

**A Review of the Effectiveness of
Medically Supervised Injecting Centres**

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**Paper submitted to the Welsh Government's
Advisory Panel on Substance Misuse**

May 2017

Medically Supervised Injecting Centres (MSIC): Review of Systematic Reviews

In March 2017, the Centre for Criminology, University of South Wales, was asked to provide evidence of the effectiveness of Medically Supervised Injection Centres (MSICs) to the Welsh Government's Advisory Panel on Substance Misuse. The research comprised collating evidence via a review of systematic reviews of MSICs. This report presents a thematic analysis of the findings from this review.

This report is structured into four main parts. The first deals with the methodological process of conducting a review of systematic reviews. The second, third and fourth sections present evidence of the effectiveness of MSICs, an overview of the cost-effectiveness of MSICs and recent literature on MSICs published in 2014 or after. The review concludes with an overview of key findings.

Introduction

There is no shortage of literature evaluating the effectiveness of Medically Supervised Injecting Centres (MSICs). The majority of these studies emanate from Australia (Goodhew et al., 2016, Latimer et al., 2016), Canada (Hadland et al., 2014, Jozaghi et al., 2014, McNeil et al., 2014, Ti et al., 2015, Zlotorzynska et al., 2014)¹, Denmark (Houborg and Frank, 2014, Kappel et al., 2016, Kinnard et al., 2014, Toth et al., 2016), Spain (Clua Garcia, 2015) and Switzerland (Dubois-Arber et al., 2008), where MSICs operate as part of broader harm reduction strategies². Nevertheless, perhaps due to the relative infancy of MSICs³, there has been a lack of collated reviews of evidence.

A review of systematic reviews utilises the same techniques as the traditional systematic review method, including the use of 'rigorous and transparent methods, clear eligibility criteria, description of the search strategy, and documentation of the selection procedure and the attrition of studies' (Holloway and Bennett, 2016, p.220). However, the necessary difference is a search strategy geared toward locating only systematic reviews. Although their use is widespread within the fields of public health, social care and psychology, their use within criminology is limited, although there have been recent efforts to address this (Weisburd et al., 2016).

To date there has been no review of systematic reviews on the effectiveness of MSICs. There is, however, a number of systematic reviews collating the abundance of peer-reviewed and grey literature on MSICs (Larney et al., 2017, MacArthur et al., 2014, McNeil and Small, 2014, Potier et al., 2014). The aim of this current paper is to collate and synthesise the contributions of these systematic reviews. In other words, the paper presents the results of a review of systematic reviews on the effectiveness of MSICs.

¹ The two non-European injecting facilities, Australia's Sydney Medically MSIC and Canada's Vancouver Insite have had more rigorous research designs as a part of their mandate to operate

² To date, more than 90 SIFs operate in ten countries (Australia, Canada, Denmark, France, Germany, Luxembourg, The Netherlands, Norway, Spain and Switzerland) (Bouvier et al., 2017)

³ The first supervised consumption room of the current type was opened in June 1986 in Berne, Switzerland, and was followed by the introduction of consumption rooms in Basle, Lucerne and St Gallen. Previously there had been unofficial or semiofficial initiatives of tolerated drug use at addiction counselling centres or youth services in the Netherlands in the early 1970s (the Prinsenhof and the HUK Amsterdam) and in Switzerland in the early 1980s. Initiatives to establish supervised injecting facilities started in Hamburg and Frankfurt in the early 1990s and in Spain in the early 2000s. The first use of a medically supervised injecting centre (MSIC) with 16 places was established in the Kings Cross area of Sydney, Australia, in May 2001, following several years of intensive discussions of the public health and order problems arising from the large illicit drugs market in this area and the role of supervised injecting facilities in tackling these. In June 2003, Health Canada approved the establishment of a supervised injecting site in Vancouver (Hedrich, 2004).

Methodology

A review of systematic reviews was conducted. The criteria used were essentially the same as that of conducting a conventional systematic review: a search strategy to identify relevant sources of literature, an inclusion and exclusion criteria, a transparent and rigorous method for recording the attrition of literature, and an overview of the final selection of identified studies.

Search Strategy

Literature sources were identified via searches in the journal databases: PubMed, Science Direct, Web of Science and ASSIA.

A Boolean search was used to identify literature. To reduce selection bias, a range of English synonyms were used to produce the following search algorithm:

ti(supervis* OR safe OR drug* OR medical*) AND ti(inject* OR shoot* OR consumption) AND ti(facilit* OR room* OR galler* OR centre* OR center* OR site* OR service* OR space*)

The term 'systematic review' was not included in the Boolean search. This was due to the term's potential to reduce the return of relevant studies. For example, there was a possibility that the term 'systematic review' would not be included in the title of relevant articles. As such, the search strategy located a broad range of studies that were screened by a member of the research team.

Results with publication dates up to 04/04/2017 were screened, with duplicates being removed and remaining articles examined based on their pertinence to the research question.

To ensure all relevant literature was identified, scans of grey literature were also conducted. This involved searches in Google and Google Scholar using the same algorithm as used for searches for peer-reviewed literature. Hand searches located the most relevant studies to the review.

Criteria for Inclusion

The initial criteria for inclusion was that the study must be a systematic review, published between 1990 and 2017, accessible to the research team during the data gathering period and have a focus on MSICs, either alone or as part of broader harm reduction strategies. The eligibility criteria each review used for selecting papers were checked by the researcher to ensure rigorous selection methods had been followed.

