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Prevalence and correlates of neck injection among people who inject drugs in Tijuana, Mexico

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Abstract

Introduction and Aims—Injecting drugs in the neck has been related to adverse health conditions such as jugular vein thrombosis, deep neck infections, aneurysm, haematomas, airway obstruction, vocal cord paralysis and wound botulism, among others. We identified prevalence and correlates of neck injection among people who inject drugs (PWID) in Tijuana, Mexico.

Design and Methods—Beginning in 2011, PWID aged 18 years who injected drugs within the last month were recruited into a prospective cohort. At baseline and semi-annually, PWID completed interviewer-administered surveys soliciting data on drug-injecting practices. Logistic regression was used to identify predictors of injecting in the neck as the most frequent injection site at a single visit.

Results—Of 380 PWID, 35.3% injected in the neck at least once in the past 6 months, among whom 71.6% reported it as their most common injection site, the most common injecting site after the arms (47%). Controlling for age, years injecting and injecting frequency, injecting heroin and methamphetamine two or more times per day and having sought injection assistance were associated with injecting in the neck [adjusted odds ratios (AOR): 2.12; 95% confidence intervals (CI): 1.27–3.53 and AOR: 2.65; 95% CI: 1.52–4.53 respectively].

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Conflict of interest

The authors declare that they have no competing interests.

Discussion and Conclusions—Injecting in the neck was very common among PWID in Tijuana and was associated with polydrug use and seeking injection assistance. Tailoring harm reduction education interventions for individuals who provide injection assistance ('hit doctors') may allow for the dissemination of safe injecting knowledge to reduce injection-related morbidity and mortality.

Keywords

injecting drug use; injection site; Mexico; polydrug use; psychosocial factor

Introduction

Apart from the increased risk of blood-borne infections such as human immunodeficiency virus (HIV) and hepatitis B and C, injecting drug use also carries other health risks. Unsafe injection practices such as paraphernalia sharing and dangerous injection techniques related to social and environmental factors such as lack of access to sterile needles [1,2] and injecting in public spaces [3]. However, health risks have also been related to a lack of safer injecting knowledge and have been related to health concerns that range from skin rashes and bacterial infections [4-7] to more critical conditions such as wound botulism, paraplegia and aneurysm among others, depending on the injecting site [7,8].

Injecting in the neck is one of the most dangerous injecting behaviours, as it increases the risk of damaging a major vein or artery not directly visible at the injecting site. In addition, veins that pass by the neck are substantially larger than those in the arm (where injection drug use is more frequent), which could lead to increased risk of circulatory problems or other life-threatening infections [4,6,9]. Injecting in the neck has been related to adverse health conditions such as deep neck infections that may develop abscesses and related complications such as haematomas, airway obstruction, vocal cord paralysis, wound botulism, extension of infection to other structures, pneumothorax, mycotic subclavian carotid artery aneurysm, paraplegia and internal jugular vein thrombosis, among others [4,5,9-17]. Internal jugular vein thrombosis is associated with pulmonary embolism, cancer and recurrent venous thromboembolic events [6,18]. The clinical manifestations of jugular vein thrombosis may be frequently over-looked because of their inconsistency; the most consistent symptoms are neck pain and swelling in the neck [6,11].

Injecting in the neck is more commonly observed among people who inject drugs (PWID) with a long history of drug injection with collapsed veins due to frequent injection [19]. Previously, Wood *et al.* [20] reported a relationship between requiring help injecting and jugular injection among PWID in Vancouver, Canada, while a study of Australian PWID reported that while the neck was considered the most dangerous injecting site by PWID, this did not deter individuals from continuing to engage in this location [19].

To date, there has not been a study of neck injection in a Latin American country, despite ongoing risky injection drug use practices in settings such as Mexico's northern border region. In 2010, for example, there were 1 559 683 inhabitants in Tijuana, the fifth largest city in Mexico [21], and it has been the Mexican city that receives the greatest number of deportees from the USA [22], who have shown frequent drug injection and less interaction

with health services [23]. In addition, it has been estimated that 10 000 PWID live in Tijuana [24], which represents a prevalence over 10 times the national mean [25,26]. Between 2010 and 2014, Global Fund provided funding for HIV programs in Mexico, which supported syringe exchange programs in Tijuana and in other cities in nine states of the country [27,28]. Since this support ended, syringe exchange programs have reduced their activity in Tijuana, where although it is legal to purchase syringes without prescription, users have reported difficulties trying to buy them at pharmacies [29]. In addition to this problem, PWID have also reported that policing practices have led PWID to rush injections and to share more syringes [30]. Because of Mexico's important role in poppy cultivation and trafficking of both heroin and methamphetamine to the USA, most PWID in Tijuana inject black tar heroin [26], and a high proportion also inject methamphetamine [31]. Compared with other formulations of heroin (i.e. white or brown powder), black tar heroin is associated with collapsed veins [32,33].

