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Risk of hepatitis B infection among young injection drug users in San Francisco: opportunities for intervention

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ABSTRACT ● **Objective** To compare the demographic characteristics and risk behaviors for hepatitis B infection among injection drug users younger than 30 years with those aged 30 or older and to evaluate participants' knowledge, attitudes, and experiences of infection, screening, and vaccination against hepatitis B virus. ● **Design** A systematic sample of injection drug users not currently in a treatment program were recruited and interviewed at needle exchange programs and community sites. ● **Participants** 135 injection drug users younger than 30 years and 96 injection drug users aged 30 or older. ● **Results** Injection drug users younger than 30 were twice as likely as drug users aged 30 or older to report having shared needles in the past 30 days (36/135 [27%] vs 12/96 [13%]). Injection drug users younger than 30 were also twice as likely to report having had more than two sexual partners in the past 6 months (80/135 [59%] vs 29/96 [30%]). Although 88 of 135 (68%) young injection drug users reported having had contact with medical providers within the past 6 months only 13 of 135 (10%) had completed the hepatitis B vaccine series and only 16 of (13%) perceived themselves as being at high risk of becoming infected with the virus. ● **Conclusion** Few young injection drug users have been immunized even though they have more frequent contact with medical providers and are at a higher risk for new hepatitis B infection than older drug users. Clinicians caring for young injection drug users and others at high risk of infection should provide education, screening, and vaccination to reduce an important source of hepatitis B infection.

INTRODUCTION

Between 200,000 and 300,000 people become infected with hepatitis B virus in the United States each year, and about 4000 to 5000 people die from cirrhosis and hepatocellular carcinoma.[1-3] About 20% of these infections occur among injection drug users, mainly through the sharing of contaminated injection equipment and unprotected sexual contact. Over 80% of injection drug users who have been injecting for longer than 10 years are infected with hepatitis B virus.[3,4] The risk of becoming infected with the virus is highest during the first years of injecting; within 1 to 5 years of starting to inject drugs, 50% of drug users may already have been infected.[4] About 6% to 10% of injection drug users who are infected with hepatitis B virus become chronic active carriers who may infect others; they may also develop end stage liver disease.[1,4]

When hepatitis B vaccine was introduced in 1982, the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices recommended that groups at high risk of infection should be vaccinated; those defined as being at high risk were injecting drug users and those who have more than two sexual partners in 6 months.[5, 6] However, the incidence of hepatitis B infection among injection drug users increased by 80% between 1982 and 1990 because targeted vaccination programs were never implemented, largely due to the perceived difficulty of ensuring that high risk groups completed to the vaccine series.[1,4,7-10] In 1991 and again in 1995, the Centers for Disease Control called for the

Summary points

- Injection drug users, especially those younger than 30, engage in behavior that puts them at a high risk of becoming infected with hepatitis B virus
- Few of these younger drug users have been vaccinated against hepatitis B
- Many younger drug users are willing to be vaccinated
- Sufficient opportunities for vaccination exist at sites frequented by these young users such as needle exchange programs
- Appropriate strategies should be developed to ensure that members of this high-risk group are vaccinated

universal vaccination of infants and adolescents.[2,6] In 1996, the average hepatitis B vaccine coverage rate among adolescents reached only 65% nationally, and it was considerably lower among those adolescents considered to be at high risk of infection.[11,12]

In San Francisco, about 13,500 to 15,000 people are injection drug users, and roughly 3000 are younger than 30 years old.[13,14] We surveyed injection drug users to determine if they engaged in behaviors that put them at risk for hepatitis B infection and to assess their knowledge of infection and prior experiences with screening and vaccination.

PARTICIPANTS AND METHODS

Between the beginning of September 1996 and the end of November 1996, a sample of 135 injection drug users was recruited for a brief interview. A systematic sample of injection drug users 30 years of age or older (n = 96) was recruited from eight needle exchange sites by distributing numbered raffle tickets and inviting those whose ticket ended in one of three pre-specified digits to participate in the study. Consecutive samples of injection drug users younger than age 30 (n = 135) were recruited from the same eight needle exchange sites, a young drop-in center, and a single residency occupancy hotel that served as an information needle exchange for younger injectors. The participants recruited were eligible for inclusion if they spoke English, had injected within the past 30 days, and were not in a drug treatment program.

