

Title: Prevalence and factors associated with chronic venous insufficiency, leg ulceration and deep-vein thrombosis among people who inject drugs in London, United Kingdom

Running title: Prevalence and associations of vascular conditions among PWID

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Declaration of Competing Interests

No conflicts to declare.

Abstract

Background:

People who inject drugs (PWID) are vulnerable to a range of harms, including vascular conditions such as chronic venous insufficiency (CVI), leg ulcers and deep-vein thrombosis (DVT). The extent of vascular conditions has rarely been studied, despite contributing to considerable illness and disability among PWID. We assess the prevalence and associations of vascular conditions in PWID in London, UK.

Methods:

Survey-data from the community-recruited Care & Prevent study of PWID in London were analysed. Participants were asked about CVI and leg ulcers using pictorial-questions, and if they had been diagnosed with DVT. Associations between vascular-conditions and demographic/drug-use information were explored using univariate and multivariable logistic regression.

Results:

Among participants (n=455), the prevalence of CVI, leg ulcers and DVT was 13% (n=57), 10% (n=46) and 23% (n=105), respectively. CVI and DVT were positively associated with injecting into the groin, whilst injecting into the leg was positively associated with leg ulcers and DVT. CVI was also associated with not cleaning injection sites and diagnosed Hepatitis C virus; and DVT with diagnosed hepatitis C.

Conclusion:

The prevalence of vascular problems among PWID in London is very high in comparison to the general population. These conditions are primarily associated with injection into the femoral

vein, as well as length of time since first injected. Use of these injection sites indicate peripheral venous access problems. There is a need to reinvigorate safe injection information provision in harm reduction services, with attention to reducing risk practices associated with venous-damage and transitions to femoral injection.

Key words: People who inject drugs; CVI; Leg Ulcers; Deep-vein thrombosis; injection-site infections; vein damage; harm reduction

1. Introduction

There are an estimated 15 million people who inject drugs (PWID) worldwide (1), with the United Kingdom (UK) having one of the highest levels of drug-use in Western Europe (2). Illicit drug injection is associated with high levels of morbidity and premature mortality and increases susceptibility to a range of injecting-related harms, including blood-borne viral (BBV) infections, such as hepatitis C (HCV) and HIV, skin and soft tissue infections (SSTIs), overdoses, and vascular damage (3) (4).

Injecting-drug use is a risk factor for venous damage, including deep vein thrombosis (DVT), chronic venous insufficiency (CVI) and leg ulceration. DVT, where occlusion of the vein occurs due to the formation of a thrombus on the vein wall, can cause irreversible damage, including peripheral oedema and post-thrombotic limb symptoms, such as ulcers and varicose eczema (5-7). A study of people receiving treatment for opioid use in Middlesbrough, UK estimated a DVT prevalence of 14% (7), compared to approximately 0.1% in general adult populations (8, 9), indicating that DVT are common among PWID. DVT in PWID may be due to endothelial damage from injecting and the use of acidifiers (10), as well high levels of coagulative factors as a result of injecting-related infections (11, 12).

CVI, a consequence of venous damage in the lower extremities (13), has been reported among PWID in treatment in a mid-west city, USA (14). Clinical manifestations of CVI include the appearance of varicose veins, oedema, and darkened, dry skin on the lower extremities (14). CVI and the ensuing vascular hypertension can give rise to the development of chronic leg ulceration (15-17). Leg ulcers, defined as 'breaks in the skin between the knee and the ankle present for four weeks or more' (18). Evidence indicates that PWID are disproportionately

affected, a study of PWID in contact with specialist services in Glasgow, Scotland found 15% reported ever having a leg ulcer, (19) in comparison the prevalence is estimated to be 1-2% in the general population of high-income countries (20-22).

As well as the substantive costs to healthcare systems (23), venous complications can be severely damaging to both physical and mental health. PWID with leg ulceration are frequently subject to chronic pain and mobility restrictions and can experience stigma and shame, including in relation to the management of open and odoriferous wounds (24, 25). Subsequently, this can act to restrict employment and social support options, access to health care and exacerbate self-medication for pain relief with illicit opioids (13, 25-27).