Increasingly, our study team has observed PWID in Tijuana injecting in the neck, often with the aid of a mirror. Therefore, this study assessed the prevalence and correlates of neck injection to determine which harm reduction strategies could improve health conditions among this vulnerable group. We hypothesised that neck injection would be associated with (i) high-risk behaviours such as sharing syringes and other drug paraphernalia; and (ii) seeking the help of a 'hit doctor' to help oneself inject.

Methods

Sample and procedures

Beginning in 2011, 785 PWID in Tijuana were enrolled in a prospective cohort study (*Proyecto El Cuete*, Phase IV) that included interviewer-administered surveys and HIV testing at baseline and every 6 months. As previously reported [34], recruitment was conducted through targeted sampling, which consisted of street-based outreach in 10 neighbourhoods across Tijuana.

Inclusion criteria included being 18 years or older, injecting drugs within the last month, being able to speak English or Spanish, currently living in Tijuana with no plans to move outside of the city over the next 24 months and not currently participating in an intervention study. The Human Research Protections Program of the University of California, San Diego and the Ethics Board at El Colegio de la Frontera Norte approved the study protocols.

For this analysis, the sample was comprised of 380 PWID who had completed the visit 4 survey, which was conducted approximately 24 months after the baseline visit, and who answered questions about injection sites, which were only added to the visit 4 questionnaire.

Measures

Interviewer-administered surveys solicited data on sociodemographic, behavioural and contextual factors, including lifetime and 6-month drug use, behaviours related to drug use such as needle and drug paraphernalia sharing, and other health conditions. To assess the injection sites, participants were asked: 'Could you tell us what are all the different sites that you use to inject drugs in the last 6 months?' Possible answers are 'temple', 'neck', 'arms',

'hands', 'breast', 'legs', 'feet' and 'other'. To assess preferred injection sites, participants were asked: 'From the sites that you mentioned, can you tell what is the most common site of your body you use to inject drugs?'

Statistical analyses

Frequencies and medians were compared between those who injected most frequently in the neck and those who injected in other sites. Univariate and multivariate logistic regressions were conducted to identify lifetime and past 6-month factors associated with preferred neck injection. To identify variables independently associated with preferred neck injection, we entered variables significant at the $P < 0.05$ level in the univariate analysis into a multivariate logistic regression model in a manual forward stepwise fashion. The likelihood ratio test was used to compare nested models, using a significance level of $P < 0.05$. For the final model, we tested for multicollinearity through a correlation matrix and Wald's tests.

Results

Of the sample of PWID reporting on injection sites ($n = 380$), 62.1% were male; the median duration of injection drug use was 17 years [interquartile range (IQR): 10–25], and median age was 38 years (IQR: 31–45).

A total of 134 (35.3%) reported injecting in the neck at least once in the past 6 months. Neck was the most common injecting site after the arms (47%). From those who had injected in the neck in the past 6 months, 99 (71.6%) reported it as the most common injection site.

There were no significant differences between those who reported the neck as the most common injecting site ($n = 99$) versus those who prefer other sites ($n = 267$) with respect to sex, age, years injecting, HIV status, marital status and history of deportation from the USA to Mexico (Table 1).

With respect to risky drug-related behaviours in the past 6 months, the proportion of PWID who had injected heroin, cocaine and/or methamphetamine at least twice per day was significantly higher in the neck injection group (95.6%) compared with the other common site group (88.4%; $P < 0.05$). Most PWID (81.5% in the neck injection group and 87.6% in the other sites group) reported obtaining syringes from a 'safe' source of syringe (i.e. pharmacist, syringe exchange programs, doctor, clinic or hospital). However, there was a significant difference between groups in the use of new, sterile syringes; 22.2% in the neck injection group and 13.5% in the other sites group reported always injecting with a new syringe ($P < 0.05$). There was no significant difference in receptive needle sharing and cleaning someone else's syringes before using them; approximately half of participants in both groups engaged in the former and only 14.1% in the neck injection group and 12.7% in the other sites group cleaned used syringes. Significantly more participants in the neck group sought the help of a 'hit doctor' compared with participants in the other sites group (41.4% in the neck injection group and 21.7% in the other sites group; $P < 0.05$). There were no significant differences in past 6-month overdoses, incarceration or engaging in sex work.

