Update of NICE Guidance PH18 on 'Needle and syringe programmes'

Qualitative and quantitative review updates

Final report

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Glossary

Cohort Study	Comparison of outcomes between participants who have received an intervention and a group that has not (i.e. not allocated by investigator) in a follow-up study.
Coverage	The area, groups or number of persons served or reached by a particular intervention.
Crack	Powder cocaine heated and mixed with bicarbonate of soda to form into 'rocks' for smoking or injecting.
Cross-Sectional Study	Examination of the relationship between disease and other variables of interest as they exist in a defined population at one particular time.
Distributive Sharing	Passing on used needles and/or syringes.
Injection Risk Behaviour	High risk behaviours related to injection drug use, such as receptive and distributive sharing, sharing paraphernalia and syringe re-use.
Methadone Maintenance Treatment	Long term prescription of methadone.
Opiate Substitution Therapy (OST)	Administration, sometimes under medical supervision, of a prescribed substance, usually oral methadone, to reduce opioid dependence (e.g. heroin).
Receptive Sharing	Using needles and/or syringes previously used by someone else.
Repeated Cross-Sectional Study	Cross-sectional studies taken at regular intervals; they differ from cohort studies in not necessarily including the same participants as at previous waves.
Uncontrolled Before and After Study	A study with no control group in which data is collected before and after the intervention has been administered.

Abbreviations

ACMD	Advisory Council for the Misuse of Drugs
AIDS	Acquired Immune Deficiency Syndrome
AOR	Adjusted Odds Ratio
BBV	Blood Borne Virus(es)
CBA	Controlled Before and After
CEA	Cost-Effectiveness Analysis
CI	Confidence Interval
CO	Cohort Study
CS	Cross-Sectional Study
CUA	Cost-Utility Analysis
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
HPA	Health Protection Agency
ICER	Incremental Cost-Effectiveness Ratio
IQR	Interquartile Range
MA	Meta-Analysis
MMT	Methadone Maintenance Treatment
MR	Motivational Referral
MR+I	Motivational Referral Plus Incentives
NICE	National Institute for Health and Care Excellence
NSP	Needle and Syringe Programme
NSVM	Needle and Syringe Vending Machine
NTA	National Treatment Agency for Substance Misuse
OECD	Organisation for Economic Co-operation and Development
OR	Odds Ratio
OST	Opiate Substitution Therapy
PIED	Performance and Image Enhancing Drugs
PWID	People who inject drugs
QALY	Quality Adjusted Life Year
RCS	Repeat Cross-Sectional Study
RCT	Randomised Controlled Trial
SD	Standard Deviation
SR	Systematic Review
STR	Standard Referral
TS	Time Series
UAM	Unlinked Anonymous Monitoring
UBA	Uncontrolled Before and After
UK	United Kingdom
USA	United States of America
VIDUS	Vancouver Injection Drug User Study

Executive summary

This review was undertaken to support the update of guidance on the optimal provision of needle and syringe programmes (NSPs) by the National Institute for Health and Care Excellence (NICE). We adopted a broad perspective on the evidence examined, seeking to incorporate qualitative and quantitative evidence, examine successes and barriers to implementation, and assess the applicability and transferability of new evidence, with a particular efforts to locate evidence relating to drop boxes, outreach schemes and vending machines.

Research questions

For the review of quantitative evidence, the following key research questions were addressed:

1. What level of coverage of needles, syringes and other types of injecting equipment are most effective and cost-effective for reducing the prevalence of HIV and hepatitis C infection among people who inject opiates and stimulants?
2. What types of NSPs are effective and cost-effective for reducing the prevalence of HIV, hepatitis C and other BBVs, and morbidity and mortality relating to injecting drug use among people who inject opiates and stimulants?
3. Which additional harm reduction services offered by NSPs are effective and cost-effective for reducing the prevalence of HIV, hepatitis C and other BBVs, and morbidity and mortality relating to injecting drug use among people who inject opiates and stimulants?
4. Whether NSPs delivered in parallel with, or alongside, services that provide opiate substitution therapy (OST) are more effective and cost-effective than alternative service configurations?

For the review of qualitative evidence, the key research questions were, among people who inject opiates and stimulants and practitioners involved in their care:

1. What do they identify as suitable types of NSPs, and what do they believe to be a suitable level of coverage of needles, syringes and other types of injecting equipment?
2. What are their views and perspectives on, and experiences of, different types of NSPs?
3. What are their views and perspectives on, and experiences of, additional harm reduction services offered by NSPs?
4. What are their views and perspectives on, and experiences of, OST delivered in parallel or alongside NSPs.

Search strategy

A database of published and unpublished literature was compiled from systematic searches based on the searches undertaken for the previous evidence review and through a snowball approach. Only studies published since the date of the previous searches (July 2008) were retrieved for screening. This was with the exception of any studies of drop boxes, outreach schemes or vending machines published prior to July 2008. If such studies were not included in the previous evidence review the date limits did not apply.

Review of effectiveness and cost-effectiveness

Forty studies were identified for inclusion in the review of effectiveness and cost-effectiveness. Of these, seven studies examined issues related to injection equipment coverage and spatial access, 17 studies examined different types of NSPs, 13 studies examined additional harm reduction services delivered by NSPs, and three studies examined NSPs delivered alongside opiate substitution therapy (OST).

What level of coverage of needles, syringes and other types of injecting equipment are most effective and cost-effective?

Two cross-sectional studies conducted in settings of high needle and syringe availability examined the association between individual levels of syringe coverage and injection risk behaviours. One study concluded that 60% coverage may be sufficiently adequate to diminish the relationship between needle and syringe availability and injection risk behaviours. In addition, both studies identified that participants who obtained their syringes via fixed-site NSPs reported greater syringe coverage. Five cross-sectional studies examined the association between geographical proximity to NSPs and injection risk behaviours. In a setting with increasing access to sterile needles and syringes via legalised NSPs and OTC pharmacies, increases in spatial access were found to be associated with greater access to sterile needles and syringes. However in a setting of high availability, proximity to NSPs was associated with high-risk injection behaviours, and distance to NSPs was not associated with specific patterns of needle and syringe acquisition. This suggests that while, in high availability settings, NSP and pharmacies may be situated where they are needed most by PWID, other neighbourhood environmental factors may continue to influence injection risk behaviour through various pathways.

Evidence statement 1a: Needle and syringe coverage and injection risk behaviours

There is moderate evidence from 2 cross-sectional studies (both +) about the association between individual levels of syringe coverage and injection risk behaviours among PWID. One study[1] reported that a level of 60% syringe coverage may be sufficiently adequate to effectively reduce injection risk behaviours among PWID. The other study[2] found that despite a high level of coverage among the overall sample, inadequate syringe coverage was associated with syringe reuse (AOR 0.56, 95% CI 0.42–0.74). This evidence is only partially applicable to the UK as these two studies were conducted in Australia where needle and syringe availability is likely to be higher than may be commonly found across the UK.

[1] Bryant et al., 2012 [CS+] ; [2] Iversen et al., 2012 [CS+]

Evidence statement 1b: Proximity to NSP and injection risk behaviours

There is moderate evidence from five cross-sectional studies (all +) about the association between geographical proximity to NSPs and injection risk behaviours. The evidence about the association is based on studies conducted in diverse settings. One study[1] found that a temporal increase in access to needles and syringes was associated with greater odds of injecting with a sterile syringe at least 75% of the time (NSP: AOR 1.23, 95% CI 1.01-1.52; OTC pharmacy: AOR 1.15, 95% CI 1.03-1.27). Further studies[2,3] showed that this association was undermined by drug-related arrests. Another study[4] found that distances between four locations utilised by PWID in purchasing and using drugs were associated with injection risk behaviours. A fifth study[5] found that the association between distance to NSPs and high-risk injection behaviour was non-linear and that proximity to an NSP was associated with high-risk injection behaviour. This evidence is only partially applicable to the UK. Four studies[1-4] were from the USA, where needles and syringes are sold over the counter in pharmacies and in settings where NSPs may have formerly been illegal. One further study[4] was conducted in a setting where needle and syringe availability is likely to be higher than may be commonly found across the UK.

[1] Cooper et al., 2011 [CS+] ; [2] Cooper et al., 2012a [RCS+] ; [3] Cooper et al., 2012b [CS+] ; [4] Williams & Metzger, 2010 [CS+] ; [5] Bruneau et al., 2008 [CS+]

What types of NSPs are effective and cost-effective?

Fifteen cross-sectional studies examined associations between participant's source of injecting equipment and injection risk behaviours and other drug-use related harms. Three studies conducted in three different countries with differing needle and syringe availability all suggested that NSPs and pharmacies tend to attract PWID with different risk profiles and that PWID are likely to favour one source over another. Two studies, one of which was conducted in a setting of high needle and syringe availability, found that PWID who use pharmacies as their main source of needles and syringes have higher risk profiles than users of fixed-site NSPs. For PWID not reached through specialist NSPs and pharmacies, studies showed that both vending machines and outreach/mobile van outlets attract high risk populations, including in one study female sex workers with high-risk injection behaviours.

One study found that small changes in the cap on the number of needles and syringes that could be exchanged were unlikely to impact on injection risk behaviours. However, a major change in NSP policy from exchange to distribution and diversification of services was associated with reductions in needle and syringe borrowing and lending among PWID.

Evidence statement 2a: Source of equipment and injection risk behaviours

There is moderate evidence from 3 cross-sectional studies[1-3] (+) about the association between source of needles and syringes and injection risk behaviours. There was consistent evidence to suggest that PWID who used pharmacies as their main source of needles and

syringes were more likely to report injection risk behaviours than those who used fixed-site NSPs. This evidence is partially applicable to the UK as although studies were conducted across a range of settings, none were directly applicable to a UK context.

[1] Bryant et al., 2010 [CS+] ; [2] Rudolph et al., 2010a [CS+] ; [3] Vorobjov et al., 2009a [CS+]

Evidence statement 2b: Profile of PWID who use vending machines

There is moderate evidence from 5 (4+,1-) cross-sectional studies[1-5] about the characteristics and risk behaviour profiles of PWID who use needle and syringe vending machines. There was evidence from four studies[1-4] to suggest that PWID who use NSVM tend to be younger[1-4] and have a shorter history of injecting drug use than users of other types of NSPs.[1,3] There was further evidence from five studies[1-5] to suggest that sharing behaviours among NSVM users did not differ significantly from users of other types of NSPs. This evidence is partially applicable to the UK as although studies were conducted across a range of settings, none were directly applicable to a UK context.

[1] Islam et al., 2008a [CS+]; [2] McDonald, 2009 [CS-]; [3] Moatti et al., 2001 [CS+]; [4] Obadia et al., 1999 [CS+]; [5] Stark et al., 1994 [CS+]

Evidence statement 2c: Profile of PWID who use outreach and mobile outlets

There is moderate evidence from 1 (++) cohort study[1] and four (2++, 2+) cross-sectional studies about the characteristics and risk behaviour profiles of PWID who use outreach and mobile outlets. There was evidence from five studies[1-5] to suggest that PWID who use outreach and mobile outlets have different characteristics to users of fixed-site and pharmacy NSP services, and represent a high-risk group of PWID. There was mixed evidence from three studies[3-5] about sharing behaviours among outreach and mobile users. Two studies[3,5] did not identify an association, but one study[4] reported an association between using a needle that had already been used by someone else and use of a mobile van NSP. This evidence is partially applicable to the UK as although studies were conducted across a range of settings, none were directly applicable to a UK context. Four studies[1-3,5] were conducted in a setting with a high proportion of cocaine injectors among PWID and a significant proportion participants in the fifth study[4] was African American.

[1] Deering et al., 2011 [CO++]; [2] Hayashi et al., 2010 [CS+]; [3] Miller et al., 2002 [CS++]; [4] Riley et al., 2000 [CS++] ; [5] Wood et al., 2003 [CS+]

Evidence statement 2d: Outreach schemes

No evidence was found from studies identified for the update review on the impact of outreach schemes on injection risk behaviours among PWID. One (–) before and after study[1] found that use of an outreach van was associated with non-significant reductions in measures of injection risk behaviours between baseline and follow-up. There was moderate evidence from 1 (++) cohort study[2] that use of a mobile outreach programme for female sex workers was independently correlated with using inpatient addiction treatment services and a drug and alcohol counsellor (AOR: 4.16, 95% CI 2.14–8.06; AOR 6.06, 95% CI 2.58–

14.23), but not inpatient methadone treatment (AOR 1.7, 95% CI 0.82–3.77). This evidence may only be partially applicable to the UK as both studies were conducted in North America.

[1] Knittel et al., 2010 (UBA-); [2] Deering et al., 2011 (CO++)

Evidence statement 2e: NSP policy changes

There was moderate evidence from 2 (+) cohort studies[1,2] that examined associations between changes in NSP policies and NSP user status[1], and injection risk behaviours[2]. One study[1] found that changes to the cap on the number of needles and syringes that could be exchanged did not have a direct impact on NSP use but increased secondary exchange. Another study[2] found that a significant change in NSP policy and diversification of services was associated with reductions in injection risk behaviours. This evidence may only be partially applicable to the UK as NSP policies in one study,[1] which was conducted in the USA, were more restrictive in comparison to policies in the UK and in the second study[2] were likely to be more liberal than may commonly be found across services in the UK.

[1] Green et al., 2010 [CO+]; [2] Kerr et al., 2010 [CO+]

Which additional harm reduction services offered by NSPs are effective and cost-effective?

Two cross-sectional studies and one systematic review examined the supply of other types of injection/drug use equipment via NSPs. The systematic review found that previous studies have been unable to directly examine the relationship between uptake of specific items of paraphernalia and paraphernalia sharing. However, a cross-sectional study found that a shortfall in injecting paraphernalia (specifically filters, spoons or sterile water) was associated with increased odds of sharing each of these items, and that uptake of such injection paraphernalia from NSPs was associated with a reduction in sharing. A further study found that the distribution of safer crack kits from NSPs in a setting with a high proportion of crack smokers among PWID was associated with reductions in injecting drug use and that the kits appeared to facilitate transition from injecting to crack smoking.

Two studies examined the effect of the installation of drop boxes on discarded needles. While a small pilot study did not find a significant change in the number of discards, a larger scale evaluation of drop boxes showed that their installation was associated with significant reductions in discards; suggesting that PWID changed their disposal behaviour in response to the installation of a safe disposal option.

One study examined a theory-based intervention designed to increase safer injecting practices, finding that it had positive short-term effects on the adoption of safer injection practices, but that these effects were not sustained over the longer term.

The co-location of nurse-led services with an NSP was shown to facilitate access to HCV testing and referral for treatment among PWID. However, evaluation of a project designed to link PWID into medical and social services via pharmacy-based NSP was limited by the

small sample size of the study. An economic evaluation study found that targeting PWID for various HBV vaccination strategies through NSPs was both more effective and less costly than a no vaccination strategy.

Four US studies examined interventions designed to encourage users of NSPs to enrol in drug treatment. Long-term follow-up of a strengths-based case management intervention showed that the intervention did not impact on retention in OST, with social and environmental factors negatively impacting on drug treatment outcomes among the study sample. Studies that reported on a trial of a motivational referral intervention showed that participants who received monetary incentives were more likely to enrol in methadone maintenance therapy over the short- and long-term than participants assigned to the motivational referral only intervention or to standard care. Participants assigned to the motivational referral intervention and monetary incentives were also, following discharge or drop out, more likely to reengage with the intervention and to reenrol in methadone maintenance therapy.

Evidence statement 3a: Uptake of injection paraphernalia and sharing of equipment

There is moderate evidence from 1 (+) cross-sectional study[1] about the association between the uptake of injection paraphernalia (specifically filters, spoons or sterile water) from NSPs and sharing of such equipment among PWID. This is evidence from this study to suggest that a shortfall in injecting paraphernalia among PWID is associated with increased odds of sharing (e.g. shortfall of more than 10 filters: AOR 1.55, 95% CI 1.12–2.14). In addition, evidence from this study suggests that uptake of injecting paraphernalia from NSPs is associated with reductions in sharing (e.g. uptake of at least one spoon: AOR 0.61, 95% CI 0.45–0.82). This evidence is directly applicable to the UK.

[1] Allen et al., 2012 (CS+)

Evidence statement 3b: Crack kit distribution

There is weak evidence from 1 (-) repeat cross-sectional study[1] to suggest that distribution of crack kits from NSPs may reduce the frequency of injecting drug use among PWID by facilitating the transition to other routes of administration (e.g. from injecting to smoking). This evidence is only of limited applicability to the UK as the setting in which the study was conducted included a high proportion of crack smoking among PWID.

[1] Leonard et al., 2008 (RCS-)

Evidence statement 3c: Drop box presence

There is moderate evidence from 1 (+) study[1] based on a time series approach and 1 (+) controlled before and after study[2] about the association between the installation of drop boxes and changes in the quantity of discarded needles. One study[2] of four drop boxes did not find a change in the number of discards but a second study[1] found that the presence of an outdoor drop box was associated with reduction of discards within 25m (98%), 50m

(92%), 100m (73%) and 200m (71%) buffer zones. This evidence is only partially applicable to the UK as both studies were conducted in cities in North America; in addition, one study[1] was conducted in a city where cocaine (associated with frequent daily injection) was the drug of choice among PWID.

