***Going into the groin*: injection into the femoral vein among people who inject drugs in three urban areas of England**

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Running head: *Femoral vein injecting in drug users.*

Summary

Background: There have been increasing concerns about injection into the femoral vein – groin injecting - among people who inject drugs in a number of countries, though most studies have been small. The extent, reasons and harms associated with groin injecting are examined.

Method: Participants were recruited using respondent driven sampling (2006-9). Weighted data was examined using bivariate analyses and logistic regression.

Results: The mean age was 32 years; 25% were women (N=855). During the preceding 28 days, 94% had injected heroin and 13% shared needles/syringes. Overall, 53% reported ever groin injecting, with 9.8% first doing so at the same age as starting to inject. Common reasons given for groin injecting included: "*Can't get a vein elsewhere*" (68%); "*It is discreet"* (18%); and "*It is quicker"* (14%). During the preceding 28 days, 41% had groin injected, for 77% this was the only body area used (for these "*It is discreet" w*as more frequently given as a reason). In the multivariable analysis, groin injection was associated with: swabbing injection sites; saving filters for reuse; and receiving opiate substitution therapy. It was less common among those injecting into two body areas, and when other people (rather than services) were the main source of needles. Groin injection was more common among those with hepatitis C and reporting ever having deep vein thrombosis or septicaemia.

Conclusions: Groin injection was common, often due to poor vascular access, but for some it was out of choice. Interventions are required to reduce injecting risk and this practice.

250 words.

Key words: people who inject drugs; femoral vein; risk behaviours; bacterial infections; viral infections.

3,998 words.

1.0 Introduction

People who inject drugs (PWID) can have difficulty maintaining access to their peripheral veins (Harris & Rhodes, 2012). Problems with accessing peripheral veins may result in people making several injection attempts or using multiple areas of the body for injection (Darke, et al., 2001; Harris & Rhodes, 2012; Maliphant & Scott, 2005). Injecting into central veins, such as the femoral vein ("groin injecting"), was generally regarded as the "last resort" for those who had no other options left, as a consequence of the vascular damage that can result after injecting over a long period of time (Darke, et al., 2001; Maliphant & Scott, 2005; Rhodes, 1995).

In the United Kingdom (UK), groin injecting has gone from being an uncommon practice among PWID in the 1990's (Rhodes, 1995), to one which was reported by up to half of those surveyed in the mid-2000's (Maliphant & Scott, 2005; Rhodes, et al., 2006). In part, this change may reflect an ageing cohort of PWID in the UK. However, for a few, injecting into the groin was reported to be occurring relatively soon after they had first started to inject, and for some, such as those injecting heroin and crack combinations, it may have become an "acceptable risk" (Rhodes, et al., 2006; Rhodes, et al., 2007). Increases in injecting into the femoral vein have been documented among PWID elsewhere. Recent reports indicate that 20% of those sampled in Seattle, USA, 31.5% of those sampled in Iran, and 34% of those sampled in Bangkok, Thailand, reported current injection into the groin or femoral vein (Coffin, et al., 2012; Karimi, et al., 2014; Ti, et al., 2014).

Injecting into the groin may occur for reasons other than difficulties with vascular access elsewhere on the body. Injecting into the groin can be viewed as discreet - as the groin is a part of the body rarely seen by others - without clearly visible signs of injection such as 'track marks' (Coffin, et al., 2012; Rhodes, et al., 2007). In addition, groin injection can also be seen by PWID as being an 'easy hit' or as possibly giving a superior 'rush' (Coffin, et al., 2012; Maliphant & Scott, 2005; Rhodes, et al., 2007). This is because injecting into the femoral vein,

due to the large size of this vein (which also allows the development of a sinus tract), is relatively simple and less likely to result in a missed 'hit' or having to repeatedly try to inject. Thus groin injection can be seen as both a discreet and a quick option.

Injecting into the femoral vein has been associated with a number of health problems (Coffin, et al., 2012; Senbanjo & Strang, 2011); including damage to the vein and to the femoral artery, infections and circulatory problems. Health problems including deep vein thrombosis (DVT) (McColl, et al., 2001), abscesses (Mackenzie, et al., 2000), chronic venous disease (Pieper, et al., 2009), and necrosis of the femoral artery (Mullan, et al., 2008) have been reported among those injecting into their groin. PWID are often unaware of the risks of developing these problems (Williams & Abbey, 2006) and often delay accessing services in response to injecting related problems (Hope, et al., 2014).

