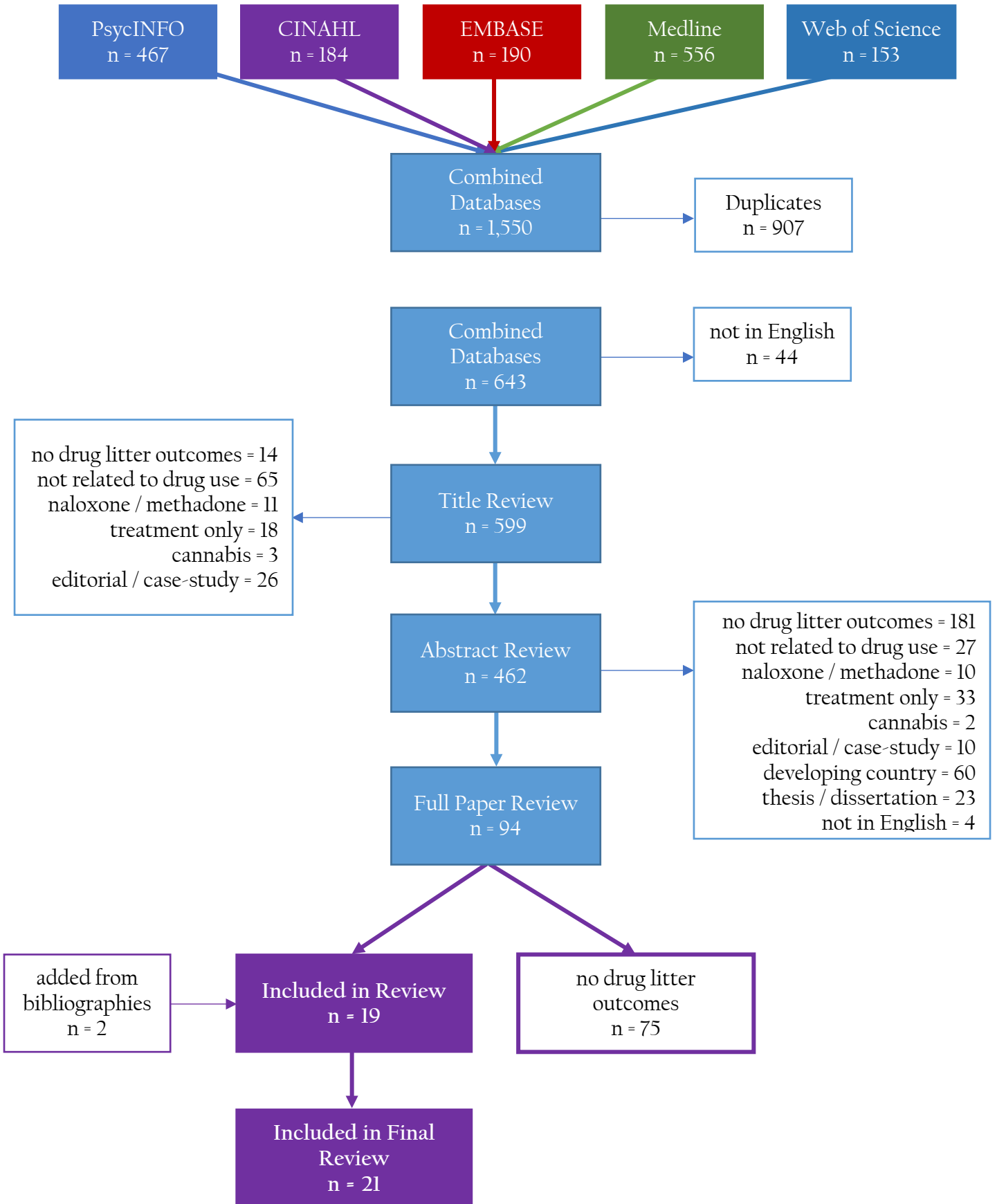


Figure 1: Flowchart of Search Strategy



## Results

A total of 21 papers were included in the final review. Half of the papers (11/21) focused on the effects of Safer Injecting Facilities (SIFs) including the only two systematic reviews included (Appendix 2). All data included were observational and neither systematic review was able to include a meta-analysis as data were too heterogeneous (Table 1). The quality of the data included in this review is, thus, not of the highest standard and cannot be considered generalisable to all situations; however, despite the studies all being observational in nature, the similar nature of the findings increases the validity of the results.

Table 1: Types of studies included in review

Study Design	number <sup>ref</sup>
Systematic Review	2 <sup>11,14</sup>
Cohort	4 <sup>3,5,16,17</sup>
Case-Control	3 <sup>2,7,19</sup>
Cross-Sectional	6 <sup>1,4,6,9,18,20</sup>
Needs Assessment	2 <sup>3,4</sup>
Service Evaluation	1 <sup>21</sup>
Qualitative	3 <sup>8,10,12</sup>

### *Safer Injecting Facilities*

Eleven of the papers reviewed focussed on the effects of the opening of Safer Injecting Facilities; episodes of public injecting and injection-related litter often being a key measureable outcome of the success of the new facility. Two key facilities that have been well represented in academic research are Vancouver's InSite injecting facility<sup>3,7,8,17,21</sup> and Sydney's Medically Supervised Injecting Centre (MSIC)<sup>13,18</sup> even though the majority of SIFs are located in Europe. In an effort to capture some of the data missing from European SIFs, the International Drug Policy Consortium published a review of all known SIFs and all available outcome data. SIFs are currently operating in Australia, Canada, Germany, Luxembourg, The Netherlands, Norway, Spain, and Switzerland.<sup>14</sup> Australia, Canada, and Spain have all collected data on injection-related litter and have found that SIFs reduce public injecting and injection related litter in public spaces. A further systematic review found a reduction in the self-reported mean number of syringes dropped after the opening of the SIF facility 11.5 vs 5.3 (aOR=2.13, 95% CI 1.47, 3.09) and fewer residents and business operators reported seeing syringes in the street (67% vs 40%; 72% vs 57%;  $p < 0.01$ ).<sup>11</sup> A single study from Copenhagen's new SIF found that 58.5% of their SIF users changed their syringe disposal practices and, of those, 95.8% changed from not always disposing safely to always disposing safely ( $p < 0.001$ ).<sup>9</sup>

There were many concerns from the Canadian government on the opening of the SIF in Vancouver and the legal exemption given to allow its opening was conditional on a rigorous scientific evaluation of its impact. The first part of the evaluation included examining the drug use patterns in the ten blocks around the SIF centre in the six weeks prior to its opening and the twelve weeks after its opening; this eighteen week period allowed sufficient follow-up to use regression modelling to adjust for seasonal changes in drug-uses patterns.<sup>21</sup> The figures and table below, taken directly from Wood et al, show an immediate drop in both publicly discarded syringes and injection-related litter following the opening of the Vancouver SIF and the seasonally adjusted modelling show a drop of almost 50% across all three measures (Table 2, Figure 2).<sup>21</sup>

Figure 2: Number of syringes / items found in 10 blocks of Vancouver SIF<sup>21</sup>

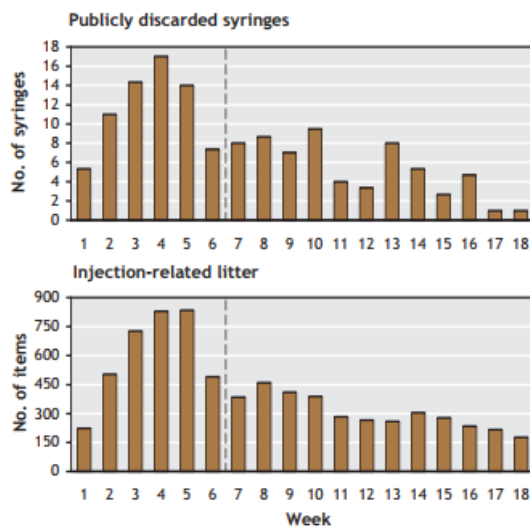


Table 2: Predicted measures of public order problems in the 6 weeks before and the 12 weeks after the opening of Vancouver SIF<sup>21</sup>

Measure	Predicted daily mean no. (95% CI)	
	Before the facility opened	After the facility opened
IDUs injecting in public	4.3 (3.5-5.4)	2.4 (1.9-3.0)
Publicly discarded syringes	11.5 (10.0-13.2)	5.4 (4.7-6.3)
Injection-related litter	601 (590-613)	310 (305-317)

The remainder of the Vancouver evaluation work is primarily based on a large cohort of SIF users (n=760) set up prior to the opening of the SIF. They are given an interviewer administered questionnaire every six months and a blood sample. In all studies that have included a question regarding drug litter / unsafe syringe disposal / safer syringe disposal, the SIF has increased safer syringe disposal and decreased the incidence of public injecting.<sup>3,8,17,21</sup> One of the larger evaluations found that individuals that reported consistent SIF usage had twice the odds of safer disposal of syringes, either in a needle exchange sharps bin or at the SIF, than those that did not regularly use the SIF (aOR=2.13; 95% CI 1.47, 3.09; p < 0.001).<sup>17</sup>