[1] de Montigny et al., 2010 (TS+); [2] Riley et al., 1998 (CBA+)

Evidence statement 3d: Theory-based intervention and safer injecting practices

There is moderate evidence from 1 (+) RCT[1] to suggest that a theory-based computer-tailored intervention may increase the use of safer injecting practices by PWID. This study showed the intervention had positive short term effects; however these effects were not sustained over the longer term. This evidence may have direct applicability to the UK.

[1] Gagnon et al., 2010 (RCT+)

Evidence statement 3e: Nurse-led services

There is moderate evidence from 1 (+) cohort study[1] to suggest that the co-location of nurse-led services with an NSP may facilitate access to HCV testing and referral to treatment. A relatively high number of participants in the study received HCV testing (73.7%) and there was a good level of uptake of referrals (70.8%). This evidence is only partially applicable to the UK as the study was in the USA where access to healthcare is not universal.

[1] Islam et al., 2012a [CO+]

Evidence statement 3f: HBV vaccination

There is moderate evidence from 1 (CEA/CUA with minor limitations) economic evaluation study[1] to suggest that the provision of HBV vaccination through NSPs may more effective and less costly than the alternative of not providing vaccination. This evidence is only partially applicable to the UK as the study was in the USA as costs and benefits were based on studies conducted in North America.

[1] Hu et al., 2008 [CEA/CUA]

Evidence statement 3g : Interventions to encourage drug treatment engagement

There is moderate evidence from 3 (all +) studies[1,2,3] to suggest that interventions delivered to NSP users may encourage enrolment and continued engagement in drug treatment programmes. However, evidence about the effect of different types of interventions is mixed. One study[1] showed that a strengths-based case management intervention did not impact on long-term retention in OST. Two studies[2,3] showed that a motivational referral and provision of monetary incentives (both for enrolment and reenrolment) was more effective than motivational referral alone and standard referral for enrolling NSP participants in MMT over the short- and long-term (intervention vs. standard care: AOR 2.54, 95% CI 1.36–4.75)[2]. Participants who received motivational referral and incentives averaged more days in treatment[2] and were more likely to reengage in treatment after discharge[3]. This evidence is

only partially applicable to the UK as both studies were conducted in the USA were universal access to drug treatment is not provided.

[1] Havens et al., 2009 (RCT+); [2] Kidorf et al., 2009, 2012 (RCT+); [3] Kidorf et al., 2011a (CO+)

Are NSPs delivered in parallel with, or alongside, services that provide opiate substitution therapy (OST) more effective and cost-effective?

Three studies examined the concurrent delivery of NSP and drug treatment. One study provided further evidence that concurrent NSP use and entry into drug treatment is associated with greater reductions in drug use, including injection drug use, than use of NSPs alone. A study based on pooled UK data and a Scottish-wide cross-sectional study found an independent effect of needle and syringe provision on incident HCV infection, with individuals with high levels of needle and syringe coverage having reduced odds of new or recent hepatitis C virus infection. Full harm reduction (OST and high needle and syringe coverage) was also associated with reduced odds of new HCV infection based on the pooling of UK data, but this finding was not replicated in adjusted analyses of the Scottish-wide data. The authors suggest that this may be related to reduced statistical power.

Evidence statement 4: Concurrent NSP use and engagement in drug treatment

There is moderate evidence from 1 (+) meta-analysis,[1] 1 (+) cross-sectional study[2] and 1 (+) cohort study[3] about the association between concurrent NSP use and engagement in drug treatment, and incidence of hepatitis C and frequency of injecting. Some of the evidence for this association was mixed. Two UK studies[1,2] identified an independent effect of NSPs; individuals with high levels of needle and syringe coverage had reduced odds of new or recent hepatitis C virus infection. One study[1] also found that that full harm reduction (OST and high needle and syringe coverage) was associated with reduced odds of new HCV infection. However, this finding was not replicated in the second UK study[2]. One US study[3] found that concurrent NSP use and entry into drug treatment was associated with greater reductions in injection drug use than use of NSPs alone. This evidence is directly applicable to the UK.

[1] Turner et al., 2010 (MA+); [2] Allen et al., 2012 (CS+) ; [3] Kidorf et al., 2011b (CO+)

Review of qualitative evidence

Views and perspectives on, and experiences of, different types of NSPs

Five qualitative studies examined views and perspectives on, and experiences of, pharmacies as a setting for needle and syringe distribution and exchange. Convenience and accessibility were identified as the main reasons for PWID accessing needle and syringes via pharmacies. However, PWID had encountered both positive and negative experiences in pharmacies. In relation to this, the need for mutual respect among PWID and pharmacy staff was identified as a theme in two studies.

Two studies explored views and perspectives on vending machines. A general acceptance of the benefits of NSVMs was reported by participants in both studies. However, the potential ease of access to needle and syringes provided by vending machines was also raised as a major potential health and safety issue. In one study, a consensus was reached among participants that increasing the accessibility of needle and syringes via vending machines would not encourage people to start injecting drugs; partly due to the important role that social context plays in the initiation of injecting drug use.

Evidence statement 5: Pharmacies

Five studies[1-5] (all +) examined views and perspectives on, and experiences of, pharmacies as a setting for needle and syringe distribution and exchange. Two studies[1,2] identified convenience and accessibility as the main reasons for PWID accessing needle and syringes from pharmacies. Three studies[1,3,4] identified that PWID had encountered both positive and negative experiences in pharmacies. A theme relating to the need for mutual respect among PWID and pharmacy staff was identified in two studies[1,5] This evidence is directly applicable to a UK context.

[1] Trealoar et al., 2010 [+]; [2] Vorobjov et al., 2009b [+]; [3] Lutnick et al., 2012 [+] ; [4] Mackridge et al., 2010; [5] Mackridge & Scott, 2009 [+]

Evidence statement 6: Needle and syringe vending machines

Two studies[1,2] (both +) explored views and perspectives on vending machines. While participants in both studies reported a general acceptance of the benefits of NSVMs, the potential ease of access of needles and syringe via vending machines was raised as a major potential public health and safety issue. However, in one study[1] there was a consensus among participants (who were PWID and drugs workers) that making needles and syringes more accessible via vending machines would not encourage people to start injecting drugs. This evidence is likely to be directly applicable to the UK.

[1] Dodding & Gaughwin, 1995 [+]; [2] Philbin et al., 2009 [+]

Views and perspectives on, and experiences of, additional harm reduction services offered by NSPs

Nine studies reported views and perspectives on, and experiences of, additional harm reduction services offered by specialist NSPs and pharmacies. Trusting relationships between PWID and NSP staff were felt to be key to facilitating engagement in additional harm reduction services in specialist NSP settings in two studies. In a further two studies, expansion of harm reduction services in pharmacies was desired by both PWID and pharmacy staff. However, the need to tackle negative attitudes towards PWID exhibited by some pharmacy staff, and the need to identify private spaces for the delivery of such services were identified as barriers to expansion. One study acknowledged that opportunities for disseminating information to users of NSVMs were limited but participants in this study did not feel that this was a major concern.

Four studies explored views and perspectives on, and experiences of drop boxes and drug-related litter bins. Discarded needles were found to be a concern for both community members and PWID; running counter to suggestions that PWID did not care enough the communities they lived in to seek safe disposal option. Community members had mixed responses to the proposed installation of drop boxes, however one study found that many fears and concerns about drop boxes may be unfounded. There was general support for drop boxes among PWID. However, significant barriers to their use were identified and one UK study identified that the correct environmental and geographical positioning of drop boxes was crucial. PWID expressed that the fear of being arrested for possession of injection paraphernalia was a barrier to the use of drop boxes. In a UK study experience of arrest following the use of a drop box had led to the adoption of unsafe injection practices.

Evidence statement 7: Additional harm reduction services

Five studies[1-5] (all +) reported views and perspectives on, and experiences of, additional harm reduction services offered by specialist NSPs and pharmacies. Two studies[1,2] identified that trusting relationships between PWID and NSP staff were felt to be key to facilitating engagement in additional harm reduction services in specialist NSP settings. Two studies[3,4] explored the potential for additional harm reduction services to be delivered via pharmacies. Expansion of services was desired by both PWID and pharmacy staff. However, barriers identified to expansion including the need to tackle negative attitudes towards PWID exhibited by some pharmacy staff, and the need to identify private spaces for the delivery of such services. One study[5] acknowledged that opportunities for disseminating information to users of NSVMs were limited but participants in this study did not feel that this was a major concern. This evidence is directly applicable to the UK.

[1] Parker et al., 2012 [++]; [2] MacNeil & Pauly, 2011 [+]; [3] Mackridge at al., 2010 [+]; [4] Lutnick et al., 2012 [+]; [5] Dodding & Gaughwin, 1995 [+]

Evidence statement 8: Drop boxes and drug-related litter bins

Four studies[1-4] (1++; 3+) explored views and perspectives on, and experiences of drop boxes and drug-related litter bins. Two studies[1,3] identified that discarded needles were a concern for both community members and PWID. Two studies[3,4] that explored the views of community members identified mixed responses to drop boxes; with one study[3] finding that many fears and concerns within the community may be unfounded. Three studies[2-4] identified general support for drop boxes among PWID. However, significant barriers to their use were identified in all four studies[1-4]. One UK study[2] identified that the correct environmental and geographical positioning of drop boxes was crucial. In all four studies[1-4], participants expressed that the fear of being arrested for possession of injection paraphernalia was a barrier to the use of drop boxes. In one UK study[2], experience of arrest following the use of a drop box led to the adoption of unsafe injection practices. The evidence is likely to be applicable to the UK.

[1] Miller, 2001 [+]; [2] Parkin & Coomber, 2011 [++]; [3] Smith et al., 1998 [+]; [4] Springer et al., 1999 [+]

Conclusions

This review was undertaken to support the update of guidance on the optimal provision of NSPs. Since the previous guidance, evidence has accumulated on the optimal provision of NSPs enabling some tentative conclusions to be drawn about what may work most effectively within the range of harm reduction services available to PWID.

There is good evidence that a high coverage of NSPs may reduce sharing behaviours and that the combination of a high coverage of NSPs and uptake of OST can reduce the risk of HCV transmission. Strategies are therefore required that increase drug treatment enrolment among PWID. There is evidence that treatment engagement and re-engagement may be enhanced through the use of motivational approaches and incentives. A range of services should be available that meet the needs of PWID with different risk profiles and this review identified evidence that PWIDs may have a preference for particular types of NSP. Needle and syringe vending machines and outreach schemes (including mobile outlets) play an important role in out of hours provision for NSPs and attract PWID with higher risk profiles than may commonly use mainstream services such as fixed-site or pharmacy-based NSPs. The evidence base on which to draw conclusions about the effectiveness of additional harm reduction services offered by NSPs is fragmented. While there is evidence that uptake of injecting paraphernalia appears to be associated with safer injecting practice, evidence for whether the distribution of drug-taking equipment via NSPs promotes non-injecting modes of drug administration is lacking. Evidence is also lacking on effective and cost-effective interventions that link PWID to other medical and social support services through referral at NSPs; though there is evidence that NSPs may provide a cost-effective setting for delivering HBV vaccination. Trusting relationships between PWID and NSP staff appears to be key to facilitating engagement in additional harm reduction services, and a lack of trusting relationships may be a barrier to the expansion of services in non-specialist setting such as pharmacy-based NSP. There is evidence that some PWID are as concerned as non-PWID about discarded needle and syringes in communities and that they may change their disposal behaviour in response to the availability of safe disposal options. As such the wide scale installation of drop boxes appears to be an effective means of reducing discarded needles and syringes.

1 Introduction

1.1 Aims and objectives

This review was undertaken to support the update of guidance on the optimal provision of needle and syringe programmes (NSPs). We adopted a broad perspective on the evidence examined, seeking to incorporate qualitative and quantitative evidence, examine successes and barriers to implementation, and assess the applicability and transferability of new evidence, with a particular efforts to locate evidence relating to drop boxes, outreach schemes and vending machines.

1.2 Research questions

For the review of quantitative evidence, the following key research questions were addressed:

1. What level of coverage of needles, syringes and other types of injecting equipment are most effective and cost-effective for reducing the prevalence of HIV and hepatitis C infection among people who inject opiates and stimulants?
2. What types of NSPs are effective and cost-effective for reducing the prevalence of HIV, hepatitis C and other BBVs, and morbidity and mortality relating to injecting drug use among people who inject opiates and stimulants?
3. Which additional harm reduction services offered by NSPs are effective and cost-effective for reducing the prevalence of HIV, hepatitis C and other BBVs, and morbidity and mortality relating to injecting drug use among people who inject opiates and stimulants?
4. Whether NSPs delivered in parallel with, or alongside, services that provide opiate substitution therapy (OST) are more effective and cost-effective than alternative service configurations?

For the review of qualitative evidence, the key research questions were, among people who inject opiates and stimulants and practitioners involved in their care:

1. What do they identify as suitable types of NSPs, and what do they believe to be a suitable level of coverage of needles, syringes and other types of injecting equipment?
2. What are their views and perspectives on, and experiences of, different types of NSPs?
3. What are their views and perspectives on, and experiences of, additional harm reduction services offered by NSPs?

4. What are their views and perspectives on, and experiences of, OST delivered in parallel or alongside NSPs.

2 Background

2.1 People who inject opiates and stimulants

2.1.1 Prevalence of injection drug use

Estimating the number of people who inject drugs (PWID) is difficult due the 'hidden' and stigmatised nature of injecting drug use. Indirect methods suggest that the number of PWID in England increased dramatically in the late 1980s (de Angelis et al., 2004). However, recent figures suggest that the prevalence of opiate and/or crack cocaine injecting is in decline. The most recent figures (for 2010/11) suggest that there are an estimated 93,401 (95% CI: 90,974–96,757) people who inject opiates and/or crack in England (Hay et al., 2013).

2.1.2 Morbidity and mortality associated with injecting drug use

PWID experience high levels of morbidity and mortality, and sharing needles and syringes is a key route by which blood borne viruses (BBVs) may be transmitted among users. Sharing of injection equipment such as filters, mixing containers and water (also termed paraphernalia) is an important route of infection, particularly in the case of the hepatitis C virus (HCV). Although surveys of PWID in contact with specialist services suggest that levels of direct sharing have declined in recent years (from 33% to 17%; Health Protection Agency, 2012a), HCV is still the most important infectious disease affecting PWID. In 2011, 43% of PWID surveyed tested positive for HCV antibodies (Health Protection Agency, 2012a). In comparison, over the last decade HIV prevalence rates have remained relatively low among injecting drug user populations (Health Protection Agency, 2012b) and there has been a decline in prevalence of hepatitis B infection (Health Protection Agency, 2010) due to an increase in hepatitis B vaccination in prisons (Farrell et al., 2010).

Although the number of opiate-related (heroin and/or methadone) deaths has decreased over the years, over the last decade (2002 to 2010), they have continued to be the largest cause of drug-related deaths in the UK, accounting for around two-thirds of all drug-related deaths (Focal Point UK, 2012). While not all opiate-related deaths occur in PWID, it is thought that the vast majority do.

PWID are also at risk of wound site infections resulting from injecting contaminated drugs and using non-sterile injecting equipment. Twenty-eight percent of PWID participating in the 2011 Unlinked Anonymous Monitoring (UAM) Survey reported experiencing an abscess, sore or open wound, or possible symptoms of an injecting site infection during the previous year (Health Protection Agency, 2012c).

2.1.3 Injection risk behaviours

Injection risk behaviours among PWID have a wider public health impact. The sharing of injection equipment is not only an important risk factor in the transmission of BBVs within populations of PWID, but also to the wider non-injecting population through sexual transmission and vertically through pregnancy and childbirth. The transmission of BBVs occurs primarily as a result of blood contact, such as when sharing of syringes or needles occurs, but also through the sharing of other types of injecting equipment used in preparation of drugs for injection (De et al., 2008). Box 1 gives an overview of how the major drugs are prepared for injection and describes the role of different types of injection equipment (highlighted in blue) in the preparation process.

Box 1. Preparing drugs for injection

Preparing different drugs for injection

Heroin – The drug is mixed with **water** in a suitable receptacle, usually a **spoon**. An **acidifying agent** is added and the solution heated to help the heroin dissolve. Once cool the solution is drawn into the syringe, usually through a **filter**.

Amphetamine – Amphetamine sulphate powder does not need to be heated or acidified in order to dissolve for injection. The preparation process is otherwise similar to that of heroin for injection, although it may also be mixed in the **syringe**.

Cocaine – The preparation of cocaine hydrochloride for injection is similar to that of amphetamine, although some cocaine injectors may mix the solution in the **syringe**. An **acidifier** is needed to prepare crack cocaine for injection.

Types of injecting equipment

Water – Used to dissolve certain drugs and for cleansing injection sites. Drawing up from a pot of communal water represents a risk for the transmission of BBVs.

Swabs – Used to wipe and cleanse injection sites prior to injecting to reduce bacteria which may be present on the skin.

Spoons or other mixing containers – Used for mixing drugs (e.g. with water and/or citric acid) to prepare them for injection. Contact of the spoon with another person's needle, which has previously been used, may be enough to transmit HCV.

Acidifiers (e.g. citric acid) – Used to dissolve brown heroin and crack cocaine for injection. Acids such as lemon juice and vinegar may contain bacteria or already be contaminated with HIV or HCV. Lemon juice has been associated with thrush and other fungal infections, leading to retinal damage. Ascorbic acid and citric acid, which can have been legally supplied by NSPs since 2005, are safer but can cause irritation to veins and tissues.

