PEOPLE WHO INJECT DRUGS' EXPERIENCES OF SKIN AND SOFT TISSUE INFECTIONS AND HARM REDUCTION: A QUALITATIVE STUDY

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ABSTRACT (261 words)

Background: Bacterial skin and soft tissue infections (SSTI) among people who inject drugs (PWID) are considered a public health concern. There is a lack of qualitative research examining the lived experience of PWID who have had SSTI. This paper explores PWID views and experiences of their SSTI, their perceptions on the causes of their SSTI and their harm reduction (HR) behaviours. The implications for HR service delivery and practice will be discussed.

Methods: Between October 2015-January 2016, 22 in-depth interviews were conducted with PWID who had experienced a SSTI within the past year. Interviewees were recruited from an injecting equipment provision service and a drug treatment service in Glasgow and Edinburgh respectively. The interview transcripts were transcribed verbatim and underwent thematic analysis.

Results: We found that the experience of SSTI can cause strong negative feelings, including panic and stigma and that there was limited knowledge of SSTI prior to first hand experience. The awareness of the unacceptable social and physical consequences of SSTI fostered a sense of personal responsibility and agency which led to the introduction or improved HR uptake. However, when PWID were struggling to inject or when their physical and political environments were compromised there was an increased risk for SSTI and reduced effectiveness of HR.

Conclusion: Compared to HCV and HIV, SSTI as an injecting related harm has received less policy attention. Policy makers need to address SSTI HR within enabling environments, such as 'safer environment interventions'. It is recommended that peer based support, improved NSP provision and medically supervised injecting facilities are needed to deliver SSTI HR.

INTRODUCTION

Skin and soft tissue infections (SSTI) among people who inject drugs (PWID) are considered a public health concern. Injection site SSTI are typically caused by bacteria on the skin from unsterile injecting equipment or contaminated drugs (Gordon & Lowy, 2005). If these infections, which typically result in abscesses or cellulitis, are left untreated they can result in serious morbidity and mortality; in addition, infections (such as anthrax and botulism) caused by spore forming bacteria (SFB) can be fatal because of the toxins produced and require prompt medical attention (Hope, 2010).

A systematic review of international prevalence studies has shown that SSTI are common among PWID; between 6 to 32% of PWID reported a current SSTI or having had one within the past month, and 7 to 37% reported an SSTI within the past 6 to 12 months (Larney, Peacock, Mathers, Hickman, & Degenhardt, 2017). Despite this, much of the harm reduction (HR) aimed at PWID has arisen from, and remains focussed on, the prevention of HCV (Hepatitis C virus) and HIV leaving SSTI as the neglected injecting related harm (Hope, 2010).

The growing body of literature on SSTI among PWID has been dominated by quantitative cross sectional studies, aimed at identifying risk factors associated with SSTI prevalence, and clinical case-reports. These studies have identified a number of risk factors: including being female, frequent injecting, and intra-muscular or subcutaneous injecting; whilst skin swabbing and hand washing were identified as protective factors (Larney et al., 2017). A limited number of behavioural change intervention studies have examined SSTI; including brief interventions addressing injection site cleaning, hand cleaning or needle bleaching (Mercure, Tetu, Lamonde,

& Cote, 2008; Phillips, Stein, Anderson, & Corsi, 2012). However, HR behaviours learned through such brief interventions may become irrelevant within the everyday life of a PWID (Miller, 2005). Studies examining the impact of structural interventions, such as injecting equipment provision, on SSTI have also been limited and quantitative in design (Larney et al., 2017). Although these quantitative studies highlight the associations between risk or protective factors and SSTI, qualitative studies are needed to help understand the many explanations within the PWIDs' within NHS Greater Glasgow and Clyde Health Board. These research sites were chosen as these Health Boards have sizeable injecting populations and unpublished survey data indicated the proportion of PWID reporting an SSTI in the past year was 36% and 27% respectively (unpublished University of the West of Scotland & NHS Health Protection Scotland Needle Exchange Surveillance Initiative (2013) data). These areas had also recently experienced clusters/outbreaks of bacterial infections. Within NHS Greater Glasgow and Clyde there was a botulism cluster/outbreak during Dec 2014-July 2015 (NHS National Services Scotland, 2017) and in NHS Lothian there was a Group A Streptococcus cluster/outbreak associated with ethylphenidate, a new psychoactive substance (NPS) during 2014-2015 (Yeung et al., 2017).