As a relatively low number of systematic reviews were returned, a full systematic review of literature from 2014 onwards was also conducted. [This decision was based on the view that relevant papers published before 2014 would have been included in the published systematic reviews.] This followed the same methodology and inclusion/exclusion criteria. However, the selection of studies was not limited to systematic reviews of MSICs and instead included all literature on MSICs from 2014 onwards.

A search of material relating to the cost-effectiveness of MSICs was also performed. This involved the scanning of literature obtained via the initial systematic review search.

Results

From the four databases searched, 1867 items were retrieved and saved into Endnote referencing software. After excluding all duplicates ($n=809$), a total of 1058 items remained and abstracts were screened by a member of the research team (see Table 1). Papers were included if they met the inclusion criteria. This left 3 peer-reviewed systematic reviews, 4 systematic reviews from grey literature and 13 publications from 2014 onwards. Table 2 provides an overview of the 7 systematic reviews, along with their concluding statements. Table 3 provides similar information for the post-2014 literature.

To date, the research team has only been able to access 5 of the post-2014 peer-reviewed papers (inter-library loans have been submitted for the remainder). Of the 5 accessible studies, 3 were from Canada, 1 from the United States and 1 was a joint study focusing on the United Kingdom and Germany. Three of the studies were descriptive reports (Bayoumi and Strike, 2016, Jozaghi et al., 2015, Lloyd et al., 2017) and two were cohort studies (Bouvier et al., 2017, Hadland et al., 2014).

Table 1: Search Results

Database	Items returned
PubMed	545
ASSIA	139
Web of Science	956
Science Direct	227
TOTAL hits	1867
Duplicates	809
TOTAL unique studies	1058

Table 2: Overview of Systematic Reviews with Authors' Conclusions

Author/Year	Topic	Aim	Number of Studies	Main Findings
(de Vel-Palumbo et al., 2013)	MSIC evidence and provision	Provide overview of existing MSIC evidence and provision	134	'The research indicates some positive outcomes from SIFs in relation to: reductions in overdose, less risky injecting practices, improved access to drug treatment, health and welfare services, improvements in public amenity and reductions in crime' (p.1).
(EMCDDA, 2016)	Drug consumption rooms: an overview of provision and evidence	Provide an objective overview of MSIC characteristics and current provision, and of their effectiveness.	27	'The benefits of providing supervised drug consumption facilities may include improvements in safe, hygienic drug use, especially among regular clients, increased access to health and social services, and reduced public drug use and associated nuisance' (p.5).
(MacArthur et al., 2014)	Interventions to prevent HIV and Hep C in People Who Inject Drugs (PWID)	Collate and synthesise the latest review-level evidence regarding of harm-reduction interventions for PWID	12	'Harm reduction interventions can reduce injecting risk behaviour. Specifically in relation to MSICs, there is tentative evidence to support the effectiveness of SIFs in reducing IRB and improving injecting hygiene' (p.1).
(McNeil and Small, 2014)	Explore the role of safer environment interventions (SEI) (including syringe exchange programmes, supervised injecting facilities, and peer based harm reduction initiatives) informed by the experiences of PWIDs	Develop a comprehensive understanding of SEIs informed by the experiences and perceptions of PWID.	29	'SEI provide refuge from drug based street scenes, enable safer injecting by reshaping the social and environmental contexts of injecting drug use, mediate access to resources and health care services' (p.151).

Author/Year	Topic	Aim	Number of Studies	Main Findings
(NHS, 2017)	Review the health needs of people who inject drugs in public places in Glasgow city centre in order to inform service provision and planning.	To specifically explore the likely benefits and risks of implementing: <ul style="list-style-type: none"> • safer injecting facilities (SIFS) • heroin-assisted treatment • extending access to injecting equipment 	Synthesised material from EMCDDA, (2016) and Potier et al., (2014)	‘Evaluations indicate that SIFs are able to attract those most at risk of injecting-related harm and support them to engage with health and social services. They can provide timely management of overdoses occurring among attendees and may contribute to reductions in drug-related deaths at a community level. There is strong evidence to support a reduction in risky injection practices among SIF clients. SIF do not appear to undermine existing addiction treatments, and may even act as a successful gateway into treatment and recovery. If located and managed appropriately, they appear to have no impact on drug-related crime or public disorder, and can improve public amenity’ (p.59).
(Schatz and Nougier, 2012)	Overview of evidence and focus on EU MSICs	Analyse available evidence regarding MSIC impact and provide overview of the various MSICs in different countries	43	‘Available evidence suggests that these facilities have a positive impact on the health and well-being of individual users and the wider community’ (p.20).
(Potier et al., 2014)	Supervised Injecting Sites (SISs)	To systematically collect and synthesize the currently available evidence regarding MSIC-induced benefits and harm	75	‘All studies converged to find that MSICs were efficacious in attracting the most marginalised PWID, promoting safer injecting conditions, enhancing access to primary health care, and reducing the overdose frequency’ (p.48).