Filters – To filter out solid debris before injecting. PWID may use improvised filters such as

cotton wool, cigarette filters or filters obtained from NSPs. Filters may be saved after injecting and re-used or shared and thus present a risk for spreading BBVs and/or bacterial infections. Also loose fibres can be drawn into the syringe and injected, causing circulatory problems.

Tourniquets – Used to raise veins. Tourniquets can cause limbs to be deprived of their blood supply if left in place too long. If not loosened prior to injection, the pressure in the veins may be raised risking rupture or leakage of the drug into the tissue. Tourniquets contaminated with blood and subsequently shared represent a HCV transmission risk.

Adapted from *The Safer Injecting Briefing* (Derricott et al., 1999)

2.2 Special populations

2.2.1 Females who inject

In England, approximately a quarter of PWID are female (Hay et al., 2009). Injecting drug use among females may be linked to specific behaviours and lifestyles that put them at an increased risk of acquiring HIV and HCV. Studies have found that females who initiate injecting are often more likely to have a sexual partner who injects and are often more likely to have a partner who obtained the drugs and injected them (Wood, 2007). Assisted injection, in particular, has been associated with receptive syringe sharing[1], and HIV incidence (Novelli et al., 2005; O'Connell et al., 2005).

2.2.2 Recent initiates to injecting

Studies in the UK and internationally have observed higher rates of HCV infection in younger injectors and those in the early years of their injecting career (Hickman et al., 2007). A Canadian study (Miller et al., 2007), which explored longitudinal drug use and sexual risk patterns among young PWID, identified that factors associated with younger age included borrowing syringes, and frequent injection of heroin, cocaine, and speedballs. In addition, participants in this study were found to be less likely to access drug treatment or methadone maintenance therapy (MMT).

2.2.3 People who inject crack cocaine

In previous years there have been concerns about the use and injection of crack cocaine becoming increasingly common. However, recent indicators of crack cocaine use suggest its use may have decreased following a peak in 2008 (UK Focal Point, 2012). Between 2006 and 2011, annually around a third of respondents to the UAM Survey of PWID reported that they had injected the drug (Health Protection Agency, 2012c). Crack cocaine injection is associated with high risk behaviours such as equipment sharing and frequent injection. As frequent injection can lead to vein collapse, frequent injectors are more likely to inject in higher risk parts of the body (e.g. the legs, hands, feet and groin). There is some evidence

[1]Using needles and/or syringes previously used by someone else.

that high risk injection practices are becoming increasingly common and acceptable among PWID, with 45% reporting groin injecting in a survey of PWID in English cities (Rhodes et al., 2006). Groin injecting is associated with significant risks of injury to the femoral vein and femoral artery, transmission of BBVs and bacterial infections, as well as more serious complications such as deep vein thrombosis, pulmonary embolism and gangrene (Senbanjo et al., 2012).

2.2.4 People who are homeless or in unstable housing

Public injecting is associated with homelessness and unstable housing, and homeless PWID are likely to be at greater risk of suffering harm from their drug use (Briggs et al., 2009). For example, a study of injecting practices in homelessness hostels in Glasgow (Wadd et al., 2006) found a significant association between living mostly in a hostel in the six months prior to interview and high-risk injecting behaviour, such as injecting with and passing on previously used needles and syringes. PWID who are homeless also appear to be at greater risk of wound site infections at injecting sites, abscesses and open sores (Health Protection Agency, 2007).

2.3 The role of NSPs in reducing drug-related harm

NSPs in England are principally provided through pharmacies and specialist services, but may also be based in outreach/mobile services, custody suites and A&E departments. Findings from the most recent UAM survey suggest that the majority of PWID in England are accessing NSPs (Health Protection Agency, 2012a).

2.3.1 A brief history of the emergence of NSPs

The first UK-based NSP was opened in Peterborough in April 1986 and was followed that same year by a further five across England and Scotland. Following the opening of these six NSPs, in 1987 the then Department of Health and Social Security and the Scottish Home and Health Department supported 15 pilot NSPs in England and Scotland. These pilot sites were mandated to provide advice and counselling on drug misuse, HIV risk and safer sex as well as distribute clean needles and syringes. Over time the number of agencies providing NSP grew, from 15 in 1987 to over 200 in 1990. Alongside this, a voluntary ban on syringe sales by pharmacists was rescinded in 1986. While legally it has remained permissible to purchase syringes from pharmacies[2], many pharmacies now operate as NSPs. In 2003, changes were made to section 9a of the Misuse of Drugs Act 1971 to allow providers of NSPs to supply five types of injection equipment: ampoules of water for injection, swabs, utensils (spoons, bowls, cups, dishes), citric acid and filters. Previously it had been an offence to supply or offer to supply these items. In addition, in 2005 ascorbic acid was permitted as an alternative acidifier to citric acid and the supply of water for injection

[2] The 2001 update of the Code of Ethics and Standards for the Royal Pharmaceutical Society for Great Britain states that “only in exceptional circumstances should pharmacists supply clean injecting equipment for drug misusers if the pharmacy has no arrangements for taking back contaminated equipment”.

ampoules of 2 mls or less without prescription was allowed. While the provision of foil through NSPs has continued to be restricted under the Misuse of Drugs Act 1971, some drug services in Britain do in fact supply specialist foil to clients to encourage smoking of heroin and crack cocaine as a safer alternative to injecting. In 2010, the Advisory Council on the Misuse of Drugs (ACMD) published their “Consideration of the use of foil, as an intervention, to reduce the harms of injecting heroin”, finding that the available evidence regarding the use of foil as a harm reduction intervention was in balance of favouring an exemption of foil from Section 9A of the Misuse of Drugs Act 1971.

2.3.2 Current coverage of NSPs in England

An indirect measure is used to estimate NSP coverage in England using data collected through the UAM survey of PWID in contact with drug services. In 2011, over half of respondents (57%) reported that the number of needles they had received from NSPs was greater than the number of times they had injected (i.e. ≥100% coverage). Community pharmacies currently account for around four in five NSPs (Abdulrahim et al., 2007). Data on General Pharmaceutical Services in England shows a year on year increase on the number of community pharmacies in contract with PCTs to provide needle and syringe exchange; with an increase of 11% between 2009-10 and 2010-11 (The NHS Information Centre, 2011). While these data demonstrate extensive and increasing NSP provision in England, the Health Protection Agency (2012a) suggest that they also indicate a need to further increase the amount of injection equipment distributed.

2.3.3 Previous NICE guidance on NSPs

NICE guidance on the optimal provision of NSPs was first issued in February 2009 (National Institute for Health and Clinical Excellence, 2009a). Prior to this a joint report by the Healthcare Commission and the NTA (Healthcare Commission/National Treatment Agency, 2008) had concluded that generally, pharmacy and specialist needle exchanges provided a wide range of harm reduction information and advice. However, the report also highlighted that there was a national shortfall in the provision of out-of-hours needle exchange, and that vaccination for hepatitis B, and testing and treatment for hepatitis C was not provided widely enough by local drug treatment partnerships. The NICE guidance recommended that action was taken to increase access to and availability of sterile injecting equipment based on local needs. They also recommended that action was taken to increase the proportion of people with 100% coverage of sterile injecting equipment and the proportion of people from different groups of injecting drug users in contact with NSPs. Areas were encouraged to provide a balanced mix of different levels of service and to coordinate services to ensure injecting equipment was available at all hours. The ACMD report (2010b) on ‘The primary prevention of hepatitis C among injecting drug users’ was published concurrently with the NICE guidance and emphasised that on their own, NSPs were insufficient to prevent hepatitis C (HCV), and that they should be commissioned as a component part of a comprehensive service. The report recommended that NSPs provide or ensure access to a range of other

services including HBV vaccination, referral to opiate substitution therapy, blood borne virus (BBV) antibody testing, and referral for HCV treatment.

2.4 Findings from the previous evidence reviews

The previous review of effectiveness and cost-effectiveness (Jones et al., 2008) identified 10 systematic reviews and meta-analyses, 24 primary studies and 13 economic evaluations for inclusion. The qualitative review (Cattan et al., 2008) identified 40 studies. The previous reviews found that there was limited evidence to determine the optimal provision of NSPs, especially in a UK context, and that PIED users were underrepresented in the literature. The review found that although high levels of individual syringe coverage were linked to lower levels of sharing, there was limited evidence to determine which levels were optimal. It was identified that further research was needed to determine the effectiveness and cost-effectiveness of intervention strategies that aim to increase the number of PWID with high levels of coverage (for example, such as through increasing opening hours). A prominent theme in the qualitative literature was the fear of being caught or exposed as a drug user, and this was thought to impact on PWID's use of different types of NSPs. Proximity to NSPs and other aspects such as location and opening hours of NSPs were barriers to use and influenced decisions about whether to share or re-use equipment among PWID. There was no evidence identified to suggest that setting or different syringe dispensation policies impacted on injection risk behaviours, but pharmacy-based NSPs were found to be popular in UK studies of PWID. The qualitative review identified that additional harm reduction services were valued, but few studies had evaluated their effectiveness or cost-effectiveness. Combination of methadone treatment and NSPs was found to reduce the incidence of HIV and HCV infection among PWID. However, the cost-effectiveness of this approach had not been examined nor its value or acceptability. The evidence statements derived from the two previous evidence reviews are presented in Appendix 1.

3 Methods for the update reviews

3.1 Search strategy

A database of published and unpublished literature was compiled from systematic searches undertaken by Information Staff at NICE based on the searches undertaken for the previous evidence review (see Appendix 2 for further details). Further references relating to studies of drop boxes, outreach schemes and vending machines for out-of-hours provision were identified using a snowball approach whereby references of references and electronic citation tracking were used as a means of identifying further sources of evidence. A parallel call for information was also used as a mean of identifying further sources of published and unpublished ('grey') literature. The snowballing technique incorporated searches of:

- Reference lists of retrieved articles meeting the inclusion criteria;
- Bibliographies of relevant literature;
- Key publications in the field;
- Reference lists of previous systematic reviews, review articles and other literature summaries; and
- Citation tracking tools e.g. the cited reference search tool on Web of Science.

Inclusion in the review was limited to English language studies and search limits were applied so that only studies published since the date of the previous searches (July 2008) were retrieved for screening. This was with the exception of any studies of drop boxes, outreach schemes or vending machines published prior to July 2008. If such studies were not included in the previous evidence review the date limits did not apply. Based on the volume of evidence identified at the initial title and abstract review stage the review team applied a filter question to exclude studies conducted outside of the OECD countries[3].

3.2 Call for information

A joint call for information was sent out to researchers, practitioners and personal and institutional contacts known to the project team and to stakeholders registered with NICE. The call emphasised on the retrieval of unpublished data.

3.3 Inclusion and exclusion criteria

Two reviewers independently screened all titles and abstracts. Full titles of any titles/abstracts that were considered relevant by both reviewers were obtained for further screening. The relevance of each article was assessed according to the criteria set out below. Any discrepancies were resolved through discussion.

[3]Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States

3.3.1 Types of studies

For the assessment of effectiveness; good quality systematic reviews of experimental and observational studies, randomised controlled trials, controlled non-randomised studies, controlled and uncontrolled before and after studies, cross-sectional studies, cohort studies, case-control studies and ecological studies were eligible for inclusion. For the assessment of cost-effectiveness; economic evaluations conducted alongside trials, intervention studies, modelling studies and analyses of administrative databases were eligible. Only full economic evaluations that compared two or more options and considered both costs and consequences (including cost-effectiveness, cost-utility and cost-benefit analyses) were considered suitable for inclusion. For the review of qualitative evidence; studies of any qualitative design were considered for inclusion, for example, ethnographic studies, studies that use a phenomenological or grounded theory approach, or participatory action research. For studies based on mixed methods research, both the qualitative and quantitative elements were screened for inclusion.

3.3.2 Types of interventions

Interventions involving the supply of needles, syringes and other injecting equipment (e.g. filters, mixing containers and sterile water) and harm reduction interventions provided by NSPs were eligible.

3.3.3 Comparators

Studies were eligible for inclusion if they compared the intervention of interest against a no intervention control or against another intervention approach. As for the previous review, studies without a control or comparison group were included when there was an absence of evidence from controlled studies.

3.3.4 Types of participants

People who currently inject drugs, including those who inject:

- Opiates (e.g. heroin), stimulants (e.g. cocaine) and other illicit substances; and
- Prescribed methadone and other opiate substitutes;

The provision of NSPs to people who inject non-prescribed anabolic steroids and other performance and image enhancing drugs (PIED) will be considered in a separate evidence review.

3.3.5 Types of outcome measure

Qualitative studies of relevance included those on the views, experiences and attitudes of PWID in relation to the supply of needles, syringes and other injecting equipment through NSPs and harm reduction interventions delivered via NSPs. In addition to views and experiences, studies of perspectives on barriers to, and opportunities for, changing behaviour in relation to injecting drug use in the context of NSPs are also of relevance.

For effectiveness studies, studies reporting changes in behaviour relating to injecting drug use were eligible, including:

- Incidence and prevalence of blood-borne viral infections, primarily HIV and hepatitis C, but also hepatitis B;
- Morbidity and mortality relating to injecting drug use, e.g. injecting site bacterial infections;
- Secondary outcomes of interest include self-reported injecting risk-behaviour (e.g. sharing or re-using injection equipment, frequency of injection), entry into drug treatment and utilisation of other health care services.

For cost-effectiveness studies, those reporting both costs (regardless of how estimated) and outcomes (regardless of how specified) were eligible. Outcomes of interest included, but were not be limited to:

- Incremental costs per case of HIV infection prevented
- Incremental costs per case of hepatitis C infection prevented
- Incremental costs per additional QALY gained

3.4 Data extraction and quality assessment

Data relating to both study design and quality were extracted by one reviewer into a predesigned table in Word. All extraction was independently checked for accuracy by a second reviewer. The same reviewer who undertook the extraction assessed the quality of the individual studies and this was checked by a second reviewer for accuracy. Disagreements were resolved through discussion. A data extraction table was designed following the methods outlined in the *Methods for the development of NICE public health guidance*, further details of the information extracted is provided in Appendix 3. The information extracted from the studies was tabulated to produce evidence tables (see Appendices 6 and 8).

The quality of the studies was assessed according to criteria set out in *Methods for the development of NICE public health guidance* (NICE, 2012). This information was tabulated (see Appendices 7 and 9) and summarised within the text of the report. Each study was graded using a code, ++, + or – based on the extent to which the potential sources of bias had been minimised, as outlined in the methods guide.

3.5 Methods of analysis/synthesis

3.5.1 Qualitative evidence

The methods for the synthesis of qualitative evidence were based on methods for the thematic synthesis of qualitative research. By examining the findings of each included study, descriptive themes were independently coded by one reviewer. Once all of the included studies have been examined and coded, the resulting themes and sub-themes were

discussed with the wider review team to examine their relationship to the key research questions and to develop a narrative synthesis of the evidence.

3.5.2 Quantitative evidence (including cost-effectiveness studies)

Studies were grouped according to the broad research question they addressed. The possible effects of study quality on the effectiveness data and review findings were discussed. Studies which reported no, insignificant or adverse effects were examined further, where possible, to determine whether the intervention was unsuccessful because of failure of the intervention concept or theory, or because the intervention was poorly implemented (Rychetnik et al., 2002; Waters et al., 2011). Details of each identified published economic evaluation, together with a critical appraisal of its quality, was to be presented in structured tables and as a narrative summary.

If sufficient data were available, where appropriate, we planned to calculate pooled intervention effects. However on examining the evidence, pooling was not appropriate or feasible.

3.5.3 Parallel synthesis

The findings of the synthesis of qualitative evidence were used in parallel with and contrasted with the findings of the synthesis of quantitative evidence to aid the interpretation of intervention effectiveness. The qualitative evidence was used to help explain variations in outcomes where identified and to explore how barriers and facilitators act on intervention effectiveness.

3.5.4 Synthesis with previous review findings

The synthesis of new studies identified for the update review considered the influence of the new data on the results of the previous review and whether the addition brought about no changes in the results or conclusions of the previous review for each of the research questions of interest, or whether a change in the conclusions was warranted.

3.6 Evidence statements and assessing applicability

Evidence statements were developed as outlined in the methods guide to provide an aggregated summary of all of the relevant studies for each review question. In addition, each evidence statement was judged to assess how similar the population(s), setting(s), intervention(s) and outcome(s) of the underpinning studies were to those outlined in the review questions. Following this assessment, each evidence statement was categorised as follows: (i) directly applicable; (ii) partially applicable; or (iii) not applicable.

4 Summary of evidence identified

4.1 Summary of study identification

The database searches located 4,586 records. An additional 225 references were identified via the Proquest databases and screened separately due to operational issues in running these searches. No additional references were identified from searches of the additional sources.

A summary of the study selection process is provided in Figure 1. Following title and abstract screening, 516 references were identified as potentially relevant and eligible for further screening. After discussions between the reviewers, a further 72 references were excluded prior to retrieval and three duplicate records were identified. Of the 441 references, 425 were available and screened against the full inclusion and exclusion criteria (16 records were unavailable in the timeframe for the review). Sixty-seven references had been identified and screened for inclusion in the previous effectiveness and cost-effectiveness and/or qualitative reviews and were therefore excluded from the initial screening process.

Following full-text screening, 318 references were excluded (including four studies that were considered potentially relevant for inclusion in the PIED review). Of the excluded references, 29 were conducted outside of the OECD countries, 98 were about an intervention and/or setting that not involve NSP, 54 did not report relevant outcomes, 9 were excluded on population and 128 were excluded on the basis of study design or because the reference was not a full research study (e.g. magazine article, conference abstract, editorial).

