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Novel Heroin Injection Practices: Implications for Transmission of HIV and other Bloodborne Pathogens

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Abstract

This article describes an ethno-epidemiologic study of injection-mediated behavioral risks in an out-of-treatment population of young heroin users in Hanoi, Vietnam (N=1270). Included is a preliminary epidemiologic profile of the novel use of an injection sac, a soft tissue portal that injectors in Hanoi employ as a means of gaining rapid and reliable access to a vein and also as a means of ameliorating high risk for vein damage associated with co-morbid use of Promethazine. Data from a large cross-sectional survey were used to describe behavioral and disease correlates associated with the use of an injection sac. Additionally, data from an ethnographic substudy were used to elaborate injectors' rationales for creating and employing an injection sac, and to illustrate influences of the local physical and social environment on injection practices and transmission dynamics. Implications for risk for HIV and other bloodborne pathogens are considered, including the urgent need for both structural and behavioral interventions with which to reduce injection-mediated harm.

INTRODUCTION

Rapid expansion in local heroin markets in Southeast and Southern Asia—including China, Vietnam, Thailand, Laos, Myanmar, and India—has been paralleled by rapid increases in negative medical consequences associated with high-risk heroin injection practices.^{1–7} Among these consequences is the spread of HIV infection and the potential for the development of a self-sustaining HIV epidemic.⁸ The HIV epidemics among injection drug users (IDUs) in this region, perhaps most notably Thailand and China, have been relatively well described. However, beyond data from sentinel surveillance activities, there remains a general dearth of information about local injection settings, groups, and practices in Vietnam.^{9–12}

This article describes findings from an ongoing study of heroin injectors in Hanoi, Vietnam, including the use of a novel injection practice known as “cay ma,” a Vietnamese idiom that may be translated as “injection sac.” An injection sac is formed by repeatedly inserting a

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hypodermic needle into a circumspect area on the skin surface, typically situated adjacent to a large vein. This practice results in a sclerosing of the injection site, stimulating formation of fibrocytes and fibroblasts (see Figure 1). Composed of type 1 collagen, the resulting mesodermal formation develops an elastic quality. When used for illicit drug injection, the needle is inserted through the sac and into the vein. Thus the sac serves as a soft tissue portal with which to access a vein with minimal bleeding. This also has the advantage of increasing the likelihood that the solution will be injected into the vein and not in the surrounding muscle, an outcome that heroin users avoid because diffusion of the drug in the muscle results in a significantly reduced effect (“high”).

Young heroin injectors in Hanoi describe purposeful cultivation of these soft-tissue portals, and as described below, offer a coherent set of explanations for the utility of this practice in the context of a host of external pressures surrounding drug injection in Vietnam. In as much as this behavioral practice has yet to be described in the available public health and social science literature on parenteral heroin administration, this article provides a preliminary profile of an injection sac, including its prevalence in a sample of young heroin injectors and their rationales for its use. It also considers the potential negative medical consequences of this injection practice, particularly in relation to HIV transmission.

METHODS

Metropolitan Hanoi is divided into fourteen districts, including nine districts that are designated as inner-city zones. Based on ethnographic mapping and informal interviews in the first phase of the study, a targeted sampling plan was developed which guided recruitment for a cross-sectional study of young, active heroin users. The targeted sampling plan spanned all nine inner-city districts, and targeted settings that had been identified as either high or medium density in relation to the prevalence of observable heroin activity, including distribution and “copping” activities, cooperative social activity related to heroin acquisition, and public or semi-public environments where evidence of heroin injection paraphernalia had been observed (e.g., syringe wrappers, used syringes sterile water vials).^{3, 14} Areas with low density heroin activity were excluded due to the lack of efficiency of recruitment and concerns about maintaining confidentiality. In an effort to reduce sampling and reporting biases associated with stigma and fear of arrest, subjects were recruited and interviewed in street-based settings (rather than in fixed site or institutional settings), including “tea stalls,” public parks, and other types of outdoor venues where heroin users congregate for general social activity as well as for cooperative activities associated with the purchase and use of heroin.

Eligibility for participation in the survey was restricted to those between the ages of 16 and 29 who self-reported heroin use within the last 30 days (including smoking, snorting, and injection). Domains in the interview included demographic characteristics, lifetime exposure and current use of alcohol, tobacco, and a wide range of illegal drugs, onset and sequence of illicit drug initiation, mode of administration at first use, current patterns of heroin use, onset of sexual activity, current sexual practices, concurrency of drug and sexual risk, exposure to HIV/STD education and testing services, exposure to drug treatment, and knowledge of behavioral risks for HIV transmission.