Harm reduction research, policy and practice has traditionally oriented around the prevention and treatment of BBVs and, more recently, SSTIs (28). Given the significant individual and social burden of injecting-related vascular issues, there is an urgent need to develop acceptable, accessible and effective preventative interventions. In order to implement such interventions, a greater understanding of the prevalence and risk factors for vascular issues among PWID is required, yet these have rarely been studied. In this study, we aimed to increase the understanding through the analysis of data from an in-depth cross-sectional survey exploring injecting practices and harms among PWID in London. We aimed to estimate the prevalence of vascular issues among PWID in London, UK and examine the associated factors.

2. Materials & Methods

2.1 Data

Anonymised survey data from the mixed-methods Care and Prevent Study (C&P) were used. Detailed methods and study rationale for C&P have previously been published (29). The in-depth survey included questions surrounding injection-related comorbidities, drug-use history, injecting practices, sociodemographic characteristics and healthcare access. Participants completed a detailed researcher-administered, computer-assisted survey.

2.2 Ethical Approval

Ethical approvals were obtained from the London Bridge Research Ethics Committee [17/LO/0872] and the London School of Hygiene and Tropical Medicine Observational Research Ethics Committee [12021]. Written consent was obtained from all participants in the study.

2.3 Study Sample Recruitment & Eligibility

Participants were recruited from six treatment centres, homeless hostels and outreach services across London, UK. Eligibility to participate in the survey was restricted to those aged 18+, who had ever injected psychoactive drugs, and who were assessed as being able to provide informed consent. Participants were fully informed about the study through a detailed participant information sheet and researchers were present at the sites to provide further information on specified days. Participants received a £10 voucher as reimbursement for their time. In total, 455 PWID completed the survey between October 2017 and March 2019.

2.4 Study Measurements

The C&P study questionnaire was carefully developed through extensive consultation with a panel of experts. The survey asked participants questions surrounding sociodemographic

details; drug use history, injection preparation and administration practices (lifetime and previous 12 months); reuse and cleaning of injecting equipment (lifetime); experience of SSTI, vascular conditions and other health conditions, including HIV and HCV. Questions pertaining to ever having CVI and leg ulceration were accompanied by pictures of typical condition presentation, to indicate their type and severity. Participants were also provided with a verbal description of symptoms in order to aid identification and nomination of severity, minimising misclassification bias. Participants were asked if they had ever been *diagnosed by a healthcare worker* as having had 'Deep Vein Thrombosis (DVT)'.

Participants answered detailed questions on reuse of injecting equipment, injecting hygiene practices, primary drugs injected, type and amount of acidifier used to prepare injection solutions, number of injections per day, week or month, body sites injected, and number of times taken to achieve an injection. The latter question was included as it has previously been shown to provide a strong indication of peripheral venous damage (30).

Those participants who reported a lifetime history of CVI or leg ulcers were asked questions about the duration of the condition, how long it took them to seek care and if they had ever been hospitalised for that condition. Participants who reported a previous diagnosis of DVT were asked how long it took them to seek care prior to diagnosis. Measures pertaining to care seeking were informed by prior epidemiological injecting-related infection risk factor and hospitalisation research (31), which used five or more days as an indicator of health care delay. Like in a previous study, we also included ten or more days in recognition of the multiple barriers many PWID face in seeking care (4).

2.5 Case Definitions

The dependent variables in this study were a lifetime history of CVI, leg ulcers and diagnosed DVT. A lifetime history of CVI was defined as participants who reported ever having CVI based on pictures of the typical CVI presentation included in the survey. A lifetime history of leg ulcers was defined as participants who reported ever having a leg ulcer based on pictorial guidance included in the survey. Finally, a lifetime history of DVT was defined as participants who reported ever being diagnosed with DVT in the past.

