIV and HCV.

Second, we asked questions about events that occurred many years in the past for a large number of subjects, including age at first injection and the time since last injection. There clearly would be recall difficulties for these questions leading to recall bias, and some answers show rounding errors by subjects.

Third, all of the subjects were recruited from entrants to a single detoxification program, and should not be seen as a “representative” sample of former injectors. Transitions from injecting to non-injecting drug use have been reported from a number of different geographic locations, but we do not yet have any systematic comparisons of similarities and differences among former injectors from different areas.

Fourth, we did not attempt to identify and quantify all causal factors that could have determined HIV and HCV prevalence among our subjects. As noted in the introduction, biological, behavioral and risk network factors would have undoubtedly affected the likelihood of whether an individual subject was HIV and/or HCV seropositive, and we were not able to measure such factors in this study. However, longer duration of injecting is a well-established risk factor for acquiring HCV, and we were able to measure years injecting among both current and former injectors.

These limitations are important, but would not seem to have generated the patterns in the data reported here. We observed lower HCV prevalence among persons who transitioned from injecting to non-injecting drug use and these relationships can be understood in terms of the differences in years injecting. Relationships between increased duration of injection and higher HCV prevalence have been observed with a variety of research designs, in different time periods, and in many different locations (Hagan et al., 2007). It is difficult to imagine how the above limitations might have generated the associations observed in the data reported here. Rather, it would seem that these associations were observed despite the limitations.

5. Conclusion

Transitions from injecting to non-injecting drug use—compared to continued injecting drug use—may provide a protective effect against infection with blood-borne viruses such as HIV and HCV. In this study, we did not observe any evidence that such transitions provided a protective effect against HIV infection. Observing a protective effect against HIV infection may require conducting studies during periods of high HIV incidence related to injecting drug use.

We did observe evidence of a protective effect against infection with HCV. HCV prevalence was lower among former injectors, and years injecting functioned as a mediating variable linking injecting status with differences in HCV prevalence. Preventing HCV infection among PWID is generally quite difficult (Casriel et al., 1990; Hagan et al., 2011) and to our knowledge the data presented here are the first quantification of a potential protective effect of transitions to non-injecting drug use against HCV infection.

Currently, there are drug treatment programs that support ceasing use of illicit drugs and syringe exchange programs that support use of sterile injection equipment among PWID, but very few programs exist that actively facilitate transitions from injecting to non-injecting drug use or that attempt to prevent relapse back to injecting among persons who have transitioned to non-injecting drug use. There have been only a few programs that focused on

reverse transitions (from injecting to non-injecting drug use) or on preventing initial transitions from non-injecting to injecting drug administration (Casriel et al., 1990; Dolan et al., 2004; Stillwell et al., 2005). In general, this area of potential HIV/HCV prevention has been “underutilized” (Bridge, 2010). Of note, the United Kingdom government has recently recommended that syringe exchange programs distribute foil for the smoking of heroin (Advisory Council on the Misuse of Drugs (ACMD), 2010) and some syringe exchange programs distribute crack cocaine kits for the smoking of cocaine, though an evaluation in Vancouver suggests that the effect of these kits on unsafe behavior is “limited” (Malachy et al., 2011).

Developing, evaluating and scaling up new programs to facilitate transitions from injecting to non-injecting drug use among PWID who are not in a position to stop using drugs completely may provide new methods of reducing HCV transmission in the community. In the meantime, it would be helpful if both drug treatment and syringe exchange programs could explore ways in which they could support non-injecting drug use among those likely to continue to use drugs.

Finally, transitions from injecting to non-injecting drug use have been reported from a variety of different geographic areas. In New York City, these transitions have continued well beyond the time when HIV/AIDS was a great threat to PWID in the city. Many of the drug users who made transitions in New York City have avoided relapse back to injecting for long periods of time—literally decades—even while using drugs at high frequencies. Additional research into how these persons have avoided relapse back to injecting may provide important new insights regarding how drug users may make and maintain positive changes in health related behavior.

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Figure 1.