The few previous studies that have examined the extent of groin injection have had small sample sizes or had recruited using simple convenience sampling approaches, usually through healthcare settings. This study recruited a comparatively large sample of PWID from the community using respondent driven sampling (RDS), a form of structured chain referral sampling which aims to adjust for selection biases that may arise from convenience surveys (Heckathorn, 1997; Salganik & Heckathorn, 2004). This quantitative study purposively collected detailed data on current injecting practices, including groin injection, to examine the associations between injecting practice and the reasons for injecting into the groin. It also examined the medical complications associated with this practice. This paper describes a) the extent of groin injection; b) the reasons given for injecting into the groin; c) the factors associated with current groin injection; and d) the health harms associated with groin injecting.

2.0 Methods

This quantitative study recruited PWID from community settings, with participants undergoing an interview and providing a dried blood spot (DBS) sample.

2.1 Recruitment

Participants were recruited into a voluntary unlinked-anonymous cross-sectional survey conducted between 2006 and 2009 in three major urban areas across England - Bristol, Leeds and Birmingham - using RDS (Hope, et al., 2014). RDS is an established recruitment process which is explained fully elsewhere (Heckathorn, 1997; Heckathorn, 2002; Salganik & Heckathorn, 2004). Briefly, RDS recruits subjects through the participants' social networks and starts with the selection of the initial recruits, or 'seeds'. In each of the urban areas the 'seeds' were selected in relation to location within the area and gender through key informants and street outreach. To be eligible, participants had to be aged over 15-years, have injected during the preceding four weeks, and live within one of the three cities.

The participants first provided a DBS sample (tested for antibodies to HIV [anti-HIV], the hepatitis B core antigen [anti-HBc], and the hepatitis C virus [anti-HCV]), before undergoing a computer-assisted interview; once this was completed they were then offered an acknowledgement. The participants were asked to act as recruiters and those who agreed were given three uniquely numbered date-limited coupons. They were instructed to give these coupons only to eligible individuals whom they knew. A single fieldwork co-ordinator screened all participants for eligibility and also for attempted repeat participations. The study had ethical approval (London REC, MREC/98/2/51).

2.2 Questionnaire

The questionnaire was developed from ones used in previous studies (Judd, et al., 2005; Hickman, et al., 2007) with the core questions consistent with those used in national bio-behavioural surveillance (Hope, et al., 2005; Hope, et al., 2014). The questions on groin injecting were developed from existing questions on injecting practice and the findings of two exploratory studies (Maliphant & Scott, 2005; Rhodes, et al., 2007). The questionnaire was reviewed by members of the study team, including the fieldworkers, and by people working

with PWID in the study areas. The two main foci were: 1) injecting drug use (drugs used, injection practices, paraphernalia used, and injection sites including a section on groin injection); and 2) health harms (particularly infections) and associated health service use and intervention uptake. In addition, the questionnaire covered demographics, contact with criminal justice system, sexual behaviours, and the uptake of other health services. Questions on injecting practice used a 28 day recall period, so as to be consistent with other UK studies; this period has previously been found to be appropriate and reliable (Stimson, et al., 1998).

2.3 Analysis

In surveys using chain referral approaches, such as RDS, there is a tendency for participants' to recruit people like themselves, and a higher probability that people with large networks will be recruited. Therefore, information on network size and characteristics were used to test for evidence of selection bias and to generate sample weights using RDSAT (Version 5.4.0. Ithaca, New York: Volz E, Heckathorn DD; 2005).

Weighted data from those who had fully completed the questionnaire were included in the analyses (undertaken in SPSS 19). Descriptive analyses initially explored the extent of ever having injected into the groin and the reasons given for having done this. Factors associated with groin injecting were explored among those who reported injecting during the preceding 28 days. First, bivariate associations between reporting recent injection into the groin and demographic characteristics, environmental factors, the drugs used, injecting practices, and recruitment site were examined using the χ^2 test. The variables selected for inclusion in the analyses related to factors that had previously been shown to be related to injecting risk. Then those characteristics found to be associated in the bivariate analysis were entered using the forward stepwise procedure in SPSS into a logistic regression model with inclusion assessed using the likelihood ratio (with the stepwise probability for inclusion of 0.05 and exclusion of 0.1).