2.6 Statistical analysis

Data analysis was performed in Stata 16.1. Unless otherwise stated, all variables included in this analysis are reported across the participants history of injecting. Descriptive statistics, including means, medians and ranges were used to present demographic and background characteristics of the entire sample and of those reporting a lifetime history of CVI, leg ulcers and diagnosed DVT. Univariate logistic regression was performed to investigate the associations between demographic and substance-use characteristics (independent variables) and lifetime history of CVI, leg ulcers and DVT (dependent variables), estimating unadjusted odds ratios (ORs) and their 95% confidence intervals (CIs). Characteristics associated with vascular issues from the univariate analysis, where the *P*-value was <0.1, were included in the multivariate logistic regression model. Separate models for each of the three vascular issues were built including the likely confounding variables age and gender, *a priori*. A forward's stepwise entry multivariable logistic regression was built to estimate adjusted ORs and their 95% CIs. At each forward step, retention in the model was dependent either on the factor having the largest confounding effect or the strongest evidence of being an independent risk factor. Multivariate associations were deemed significant if *P*-values obtained by the Wald test were <0.05.

3. Results

3.1 Prevalence of CVI, Leg Ulcers and DVT

Of the 455 participants, 13% (n=57) reported lifetime history of CVI, 10% (n=46) reported leg ulceration and 23% (n= 105) had been diagnosed with DVT (*Table 1*). Of those reporting CVI, 37% (n=21) had lived with this for 5 or more years, 46% (n=26) had received related medical care and 16% (n=9) were hospitalised as a result. Of those reporting leg ulceration, 11% (n=5) had lived with this for 5+ years, 74% (n=34) had received related medical care and 37% (n=17) were hospitalised. The proportion of participants who reported taking 10 or more days to seek medical advice from first noticing symptoms of vascular issues was 28% (n=16) in those with CVI, 20% (n=9) and in those with leg ulcers.

Table 1. Prevalence and Treatment of CVI, Leg Ulcers and DVT among PWID (n=455)

	CVI	Leg Ulcers	DVT
Prevalence (%)	13% (n=57)	10% (n=46)	23% (n=105)
Duration with Venous Issue			
<5 years (%)	63% (n=36)	89% (n=41)	*
5+ years (%)	37% (n=21)	11% (n=5)	*
Received medical attention for the condition (%)	46% (n=26)	74% (n=34)	*
Hospitalised with this condition (%)	16% (n=9)	37% (n=17)	*
Took 10+ days to seek medical advice for the condition (%)	28% (n=16)	20% (n=9)	25% (n=26)
* Participants were not asked about this in relation to DVT.			
Abbreviations: Chronic Venous Insufficiency (CVI); Deep-Vein Thrombosis (DVT).			

3.2 Socio-demographic characteristics and unadjusted associations with venous issues

The mean age of all participants (n=455) was 46 years and 75% (n=341) identified as male. More than half of participants (54%, n=244) self-reported an HCV diagnosis and the majority (78%, n=355) reported a lifetime history of street homelessness for a mean duration of four

years (*Table 2*). The percentage of participants who were ever homeless was 86%, 85% and 83% among those with a lifetime history of CVI, leg ulcers and DVT, respectively. Diagnosed HCV and increasing number of years homeless were crudely associated with all three conditions. In addition, increasing age in years was crudely associated with CVI, whilst female gender was protective against CVI (*Table 2*).

Table 2. Demographic & Health Characteristics among PWID (n=455) stratified by CVI, Leg Ulcers and DVT