Qualitative studies across Canada also support these findings; Vancouver is much cleaner and existing SIF users have become ‘ambassadors’ for the service to those who may be new in town or are unaware of the service:

*“If we see somebody new in town, we try to take him to In Site. We are tired of seeing people OD in alleys; we are tired of seeing rigs on the ground. I also go around in alleys and pick up rigs and bring em back to InSite or the needle depot.” – Sam, Vancouver*

Other cities in Canada without the service are struggling with safe needle disposal and needle re-use amongst users:

*“I see a lot of people just picking up dirty needles from the ground or in the grass or in mud.”– IDU, Victoria*

*“More people are sharing and disposing of their rigs [needles] on the street.” – IDU, Victoria*

*“I have seen people just picking needles off the ground and using them.” – Gary, Surry*

Sydney, Australia did not have a formal scientific evaluation and focused more on public perceptions of their SIF facility particularly as one of the key political arguments for the opening of the SIF in May of 2001 was to reduce public injecting and the level of drug related litter. Three computer assisted landline, telephone surveys were conducted to survey residents and business managers in the immediate area around Sydney’s SIF in 2000, 2002, and 2005.<sup>13,18</sup> Across the five-year period, a reduction in publically discarded needles was seen across both groups (Table 3).

**Table 3: Percent of Residents/Business Operators that witnessed publically discarded needles in the previous month<sup>13</sup>**

	2000	2002	2005	
Residents	67%	58%	40%	p < 0.001
Business Operators	72%	64%	57%	p = 0.01

### *Harm Reduction Options other than SIFs*

The remaining studies included in this review covered a wide variety of topics; some offered evidence regarding the impact of specific harm reduction programmes such as needle-exchange programmes (NSPs)<sup>19</sup> or public sharps bins<sup>10</sup> others described the potential dangers of further isolating individuals that use injecting drugs and increasing the incidence

of drug related litter with 'safe city' programmes<sup>12</sup> or police crackdowns<sup>16</sup>; however, only six included drug related litter / discarded syringes as a primary outcome in the study.

Three of the included studies included visual inspection of neighbourhoods to understand the drug litter distribution and in one study to build a spatial model to understand IDU patterns within a city.<sup>2,4,19</sup> In a suburb of Sydney, Australia discarded needles were found on all sixteen monitoring sessions in 'footpaths and parks, as well as street gutters, car parks and residential driveways.'<sup>4</sup> In fact, the problem in North Richmond, Australia is so bad that government cleaners at one local housing estate are 'required to systematically rake all the children's playgrounds each morning as well as regularly [patrol] housing estate care parks to collect discarded needle-syringes.'<sup>4</sup> In the United States, San Francisco a city with over 20,000 estimated IDUs but with a large number of NSPs was compared with Miami, a city with half the number of IDUs but where NSPs are expressly forbidden in law;<sup>19</sup> visual walkthroughs were conducted in the top quartile of drug-affected areas in each city (Table 4). IDUs in Miami also had over 34 times the self-reported odds of public syringe disposal than IDUs in San Francisco (aOR = 34.2; 95% CI 21.92, 53.47).<sup>19</sup>

Table 4: Public Syringe Disposal in San Francisco vs Miami<sup>19</sup>

	San Francisco	Miami
<b>Visual Walkthrough</b>		
Estimated number of IDUs	24,582	10,529
Total syringes found	11	328
syringe density	44 / 1000 census blocks	371 / 1000 census blocks
syringe prevalence	0.3 / 1000 people	4.9 / 1000 people
<b>IDU Interviews</b>		
Disposing of syringe in public place	11%	69%
Total syringes disposed of improperly (not in sharps bin)	13.2%	94.9%

Finally, a study in Canada attempted to identify physical and social environmental factors associated with discarded needles on public streets.<sup>2</sup> De Montigny et al found that needles were evenly distributed across four location types: alleys (21%), parking lots (22%),

sidewalks (23%), other (34%) but the discards were more likely to be found near bus stops, pay phones, adult services, pawn shops, and single-room occupancy hotels.

One of the recommendations set forth by Defra to reduce drug related litter is the installation of public sharps bins.<sup>22</sup> Parkin et al described the views of injecting drug users in two unnamed UK cities that had installed publically accessible sharps bins. One city used unlabelled bins across the city but failed to adequately publicise them to the target group; only 13% of those surveyed were aware of the bins. Users that were aware of the bins were hesitant to use them as they thought it might highlight the local heroin problem:

*“And it’s gonna be all over the place that ‘smackhead this and smackhead that’ ... and that ‘people shouldn’t do [drugs] anyway’. I mean people shouldn’t throw their needles on the floor in the first place. [But] they’re not gonna take it to a bin are they?”*

*“[Would I use it?] Yes and no. Because [people] might see me using it.”*

*“there’s needles outside here if you go and have a look around the corner. Some people’s been using here, on this street [next to the bin]”*

In the second city, the public sharps bins were located in distinctive public toilets and were further labelled (visual, symbolic, textual, and Braille).<sup>10</sup> Unlike the first city, 85% of IDUs were aware of these bins and thought they indicated that the local authority recognised that public injecting occurs and were attempting to minimise harms; however, there were concerns that the local police service were using the toilets as a form of ‘entrapment.’ The final analysis concluded that public bins needed to be ‘spatially sensitive to potentially stigmatising situations and contact with street-based security / surveillance or policing procedures.

In Vancouver, a peer-run outreach program was introduced to reach those most on the margins of society.<sup>5</sup> As discussed previously, Vancouver has North America’s only SIF *InSite*, however, not all injecting drug users are comfortable using the facility or are aware of the services available. In an effort to reach this underserved group, the peer-based outreach program was introduced. Unsafe syringe disposal was a key outcome indicator following contact with a peer-outreach member: aOR = 0.75 (95% CI 0.54, 1.04; p = 0.080).

The final paper to use safe syringe disposal as a primary outcome was again undertaken in the United States and focussed on rebuking the often used hypothesis that increased syringe

coverage is associated with unsafe syringe disposal.<sup>1</sup> In early years of NEPs one-for-one rules, stipulating that injectors could only take a needle in exchange for a used one that is returned, were often used due to this hypothesis. These are now strongly discouraged because they have been shown to be associated with much higher levels of HIV and hepatitis infection.<sup>22</sup> Bluethenthal et al interviewed individuals attending Californian NEPs and asked about syringe coverage; 100% syringe coverage indicates a new syringe is used for each injection. As clean syringes may be given away, lost, confiscated by police, etc, the aim of NEPs is coverage of greater than 100%. The study concluded that safe syringe disposal was higher amongst NEP clients with greater syringe coverage ( $p < 0.001$ , Table 5).

Table 5: Association between syringe coverage and safe syringe disposal

	Syringe Coverage			
	<50%	50-99%	100-149%	150%+
Safe	34%	18%	13%	36%
Unsafe	40%	28%	14%	19%

Whilst the remaining studies may not have focussed on drug litter as a primary outcome, many offer evidence to the limited body of work on this topic. Two cross sectional studies discussed public injecting and unsafe needle disposal.<sup>6,18</sup> In London and Leeds, 24% of IDUs surveyed reported unsafe needle disposal in the previous month.<sup>6</sup> Public injecting was highly correlated with unsafe needle disposal (aOR = 3.6; 95% CI 1.9, 6.9;  $p < 0.001$ ). In a survey of business managers in New York City, 58% reported drug use in their business bathrooms in the previous six months.<sup>18</sup> Two of the managers surveyed, in the highest poverty neighbourhoods, reported an average of 300 drug related encounters a month.

‘Safer space’ interventions and large scale ‘police crackdowns’ are often widely supported by community organisations and politicians as they reduce the visible aspects of street drug markets.<sup>12,16</sup> The risk, unfortunately, to these actions are to the users themselves as it may push their actions further ‘underground,’ encourage hasty injections, increase social marginalisation, and increase drug-related litter. A effects large-scale police crackdown on the drug-market in Vancouver were investigated with ethnography, interviews with injecting drug users, and interviews with service providers. The police crackdown meant that IDUs were reluctant to be found carrying syringes (despite that being legal):<sup>16</sup>

*“I had a bag of twenty or thirty old ones but I kept throwing the rigs in the garbage can. Because whenever you got a rig on you and if the cops see it they search you even more.” – IDU*

*“They [clients] don’t want to have syringes on them in case they get jacked up. So they throw them away.”*  
– Service Provider

*“I have noticed that there seems to be a high level of discarded rigs around downtown eastside. Because once they use them in the alleys or wherever, they just don’t want to have that rig on them. So they get rid of it quickly. Because if you have rigs on you, the police will be questioning you a little bit more.”* – Service provider

The ‘safe city’ initiative in Wales led to a qualitative investigation of the views of drug-users across South Wales.<sup>12</sup> There was an understanding that some public spaces that addicts have been forced to occupy due to city clean-ups are particularly “horrible” :

*“There are needles everywhere. There’s a mattress on the floor that’s been burnt to smithereens, only the springs sticking up. And there’s needles poking out everywhere, dirty filters, dirty cookers everywhere.”* – IDU Methyr

*“There’s needles everywhere-all uses...I’ve seen boys going in there, like a friend of mine, he’s been so bad he’s found a needle on the floor, he’s picked it up and used it without boiling it or whatever...”* – IDU Methyr

There was also, however, a separation between ‘us’ and ‘them.’ There were drug-users that used NSPs and followed the rules versus those that gave everyone a bad name.