In total, 42 studies were identified for inclusion in the review through the update searches. Following the identification of further references relating to studies of drop boxes, outreach schemes and vending machines for out-of-hours provision (see Appendix 10), the references that had been identified and screened for inclusion in the previous effectiveness and cost-effectiveness and/or qualitative reviews were re-screened and 11 relevant studies identified. Of the included studies, 39 were effectiveness studies, one study was an economic evaluation and 13 were qualitative studies.

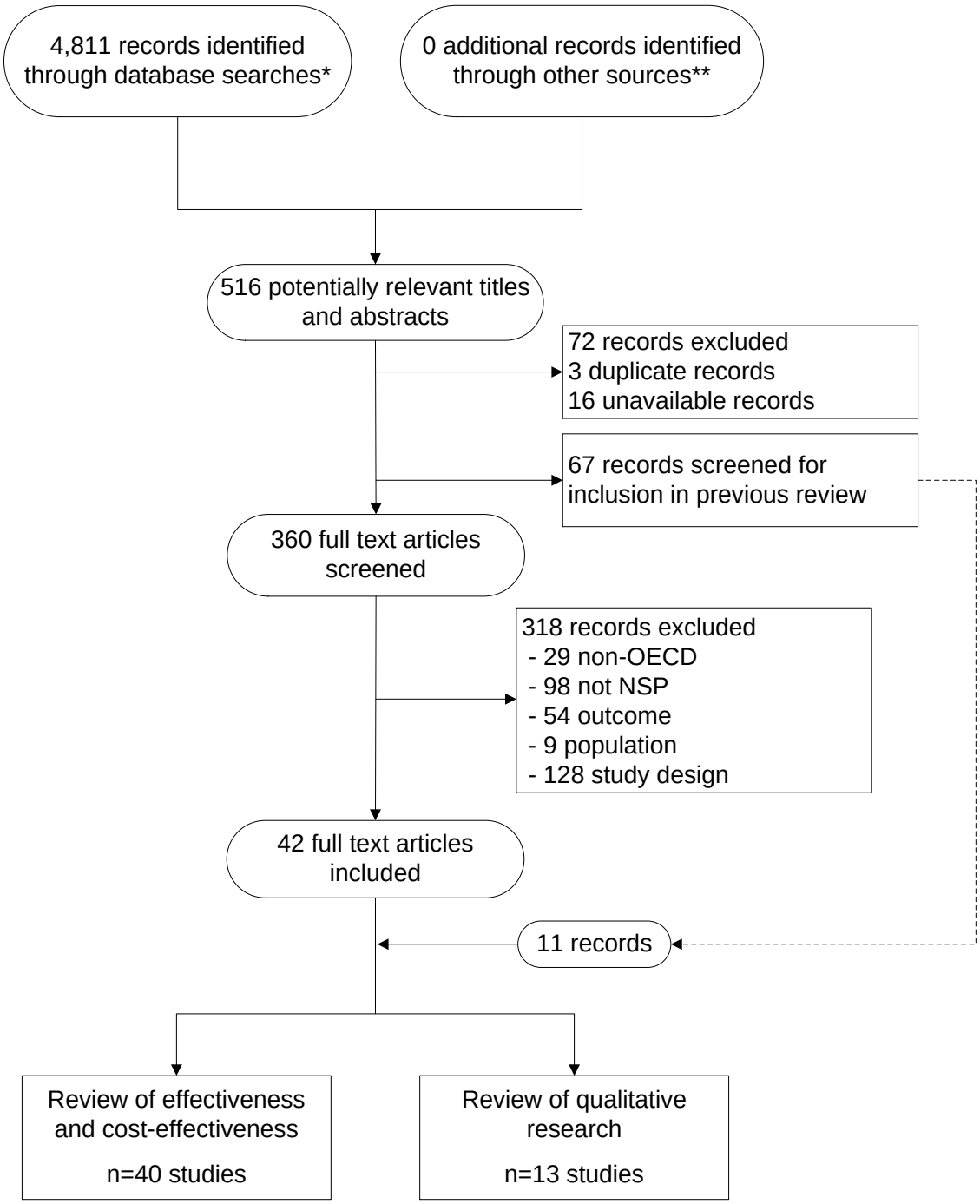

Figure 1. Summary of study selection

5 Review of effectiveness and cost-effectiveness

5.1 Overview of evidence identified

Forty references to 39 studies were identified for inclusion in the review of effectiveness and cost-effectiveness. Of these, seven studies examined issues related to injection equipment coverage and spatial access, 17 studies examined different types of NSPs, 13 studies examined additional harm reduction services delivered by NSPs, and three studies examined NSPs delivered alongside opiate substitution therapy (OST).

5.2 What level of coverage of needles, syringes and other types of injecting equipment are most effective and cost-effective?

Research-based definitions of coverage usually refer to the number of syringes distributed per PWID per injection. Syringe coverage, however, may also be used to refer the proportion of services reaching a particular population. For this reason in the update review we included studies that examined spatial access (i.e. the distance between NSPs and PWID' place of residence) under Review question 1[4].

5.2.1 Overview of evidence identified

Seven studies were identified as relevant to research question 1. Two Australian studies examined coverage (Bryant et al., 2012; Iversen et al., 2012) and five studies examined spatial access. Of the studies on spatial access, one was conducted in Montreal, Canada (Bruneau et al., 2008), a setting of high syringe availability; three (Cooper et al., 2010; 2012a; 2012b) examined relationships between spatial access to NSPs and/or pharmacies in New York City, USA; and one (Williams and Metzger, 2010) was conducted in Philadelphia, USA.

Table 1. Research question 1: summary of studies

Study (design)	Population	Setting/Intervention	Outcomes
Optimal coverage			
Bryant, et al., 2012 (CS+)	Australia; n= 417 PWID	Pharmacy-based NSP	Participants who had not used an NSP in the previous month were more likely to report inadequate coverage.
Iversen, et al., 2012 (CS+)	Australia; n=1,568 PWID attending NSPs	Participation in harm reduction defined as poor (no OST or NSP), full (both NSP and OST), and partial (NSP only; or OST only).	Obtaining N/S from NSP significantly associated with N/S coverage of ≥100%.
Spatial access			
Bruneau, et al., 2008 (CS+)	Australia; n=456 PWID; injected drugs in past 6 months	Consistent NSP users compared to: consistent pharmacy users; mixed reliable source users; and mixed unreliable source users	Non-linear association between distance to NSPs and high-risk injection behaviours. No association with distance to pharmacies.

[4] In the previous review these studies were examined under Review question 2: Types of NSPs.

Study (design)	Population	Setting/Intervention	Outcomes
Cooper, et al., 2011 (RCS+)	USA; n=4,003 PWID, injected drugs in past 6 months	NSPs located in NYC and within a mile of city boundaries; pharmacy sales of N/S	Increase in spatial access to N/S associated with higher odds of injecting with a sterile syringe.
Cooper, et al., 2012a (RCS+)	USA; n=4,067 PWID, injected drugs in past 6 months	Outcomes compared across districts with differing levels of access to N/S.	Adverse relationship between arrest rates and injecting with unsterile equipment.
Cooper, et al., 2012b (RCS+)	*As Cooper et al., 2012a*	*As Cooper et al., 2012a*	Higher drug-related arrest rates appeared to erode protective effects of local NSPs on sterile syringe use, and vice versa.
Williams & Metzger, 2010 (CS+)	USA; n=2,599 PWID; injected drugs in past 6 months	Distances among PWID' residences, drug purchase and use locations, and NSPs	Odds of using a syringe or other injection equipment after someone else decreased with each mile increase in average distance among the four locations.

CS = cross-sectional study. RCS = repeat cross-sectional study. NSP = needle and syringe programme. N/S = needles and syringes. NYC = New York City. OST = opiate substitution therapy.

Quality assessment

All seven studies were based on a cross-sectional study design and awarded a '+' quality score. Across all studies, although the methodology used indicated that the study had generally been conducted in such a way to minimise the risk of bias, not all of the checklist criteria were fulfilled as they were limited by the use of cross-sectional methods and non-random sampling. This was particularly in relation to the way outcomes were measured as they were based on self-report in all studies. In addition, two studies (Bryant et al., 2012; Iversen et al., 2012) did not address all aspects on the checklist in relation to the representativeness of the populations and were awarded a '+' score for external validity.

Study objectives

The two Australian studies (Bryant et al., 2012 [CS+]; Iversen et al., 2012 [CS+]) calculated syringe coverage using methods outlined by Bluthenthal et al. (2007)[5]. The number of retained syringes in the previous month was calculated by summing the number of syringes usually obtained minus the number sold or given away, and multiplied by the number of times procured in the last month (e.g. number of visits to NSP or pharmacy in the case of Bryant et al., 2012). The total number of retained syringes was divided by the total number of injections in the previous month, and multiplied by 100 to derive % syringe coverage for each participant. Adequate syringe coverage was defined as coverage of 100% or more, and inadequate syringe coverage was defined as coverage of less than 100%. Bryant et al. (2012 [CS+]) derived syringe coverage based on syringes obtained from three sources (pharmacies, NSPs and peers) and Iversen et al. (2012 [CS+]) based their measure of coverage on syringes procured from pharmacies, NSPs and vending machines. Iversen et al.

[5] This study was included in the previous effectiveness and cost-effectiveness review.

(2012) dropped receptive syringe sharing[6] as a variable from their final multivariate model due to a strong association between syringe reuse and receptive syringe sharing ($p<0.001$), and what they considered “the primacy of syringe reuse as a measure which captures receptive syringe sharing”.

Bruneau et al. (2008 [CS +]) investigated the relationship between distance to, and patterns of utilisation of, NSPs in relation to high-risk injecting behaviours among PWID. Participants were categorised according to their syringe access patterns; participants who reported only using NSPs or pharmacies as their source of sterile syringes in the past 6 months were categorised as ‘consistent NSPs users’ and ‘consistent pharmacy users’, respectively; ‘mixed reliable source users’ were participants who used both NSPs and pharmacies; and ‘mixed unreliable source users’ were participants who reported obtaining syringes from a combination of sources (including street, friends or dealers). Across three repeat cross-sectional studies, Cooper et al. (2011; 2012a; 2012b [all RCS+]) examined the temporal relationship between spatial access to NSPs and/or pharmacies that sold over-the-counter (OTC) syringes and use of sterile syringe among PWID. Over the 12-year study period, access to needles and syringes in New York City evolved with selected NSPs allowed to operate legally and (as of Jan 2001), registered pharmacists permitted to sell OTC syringes. Two studies (Cooper et al., 2012a; 2012b [RCS+]) additionally explored spatial overlap between access to NSPs and drug-related arrests. Williams and Metzer (2010 [CS+]) examined geographic distances between places of relevance to PWID, including place of residence, drug use locations and drug purchase locations, alongside NSP access, and their association with injecting risk behaviours.

5.2.2 Study findings

Coverage

Bryant et al. (2012 [CS+]) found that a large proportion of participants in their study reported adequate syringe coverage (62% reported ≥100% coverage). Bivariate analysis indicated that participants who had not used an NSP in the previous month were more likely to report inadequate coverage (AOR 2.25, 95% CI 1.25–4.05). The authors noted that even within a good access environment, such as the Australian setting, there remained barriers to syringe access created through the need for some PWID to purchase or exchange syringes at pharmacies. In multivariate analysis, syringe coverage was not associated with receptive syringe sharing[7], once other known correlates of syringe sharing were accounted for. The authors concluded from these findings that in the setting examined, the level of syringe coverage (60%) may have been sufficiently adequate to diminish the relationship between syringe availability and risk behaviours.

[6] Using needles and/or syringes previously used by someone else.
[7] Using needles and/or syringes previously used by someone else.

Iversen et al. (2012 [CS+]) also found a high level of adequate syringe coverage among their study sample, with 80% of participants reporting 100% coverage or more. In multivariate analyses, having obtained syringes from an NSP was associated with adequate syringe coverage (≥100%; AOR 2.96, 95% CI 2.03–4.33) and compared with participants who used a sterile syringe for all injections, participants who reported syringe reuse were less likely to have adequate syringe coverage (AOR 0.56, 95% CI 0.42–0.74). As noted, receptive syringe sharing was dropped as a variable from the final multivariate model developed and receptive sharing of injection paraphernalia was not associated with <100% syringe coverage in a univariate analysis (p=0.182).

Spatial access

Bruneau et al. (2008 [CS+]) found that, in a setting with liberal syringe access, the association between distance to NSPs and high-risk injection behaviour was non-linear and that proximity to an NSP was associated with high-risk injection behaviour. For participants living within 1600 m of the nearest NSP, there was a 13% increase in the odds of high-risk injection behaviour for each 200 m increment in distance (OR 1.13, 95% CI 1.00-1.28). Between 1600 and 3000 m there was no association between distance and injecting risk behaviours, and for PWID living greater than 3000 m away there was a negative association (i.e. lower prevalence of risky behaviours). No apparent association was found between distance to pharmacies and high-risk injecting behaviours. Based on the syringe access patterns of the participants, a lower prevalence of high-risk injection behaviour was found among PWID who reported consistently using NSPs or pharmacies as their sole syringe supply compared to participants who were categorised as ‘mixed unreliable source users’ (consistent NSP users: OR 0.36, 95% CI 0.19-0.71; consistent pharmacy users: OR 0.38, 0.17-0.83). The authors noted that in their study, distance was not associated with specific patterns of syringe acquisition. Overall, the authors interpreted the findings as indicating that for the most part, NSP and pharmacies were situated where they were needed most by PWID.

Cooper et al. found that increases in access to NSPs and OTC pharmacy sales over time were associated with higher odds of injecting with a sterile syringe. Cooper et al. (2011 [RCS+]) reported that a 1-unit increase in the natural log of spatial access to an NSP or OTC pharmacy was associated with greater odds of injecting with a sterile syringe at least 75% of the time (NSP: AOR 1.23, 95% CI 1.01-1.52; OTC pharmacy: AOR 1.15, 95% CI 1.03-1.27). Cooper et al. (2012a [RCS+]) identified that the relationship between access to syringes and the odds of injecting with an unsterile syringe depended on drug-related arrest rates; districts with better spatial access to syringes were able to offset the adverse relationship between arrest rates and unsterile injecting. Cooper et al. (2012b [CS+]) further showed that high levels of drug-related arrests appeared to erode the protective effects of NSPs on sterile syringe use.

Williams and Metzger (2010 [CS+]) found that in the overall model, with each mile increase in average distance among the four locations examined (based on place of residence, drug use location, drug purchase location and NSP location) the odds of using a syringe or other injection equipment after someone else slightly decreased (syringe: OR 0.89, 95% CI 0.83-0.96; other injecting equipment: OR 0.97, 0.91-1.03). The authors primarily explored interactions by race, finding that the relationship between distances travelled between locations and injecting risk behaviours, varied by race. Black participants were less likely than White or Latino participants to report receptive sharing of syringes and other injection equipment, an effect which was not moderated by distance. Use of injection equipment by Latino participants, however, was moderated by distance; the odds of receptive sharing of syringes or other injection equipment increased among this group with each mile increase in average distance among the four locations examined. Based on participants' usual source of sterile syringes, regular use of non-NSP sources were associated increased odds of receptive sharing of syringes (OR 1.60, 95% CI 1.25-2.04) but not of injecting equipment (OR 1.05, 9%% CI 0.85-1.31). While Black participants in this study were less likely to report receptive sharing, they were significantly more likely than White participants to access injecting equipment from non-NSP sites (e.g. drug dealers and other users).

5.2.3 Findings of the previous evidence review

At the time the previous review was undertaken there was little research evidence on the coverage of syringe distribution required to effectively prevent BBVs. One cross-sectional study was identified for inclusion. This study suggested that higher syringe coverage was associated with lower injection risk behaviours. Additionally in the previous review, two cross-sectional studies that examined the impact of geographical proximity to NSPs on risk behaviours among PWID were included. These studies found that participants living within close proximity to NSPs were more likely to utilise NSP services and report lower levels of injection risk behaviours, thus indicating the importance of spatial access to NSPs.

5.2.4 Summary and evidence statements

Coverage

Two studies (Bryant et al., 2012; Iversen et al., 2012) examined coverage, both finding a high level of adequate syringe coverage among the participants; drawing conclusions that 60% may be sufficiently adequate to diminish the relationship between needle and syringe availability and injection risk behaviours. Both studies were conducted in Australia, which generally has liberal syringe distribution policies. Both studies identified that participants who had obtained their syringes via fixed-site NSPs reported greater syringe coverage, and Bryant et al. (2012) noted that this may be related to continuing barriers to syringe access via pharmacies that require PWID to purchase or exchange syringes.

Evidence statement 1a: Needle and syringe coverage and injection risk behaviours

There is moderate evidence from 2 cross-sectional studies (both +) about the association between individual levels of syringe coverage and injection risk behaviours among PWID. One study[1] reported that a level of 60% syringe coverage may be sufficiently adequate to effectively reduce injection risk behaviours among PWID. The other study[2] found that despite a high level of coverage among the overall sample, inadequate syringe coverage was associated with syringe reuse (AOR 0.56, 95% CI 0.42–0.74). This evidence is only partially applicable to the UK as these two studies were conducted in Australia where needle and syringe availability is likely to be higher than may be commonly found across the UK.