Regarding the type of substances used, significantly more participants in the neck injection group reported injecting methamphetamine and heroin combined at least twice per day compared with those that injected most commonly in other sites (58.8% and 40.6% respectively; $P < 0.05$). In contrast, significantly fewer of those in the neck injection group reported having exclusively injected heroin compared with those in the group that preferred other injection sites (44.2% and 59.4% respectively; $P < 0.05$).

In univariate logistic regression models, injecting drugs at least twice per day, injecting methamphetamine and heroin combined at least twice per day, seeking the help of a hit doctor to inject and reporting always injecting with a new syringe were significantly associated with a higher odds of injecting in the neck (Table 2; $P < 0.05$). Injecting heroin most frequently was significantly associated with lower odds of injecting in the neck.

Given the collinearity between methamphetamine and heroin use separately and use in combination, we tested each of these variables in different multivariate models. The best fitting model included methamphetamine and heroin injected in combination. Controlling for injecting at least twice per day, [adjusted odds ratio (AOR): 1.9; 95% confidence interval (CI): 0.6–6.1], having sought injection assistance (AOR: 2.5; 95% CI: 1.5–4.3), always using a new, sterile syringe (AOR: 2.12; 95% CI: 1.1–4.1) and injecting heroin and methamphetamine combined at least twice per day (AOR: 2.0; 95% CI: 1.2–3.4) were independently associated with injecting in the neck.

Discussion

Compared with other researchers who have examined neck injection among PWID in other countries, injecting in the neck was surprisingly common in Tijuana, Mexico. In our sample, more than a third of the participants reported having injected in the neck at least once in the past 6 months. In contrast, in a study in Sydney, Australia, 10% of PWID reported injecting in the neck in their lifetime and 4% reported having done so in the past 6 months [19]. In a PWID population in Vancouver, Canada, 25% reported to have injected in the neck in the past 6 months [9]. Our sample had an older median age than the mean ages reported in both the Canadian and Australian studies; however, we did not find age differences between those who used the neck as the most common injection site and those who preferred other injection sites. Therefore, it is unlikely that the age difference explains the higher prevalence of neck injection among PWID in Tijuana. To explain the high proportion of neck injection, it is necessary to explore other findings, such as the type of drugs used and injection frequency.

Injecting heroin and methamphetamine combined at least twice per day was significantly associated with preferring to inject in the neck in our sample. It is possible that differences in the frequency of injection in the neck in our sample and others are due to the type of drugs available in Tijuana compared with other drug markets. Black tar heroin, the main form of heroin produced in Mexico [35], is likely to be contaminated with adulterants [32]. Its use has been associated with venous sclerosis and the practice of ‘skin popping’ (injecting the substance under the skin) with the loss of usable veins, increasing the risk of wound botulism that may lead to morbidity and death, even when PWID employ safer

injection behaviours such as skin cleaning, used needle cleaning or use of sterile syringes [17,32, 33,36,37]. As frequent injections may cause vascular damage regardless of harm reduction practices [9,19], the relatively short half-life of methamphetamine may also contribute to more injecting and more vascular damage, leading PWID to progress to neck injection after damaging injection sites that are more easily accessible [19]. Our findings are consistent with others who have suggested that neck injection is a marker of reduced venous access, longer duration of drug use or higher intensity drug use [9].

An interesting finding is that injecting career was not a significant correlate. It may be that because of the previously mentioned significant drug use pattern, even PWID with a short injection drug use history have needed to use more dangerous injection sites such as the neck.

We found a significant association between injecting in the neck and requiring help injecting by a hit doctor. In previous studies by our team, we have found that a higher proportion of Tijuana PWID report requiring help injecting compared with other cities [9,20]. We hypothesise that the frequent use of hit doctors may be related to the difficulty of injecting oneself in the neck without directly looking at the injection site. Seeking injection assistance increases the odds of overdose and blood-borne infections [34,38], and may be related to lack of control over own injection drug use, which can increase the odds of other risky behaviours. However, not all assisted injection is harmful; a study that analysed injection assistance by trained peer volunteers at a safe injection facility suggests that this interventions may reshape social and structural contexts related to injection drug use by minimising HIV and other health risks [38,39]. Accordingly, specific interventions targeting hit doctors combined with the opportunity of accessing safe injection facilities may allow for the dissemination of safer injecting practices and education of other PWID.