*“Most of the people are bad. they just chuck the needles on the floor ... I put mine in the bins straight away – ‘cin bins’ – and I take them back every time. But I know loads of people who just chuck them, even on the street, and it’s disgusting to be honest”* – IDU Methyr

*“I know we are addicts, yeah, but smackheads are different. They don’t even put the tops on their needles, and throw them anywhere. Kids could walk and pick them up. We’ve got cin bins that we can put our needles in. We bring our needles back in here [syringe exchange] whenever we are finished with them...”* – IDU Cardiff

*“They just chuck them [needles, syringes]. Or you do get the odd decent person like myself, I will pick them up and get rid of them properly”* – IDU Cardiff

The risk was further isolation of ‘them’ with these initiatives and forcing them into ‘horrible shooting galleries.’<sup>12</sup>



## Bibliography of Included Papers

- 1) Bluthenthal R.N., R. Anderson, N. M. Flynn and A. H. Kral (2007). 'Higher syringe coverage is associated with lower odds of HIV risk and does not increase unsafe syringe disposal among syringe exchange program clients.' Drug and Alcohol Dependence 89: 214-222.
- 2) de Montigny, L., A. V. Moudon, B. C. Leigh and S.-Y. Kim (2011). "A spatial analysis of the physical and social environmental correlates of discarded needles." Health & place 17(3): 757-766.
- 3) DeBeck, K., E. Wood, R. Zhang, M. Tyndall, J. Montaner and T. Kerr (2008). "Police and public health partnerships: Evidence from the evaluation of Vancouver's supervised injection facility." Substance Abuse Treatment, Prevention, and Policy 3.
- 4) Dwyer, R., R. Power, G. Denham and P. Dietze (2016). "Public injecting and public amenity in an inner-city suburb of Melbourne, Australia." Journal of Substance Use 21(2): 162-169.
- 5) Hayashi, K., E. Wood, L. Wiebe, J. Qi and T. Kerr (2010). "An external evaluation of a peer-run outreach-based syringe exchange in Vancouver, Canada." International Journal of Drug Policy 21(5): 418-421.
- 6) Hunt, N., J. Kimber, C. Lloyd and C. Tompkins (2007). "Public injecting and willingness to use a drug consumption room among needle exchange programme attendees in the UK." International Journal of Drug Policy 18(1): 62-65.
- 7) Ivsins, A., C. Chow, S. Macdonald, T. Stockwell, K. Vallance, D. C. Marsh, W. Michelow and C. Duff (2012). "An examination of injection drug use trends in Victoria and Vancouver, BC after the closure of Victoria's only fixed-site needle and syringe programme." International Journal of Drug Policy 23(4): 338-340.
- 8) Jozaghi, E. and M. A. Andresen (2013). "Should North America's first and only supervised injection facility (InSite) be expanded in British Columbia, Canada?" Harm Reduction Journal 10.
- 9) Kinnard, E. N., C. J. Howe, T. Kerr, V. S. Hass and B. D. L. Marshall (2014). "Self-reported changes in drug use behaviors and syringe disposal methods following the

- opening of a supervised injecting facility in Copenhagen, Denmark." Harm Reduction Journal **11**: 8.
- 10) Parkin, S. and R. Coomber (2011). "Injecting drug user views (and experiences) of drug-related litter bins in public places: a comparative study of qualitative research findings obtained from UK settings." Health & place **17**(6): 1218-1227.
  - 11) Potier, C., V. Lapr evote, F. Dubois-Arber, O. Cottencin and B. Rolland (2014). "Supervised injection services: What has been demonstrated? A systematic literature review." Drug and Alcohol Dependence **145**: 48-68.
  - 12) Rhodes, T., L. Watts, S. Davies, A. Martin, J. Smith, D. Clark, N. Craine and M. Lyons (2007). "Risk, shame and the public injector: A qualitative study of drug injecting in South Wales." Social Science & Medicine **65**(3): 572-585.
  - 13) Salmon, A. M., H. Thein, J. Kimber, J. M. Kaldor and L. Maher (2007). "Five years on: what are the community perceptions of drug-related public amenity following the establishment of the Sydney Medically Supervised Injecting Centre?" International Journal of Drug Policy **18**(1): 46-53.
  - 14) Schatz, E. and M. Nougier (2012). 'Drug consumption rooms: Evidence and practice.' International Drug Policy Consortium Briefing Paper. Available at: <http://idpc.net/publications/2012/06/idpc-briefing-paper-drug-consumption-rooms-evidence-and-practice>.
  - 15) Semaan, S., P. Fleming, C. Worrell, H. Stolp, B. Baack and M. Miller (2011). "Potential role of safer injection facilities in reducing HIV and Hepatitis C infections and overdose mortality in the United States." Drug & Alcohol Dependence **118**(2/3): 100-110.
  - 16) Small, W., T. Kerr, J. Charette, M. T. Schechter and P. M. Spittal (2006). "Impacts of intensified police activity on injection drug users: Evidence from an ethnographic investigation." International Journal of Drug Policy **17**(2): 85-95.
  - 17) Stoltz, J.-A., E. Wood, W. Small, K. Li, M. Tyndall, J. Montaner and T. Kerr (2007). "Changes in injecting practices associated with the use of a medically supervised safer injection facility." Journal of public health (Oxford, England) **29**(1): 35-39.
  - 18) Thein, H.-H., J. Kimber, L. Maher, M. MacDonald and J. M. Kaldor (2005). "Public

opinion towards supervised injecting centres and the Sydney Medically Supervised Injecting Centre." International Journal of Drug Policy 16(4): 275-280.

- 19) Tookes, H. E., A. H. Kral, L. D. Wenger, G. A. Cardenas, A. N. Martinez, R. L. Sherman, M. Pereyra, D. W. Forrest, M. LaLota and L. R. Metsch (2012). "A comparison of syringe disposal practices among injection drug users in a city with versus a city without needle and syringe programs." Drug and Alcohol Dependence 123(1-3): 255-259.
- 20) Wolfson-Stofko, B., A. S. Bennett, L. Elliott and R. Curtis (2017). "Drug use in business bathrooms: An exploratory study of manager encounters in New York City." International Journal of Drug Policy 39: 69-77.
- 21) Wood, E., M. W. Tyndall, J. S. Montaner and T. Kerr (2006). "Summary of findings from the evaluation of a pilot medically supervised safer injecting facility." Canadian Medical Association Journal 175(11): 1399-1404.

#### Additional Literature Reference

- 22) Department for Environment, Food, and Rural Affairs (2005). Tackling drug related litter: Guidance and good practice. Available at: <https://www.gov.uk/government/publications/tackling-drug-related-litter-guidance-and-good-practice>.

## Appendix 1: Search Strategy

Databases searched: PsycINFO, CINAHL, Medline, EMBASE, Web of Science (core collection)

Limits: published after 31 December 2004, English only, peer-reviewed journal articles – no editorials, commentaries, case studies, or dissertations included

Terms in the following groups were searched within each database combined with OR. The results of the three group searches were then combined with AND for the final results.