Variable	Entire Sample (n=455)	CVI (n=57)			Leg Ulcers (n=46)			DVT (n=105)		
	N (%) /Mean (IQR)	N (%)	Crude OR (95% CI)	P- value	N (%)	Crude OR (95% CI)	P- value	N (%)	Crude OR (95% CI)	P- value
Age										
Mean (IQR)	45.7 (44.9,46.5)	48 (45.9,50)	1.03 (1.01,0.7)	0.04	46 (43.8,48.7)	1.0 (0.97,1.04)	0.65	46 (44.2,47.6)	1.0 (0.98,1.03)	0.77
Gender										
Male	341 (75)	50 (88)	1	0.01	35 (76)	1		83 (79)	1	0.26
Female	114 (25)	7 (12)	0.38 (0.14,0.88)		11 (24)	0.93 (0.41,1.97)	0.85	22 (21)	0.74 (0.42,1.29)	
Diagnosed Hepatitis C										
No	211 (46)	16 (28)	1	0.003	15 (33)	1		32 (30)	1	<0.001
Yes	244 (54)	41 (72)	2.46 (1.3,4.9)		31 (67)	1.9 (0.96,3.91)	0.05	73 (70)	2.39 (1.47,3.93)	
Number of years Homeless										
Mean (IQR)	4.1 (3.4,4.7)	6.8 (3.9,9.6)	1.1 (1.02,1.1)	0.002	6.2 (3.0,9.5)	1.05 (1.0,1.1)	0.03	5.7 (4.1,7.3)	2.23 (1.18,4.43)	0.001
Abbreviations: Chronic Venous Insufficiency (CVI); Deep-Vein Thrombosis (DVT); Odds Ratio (OR); Confidence Interval (CI); Interquartile range (IQR).										

3.3 Substance use characteristics and unadjusted associations with venous issues

As shown in *Table 3*, 42% (n=192) of participants injected drugs for 15 or more years and 59.5% (n=271) primarily injected either heroin, crack or heroin and crack combined in the previous 12 months. Two-thirds(68%, n=311) had a history of smoking tobacco. Most participants (60%, n=273) reported injecting more than once per day, and use of higher risk body sites for injection was common: 60.5% (n=275) had ever injected into their leg, 41.5%

(n=189) had ever injected into their groin and 37.1% (n=169) had ever injected into their neck. Twenty-five percent of participants (n=113) typically take four or more attempts (skin punctures) to achieve an injection. Two thirds (67%, n=306) sometimes or always reuse needles and almost one quarter (22.6%, n=103) never wipe the injection site prior to injecting. Crude associations showed that CVI was positively associated with injecting for 15+ years; ever injecting into the leg, groin or neck; and never cleaning the injection site(*Table 3*). Leg ulcers were more likely in PWID who reported: injecting for 15+ years; injecting heroin, crack or heroin & crack combined as a main drug in the previous year; ever injecting into the leg, groin or neck and taking 4+ attempts to achieve an injection(*Table 3*). Finally, DVT was more likely in those who reported injecting for 15+ years ; injecting heroin, crack or heroin & crack combined as a main drug in the previous year; injecting more than once per day and ever injecting into the leg, groin or neck(*Table 3*).

Table 3. Substance Use Characteristics among PWID (n=455) stratified by CVI, Leg Ulcers and DVT

Variable	Entire Sample (n=455)	CVI (n=57)			Leg Ulcers (n=46)			DVT (n=105)		
	N (%)	N (%)	Crude OR (95% CI)	P-value	N (%)	Crude OR (95% CI)	P-value	N (%)	Crude OR (95% CI)	P-value
Years injecting										
<15 years	263 (58)	23 (40.3)	1	0.004	16 (35)	1	0.001	43 (41)	1	<0.001
15+ years	192 (42)	34 (59.7)	2.25 (1.23,4.15)		30 (65)	2.86 (1.45,5.79)		62 (59)	2.44 (1.53,3.91)	
Injected Heroin, Crack or Heroin, Crack Combined in past year										
No	184 (40.5)	23 (40.3)	1	0.99	10 (22)	1	0.006	31 (30)	1	0.001
Yes	271 (59.5)	34 (59.7)	1.0 (0.6,1.9)		36 (78)	2.67 (1.25,6.18)		74 (70)	1.85 (1.14,3.07)	
Ever smoked tobacco										
No	144 (31.6%)	22 (38.6)	1	0.23	13 (28.3)	1	0.61	30 (28.6)	1	0.44
Yes	311 (68.4%)	35 (61.4)	0.7 (0.38,1.32)		33 (71.7)	1.2 (0.59,2.56)		75 (71.4)	1.21 (0.73,2.02)	
Typical Injecting Frequency										