3.0 Results

3.1 Demographic and drug use characteristics

Across the three areas 855 individuals were recruited (291 in both Birmingham and Leeds; and 273 in Bristol). The mean age of the weighted sample was 32 years (median 31, IQR 27-37 years); with 13% (113) of the participants aged under 25-years and 34% (293) aged over 34-years. One-quarter (25%, 217) of the participants were women, and 4.4% (38) had been born outside the UK. For 31% (267) their main source of income was illicit (i.e. not from employment or benefits). During the preceding year, two-thirds (67%, 574) had been arrested, half (50%, 430) had been homeless and a third (33%, 284) had been imprisoned. The mean time since first injection was 10.6 years (median 10, IQR 5-15 years), with 21% (181) of the participants having first injected less than five-years ago and 25% (217) over 14-years ago.

During the preceding 28 days, 94% (807) had injected heroin, 50% (430) crack-cocaine, 11% (93) amphetamines, and 6.9% (59) cocaine powder. During that time, 37% (313) of the participants had injected daily. On the last complete day that they injected, 70% had injected more than once (271 twice, 163 thrice and 161 four or more times). For two-fifths (40%, 339) injecting usually took place in their own home, for a third it was someone else's home (33%, 280), and for 15% (131) it was a hostel; for the rest (12%, 105) it was a public place. During the preceding 28 days, two-fifths (43%, 364) had always washed their hands prior to injecting, and half (52%, 448) had always swabbed their injection sites. A third (35%, 298) had re-used a filter, a third (32%, 276) had saved filters for reuse, and 13% (115) had shared needles or syringes in the preceding 28 days.

3.2 Ever injected into the groin

Overall, 53% (450) reported that they had *ever* injected into their groin (femoral vein). This did not differ by age (for those groin injecting the mean age was 32.5 years, median 31, vs. mean of 31.6, median 30, for those not; Mann-Whitney U p=0.063) or by gender (54%, 345/638, of men and 48%, 105/217, of women had; p=0.153). However, those who had ever injected into

their groin had on average been injecting for longer, for a mean of 11.4 years (median 10 years) compared with a mean of 9.7 years (median 8 years) for those who had not (Mann-Whitney U $p<0.001$). The mean period between age at first injection and the age at first groin injection was 6.5 years (median 5 years; N=441); with one in 10 (43/441) having first injected into their groin at the same age that they had started to inject.

3.3 Factors associated with current groin injecting

When asked about the areas of the body used for injection during the preceding month, 41% (348) reported that they had used their groin. A range of other body areas were reported: the arms (53%, 545), legs (17%, 141), hands (13%, 108), neck (7.0%, 60), feet (6.5%, 56) and other areas (2.1%, 18); with 20% (167) reporting use of two of these areas and 6.8% (58) reported use of three or more of these areas.

The demographic, environmental and drug use characteristics associated with having injected into the groin during the preceding 28 days, in both the bivariate and multivariate analyses, are given in table 1. In the multivariable analysis, reporting recent groin injection was associated with the recruitment location; and was more common among those always swabbing injection sites, those saving filters for re-use, and those currently on opiate substitution therapy. It was however, less common among those using *only* two body areas for injection, compared to those using either one area or three or more areas, and it was also less common among those mainly obtaining needle and syringes from other people (table 1).

3.4 Reasons for groin injection

The most commonly given reason for having injected into the groin was because they "*Can't get a vein elsewhere*" (68%, 307), with "*It is discreet*" (18%, 83) being the second most common reason reported, see table 2. These reported reasons did not vary greatly by age and gender; other than women were more likely to report *"It was how I was shown to inject"* (13%, 14/105 vs. 5.7%, 21/345 for men, p=0.015), and those aged over 30-years were more likely to report other reasons (5.4%, 13/239 vs. 1.9% 4/211 of those aged under 31-years,

p=0.048), with a greater proportion also reporting *"It is quicker"* (18%, 42/239 vs. 11%, 23/211 of those aged under 31-years) but this was not significant (*p*=0.056).