### Group 1:

- substance abuse
- heroin
- intravenous substance abuse
- drug abuse
- drug consumption

*Subject Headings (searched for each database using database specific thesaurus)*

[terms all exploded]

- substance abuse
- heroin

### Group 2:

[most common places drugs litter found according to 2005 Defra Report]<sup>22</sup>

- public place\*
- public space\*
- public inject\*
- open drug scene
- field\*
- park\*
- public toilet\*
- public loo\*
- footpath\*
- car park\*
- parking lot
- school\*
- churchyard\*
- beach\*

*Subject Headings (searched for each database using database specific thesaurus)*

[terms all exploded]

- school
- campus

Group 3:

- litter
- trash
- rubbish
- garbage
- needle\*
- inject\* equip\*
- swab\*
- filter\*
- spoon\*

*Subject Headings (searched for each database using database specific thesaurus)*

[terms all exploded]

- needle sharing
- needle exchange
- drug litter

## Appendix 2: Review of all included papers

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
Papers focussing on Safer Injecting Facilities (SIFs)				
1) Potier (2014)	systematic review	collect all data around SIFs <sup>a</sup> and determine if primary objectives have been realised	<p>Vancouver, Canada: reduction in the mean number of syringes dropped 11.5 (IQR = 7.3 – 14.3) vs 5.3 (IQR 3.0 – 8.0) [p=0.022]; reduction in injection-related litter 601.7 (IQR = 490.0 – 830.3) vs 305.3 (IQR = 246.3 – 387.0) [p=0.014].</p> <p>Sydney, Australia: fewer residents reported seeing syringes dropped after SIF opening (67% vs 40%), and business operators (72% vs 57%) [p&lt;0.01].</p> <p>Vancouver SIF attendance was associated with a reduction in self-reported syringe dropping aOR=2.13 (95% CI 1.47, 3.09)</p>	<p>systematic review; however, studies too heterogeneous to combine into meta-analysis. despite study heterogeneity, drug litter data showed decrease in both cities with data available.</p> <p>distinct lack of European data on SIFs (where most SIFs are located), reflection of academic literature which is primarily focussed on Vancouver and Sydney SIFs</p>
2) Schatz (2012)	review of international data	collect eligibility information and service design, legislative information, and outcome data (if any) from all countries operating SIFs: Australia, Canada, Germany, Luxembourg, The Netherlands, Norway, Spain, Switzerland	<p>Australia: reduced public injecting and injection-related litter (one of primary objectives)</p> <p>Canada: reduced public injecting and injection-related litter (one of primary objectives)</p> <p>Spain: reduced injection-related litter in public spaces (one of primary objectives)</p> <p>Switzerland: first SIF (1986), sought to reduce public disturbance created by drug use in public areas</p>	<p>not a systematic review of academic literature</p> <p>included data from European SIFs that is missing from published journals</p> <p>'hard' outcomes for drug-related litter were not included</p>
3) Semaan (2011)	ethical review of SIFs in relation to	needs assessment with particular focus	neighbourhoods around InSite [Vancouver's SIF] exhibited decreased public injection and litter	not a rigorous scientific review of literature, more an ethical

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
	needs of US IDUs <sup>a</sup>	on SIFs and an operational and ethical discussion of SIFs relevant to implementation in the US	SIFs have reduced the risk of accidental needle stick injuries to community members, sanitation workers, and law enforcement officers	commentary on potential introduction of SIFs to the US
4) Salmon (2007)	cross-sectional  (repeated telephone surveys)	community perceptions of Sydney SIF 5-years after opening	Residents witnessed publically discarded needles in last month – 2000: 67%, 2002: 58%, 2005: 40% [p<0.001]  Business operators witnessed publically discarded needles in last month – 2000: 72%, 2002: 64%, 2005: 57% [p=0.01]	landline telephone survey, response rates 75% 2000, 78% 2002, 82% 2005  potential for recall bias; SIF in Sydney also remains controversial which may impact responses; sample sizes reasonably small for a telephone survey (n=500 for first two waves, n=350 for last wave), but only included residents living within 2km on SIF and is primarily a business area not residential
5) DeBeck (2008)	cohort  (cohort recruited prior to SIF opening, interviewer administered questionnaire every 6 months plus blood sample)	determine if local police in Vancouver were facilitating use of Vancouver's SIF	Factors associated with being referred to SIF by police: unsafe syringe disposal OR=1.73 (95% CI 1.20, 2.20); aOR <sup>b</sup> =1.46 (95% CI 1.00, 2.11) [p=0.048]  (Vancouver SIF providing local police with a mechanism to address public injection and unsafe syringe disposal by referring to SIF)	longitudinal data set of Vancouver SIF users  self-reported data, social desirability bias – particularly unsafe syringe disposal
6) Stoltz (2007)	cohort	associations between consistent SIF usage	safer disposal of syringes OR=2.22 (95% CI 1.54, 3.20, p < 0.001); aOR=2.13 (95% CI 1.47, 3.09, p <	longitudinal data set of Vancouver SIF users (n=760)

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
	(cohort recruited prior to SIF opening, interviewer administered questionnaire every 6 months plus blood sample)	and self-reported changes in injecting practices	0.001)	self-reported data, social desirability bias – particularly unsafe syringe disposal
7) Wood (2006)	service evaluation (field-survey)	drug use patterns in Vancouver community (10 blocks around SIF) 6 weeks prior to SIF opening and 12 weeks after SIF opening	predicted daily mean number of publicly discarded syringes before SIF = 11.5 (95% CI 10.0, 13.2) vs after SIF = 5.4 (95% CI 4.7, 6.3)  predicted daily mean number of injection-related litter before SIF = 601 (95% CI 590, 613) vs after SIF = 310 (95% CI 305, 317)	observational studies only; however, they have had similar results to other SIFs worldwide
8) Ivsins (2012)	case-control (qualitative interviews and surveys with IDUs)	compare IDU trends and behaviours in Vancouver, Canada which has a SIF and fixed site NSP <sup>a</sup> with Victoria, Canada which has no SIF and recently closed the only fixed site NSP	“I see a lot of people just picking up dirty needles from the ground or in the grass or in mud. It’s just so much dirtier since the needle exchange closed.” – IDU, Victoria  “More people are sharing and disposing of their rigs [needles] on the street.” – IDU, Victoria	study focussed on needle sharing  non-random sample, serial, cross-sectional surveys with a different sample each time  self-report (reporting bias), social desirability bias (may under report undesirable behaviour to staff)



First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings																		
9) Kinnard (2014)	cross-sectional  (survey of IDUs using SIF completed with a member of staff)	use of new Copenhagen SIF was associated with changed in injecting behaviour and syringe disposal practices	<table border="1"> <thead> <tr> <th>Needle Disposal</th> <th>before SIF</th> <th>after SIF</th> </tr> </thead> <tbody> <tr> <td>NSP / SIF</td> <td>34.1%</td> <td>87.8%</td> </tr> <tr> <td>threw in bin</td> <td>56.1%</td> <td>12.2%</td> </tr> <tr> <td>dropped on ground</td> <td>12.2%</td> <td>0.0%</td> </tr> <tr> <td>flushed in loo</td> <td>9.8%</td> <td>0.0%</td> </tr> <tr> <td>other</td> <td>7.3%</td> <td>0.0%</td> </tr> </tbody> </table> <p>58.5% reported changing syringe disposal practices; of those, 95.8% changed from not always disposing safely to always disposing safely (<math>p &lt; 0.001</math>)</p>	Needle Disposal	before SIF	after SIF	NSP / SIF	34.1%	87.8%	threw in bin	56.1%	12.2%	dropped on ground	12.2%	0.0%	flushed in loo	9.8%	0.0%	other	7.3%	0.0%	<p>self-report (reporting bias), small sample (n=41), convenience sampling, social desirability bias (may under report undesirable behaviour to staff)</p> <p>cross-sectional (recall bias)</p>
Needle Disposal	before SIF	after SIF																				
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other	7.3%	0.0%																				
10) Thein (2005)	cross-sectional  (repeated telephone surveys)	community perceptions of Sydney SIF 2-years after opening	Agreement with the statement that ‘SIFs reduce discarded needles and syringes’ – 2000: 80%, 2002: 82% [ $p=0.01$ ]	<p>landline telephone survey, response rates 75% 2000, 78% 2002</p> <p>No measure of syringe discards, just perceptions</p> <p>potential for recall bias; sample sizes reasonably small for a telephone survey (n=515, 540)</p>																		
11) Jozaghi (2013)	qualitative  (interviews with IDUs in Canada)	explores the views of IDUs across three Canadian cities regarding SIFs (only one city currently has a SIF – Vancouver’s InSite)	“If it wasn’t for InSite you would see 150 people sitting down in the alley with rigs [needles] sticking out of their arms ... leaving their rigs around ... Today you rarely see people fixing outside, especially in and around InSite” – Joe, Vancouver	<p>Qualitative study, difficult to generalise</p> <p>Does not include the views of non-IDUs</p> <p>Views pertain to North</p>																		

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
			<p>“I have seen people picking needles off the ground and using them.” – Gary, Surrey</p> <p>“If we see somebody new in town, we try to take him to In Site. We are tired of seeing people OD in alleys; we are tired of seeing rigs on the ground. I also go around in alleys and pick up rigs and bring em back to InSite or the needle depot.” – Sam, Vancouver</p>	American IDUs; however, the findings are similar to others presented
Papers focussing on harm reduction options other than SIFs				
12) Dwyer (2012)	<p>rapid needs assessment</p> <p>(qualitative interviews with IDUs, stakeholders, visual inspections of the neighbourhood)</p>	<p>gathering evidence on IDU behaviours and its impact on public amenity in North Richmond, Australia and explore community suggestions for responses to the issues</p>	<p>discarded needle-syringes (NS) and drug-related litter were observed in ‘footpaths and parks, as well as street gutters, car parks and residential driveways’</p> <p>NS were found on all monitoring sessions (n=16), an average of 14 NS were observed on each visit; other drug related litter were more frequent and widespread</p> <p>two most common reasons for equipment being discarded inappropriately were ‘people concerned about being stopped by police and found in possession of injecting equipment, and that “some users don’t care”’</p> <p>most discarded NS were observed in locations where there were no disposal bins or when bins were full</p> <p>local primary school has ‘syringe-handling policies, with children instructed in the appropriate</p>	<p>small sample sizes for interviews (n=15 IDUs, n=20 stakeholders)</p> <p>Assessment was following a large media and public attention focussing on IDUs and public injecting / drug litter (social desirability bias)</p>