[1] Bryant et al., 2012 [CS+] ; [2] Iversen et al., 2012 [CS+]

Spatial access

In a setting with increasing access to sterile needles and syringes via legalised NSPs and OTC pharmacies, Cooper et al. (2011) found that increases in spatial access were associated with greater access to sterile needles and syringes. Further studies showed that such gains were undermined by drug-related arrests. In a Canadian setting with liberal syringe access (Bruneau et al., 2008), proximity to NSPs was associated with high-risk injection behaviours. Distance to NSPs was also not associated with specific patterns of needle and syringe acquisition. This suggests that while NSP and pharmacies were situated where they were needed most by PWID, other neighbourhood environmental factors (such as social disorder) may influence injection risk behaviour through various pathways.

Evidence statement 1b: Proximity to NSP and injection risk behaviours

There is moderate evidence from five cross-sectional studies (all +) about the association between geographical proximity to NSPs and injection risk behaviours. The evidence about the association is based on studies conducted in diverse settings. One study[1] found that a temporal increase in access to needles and syringes was associated with greater odds of injecting with a sterile syringe at least 75% of the time (NSP: AOR 1.23, 95% CI 1.01-1.52; OTC pharmacy: AOR 1.15, 95% CI 1.03-1.27). Further studies[2,3] showed that this association was undermined by drug-related arrests. Another study[4] found that distances between four locations utilised by PWID in purchasing and using drugs were associated with injection risk behaviours. A fifth study[5] found that the association between distance to NSPs and high-risk injection behaviour was non-linear and that proximity to an NSP was associated with high-risk injection behaviour. This evidence is only partially applicable to the UK. Four studies[1-4] were from the USA, where needles and syringes are sold over the counter in pharmacies and in settings where NSPs may have formerly been illegal. One further study[4] was conducted in a setting where needle and syringe availability is likely to be higher than may be commonly found across the UK.

[1] Cooper et al., 2011 [CS+] ; [2] Cooper et al., 2012a [RCS+] ; [3] Cooper et al., 2012b [CS+] ; [4] Williams & Metzger, 2010 [CS+] ; [5] Bruneau et al., 2008 [CS+]

5.3 What types of NSPs are effective and cost-effective?

The term NSP is applied to a wide variety of harm reduction programmes targeted at PWID, and which involve the distribution of sterile injecting equipment and the collection and safe disposal of used needles and syringes. NSPs may also be located in a variety of settings; in England many services are pharmacy-based, but other services are stand-alone or operate as part of mixed-service provision, located alongside drug treatment services. Specialist services may be fixed-site, mobile or both and often operate with very different opening hours. Distributions and returns policies at NSPs vary not only by country but also within them. In England, the majority of NSPs have a returns policy whereby the service encourages returns; however this is not generally a condition for exchanging sterile injecting equipment (Abdulrahim et al 2006). Different approaches, including distribution via vending or dispensing machines and mobile van and bus services, have developed in addition to fixed-site NSPs and pharmacies to improve geographical and temporal access to needles and syringes, and to overcome barriers to service use. While outreach and mobile outlets have been part of NSP services in England since needle exchange schemes were introduced in the 1980s, vending machines have not become part of the types of NSPs available.

5.3.1 Overview of evidence identified

In total, 17 studies were identified that were of relevance to research question 2. Fifteen studies (see Table 2) examined associations between participant's primary source of injecting equipment by NSP type and injection risk behaviours, and a further two studies examined the impact of changes in NSP policies (Green et al., 2010; Kerr et al., 2010; Table 2).

Table 2. Research question 2: summary of studies

Study (design)	Population	Setting/Intervention	Outcomes
NSP type: pharmacy vs. fixed site NSPs			
Bryant, et al., 2010 (CS+)	Australia; n=332 PWID	Participants grouped based on reported points of access of N/S acquisition in the last month	Exclusive users of pharmacies and users of both pharmacies and NSPs more likely to report receptive sharing of any injection equipment compared to exclusive NSP users.
Rudolph, et al., 2010a (CS+)	USA; n= 285 PWID with different primary sources of N/S	Categorised according to primary syringe source (pharmacies, NSPs or other)	Primary NSP users more likely to inject daily and use a new syringe when injecting.
Vorobjov, et al., 2009a (CS+)	Estonia; n=133 primary pharmacy users; 195 primary NSP users	Compared PWID who primarily used pharmacies and those who NSPs	No difference in sharing of N/S or paraphernalia. Primary pharmacy users had lower odds of self-reporting a positive HIV status.
NSP type: needle and syringe vending machines			

Study (design)	Population	Setting/Intervention	Outcomes
Islam, et al., 2008a (CS+)	Australia; n=167 PWID; had used NSVM in past month	N/S vending machine	Younger PWID tended to be primary users of NSVMs. Primary users of NSVMs more likely to report short history of injecting. Primary NSVM users and primary users of other NSPs did not differ significantly in terms of sharing of injection equipment
*Obadia et al., 1999 (CS+)	Marseille, France; n=373 PWID; 73 primary NSVM users	N/S available for purchase from pharmacies, from four NSPs and at seven NSVM	Primary users were significantly younger and less likely to have been in drug treatment. No difference between users and non-users in sharing N/S.
McDonald, 2009 (CS-)	Canberra, Australia;n=147 PWID and NSVM users; compared to respondents to the 2005 National Australian NSP survey	Four vending machines	NSVM users appeared to be younger than NSP users and a higher % were female. 84% of VM users stated that having the VM "reduces the incidence of needle sharing".
**Moatti et al., 2001 (CS+)	Marseille, France; n=343 PWID; 88 last obtained N/S from NSVM	39 sites selected; 32 pharmacies, four NSPs and three vending machines	NSVM users were younger than NSP users; had a shorter history of injecting drug use and injected less frequently. No difference in N/S sharing. NSVM users reported lower levels of other injection equipment sharing.
**Stark et al., 1994 (CS+)	Berlin, Germany; n=313 PWID using three vending machines	N/S vending machine (~80 % of all N/S provided by vending machines were purchased via these machines).	24.9% had borrowed injection equipment in the past 6 months. Younger PWID were more likely to have borrowed equipment. Of participants with a known HIV test result, 19.8% were HIV-seropositive.
NSP type: outreach and mobile van outlets			
Deering, et al., 2011 (CO++)	Vancouver, Canada; women engaged in sex work; n= 97 van users; 145 no van use	Mobile outreach van	Users of the van were more likely to have injected cocaine in the last 6 months, to have accessed a drop-in centre in the past 6 months and to have accessed detox services.
Hayashi et al., 2010 (CS+)	Vancouver, Canada; n=854 PWID	VANDU Alley Patrol; peer-based outreach programme	Use of the VANDU Alley Patrol associated with: unstable housing; frequent heroin injection; frequent cocaine injection; injecting in public; and needle reuse.
Knittel, et al., 2010 (UBA-)	Michigan, USA; n=105 PWID	Outreach van (parked three days a week in designated locations)	At FU, less likely to report giving another IDU a previously used syringe. NS trends in other injection risk behaviours.
*Miller et al., 2002 (CS++)	Vancouver, Canada; n=62 pharmacy users, 768 fixed site users, 190 mobile van users	Mobile van NSP, also pharmacy sales and fixed site NSP	No significant trend for needle borrowing or lending, but pharmacy users were more likely to report needle sharing behaviours (not significantly). HIV prevalence was lower among pharmacy users than participants who reported using the van or fixed sites NSPs.

Study (design)	Population	Setting/Intervention	Outcomes
*Riley et al., 2000 (CS++)	Baltimore, USA; n=124 primary van users, 162 of pharmacy users	Mobile van-based NSP and fixed site pharmacy-based NSP.	The different sites attracted first-time NSP users with different characteristics. Compared with pharmacy users, van users tended to be high-frequency injectors.
**Wood et al., 2003 (CS+)	Vancouver, Canada; n=165 peer run NSP users, 422 non-users	All-night unsanctioned peer run NSP (tent based). Needle exchange policy (capped at 10 if no N/S to exchange)	Characteristics associated with obtaining needles and syringes from the peer run NSP were frequent cocaine injection, injecting in public, requiring help injecting and safe syringe disposal.
NSP type: other			
Bravo, et al., 2008 (CS-)	Spain; n=443 PWID	Categorised according to main sources of obtaining N/S	Not sharing and no reusing associated with obtaining all sterile syringes free of charge.
NSP policy			
Green, et al., 2010 (CO+)	Hartford, Oakland & Chicago, USA; n=228 PWID	Transition probabilities of NSP attendance following change in syringe access policies	Stronger maintenance of Indirect NSP user status over time than the other attendance typologies.
Kerr, et al., 2010 (CO+)	Vancouver, Canada; n=1,228 PWID	Time before and after NSP policy changes	Reductions in syringe borrowing and lending and independent association with HIV incidence.

CS = cross-sectional study. CO = cohort study. NSP = needle and syringe programme. OST = opiate substitution therapy. N/S = needles and/or syringes. UBA = uncontrolled before and after study. NSVM = needle and syringe vending machine. *Included in previous review of effectiveness and cost-effectiveness. **Excluded from previous review of effectiveness and cost-effectiveness.

Quality assessment

Of three cohort studies; one was awarded a '++' rating (Deering et al., 2011) and two (Green et al., 2010; Kerr et al., 2010) were awarded a '+' rating for quality. Twelve studies were based on cross-sectional designs. Two well-conducted cross-sectional studies (Miller et al., 2002; Riley et al., 2000) were rated '++' for quality. Nine cross-sectional studies (Bryant et al., 2010; Hayashi et al., 2010; Islam et al., 2008a; Moatti et al., 2001; Obadia et al., 1999; Rudolph et al., 2010a; Stark et al., 1999; Vorobjov et al., 2009a; Wood et al., 2003) were rated '+' for quality, as although the risk of bias had generally been minimised in these studies some potential sources of bias were not adequately addressed (see Appendix 7). Two cross-sectional studies (Bravo et al., 2008; McDonald, 2009) were awarded a '-' rating. The study by Bravo et al. (2008) lacked a clear description of the source population and the methods of analysis were poorly reported. The study by McDonald (2009) also did not provide a clear description of the population and differences between the participants and comparison subjects from a national survey were not adequately accounted for in the analyses. The uncontrolled before and after study by Knittel et al. (2008) was also judged to be of poor quality and awarded a '-' rating. It was unlikely that the population were representative given the small study sample and high rate of attrition over follow-up.

Study objectives

Sixteen studies examined the impact of obtaining needles and syringes from different sources; including:

- Three studies (Bryant et al., 2010 [CS+]; Rudolph et al., 2010a [CS+]; Vorobjov et al., 2009a [CS+]) of pharmacy-based NSPs compared to fixed-site NSPs;
- Five studies (Islam, et al., 2008a [CS+]; Obadia et al., 1999 [CS+]; McDonald, 2009 [CS-]; Moatti et al., 2001 [CS+]; Stark et al., 1994 [CS+]) of the distribution of needles and syringes via vending machines (NSVM);
- Six studies (Deering et al., 2011 [CO++]; Hayashi et al., 2010 [CS+]; Knittel et al., 2010 [UBA-]; Miller et al., 2002 [CS++]; Riley et al., 2000 [CS++]; Wood et al., 2003 [CS+]) of the NSPs situated in mobile outlets or outreach settings; and
- One study (Bravo et al., 2008 [CS-]) that examined outcomes according to whether syringes were obtained free or purchased.

Two studies examined changes in NSP policies. One study (Green et al., 2010 [CO+]) examined transitions in probabilities of NSP attendance typologies before compared to after changes in syringe access policy. Four NSP attendance typologies were defined: (i) direct NSP users; (ii) secondary exchange users (i.e., received needles and equipment from someone who attends an NSP; (iii) knows a direct NSP user but does not receive any NSP equipment from them; and (iv) does not know an NSP attendee and does not receive NSP equipment. A second study (Kerr et al., 2010) assessed the effects of NSP policy changes that occurred in Vancouver, Canada between 2001 and 2003 on injection risk behaviours and rates of HIV incidence mong PWID. During this time the focus of NSP policies in the city shifted from exchange to distribution and involved the decentralisation of service. These changes increased the number of NSP sites, diversified the methods used to distribute needles and syringes, and resulted in the removal of limits on the number of needles and syringes that could be obtained by PWID.

5.3.2 Study findings: NSP type

Pharmacy vs. fixed site NSPs

Injection risk behaviours

In an area of Australia with an extensive needle and syringe distribution system, Bryant et al. (2010 [CS+]) found that point of access to needle and syringes was associated with receptive equipment sharing. Although many participants in the study used both NSP and pharmacies to obtain sterile needles and syringes, they tended to favour one or the other. Participants who had exclusively used pharmacies in the last month were more likely to report receptive sharing of any equipment compared to those who had exclusively used NSPs (AOR 5.9, 95% CI 2.02–17.14); as were participants who used both NSPs and pharmacies (AOR 5.8, 95% CI 2.35–14.40). Exclusive users of pharmacies appeared to be more disengaged from health services compared to other groups of PWID in the study. The

authors concluded from their findings that different points of access attract different groups of PWID with different demographic and injection risk behaviour profiles.

Rudolph et al. (2010a [CS+]) found that PWID in New York City who used NSPs as a primary source of new needles and syringes were more likely to use a new syringe when injecting compared to those who obtained most of their new syringes from other sources (e.g. family members, relatives, sex partners, drug dealers; OR 2.68, 95% CI 1.30–5.54). The authors suggest that their findings indicate that different subpopulations of PWID access needles and syringes via different sources, with their analysis revealing different risk profiles for PWID using different sources of needles and syringes. Black participants and those who reported injecting infrequently were highlighted as the groups least likely to use NSPs and pharmacies as a source of needles and syringes, and were therefore likely to be groups at greater risk of not using new needles and syringes when injecting. The finding that Black participants are less likely to use NSPs is consistent with findings from other studies in US cites; with the suggestion that stigma and fear of arrest may be more prominent among Black PWID (see Williams and Metzger, 2010 for further discussion).

Vorobjov et al. (2009a [CS+]) examined factors associated with obtaining injection equipment from different sources in Tallinn, Estonia, a location with high HIV incidence and prevalence among PWID and limited resources. They found that the majority of PWID reported using either NSPs or pharmacies as their primary source of injection equipment. Sharing of syringes or paraphernalia was high among the sample but was not associated with whether PWID obtained their equipment primarily via pharmacies or NSPs (sharing needles and syringes during past 6 months: 62.1% vs. 66.0%; AOR 1.42, 95% CI 0.87–2.32; sharing paraphernalia during past 6 months: 76.7% vs. 79.3%; AOR 1.33, 95% CI 0.76–2.34 0.312).

Blood borne virus infections

In Tallinn, Estonia, a setting with high HIV incidence and prevalence among PWID and limited resources, Vorobjov et al. (2009a [CS+]) found that participants who obtained injecting equipment primarily from pharmacies had lower odds of self-reporting a positive HIV (45.9% vs. 64.1%; AOR 0.54, 95% CI 0.33–0.87) or HCV (88.0% vs. 99.0%; AOR 0.10 95% CI 0.02–0.50) serostatus compared to NSP users.

Needle and syringe vending machines

Characteristics of NSVM users

Four studies (Islam et al., 2008a [CS+]; McDonald, 2000 [CS-]; Moatti et al., 2001 [CS+]; Obadia et al., 1999 [CS+];) reported that NSVMs tended to attract younger PWID. In the study by Islam et al. (2008a), 32.4% of primary NSVM users were aged 30 or younger compared to 13.0% of fixed-site/pharmacy NSP users. The two studies conducted in the Marseille, France (Moatti et al., 2001 [CS+]; Obadia et al., 1999 [CS+]) found that users of NSVMs were significantly more likely to be younger than users of other NSPs in multivariate

analyses (Moatti et al., 2001, [aged ≥35 years] OR 0.5, 95% CI 0.3-0.9; Obadia et al., 1999, [aged 17-30 years] OR 1.3, 95% CI, 1.1-1.8). Compared to compared to respondents to the 2005 National Australian NSP survey, McDonald (2009 [CS-]) reported that NSVM users 'appeared to be younger' (mean 36 years for national survey respondents vs.33 years for NSVM users [no p value reported]). The studies by Moatti et al. (2001 [CS+]) and Islam et al. (2008a [CS+]) also found that PWID who were primary users of NSVMs were more likely to have a shorter history of injection than primary users of fixed-site NSPs (Islam et al., 2008a [injection duration <16 years], 46.3% vs. 18.5%, p=0.00; Moatti et al., 2001 [injection duration ≤10 years] OR 1.9, 95% CI 1.1–3.4).

Injection risk behaviours

As all of the studies were based on cross-sectional designs, they were not able to explore the impact of NSVMs on sharing of injection equipment. Four studies (Islam et al., 2008a [CS+]; Obadia et al., 1999 [CS+]; Moatti et al., 2001 [CS+]; McDonald, 2009 [CS-]) found that sharing behaviours among NSVM users did not differ significantly from users of other types of NSPs (data shown in evidence tables in Appendix 6). Stark et al. (1994 [CS+]) reported that 24.9% of participants in their study had borrowed injection equipment in the past 6 months, and that younger PWID were more likely to have borrowed needles and syringes.