Table 3: Overview of Literature 2014-2017 with Conclusions

Author/Year	Study Purpose	Main findings
Bayoumi and Strike, 2016	Providing evidence for use of MSICs	'Services allow safer injection, are associated with decreased overdoses, facilitate referrals for drug treatment, and benefit public order' (p.1)
Bouvier et al. 2017	Explore factors associated with willingness to use a SIF among participants who had injected drugs or were at risk of initiating injection drug use	'Established risk factors for overdose, including homelessness, history of overdose, daily injection drug use, heroin use, and fentanyl misuse, were associated with higher SIF acceptability, indicating that young people at the highest risk of overdose might ultimately be the same individuals to use the facility' (p.14)
Hadland et al., 2014	Identify factors associated with use of the Vancouver SIF, the only such facility in North America, among street youth.	'MSICs attracted high-frequency young drug users most at risk of bloodborne infection and overdose and those who otherwise inject in public spaces' (p.4)
Jozaghi et al., 2015	To determine whether the currently MSIC facilities needs to be expanded to other areas of Canada	'Establishing two SIFs locations outside Vancouver in British Columbia's capital city, Victoria, is cost-effective, with a benefit-cost ratio of 1.25:1. It appears that expanding SIFs to Victoria could offer significant savings for local health care institutions' (p.7)
Lloyd et al., 2017	Identify key problems and divergent responses: toward drug consumption room policies in the UK and Germany	'In explaining the different situations in the two countries, key factors are the potential for city level policies, the stigma attached to drug users in media reporting, and the historical development of open drug scenes. Drug policy decisions are therefore affected by wider political goals and pressures in unpredictable ways' (p.66).

Thematic Findings from Systematic Reviews

Peer reviewed

Potier et al. (2014) provide the most comprehensive and directly relevant of the three peer-reviewed reviews. Their review identifies 75 studies focusing on MSICs and a thematic analysis of their findings. They note that ‘all studies converged to find that MSIC were efficacious in attracting the most marginalised PWID, promoting safer injection conditions, enhancing access to primary health care, and reducing the overdose frequency’ (Potier et al., 2014, p.48). Sixty-six of the studies in their report provided empirical evidence from MSICs in Vancouver (n=51), Sydney (n=13) and Europe (n=2). Nine studies were descriptive accounts of MSICs as part of broader harm reduction strategies.

The review by McNeil and Small (2014) was both a systematic review and meta-synthesis of qualitative studies exploring PWID’s experience of three types of ‘Safe Environment Interventions’ (syringe exchange programmes, supervised injection facilities and peer-based harm reduction interventions). They provide evidence that MSICs function to offer refuge from street-based drug scenes, enable safe injecting practices and mediate access to agencies and resources. They include 29 studies from Canada (n=16), USA (n=6), Russia (n=4) and other settings (n=4).

Finally, MacArthur et al. (2014) undertook a review of reviews regarding the effectiveness of harm reduction interventions in relation to HIV transmission. They identified 12 ‘core reviews’, one of which provides tentative evidence to support the effectiveness of MSICs in reducing Injecting Risk Behaviours (IRB) and preventing HIV infections (Tilson, 2007).

Grey Literature

de Vel-Palumbo et al. (2013) identified 147 pertinent studies, however, the majority of this literature is not synthesised and instead is presented as a bibliography. Nevertheless, their review does present evidence from Canada (n=16) and Sydney (n=10) that indicates positive outcomes from MSICs in relation to reductions in overdoses, less risky injecting practices, improved access to drug treatment and health and welfare services, improvement in public amenity and reductions in crime.

The report from the EMCDDA (2016) locates 27 studies and applies many of its findings to EU-based MSICs. They concluded that MSICs lead to improvements in safe, hygienic drug use, especially among regular clients, increased access to health and social services, and reduced public drug use and associated nuisance. As such, they called for their implementation in EU countries where proposals are currently being debated.

The NHS (2017) study ‘Taking Away the Chaos’ synthesises material two of the aforementioned systematic reviews (EMCDDA, 2016, Potier et al., 2014). This material is juxtaposed alongside a review of the health needs of people who inject drugs in public places in Glasgow City Centre in order to inform service provision and planning of safer environment interventions. The review finds evidence to suggest that MSICs are able to attract those most at risk of injecting-related harm and support them to engage with health and social services, provide the timely management of overdoses occurring among attendees and contribute to reductions in drug-related deaths at a community level. There was also strong evidence to support a reduction in risky injection practices among MSIC clients and that MSICs do not appear to undermine existing addiction treatments, and may even act as a successful gateway into treatment and recovery. If located and managed appropriately, the authors concluded that MSICs appear to have no impact on drug-related crime or public disorder, and can improve public amenity.

Finally, Schatz and Nougier (2012) provide evidence from 43 papers regarding MSIC impact. They also provide an extensive overview of the various MSICs in different countries, including those in the EU. Their review suggests that MSICs have a positive impact on the health and well-being of individual users and the wider community.

The following sections provide a thematic analysis of the main findings emerging from the seven reviews.

The Impact of MSICs on Overdose-Induced Mortality and Morbidity

Potier et al (2014) provide the only peer-reviewed synthesis of studies on whether MSICs successfully reduce harm among MSIC in relation to overdose deaths, although there is some material presented in two reviews identified in the grey literature (NHS, 2017, Schatz and Nougier, 2012). In studies where this parameter was measured (Kerr et al., 2007b, Kerr et al., 2006, Marshall et al., 2011, Milloy et al., 2008a, Milloy et al., 2008b, van Beek, 2003), no death by overdose was ever reported at a researched MSIC. There is also synthesised evidence found in Schatz and Nougier (2012) to suggest that no fatal overdoses have ever been recorded at MSICs in Canada, Germany and Luxembourg (where 1,025 overdoses have successfully been managed without fatality).