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
			<p>response'</p> <p>government cleaners at 'housing estate are required to systematically rake all the children's playgrounds each morning as well as regularly patrolling housing estate care parks to collect discarded NS'</p> <p>suggested stakeholder responses included: improved NS distribution and coverage, installation of syringe vending machines, installation of more disposal bins, increased policing of the area and SIFs</p>	
13) Tookes (2012)	<p>case-control</p> <p>(visual walkthroughs the top quartile of drug-affected areas and interviews with IDUs)</p>	<p>compare syringe disposal practices in a US city with NSPs (San Francisco) to US city without NSPs (Miami) – it is expressly forbidden in law to run NSPs in Miami, Florida</p>	<p>San Francisco (SF) (with NSPs):            estimated 24,582 IDUs            total syringes found = 11            syringe density = 44/1000 census blocks            syringe prevalence = 0.3/1000 people</p> <p>Miami (without NSPs):            estimated 10,529 IDUs            total syringes found = 328            syringe density = 371/1000 census blocks            syringe prevalence = 4.9/1000 people</p> <p>Report disposing of syringes in public place: 11% in SF vs 69% in Miami (p &lt; 0.001); Total syringes disposed of improperly: 13.2% in SF vs 94.9% in Miami</p> <p>IDUs in Miami had 34 times the odds of public syringe disposal than IDUs in SF (aOR=34.2; 95% CI 21.92, 53.47)</p>	<p>each city was visually examined and surveyed in different years (SF in 2008, Miami in 2009)</p> <p>large sample sizes (n=602 SF, n=448 Miami)</p> <p>self-report (reporting bias), convenience sampling, social desirability bias (may under report undesirable behaviour to staff), cross-sectional (recall bias); however, it is unlikely that these biases will be different in either city</p>

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
14) Hayashi (2010)	cohort  (Vancouver Injection Drug Users Survey – 6 monthly questionnaire and blood sample)	evaluation of peer-run outreach based SEP <sup>a</sup>	Odds of unsafe vs safe syringe disposal after contact with peer-outreach OR=0.71 (95% CI 0.51, 0.97; p=0.034); aOR=0.75 (95% CI 0.54, 1.04; p=0.080)	longitudinal data set of Vancouver IDUs (n=854)  self-reported data, social desirability bias – particularly unsafe syringe disposal
15) Parkin (2011)	qualitative	views of IDUs of public sharps bins placed in two UK cities [referred to as Aragon and Boleyn in the paper]	Aragon: unlabelled, street-based bins; only 13% (4/31) respondents were aware of bins  “[There are bins] but you know, people still don’t care ... I’ve seen needles all over this city just on the floor and that”  “there’s needles outside here if you go and have a look around the corner. Some people’s been using around here, on this street [next to the bin]”  fear that it would alert residents of a local heroin problem: “And it’s gonna be all over the place that ‘smackhead this and smackhead that’ ... and that ‘people shouldn’t do (drugs) anyway’. I mean, people shouldn’t throw their needles on the floor in the first place. [But] they’re not gonna take it to a bin are they?”  “[Would I use it?] Yes and no. Because [people] might see me using it.”  concerns about positioning of the bins and suggestions for improved locations included city centre public toilets and/or car parking facilities	Qualitative study, difficult to generalise but one of the few studies that looked at the view of UK IDUs  Does not include the views of non-IDUs  Included an examination of the theory of ‘place’ to give a wider understanding to the importance of needle disposal and potential public sharps bins location

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
			<p><b>Boyleyn:</b> labelled (visual, symbolic, textual, and Braille) sharps bin in distinctive public toilets; 85% (17/20) of IDUs aware of bins</p> <p>believed the bins promoted safer discarding practice; shared view that LAs recognised that public injecting occurs and were attempting to minimise harms</p> <p>common belief that the bins were a form of police 'entrapment'</p> <p><b>Place-based Theory:</b> place matters bins need to be 'spatially sensitive to potentially stigmatising situations and contact with street-based security/surveillance or policing procedures'</p> <p>'bins that are more discrete are more likely to be used ... with greater frequency than those that are street-based...in which deposits may be observed by others'</p>	
16) Small (2004)	cohort  (qualitative, ethnographic observations)	assess the impact of a large-scale police crackdown on the drug-market, drug consumption activities, and access to health services	<p>police crackdown led to increased anxiety among public users, encouraging hasty injections as evidence by observations: 'female yells "6 UP"! [announcing police arriving]. He then quickly rushes the injection and drops the rig on the ground as the alley clears'</p> <p>'Interviewees explained that being found with syringes, while legal, led to more problems when being scrutinized by officers. This was a deterrent to carrying syringes and encouraged a dynamic</p>	<p>longitudinal data set of Vancouver IDUs (n=1500), of which n=30 were selected for interview, n=9 service providers were interviewed</p> <p>self-reported data, social desirability bias – particularly unsafe syringe disposal – however, these data were complemented with ethnography</p>

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
			<p>resulting in unsafe disposal':</p> <p>"I had a bag of twenty or thirty old ones but I kept throwing the rigs in the garbage can. Because whenever you got a rig on you and if the cops see it they search you even more." – IDU</p> <p>"They [clients] don't want to have syringes on them in case they get jacked up. So they throw them away." – Service Provider</p> <p>"I have noticed that there seems to be a high level of discarded rigs around downtown eastside. Because once they use them in the alleys or wherever, they just don't want to have that rig on them. So they get rid of it quickly. Because if you have rigs on you, the police will be questioning you a little bit more." – Service provider</p>	<p>that supported many of the statements</p> <p>views of non-IDU residents and business owners were not included</p> <p>Did not include any objective measures of drug litter in their field work</p>
17) Hunt (2006)	cross-sectional (survey of IDUs in London and Leeds)	prevalence and predictors of public injecting and awareness of SIFs	<p>24% reported unsafe needle disposal in the previous month</p> <p>public injecting was associated with unsafe needle/syringe disposal: 78% vs 47%; OR=4.0 (95% CI 3.1, 9.4; p &lt; 0.001) aOR=3.6 (95% CI 1.9, 6.9; p &lt; 0.001)</p>	<p>convenience sample (NSP attendees), self-report (reporting bias), social desirability bias (may under report undesirable behaviour to staff)</p> <p>cross-sectional (recall bias)</p>
18) Wolfson-Stofko (2017)	cross-sectional (survey of business managers in New York City)	quantify business manager encounters with drug use, paraphernalia, and overdose occurring in business bathrooms	<p>58% (n=50) of the managers reported drug use in their business bathrooms in the previous 6 months</p> <p>Of those, 94% found drug paraphernalia, 34% found syringes, 22% found crack pipes</p> <p>Two managers (in high poverty neighbourhoods) reported an average of 300 encounters per month,</p>	<p>convenience and purposive sampling (n=86 managers), small sample size, cross-sectional (recall bias), social desirability bias</p>

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings																				
			10 per day																					
19) de Montigny (2011)	spatial case-control  (using discarded needle data, physical environment anchors, and police stations)	identify physical and social environmental factors associated with discarded needles, which could serve as a proxy for public injection	needles were evenly distributed across four location types: alleys (21%), parking lots (22%), sidewalks (23%), other (34%) *data did not include discards in public parks  discards were more likely to be found near bus stops, pay phones, adult services, pawnshops, and single-room occupancy hotels	were not able to fully understand police role in the environment and relied on proxy measure of police stations  missing some information on discarded needles, particularly in parks, but first study to examine IDU drug use in a city on a spatial level to inform citing of NSP or SIF services																				
20) Bluthenthal (2007)	cross-sectional  (IDUs from California's SEPs, interviewer assisted survey plus HIV testing in three annual waves)	determine whether syringe coverage is associated with syringe re-use and injection related HIV risk behaviours; if increased syringe coverage is associated with unsafe syringe disposal	safe syringe disposal was higher among SEP clients with greater syringe coverage ( $p < 0.001$ ) [100% syringe coverage means a new syringe for each injection]  <table border="1"> <thead> <tr> <th></th> <th colspan="4">Syringe Coverage</th> </tr> <tr> <th></th> <th>&lt;50%</th> <th>50-99%</th> <th>100-149%</th> <th>150%+</th> </tr> </thead> <tbody> <tr> <td><b>Safe</b></td> <td>34%</td> <td>18%</td> <td>13%</td> <td>36%</td> </tr> <tr> <td><b>Unsafe</b></td> <td>40%</td> <td>28%</td> <td>14%</td> <td>19%</td> </tr> </tbody> </table>		Syringe Coverage					<50%	50-99%	100-149%	150%+	<b>Safe</b>	34%	18%	13%	36%	<b>Unsafe</b>	40%	28%	14%	19%	cross-sectional (recall bias), self-report (social desirability bias)  this study was concerned with increasing syringe coverage and the potential effects on unsafe disposal – no correlation was found in the multivariate analysis. there were no independent observations on the reasons for unsafe disposal.
	Syringe Coverage																							
	<50%	50-99%	100-149%	150%+																				
<b>Safe</b>	34%	18%	13%	36%																				
<b>Unsafe</b>	40%	28%	14%	19%																				
21) Rhodes (2007)	qualitative  (interviews with IDUs in South Wales)	how 'safe city' initiatives impact risk and social marginalisation amongst IDUs	"There are needles everywhere. There's a mattress on the floor that's been burnt to smithereens, only the springs sticking up. And there's needles poking out everywhere, dirty filters, dirty cookers everywhere." – IDU Methyr  "There's needles everywhere-all uses...I've seen boys going in there, like a friend of mine, he's been so bad he's found a needle on the floor, he's picked it up and used it without boiling it or whatever..." –	Qualitative study, difficult to generalise but one of the few studies that looked at the view of UK IDUs  Does not include the views of non-IDUs																				