Those who had injected into their groin during the preceding 28 days were more likely to report doing this because "*It is discreet*", and less likely to report doing this because "*It's a sure hit*" or for other reasons, than those who had previously injected into their groin (table 2). Among those who had injected into their groin during the preceding 28 days, reasons for this were compared among those using one, two, or three or more body areas for injection (table 3). Those only injecting into one body area – in this case just the groin – were significantly more likely to report the groin being 'discreet' as a reason (table 3). Whilst those injecting into three or more body areas were significantly more likely to report "*Can get into a vein easier when it is cold*" as a reason for injecting into their groin; they also more frequently reported "*Can't get a vein elsewhere*" as a reason, but this difference was not significant (table 3).

3.5 Health harms and groin injection

Overall, during the preceding 28 days, 5.2% reported a sore or open wound, 6.1% an abscess, and 21% redness, swelling and tenderness at an injection site. Fewer of those reporting an abscess or redness, swelling and tenderness also reported recent groin injection (adjusted odds ratio [adj-OR]=0.50 95%CI 0.26-0.94 and adj-OR=0.49 95%CI 0.34-0.71 respectively, table 4). Ever been diagnosed with blood poisoning (septicaemia) was reported by 8.7% and ever been diagnosed with DVT by 16%; those who had been diagnosed with these conditions were more likely to report current groin injection (adj-OR=2.05, 95%CI 1.25-3.37 and adj-OR=3.41 95%CI 2.28-5.11 respectively, table 4). Only four (0.47%) of the participants had anti-HIV, a fifth (19%, 167) had anti-HBc and half (50%, 431) anti-HCV; these are similar to those reported in other UK studies (Hickman, et al., 2007; Hope, et al., 2014). There was no association between ever infection with hepatitis B and current groin injection (HIV was not examined as the prevalence was low); however, those who had anti-HCV were

more likely to be currently injecting into their groin (adj-OR=1.46 95%CI 1.09-1.96, table 4) than those who were negative.

4.0 Discussion

Injecting into the femoral vein, or groin, is common amongst people who inject drugs; in our study over half had *ever* done this, and two-fifths were currently injecting into their groin. The main reason for injecting into the groin was difficulties with vascular access at other sites; though for a fifth it was because groin injecting was seen as being 'discreet'. Whilst those who had *ever* injected into their groin had overall been injecting for longer than those who had not, some had started groin injecting soon after they had first injected. Half had injected into their groin within five-years of their first injection, and for one-in-ten the age at first groin injection and the age they started injecting were the same. In part, this will reflect the fact that of those who had injected into their groin, one in thirteen reported this was how they had been shown to inject.

First, it is important to consider both the limitations and generalizability of these findings. The comparative rarity, marginalisation and illegal nature of injecting drug use are all impediments to the recruitment of a representative sample of PWID. This study aimed to minimize sampling biases and maximize representativeness by recruiting participants using RDS (Heckathorn, 1997; Heckathorn, 2002; Salganik & Heckathorn, 2004). Sample derived weights were then applied with the aim of correcting for possible sampling biases; though it is not possible to test how successful this adjustment has been (Mills, et al., 2014). Even so, RDS is currently regarded as one of the most appropriate methods for recruiting community based samples of PWID. Self-reports were used in this study, the accuracy of these can be questioned as they are subject to recall bias, however, the reliability of self-reported risk behaviours among PWID has been previously shown (Latkin, et al., 1993). Finally, this study only recruited participants from three urban areas and found differences in the extent of groin

injecting by area. Considering these issues, this study's findings should be generalised with caution.

The extent of current groin injecting observed in this survey, 41%, is similar to that reported in the few previous studies that have looked at this. These studies from the UK, USA, Iran and Thailand found that between 20% and 34% of PWID sampled were currently injecting into their femoral vein (Coffin, et al., 2012; Karimi, et al., 2014; Rhodes, et al., 2006; Ti, et al., 2014). As in these previous studies, older people who inject drugs, and those who had been injecting longer, were found to be more likely to have *ever* injected into the groin than younger people and those who had more recently started injecting. However, in our study there was no difference in the extent of *current* groin injection by age or injecting duration – something that has been noted previously (Coffin, et al., 2012; Ti, et al., 2014).