Outreach and mobile outlets

Characteristics of outreach and mobile outlet users

Four studies (Hayashi et al., 2010 [CS+]; Miller et al., [CS++]; Deering et al., [CO++]; Wood et al., 2003 [CS+]) examined different types of outreach programmes that operated in Vancouver, Canada, including three studies (Hayashi et al., 2010 [CS+]; Miller et al., [CS++]; Wood et al., 2003 [CS+]) that analysed cross-sectional data from an on-going prospective open cohort study, the Vancouver Injection Drug User Study (VIDUS). All three studies based on the VIDUS data indicated that users of mobile outlets and outreach programmes were a high-risk group. Compared to fixed-site and pharmacy NSP services, frequent or daily cocaine injection was independently associated with use of a mobile NSP patrol (Hayashi et al., 2010 [CS+]; AOR 1.34, 95% CI: 1.03–1.73), an unsanctioned peer run NSP (Wood et al., 2003 [CS+]; AOR 1.56, 95% CI 1.00-2.44), and use of a mobile van NSP (Miller et al., 2002 [CS++]; AOR 1.35, 95% CI 1.01-1.80). Miller et al. (2002 [CS++]) additionally found that use of a mobile van-based NSP was independently associated with a shorter history of injecting drug use (AOR 0.97, 95% CI 0.95-0.98). Deering et al. (2011 [CO++]) found that use of a mobile outreach programme for female sex workers was associated with cocaine injection (42% of van users vs. 26% of non-users; p=0.01).

Comparison of first-time attendees at a van-based NSP and two pharmacy-based sites in Baltimore, USA (Riley et al., 2000 [CS++]) showed that the sites attracted users with different characteristics. After controlling for the other independent variables, factors that

were predictive of using the van-based NSPs were race (African American: AOR 0.21, 95% CI0.08–0.64), having injected cocaine in the past two weeks (AOR 2.82, 95% CI 1.35-5.87) and having injected 4 or more times in a day in the past 2 weeks (AOR 2.0, 95% CI 1.20-3.33).

Injection risk behaviours

Knittel et al. (2010 [BA-]) found that use of an outreach van was associated with non-significant reductions in most measures of injection risk behaviours between baseline and follow-up. However, the small sample size and data quality significantly limited this evaluation and the conclusions that could be drawn from the study.

Other studies that examined injection risk behaviours were based on cross-sectional designs, and were therefore not able to explore the impact of outreach and mobile outlet and on the sharing of injection equipment and other behaviours. Two studies (Hayashi et al., 2010 [CS+]; Wood et al., 2003 [CS+]) found that mobile and outreach users were more likely than users of fixed-site/pharmacy-based NSPs to report injecting in public (AOR 3.07, 95% CI: 2.32–4.06; AOR 2.71, 95% CI 1.62–4.53; respectively). Wood et al. (2003 [CS+]) additionally found an independent association with requiring help injecting (AOR 2.13, 95% CI 1.33–3.42). With respect to sharing behaviours, Miller et al. (2002 [CS++]) and Wood et al. (2003 [CS+]) did not identify an association for needle borrowing or lending among mobile/outreach users but Riley et al. (2000 [CS++]) reported than van users in their study more likely to use a needle that had already been used by someone else (OR 1.98, 95% CI 1.33–3.68) compared to users at pharmacy-based sites. Hayashi et al. (2010 [CS+]) found that users of the mobile NSP patrol were likely to report needle reuse (AOR 0.65, 95% CI: 0.46–0.92).

Drug treatment enrolment

Use of the mobile outreach programme for female sex workers (Deering et al., 2011 [CO++]) was independently correlated with using inpatient addiction treatment services (AOR: 4.16, 95% CI 2.14–8.06) and use of a drug and alcohol counsellor (AOR 6.06, 95%CI 2.58–14.23). However, use was not associated with inpatient methadone treatment (AOR 1.7, 95% CI 0.82–3.77).

Other NSP types

Injection risk behaviours

Bravo et al. (2008 [CS-]) found that not sharing syringes among PWID who participated in the study was associated with obtaining all syringes free of charge. However, not sharing was not associated with the way syringes were purchased. There was also no association between not reusing and buying most syringes in the street among participants who purchased syringes.

5.3.3 Study findings: NSP policy

Injection risk behaviours

Green et al. (2010 [CO+]) found that, overall, following policy changes to the cap on needle and syringe exchange, there was a stronger maintenance of Indirect NSP user status over time than the other attendance typologies (transition probability = 0.736 Indirect NSP user vs. 0.560 for Isolated IDUs vs. 0.557 for Direct NSP users). There was a greater increase in the prevalence of Indirect NSP users (from 43.2% to 50.6%) than of Direct NSP users (29.2% to 31.5%); while the prevalence of Isolated IDUs declined (from 27.6% to 17.8%). The authors note that consistent with previous studies, their findings suggest that legislation that only modestly increases the cap on access to clean needles and syringes at NSPs appears to have little effect on increasing availability, and thus decreasing risk of BBV transmission.

In the study by Kerr et al. (2010 [CO+]), reductions in the proportion of participants reporting syringe borrowing and syringe lending were observed over the period of change in NSP policies. Wide ranging changes to policy resulted in an increased number of NSP sites, diversification of the methods used to distribute needles and syringes, and a removal of limits on the number of needles and syringes that could be obtained. Multivariate analyses showed that the period following the change in NSP policy was independently associated with syringe borrowing and lending. The adjusted odds ratio (AOR) showed that both syringe borrowing (AOR 0.57, 95% CI 0.49-0.65, $p<0.001$) and syringe lending (AOR 0.52, 95% CI 0.45-0.60, $p<0.001$) were less likely in the period after the change in policy.

Blood borne virus infections

Kerr et al. (2010 [CO+]) also found that HIV incidence was independently associated with the period following the change in NSP policy. The multivariate analyses showed that HIV incidence was reduced in this period (AOR 0.13, 95% CI 0.06-0.31, $p<0.001$). The authors noted that the rates of access to various sources of sterile syringes changed significantly over time with the changes in policy. Whilst, the proportion of participants accessing pharmacies, a fixed NSP, and NSP vans declined over time, there was an increase in the proportion of participants who accessed other types of NSPs (e.g. street nurses, hotel-based NSPs, health clinics, and a ‘Health Van’); in particular the use of a drug user–led NSP increased quickly after the programme was implemented.

5.3.4 Findings from the previous evidence review

Twelve studies were identified for inclusion in the previous review that addressed different types of NSPs and their impact on effectiveness. Evidence from two RCTs suggested that NSP setting did not impact on injection risk behaviours. Further evidence from eight cross-sectional studies that examined a variety of outcomes depending on their main source of needles was inconsistent and difficult to interpret given the range of settings examined. Three cross-sectional studies examined the impact of different syringe dispensation policies,

finding that syringe dispensation policies had a limited impact on behavioural outcomes such as sharing but had some impact on syringe re-use.

5.3.5 Summary and evidence statements

NSP type

Three studies conducted in three different countries all suggested that NSPs and pharmacies tend to attract PWID with different risk profiles and that PWID are likely to favour one source over another. Two studies, one of which was conducted in a setting of high needle and syringe availability, found that PWID who use pharmacies as their main source of needles and syringes have higher risk profiles than users of fixed-site NSPs. For PWID not reached through specialist NSPs and pharmacies, studies showed that both vending machines and outreach/mobile outlets attract high risk populations, including in one study female sex workers with high-risk injection behaviours.

Evidence statement 2a: Source of equipment and injection risk behaviours

There is moderate evidence from 3 cross-sectional studies[1-3] (+) about the association between source of needles and syringes and injection risk behaviours. There was consistent evidence to suggest that PWID who used pharmacies as their main source of needles and syringes were more likely to report injection risk behaviours than those who used fixed-site NSPs. This evidence is partially applicable to the UK as although studies were conducted across a range of settings, none were directly applicable to a UK context.

[1] Bryant et al., 2010 [CS+] ; [2] Rudolph et al., 2010a [CS+] ; [3] Vorobjov et al., 2009a [CS+]

Evidence statement 2b: Profile of PWID who use vending machines

There is moderate evidence from 5 (4+,1-) cross-sectional studies[1-5] about the characteristics and risk behaviour profiles of PWID who use needle and syringe vending machines. There was evidence from four studies[1-4] to suggest that PWID who use NSVM tend to be younger[1-4] and have a shorter history of injecting drug use than users of other types of NSPs.[1,3] There was further evidence from five studies[1-5] to suggest that sharing behaviours among NSVM users did not differ significantly from users of other types of NSPs. This evidence is partially applicable to the UK as although studies were conducted across a range of settings, none were directly applicable to a UK context.

[1] Islam et al., 2008a [CS+]; [2] McDonald, 2009 [CS-]; [3] Moatti et al., 2001 [CS+]; [4] Obadia et al., 1999 [CS+]; [5] Stark et al., 1994 [CS+]

Evidence statement 2c: Profile of PWID who use outreach and mobile outlets

There is moderate evidence from 1 (++) cohort study[1] and four (2++, 2+) cross-sectional studies about the characteristics and risk behaviour profiles of PWID who use outreach and mobile outlets. There was evidence from five studies[1-5] to suggest that PWID who use outreach and mobile outlets have different characteristics to users of fixed-site and pharmacy NSP services, and represent a high-risk group of PWID. There was mixed

evidence from three studies[3-5] about sharing behaviours among outreach and mobile users. Two studies[3,5] did not identify an association, but one study[4] reported an association between using a needle that had already been used by someone else and use of a mobile van NSP. This evidence is partially applicable to the UK as although studies were conducted across a range of settings, none were directly applicable to a UK context. Four studies[1-3,5] were conducted in a setting with a high proportion of cocaine injectors among PWID and a significant proportion participants in the fifth study[4] was African American.

[1] Deering et al., 2011 [CO++]; [2] Hayashi et al., 2010 [CS+]; [3] Miller et al., 2002 [CS++]; [4] Riley et al., 2000 [CS++] ; [5] Wood et al., 2003 [CS+]

Evidence statement 2d: Outreach schemes

No evidence was found from studies identified for the update review on the impact of outreach schemes on injection risk behaviours among PWID. One (–) before and after study[1] found that use of an outreach van was associated with non-significant reductions in measures of injection risk behaviours between baseline and follow-up. There was moderate evidence from 1 (++) cohort study[2] that use of a mobile outreach programme for female sex workers was independently correlated with using inpatient addiction treatment services and a drug and alcohol counsellor (AOR: 4.16, 95% CI 2.14–8.06; AOR 6.06, 95% CI 2.58–14.23), but not inpatient methadone treatment (AOR 1.7, 95% CI 0.82–3.77). This evidence may only be partially applicable to the UK as both studies were conducted in North America.

[1] Knittel et al., 2010 (UBA-); [2] Deering et al., 2011 (CO++)

NSP policy

In common with the findings of the previous review, small changes in the cap on the number of needles and syringes that could be exchanged were found to be unlikely to impact on injection risk behaviours (Green et al., 2010 [CO+]) . A major change in NSP policy from exchange to distribution (i.e. removal of the number of syringes that could be distributed at any one time), and diversification of services in Vancouver, Canada, however, was associated with reductions in needle and syringe borrowing and lending among PWID (Kerr et al., 2010 [CO+]).

Evidence statement 2e: NSP policy changes

There was moderate evidence from 2 (+) cohort studies[1,2] that examined associations between changes in NSP policies and NSP user status[1], and injection risk behaviours[2]. One study[1] found that changes to the cap on the number of needles and syringes that could be exchanged did not have a direct impact on NSP use but increased secondary exchange. Another study[2] found that a significant change in NSP policy and diversification of services was associated with reductions in injection risk behaviours. This evidence may only be partially applicable to the UK as NSP policies in one study,[1] which was conducted in the USA, were more restrictive in comparison to policies in the UK and in the second study[2] were likely to be more liberal than may commonly be found across services in the UK.

[1] Green et al., 2010 [CO+]; [2] Kerr et al., 2010 [CO+]

5.4 Which additional harm reduction services offered by NSPs are effective and cost-effective?

NSPs often offer other harm reduction interventions alongside the distribution of sterile needles and syringes, and such services may include: information/advice on safer injecting practices and safe disposal of used equipment; the supply of additional injection equipment (e.g. filters, mixing containers and sterile water); on-site testing for BBVs, pre- and post-diagnostic counselling, hepatitis B immunisation; general health advice; referral to additional support services (e.g. drug and alcohol treatment, primary care services, welfare, housing and legal advice); and safer sex/sexual health advice. The last NTA survey of needle exchanges in England (Abdulrahim et al., 2006) found that service provision and the range of harm reduction interventions differed between regions in England.

5.4.1 Overview of evidence identified

Thirteen studies were identified that were relevant to research question 3 (Table 3). Two cross-sectional studies and one systematic review (Gillies et al., 2010; Aspinall et al., 2012; Leonard et al., 2008) examined the supply of other types of injection/drug use equipment via NSPs. Two studies (Riley et al., 1998; de Montigny et al., 2010) examined the effect of the installation of drop boxes on discarded needles, in Baltimore, USA and Montreal, Canada, respectively. One study (Gagnon et al., 2010) examined a theory-based intervention designed to increase safer injecting practices. A further four US studies examined interventions designed to encourage users of NSPs to enrol in drug treatment (Havens et al., 2009; Kidorf et al., 2009; Kidorf et al., 2011a; Kidorf et al., 2012) and one further study examined an intervention designed to link PWID with services through pharmacies (Rudolph et al., 2010b). One economic evaluation study (Hu et al., 2008) was a cost-effectiveness and cost-utility analysis of the provision of hepatitis B vaccination via NSPs.

Table 3. Research question 3: summary of studies

Study (study design)	Population	Setting/Intervention	Outcomes
Supply of additional harm reduction equipment			
Aspinall, et al., 2012 (CS+)	Glasgow, UK; n=2,037 PWID attending participating NSPs and other harm reduction services	Various NSP services participated; 48% pharmacy-based NSPs and 56% specialist NSPs.	Significantly reduced odds of sharing if, in an average week, had collected >30 filters; reported uptake of at least one spoon; or had obtained sterile water.
Gillies et al., 2010 (SR++)	NA	Exposure to injecting paraphernalia (limited to drug cookers, filters and water) among	No studies examined the relationship between the supply of injecting paraphernalia and biological measures of HCV infection.

Study (study design)	Population	Setting/Intervention	Outcomes
Leonard et al., 2008 (RCS-)	Canada; n= 550 PWID	Safer crack kits (containing glass stem, brass screens, rubber mouthpiece, chopstick, alcohol swabs, condoms, lubricant, lip balm, gum, hand wipes and material emphasising non-sharing behaviour and safe disposal).	Decreasing proportions of participants reported that they had injected drugs in the month prior to their interview. 41% at 6-month post-implementation and 40 % at the 12-month point reported that engagement in injecting drugs had declined.
Safe disposal of used needles and syringes			
de Montigny et al., 2010 (TS+)	Montreal, Canada; dataset of discarded needles collected from 2.5 km^2 area	Drop boxes installed outside NSPs and in areas with high levels of discarded needles.	Presence of a drop box was associated with fewer discarded needles.
Riley et al., 1988 (CBA+)	Baltimore, USA; standardised counts of discarded needles.	US mail boxes converted to needle drop boxes; four drop boxes placed within a 10 block radius.	No significant association found between the distribution of discarded needles and the presence or absence of a drop box.
Information and advice on safer injection practices			
Gagnon, et al., 2010 (RCT+)	Canada; n=260 PWID (130 intervention; 130 control)	Computer tailored intervention; website including messages delivered by a virtual character; targeted injecting practices.	Fewer 'dirty' syringes were used by intervention participants at short-term FU; no difference at long-term FU. Same findings in relation to adoption of 'safe behaviour'.
Referral to additional support services			
Hu et al., 2008 (CEA/ CUA+)	USA; n=1,964 PWID	Four strategies; standard or accelerated vaccination schedule with first vaccine dose at screening visit or after.	All four strategies were cost saving in comparison to a no vaccination scenario.
Islam, et al., 2012a (CO+)	Australia; n=167 PWID who accessed the service between July 2006 and December 2010	Nurse led service with a caseworker and visiting medical officer. Co-located with NSP services in a multidisciplinary centre.	74% underwent HCV antibody screening. Liver clinic referral appointments made for 67% of those testing positive; 71% attended an appointment.
Rudolph, et al., 2010b (CBA-)	USA; n= 29 intervention, 66 control	Intervention designed to link PWID purchasing needles in pharmacies to medical/social services.	Unable to detect any impact of the intervention.
Referral to drug treatment			
Havens, et al., 2009 (RCT+)	USA; n=127 (62 intervention; 65 control)	Free case management services; case managers assisted clients in setting drug treatment goals and managed needs to achieve those goals.	No differences in retention in OST between intervention and control groups.
Kidorf, et al., 2009; 2012 (RCT+)	USA; n=94 MR, 94 MR+I, 93 SR	Motivated Referral to drug treatment (MR) with and without incentives (+I) compared to standard referral (STR).	MR+I more likely to enrol in any drug treatment and MMT than MR or SR at short-term FU. No differences in enrolment for any drug treatment at long-term FU; MR+I more likely to enrol in MMT than MR or STR.

Study (study design)	Population	Setting/Intervention	Outcomes
Kidorf, et al., 2011a (CO+)	USA; n=31 MR, 49 MR+I, 33 SR	Participation in additional weekly treatment reengagement group sessions (same population as Kidorf et al., 2009; 2012)	MR+I more likely to attend at least one reengagement session than MR, and attended higher mean number of sessions. MR+I more likely to reenrol in any treatment and MMT than MR or SR.