First Author (Year)	Study Design	Primary Outcome	Drug Litter Findings	Comments on methodology / findings
			<p>IDU Methyr</p> <p>“Most of the people are bad. they just chuck the needles on the floor ... I put mine in the bins straight away – ‘cin bins’ – and I take them back every time. But I know loads of people who just chuck them, even on the street, and it’s disgusting to be honest” – IDU Methyr</p> <p>“I know we are addicts, yeah, but smackheads are different. They don’t even put the tops on their needles, and throw them anywhere. Kids could walk and pick them up. We’ve got cin bins that we can put our needles in. We bring our needles back in here [syringe exchange] whenever we are finished with them...” – IDU Cardiff</p> <p>“They just chuck them [needles, syringes]. Or you do get the odd decent person like myself, I will pick them up and get rid of them properly” – IDU Cardiff</p>	

<sup>a</sup>IDUs: injecting drug users, SIF: safer injecting facility, NSP: needle and syringe exchange programme, SEP: syringe exchange programme

<sup>b</sup>aOR=adjusted odds ratio



### Appendix 3: Bibliography of Papers included in Full Paper Review

- 1) Aitken, C. K., P. G. Higgs and M. E. Hellard (2008). "Buprenorphine injection in Melbourne, Australia - an update." Drug and Alcohol Review 27(2): 197-199.
- 2) Allen, S. T., M. S. Ruiz, J. Jones and M. M. Turner (2016). "Legal space for syringe exchange programs in hot spots of injection drug use-related crime." Harm Reduction Journal 13: 7.
- 3) Andresen, M. A. and N. Boyd (2010). "A cost-benefit and cost-effectiveness analysis of Vancouver's supervised injection facility." International Journal of Drug Policy 21(1): 70-76.
- 4) Badrieva, L., E. Karchevsky, K. S. Irwin and R. Heimer (2007). "Lower injection-related HIV-1 risk associated with participation in a harm reduction program in Kazan, Russia." AIDS Education and Prevention 19(1): 13-23.
- 5) Beckwith, C. G., N. Zaller and T. P. Flanigan (2007). "HIV counseling and testing among injection drug users needs to continue...Am J Public Health. 2007 Jan;97(1):110-6." American Journal of Public Health 97(7): 1161-1161.
- 6) Beletsky, L., A. Agrawal, B. Moreau, P. Kumar, N. Weiss-Laxer and R. Heimer (2011). "Police training to align law enforcement and HIV prevention: Preliminary evidence from the field." American Journal of Public Health 101(11): 2012-2015.
- 7) Beletsky, L., J. Cochrane, A. L. Sawyer, C. Serio-Chapman, M. Smelyanskaya, J. Han, N. Robinowitz and S. G. Sherman (2015). "Police encounters among needle exchange clients in Baltimore: Drug law enforcement as a structural determinant of health." American Journal of Public Health 105(9): 1872-1879.
- 8) Beletsky, L., L. E. Grau, E. White, S. Bowman and R. Heimer (2011). "The roles of law, client race and program visibility in shaping police interference with the operation of US syringe exchange programs." Addiction 106(2): 357-365.
- 9) Beletsky, L., L. E. Grau, E. White, S. Bowman and R. Heimer (2011). "Prevalence, characteristics, and predictors of police training initiatives by US SEPs: Building an evidence base for structural interventions." Drug and Alcohol Dependence 119(1-2): 145-149.

- 10) Beletsky, L., D. Heller, S. M. Jenness, A. Neaigus, C. Gelpi-Acosta and H. Hagan (2014). "Syringe access, syringe sharing, and police encounters among people who inject drugs in New York City: A community-level perspective." International Journal of Drug Policy 25(1): 105-111.
- 11) Beletsky, L., R. Lozada, T. Gaines, D. Abramovitz, H. Staines, A. Vera, G. Rangel, J. Arredondo and S. A. Strathdee (2013). "Syringe confiscation as an HIV risk factor: the public health implications of arbitrary policing in Tijuana and Ciudad Juarez, Mexico." Journal of urban health : bulletin of the New York Academy of Medicine 90(2): 284-298.
- 12) Bridge, J. (2010). "Route transition interventions: Potential public health gains from reducing or preventing injecting." International Journal of Drug Policy 21(2): 125-128.
- 13) Burrows, D. (2006). "Rethinking Coverage of Needle Exchange Programs." Substance Use & Misuse 41(6-7): 1045-1048.
- 14) Burt, R. D. and H. Thiede (2016). "Reduction in Needle Sharing Among Seattle-Area Injection Drug Users Across 4 Surveys, 1994-2013." American journal of public health 106(2): 301-307.
- 15) Chiarello, E. (2016). "Nonprescription syringe sales: Resistant pharmacists' attitudes and practices." Drug and Alcohol Dependence 166: 45-50.
- 16) Cooper, H., L. Moore, S. Gruskin and N. Krieger (2005). "The impact of a police drug crackdown on drug injectors' ability to practice harm reduction: A qualitative study." Social Science & Medicine 61(3): 673-684.
- 17) Cooper, H. L., B. Bossak, B. Tempalski, D. C. Des Jarlais, S. R. Friedman, H. L. F. Cooper, B. Bossak, B. Tempalski, D. C. Des Jarlais and S. R. Friedman (2009). "Geographic approaches to quantifying the risk environment: drug-related law enforcement and access to syringe exchange programmes." International Journal of Drug Policy 20(3): 217-226.
- 18) Crawford, N. D., S. Amesty, A. V. Rivera, K. Harripersaud, A. Turner and C. M. Fuller (2014). "Community Impact of Pharmacy-Randomized Intervention to Improve Access to Syringes and Services for Injection Drug Users." Health education & behavior : the official publication of the Society for Public Health Education 41(4): 397-405.

- 19) Cruz, M. F., J. Patra, B. Fischer, J. Rehm and K. Kalousek (2007). "Public opinion towards supervised injection facilities and heroin-assisted treatment in Ontario, Canada." International Journal of Drug Policy 18(1): 54-61.
- 20) Davidson, P. J. and M. Howe (2014). "Beyond NIMBYism: Understanding community antipathy toward needle distribution services." International Journal of Drug Policy 25(3): 624-632.
- 21) de Montigny, L., A. V. Moudon, B. C. Leigh and S.-Y. Kim (2011). "A spatial analysis of the physical and social environmental correlates of discarded needles." Health & place 17(3): 757-766.
- 22) DeBeck, K., W. Small, E. Wood, K. Li, J. Montaner and T. Kerr (2009). "Public injecting among a cohort of injecting drug users in Vancouver, Canada." Journal of Epidemiology and Community Health 63(1): 81-86.
- 23) DeBeck, K., E. Wood, R. Zhang, M. Tyndall, J. Montaner and T. Kerr (2008). "Police and public health partnerships: Evidence from the evaluation of Vancouver's supervised injection facility." Substance Abuse Treatment, Prevention, and Policy 3.
- 24) Duplessy, C. and E. G. Reynaud (2014). "Long-term survey of a syringe-dispensing machine needle exchange program: Answering public concerns." Harm Reduction Journal 11.
- 25) Dwyer, R., R. Power, G. Denham and P. Dietze (2016). "Public injecting and public amenity in an inner-city suburb of Melbourne, Australia." Journal of Substance Use 21(2): 162-169.
- 26) Enns, E. A., G. S. Zaric, C. J. Strike, J. A. Jairam, G. Kolla and A. M. Bayoumi (2016). "Potential cost-effectiveness of supervised injection facilities in Toronto and Ottawa, Canada." Addiction 111(3): 475-489.
- 27) Finlinson, H. A., D. Oliver-Vélez, S. Deren, J. G. H. Cant, H. M. Colón, R. R. Robles, S.-Y. Kang and J. F. Andía (2006). "A longitudinal study of syringe acquisition by Puerto Rican injection drug users in New York and Puerto Rico: implications for syringe exchange and distribution programs." Substance use & misuse 41(9): 1313-1336.