This finding suggests that regular groin injection is not necessarily related to loss of access to peripheral veins due to the damage resulting from injecting over a long period of time. Instead it suggests that issues related to poor injection technique, or personal choice, are involved. Considering the reasons given for groin injection - one-in-seven reported it being 'quicker' and almost one-in-five reported it being 'discreet' - and that 10% had started groin injecting around the time they had first started to inject, personal choice would now appear to be an important factor. Together, these new findings suggest that groin injecting is – for some PWID at least – not a behaviour of 'last resort', but one that is being normalised. This is supported by the analyses of factors associated with *current* groin injection. Injecting into the groin was found to be more common among those using either a single body area for injection or using multiple areas. Most of those currently injecting into the groin reported using just one area – the groin. In this group, groin injecting being 'discreet' was more frequently reported as a reason for using this area than among those using multiple sites, which suggest that for some the use of the groin is due to choice. The use of multiple sites, including the groin, by a smaller group suggests that others are using the groin because of issues with vascular access, and this is

reflected by the reported reasons given by this group. Together these findings suggest that groin injection may now follow several patterns, and though this needs further investigation, those working with PWID should take these patterns into consideration when supporting clients who groin inject.

The association between current groin injection and being in receipt of opiate substitution therapy could reflect a number of issues: people trying to conceal their injection of drugs on top of their prescribed medication by using a discreet injection site; those groin injecting being more likely to access addiction treatment due to health and other problems; or those injecting into the groin staying in treatment longer. This association need further investigation.

This study found that injecting into the groin was less common among those reporting symptoms of injuries and infections at injection sites, a finding that has not been previously noted. This possibly reflects groin injecting being a 'sure hit', and so fewer insertions before successfully injecting (so less damage to tissues), less handling (so less contamination) of the injecting equipment and site, and fewer accidental subcutaneous and intramuscular injections. Furthermore, those injecting into the groin were more likely to swab their injection sites, which should reduce infection risks. Considering the acidic nature of most drug solutions injected in the UK (the two most commonly injected psychoactive drugs, brown heroin and crack-cocaine, both need to be dissolved in acidic solutions) subcutaneous and intramuscular injections (either intentional or due to accidentally missing a peripheral vein) may be particularly likely to result in injection site problems. In addition, the high volume of blood in the femoral vein, when compared to peripheral veins, relative to the volume of the injection means that irritation of, and damage to, the veins from the acidic solution will theoretically be reduced.

Though people who inject into the groin report fewer symptoms of injuries and infections at injection sites – which are often comparatively minor – they report much higher levels of other health problems, such as, DVTs, septicaemia and hepatitis C infection. Worryingly, but not

surprisingly, having had septicaemia was twice as common and reporting a DVT more than three times as common among those injecting into their groins. These usually severe problems are among a number of adverse health outcomes that have been reported among people injecting into their groins (Mackenzie, et al., 2000; McColl, et al., 2001; Pieper, et al., 2009; Mullan, et al., 2008; Senbanjo, et al., 2012; Coffin, et al., 2012). Public health interventions are thus needed to reduce the harms associated with groin injecting.

Public health responses to groin injection should first look at ways to support and promote good injection site management and hygiene so as to minimize vein damage and so reduce vascular access problems. Secondly, interventions should promote awareness among PWID of the risks and harms that are associated with injecting into the groin, and support those already groin injecting in *not* initiating others. Considering that women who had injected in the groin reported more often than men '*It was how I was shown to inject*', interventions to 'break the cycle' may need to target women and their partners. In the UK, these preventive approaches are supported by guidance (NICE, 2014) and health promotion materials (NTA and Exchange Supplies, 2009), but the extent of implementation is unclear. These should of course be in addition to high coverage needle and syringe programmes and easy access to opiate substitution therapy (MacArthur, et al., 2014). Although these are widely available in the UK, our findings show that the reuse of injecting equipment, particularly filters, continues.

A third approach is to encourage those injecting into the groin to successfully access and use their peripheral veins, as such transitions have been shown to be possible, although among those experiencing complications related to groin injection (Senbanjo, et al., 2011; Zador, et al., 2008). Transitions away from groin injection will require the involvement of trained healthcare workers to support PWID with accessing peripheral veins even when they believe this is no longer possible (Zador, et al., 2008). As part of such approaches, the use of point-of-care ultrasound to improve understanding of the damage caused to the femoral vein as an aid to supporting behaviour change should be explored (Senbanjo, et al., 2012). However, such

transitions may not always be possible due to the extent of peripheral vein damage or because such transitions are not currently acceptable, considering that some people groin inject because it is perceived as discreet and quick, or out of choice. For these individuals, the development of harm reduction interventions to support safer groin injection techniques and use of appropriate injection equipment should be considered.