Inject less than once per day	138 (30)	15 (26.3)	1	0.48	17 (37)	1		23 (22)	1	0.03
Inject 1+ times per day	317 (70)	42 (73.7)	1.25 (0.7,2.5)		29 (63)	0.72 (0.37,1.45)	0.302	82 (78)	1.74 (1.02,3.06)	
Ever Injected into the leg										
No	180 (39.5)	12 (21.1)	1	0.002	5 (10.9)	1	<0.001	12 (11.4)	1	<0.001
Yes	275 (60.5)	45 (78.9)	2.74 (1.37,5.86)		41 (89.1)	6.13 (2.35,20.2)		93 (88.6)	7.15 (3.7,14.8)	
Ever Injected into the groin										
No	266 (58.5)	11 (19.3)	1	<0.001	15 (32.6)	1	<0.001	16 (15.2)	1	<0.001
Yes	189 (41.5)	46 (80.7)	7.46 (3.65,16.4)		31 (67.4)	3.28 (1.65,6.75)		89 (84.8)	13.9 (7.61,26.5)	
Ever Injected into the neck										
No	286 (62.9)	21 (36.8)	1	<0.001	19 (41.3)	1	0.001	40 (38.1)	1	<0.001
Yes	169 (37.1)	36 (63.2)	3.42 (1.85,6.4)		27 (58.7)	2.67 (1.37,5.26)		65 (61.9)	3.84 (2.38,6.23)	
Typical Number of attempts to achieve injection										
1-4 times	342 (75)	37 (65)	1	0.05	28 (61)	1	0.02	75 (71)	1	0.31
4+ times	113 (25)	20 (35)	1.8 (0.9,3.3)		18 (39)	2.12 (1.1,4.18)		30 (29)	1.29 (0.76,2.15)	
Typically Wipe Injection Site Before Injecting										
Always or Sometimes	352 (77)	31 (54)	1	<0.001	31 (67)	1	0.088	78 (74)	1	0.39
Never	103 (23)	26 (46)	3.5 (1.9,6.5)		15 (33)	1.77 (0.8,3.54)		27 (26)	1.25 (0.72,2.12)	
Ever reuse needles/syringes										
Never	149 (33)	13 (23)	1	0.08	12 (26)	1	0.3	26 (25)	1	0.05
Sometimes or Always	306 (67)	44 (77)	1.8 (0.9,3.7)		34 (74)	1.43 (0.7,3.1)		79 (75)	1.65 (0.98,2.82)	
Abbreviations: Chronic Venous Insufficiency (CVI); Deep-Vein Thrombosis (DVT); Odds Ratio (OR); Confidence Interval (CI); Interquartile range (IQR).										

3.4 Factors associated with CVI, Leg Ulcers and DVT: Multivariable analysis results

Factors associated with CVI, leg ulcers and DVT among PWID in this study are shown in *Table 4* as adjusted odds ratios (aOR). Following adjustment, ever injecting into the groin and ever injecting into the leg was associated with both leg ulcers and DVT. CVI was also associated with never cleaning the injection site before injecting and diagnosed HCV. Finally, DVT was associated with diagnosed HCV (Table 4).

Table 4. Factors Associated with CVI, Leg Ulcers and DVT among PWID (n=455):