Sampling and recruitment

Staff at the research sites facilitated recruitment by initially informing their clients about the study and the availability of the researcher. The researcher explained the nature of the study to possible participants and checked eligibility. Eligible participants were those who were 18 years or older, had injected in the past six months and had experienced a SSTI within the past year. SSTI were defined as abscesses, cellulitis or necrotising fasciitis caused by injecting. Photographs of localised SSTI symptoms and descriptions of local and systemic symptoms were used to help identify the nature of the SSTI experienced. Purposive sampling was used to recruit PWID by SSTI and by gender. Exclusion criteria included those younger than 18 years.

Data collection

In-depth interviews, lasting between 21 and 67 minutes, were undertaken in a private consulting room

at the recruitment sites between October 2015 and January 2016. A short questionnaire was used to gather non-identifiable demographics, drug use and opiate substitution treatment history within the past six months. A topic guide explored PWID's experiences and views of SSTI including clusters/outbreaks of SFB infections, how they responded to their infection in terms of HR, healthcare seeking and self-treatment. The interview focussed on the most recent and/or most severe SSTI experienced.

Analysis

All interviews were digitally recorded, transcribed verbatim and pseudonyms assigned. The transcripts were categorised thematically using framework analysis (Ritchie, Lewis, McNaughton Nicholls, & Ormston, 2014). Framework analysis, which consists of data management and data analysis is a useful technique for the formulation of policy (Tim Rhodes & Coomber, 2010; Ritchie et al., 2014).

Microsoft WORD was used to manage the data. The lead author checked the transcripts and recordings for accuracy and familiarisation of the data, developed the initial framework by applying the topic guide to create categories to help sift and sort the data. The study team agreed the coding framework. The lead author indexed each transcript using these framework categories. Matrices were developed for each framework category where the participants' interviews were summarized within the matrix. This enabled analysis of a category across all participants or analysis across the categories by a single participant. Data analysis consisted of mapping the range of responses and looking for patterns in the matrices and links between categories.

From this a number of themes emerged including: impact of SSTI; knowledge of SSTI; personal responsibility and agency; social and physical risk environment. Rhodes' theory of risk environment was used to help interpret and explain the findings to aid a policy level discussion on the need and direction for SSTI HR interventions (Tim Rhodes, 2002, 2009). The 'risk environment' framework enables an examination of the physical, social, economic and political environments that influence injecting practices and disrupt HR uptake. These four dimensions operate at a micro and macro level.

The 'risk environment' shapes the success or failure of HR interventions (Tim Rhodes, 2002). Descriptive statistics were used to describe the participants' demographics.

Ethics

NHS West of Scotland Research Ethics Committee and the University of the West of Scotland Ethics Committee granted ethical approval. Participants were given an information sheet and provided informed consent prior to data collection. Participants were offered a £25 retail voucher for their time.

FINDINGS

Participant characteristics

Twenty two PWID were interviewed between Glasgow (n=14) and Edinburgh (n=8). The median age was 36.5 years (range 21 to 61 years), 68% (15) were male and 59% (13) had experienced homelessness during the past six months. They had been injecting for a median of 15.5 years (range 5 to 43 years). All participants had injected heroin within the past six months, for 82% (18) this was the main drug injected; for one participant cocaine was their main drug, and for another one it was NPS and heroin equally taken. The majority (82%, 18) were injecting at least daily. Between all participants, a total of 23 abscesses, three cellulitis and two necrotising fasciitis infections were experienced in the past year.

Impact of SSTI

SSTI typically caused many strong negative feelings among the majority of participants whilst only a few participants felt unconcerned.

Dave, for example, who had experienced abscesses intermittently over the past 25 years, showed no concern for abscesses, describing SSTI to be an inevitable consequence of injecting:

> It's all part and parcel of, it's just a, another sort of hazard a' drug taking. (Dave, Male, 40 year old)

This suggests that some PWID normalise SSTI. However, this view that injecting related harm, such as abscesses, is normal or inevitable (Morrison, Elliott, & Gruer, 1997) belies the strong negative

psychological suffering that can be experienced by PWID with SSTI. In contrast to Dave's unconcern, others felt panicked or stigmatised by the symptoms.