Concurrent with the cross-sectional interview, and also based on the initial formative ethnographic research in which the use of an injection sac described above first appeared, a small number of detailed ethnographic interviews were conducted among a subset of subjects who reported use of an injection sac in the course of their cross-sectional interview ($n=11$). These subjects were selected from the larger cross-sectional sample on an opportunistic basis and interviews were conducted jointly by the two senior authors. Like the survey interviews, the informal ethnographic interviews were conducted in outdoor settings proximate to heroin

copping and injection settings, and owing to the nature of the physical environment, data were only recorded in the form of brief hand-written field notes. Participants were guided through a loose series of topical areas in an effort to gather additional information about the behavioral practices used to create and maintain an injection sac, the circumstances under which the development of a sac was initiated, and the users' own perspective on reasons for employing this practice in the course of heroin use. Somewhat juxtaposed to the course of the survey interviews which followed a highly structured format, an effort was made to maintain an informal, conversational format in which to elicit an ethnographic "voice." Subjects were encouraged to provide full narrative responses to the open-ended questions, typically in and through telling the "story" of injection events which reflect their own prior experience.¹⁵ Although the nature of the setting did not permit audio recording of the interviews, and hence the data are limited to field notes, a thematic analysis of data from these interviews is included, largely centered on rationales for forming and maintaining an injection sac.

Study participants were paid the equivalent of \$5 in local currency in compensation for their time. All study procedures and instruments were reviewed and approved by the Institutional Review Board at National Development and Research Institutes, Inc., as well as the Institutional Review Board at Hanoi Medical University.

Finally, and based on the details about this practice that were emerging from both the survey and ethnographic interviews, a series of clinical consultations were made with a specialist in the Hanoi area with substantive experience in the clinical pathology of HIV infection among IDUs in Vietnam. Consultation was sought on the kinds of tissue pathology that might be expected to result from this kind practice, particularly its potential implications for increasing risk for HIV transmission. Additionally, consultation was sought on the pharmacology and negative medical consequences associated with co-morbid Promethazine injection since as elaborated below, this emerged as an important factor in injectors' rationales for forming and maintaining an injection sac.

RESULTS

Cross-Sectional Study

Study participation was relatively high, with 90% of those screened and found to be eligible agreeing to participate. Although the overall sample includes 1270 subjects (including subjects who only smoke heroin), the present analysis is concerned with illuminating the use of injection sac and its potential to contribute to increased risk in injection-mediated transmission of bloodborne pathogens. Consequently, subjects who have only smoked heroin are omitted and this analysis is limited to subjects who have ever employed injection as a mode of administration, including 850 males and 70 females ($n=920$).

In comparing those who had ever had an injection sac with those who had never had one, those that employ a sac are significantly more likely to be male (95.1% vs 90.5%, $p < 0.001$) and significantly more likely to be older (mean age of 24.3 vs 23.3, $p < 0.001$). While both groups describe family support as their primary source of income, generally those with an injection sac depend more heavily on the street economy, including drug distribution and theft. Both groups are similar at age of first heroin use and also similar at age of first injection, but differ significantly in the mode of administration at time of first heroin use (smoking vs. injection) ($p < 0.001$). These data are presented in Table 1.

In examining mode of administration and frequency of heroin use within the last 30 days, injectors with an injection sac are less likely to have smoked heroin and more likely to use injection as their most frequent mode of administration ($p < 0.001$). Those with a sac are also significantly more likely to report more frequent use of heroin, including daily use ($p < 0.001$).

Relatively little serial re-use of syringes (“haring”) is reported in the overall sample, but sac injectors tend to have higher levels of syringe sharing. These data are presented in Table 2.

The vast majority of those who have ever employed an injection continue to employ this injection method (89.9%), suggesting that once initiated, the practice is sustained. Roughly three quarters (72%) have only one sac but over one quarter have two or more sacs (28%). Most report the groin as the location of their injection sac (79%). Most have maintained an injection sac for at least the last six months (72.1%) and most use the injection sac frequently, with 82% using an injection sac between two and five times on the day prior to the interview. These data are shown in Table 3.