There is confirmation from ecological studies that MSICs can reduce the risk of overdoses in the local community. It was found that the introduction of MSICs in Australia, Canada, The Netherlands, Norway, Spain and Switzerland may have resulted in fewer overdoses occurring within close proximity (Schatz and Nougier, 2012). In Vancouver, Insite has led to a 35% decrease in the number of lethal overdoses within a 500m radius of its centre (Marshall et al., 2011). There was also evidence of a 68% reduction in call outs for ambulances related to overdoses during operational hours of the MSIC in Sydney (Salmon et al., 2010, van Beek, 2003). The findings from these papers led Potier et al. (2014, p.64) to conclude that the safer injecting conditions and equipment, overdose management personnel and injection technique education within MSICs meant that ‘the global rate of overdoses in MSICs was found to be very low’.

Effectiveness of MSICs on Injecting Risk Behaviour.

The 3 peer-reviewed reviews included 26 studies that explored the effectiveness of MSICs promoting safer injecting practices, two of which were duplicates. Potier et al. (2014) located 8 studies, all of which provided evidence of MSICs reducing injecting related harms: regular use of MSIC was associated with decreased syringe sharing (Kerr et al., 2005) and a reduction in syringe reuse and public injecting (Stoltz et al., 2007). Similarly McNeil and Small (2014) cited qualitative evidence from five studies that suggest MSICs enable reductions in risk behaviours such as ‘rushed injections’ (Kerr et al., 2007c, Small et al., 2012) and syringe sharing (Fairbairn et al., 2010, Fast et al., 2008, Krusi et al., 2009, Ngo et al., 2009, Parker et al., 2012). Their review also located a study by Milloy and Wood (2009) that estimated a 69% reduction in the likelihood that MSIC users would share syringes, and noted evidence of MSICs fostering the use of sterile injection materials, the elimination of used materials (Fast et al., 2008) and engaging users in education on safer injecting practices (Wood et al., 2008).

However, although there is some academic evidence to suggest that MSICs have utility in reducing HIV and Hepatitis C transmission (Tilson, 2007), the limited number of studies exploring this topic led MacArthur et al. (2014, p.26) to conclude that ‘there is insufficient review level evidence to support or discount the effectiveness of SIFs in relation to HIV [and HCV] transmission’. Nevertheless, their review does provide data from studies exploring the role of MSICs in reducing risky injecting behaviour and improving injecting hygiene (Kerr et al., 2007a). This included MSICs providing safe injecting equipment and a hygienic site for

drug use. Based on the synthesised evidence, MacArthur et al. (2014, p.26) stated their was 'tentative evidence' of MSICs reducing risky injecting behaviour and improving injecting hygiene. There is also duplicated evidence found in two reviews from the grey literature (EMCDDA, 2016, NHS, 2017) that conclude that a direct link between HIV and Hepatitis C transmission is inconclusive, in part due to the difficulties of undertaking a study that is capable of detangling the effects of MSICs from concurrent harm reduction initiatives, such as injecting equipment provision or opiate substitution treatment.

Impact of MSIC on Access to Addiction Treatment Programmes

Four reviews combined a total of 16 studies that cited favourable evidence of MSICs mediating access to drug treatment programmes, support and care.

Potier et al. (2014) located 5 studies where MSIC attendance was associated with an increase in client referral to an addiction treatment centre, detoxification programme or methadone therapy (Debeck et al., 2011a, Kimber et al., 2008, Milloy et al., 2010, Wood et al., 2007, Wood et al., 2006c). Four of the studies were from the Vancouver MSIC (Debeck et al., 2011a, Kimber et al., 2008, Milloy et al., 2010, Wood et al., 2007, Wood et al., 2006c) whilst Kimber et al (2008) provided positive evidence from the Sydney MSIC. Among PWID in the Vancouver MSIC, 18% of clients went on to engage in detoxification programme, 57% engaged with addiction treatment and 23% desisted from drugs over a 16 month period (Debeck et al. 2011).

McNeil and Small (2014) provided further positive evidence of MSIC in leading to treatment programmes and support, although their review cited a number of studies that demonstrated the potential of MSICs mediating access to ancillary services (e.g. food and shelter) and broader health and social care. MSICs also fostered levels of trusts between clients and health professionals that facilitated clients' access into medical treatment.

Schatz and Nougier (2012) and (NHS, 2017) cite the same sources (DeBeck et al., 2011b, Wood et al., 2006b) found in Potier et al. (2014) and conclude that MSICs 'play a role in facilitating access to addictions treatment and recovery' (NHS, 2017, p.54).

Environmental and Social Benefits

Four reviews (EMCDDA, 2016; McNeil & Small, 2014; NHS, 2017; Potier et al., 2014) cite evidence that MSICs are effective in providing a number of positive environmental, social and neighbourhood effects. These include: 1) providing refuge from street based drug scenes (Fairbairn et al. 2008; MacNeil and Pauly, 2010; Small et al, 2012; 2) alleviating local drug related crime, violence and trafficking (Freeman et al., 2005, Milloy et al., 2009, Wood et al., 2006a); 3) increased physical and personal safety for PWID (Krusi et al., 2009, MacNeil and Pauly, 2010), and; 4) reduced nuisance caused by PWID in public spaces (McKnight et al., 2007, Petrar et al., 2007, Stoltz et al., 2007). There is also evidence that local residents and police hold favourable perceptions of MSICs (Cruz et al., 2007, Thein et al., 2005). The following sections will provide an overview of each of these themes.

