



Full length article

## Association between harm reduction intervention uptake and skin and soft tissue infections among people who inject drugs



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### ABSTRACT

**Background:** Bacterial skin and soft tissue infections (SSTIs) are a health issue for people who inject drugs (PWID). There is a lack of evidence on the associations between harm reduction (HR) uptake and SSTIs. This paper examines the associations between the uptake of injecting equipment (IE) and opiate substitution treatment (OST) on SSTIs among PWID, and the injecting behaviours associated with having had an SSTI. This is the first large-scale, national study to examine the association between IE uptake and SSTIs.

**Methods:** A cross-sectional, voluntary and anonymous survey was undertaken with PWID recruited from pharmacies/agencies providing IE across mainland Scotland during 2013–2014. Participants were asked: if they had an SSTI within the past year; about their uptake of HR within the past 6 months (including needle/syringes (N/S), paraphernalia and OST); and about their frequency of injecting, sharing of IE and re-use of own N/S. Data from 1876 PWID who had reported injecting within the past 6 months were analysed.

**Findings:** In multivariate logistic regression, those with high combined IE-OST uptake (adjusted odds ratio [AOR] 0.614, 95% CI 0.458–0.823,  $p = 0.001$ ) and medium combined IE-OST uptake (AOR 0.725, 95% CI 0.546–0.962,  $p = 0.026$ ) had lower odds of having had an SSTI compared to those with low combined IE-OST uptake.

**Conclusions:** IE and OST uptake may reduce the level of SSTIs among PWID, suggesting increasing combined uptake may be beneficial. Nevertheless, a sizeable proportion of PWID with high HR uptake experienced SSTIs, suggesting the importance of other interventions.

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## 1. Introduction

Bacterial skin and soft tissue infections (SSTIs) are a health issue for people who inject drugs (PWID). Infections are caused by a number of bacteria, such as those from the injectors' own skin, and those present in contaminated drugs, cutting agents or injecting paraphernalia (Gordon and Lowy, 2005). Although most of these infections are localised, mild and superficial, they can result in serious morbidity and mortality when associated with systemic symptoms such as fever, rapid heartbeat or low blood pressure, or with a co-morbidity, sepsis syndrome or a life-threatening infection, such as necrotizing fasciitis (Dryden, 2009). Harm reduction

(HR), such as the provision of sterile injecting equipment (IE) or opiate substitution treatment (OST), may be important to help prevent the potential onset of serious infection (Hope, 2010).

The most common forms of injection site SSTIs are abscesses or cellulitis (Fink et al., 2011; Hope, 2010). Prevalence studies from Europe, North America and Australia have shown that 21% to 32% of PWID had a current abscess (Binswanger et al., 2000; Morrison et al., 1997; Saeland et al., 2014); 7% to 36% had an abscess or open wound within the past year (Dwyer et al., 2009; Hope et al., 2010; Maloney, 2010; Phillips and Stein, 2010; Public Health England et al., 2014). Re-use or sharing of unsterile needles and syringes (N/S) has been shown to be associated with increased SSTI prevalence (Hope et al., 2014b; Hope et al., 2008; Lloyd-Smith et al., 2008; Maloney, 2010), as has the re-use and sharing of injecting paraphernalia, in particular, filters and flush water (Hope et al., 2010). More frequent injecting is also associated with SSTIs (Hope et al.,

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2014b; Hope et al., 2010; Phillips and Stein, 2010): repeated injections damage the skin and tissues providing a focus for infection (Pieper and Hopper, 2005). Limited research exists examining the association between HR, such as IE provision and OST, and SSTIs among PWID. The total number of clean N/S distributed from a needle exchange (NE) and the opening of a NE were shown to be associated with reduced SSTI prevalence (Bhattacharya et al., 2006; Hart et al., 1989; Tomolillo et al., 2007). None of these small-scale single site studies showed the level of injection equipment (IE) uptake needed per individual for use sterile IE for every injection. Those who took OST in the past but not currently had higher odds of having had an SSTI in the past year (Hope et al., 2008). Others have demonstrated that combined high uptake of N/S and OST was associated with reduced incidence of HCV among PWIDs in Scotland (Palmateer et al., 2014); and OST and IE provision services have been shown to reduce self-reported injecting risk behaviours, such as the borrowing, lending, re-use of N/S or paraphernalia, and injecting frequency (MacArthur et al., 2014); and IE provision (IEP) and OST are associated with reduced HIV infection (Degenhardt et al., 2010; Palmateer et al., 2010). Notably, no study has examined the associations between the uptake of sterile IE, or the combined effect of IE and OST uptake, on SSTIs. This paper will be unique by analysing data from a national survey of PWID conducted in Scotland. The paper also examines injecting behaviours associated with having had an SSTI.