In comparing self-reported poor health outcomes between those who employ an injection sac and those who do not, use of an injection sac is significantly associated with a number of poor health outcomes. For example, both groups have high rates of suicidal ideation. However, those with an injection sac are significantly more likely to report suicidal ideation (38% vs 28%, respectively; $p < 0.002$). Both groups have roughly similar rates of HIV testing (53% vs 43%), but those using a sac are more likely to have been tested (perhaps reflecting more advanced behavioral risk). Particularly given the young age of the overall sample, both groups report relatively high rates of HIV infection (9% vs 7%). However, having an injection sac is significantly associated with self-reported Hepatitis B infection (12.2% vs 5.0%, $p < 0.002$) and Pneumonia (11.9% vs 6.2%, $p < 0.002$). These data are shown in Table 4.

Ethnographic Substudy

Subjects in the ethnographic substudy ranged in age from 18 to 35 years, including nine males and two females (N=11). Overall subjects reported a relatively extended range of time since onset of heroin use, from 3 to 10 years. Most described transitioning from heroin smoking to injection over a period of several years, largely because the volume of heroin they used had increased and injection was more economic. Others, however, highlighted situational and contextual factors in switching from smoking to injection, particularly changes in the form of heroin that was locally available (notably a decline in the availability of powder heroin and the gradual predominance of a granular form of heroin that is more difficult to smoke and that consequently favored the use of injection as a mode of administration).

Heroin is typically sold in Vietnam in small units known as a “tep,” each costing approximately 50,000 Vietnam Dong (approximately \$3.00). On average, subjects report use of 3 or 4 units per day, often securing money through cooperative economic activities with other heroin injectors, a fact that often requires sharing drug solutions. Division of shared drug solutions is typically accomplished through “frontloading,” a practice in which the heroin solution is injected from a distributing syringe into the front end of each recipient syringe).¹⁶

Subjects describe having developed an injection sac relatively soon after they switched from smoking to injection on a regular basis. Knowledge about the potential advantages of a sac, and technical practices employed to create and maintain one, was often obtained from other IDUs with whom they had engaged in cooperative economic activities in relation to the joint purchase of heroin, sometimes simply through visual observation of others' use of an injection sac but often through direct instruction and assistance by another IDU. One injector elaborated that the assistance of another IDU was particularly important in forming an injection sac in the groin owing to the precision that is needed in inserting the needle in a circumspect area adjacent to a major vein where risk of vein damage is high.

Inquiry about users' rationales for creating and maintaining an injection sac yielded narrative descriptions of a complex set of inter-related considerations. Overwhelmingly, the most salient explanation was that a sac provided advantage in accessing a vein both quickly and reliably.

Both have strategic advantage in the context of contemporary Vietnam; cities like Hanoi are densely populated, with large extended families living in relatively restricted living quarters that are used primarily for sleeping and eating. Much of everyday life occurs outdoors in public or semi-public areas. Individual privacy is limited and this presents a substantial challenge for IDUs, who are especially vulnerable to stigma and related kinds of social sanction related to drug use. Additionally, police surveillance is concentrated in and around many drug distribution settings and neighborhoods where drug users live and congregate, and the penalty for repeated arrest for heroin possession is relatively severe (including mandated detoxification and extended incarceration in drug rehabilitation facilities). Thus, risks for discovery and penalties associated with arrest are both high, a fact that places a premium on immediate consumption of heroin after it has been purchased so as to avoid detection, confiscation, and arrest.

Heroin injectors describe mitigating risk for discovery and arrest by injecting in a doorway, public toilet, park, or similar public settings immediately proximate to where they purchase heroin. Indicative of this fact, areas near heroin distribution sites are littered with discarded items associated with illicit heroin injection, including used syringes (often with noticeable blood residue), discarded cellophane syringe casings, empty heroin wrappers, and empty vials of purified water (used to transform heroin into soluble form for injection). These areas are also littered with used vials of Promethazine Hydrochloride and Novocaine, both of which are also widely used among heroin injectors (see below). Thus, features of the local physical environment (urban density), combined with elements of the local social environment (shifts in heroin markets/forms, drug control policy, and local police tactics), have had the combined consequence of favoring rapid consumption of heroin soon after purchase, notably using injection as a mode of administration (rather than smoking). The types of public settings that are most readily available after copping, however, bring high risk for discovery (both by police as well as by other injectors) and thus a premium is placed on preparing the drug solution and injecting it quickly, an objective that IDUs report is facilitated by an injection sac because it provides ready access to a vein.