Informed consent was obtained. Standardized, face-to-face interviews were conducted by trained peer interviewers who were current or former drug users, by outreach workers, or by professionals who had experience working with injection drug users. During the interview, participants were asked to provide demographic information and information on their health, sexual and drug use behaviors, their knowledge and beliefs about hepatitis B, and whether they had ever been tested for hepatitis B or offered vaccination. Interviewers used an open-ended format to ask participants whether they would be willing to accept the vaccine had it been offered at the time of the interview and why.

Medians and ranges were calculated for continuous variables, and percentages were calculated for categorical variables. Statistical comparisons were made between injection drug users younger than 30 and those aged 30 and older using the χ^2 or Fisher's exact test for categorical variables and the Mann-Whitney test for continuous variables. The participant's knowledge score was calculated as the percentage of the statements about hepatitis B answered correctly; this was dichotomized as <75% or ≥75% correct. The study was approved by the Committee on Human Research at the University of California, San Francisco.

RESULTS

Of the 321 injection drug users initially contacted, 231 (72%) consented to be interviewed. The demographic characteristics of participants are presented in table 1. Drug use behaviors and sexual behaviors that put injection drug users at a high risk of becoming infected are shown in table 2. The younger injection drug users (aged <30) were more than twice as likely to report sharing needles as older injection drug users (36/135 [27%] vs 12/96

Table 1 *Demographic characteristics of injection drug users by age group, San Francisco, 1996*

Characteristic	Age <30 years (n = 135)	Age ≥30 years (n = 96)
Median (range) age (years)	22 (14-29)	41 (30-64)
Sex*		
Male	91 (67)	70 (73)
Female	41 (30)	23 (25)
Race		
White	99 (73)	44 (46)
African American†	4 (3)	38 (40)
Asian or Pacific Islander	3 (2)	1.0 (1.0)
Hispanic	7 (5)	8.0 (8.0)
Mixed race or other race	22 (16)	5.0 (5.0)
Completed high school or age-appropriate number of years of education†	65 (48)	73 (76)
Currently homeless†	60 (44)	10 (10)
Median number (range) of places stayed in past 6 months†	7 (1-200)	1 (1-30)
Median number (range) of consecutive months in San Francisco†	6 (0.5-392)	180 (1-828)

Values are numbers (percentages) unless otherwise indicated
*Data were missing for some participants
†P ≤ 0.001 for difference between the two age groups

Table 2 *Injection behavior and sexual behavior of injection drug users by age group, San Francisco, 1996*

Behavior	Age <30 years (n = 135)	Age ≥30 years (n = 96)
Injection behavior		
Median (range) number of years injecting	5 (0-17)	20 (1-47)
Median total number (range) injections in past month	50 (1-600)	90 (1-900)
Drugs injected in past month*:		
Heroin	104 (77)	76 (79)
Cocaine	34 (25)	32 (33)
Methamphetamine*	70 (52)	28 (29)
Shared needles past month*	36 (27)	12 (13)
Ever overdosed†	59 (44)	42 (44)
Had drug treatment in the past year‡	42 (31)	36 (38)
Sexual behavior		
Type of sexual behavior in the past 6 months:		
Men		
Exclusively heterosexual*	62/91 (68)	49/70 (70)
Bisexual	28/91 (31)	13/70 (19)
Exclusively homosexual	1/91 (1)	8/70 (11)
Women		
Exclusively heterosexual	17/41 (42)	12/23 (52)
Bisexual	22/41 (54)	9/23 (39)
Exclusively homosexual	2/41 (5)	2/23 (9)
Had ≥2 sexual partners in past 6 months*	80 (59)	29 (30)
No condom used during last sexual encounter§	59/126 (47)	39/67 (58)
Had a sexually transmitted disease in the past year	16 (12)	3 (3)
Exchanged sex for money or drugs in the past year	14 (10)	9 (9)

Values are numbers (percentages) unless otherwise indicated
*P < 0.05
†Self-reported
‡Includes methadone treatment
§Denominator is the number who were sexually active in past 6 months

[13%]). Younger participants were more likely than older participants to report having had two or more sexual partners in the past 6 months (80/135 [59%] vs 29/96 [30%]).