Feelings of panic were linked to physical consequences such as a fear of losing a limb, which was a commonly held view, or from lack of healing and potential poisoning of the body. Fear of losing a limb was illustrated by Brian who had cellulitis:

> I What is it about it that – what is it that makes you worry about it?
>
> R Just the infection an' everything. Do you know what I mean? Because you don't know what it could beYou might end up losing a limb. (Brian, Male, 42 years old)

In addition to the fear of the possible physical outcomes of SSTI, PWID also felt stigmatised by them. This stigma could be internalised, as demonstrated by Holly:

> And I feel conscious about it and I hate myself for it. So it makes me feel, it makes me feel horrible. Ugly and horrible and, you know. It's no nice. But it's self inflicted, but it's ma own fault, you know. (Holly, Female, 36 years old)

But, like HCV and HIV, which stigmatise PWID by association with injecting (Treloar & Rhodes, 2009), SSTI were also socially stigmatising, but in a much more visual way, by potentially identifying a PWID because of the unsightly visible physical symptoms:

> But see when I've got poison in them an' they're green an' yellow an' that, you dinnae like any, naebody tae [you don't like anyone to] actually see that. It's horrible, it's like a deformity on you [A]s if somebody would go, "Aye, you can tell he's jagging. Look, you can tell he's injecting drugs because look at his legs." it stops you fae wearing shorts or things like that on a hot day or whatever, eh? (Danny, Male, 43 years old)

Knowledge of SSTI

Concern, or lack of it, about the physical aspects of SSTI appeared to be linked to level of knowledge about SSTI. Dave, mentioned above as showing no concern, had gained knowledge from having had abscesses over 25 years:

> I knew a fair lot cause I had a fair few [laughs]. (Dave, Male, 40 year old)

And Alison, who was also unconcerned about her abscess, had gained awareness from seeing or hearing about abscesses from her social network:

> I wasn't overly worried about it because I knew that it was acting as the same way as ma

other friends. (Alison, Female, 36 year old)

In contrast, among some PWID there was very little second hand learning of SSTI from peers:

> I'd seen folk wi' them and that eh. But I just never knew anything aboot them eh. (Bobby, Male, 32 year old)

> My ex boyfriend, he had an abscess. [I] Never ever looked at it. But he was always on about abscess[es]. I didnae [did not] ask him any questions or anything like that. Just…but aye and then I got one maself. (Tanya, Female, 21 years old)

Consequently, those who experienced a SSTI for the first time demonstrated a lack of knowledge as exemplified by Allan, who had been injecting for 16 years before experiencing his first abscess:

> I didn't know anything about them until it happened. … Until I got, [NAME of FRIEND] knew about them but he didn't tell me until something happened. … Cause I, I asked him. I was like, 'what the hell's that on my arm?' He's like, 'it's an abscess'. (Allan, Male, 34 year old)

A lack of second-hand learning from other peoples' experiences reflected a disinterest until SSTI became relevant:

> Ken, it was nowt tae dae wi' me [Do you know what I mean, it was nothing to do with me], until I started getting them an' then I started realising "Oh here, he must have got that through the… here mate, how did you get that?" Aye, it's just I've got one there an' you can, sometimes you compare, eh? (Danny, Male, 43 years old)

For some this disinterest arose from a belief that they would never suffer from a SSTI as illustrated by Bobby:

> Aye that'll never happen tae me. I had the attitude, that was the attitude I had. 'That'll never happen tae me'. I'm the lucky one and that, it'll no happen tae me (Bobby, Male, 32 years old)

Interestingly, Bobby was unwilling to share his experience of his groin abscess with his social network, an approach which helps explain a lack of second-hand learning:

> I didnae [I didn't] like talking about mine because it was all self inflicted eh. It was all really my fault. So it was like that's ma business eh (Bobby, Male, 32 years old)

The above shows that for some PWID, learning about SSTI was gained from personal experience whilst others gained awareness from their peers.

The experience of, and learning gained from having a SSTI can also leave some PWID, such as Allan, viewing SSTI as an experience not to be repeated:

> I don't want another abscess, trust me. The pain was excruciating. (Allan, Male, 34 year old)

Personal responsibility and agency

Awareness of the unacceptable social or physical consequences of SSTI fostered a sense of personal responsibility and agency in some PWID which, in turn, encouraged wound care or the use of HR techniques to avoid future infection. However, whilst it was commonplace for HR to be introduced or used more frequently since a SSTI, some PWID did not consciously associate this with addressing SSTI or they considered SSTI to be unpredictable:

> But see, see to tell you the truth, you, you don't, you dinnae [didn't] even really know when you're gonnae [going to] get them because one time you could get yourself in the vein and it can turn intae an abscess. Or another time you can miss and it doesnae turn intae [does not turn into] an abscess. Another time you can miss and it does turn intae an abscess. (Amy, Female, 34 year old)

Dave, who considered the unsightly symptoms as socially unacceptable, was prepared to look after his abscesses, indicating a level of personal responsibility and awareness of the need to manage and minimise any symptoms:

> They don't bother me because I don't let them get…I don't let them get out a' control. I know people and they do nothing about them. And they're stinking and it's, it's horrible. And there's no need for it. Well I, I use antiseptic swabs morning, noon and night. I dress them meself wi' iodine and…and patch [bandages] Yeah, yeah but if it gets too bad I'll go tae a doctor and get a course a' antibiotics and then, or else he'll slit it or taken intae a hospital, depending on how bad it is or where on the body is it. (Dave, Male, 40 year old)

Many participants practiced skin swabbing. Brian, who had been hospitalised with cellulitis, engaged in consistent swabbing to help avoid another infection:

> Well, like I said, I'm swabbing mair [more]. Do you know what I mean? To make sure that it's no' happening. It's the last thing I want. I dinnae [don't] want that again. Naebody [Nobody] wants it. (Brian, Male, 42 years old)

And, as noted by Patricia, the provision of swabs in the 'one hit kits' (a pack containing a sterile N/S, spoon, filter, wipe/swab and citric acid sachet for a single injection) was beneficial:

> 'Cause especially wi' the one hit kits now. Like, before when you got your tools, … probably a Sterex wasnae the first on your – you know, you wouldnae [would not] really think 'Oh, I need a Sterex.' But when it's in the one hit kit and it's there for you to use, I think you're more likely to use it, you know? (Patricia, Female, 34 years old)

However, despite the supply of swabs in the 'one hit kits', they were not always used for the intended purpose:

> Getting them quite regular. Always making sure that I've got new, new clean needles and

> swabs. A', a' the paraphernalia, the cookers, everything. But one a' the things that I didnae dae [didn't do] and I should have done during ma using was the swabs. I didnae clean maself often enough before I, before I had the injection. … But it's like another thing, you know, because you've got about ten things tae dae [to do] before you actually get the hit. And it's building up and building up, a' the excitement, everything. And then so I'll just say the less work [to] get this hit, get this. (Sam, Male, 49 year old)

John used his wipes to clean the injecting equipment and to get a better flame:

> Just maybe cleaning my pot, or if my lighter's no' very good, lighting the swab because that's got alcohol in it and gies [gives] you a flame tae [to] cook the hit up. (John, Male, 45 years old)

A few participants noted that pre-injection wipes were not necessary as they showered or bathed before injecting to help them locate surface veins. Others would use baby wipes or alcohol wipes post-injection rather than pre-injection.

Other HR introduced following a SSTI included: improved general cleanliness, staying away from squalid injecting settings, taking time to inject to avoid missing, keeping to surface veins by using 1ml N/S to avoid digging for deeper veins, using a sterile needle for each attempt, increasing the quantity of injecting equipment collected from a NSP (for example, from 10-20 N/S to a box of 100 N/S), reducing injecting frequency, regularly getting injecting wounds checked by a nurse, and abstaining from groin injecting or NPS. Notably, some injecting changes made would be ineffectual or counter-productive, such as, boiling the drug solution more to remove black flecks or using more citric acid.

Also, a transition to smoking was undertaken by some. Allan transitioned to smoking to reduce his injecting frequency and to allow his abscess to heal:

> But I've sorta stopped going into my arms just to let them heal. I'm smoking now at the moment. But I…I…I'm not gonna [going to] lie to you, I miss injecting too much. I miss the high of the injection. (Allan, Male, 34 year old)

Later on in the interview, he admitted to occasionally injecting into the veins in his hand. However, Patricia, who had transitioned to smoking since getting an upper arm abscess, acknowledged this was because of the difficulty getting a vein rather than avoiding a SSTI *per se*. For some, smoking or snorting was not an option because of poor quality heroin, injecting being better and more cost effective, lung problems, and sharing drugs with another injector.

It was rare for participants to practice injection site rotation prior to or since their SSTI. The same

injecting site was re-used to ensure another successful hit as explained by Eric and Liam:

> …if you have success with the hands from the previous time, that's what I would go for the next time because I thought "Well, it worked the last time." … cause veins do not pop up very much, it's difficult to even see them, never mind actually hit them. (Eric, Male, 61 years old)

…cause I got it the last time and I, I know sort of what angle to go in at. Some a' them could be quite a bit deep under the skin, yeah. (Liam, Male, 36 years old)

Furthermore, Liam explained that he was unaware of injection site rotation and would re-use the same vein until it was damaged before moving onto another vein:

> See I didn't realise that site rotation was so important when I started injecting. And to be honest when I first started injecting, my, my main goal was suicide really, yeah. And but…yeah I would always use one vein until it, it was damaged and then move on to the next. … Then I got to the point where I was lucky if I found one. (Liam, Male, 36 years old)