Injectors also highlight the utility of an injection sac in relation to concurrent use of other psychoactive substances that are collectively distinguished as “Western medicine.” These substances, all of which can be purchased at any local pharmacy without a medical prescription, include Valium, Novocaine, and Promethazine Hydrochloride. Perhaps the most common of these substances, Promethazine, is sold locally under the brand name Pipolphen (“Phen”). Like Valium and Novocaine, heroin injectors use it as a means of amplifying or augmenting the positive psychoactive effects of heroin, or as a means of extending the desired effect of heroin. Additionally, Prometazine may also be used as a substitute for heroin when the user cannot obtain heroin, thereby delaying the time before onset of the physical and psychological symptoms associated with heroin withdrawal (including painful cramping, profuse sweating, and a general feeling of agitation and unease). Promethazine is much less expensive than heroin (approximately \$0.50) and can be legally purchased from most neighborhood pharmacies. Thus, heroin injectors use substances such as Promethazine to offset multiple risks and constraints in the local physical and social environment (including risk for arrest, high cost, and situational scarcity) by supplementing heroin use with substances that may be obtained legally (reducing risk of arrest), are less expensive (reducing cost), and are more readily available (reducing risk of withdrawal).

Despite the advantages offered by use of Promethazine, most IDUs also voiced concern about its negative effects, particularly in relation to vein health. Most subjects elaborated personal experiences with rapid deterioration of veins which they attributed to Promethazine. Vein health is a potent concern for individuals with heroin dependence, particularly those with limited economic means, because loss of functional veins threatens the use of this preferred

mode of administration.¹⁷ In the course of their narrative descriptions, several subjects revealed dark and discolored veins which they attribute to the effects of Promethazine, and others reported that their veins had “disappeared” following what they described as a single use of Promethazine. Some users described having to inject in their leg or neck because veins in their arms have been rendered inaccessible, outcomes that they attributed to the effects of Promethazine injection. This is consistent with clinical uses of Promethazine which specifically note that injection is counter-indicated. However, in ethnographic interviews, IDUs voiced the conviction that injecting in an injection sac mitigates Promethazine’s destructive impact on vein health. Indeed, so pronounced was this latter set of considerations, that several injectors described having specifically created an injection sac relatively soon after they had begun regular heroin injection (typically an indicator of habitual use) in anticipation of the fact that they would some day need to substitute Promethazine for heroin and that they did not want to have to risk potential vein damage by not having a sac, and experience in using it, already available to them.

Finally, and independent of whether or not they used Promethazine, female sex workers also described using an injection sac as a means of concealing their involvement in injection drug use from sex work clients, a fact that would be readily apparent if they injected on their arms. All described purposely locating the sac in their groin as a means of concealing injection from clients in commercial sex work. Both men and women acknowledged that this sometimes also had advantages in concealing evidence of injection drug use from police who are likely to check arms and legs for track marks and other evidence of injection, but less likely to search the groin area.

In summary, injectors described purposeful cultivation of sacs soon after onset of habitual heroin injection, highlighting at least two inter-related rationales: First, use of a sac has advantage in the contexts of a number of external risks in the social environment (including high risk for arrest and interdiction, and the need for immediate consumption of heroin after purchase, often in public or semi-public settings where there rapid and reliable access to a vein may otherwise be difficult). Second, injectors report co-morbid use of Promethazine (to enhance effects of heroin, delay onset of withdrawal, and offset high cost/situational scarcity of heroin) and the belief that using an injection sac mitigates high risk for vein damage.

Preliminary Pathology Assessment and HIV Transmission Risk

An interest in understanding the prevalence, distribution, and rationale for employing injection sacs in the findings described above, also prompted an interest in considering the potential of this practice to facilitate transmission of bloodborne pathogens. Consultation was made with the pathology department at one of the main hospitals in Hanoi. It was limited to review of the available macroscopic evidence related to an injection sac, including detailed description of injectors’ self-reported descriptions of how injection sacs are created and maintained, and photographs of their appearance.

In general, and based on the limited information that could be derived from both the survey and ethnographic data (but without the benefit of microscopic study), it may be expected that an injection sac may not produce a generalized (non-specific) immune response. This is a concern because such a generalized response would draw high concentration of lymphocytes (including T cells) to the site of the injection sac, and consequently make them more readily available to HIV infection (thereby increasing probability of successful transmission). However, theoretical assumptions about a generalized immune response stemming from the injection sac itself must be tempered by the following considerations: First, it is noteworthy subjects described creating an injection sac with through repeated puncture with a needle. While rates of HIV transmission from accidental needle-stick injuries are generally low, there

may be some transmission risk in the development of the injection sac in this process which involves repeated needle-sticks with a potentially infected syringe.