1) Providing Refuge from Street Based Drug Scenes

McNeil and Small (2014) located 1 study that evidenced how MSICs minimized the risk of violence to clients (Fairbairn et al., 2008). They also made reference to broader 'safer environment interventions' - including MSICs - that can operate as 'refuges from structural and everyday violence' (McNeil and Small, 2014, p.153). Fairbairn et al's (2008) study was cited by the authors as evidence of MSICs as valuable interventions in reducing gender-based violence against female PWID. Based on the synthesised evidence, the authors concluded that MSICs can operate as 'safe, regulated spaces that mitigate the dangers of the street-based drug scene' (McNeil and Small, 2014, p.153).

2) Impact on Drug Related Crime

Three reviews (EMCDDA, 2016, NHS, 2017, Potier et al., 2014) cited 4 studies from Vancouver (Milloy et al, 2009; Wood et al, 2006) and Sydney (Fitzgerald et al, 2010; Freeman et al, 2005) that report no increase in crime, violence or drug trafficking around the MSIC after its opening. The studies from Sydney rely on police data from over a 10 year period. As such, Potier et al (2014) state that although there is public fear that the opening of MSICs may lead to increased drug related crime and trafficking, this was not highlighted in any of their cited articles. There is also evidence from the EU that found no suggestion of increased crime in the close proximity to Swiss or Dutch MSICs (Hedrich et al., 2010).

3) Increased Physical and Personal Safety

McNeil and Small (2014) located a number of studies that supported the use of MSICs in fostering supportive and safe environments that negated the risk of physical violence towards PWID (Fairbairn et al., 2008, Small et al., 2011). MSICs were noted for their ability to provide alternative to street-based injecting sites, where violence and conflict can frequently occur (Bourgois, 2009.). As such, McNeil and Small (2014) concluded that MSICs are able to increase safety and disrupt physical violence and interpersonal stigma toward PWID.

4) Reducing Nuisance Caused by PWID in Public Spaces

Potier et al (2014) cited 6 studies that explored the role of MSICs in reducing nuisance and public disorder caused by PWID in public spaces (McKnight et al., 2007, Petrar et al., 2007, Salmon et al., 2007, Stoltz et al., 2007, Thein et al., 2005, Wood et al., 2005). These were obtained from the studies conducted in the Vancouver (McKnight et al., 2007; Petrar et al., 2007; Stoltz et al, 2007; Wood et al, 2004) and Sydney (Salmon et al., 2007; Thein et al, 2005) MSICs. The studies demonstrated MSIC's role in reducing public nuisance related to syringe dropping and public injecting (Salmon et al., 2007; Wood et al., 2004) and self-declared public drug injecting (Petrar et al., 2007; Stoltz et al 2007). Although there were data suggesting that their impact on public drug dealing is limited (Salmon et al 2007), Potier et al (2014, p.76) concluded that based on the synthesised material, MSICs 'reduced the problems induced by drug injection in public spaces...[and] contributed to a significant reduction of drug injection in public spaces, [and] the amount of waste resulting from drug injection in public spaces'. This finding is congruent with European studies which have found similar results (Hedrich et al., 2010). Nevertheless, Potier et al (2014) stated that any reductions in public nuisance should be read with caution due to the difficulties in assessing such impacts. For example, they cite numerous other external factors (such as increased street cleaning, surveillance and support in particular 'hot spots') that may also account for recorded changes in public nuisances.

5) Resident and Authority Perceptions of MSICs

Potier et al (2014) allude to 7 surveys that explored the opinions of local residents, police and authorities working in the drug field toward MSICs. All studies (Cruz et al., 2007, DeBeck et al., 2012, O'Shea, 2007, Philbin et al., 2009, Thein et al., 2005, Watson et al., 2012) other than (Salmon et al., 2007) and (Watson et al., 2012) reported favourable perceptions towards MSICs; this included population surveys of local residents in Ontario, where 60% of the local population favoured the existence of an MSIC (Cruz et al, 2007) and random sample studies in Sydney where more than 70% and 58% of companies located close to the MSIC responded favourably to its introduction (Thein et al 2005). Nevertheless, Potier et al (2014) did report some opposition to MSICs, notably in the studies of Watson et al (2012) and Salmon et al (2007) who reported disapproval amongst the police forces in Toronto and Ottawa to proposed MSICs and a perception amongst some residents that MSICs may contribute to negative perceptions of the neighbourhood and foster increased drug use, crime and dealing (Salmon et al, 2007). As such, Potier et al (2014) recommend that any proposed implementation of a MSIC should be preceded by educational campaigns that inform and educate those living within close

proximity to the proposed MSIC. Such initiatives have been found to be highly effective at fostering the acceptance of MSIC by local residents and police services (Potier et al, 2014).

Cost-Effectiveness of MSICs

10 studies present an economic/cost-effectiveness analysis of MSICs (Andresen and Boyd, 2010, Andresen and Jozaghi, 2012, Bayoumi and Zaric, 2008, Enns et al., 2016, Irwin et al., 2016, Jozaghi, 2014, Jozaghi and Jackson, 2015, Jozaghi et al., 2013, Jozaghi et al., 2014, Pinkerton, 2010). These studies estimate the savings generated by MSICs averting new HIV and HCV infections. The majority of evidence is from Vancouver’s Insite facility (Andresen and Boyd, 2010, Andresen and Jozaghi, 2012, Bayoumi and Zaric, 2008, Pinkerton, 2010) . However, there is also evidence from an unsanctioned smoking facility in downtown Vancouver (Jozaghi, 2014) and a number of more recent studies estimating averted HIV and HCV infections via proposed MSICs in Canadian cities including Montreal (Jozaghi et al., 2013), Ottawa (Enns et al., 2016, Jozaghi et al., 2014), Saskatoon (Jozaghi and Jackson, 2015) and Toronto (Enns et al., 2016). Table 4 provides an overview of the estimated HIV and HCV infections averted each year due to proposed MSICs in several Canadian cities and one in San Francisco.