- 28) Flath, N., K. Tobin, K. King, A. Lee and C. Latkin (2017). "Enduring consequences from the war on drugs: How policing practices impact HIV risk among people who inject drugs in Baltimore City." Substance Use & Misuse 52(8): 1003-1010.
- 29) Freeman, K., C. G. A. Jones, D. J. Weatherburn, S. Rutter, C. J. Spooner and N. Donnelly (2005). "The impact of the Sydney Medically Supervised Injecting Centre (MSIC) on crime." Drug and Alcohol Review 24(2): 173-184.
- 30) Gyarmathy, V. A., R. Csák, K. Bálint, E. Bene, A. E. Varga, M. Varga, N. Csiszér, I. Vingender and J. Rácz (2016). "A needle in the haystack--the dire straits of needle exchange in Hungary." BMC public health 16: 157.
- 31) Hayashi, K., E. Wood, L. Wiebe, J. Qi and T. Kerr (2010). "An external evaluation of a peer-run outreach-based syringe exchange in Vancouver, Canada." International Journal of Drug Policy 21(5): 418-421.
- 32) Hedrich, D., A. Pirona and L. Wiessing (2008). "From margin to mainstream: The evolution of harm reduction responses to problem drug use in Europe." Drugs: Education, Prevention & Policy 15(6): 503-517.
- 33) Heller, D. I., D. Paone, A. Siegler and A. Karpati (2009). "The syringe gap: An assessment of sterile syringe need and acquisition among syringe exchange program participants in New York City." Harm Reduction Journal 6.
- 34) Hunt, N., J. Kimber, C. Lloyd and C. Tompkins (2007). "Public injecting and willingness to use a drug consumption room among needle exchange programme attendees in the UK." International Journal of Drug Policy 18(1): 62-65.
- 35) Hyshka, E., T. Bubela and T. C. Wild (2013). "Prospects for scaling-up supervised injection facilities in Canada: The role of evidence in legal and political decision-making." Addiction 108(3): 468-476.
- 36) Irwin, A., E. Jozaghi, B. W. Weir, S. T. Allen, A. Lindsay and S. G. Sherman (2017). "Mitigating the heroin crisis in Baltimore, MD, USA: a cost-benefit analysis of a hypothetical supervised injection facility." Harm Reduction Journal 14: 14.

- 37) Iversen, J., L. Topp, H. Wand and L. Maher (2012). "Individual-level syringe coverage among Needle and Syringe Program attendees in Australia." Drug and Alcohol Dependence 122(3): 195-200.
- 38) Ivsins, A., C. Chow, S. Macdonald, T. Stockwell, K. Vallance, D. C. Marsh, W. Michelow and C. Duff (2012). "An examination of injection drug use trends in Victoria and Vancouver, BC after the closure of Victoria's only fixed-site needle and syringe programme." International Journal of Drug Policy 23(4): 338-340.
- 39) Jozaghi, E. (2012). "Science versus politics: The need for supervised injection facilities in Montreal, Canada." International Journal of Drug Policy 23(5): 420-421.
- 40) Jozaghi, E. and M. A. Andresen (2013). "Should North America's first and only supervised injection facility (InSite) be expanded in British Columbia, Canada?" Harm Reduction Journal 10.
- 41) Jozaghi, E. and A. Jackson (2015). "Examining the potential role of a supervised injection facility in Saskatoon, Saskatchewan, to avert HIV among people who inject drugs." International journal of health policy and management 4(6): 373-379.
- 42) Jozaghi, E., A. A. Reid, M. A. Andresen and A. Juneau (2014). "A cost-benefit/cost-effectiveness analysis of proposed supervised injection facilities in Ottawa, Canada." Substance Abuse Treatment, Prevention, and Policy 9.
- 43) Kerr, T., J. Kimber, K. Debeck and E. Wood (2007). "The role of safer injection facilities in the response to HIV/AIDS among injection drug users." Current HIV/AIDS reports 4(4): 158-164.
- 44) Kerr, T., J.-A. Stoltz, M. Tyndall, K. Li, R. Zhang, J. Montaner and E. Wood (2006). "Impact of a medically supervised safer injection facility on community drug use patterns: a before and after study." BMJ (Clinical research ed.) 332(7535): 220-222.
- 45) Kimber, J. and K. Dolan (2007). "Shooting gallery operation in the context of establishing a medically supervised injecting center: Sydney, Australia." Journal of Urban Health-Bulletin of the New York Academy of Medicine 84(2): 255-266.
- 46) Kinnard, E. N., C. J. Howe, T. Kerr, V. S. Hass and B. D. L. Marshall (2014). "Self-reported changes in drug use behaviors and syringe disposal methods following the

- opening of a supervised injecting facility in Copenhagen, Denmark." Harm Reduction Journal 11: 8.
- 47) Lenton, S., J. Bevan and T. Lamond (2006). "Threat or Opportunity? Secondary Exchange in a Setting With Widespread Availability of Needles." Substance Use & Misuse 41(6-7): 845-864.
- 48) León, C., L. Cardoso, S. Mackin, B. Bock and J. M. Gaeta (2017). "The willingness of people who inject drugs in Boston to use a supervised injection facility." Substance abuse: 1-7.
- 49) Lorvick, J., R. N. Bluthenthal, A. Scott, M. L. Gilbert, K. S. Riehm, R. L. Anderson, N. M. Flynn and A. H. Kral (2006). "Secondary syringe exchange among users of 23 California syringe exchange programs." Substance Use & Misuse 41(6-7): 865-882.
- 50) McKnight, I., B. Maas, E. Wood, M. W. Tyndall, W. Small, C. Lai, J. S. G. Montaner and T. Kerr (2007). "Factors associated with public injecting among users of Vancouver's supervised injection facility." The American Journal of Drug and Alcohol Abuse 33(2): 319-325.
- 51) McNeil, R. and W. Small (2014). "Safer environment interventions: A qualitative synthesis of the experiences and perceptions of people who inject drugs." Social Science & Medicine 106: 151-158.
- 52) Miller, C. L., M. Firestone, R. Ramos, S. Burris, M. E. Ramos, P. Case, K. C. Brouwer, M. A. Fraga and S. A. Strathdee (2008). "Injecting drug users' experiences of policing practices in two Mexican—U.S. Border cities: Public health perspectives." International Journal of Drug Policy 19(4): 324-331.
- 53) Mitton, J. (2008). "The experience of injecting drugs in public spaces was characterised by urgency, a need for privacy, hygienic concerns, and a sense of shame." Evidence Based Nursing 11(1): 28-28.
- 54) Oramasionwu, C. U., T. L. Johnson, W. A. Zule, J. Carda-Auten and C. E. Golin (2015). "Using pharmacies in a structural intervention to distribute low dead space syringes to reduce HIV and HCV transmission in people who inject drugs." American Journal of Public Health 105(6): 1066-1071.

- 55) Parkin, S. and R. Coomber (2011). "Public injecting drug use and the social production of harmful practice in high-rise tower blocks (London, UK): A Lefebvrian analysis." Health & Place **17**(3): 717-726.
- 56) Parkin, S. and R. Coomber (2011). "Injecting drug user views (and experiences) of drug-related litter bins in public places: a comparative study of qualitative research findings obtained from UK settings." Health & place **17**(6): 1218-1227.
- 57) Potier, C., V. Lapr evote, F. Dubois-Arber, O. Cottencin and B. Rolland (2014). "Supervised injection services: What has been demonstrated? A systematic literature review." Drug and Alcohol Dependence **145**: 48-68.
- 58) Rhodes, T., L. Watts, S. Davies, A. Martin, J. Smith, D. Clark, N. Craine and M. Lyons (2007). "Risk, shame and the public injector: A qualitative study of drug injecting in South Wales." Social Science & Medicine **65**(3): 572-585.
- 59) Rivera, A. V., J. De Cuir, N. D. Crawford, S. Amesty and C. F. Lewis (2014). "Internalized stigma and sterile syringe use among people who inject drugs in New York City, 2010–2012." Drug and Alcohol Dependence **144**: 259-264.
- 60) Rose, V. J., G. Backes, A. Martinez and W. McFarland (2010). "Non-prescription syringe sales in California: a qualitative examination of practices among 12 local health jurisdictions." Journal of urban health : bulletin of the New York Academy of Medicine **87**(4): 561-575.
- 61) Rose, V. J., A. Lutnick and A. H. Kral (2014). "Feasibility of providing interventions for injection drug users in pharmacy settings: A case study among San Francisco pharmacists." Journal of Psychoactive Drugs **46**(3): 226-232.
- 62) Rose, V. J. and H. F. Raymond (2010). "Evaluation of nonprescription syringe sales in San Francisco." Journal of the American Pharmacists Association : JAPhA **50**(5): 595-599.
- 63) Salmon, A. M., H. Thein, J. Kimber, J. M. Kaldor and L. Maher (2007). "Five years on: what are the community perceptions of drug-related public amenity following the establishment of the Sydney Medically Supervised Injecting Centre?" International Journal of Drug Policy **18**(1): 46-53.