However, Pete, who despite been advised by a friend to practice injection site rotation, justified not doing so because he did not want to use alternative injecting sites that he could not conceal and thus avoid social stigma:

> I Okay. So, why always go in the same [injecting body site]?
> R I don't know. I think it was just so I didnae [didn't] get track marks up and doon my airms [down my arms]. … Well, when I – when I first started injecting, my mate telt me 'a'ways go, dae it here once, there once, there, just dae a box' [my mate told me always do it here once, there once, there, just do a box} [PARTICIPANT POINTED TO LOWER RIGHT AND LEFT ARM]. So, if I dae that I'm gie'in myself [So, if I do that I'm giving myself] a chance to heal. … And I'll no' end up wi' marks. But I was dae'in [doing it] it that much then I had a mark here, here, here, and here, and I looked like a pure state. (Pete, Male, 28 years old)

For some, such as Patricia, not being aware of and not practising injecting site rotation was a cause of regret:

> "… I just wish I had rotated my veins more. And I wish I was more aware of it when I first started injecting. You know? I'd have probably done it. 'Cause I did have good veins at one time but they've packed in now." (Patricia, Female, 34 years old)

Personal responsibility for SSTI was also seen in the reasons PWID gave for developing these infections. Many participants blamed their own injecting technique, or lack of it.

Missing the vein was cited as a cause of SSTI through struggling to inject into damaged veins or from a lack of confidence in technique as noted by Allan who had an abscess in the crook of his arm:

> Yeah a missed hit but I think, but the thing is I'm not the best hitter. I'm no gonnae lie tae you right [I'm not going to lie to you]. I'm not the greatest hitter. . . . but now my veins…are paying the price for it, I think. You know, now cause I've been missing it a lot. It's like I'm really starting…tae get scared aboot it [to get scared about it] (Allan, Male, 34 year old)

Or from shaky hands as noted by John:

> Sometimes I dinnae [didn't] have the needle right in, like against my skin and the needle might be out a bit when I find the vein, so, I'll try and hold it in that position. But it depends, you know, shaky hands and stuff like that. You end up missing at times. (John, Male, 45 years old)

Reliance on assisted injecting was also implicated for causing missed hits by Patricia and Danny who both noted that the assisting injector can be careless, inexperienced, unaware they have caused a problem or impatient to get their own hit. This can even be an issue when the person assisting was trusted:

> I thoroughly believe that the person was genuinely trying to get me, but unfortunately they missed. Right? But they're in, maybe they're in a rush for their ain stuff, or maybe whatever. Maybe just lack o' knowledge o' trying tae get it right an' they've inadvertently burnt me an' caused the abscess. It's gottae be people I know an' people I
> have, I can trust. But even people you trust, you can still end up with abscesses an' such like. (Danny, Male, 43 years old)

Although struggling to inject was not always given as an explanation for their SSTI, it was a recurrent theme raised during descriptions of injecting experiences. Eric described deliberate muscle popping:

> Sometimes if I just haven't been able to get a vein after, say, three tries, I'll just put it into muscle. (Eric, Male, 61 year old)

Struggling to inject resulted in some PWID resorting to surface veins or central veins, such as the groin.

Groin injecting was commonplace and was associated with practical injecting difficulties. Caroline, who had a groin abscess, in general guessed whether she had hit the femoral vein and acknowledged she probably misses. Similarly, Tanya, who had been hospitalised for a groin abscess and DVT, noted that despite injecting into her groin she did not know what she doing:

> Well ma ex, he was the one that marked me. I just seen the hole and thought I could go intae it [into it]. And didnae [didn't] realise what I was doing. I was hitting a nerve, artery, punctured ma artery. Ended up wi' DVT, everything. Just using blunt needles, using used tools, using wi' other people. (Tanya, Female, 21 years old)

In addition, struggling to inject resulted in injecting equipment supplies being quickly depleted:

> It's too much trouble you can spend ower an hour over mair just tae [over an hour, over more just to] get it. And then you could have five sets to start with and you end up getting, you're on the last one. (Hugh, Male, 53 years old)

Depletion of injecting equipment could lead to re-use of needles, seen as a cause of SSTI by some

participants.