Table 4: Infections Averted due to Installation of MSIC

Location	Study	Infections Averted (per year)	
		HIV	HCV
Vancouver	(Andresen and Boyd, 2010)	35	
Vancouver	(Andresen and Jozaghi, 2012)	22	
Vancouver	(Bayoumi and Zaric, 2008)	157	
Vancouver	(Jozaghi, 2014)		57
Vancouver	(Pinkerton, 2010)	80.7	
Toronto	(Enns et al., 2016)	8.2	22.95
Ottawa	(Enns et al., 2016)	17.9	16.1
Ottawa	(Jozaghi et al., 2014)	7	
Montreal	(Jozaghi et al., 2013)	14	84
Saskatoon	(Jozaghi and Jackson, 2015)	15	
San Francisco	(Irwin et al., 2016)	3.3	19

All studies of the Insite facility utilise complex simulation models to project potential savings. Bayoumi and Zaric (2008) projected new HIV and HCV infections for the City of Vancouver over a 10-year period that would occur *without* the Insite facility. They estimated that the implementation of an MSIC would avert 1191 new HIV and 54 new HCV over that timescale. By assigning a monetary value to the number of averted cases, the authors were able to predict that the SIF would yield annual savings of \$25 million Canadian dollars at a cost-benefit ratio of 16.84⁴.

Andresen and Boyd (2010) utilised a different methodological technique that consisted of four separate mathematical models to assess the economic impact of preventing new HIV infections each year through MSICs. Data were obtained from the analysis of Insite. Their findings found that on average, 35 cases of new HIV infection could be prevented each year. This is not too dissimilar from the prediction found in Andresen and Jozaghi (2012) that the Insite facility would prevent 22 HIV infections each year. When assigning economic values to these figures, Andresen and Boyd (2010) estimate a societal benefit \$6 million Canadian dollars each year, translating to an average benefit-cost ratio of 5.12:1. Although this is slightly lower than the

⁴ Des Jarlais et al (2008), however, have since shown these figures to be unrealistically high. Instead, they suggest a figure of 20-30 averted HIV cases each year.

figures presents in Bayoumi and Zaric (2008, p.70), the authors conclude that the results demonstrate that 'Vancouver's SIF appears to be an effective and efficient use of public health care resources'.

Although the findings of their analysis are generally consistent with those of Bayoumi and Zaric (2008), Pinkerton (2010) observed that much of the effectiveness of Insite is due to its needle exchange programme, which on average would prevent 80.7 HIV infections per year. A reduction in borrowing rates due to safe injections within the MSIC would prevent an additional 2.8 infections per year, resulting in a reduction of 83.5 infections per year. This would equate to \$17.6 million Canadian dollars saved in lifetime HIV related medical costs. Hence, Pinkerton concluded that 'Insite's safe injection facility and syringe exchange programme substantially reduce(s) the incidence of HIV infection within Vancouver's IDU community [and] averted HIV-related medical care costs are more than sufficient to offset Insite's operating costs'.

Jozaghi (2014) published empirical data from an unsanctioned supervised smoking facility (SSF) located in downtown Vancouver. The SSF was operated by the Vancouver Area Network of Drug Users (VANDU) without a licence for a number of years, before it was eventually forced to shut down in 2013. The SSF provided similar facilities to those of MSICs, although its use was reserved for Non-Injecting Drug Users (NIDUs) engaging in the smoking of crack cocaine. A safe and hygienic smoking room was provided for users, along with a 'safer crack use kit' containing mouth pieces, push sticks, alcohol swaps and heat-resistant, shatter proof smoking paraphernalia. Using similar mathematical modelling techniques with conservative parameter estimates, the analysis estimated the number of HCV infections prevented as a result of the SSF. The costs saved from prevented infections were then compared to the operational costs of the SSF. The results from both the baseline and sensitivity analysis estimated that the SSF on average saved \$1.8 million Canadian dollars annually in taxpayer's money. The findings led Jozaghi (2014, p.6) to conclude that 'establishing more SSFs in Vancouver's DTES would be a beneficial and fiscally responsible in addition to the publically funded health-care system'.

Estimates of Proposed MSICs

A number of more recent studies estimate both HIV and HCV infections that could be averted by establishing new SIFs in a number of Canadian cities (Enns et al., 2016, Jozaghi et al., 2013, Jozaghi et al., 2014). All studies find MSICs as cost-effective harm reduction strategies, equalling million-dollar savings on HIV and HCV infections.

The most comprehensive cost-benefit study, however, is that of Irwin et al. (2016). Their study goes beyond preceding studies that only estimate potential savings based on reductions in HIV and HCV to include five outcomes measures: averted HIV and HCV infections, reduced skin and soft tissue infection (SSTI), averted overdose deaths, and increased medication-assisted treatment (MAT) uptake. They project that the introduction of a MSIC in San Francisco would save approximately \$6.1 million per year. This is based on the operating costs of a MSIC equating to approximately \$2.6 million per year and a saving of \$2.33 for every dollar spend. In total, net savings earned from the introduction of the MSIC were estimated to be US\$3.5 million. Table 5 provides a summary of each individual measured component and their project savings.