A total of 88 of 135 (68%) participants younger than 30 had seen a healthcare provider within the past 6 months; 16 of 135 (13%) perceived themselves to be at high risk of becoming infected with hepatitis B virus (table 3). Among younger injection drug users the self-perceived risk of infection was significantly associated with needle sharing but not with sexual behavior (data not shown). Although 127 of 135 (94%) younger participants said that they would have been willing to be tested for hepatitis B infection if it had it been offered, only 54 of the 135 (40%) reported ever having been tested.

Thirty-four (25%) of the 135 participants younger than 30 reported having been offered vaccination, and 24 (18%) had accepted it. Of these, 13 (54%) had received all three doses (10% of participants younger than 30); however, 96 of 135 (71%) younger participants said that they would have accepted the vaccine if it had been offered. Among the younger participants the most frequently cited reasons for being willing to be vaccinated were a desire to prevent hepatitis B, a fear of dying, and knowing someone who had hepatitis B. Altogether, 79 of the 96 (82%) participants younger than 30 who were willing to be vaccinated anticipated that they would return for the last two doses of the vaccine, and 83 (87%) identified needle exchange sites as the preferred location for vaccination. Of the 39 of the 135 (29%) participants less than 30 years of age who said that they would refuse the vaccine if it was offered, the most frequently cited reasons were that they did not believe themselves to be at risk of becoming infected, that they had a general distrust of the medical system, and that they would not be able to remain in one place for the 6-month series.

The median score on the 19-item test of knowledge about hepatitis B infection was 68% for the younger injection drug users and 63% for the older users (table 3). Only 48/135 (36%) of younger participants answered 75% or more of the questions correctly; these younger users were more likely than those who scored < 75% to say that they would accept vaccination at the time of the interview (40/48 [83%] vs 61/87 [70%]) (data not shown).

DISCUSSION

We chose to focus on injection drug users who were younger than 30 because in the United States the highest incidence of new hepatitis B infection has occurred among injection drug users aged 15 to 29.[14-16] Our results show that young injection drug users are significantly more likely to engage in high-risk behavior than older users. Although the majority of younger injection drug users reported having recent contact with healthcare providers, they still greatly underestimated their risk of becoming infected with hepatitis B virus, few had been screened, and even fewer had been fully vaccinated. Although knowledge of hepatitis B among younger injection drug users was incomplete they did understand that infection could be prevented by vaccination. The majority of younger users indicated that they would accept vaccination if it was offered.

In San Francisco, young injection drug users seem to be demographically distinct from those aged 30 or older. When compared with older injection drug users, younger users were far more likely to be transient and homeless or temporarily housed, and barely half had completed the appropriate number of school years for their age.[17,18] Other studies have shown that a flexible schedule for administering hepatitis B vaccine can provide immunity for a greater number of people through improved compliance[25-27]; our findings emphasize the need to develop such programs.

Table 3 *History of infection, screening, and vaccination against hepatitis B virus among injection drug users by age group, San Francisco, 1996*

Variable	Age <30 years (n = 135)	Age ≥30 years (n = 96)
Time since last visited healthcare provider*		
<6 months	88 (65)	63 (66)
6-18 months	24 (18)	20 (21)
>18 months	23 (17)	13 (14)
Self-perceived chance of being infected with HBV*		
High	16 (12)	6 (6)
Some	50 (37)	30 (31)
None to very little	56 (42)	32 (40)
Amount of concern about HBV infection:		
Not or somewhat worried	116 (86)	68 (71)
Worried or very worried	19 (14)	28 (29)
Ever screened for HBV infection†	54 (40)	50 (52)
Ever offered vaccination against HBV‡	34 (25)	12 (13)
Ever accepted vaccination against HBV†	24/34 (71)	9/12 (75)
Number of doses received in vaccine series†:		
One dose	7 (5)	1 (1)
Two doses	4 (3)	4 (4)
Three doses	13 (10)	4 (4)
Would accept screening for HBV§	127 (94)	86 (90)
Would accept vaccination§	96 (71)	76 (79)
Would return for all 3 doses over 6 months¶	79/96 (82)	73/76 (96)
Believe vaccine to be safe	55 (41)	84 (88)
Median percentage (interquartile range) score correct on items measuring knowledge of HBV	68 (58-84)	63 (45-79)
Score >75% on test measuring knowledge of HBV	48 (36)	26 (27)