Needles were re-used because of lack of time or inability to replenish supplies due, for example, to weekend closing of convenient NSP or if they woke in the middle of the night:

> A chaotic life situation that I was in at the time, that I had to re-use because there isnae [isn't] really any excuse for it, there's exchanges everywhere in [NAME of CITY], do you know what I mean? And there's a 24 hour one … Aye, so, there's really no excuse for – but maybe time. Like, if it's early hours and, you know, if you're using, if you've woke up and it's, like, half one or whatever and you're gonnae [going to] have a charge then you've ran out of tools or whatever then, like, you just think 'Ach, I'll use that one I used earlier. (Patricia, Female, 34 years old)

The tendency was to re-use needles and syringes (N/S) twice or three times, with some acknowledgment that the needles were probably barbed, had not been cleaned or only rinsed, and had been taken out of a 'cin-bin' (incineration bin used for the safe disposal of sharps) or a bag as described by Tanya:

> Needles, couldn't be bothered walking to [NAME of EXCHANGE] because a' the pain I was in. I just went to the cin-bin [sharps bin] and took, took a few used, and some a' them were barbed. I didn't know what a barbed was cause I never got told. (Tanya, Female, 21 years old)

However, Sam who admitted to re-using the same needle up to 10 times, acknowledged that a photograph of a barbed needle, displayed in a drug treatment centre, had impact:

> I Did you know [about barbed needles]?
> R No, I forgot. No I didnae [didn't] know that it was as bad as that photae. And when I seen that photae, how a needle looks when blunt, I was like, 'what!'. Didnae [didn't] know that. That's, that's a, that is a pure absolute cracking photae. You know, it's amazing that photae. If I'd have seen that years and years ago I woulda' definitely have thrown them things away. (Sam, Male, 49 years old)

Reasons for re-using, despite picking up plenty of N/S, included had given them away to others or had been accidentally supplied with the wrong sized needles and preferring to re-use than use the wrong needle. Re-using one's own N/S is considered protective against N/S sharing (Rhodes, Davis, & Judd, 2004) but may not prevent vein damage and the development of SSTI.

Social and physical environment risks

Some SSTI risks were out-with the individual control or personal agency of PWID. For example, drug composition constitutes a physical/pharmacological risk environment over which PWID have no control (Elliott et al, 2018; McGowan et al, 2017). Some PWID believed that the drug or adulterants

had caused their SSTI because the drug did not look right, they generally practised safe injecting or they had used a different dealer from their usual. In particular, NPS injecting was implicated as the cause of SSTI by some participants. Danny, who had experienced abscesses whilst injecting NPS, noted its 'corrosive' effect on the skin because of ingredients such as 'draining fluid' or 'oven cleaning fluid' and Mike considered:

> It's chemicals inside the legal highs, I think. It's all it could be. Never had anything like that wi' heroin so it's a chemical inside the legal highs. It's gotta [got to] be. (Mike, Male, 33 years old)

However, a squalid physical risk environment, was also described by those injecting NPS, which could be implicated as causing SSTI. The most commonly injected NPS in Lothian at the time of the study was 'Burst' which contained the stimulant ethylphenidate (Lafferty et al, 2016). Pete described his experience whilst injecting 'Burst'.

> In the place I was sitting, 'cause some o' the places I was sitting when I was on that Burst were nae better than Trainspotting. … Bloody swabs all aboot the place, uncapped needles, cin-bins [sharps bins] - unused dirty works and in juice bottles. … It was like sitting in the kerb doon near the rubbish. (Pete, Male, 28 year old)

Furthermore, Pete acknowledged sharing N/S whilst injecting Burst, suggesting that his previously established HR practice was being hindered:

> R But, see wi' heroin? Wi' heroin, you didnae [didn't] bother, if you couldnae [could not] get a needle, you didn't [inject], you went withoot [without]. But wi' this stuff [Burst], it was unbelievably addictive.
> I Right.
> R An' it was really, really bad. You didnae care, you didnae bother and it didnae matter if the blood, the barrel was see-through or it was bright pink, bright red. It was, it was in the blood, you ended up taking it. Ken [Do you know what I mean}, it was disgusting, what [BURST] would actually dae to your heid [do to your head].
> I Aye. Aye.
> R Ken [Do you know what I mean] 'cause they usually tell you
> that's wrong, dinnae dae [don't do it] it, wi' heroin. But this stuff, you just – you switched off. (Pete, Male, 28 years old)

DISCUSSION

Our study is one of the few qualitative studies to have explored PWID views and experiences of their SSTI, perceived causes of SSTI and use of HR. A number of themes emerged including: impact of SSTI, knowledge of SSTI, personal responsibility and agency, and the social and physical risk environment. We found that the experience of SSTI can cause strong negative feelings, including

panic and stigma and that there was limited second hand learning from peers about SSTI. None of the respondents mentioned learning about SSTI prior to experiencing them from services such as NSP. The awareness of the unacceptable social and physical consequences of SSTI fostered a sense of personal responsibility and agency which led to the introduction or improved HR uptake. However, when PWID were struggling to inject or when their social environments were compromised there was an increased risk for SSTI and reduced effectiveness of HR.