Associations between injecting status, years injecting and HCV status for patients who began injecting prior to 1995

Notes:

1 Solid lines indicate a strong, statistically significant association

2. Dashed lines indicate a weak, statistically non-significant association

*Injecting status: current vs. former injection drug users

**HCV status: HCV seropositives vs. HCV seronegative

***OR: Odds Ratio

Years injecting measured as a continuous variable. OR is increased odds ratio of being HCV seropositives for each additional year of injecting

Figure 2.
Distribution of years injecting among former injectors entering the detoxification program at Beth Israel Medical Center in New York City, 2007–2011

Figure 3.
Distribution of numbers of subjects transitioning to non-injecting drug use by year of last injection

Table 1

Demographics and drug injecting history among current and former injectors entering the detoxification program at Beth Israel Medical Center in New York City (2007–2011)

	All IDU	Past IDU*	Current IDU*	p value
		N (%)	N (%)	
Total***	1123 (100)	322 (100)	801 (100)	
Gender				ns
Male	921 (82)	259 (80)	662 (83)	
Female	202 (18)	63 (20)	139 (17)	
Race/Ethnicity				<0.001
White	302 (27)	41 (13)	261 (33)	
Black	282 (25)	153 (48)	129 (16)	
Hispanic	501 (45)	119 (37)	382 (48)	
Average age (sd**)	42 (10)	48 (8)	40 (9)	<0.001
Average years of injecting (sd**)	14 (12)	11 (11)	16 (12)	<0.001
First injection				<0.001
Before 1995	584 (52)	233 (72)	351 (44)	
In 1995 or later	534 (48)	86 (27)	448 (56)	

* IDU: Injection drug user

** sd: standard deviation

*** Categories may not always equal total N due to missing data

Table 2

HIV and HCV prevalence and HCV/HIV joint exposure prevalence by period of first injection among current and former injectors entering the detoxification program at Beth Israel Medical Center in New York City (2007–2011)

First injection before 1995	n (%)	HIV+ n (%)	HCV + n (%)	HCV+ among HIV+ n (%)
Former injectors	233 (100)	54 (23) *	181 (78) ***	50 (93) *
Current injectors	351 (100)	68 (19) *	310 (88) *	64 (94) *
First injection in 1995 or later				
Former injectors	86 (100)	9 (10)	35 (41) **	3 (33)
Current injectors	448 (100)	27 (6)	244 (54)	15 (56)

* Significant difference ($p < 0.05$) by chi-squared test across periods within injection status

** Significant difference ($p < 0.05$) by chi-squared test in the same period across injection status

Table 3a

Univariate and multiple logistic regression models of the association of HCV with injection status and years of injecting among current and former injectors who first started injecting before 1995 (entering the detoxification program at Beth Israel Medical Center in New York City, 2007–2011)

	Univariate	Multiple
	OR* (95% CI)	OR* (95% CI)
Injection status		
Former injectors	1.00	1.00
Current injectors	2.17 (1.39–3.40)	1.25 (0.71–2.20)
Years of injecting	1.05 (1.03–1.07)	1.04 (1.02–1.07)

* OR= odds ratio

For period before 1995 average years of injecting was 26 (SD=8) among current injectors and 14 (SD=11) among former injectors ($p < 0.001$); $d = 1.27$

Table 3b

Univariate and multiple logistic regression models of the association of HCV with injection status and years of injecting among current and former injectors who first started injecting in 1995 or later (entering the detoxification program at Beth Israel Medical Center in New York City, 2007–2011)

	Univariate	Multiple
	OR* (95% CI)	OR* (95% CI)
Injection status		
Former injectors	1.00	1.00
Current injectors	1.74 (1.09–2.79)	1.12 (0.68–1.84)
Years of injecting	1.14 (1.10–1.19)	1.14 (1.10–1.19)

* OR = odds ratio

For period 1995 or later average years of injecting was 7 (SD=5) among current injectors and 3 (SD=4) among former injectors ($p < 0.001$); $d = 0.82$