Second, most injectors described the presence and assistance of an older and more experienced injector in the process of creating an injection sac, a context which typically involved sharing drug solutions. Pedagogy in these early injections also commonly involved paraphernalia sharing. Thus, there may be heightened risk in the course of creating a sac, particularly in relation to HCV transmission.

Finally, it is noteworthy that Vietnam has a generally hot and humid climate and the prevalence of surface bacteria on the skin is high. Unfortunately, hygienic preparation of injection sites among IDUs is rare in Vietnam, with the result that there is high risk for introduction of bacteria and other skin surface pathogens in the course of heroin injection. These circumstances may increase the likelihood that a general immune response would be induced. The fact that sac users are injecting repeatedly at the same site, rather than rotating amongst different injection sites, may increase the likelihood HIV-1 transmission.

As noted above, the use of an injection sac is positively correlated with higher rates of disease. In the context of cross-sectional data, it cannot be determined if this is an artifact of the fact that sac users have more chronic heroin use profiles or whether this is a consequence of the use of this injection strategy itself. Additional microscopic investigation is needed to determine whether the use of an injection sac confers additional risk of viral transmission.

DISCUSSION

Prior ethno-epidemiologic studies have highlighted the fact that transmission risk is not limited to syringe sharing, and that ancillary injection paraphernalia such as “cookers,” “cotton,” and “rinse water” may also pose risks for transmission of viral pathogens.^{18, 19} Moreover, the injection process itself has been shown to be far more complex than was initially appreciated, with substantial behavioral variability in relation to time and place as well as in relation to drug type and drug form.²⁰ Transmission risk associated with the ways that illegal drugs such as heroin are prepared, distributed, and self-administered have often been shown to have emerged as adaptive responses to opportunities and constraints in the local physical and social environments.²¹ The use of an injection sac appears to have arisen in a similar context in Vietnam.

This practice has yet to be described elsewhere in the epidemiologic literature on heroin injection practices, although reports of similar practices have recently emerged from ethnographic studies among IDU populations in London.²² The implications of injection sacs for transmission of HIV and other bloodborne pathogens remain unknown and additional clinical and behavioral research is needed.

The practice is relatively common among young injection drug users in Hanoi, Vietnam, and at least in this context, it is clearly related to prevailing social policies that have placed a premium on rapid, surreptitious, and inevitably higher risk, heroin injection practices. In this context, a number of opportunities for behavioral, structural, and policy interventions become apparent. For example, the fact that potentially high risk behavioral practices such as these are emerging as coherent responses to prevailing social policies (including high levels of social stigma and adverse policing practices), suggests that it may be useful to reconsider the utility of such social policies.

On the more immediate horizon, there is a clear need for structural interventions with which to mitigate the excess harm that emerges from the existing policies. For example, contemporary policies favor public injection and rapid discard of injection paraphernalia immediately after

use. Over time this has resulted in accumulation of a large volume of potentially infectious injection paraphernalia in many areas in Hanoi. This refuse serves as a reservoir of paraphernalia to which injectors may take recourse when they are unable to obtain heroin (by recovering residual heroin left in a discarded syringe) and also when they are unable to obtain a sterile syringe. Reuse of discarded injection paraphernalia places the user at risk for exposure to any bloodborne pathogens surviving in used paraphernalia.²³ Moreover, the sheer volume of discarded injection paraphernalia constitutes an abiding environmental risk for accidental needle stick and secondary viral transmission to non injectors, particularly to the many children who play in these same areas. Thus, advancing policies and structural interventions that ease constraints on access and possession of syringes, including viable options for proper paraphernalia disposal, would reduce harm associated with heroin injection among IDUs as well as in the community at large. There is an urgent need to develop community-based alternatives to the current approach of incarcerated “rehabilitation.” Finally, advancing behavioral interventions, including safe injection practices and techniques, and proper wound care, are also key challenges for HIV prevention policy and programming.