In general, interventions are needed to enable PWID to exercise personal responsibility and agency over preventing and dealing with SSTI while also addressing the lack of SSTI awareness and knowledge, practical injecting difficulties and the risk environment. There is a need to provide advice and information, address individual level behaviour change and structural level change.

SSTI advice could include the signs and symptoms, wound care, HR and sources of healthcare. This may help some PWID to feel less stigmatised and panicked by SSTI, aid prevention and encourage timely healthcare seeking. Safer injecting advice could include for example, showing PWID how to find a vein to avoid missed hits, and should promote injection site rotation and route transition. We found that PWID were reluctant to practice HR such as vein care and route transition before or since their SSTI. This was because of poor awareness of injection site rotation, a lack of viable veins, a reluctance to use alternative injection sites that cannot be concealed, and a preference for injecting over other consumption routes. Pragmatic vein care advice has been advocated for PWID having difficulty injecting (Harris & Rhodes, 2012). Vein care advice may be more effective for those PWID disenfranchised with route transition advice (Harris & Rhodes, 2012). Our findings show that some PWID did not consider route transition viable and the few PWID who transitioned to smoking/snorting did so either temporarily to allow SSTI wound healing or their reason was unrelated to preventing SSTI.

Such awareness raising may be needed for all PWID regardless of duration of injecting. In our sample, poor knowledge of SSTI was not necessarily associated with new initiates to injecting. Our PWID had been injecting for on average 15 years, with none having a duration of injecting of less than

five years, and some were experiencing their first ever SSTI after five years injecting. This may indicate a group of PWID for whom their first SSTI was a consequence of prolonged injecting histories, for example, from venous damage.

Our findings also suggest that any HR interventions which focus on the unacceptable consequences of SSTI, including the stigma, unsightly visible marks, swellings and pain, rather than health promotion may be effective. This is supported by previous work that found body image management, namely avoiding track marks and scarring, was a rationale given by HCV negative PWID for engaging with HR rather than HCV prevention or vein maintenance (Harris, Treloar, & Maher, 2012).

However, behavioural and individual level HR interventions and messages may be limited in effectiveness without a recognition of the limitations imposed by the risk environment (Moore, 2004). Interventions also need to address the compromised social, physical and political environments (Tim Rhodes, 2002, 2009) exposing PWID to i) injecting equipment shortages, ii) squalid injecting environments, iii) withdrawal and iv) adulterated drugs. These experiences, alongside struggling to inject, underpin the risk behaviours and compromised HR practices putting PWID at risk of SSTI. Consistent with findings from other studies which examined SSTI and injecting (Phillips et al., 2012) or injecting in general (Moore, 2004; Neale, 2002; Taylor A., Fleming A., Rutherford J., & Goldberg, 2004) the PWID in our study were re-using N/S, injecting sub-cutaneously or intra-muscularly, inexpertly groin injecting, reliant on assisted injecting and not consistently swabbing. These behaviours have been found to be risk factors for SSTI (Dunleavy et al., 2017; Hope, Hickman, Parry, & Ncube, 2014; Hope, Kimber, Vickerman, Hickman, & Ncube, 2008; Larney et al., 2017; Lloyd-Smith et al., 2008; Murphy et al., 2001) .

'Safer environment interventions' have been identified as mitigating against the risk environment and include peer-based harm reduction interventions, NSP provision and supervised injection facilities (McNeil & Small, 2014; T. Rhodes et al., 2006) . They produce social, structural and physical settings for HR whilst providing access to social and material resources, such as advice, injecting equipment supplies and healthcare.

Peer based support interventions

There are many examples of peer-based interventions that have provided HR, advice and health services (Marshall, Dechman, Minichiello, Alcock, & Harris, 2015). Abscess management, among other injecting related harms, has been facilitated through the provision of peer-to-peer out-reach education and assistance to promote safer injection techniques at the point of injection (Small et al., 2012). This has been delivered to those engaged in public or semi-public injecting via drug-user-led 'Injection Support Teams'. The advice provided included injection techniques, safer injection practices, route transition advice and verbal instruction promoting self- administration of injections. However, peer interaction needs to be frequent, for example Jain et al. (2014) found that three or more sessions per month were associated with behaviour change such as reduced N/S sharing (Jain et al., 2014). Other means of delivering advice and education are needed for PWID not engaged in public injecting. The 'Injection Support Teams' also provided peer-led workshops including education on bacterial infections from drop-in centres and single room occupancy hotels (Callon, Charles, Alexander, Small, & Kerr, 2013).