Considering how frequent neck injection is among PWID in Tijuana, PWID who report this behaviour may be at risk for additional health consequences (e.g. deep tissue infections) and in need of frequent medical care. Internal jugular vein thrombosis and deep neck infections associated with injection drug use require an aggressive antibiotic therapy and possibly surgical interventions and other care procedures [5,6,11]. As such, increased medical outreach may be required among PWID in Tijuana, which should seek to identify those experiencing medical complications related to neck injection. Again, hit doctors may be employed in this capacity to help identify those individuals who seek assistance for neck injection and who, therefore, are at high risk of injection-related morbidity and mortality. Educational programs may also be developed for PWID attending shooting galleries where they often seek injection assistance.

Our study had a number of limitations. First, data on injection assistance did not specify whether the person sought help to inject in the neck or in other injection sites. Second, we did not have information regarding injection-related problems such as scarring, swelling or difficulty injecting, or whether participants perceived injecting in the neck as dangerous. Third, we were not able to analyse injection careers before and after injecting in the neck; hence, we were not able to study the injection site trajectories relative to reasons they may have begun injecting in the neck. Fourth, our findings are based on a specific cohort of

PWID in Tijuana; therefore, it is not possible to generalise these findings to other PWID populations. Finally, as questions on injection sites were not added until the fourth study visit, our sample may have been less likely to include higher risk PWID who were lost to follow up.

Conclusions

Injecting in the neck was surprisingly common in Tijuana and was associated with polydrug use (heroin and methamphetamine) and seeking injection assistance. Our findings are of concern considering the serious adverse health consequences related to injecting in this site. Harm reduction education programs that target the dangers of neck injection are recommended for PWID, and especially for hit doctors who may be involved in choosing a safer injecting site. It is recommended to implement a safer injection facility in the city where, besides sterilised material, PWID may obtain health interventions and learn harm reduction strategies.

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Table 1
Descriptive statistics of most commonly injecting in the neck in the past 6 months. El Cuete IV 2011, Tijuana (n = 380)

	Neck as most common site (n = 99)		Other sites (n = 267)	
	n	%/median (IQR)	n	%/median (IQR)
Sociodemographics				
Female	35	38.46	86	37.07
Age (median)	91	38 (32–43)	232	38 (30–45)
Time injecting in years (median)	91	18 (12–22)	232	16 (9–25)
Lifetime deportation	46	71.88	103	66.45
HIV positive	1	1.02	6	2.26
Married/common law	46	14.24	112	34.67
HIV risk behaviours ^a				
Injected drugs more than twice per day	95	95.96 ^c	236	88.39
Safe source of syringe ^b	53	81.54	141	87.58
Always injected with a new, sterile syringe	22	22.22 ^c	36	13.48
Receptive needle sharing	47	47.47	143	53.56
Never cleaned syringe from someone else with bleach before using it	14	14.14	34	12.73
Sought the help of a 'hit doctor'	41	41.41 ^c	58	21.72
Overdose	9	9.09	20	7.49
Prison/jail	41	85.42	122	89.05
Sex work	26	26.26	74	27.72
Substances used ^a				
Mostly injected methamphetamine or methamphetamine and heroin combo	53	55.79 ^c	103	40.23
Injected methamphetamine and heroin combo 2 times per day	58	59.79 ^c	102	40.64
Injected most frequently heroin only	42	44.21 ^c	152	59.38

^aPast-six months;

^bpharmacist, syringe exchange program, doctor, clinic or hospital;

^csignificant difference at $P < 0.05$. HIV, human immunodeficiency virus; IQR, interquartile range.

Table 2
Injection drug use patterns associated with most commonly injecting in the neck in the past 6 months. El Cuete IV 2011, Tijuana (n = 380)

	OR	95% CI	AOR	95% CI
Injected drugs more than twice per day	3.12	1.07	9.08 ^a	
Injected methamphetamine and heroin combo at least twice per day	2.17	1.35	3.50 ^a	2.02 1.21 3.36 ^a
Mostly injected methamphetamine or methamphetamine and heroin combined	1.87	1.16	3.02 ^a	
Injected most frequently heroin only	0.54	0.34	0.87 ^a	
Always injected with a new, sterile syringe	1.83	1.02	3.31 ^a	2.12 1.11 4.06 ^a
Sought the help of a 'hit doctor'	2.52	1.55	4.18 ^a	2.52 1.50 4.25 ^a

^aSignificant difference at $P < 0.05$. AOR, adjusted odds ratio controlling for injecting frequency; CI, confidence intervals; OR, odds ratio.