- 64) Scherbaum, N., M. Specka, J. Bombeck and B. Marrziniak (2009). "Drug consumption facility as part of a primary health care centre for problem drug users-Which clients are attracted?" International Journal of Drug Policy 20(5): 447-449.
- 65) Semaan, S., P. Fleming, C. Worrell, H. Stolp, B. Baack and M. Miller (2011). "Potential role of safer injection facilities in reducing HIV and Hepatitis C infections and overdose mortality in the United States." Drug & Alcohol Dependence 118(2/3): 100-110.
- 66) Severtson, S. G., M. M. Mitchell, B. E. Mancha and W. W. Latimer (2009). "The association between planning abilities and sharing injection drug use equipment among injection drug users in Baltimore, MD." Journal of Substance Use 14(5): 325-333.
- 67) Shaw, A., L. Lazarus, T. Pantalone, S. LeBlanc, D. Lin, D. Stanley, C. Chepesiuk, S. Patel, M. Tyndall and P. C. A. Committee (2015). "Risk environments facing potential users of a supervised injection site in Ottawa, Canada." Harm reduction journal 12: 49.
- 68) Small, W., T. Kerr, J. Charette, M. T. Schechter and P. M. Spittal (2006). "Impacts of intensified police activity on injection drug users: Evidence from an ethnographic investigation." International Journal of Drug Policy 17(2): 85-95.
- 69) Small, W., A. Krusi, E. Wood, J. Montaner and T. Kerr (2012). "Street-level policing in the downtown eastside of Vancouver, Canada, during the 2010 winter olympics." International Journal of Drug Policy 23(2): 128-133.
- 70) Small, W., T. Rhodes, E. Wood and T. Kerr (2007). "Public injection settings in Vancouver: Physical environment, social context and risk." International Journal of Drug Policy 18(1): 27-36.
- 71) Somaini, B. and P. Grob (2012). "How and why AIDS changed drug policy in Switzerland." Journal of Public Health Policy 33(3): 317-324.
- 72) Stafford, J. and L. Burns (2015). "Health related issues among people who inject drugs in Australia." Drug and Alcohol Dependence 156.
- 73) Stoltz, J.-A., E. Wood, W. Small, K. Li, M. Tyndall, J. Montaner and T. Kerr (2007). "Changes in injecting practices associated with the use of a medically supervised safer injection facility." Journal of public health (Oxford, England) 29(1): 35-39.



- 74) Strike, C., J. A. Jairam, G. Kolla, P. Millson, S. Shepherd, B. Fischer, T. M. Watson and A. M. Bayoumi (2014). "Increasing public support for supervised injection facilities in Ontario, Canada." Addiction 109(6): 946-953.
- 75) Strike, C. and T. M. Watson (2017). "Relationships between needle and syringe programs and police: An exploratory analysis of the potential role of in-service training." Drug and Alcohol Dependence 175: 51-54.
- 76) Thein, H.-H., J. Kimber, L. Maher, M. MacDonald and J. M. Kaldor (2005). "Public opinion towards supervised injecting centres and the Sydney Medically Supervised Injecting Centre." International Journal of Drug Policy 16(4): 275-280.
- 77) Ti, L., E. Wood, K. Shannon, C. Feng and T. Kerr (2013). "Police confrontations among street-involved youth in a Canadian setting." International Journal of Drug Policy 24(1): 46-51.
- 78) Tookes, H. E., A. H. Kral, L. D. Wenger, G. A. Cardenas, A. N. Martinez, R. L. Sherman, M. Pereyra, D. W. Forrest, M. LaLota and L. R. Metsch (2012). "A comparison of syringe disposal practices among injection drug users in a city with versus a city without needle and syringe programs." Drug and Alcohol Dependence 123(1-3): 255-259.
- 79) Uchtenhagen, A. (2010). "Heroin-assisted treatment in Switzerland: A case study in policy change." Addiction 105(1): 29-37.
- 80) Uosukainen, H., J. H. O. Turunen, J. Ilomäki and J. S. Bell (2014). "Community pharmacy services for drug misuse: Attitudes and practices of Finnish pharmacists." International Journal of Drug Policy 25(6): 1139-1142.
- 81) Wenger, L. D., S. G. Arreola and A. H. Kral (2011). "The prospect of implementing a Safer Injection Facility in San Francisco: Perspectives of community stakeholders." International Journal of Drug Policy 22(3): 239-241.
- 82) Wenger, L. D., A. N. Martinez, L. Carpenter, D. Geckeler, G. Colfax and A. H. Kral (2011). "Syringe disposal among injection drug users in San Francisco." American Journal of Public Health 101(3): 484-486.
- 83) Werb, D., T. Kerr, J. Buxton, J. Shoveller, C. Richardson, J. Montaner and E. Wood (2013). "Patterns of injection drug use cessation during an expansion of syringe

- exchange services in a Canadian setting." Drug and Alcohol Dependence 132(3): 535-540.
- 84) Werb, D., E. Wood, W. Small, S. Strathdee, K. Li, J. Montaner and T. Kerr (2008). "Effects of police confiscation of illicit drugs and syringes among injection drug users in Vancouver." The International journal on drug policy 19(4): 332-338.
- 85) Wiessing, L., M. Ferri, V. Belackova, P. Carrieri, S. R. Friedman, C. Folch, K. Dolan, B. Galvin, P. Vickerman, J. V. Lazarus, V. Mravcik, M. Kretzschmar, V. Sypsa, A. Sarasa-Renedo, A. Uuskula, D. Paraskevis, L. Mendao, D. Rossi, N. van Gelder, L. Mitcheson, L. Paoli, C. D. Gomez, M. Milhet, N. Dascalu, J. Knight, G. Hay, E. Kalamara, R. Simon, C. Comiskey, C. Rossi, P. Griffiths and G. Eubest Working (2017). "Monitoring quality and coverage of harm reduction services for people who use drugs: a consensus study." Harm Reduction Journal 14: 14.
- 86) Williams, C. T. and D. S. Metzger (2010). "Race and distance effects on regular syringe exchange program use and injection risks: A geobehavioral analysis." American Journal of Public Health 100(6): 1068-1074.
- 87) Wolfson-Stofko, B., A. S. Bennett, L. Elliott and R. Curtis (2017). "Drug use in business bathrooms: An exploratory study of manager encounters in New York City." International Journal of Drug Policy 39: 69-77.
- 88) Wolfson-Stofko, B., R. Curtis, F. Fuentes, E. Manchess, A. Del Rio-Cumba and A. S. Bennett (2016). "The Portapotty Experiment: Neoliberal approaches to the intertwined epidemics of opioid-related overdose and HIV/HCV, and why we need cultural anthropologists in the South Bronx." Dialectical anthropology 40(4): 395-410.
- 89) Wood, E., M. W. Tyndall, K. Li, E. Lloyd-Smith, W. Small, J. S. G. Montaner and T. Kerr (2005). "Do supervised injecting facilities attract higher-risk injection drug users?" American Journal of Preventive Medicine 29(2): 126-130.
- 90) Wood, E., M. W. Tyndall, J. S. Montaner and T. Kerr (2006). "Summary of findings from the evaluation of a pilot medically supervised safer injecting facility." Canadian Medical Association Journal 175(11): 1399-1404.

- 91) Wood, E., M. W. Tyndall, Z. Qui, R. Zhang, J. S. Montaner and T. Kerr (2006). "Field action report. Service uptake and characteristics of injection drug users utilizing North America's first medically supervised safer injecting facility." American Journal of Public Health 96(5): 770-773.
- 92) Wood, E., M. W. Tyndall, Z. Qui, R. Zhang, J. S. G. Montaner and T. Kerr (2006). "Service Uptake and Characteristics of Injection Drug Users Utilizing North America's First Medically Supervised Safer Injecting Facility." American Journal of Public Health 96(5): 770-773.
- 93) Wood, E., M. W. Tyndall, Z. G. Qui, R. Zhang, J. S. G. Montaner and T. Kerr (2006). "Service uptake and characteristics of injection drug users utilizing North America's first medically supervised safer injecting facility." American Journal of Public Health 96(5): 770-773.
- 94) Zaller, N. D., M. A. Yokell, N. Apeakorang, J. Gaggin and P. Case (2012). "Reported experiences during syringe purchases in Providence, Rhode Island: implications for HIV prevention." Journal of health care for the poor and underserved 23(3): 1310-1326.