Structural interventions

Structural level interventions, such as improved NSP provision and medically supervised injecting facilities should also be considered for prevention of SSTI. In order to ensure adequate individual-level N/S coverage, to prevent N/S re-use, policies governing injecting equipment distribution may need to be scaled up. Homelessness and public injecting have been found to be associated with a 'syringe gap', that is, an inadequate number of N/S for the number of injections (Bluthenthal, Anderson, Flynn, & Kral, 2007; Heller, Paone, Siegler, & Karpati, 2009). This suggests a need to scale-up street based outreach or peer distribution, and 24 hour NSP access. In addition, PWID could also be offered a postal service where practical (European Monitoring Centre for Drugs and Drug Addiction, 2016). However, expansion of injecting equipment distribution without also offering a more client- tailored NSP service that addresses PWID social disadvantages, poor physical and mental health will not eliminate risky injecting practices (Treloar, Mao, & Wilson, 2016).

Medically supervised injecting facilities could also be instrumental in raising awareness and helping PWID avoid SSTI. Although there is no evidence on the impact of supervised injecting facilities on the prevalence and incidence of SSTI, it has been perceived by healthcare staff and users that safer injecting education delivered within a supervised injecting facility had resulted in a reduction in abscess occurrence (Fast, Small, Wood, & Kerr, 2008; Krüsi, Small, Wood, & Kerr, 2009). Education included how to find a vein, tourniquet use, hygienic use of a filter (Wood et al., 2008). In addition, the facility was found to increase access to nurses offering SSTI assessment and healthcare and facilitated timely hospital referral for the more serious SSTI (Lloyd-Smith et al., 2009; Wood et al., 2008). It was not the safer injecting education *per se* but it's timely delivery within the supportive environment of a supervised injecting facility that heightened PWID awareness and diligence, and enabled safer injecting to become habit forming both onsite and outside the supervised injecting facility (Fast et al., 2008). Furthermore, the more hygienic space of a supervised injecting facility coupled with access to a readily available supply of sterile N/S at the point of injection may for some PWID mitigate against physical risk environments.

Although there were no differences in the PWID views and experiences across the two recruitment sites SSTI associated with NPS injecting was only experienced within NHS Lothian. NPS (ethylphenidate) injecting was more prevalent in NHS Lothian and had been implicated in an outbreak of bacterial infections, including SSTI (Lafferty, Smith, Coull, & Shanley, 2016). This highlights a need for localised drug-specific as well as general HR advice. For example, drug-specific advice was needed for the NPS injectors as the process of drug preparation for injecting ethylphenidate is different from heroin (for example, there is no need to heat the drug solution or to use citric acid).

There are a number of limitations with the study. As in all qualitative studies, our sample was small and the findings cannot be generalised to other settings. Our participants were drawn from a drug treatment and a NSP service, one of which provided a wound clinic. This may have heightened some participants' willingness to engage with HR since their SSTI. In addition, our study did not include PWID without experiences of SSTI – this group may have avoided SSTI by increased awareness and

HR implementation.

Implications for research, policy and practice

Further research is needed to assess the impact of NPS injecting on HR. Our findings also highlight the compounding effects of drugs as illustrated by the use of NPS. NPS injection has been associated with SSTI (Dorairaj, Healy, McMenamin, & Eadie, 2012; Health Protection Scotland & NHS NSS, 2015; Van Hout & Bingham, 2012). Our findings add to this by suggesting previously adhered to HR may be being abandoned when injecting NPS – as highlighted by the sharing of N/S and the squalid physical injecting environments. The mechanisms for this are unclear, whether it is a product of the social environment, such as the peer group norms of the injecting scene, and/or the psychoactive effect of NPS.

Compared to HCV and HIV, SSTI as an injecting related harm has received less policy attention. This may in part help to explain the limited learning or awareness about SSTI until experienced first-hand. This coupled with the stigma associated with SSTI highlighted a need for awareness raising and sharing of SSTI experiences. Our findings also show that PWID experience constraints within their physical and social environments that influence their injecting experiences and disrupt HR practices increasing their risk of SSTI. Consequently, policy makers need to address SSTI HR within enabling environments, such as 'safer environment interventions'. It is recommended that peer based support, improved NSP provision and medically supervised injecting facilities are needed to deliver SSTI HR.

Authors' contributions

KD, VH, KR and AT designed the qualitative study. KD implemented and analysed the qualitative interviews. KD wrote the drafts of the manuscript. All authors critically reviewed and approved the final manuscript.

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All authors report no potential conflicts.

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