Multivariable Regression Results

Variable	CVI		Leg Ulcers		DVT	
	aOR (95% CI)	P-value	aOR (95% CI)	P-value	aOR (95% CI)	P-value
Sex						
Male	1	0.09	1	0.58	1	0.84
Female	0.47 (0.19,1.1)		1.23 (0.58,2.62)		0.94 (0.49,1.77)	
Age (in years)	1.03 (0.99,1.07)	0.08	0.99 (0.95,1.03)	0.68	0.99 (0.97,1.02)	0.93
Diagnosed HCV						
No	1 (Ref)	0.03	¥	-	1 (Ref)	
Yes	2.1 (1.10,3.99)				1.83 (1.1,3.13)	0.02
Ever Injected into the Groin						
No	1 (Ref)		1 (Ref)		1 (Ref)	
Yes	6.69 (3.28,13.63)	<0.0001	1.96 (0.98,3.93)	0.05	9.57 (5.2,17.6)	<0.001
Ever Injected into the leg						
No	¥	-	1 (Ref)	0.009	1 (Ref)	<0.001
Yes			3.92 (1.41,10.86)		3.2 (1.57,6.48)	
Typically Wipe Injection Site Before Injecting						
Always or Sometimes	1 (Ref)		¥	-	¥	-
Never	3.03 (1.62,5.68)	0.001				
Years injecting						
<15 years	¥	-	1 (Ref)		1 (Ref)	
15+ years			1.95 (0.98,3.93)	0.06	1.58 (0.98,2.56)	0.07

¥ This variable was not included in the final model.

Abbreviations: Chronic Venous Insufficiency (CVI); Deep-Vein Thrombosis (DVT); Odds Ratio (OR); Confidence Interval (CI); Interquartile range (IQR).

4. Discussion

This study found a high prevalence of vascular damage among PWID in London. The prevalence of CVI, leg ulceration and DVT are markedly higher than the levels in the general adult population. DVT was the most common venous issue reported in this sample of PWID, with a lifetime prevalence of 23%. Given participants were only asked about diagnosed DVT, actual prevalence might be higher. Among the general population, DVT incidence increases with age, from 1 per 10,000 in the adults aged under 40 years to 5-6 per 1,000 in those aged 80 and over (8, 9), but is significantly lower than in this sample of PWID. Leg ulceration was also common, being reported by one-in ten of this sample of PWID, drastically higher than the lifetime prevalence among general population in high-income countries of approximately 1% (20-22). The prevalence of CVI, at 13%, is also higher than the few available estimates

pertaining to general populations in high-income countries, where the prevalence is approximately 6-9% (32). The high prevalence of DVT, CVI and leg ulceration reported in this study's sample of highly marginalised PWID are in line with the few previously reported estimates, obtained predominately from samples of those receiving treatment for their drug use (33-35).

While the factors associated with each of the vascular conditions in this study varied, the strongest association for all was having ever injected into the femoral vein. Participants who reported ever using the femoral vein (42%) had almost ten-, seven- and two- times the odds of reporting DVT, CVI and leg ulcers, respectively, than those who never injected into the femoral vein. As damage to the femoral vein through injecting will likely impact returning blood flow in the area, this finding is expected. Transitions to using the femoral vein commonly occur due to difficult peripheral venous access – also indicated by our sample. We asked how many attempts (skin punctures) it took to achieve a typical injection, with 25% reporting four or more attempts. This, a clear marker of compromised venous access, is a risk for transitions to the use of deeper veins such as the femoral or jugular veins, with potentially dangerous health consequences (10, 36-38).

Compromised venous access and damage among PWID is likely due to scarring from repeated injections, including the possible overuse of acidifiers when injecting and/or compromised filtration practice (10, 30). Venous damage is also likely to increase with number of years of injecting (39), thus, it is not surprising that we found those who injected for 15+ years were almost twice as likely to have a leg ulcer and DVT than those who have been injecting for less than 15 years. Interventions to promote and maintain peripheral venous health are a key

preventative measure for the vascular conditions described in this study. Harris et al., for example, have detailed the role of structural and educational interventions in alerting to link between overuse of acidifier in injection preparation and venous damage (30). Interventions orientated toward promoting venous care and safe injection preparation practice are also likely to resonate with PWID and provide a point of connection for other health and social care interventions (40).

As more broadly reported (REFS), difficulty in maintaining injecting related hygiene (such as cleaning sites prior to injection) can exacerbate risk of bacterial infection and related complications (41). People who are unstably housed, rough sleeping and/or have difficulty accessing fresh, clean water are likely to be most at risk (42). It is crucial therefore, that interventions also practically orientate toward providing sufficient equipment to support hygienic injection practice (such as clean water, hand wipes, alcohol wipes, injection preparation mats) as well as information on how to do so. Advocacy for the introduction of environments that support safe, hygienic injection practice is crucial, particularly in countries that currently legislate against safe or supervised injection facilities.