CBA = controlled before and after study. CEA = cost-effectiveness analysis. CO = cohort study. CS = cross-sectional study. CUA = cost-utility analysis. FU = follow-up. HCV = hepatitis C virus. MR = motivational referral. MR+I = motivational referral plus incentives. NSP = needle and syringe programme. OST = opiate substitution therapy. RCS = repeat cross-sectional study. RCT = randomised controlled trial. SR = systematic review. STR = standard referral. TS = time series.

Quality assessment

Of the effectiveness studies, three were RCTs (Havens et al., 2009; Kidorf et al., 2009; Gagnon et al., 2010); all awarded a '+' rating. While the majority of the checklist criteria were fulfilled in relation to outcomes and analyses, the methods of allocation to intervention were not adequately described in all three studies. Two studies were cohort studies (Islam et al., 2012a; Kidorf et al., 2011a[8]), and were both awarded a '+' rating. Kidorf et al. (2011a) was limited by inadequate reporting of items related to methods of allocation and details of the population were not fully reported. In Islam et al. (2012a) the methods of selection exposure were inadequately described. Two studies were controlled before and after studies, one of which was awarded a '+' rating (Riley et al., 1998) and one of which was awarded a '-' rating (Rudolph et al., 2010b). The study by Rudolph et al. (2010b) was limited by the small sample size and consequently the analyses were not able to detect an impact of the intervention. Two studies were cross-sectional studies, Leonard et al. (2008) was awarded a '-' rating, due to the use of only basic analytical methods, and Aspinall et al. (2012) was awarded a '+' rating. The study by de Montigny, et al. (2010) was based on a time series approach and appeared to have been generally well executed, however some the checklist criteria were not fulfilled relation to the reporting of the outcomes and analyses and it was awarded a '+' rating. A systematic review (Gillies et al., 2010) was well-reported and awarded a '++' rating. The sole economic evaluation study was assessed to have minor limitations overall, the main limitations were that the estimates of baseline outcomes and treatment effects were not based on a systematic review.

Study objectives

A systematic review and cross-sectional study by the same research team were undertaken with a view to establishing whether provision of paraphernalia has any impact on paraphernalia sharing. Drawing on published literature, Gillies et al. (2010 [SR++]) sought to determine whether the provision of sterile injecting paraphernalia (specifically drug cookers, filters and water) reduced injecting risk behaviours or hepatitis C virus transmission among PWID. Following on from the review, Aspinall et al (2012 [CS+]) examined factors

[8] Cohort nested within an RCT (Kidorf et al., 2009; 2012).

associated with the sharing of injecting paraphernalia (specifically, spoons, sterile water and filters) among Scottish IDUs, in particular, whether self-reported uptake of injecting paraphernalia was associated with a reduction in sharing. The authors calculated each participants' 'shortfall' in paraphernalia by subtracting the amount of equipment collected in an average week in the previous 6 months from the number of injections reported in an average week in the previous 6 months. Factors associated with sharing of the different types of injecting paraphernalia were explored in multivariate analyses. Leonard et al. (2008 [RCS-]) examined the impact of the Safer Crack Use Initiative on the frequency of injecting among PWID in Ottawa, Canada. Study evaluation occurred at four time points, one pre-implementation of the initiative and three post-implementation at 1-, 6- and 12-months. Cross-sectional samples were used at each time point.

Two studies (Riley et al., 1998 [CBA+]; de Montigny et al., 2010 [TS+]) sought to quantify the effects of drop boxes on discarded needles by comparing rates of discarded needles before and after the installation of outdoor drop boxes. Riley et al. (1998) reported on a pilot study that examined the installation of four drop boxes within a 10 block radius in a neighbourhood in Baltimore, USA. Discarded needle counts were compared before and after the drop boxes were installed and with control areas. de Montigny et al. (2010 [TS+]) used data on the number of discarded needles collected between 2001 and 2006, a period during which multiple drop boxes were installed in one neighbourhood in Montreal, Canada. To investigate the range of effect of drop boxes, the study examined changes in rates of discards across a range of distances from individual drop boxes, while controlling for environmental covariates (e.g. weather conditions).

Gagnon et al. (2010 [RCT+]) evaluated the efficacy of a theory-based intervention to increase safer injection practices among PWID. The intervention was website-based and included an electronic bank of 22 audio-visual messages delivered by a virtual character and which targeted injecting practices. Messages were tailored to users' measured intentions, attitudes, perceived behavioural control and behaviour.

Three studies examined the effectiveness (Islam et al., 2012a; Rudolph et al., 2010b) and cost-effectiveness (Hu et al., 2008) of additional support services. Islam et al. (2012a [CO+]) examined uptake of referrals to a liver clinic via nurse-led service co-located with NSP. Rudolph et al. (2010b [CBA-]) evaluated the effectiveness of an intervention designed to link PWID purchasing needles in pharmacies to medical and social services (Pharmacies as the Link to Community Services [PAT-LINK] project). Pharmacies that enrolled in the project provided PWID with information on harm reduction and referrals to medical and social services. Poster and information materials were provided for display and staff in the pharmacies was invited to attend two workshops. Hu et al. (2008 [CEA/CUA]) examined the cost-effectiveness and cost-utility of targeting PWID for HBV vaccination through NSPs. Four vaccination strategies were compared to a no vaccination strategy: (i) standard vaccination (scheduled at 0, 1 and 6 months) with first dose after screening visit (current standard

recommended practice); (ii) standard vaccination with first dose at screening visit' (iii) accelerated vaccination (scheduled at 0, 1 and 2 months) with first dose after screening; and (iv) accelerated vaccination with first dose at screening.

The study by Havens et al. (2009 [CRCT+]) was a follow-up of the study sample included in Strathdee et al. (2006)[9] to determine the effect of a strengths-based case management intervention on retention in OST. Four studies by Kidorf and colleagues examined the effectiveness of a motivational referral intervention, with or without incentives. Kidorf et al. (2009; 2012 [RCT+]) examined the effectiveness of an intervention combining motivational enhancement and treatment readiness groups, with and without monetary incentives for attendance and treatment enrolment on enhancing drug treatment entry. New NSP registrants were assigned to one of three groups: (i) a motivational referral (MR) condition; (ii) a motivational referral with voucher incentives (MR+I) condition; (iii) or a standard referral (STR) condition. Participants were followed up at 4 (Kidorf et al., 2009 [RCT+]) and 12 months (Kidorf et al., 2012 [RCT+]). Participants assigned to the two MR conditions were encouraged participate in up to 12 additional weekly treatment reengagement group sessions if they left treatment early; MR+I participants were provided with incentives to participate in these sessions. The outcomes of these sessions on treatment reengagement were explored in Kidorf et al. (2011a [CO+]).

5.4.2 Study findings

Supply of additional harm reduction equipment

Gillies et al. (2010 [SR++]) found that in most published studies that had examined the association between uptake and sharing of injecting paraphernalia, attendance at NSPs was used as a proxy measure for uptake of injection equipment such as drug cookers, filters and water. Effect size estimates reported in the included studies suggested that there was an association between exposure to NSPs and reductions in the odds of sharing injecting paraphernalia. However the authors noted that confidence intervals were wide and often included unity.

Allen et al. (2012 [CS+]) found that a shortfall in injecting paraphernalia (specifically filters[10], spoons[11] or sterile water[12]) was associated with increased odds of sharing each of these items. Compared to participants who had not obtained that item of paraphernalia, participants had significantly reduced odds of sharing if, in an average week, they had collected more than 30 filters (adjusted odds ratio [AOR] 0.50, 95% CI 0.32–0.79); they reported uptake of at least one spoon (AOR 0.61, 95% CI 0.45–0.82); or they had obtained sterile water (AOR 0.36, 95% CI 0.22–0.61). Compared to participants with no shortfall, the following factors were associated with significantly increased odds of sharing that item in an

[9] This study was included in the previous review of effectiveness and cost-effectiveness.
[10] Used to filter out solid debris from drugs prior to injection.
[11] Used for mixing drugs (e.g. with water or citric acid) to prepare them for injection.
[12] Used to dissolve certain drugs and for cleansing injection sites.

average week: shortfall of more than 10 filters (AOR 1.55, 95% CI 1.12–2.14); a shortfall of spoons (shortfall of 1–10 spoons = AOR 1.37, 95% CI 1.02–1.83; shortfall >10 spoons = AOR 1.85, 95% CI 1.31–2.60); and a shortfall of sterile water ampoules (AOR 5.84, 95% CI 2.32–14.71). Aspinall et al (2012 [CS+]) noted that the majority of participants who reported that they did not collect paraphernalia were not aware that such items were available. In addition, the authors suggest that other factors, such as the perceived risks of sharing, may also be important alongside availability in determining whether sharing of equipment takes place.

Following the introduction of the 'Safer Crack Use Initiative'[13], Leonard et al. (2008 [RCS-]) found that there were significant reductions in the proportion of participants who reported injecting in the last month across the period of evaluation (96% pre-implementation vs. 78% 12-months post-evaluation, p<0.001). However, as the study was based on cross-sectional samples at each time point it was not possible to attribute these changes to the intervention. At the 6- and 12-month evaluations, 56% of participants at each time point indicated that their level of engagement in injecting drugs had not changed since the introduction of the initiative. Among participants whose level of injecting had reduced (41% and 40%, respectively at 6- and 12-month evaluations), the main reasons given for this decline were stated intentions to decrease overall engagement in injecting drugs and a preference for smoking over injecting as the route of administration. Access to safer smoking supplies was the third ranked reason for injecting less.

Safe disposal of used needles and syringes

The pilot study by Riley et al. (1998 [CBA+]) did not find a significant change in discarded needles in drop box areas compared with control areas (overall rate ratio: 0.83, 95% CI 0.27-2.60). However, overall a low number of needles were sighted before and after placement of the drop boxes. The study by de Montigny et al. (2010 [TS+]) found that the presence of an outdoor drop box was associated with fewer discarded needles for all four buffer sizes examined (25m, 50m, 100m and 200m). When other variables were held constant, the presence of a drop box was associated with the following reduction of discards: 98% within 25m; 92% within 50m; 73% within 100m; and 71% within 200m. The authors noted that evidence of persistent reduction in discards over the full study period suggested that the installation of drop boxes had lasting impacts.

Information and advice on safer injection practices

Gagnon et al. (2010 [RCT+]) found a significant difference in the proportion of 'dirty' syringes used by participants between the intervention and the control groups at short-term (intervention 8.5% vs. control 19.5%; RR 0.44, 95% CI 0.26-0.72, p=0.001) but not at long-term (intervention 12.7% vs. control 20.2%; RR 0.63, 95% CI 0.30-1.33) follow-up. The

[13] The distribution of safer crack kits containing a glass stem, brass screens, rubber mouthpiece, chopstick, alcohol swabs, condoms, lubricant, lip balm, gum, hand wipes and material emphasising non-sharing behaviour and safe disposal.

adoption of 'safe behaviour' was found to be significantly greater in the intervention group over the short-term (intervention 53.5% vs. control 69.3%; RR 1.29, 95% CI 1.06-1.59), but again there was no difference at the long-term follow-up (intervention 59.4% vs. control 62.6%; RR 1.05, 95% CI 0.83-1.33).

Referral to additional support services

Islam et al. (2012a [CO+]) found that co-location of a nurse-led service with an NSP resulted in a relatively high number of PWID receiving HCV testing (73.7%) and a good level of uptake of referrals to a liver clinic (70.8% of referred clients attended an appointment). Evaluation of the PAT-LINK project (Rudolph et al., 2010b [CBA-]) was limited by the small number of PWID who were involved (n=29). Consequently the authors were unable to detect any impacts of the intervention.

Hu et al. (2008 [CEA/CUA]) found the four vaccination strategies were all more effective and less costly (i.e. dominant) than the no-vaccination strategy. Varying assumptions related to the disease progression factors did not change the cost saving result, but all four strategies were more costly than no vaccination, when: (i) the rate of susceptibility to HBV infection was greater than 17%; (ii) the annual incidence rate for HBV was lower than 2.5%; (iii) the injecting cessation rate among PWID was greater than 29%; and (iv) access to medical care among PWID fell below 46%.

Referral to drug treatment

In the original study by Strathdee et al. (2006)[14], participation rates were higher among intervention participants compared to controls; but after adjusting for farther travel, access to a car and clustering by NSP site, the odds of intervention participants entering treatment where not significantly higher than among the control group. At 18 months follow-up of this study sample, Havens et al. (2009 [RCT+]) found that there were no differences in treatment retention between those randomized to the strengths-based case management intervention group compared to those in the control group (unadjusted relative hazard 1.02, 95% CI 0.67–1.56). The authors note that it is likely that the intervention trialled in the study was unable to adequately address individual-level social and environment factors (e.g. unstable living conditions, having to travel for treatment) or systems-level factors that adversely impact on treatment retention.

At 4-months follow-up, Kidorf et al. (2009 [RCT+]) found that PWID who received monetary incentives for attending motivational enhancement sessions and treatment readiness group sessions (i.e. MR+I participants) were more likely to enrol in any type of drug treatment and more likely to enrol in methadone maintenance treatment (MMT) than participants assigned to the other two conditions (motivational referral without incentives [MR] and standard referral [STR]). At 12-months follow-up (Kidorf et al., 2012 [RCT+]), although there were no between-condition differences in enrolment, MR+I participants were more likely to have

[14] This study was included in the previous of effectiveness and cost-effectiveness.

enrolled in MMT. MR+I participants also averaged more days in treatment in each month of follow-up compared to participants in the MR and STR conditions, and reported fewer days of heroin and injection drug use. Kidorf et al. (2011a [CO+]) found that MR+I participants were more likely to attend at least one reengagement session than MR participants and overall they attended a higher mean number of sessions. MR+I participants were also more likely to reenrol in any type of drug treatment and in MMT compared to MR and STR participants.

5.4.3 Findings from the previous evidence review

Few studies were identified for inclusion in the previous review that directly examined the effectiveness of additional harm reduction services offered by NSPs. However, it was apparent from the literature reviewed that few NSP services examined in research studies only distributed needles and syringes; in fact the majority reported linkages to, or directly provided a range of additional services, including outreach, distribution of harm reduction materials, and counselling and testing.

5.4.4 Summary and evidence statements

Supply of additional harm reduction equipment

The systematic review by Gillies et al. (2010 [SR++]) found that previous studies have been unable to directly examine the relationship between uptake of specific items of paraphernalia and paraphernalia sharing. Addressing this gap in a cross-sectional study, Allen et al. (2012 [CS+]) found that a shortfall in injecting paraphernalia (specifically filters, spoons or sterile water) was associated with increased odds of sharing each of these items, and that uptake of such injection paraphernalia from NSPs was associated with a reduction in sharing. The distribution of crack kits from NSPs (Leonard et al., 2008 [RCS-]) was associated with reductions in injecting drug use and appeared to facilitate transition to other routes of administration (in this particular study, crack smoking).

Evidence statement 3a: Uptake of injection paraphernalia and sharing of equipment

There is moderate evidence from 1 (+) cross-sectional study[1] about the association between the uptake of injection paraphernalia (specifically filters, spoons or sterile water) from NSPs and sharing of such equipment among PWID. This is evidence from this study to suggest that a shortfall in injecting paraphernalia among PWID is associated with increased odds of sharing (e.g. shortfall of more than 10 filters: AOR 1.55, 95% CI 1.12–2.14). In addition, evidence from this study suggests that uptake of injecting paraphernalia from NSPs is associated with reductions in sharing (e.g. uptake of at least one spoon: AOR 0.61, 95% CI 0.45–0.82). This evidence is directly applicable to the UK.

[1] Allen et al., 2012 (CS+)

Evidence statement 3b: Crack kit distribution

There is weak evidence from 1 (-) repeat cross-sectional study[1] to suggest that distribution of crack kits from NSPs may reduce the frequency of injecting drug use among PWID by facilitating the transition to other routes of administration (e.g. from injecting to smoking). This evidence is only of limited applicability to the UK as the setting in which the study was conducted included a high proportion of crack smoking among PWID.

[1] Leonard et al., 2008 (RCS-)

Safe disposal of used needles and syringes

Two studies examined the installation of drop boxes. A small pilot study (Riley et al., 1998 [CBA]) did not find a significant change in the number of discarded needles following installation of four boxes within a 10 block radius. However, a larger scale evaluation of 12 drop boxes installed across a 2.5km^2 neighbourhood area (de Montigny et al., 2010 [TS+]) showed that their installation was associated with significant reductions in discarded needles. de Montigy et al. (2009) suggested that PWID in their study changed their disposal behaviour in response to increased options for safe disposal.

Evidence statement 3c: Drop box presence

There is moderate evidence from 1 (+) study[1] based on a time series approach and 1 (+) controlled before and after study[2] about the association between the installation of drop boxes and changes in the quantity of discarded needles. One study[2] of four drop boxes did not find a change in the number of discards but a second study[1] found that the presence of an outdoor drop box was associated with reduction of discards within 25m (98%), 50m (92%), 100m (73%) and 200m (71%) buffer zones. This evidence is only partially applicable to the UK as both studies were conducted in cities in North America; in addition, one study[1] was conducted in a city where cocaine (associated with frequent daily injection) was the drug of choice among PWID.

[1] de Montigny et al., 2010 (TS+); [2] Riley et al., 1998 (CBA+)

Information and advice on safer injecting practices

A study of a theory-based computer-tailored intervention (Gagnon et al., 2010) showed that it had positive short-term effects on the adoption of safer injection practices, but that these effects were not sustained over the longer term.