## 2. Materials and methods

### 2.1. Data source

Data used for this paper was gathered in 2013–2014 as part of the Needle Exchange Surveillance Initiative (NESI) Scotland study. NESI is a cross sectional, voluntary, and anonymous survey, which has been on-going since 2008 (University of the West of Scotland et al., 2015). Between February 2013 and February 2014, participants were recruited from 106 pharmacies and 28 agencies providing a fixed site, mobile or outreach IEP service across Scotland's eleven mainland NHS Health Boards. Healthcare for Scotland is devolved to regional Health Boards. Trained interviewers asked eligible participants to participate in a 15-min face-to-face questionnaire. Those eligible had injected drugs at least once in the past and had not already participated in the current data collection sweep. The questionnaire included questions on drug use history, injecting risk behaviours and harms, IE and OST uptake and participant demographics. All participants provided informed consent, were provided with a £5 shopping-voucher, and interviews were conducted in a private room. Ethics approval was obtained from the West of Scotland NHS Research Ethics Committee.

### 2.2. Measures

**2.2.1. Outcome measure.** This was measured using the question 'In the last year, have you had a swelling containing pus (abscess), a sore or open wound at an injection site?'

**2.2.2. Intervention measures.** HR interventions considered were IE uptake and OST, that is, methadone. These measures which were derived from the questionnaire have been used in previous work (Palmateer et al., 2014) and included uptake of: i.) N/S, ii.) paraphernalia, iii.) combined IE (N/S and paraphernalia), iv.) OST, and v.) combined IE and OST.

N/S uptake was derived by dividing the self-reported number of N/S obtained in the last six months by the self-reported number of injections in the last six months. This was categorised into high and low uptake. The threshold for high uptake (200%+, at least twice as many N/S as injections) has been used in previous work,

where it was chosen on the basis of sensitivity analyses (Palmateer et al., 2014). Paraphernalia uptake was derived by combining filter and spoon uptake. Those who reported high uptake (200%+) of both spoons and filters were classified as having high paraphernalia uptake, with the remaining falling into low category. A combined variable, called IE uptake, was derived where those with high uptake (200%+) on both N/S and paraphernalia were categorised as high and the remaining were categorised as low. OST uptake was defined as 'never been on OST', 'currently on OST at the time of the study' or 'on OST in the past but not currently'. A final combined uptake variable was derived by combining IE and OST uptake, with categories low, medium and high. In order to derive this combined variable, those who had 'never been on OST' or 'on OST in the past but not currently' were combined to represent not currently on OST. The 'Low combined IE-OST' uptake category included those with low IE uptake and were not currently on OST; 'medium combined IE-OST' uptake included those with either low IE uptake and were currently on OST, or had high IE uptake but were not currently on OST; 'high combined IE-OST' uptake included those who had high IE uptake and were currently on OST.

**2.2.3. Injecting behaviours.** Injecting behaviours included frequency of injecting, sharing IE and re-use of one's own N/S. These were self-reported and related to the past 6 months. Frequency of injection was categorised as daily or more, or less than daily. Sharing IE (including N/S, spoons and filters) was categorised as yes/no. Re-using one's own N/S was measured as yes/no to record if the N/S had been re-used more than once.

### 2.3. Statistical analysis

Logistic regression was used to calculate the odds of self-reported SSTI associated with i.) uptake of the HR interventions and ii.) injecting behaviours. Associations between other variables and SSTI were also explored using Pearson's  $\chi^2$  test (Table 1). The confounders selected for inclusion in the multivariate logistic regression were those found to be statistically significant ( $p < 0.05$ ) using the bivariate analysis in Table 1 and those previously found to be associated with SSTI prevalence. The potential confounders included Health Board area, time since onset of injecting, injection of more than one drug ('poly-drug use'), gender, and homeless in the past six months. Poly-drug use was included, rather than stimulant use, to incorporate the number of emerging new psychoactive substances (NPS) injectors in the sample – such as 'Burst'. For time since onset of injecting, '<5 years' and '5–10 years' was collapsed to '<10 years' to give a reference group with a larger sample size. Injecting risk behaviour and injecting frequency variables were not considered for the regression models examining HR interventions and SSTI because they are on the causal pathway, but injecting frequency was included as a confounder in the regression model for SSTI and sharing IE, and re-use of N/S. Multivariate regression was generated by forward step-wise analysis and was statistically significant at  $p < 0.05$  (Tables 2 and 3). Analyses were undertaken with SPSS version 22.

## 3. Results

Of the 2463 participants, 119 duplicate records from individuals who had participated more than once were excluded. Of the remaining 2344 respondents, those who had not injected within the past 6 months ( $n = 402$ ), those who exclusively injected body-building drugs ( $n = 58$ ), as this group were less likely to have had an SSTI, and those with missing injecting status ( $n = 9$ ) were excluded. The remaining 1876 participants were analysed.

Of the sample, 28% (533/1876) had reported an SSTI in the past year, 30% (555/1866) were female, 52% (984/1875) were aged 35

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