Values are numbers (percentages) unless otherwise indicated.
HBV = hepatitis B virus.
*Data were missing for some participants
†Self-reported
‡Percentage of those who reported accepting vaccine when offered
§If offered at the time of the interview
¶Percentage who would have accepted vaccination if offered at the interview

In our sample, injection drug users younger than 30 were more likely to have engaged in high-risk sexual behavior (such as not using a condom during their last sexual encounter) and injecting behavior (such as sharing a syringe) than their older counterparts, activities that place them at a higher risk of becoming infected. As in this study, other studies have also found that injection drug users younger than 30 are more likely to share syringes and engage in sex with multiple partners.[14,16-18] Drug treatment programs and needle exchange programs have been shown to reduce high-risk behavior but young injection drug users (24% of our sample was < 21 years) lack access to these programs because most drug treatment programs are restricted to those aged 18 or older and young injectors in San Francisco tend to use sanctioned needle exchange programs (JA Hahn, unpublished data). In contrast, 68% of the younger participants in this study had had access to medical care within the past 6 months. Thus, healthcare providers have a unique opportunity to reach this population: they should inquire about the use of injected drugs and high-risk sexual behavior and, if indicated, offer vaccination to those at high risk of becoming infected with hepatitis B virus.

Despite recommendations that people at high risk of becoming infected with hepatitis B virus should be targeted for vaccination, less than one-quarter of youths and young adults considered to be at high risk have been vaccinated.[7,10,12,19] In our sample, only 10% of younger participants reported having completed the hepatitis B vaccine series. Undervaccination of high-risk groups may stem from a failure of the public health system and providers to emphasize the health risks of infection and to develop programs for vaccination.[12] We did not identify sites where participants received health care. Low rates of vaccination might also reflect the fact that injection drug users tend to receive their medical care in emergency or urgent care settings, sites that do not provide immunizations routinely.[20,21] However, these sites might be ideally suited to providing targeted public health interventions, such as education about hepatitis B infection and immunizations, to those who would otherwise not be reached.

Attempts to vaccinate injection drug users and high-

risk adults against hepatitis B infection have met with variable results; some studies have reported only limited success.[8,22] Clinicians have attributed their own reluctance to offer vaccinations to drug users to economic disincentives, concerns about completion of the series, an inability to identify and contact young adults at risk, and their own negative attitudes towards injection drug users.[1,2,9,10,12] Long-term adherence to protocols designed to prevent disease, including vaccination against hepatitis B, has been achieved through the use of innovative and cost-effective approaches (such as reminder calls or postcards, the provision of cash or other incentives, the use of peer outreach, and offering reduced waiting times) among young people and drug users recruited from a variety of settings (J Klausner, unpublished data).[9,23,24] Programs in which vaccinations are provided by clinicians sensitive to the needs of young injection drug users, and that have used flexible dosing schedules, have achieved significantly higher levels of immunity through ensuring that participants receive all three doses of the vaccine.[25-27]

Conclusion

Injection drug users younger than 30 are at a higher risk of acute hepatitis B infection because they are more likely to engage in high-risk sexual behavior and injection practices than older injection drug users. Although younger users report frequent contact with health providers, their knowledge about hepatitis B infection is incomplete, they underestimate their risk of infection, and few have been vaccinated.

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capsule

Nostrils smell differently Collectors of science trivia will be interested to learn that air flows faster through one nostril than the other, and that the fast flow switches between nostrils every few hours (*Nature* 1999;402:35). The effect of this nasal oddity is that smells are perceived differently through each nostril. No one knows why we have evolved this way, but scientists guess that it has something to do with expanding our repertoire of perceptible smells.