Finally, as smoking or snorting drugs, whilst not without risk, are safer than injecting, route transition interventions, to support use of drug administration routes other than injecting, should be considered (Senbanjo, et al., 2011). These interventions, such as providing foil for smoking heroin, can be effective (Pizzey & Hunt, 2008; Advisory Council on the Misuse of Drugs, 2010). Recent legislative changes mean that the provision of foil for smoking drugs through health services is now lawful in the UK (Home Office, 2014), and current guidance supports this approach (Public Health England, 2014). The impact of providing foil on both preventing and reducing the use of higher risk injection sites, such as the groin, needs further examination. Notwithstanding this, effective support and appropriate equipment for drug administration by routes other than injecting should be available to those either groin injecting or at risk of this.

5.0 Conclusions

This study confirms, using a large sample recruited through RDS, previous findings showing that groin injection is common among PWID in the UK. It also shows that for some, the groin is their usual body area for injecting, whilst for others it is one of several sites used. This study's detailed examination of the reasons for groin injecting in the context of current injecting practice indicates that there are a range of reasons why people inject into their groin. Worryingly, the findings presented here suggest that when groin injecting starts soon after initiation of injection this may often be out of choice rather than need. Considering the various, and often serious, health problems associated with groin injecting, these findings highlight the need for the development of evidence-based public health interventions to prevent and reduce

groin injection. These interventions need to improve PWID understanding of the associated harms, and to support PWID in using safer injection sites or to transition to safer routes of drug administration.

Table 1.
Factors associated with injecting into the groin during the preceding 28 days in three urban areas of England.

Characteristic		Injected into the groin during the preceding 28 days?						
		Yes		N	*p*	Adjusted Odds Ratio with 95% CI		
Recruitment site	Bristol	102	37%	273		1.00		
	Leeds	156	54%	291		**1.76**	**1.23**	**- 2.54**
	Birmingham	90	31%	291	*<0.001*	0.69	0.46	- 1.03
Homeless, during preceding year	No/Never	188	44%	425		†		
	Yes	160	37%	430	*0.037*			
Injected heroin*	No	14	29%	48		†		
	Yes	334	41%	807	*0.083*			
Injected crack*	No	152	36%	425		†		
	Yes	196	46%	430	*0.004*			
Injected amphetamine*	No	319	42%	762		†		
	Yes	30	32%	93	*0.068*			
Number of body areas injected into*	1	269	43%	630		1.00		
	2	52	31%	167		**0.60**	**0.41**	**- 0.88**
	3+	27	47%	58	*0.017*	1.25	0.70	- 2.21
Swabbed injection sites*	Not always	148	36%	407		1.00		
	Always	200	45%	448	*0.015*	**1.42**	**1.06**	**- 1.90**
Cleaned "spoon" before reuse*	Not always	85	34%	248		†		
	Always	263	43%	607	*0.016*			
Save filters for re-use*	No	219	38%	579		1.00		
	Yes	129	47%	276	*0.011*	**1.60**	**1.17**	**- 2.18**
Currently receiving opiate substitution therapy	Previously/Never	113	35%	327		1.00		
	Currently	235	45%	528	*0.004*	**1.53**	**1.12**	**- 2.07**
Main source of needle and syringes*	Pharmacy NSP	122	39%	310		1.00		
	Specialist NSP	182	46%	392		0.97	0.68	- 1.36
	Other people	44	29%	153	*0.001*	**0.59**	**0.39**	**- 0.91**

P values are for Pearson Chi-Square test.

NSP, Needle and Syringe programme

* During preceding 28 days

† Not in the final model.

No associations with: Gender; Age in years; Ever being arrested; Ever Imprisonment; Main Source of Income (Illicit or not); Years since first injected; Injecting cocaine preceding 28 days; Main place when injecting preceding 28 days (own home, others home, hostel, public building, public toilet, or public place); Number of times injected preceding 28 days; Cleaning needles and syringes before re-using them; Wash hands before injecting preceding 28 days; Re-use filters preceding 28 days; Share needles or syringes preceding 28 days; Been paid for sex during last year; Ever having a voluntary confidential test for HIV; Ever having a voluntary confidential test for hepatitis C; and Uptake of the vaccine against hepatitis B.