Table 5: Summary of Savings for Individual Components (Irwin et al., 2016)

	Health Indicator Value	Dollar Value (US\$ million)	Unit
Component	Case	Case	
HCV Savings	19	1.3	Cases
HIV Savings	3.3	1.3	Cases
SSTI Savings	415	1.7	Hospital Days
Overdose deaths	0.24	0.28	Deaths
MAT Savings	110	1.5	New Patients

Note. HCV = hepatitis C virus; SSTI = skin and soft tissue infection; MAT = medication-assisted treatment.

Taken together, the synthesised evidence demonstrates that MSICs are cost effective measures in relation to two outcomes (HIV and HCV infections). There is also robust evidence from one recent study (Irwin et al., 2016) that suggests MSICs are cost effective across five measures of HCV and HIV infections, skin and soft tissue infection, overdose death and medication assisted treatment. These findings are consistent despite the use of various complex mathematical models to estimate infection rates (Irwin et al., 2016).

It is also worth noting the MSICs may also result in a number of health and social benefits that could not be quantified in any of the studies. Literature included in this review shows that MSICs reduce public drug use, syringe littering and drug related crime (McKnight et al., 2007, Petrar et al., 2007, Salmon et al., 2007, Stoltz et al., 2007, Thein et al., 2005; Wood et al., 2005). Hence, there are potentially a number of public and social benefits that have yet to be assigned an economic value in these studies (Irwin et al., 2016, NHS, 2017).

Literature Review 2014 onwards

The following sections provide a thematic analysis of the main findings from literature pertaining to MSICs published in 2014 or more recently.

Engaging the ‘hard-to-reach’

There is currently little existing research that provides evidence of MSICs engaging hard-to-reach PWID, particularly those who are homeless, young and most at risk of overdose or blood borne infections (Wood et al., 2004). In our screening of studies published in 2014 or more recently, we identified two studies (Bouvier et al., 2017, Hadland et al., 2014) that address this issue. The evidence presented in Hadland et al., (2014) states that the researched MSIC was successful in attracting young, homeless and high-frequency injectors. It is believed that this category of PWID are most at-risk of contracting blood-borne infection, and therefore may benefit most from using MSICs (Haley et al., 2000) Out of their sample of 175 MSIC-using participants, 90 (51.4%) went to the MSIC at least weekly, 78 (44.6%) used it for at least one-quarter of all injections, and 39 (22.3%) reported receiving new information about safe injection practices they did not already know. Only five (2.9%) MSIC users felt the facility was not youth friendly. When not using the MSIC, 65 (37.1%) reported that most of the time, they injected on the street, in a public bathroom or in a park.

Bouvier et al., (2017), who evaluated the willingness of young people who had injected drugs or were at risk of injecting drug use, found similar findings. Amongst a (relatively small) sample of 31 eligible participants, 27 (87.1%) reported willingness to use a MSIC; 15 of the 19 (78.9%) who injected less than daily reported willingness, while all 12 (100.0%) of the participants who injected daily reported willingness. This led them to conclude that ‘Established risk factors for overdose, including homelessness, history of overdose, daily injection drug use, heroin use, and fentanyl misuse, were associated with higher SIF

acceptability, indicating that young people at the highest risk of overdose might ultimately be the same individuals to use the facility' (Bouvier et al., 2017, p.6).

However, previously published reviews suggest that MSICs may not be able to attract the most marginalised fringes of PWID (Portier et al., 2017). Many 'at-risk' PWID are unable to self-inject due to poor venous access or physical impairments or remain reliant on the assistance of intimate partners (i.e. being injected by a boyfriend) (McNeil et al., 2014). The majority of MSICs, however, are prohibited from assisting with injections due to the potential for criminal or civil liabilities⁵. Hence, there is a danger that MSICs are inaccessible for certain 'at-risk' subpopulations of PWID.

Recent Developments

The three remaining studies from 2014 onwards are largely descriptive analyses, providing either evidence for the future expansion of MSICs in Canada (Bayoumi and Strike, 2016, Jozaghi et al., 2015) as well as one study that explores the differences in responses to MSICs in Germany and the UK (Lloyd et al., 2017).

The two descriptive analyses provide similar evidence to that presented in the aforementioned systematic reviews. This includes synthesised evidence to support the effectiveness of MSICs in decreasing overdoses, facilitating referrals for drug treatment, and benefiting public order. However, Jozaghi et al. (2015) does provide further evidence of the cost-effectiveness of MSICs. Using mathematical modelling to estimate the number of new HIV and HCV infections prevented based on the available secondary data, it was estimated that 13 new infections per year could be prevented through the introduction of an MSIC. They also estimate the number of prevented overdose deaths attributable to the MSIC. With very conservative estimates, it was predicted that establishing two SIFs locations outside Vancouver in British Columbia's capital city, Victoria, was cost-effective, with a benefit-cost ratio of 1.25:1.

Finally, Lloyd et al. (2017) provide an overview of the contextual difference in attitudes toward MSICs in Germany and the UK. Although the paper presents no empirical findings, its explanation of broader forces structuring diverging approaches to MSICs between countries has significance for the implementation of MSICs in Wales. Indeed, they suggest that the UK has responded unfavourably to the implementation of MSICs in the past, largely due to a 'lack of evidence, legal problems, and negative media responses' (Lloyd et al., 2017, p.66). Hence, for any future installation of MSICs to occur in the UK, Potier et al. (2014) suggest a pressing need to provide scientific evidence of their effectiveness, including their potential in reducing drug related harms, public and neighbourhood nuisances and their financial efficacy. Campaigns that inform and educate those that oppose their implementation are cited as being highly effective here. In doing so, there is the potential to provide local and national political support that can overcome political hindrances and public opposition (Potier et al., 2014)

⁵ See McNeil et al. (2014) on MSIC operating regulations that prohibit assisted injections.