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Figure 1.
Injection sac

Table 1

Demographic characteristics

	Injection sac user		Non-injection sac user		p value
	% or M	n or SD	% or M	n or SD	
Age (years)	24.3	2.8	23.3	2.9	<0.001
Gender					0.009
Male	95.1%	366	90.5%	484	
Female	4.9%	19	9.5%	51	
Primary income source in the last year ^a					0.003
Family support	28.1%	108	28.8%	154	
Legal fixed employment	17.9%	69	27.9%	149	
Street-based employment	15.6%	60	15.5%	83	
Drug distribution	4.2%	16	2.4%	13	
Sex work	4.7%	18	5.0%	27	
Stealing	23.4%	90	15.7%	84	
Other	6.2%	24	4.7%	25	
Age of first use of heroin	18.5	3.1	18.4	3.1	-
Mode of administration on the first occasion					<0.001
Smoked	91.9%	354	94.0%	503	
Injection	8.1%	31	6.0%	32	
Age of first injection of heroin	20.9	5.0	20.8	3.1	

SD, standard deviation

^aLegal fixed employment: agriculture, construction, clothing (seamstress/tailor) or shoe repair, education (school teacher, teacher's aide), domestic worker (housekeeper, childcare), factory worker (textile, jewelry, manufacturing etc.), office work, retail store, restaurant (waiter, waitress, cook, dishwasher), sanitation worker, security guard (building, parking lot etc.), tourist entertainment (non-sex massage, bar, night club), transportation worker. Street-based employment: porter (moving materials, loading/unloading), street vending mobile (books, fruits, shoeshine, etc.), street vending fixed (fruit stand, tea stall, etc.), Honda/motorbike taxi driver, gambling (playing cards, local lottery etc). Sex work: trade/exchange of sex for money, other types of work in the sex economy (pimping, porn)

Table 2

Initiation and current use of heroin

	Injection sac user		Non-injection sac user		p value
	% or <i>M</i>	<i>n</i> or <i>SD</i>	% or <i>M</i>	<i>N</i> or <i>SD</i>	
Mode of administration in the last 30 days					
Smoked	9.9%	38	30.7%	164	<.0001
Injected	100%	385	88.6%	474	<.0001
Most frequent mode in the last 30 days					
Smoking	2.3%	9	22.6%	121	<.0001
Injection	97.7%	376	77.2%	413	-
Days used heroin in the last 30 days					
1 - 9	28.6	5.1	26.7	7.3	<.001
10 -- 19	2.9%	11	6.0%	32	-
20 - 29	2.1%	8	6.4%	34	-
Injected daily (30 days)	6.8%	26	13.1%	70	-
Used a syringe someone else had injected before	88.3%	340	74.6%	399	<.0001
Body part most often injected					
Upper arm	6.0%	23	3.4%	18	<.0001
Elbow	6.2%	24	21.5%	102	-
Lower arm	16.6%	64	44.5%	211	-
Wrist	6.5%	25	15.8%	75	-
Groin	1.8%	7	5.5%	26	-
Other	65.2%	251	8.9%	42	-
	3.6%	14	3.8%	18	-
SD, standard deviation					

SD, standard deviation

Table 3

Current use of injection sac

	% or <i>M</i>	<i>n</i> or <i>SD</i>
Currently using injection sac		
Yes	89.9%	346
No	10.1%	39
How many injection sacs currently using (<i>n</i>=346)		
One sac	72.0%	249
Multiple sacs	28.0%	97
Location of injection sac (<i>n</i>=346)		
Upper arm	4.6%	16
Elbow	13.0%	45
Lower arm	2.6%	9
Wrist	1.4%	5
Neck	0.6%	2
Groin	79.2%	274
Thigh	2.3%	8
Upper shin	0.9%	3
Ankle	0.3%	1
Oldest active injection sac		
More than six months	72.1%	248
Less than 6 months	20.1%	69
Less than 2 months	5.5%	19
Less than 1 month	2.3%	8
Times used injection sac yesterday		
0	2.7	1.4
1	3.5%	12
2 - 5	10.7%	37
6 - 12	82.0%	283
	3.8%	13

SD, standard deviation

Table 4

Illness and disease

	Injection sac user % or <i>M</i>	<i>n</i> or <i>SD</i>	Non-injection sac user % or <i>M</i>	<i>n</i> or <i>SD</i>	<i>p</i> value
Disease History					
Hepatitis B	12.2%	47	5.0%	27	<0.001
Tuberculosis	2.3%	9	1.7%	9	-
Malaria	4.4%	17	2.8%	15	-
Endocarditic (Heart Infections)	0.8%	3	0.6%	3	-
Pneumonia	11.9%	46	6.2%	33	0.002
Seriously considered suicide	37.9%	146	28.2%	151	0.002
HIV status					
Ever tested for HIV (<i>n</i> =601)	53.1%	199	42.6%	274	
Tested HIV-negative	77.7%	153	82.4%	224	
Tested HIV-positive	9.1%	18	7.0%	19	
Don't know/Not Sure	2.5%	5	1.5%	4	
Did not disclose HIV status	10.7%	21	9.2%	25	

SD, standard deviation