Table 2.
Reasons given for injecting into the groin in three urban areas of England.

Why have you injected into groin?	Ever injected into groin		Injected into groin during the preceding 28 days				
			Yes		No		*p*
	450		348		102		
It is quicker	65	14%	50	14%	15	15%	0.926
It was how I was shown to inject	35	7.8%	28	8.0%	7	6.9%	0.550
Can't get a vein elsewhere	307	68%	235	68%	72	71%	0.457
Can get into a vein easier when it is cold	16	3.6%	11	3.2%	5	4.9%	*0.370
It is a sure hit	24	5.3%	14	4.0%	10	10%	**0.036**
It is discreet	83	18%	73	21%	10	10%	**0.009**
Other	16	3.6%	9	2.6%	7	6.9%	***0.032**

P values are for Pearson Chi-Square test, unless marked with an * when they are for Fisher's Exact Test.

Table 3.
Reasons given for injecting into the groin amongst current groin injectors in three urban areas of England: by number of body areas used for injecting

Those who had injected into the groin during the preceding 28 days: Why have you injected into groin?	Number of body areas injected into, during the preceding 28 days									
	One		Two		Three or more		Total	χ^2 for linear trend, *p*	χ^2 comparing two or more with one, *p*	χ^2 comparing 'three or more' with 'one/two', *p*
It is quicker	34	13%	10	19%	6	22%	50	0.099	0.101	0.250*
It was how I was shown to inject	22	8.2%	3	5.8%	3	11%	28	0.707	0.966	0.467*
Can't get a vein elsewhere	180	67%	33	63%	22	81%	235	0.413	0.892	0.132
Can get into a vein easier when it is cold	6	2.2%	2	3.8%	3	11%	11	**0.032**	0.134*	**0.049***
It is a sure hit	9	3.3%	4	7.7%	2	7.4%	15	0.153	0.120*	0.326*
It is discreet	61	23%	11	21%	1	3.7%	73	**0.048**	0.168	**0.020**
Other	5	1.9%	3	5.8%	1	3.7%	9	0.123	0.123*	0.479
Total	*269*		*52*		*27*		*348*			

P values are for Pearson Chi-Square test, unless marked with an * when they are for Fisher's Exact Test, or are for linear trend.

Table 4.
Health harms and levels of current injecting into the groin in three urban areas of England.

Health harm†		Injected into the groin during the preceding 28 days? Yes		N	*p*	Odds Ratio, Adjusted* with 95%CI		
Anti-HBc test result	Negative	270	39%	688		1.00		
	Positive	78	47%	167	*0.069*	1.38	0.96 -	1.99
Anti-HCV test result	Negative	148	35%	424		**1.00**		
	Positive	200	46%	431	*0.001*	**1.46**	**1.09 -**	**1.96**
Had abscess, preceding 28 days	No	334	42%	803		**1.00**		
	Yes	14	27%	52	*0.036*	**0.50**	**0.26 -**	**0.94**
Had redness, swelling & tenderness, preceding 28 days	No	301	44%	678		**1.00**		
	Yes	47	27%	177	*<0.001*	**0.49**	**0.34 -**	**0.71**
Had a sore or open wound, preceding 28 days	No	334	41%	811		1.00		
	Yes	14	31%	44	*0.188*	0.67	0.34 -	1.30
Ever been diagnosed with blood poisoning (septicaemia)	No / Not sure	305	39%	780		**1.00**		
	Yes	43	58%	75	*0.002*	**2.05**	**1.25 -**	**3.37**
Ever been diagnosed with deep vein thrombosis (DVT)	No / Not sure	259	36%	722		**1.00**		
	Yes	89	67%	133	*<0.001*	**3.41**	**2.28 -**	**5.11**

P values are for Pearson Chi-Square test.

* adjusted for age, gender and recruitment location, as the extent of the above health harms are known to be associated with these factors.

† For anti-HIV adjustment not undertaken due to small numbers: of anti-HIV positives 33% (1/4) had injected into their groin during preceding 28 days compared with 41% (347/851) of the anti-HIV negatives (*p*=0.748).

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