Overview

The 7 systematic reviews analysed in this review synthesise a total of 349 studies pertaining to MSICs. A number of these were duplicated across at least five of the reviews, however. Although the majority of MSICs are located in the EU, literature originating from them is limited and instead remains dominated by studies from Canada (n=67), Australia (n=13) and the US (n=6). Nevertheless where studies have been conducted, Potier et al. (2014) suggests that results are relatively homogenous between countries. The majority of literature pertaining to EU MSICs is found in EMCDDA (2016).

The reviews synthesised different data relating to MSICs; Potier et al. (2014) provides the most extensive review and includes studies relating to the effectiveness of MSICs in reducing a number of drug-related problems, including overdose induced mortality and morbidity (Kerr et al., 2007b, Kerr et al., 2006, Marshall et al., 2011, Milloy et al., 2008a, Milloy et al., 2008b, van Beek, 2003), injecting behaviours, drug-related harms, access to addiction treatment therapy (Debeck et al., 2011a, Kimber et al., 2008, Milloy et al., 2010, Wood et al., 2007, Wood et al., 2006c), drug-related nuisance in public spaces (McKnight et al., 2007, Petrar et al., 2007, Salmon et al., 2007, Stoltz et al., 2007, Thein et al., 2005) and crime, violence and trafficking (Milloy et al, 2009; Wood et al, 2006 Fitzgerald et al, 2010; Freeman et al, 2005). Their report also reports public polls demonstrating favourable attitudes toward MSICs (Cruz et al., 2007, DeBeck et al., 2012, O'Shea, 2007, Philbin et al., 2009, Thein et al., 2005, Watson et al., 2012)

All reviews provide ubiquitous conclusions that MSICs are efficacious to PWID and the broader population. However, evidence was strongest for the effectiveness of MSICs in reducing drug related harms. For this outcome we identified review level confirmation (de Vel-Palumbo et al., 2012; EMCDDA, 2016; McNeil and Smith, 2014; NHS, 2017; Potier et al., 2014; Schatz and Nougier, 2014) that MSICs facilitated safer injection conditions, including reduced syringe sharing, the use of sterile injection material, reductions in 'rushed injections', increased control over the injection process and increased requests for education on safer education practices. McNeil and Small (2014) also add to these findings by synthesising qualitative evidence of MSICs providing refuge from street-based drug scenes. Hence, there is further evidence that MSICs can act as safe spaces that reshape the physical and social contexts of injecting drug use. This includes minimising the risk of street-based violence, increased safety from stigma and structural violence and 'disrupting inequities that typically shape these drug use environments' (McNeil and Small, 2014: 153). To expand upon these findings, Potier et al (2014) suggest that due to the reduction of drug related harms enabled by decreased syringe sharing, access to services and the presence of health care workers, the global rate of overdoses in MSIC is very low. This includes data suggesting a decrease in the number of lethal overdoses in the vicinity of the MSIC and the number of calls for ambulances related to overdoses during the operational hours of the MSIC. Taken together, the evidence suggests that via the increased availability of harm reduction services within MSIC, they are efficacious in reducing drug related harms and risks of overdose.

Three of the reviews (McNeil and Small, 2014, NHS, 2017, Potier et al., 2014) provided strong review-level evidence that MSICs also promoted a number of social benefits in relation to reducing drug-related crime (Milloy et al, 2009; Wood et al, 2006; Fitzgerald et al, 2010; Freeman et al, 2005) increased safety for PWID (Fairbairn et al., 2008, Small et al., 2011) and reducing drug-related public nuisance (McKnight et al., 2007, Petrar et al., 2007, Salmon et al., 2007, Stoltz et al., 2007, Thein et al., 2005, Wood et al., 2005). These findings are particular relevant given the misguided public perception that the opening of MSICs may lead to increased problems around drug-related crime and public nuisance. However, Potier et al. (2014) concludes that there is synthesised evidence to suggest that MSICs contribute to a reduction of drug related waste and paraphernalia left in public spaces (McKnight et al., 2007; Wood et al., 2005, p.145) and 'do not increase crime or drug trafficking or the number of

PWID". Hence, it is important to promote the positive social benefits of MSICs given that public opinion towards the implementation of MSICs remains mixed (Potier et al., 2014).

Overall, this review presents evidence of numerous benefits of MSIC: a decrease in overdoses, safer injecting behaviour and an increase in the availability of safe injecting equipment, increased access and availability of addiction and social services and increased information to reduce the risk of risky injecting behaviour. Taken together, MSICs are efficacious as they minimise the number of risks available to PWID.

MSIC also induce a number of social and public benefits such as a reduction in public nuisance and injecting, reductions in drug related crime and trafficking and an increase physical and personal safety for PWID. Further, they are found to be extremely cost-effective in relation to reductions in HIV and HCV infections, although it should be noted that MSICs may also contribute to a number of social benefits that cannot be quantified. MSICs can therefore be deemed a successful tool as part of broader harm reduction interventions and strategies. Nevertheless, political hindrances and public opposition remain barriers to their installation in the UK. Continued evidence of their effectiveness (notably in terms of reducing overdoses and drug related harms, public nuisances and their financial efficiency) may help to influence and change opposition to their instalment.

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