We note high levels of hospitalisation for venous issues (16% for CVI and 37% for leg ulcers) in this sample of PWID and have published elsewhere on the association between the time taken to seek medical care (apparent among 20% of those reporting a venous issue), condition severity and hospitalisation (4). Delayed care seeking for venous conditions can be extremely dangerous. Untreated DVT, for example, can lead to pulmonary embolism, which is associated with mortality (43). Although this particular analysis did not seek to identify specific barriers to the treatment of vascular issues, findings from other parts of the Care and

Prevent project evidence that PWID face wide-ranging barriers to accessing healthcare, from stigma and discrimination to structural barriers such as limited financial support for transport to attend wound care appointments (44) with this corroborated by other studies globally (45-47). Thus, addressing the barriers PWID face when seeking care are compounding harm, and significant policy and structural changes are warranted to address such barriers (44).

Given the high prevalence of venous complications in PWID, active screening for DVT, CVI and leg ulcers should be offered to PWID as part of general healthcare provision. As self-care of injecting related injuries and infections is likely to be high among PWID (4), any encounter with healthcare should also be at the very least an opportunity to provide information regarding venous care and support self-care best practice. This might include provision of wound-dressing instructions and equipment. Although supporting self-care for venous ulcers is compromised by the need for specialist compression bandaging application, it might support wound healing for PWID unable to attend regular wound care appointments. Geographical distance, poverty, competing priorities and fear of stigma pose barriers to specialist service access for many marginalised populations. It is crucial therefore, that financial and policy support is provided for a range of innovative accessible interventions, such as in-reach wound care nurses at drug treatment and homeless hostel services and outreach wound care services for people living on the street (48).

4.1 Strengths & Limitations

This study measured wide-ranging injecting-related conditions, however, the inherent nature of a cross-sectional study meant we were unable to investigate temporal-relationships between factors associated with the conditions and thus we cannot eliminate the possibility

of reverse causality. Additionally, the nature of the study meant that only current injecting related behaviour could be explored in detail, however past practices and risks may be different from current ones. However, in contrast to longitudinal studies which use healthcare records, our study captures a community-based sample, who were not necessarily accessing healthcare services and who have conditions that may not have been clinically recognised or recorded. Survey data may be subject to reporting bias as self-reporting of conditions, including those diagnosed, was used. Previous studies have, however, indicated that self-reporting of injecting-related infections is reliable among PWID (49). In addition, this study used photographs to aid recall and self-diagnosis (see Wright et al., 2020). However, though conditions might be incorrectly reported in this study we believe this to be minimal. Answers relating to questions surrounding injection practices and hygiene may have been influenced by social desirability bias, though this is unavoidable and likely minimal.

The study aimed to be as representative as possible. Recruitment took place in community settings, thus aiming to engage a range of PWID – including those who might have difficulty accessing clinical services or hospitals. Although recruitment of participants was solely in London, a previous study has shown that C&P participants characteristics largely reflect those among PWID nationally in the UK (41) and thus we believe that our findings have a high degree of generalisability in the UK. However, we cannot rule out the likelihood of participant selection bias.

4.2 Conclusion

The lifetime prevalence of vascular issues in PWID in London (UK) is considerably higher than in the general population. Considering the associated healthcare costs, distress and disability,

interventions are urgently needed to reduce their occurrence, including removing the barriers to safe injecting practice, and improving access to care. Interventions which prevent vascular damage early on the causal pathway and help to promote safe injecting preparation and practice are likely to yield the most significant harm reduction benefits.

Author Contributions

The study was conceived by MH and VH. C&P data collection tools were developed by MH. C&P data collection was overseen by MH and TW. Data analysis was conducted by JD. The paper was drafted by JD, with significant input from MH, VH, TW, DC & JS. All authors read and commented on the final manuscript.

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Declaration of Competing Interests

No conflicts to declare.

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