Evidence statement 3d: Theory-based intervention and safer injecting practices

There is moderate evidence from 1 (+) RCT[1] to suggest that a theory-based computer-tailored intervention may increase the use of safer injecting practices by PWID. This study showed the intervention had positive short term effects; however these effects were not sustained over the longer term. This evidence may have direct applicability to the UK.

[1] Gagnon et al., 2010 (RCT+)

Referral to additional support services

The co-location of nurse-led services with an NSP was shown to facilitate access to HCV testing and referral for treatment among PWID (Islam et al., 2012a). However, evaluation of a project designed to link PWID into medical and social services via pharmacy-based NSP was limited by the small sample size of the study (Rudolph et al., 2010b). An economic evaluation study found that targeting PWID for various HBV vaccination strategies through NSPs was both more effective and less costly than a no vaccination strategy (Hu et al, 2008).

Evidence statement 3e: Nurse-led services

There is moderate evidence from 1 (+) cohort study[1] to suggest that the co-location of nurse-led services with an NSP may facilitate access to HCV testing and referral to treatment. A relatively high number of participants in the study received HCV testing (73.7%) and there was a good level of uptake of referrals (70.8%). This evidence is only partially applicable to the UK as the study was in the USA where access to healthcare is not universal.

[1] Islam et al., 2012a [CO+]

Evidence statement 3f: HBV vaccination

There is moderate evidence from 1 (CEA/CUA with minor limitations) economic evaluation study[1] to suggest that the provision of HBV vaccination through NSPs may more effective and less costly than the alternative of not providing vaccination. This evidence is only partially applicable to the UK as the study was in the USA as costs and benefits were based on studies conducted in North America.

[1] Hu et al., 2008 [CEA/CUA]

Referral to drug treatment

Long-term follow-up of a strengths-based case management intervention (Haven et al., 2009) showed that the intervention did not impact on retention in OST, with social and environmental factors negatively impacting on drug treatment outcomes among the study sample. A trial of a motivational referral intervention (Kidorf et al., 2009; 2012) showed that participants who received monetary incentives were more likely to enrol in MMT over the short- and long-term, and were more likely to reenrol in treatment.

Evidence statement 3g: Interventions to encourage drug treatment engagement

There is moderate evidence from 3 (all +) studies[1,2,3] to suggest that interventions delivered to NSP users may encourage enrolment and continued engagement in drug treatment programmes. However, evidence about the effect of different types of interventions is mixed. One study[1] showed that a strengths-based case management intervention did not impact on long-term retention in OST. Two studies[2,3] showed that a motivational referral and provision of monetary incentives (both for enrolment and reenrolment) was more effective than motivational referral alone and standard referral for enrolling NSP participants in MMT over the short- and long-term (intervention vs. standard care: AOR 2.54, 95% CI 1.36–4.75)[2].

Participants who received motivational referral and incentives averaged more days in treatment[2] and were more likely to reengage in treatment after discharge[3]. This evidence is only partially applicable to the UK as both studies were conducted in the USA were universal access to drug treatment is not provided.

[1] Havens et al., 2009 (RCT+); [2] Kidorf et al., 2009, 2012 (RCT+); [3] Kidorf et al., 2011a (CO+)

5.5 Are NSPs delivered in parallel with, or alongside, services that provide opiate substitution therapy (OST) more effective and cost-effective?

5.5.1 Overview of evidence identified

Three studies examined the concurrent delivery of NSP and drug treatment, including two UK studies (Turner et al., 2011; Allen et al., 2012) and one US study (Kidorf et al., 2011b).

Table 4. Research question 4: summary of studies

Study (design)	Population	Setting/Intervention	Outcomes
Allen, et al., 2012 (CS+)	UK; n=NR; survey of current and former PWID	Combined measure of intervention coverage (OST and N/S coverage) created with high, medium and low categories.	Reduced odds of recent HCV among those with ≥200% N/S coverage. No significant difference in risk of recent infection in individuals with high coverage compared to those with low or those currently on MMT compared to those not currently on MMT (in last 6 months).
Kidorf, et al., 2011b (CO+)	USA; n=281 (same sample as Kidorf et al., 2009; 2012)	New NSP enrollees concurrently receiving drug treatment compared to those not.	Treatment enrolled participants reported fewer days of opioid and cocaine use and injection drug use than no treatment participants. No difference in equipment sharing or emergency room visits.
Turner, et al., 2011 (MA+)	UK; n= 2,986 PWID	Levels of harm reduction defined according to NSP coverage and OST status.	Lower odds of needle sharing in last month and lower mean number of injections among those with full harm reduction. Risk of new HCV infection was lower among those on full harm reduction compared to minimal harm reduction

MA = meta-analysis. NR = not reported. CS = cross-sectional study. CO = cohort study. OST = opiate substitution therapy. MMT = methadone maintenance treatment. N/S = needles and syringes.

Quality assessment

All three studies (Allen et al., 2012; Kidorf et al., 2011b; Turner et al., 2011) were awarded a '+' rating for quality and fulfilled the majority of the criteria on their respective checklists (see Appendix 7).

Study objectives

Turner et al. (2011 [MA+]) pooled individual-level data from UK studies published since 2000 to investigate whether OST and NSP could reduce hepatitis C transmission among PWID. Levels of harm reduction were defined according to NSP coverage and OST status as follows: 'Full harm reduction' = Individuals receiving OST and needles per injection ≥100%; or receiving OST and no injections in the last month or last year; 'Partial harm reduction' = Individuals receiving OST and needles per injection <100%; or not receiving OST and needles per injection ≥100%; and 'Minimal harm reduction' = Individuals not receiving OST.

Allen et al. (2012 [CS+]) investigated individual-level association between self-reported uptake of harm reduction intervention among Scottish PWID and hepatitis C virus incidence. A combined measure of intervention was created with high, medium and low categories defined as follows: Low = not currently on MMT (but in last six months) and <200% needle and syringe (NS) coverage; or no MMT in last six months and <200% NS coverage; Medium = currently on MMT and <200% NS coverage; or not currently on MMT (but in last six months) and ≥200% NS coverage; or no MMT in last six months and ≥200% NS coverage; and High = currently on MMT and ≥200% NS coverage; or currently on MMT and did not inject in last six months; or not currently on MMT (but in last six months) and not inject in last six months.

The study by Kidorf et al. (2011b [CO+]) drew on a study sample that had participated in a wider intervention trial of methods for encouraging NSP users to enrol in drug treatment (Kidorf et al., 2009). The authors were able to compare high-risk behaviours among new users of an NSP with respect to whether or not they concurrently entered drug treatment by using the whole trial sample regardless of intervention allocation in the original study.

5.5.2 Study findings

Injection risk behaviours

Using data from six studies (n=2,986 participants), Turner et al. (2011 [MA+]) defined three levels of harm reduction according to NSP coverage and OST status: full harm reduction, partial harm reduction and minimal harm reduction. Compared to individuals with minimal harm reduction, those receiving full harm reduction were significantly less likely to report needle sharing in last month (AOR 0.52, 95% CI 0.32–0.83) and reported a lower mean number of injections in the last month (mean difference [MD] -20.8, 95% CI -27.3 to -14.4, p<0.001).

Kidorf et al. (2011b [CO+]) found that treatment enrolled participants reported fewer days of opioid and cocaine use, and injection drug use in each month of follow-up. There was no difference in equipment sharing or emergency room visits. They also found that the number of days of treatment was significantly related to the extent of improvement across outcome measures. A series of Pearson (partial) correlations showed that days of treatment were negatively correlated with days of cocaine use (p<0.05), days of opioid use (p<0.001) and number of drug injections (p<0.001).

Blood borne viruses

Turner et al., (2011 [MA+]) found that the risk of new HCV infection was lower among those on full harm reduction compared to those on minimal harm reduction (AOR 0.21, 95% CI: 0.08–0.52). Individuals receiving OST had reduced odds of new HCV infection compared with those not receiving OST (AOR 0.41, 95% CI: 0.21–0.82) as did individuals with high NSP coverage compared to those with <100% NS coverage (AOR 0.48, 95% CI: 0.25–0.93).

Among Scottish PWID, Allen et al. (2012 [CS+]) found that relative to those with <200% NS coverage, individuals with ≥200% NS coverage had reduced odds of recent HCV infection (AOR 0.32, 95% CI 0.10-1.00). After adjustment, other findings were no longer statistically significant; there were no significant differences in risk of recent infection in individuals with high coverage compared to those with low coverage (AOR 0.48, 95% CI 0.16–1.48, p=0.203) or those currently on MMT compared to those not currently on MMT (in last 6 months) (AOR 0.29, 95% 0.07–1.19, p=0.086).

5.5.3 Previous evidence review

Two studies examined needle and syringe distribution delivered alongside OST, finding that the combination was likely to be associated with reduced injection risk behaviours and a lower incidence of HIV and HCV among PWID.

5.5.4 Summary and evidence statements

The study by Kidorf et al. (2011b [CO+]) provided further evidence that concurrent NSP use and entry into drug treatment is associated with greater reductions in drug use, including injection drug use, than use of NSPs alone. Based on pooled data from UK studies, Turner et al. (2010) found an independent effect of needle and syringe provision on incident HCV infection, and further evidence of this effect was provided in the Scottish study by Allen et al (2012). In both studies, individuals with high levels of needle and syringe coverage had reduced odds of new or recent hepatitis C virus infection. Turner et al. (2010 [MA+]) found that full harm reduction (OST and high needle and syringe coverage) was also associated with reduced odds of new HCV infection, but Allen et al. (2012 [CS+]) did not replicate this finding in adjusted analyses of the Scottish-wide data. The authors suggest that this may be related to reduced statistical power as their sample included fewer recent hepatitis C infections.

Evidence statement 4: Concurrent NSP use and engagement in drug treatment

There is moderate evidence from 1 (+) meta-analysis,[1] 1 (+) cross-sectional study[2] and 1 (+) cohort study[3] about the association between concurrent NSP use and engagement in drug treatment, and incidence of hepatitis C and frequency of injecting. Some of the evidence for this association was mixed. Two UK studies[1,2] identified an independent effect of NSPs; individuals with high levels of needle and syringe coverage had reduced odds of new or recent hepatitis C virus infection. One study[1] also found that that full harm reduction (OST and high needle and syringe coverage) was associated with reduced odds of new HCV infection. However, this finding was not replicated in the second UK study[2]. One US study[3] found that concurrent NSP use and entry into drug treatment was associated with greater reductions in injection drug use than use of NSPs alone. This evidence is directly applicable to the UK.

[1] Turner et al., 2010 (MA+); [2] Allen et al., 2012 (CS+) ; [3] Kidorf et al., 2011b (CO+)

6 Review of qualitative evidence

6.1 Overview of evidence identified

6.1.1 Characteristics of the included studies

Thirteen studies (Table 5) were identified for inclusion in the review of qualitative evidence. None of the included studies addressed review question 1, regarding suitable types of NSP or coverage, or review question 4, regarding NSP delivered in parallel to OST services. Eight studies (Lutnick et al., 2012; Mackridge & Scott, 2009; Mackridge et al., 2010; Treloar et al., 2010; Vorobjov et al., 2009b; Doddings & Gaughwin, 1995; Philbin et al., 2009; Parker et al., 2012) identified key themes that were relevant to review question 2 on different types of NSPs and nine studies (MacNeil & Pauly, 2011; Parker et al., 2012; Mackridge et al., 2010; Lutnick et al., 2012; Dodding and Gaughwin, 1995; Parkin & Coomber, 2011; Miller, 2001; Smith et al., 1998; Springer et al., 1999) identified key themes relevant to review question 3 on additional harms reduction services.

Table 5. Summary of studies identified for the review of qualitative evidence

Study (rating)	Research question	Population	Key themes
Pharmacies			
Lutnick et al., 2012 (+)	Interactions with and perceptions of pharmacists, their receptiveness to pharmacy-based interventions, and perceived facilitators and barriers to service implementation.	USA; n=11 PWID; 27% had prior use of pharmacy services	Good and bad experiences of pharmacies; the potential for additional services
Mackridge & Scott, 2009 (+)	To explore experiences and attitudes with respect to drug users, and their treatment and to examine self-identified training needs and the desire for undertaking further training.	UK; n=454 respondents in registered community pharmacies	The relationship between experiences and attitudes; pharmacy involvement in services to drug users
Mackridge et al., 2010 (+)	To explore the feasibility and desirability for further developing community pharmacy services to meet the needs of PWID	UK; n=7 stakeholders; 8 pharmacists/ technicians; 20 drug users with experience as pharmacy users	Experiences and view in relation to existing services; potential new services; direct interventions; barriers to expansion of pharmacy services
Treloar et al., 2010 (+)	(1) What factors influence the choice of pharmacy for injecting equipment?: and (2) What are the policy and programme implications for the pharmacy NSPs?	Australia; n=15 PWID aged over 18 years; user of pharmacies to access injecting equipment.	Convenience and choice; Anonymity, surveillance, stigma.

Study (rating)	Research question	Population	Key themes
Vorobjov et al., 2009b (+)	To explore attitudes of pharmacists and PWID towards the role of pharmacists in HIV prevention services for PWID.	Estonia; n=19 pharmacists; 15 PWID	Convenience and accessibility; negative experiences of pharmacies; negative experiences of PWID
Needle and syringe vending machines			
Doddings & Gaughwin, 1995* (+)	To examine the feasibility of and issues surround the introduction of needle and syringe vending machines.	Australia; n=24 PWID and drug workers	General perceptions about vending machines; will vending machine encourage injecting
Philbin et al., 2009 (+)	To explore the acceptability and feasibility of interventions to reduce drug-related harm in Tijuana, Mexico	Mexico; n=40 stakeholders (20 'interactor' level and 20 systems level)	Syringe vending machines
Specialist NSPs			
MacNeil & Pauly, 2011 (+)	To explore the meaning of NSPs from the perspectives of those who access such services.	Canada; n=33 PWID and NSP users	Development of trust and linkages to other services
Parker et al., 2012 (++)	To explore how social relationships influence the safer and unsafe practices of PWID	Canada; n=115 PWID	Challenges to accessing sterile equipment; where service is available; other benefits of harm reduction services;
Drop boxes			
Miller, 2001* (+)	To explore users' perspectives on needle disposal and what factors are responsible for discarding of these needles	Australia; n=60 heroin users	Discarded needles as a major concern; laws surrounding injecting paraphernalia acting as a disincentive to appropriate needle disposal
Parkin & Coomber, 2011 (++)	To study the views and experiences of PWID regarding drug-related litter bin provision.	UK; n=51 PWID with recent experience of public injecting	Positive views but negative experiences; place matters in street-based service provision
Smith et al., 1998** (+)	To assess the acceptability of community-based needle and syringe disposal boxes.	USA; n=6 community residents; 24 PWID; 15 police officers; 4 pharmacists	*Community residents*: presence of drop boxes condones drug use; drop boxes convey negative messages about the community *Police officers*: concerns about attracting drug users to the area; general opposition to drop boxes *PWID*: general support for drop boxes; fear of the police and identification as a drug user.
Springer et al., 1999* (+)	To explore the PWID and non PWID community members perceptions of three syringe disposal interventions: (i) a syringe collection program; (ii) a one-way drop box; and (iii) an NSP.	USA; n=32 community members; 26 PWID	Convenient and discrete method for disposing of syringes (community members); concerns about increasing the availability of needles (both groups); fear of being arrested or identification as a drug user (PWID).

CS = cross-sectional study. CO = cohort study. NSP = needle and syringe programme. OST = opiate substitution therapy. N/S = needles and/or syringes. UBA = uncontrolled before and after study. NSVM = needle and syringe vending machine. *Included in previous review of qualitative evidence. **Excluded from previous review of qualitative evidence.

Three studies (Mackridge & Scott, 2009; Mackridge et al., 2010; Parkin & Coomber, 2011) were conducted in the UK, three in Australia (Treloar et al., 2010; Doddings & Gaughwin, 1995; Miller, 2001), three in the USA (Lutnick et al., 2012; Smith et al., 1998; Springer et al., 1999), two in Canada (Parker et al., 2012; MacNeil & Pauly, 2011), and one study each in Estonia (Vorobjov et al., 2009b) and Mexico (Philbin et al., 2009).

6.1.2 Quality assessment

Of the thirteen qualitative studies identified for inclusion, two (Parker et al., 2012; Parkin & Coomber, 2011) were awarded a '++' rating and the remaining 11 studies were awarded a '+'rating. The use of qualitative methodology as a whole or part of the research objectives was considered appropriate for all of the included studies; however, commonly across studies there was inadequate reporting of sampling strategies, data collection and methods of analysis. In addition, the theory underpinning the qualitative methods was not reported in the majority of studies. On the whole the data presented were considered rich, but while no studies were rated poor on this checklist item, the data presented in some studies was lacking context and illustrative quotes.

6.2 Views and perspectives on, and experiences of, different types of NSPs

6.2.1 Overview of evidence identified

Eight studies identified key themes that were relevant to review question 2. Five studies (Lutnick et al., 2012; Mackridge & Scott, 2009; Mackridge et al., 2010; Treloar et al., 2010; Vorobjov et al., 2009b) examined views and perspectives on, and experiences of, pharmacies as a setting for needle and syringe distribution and exchange. With the exception of the studies conducted in the UK, PWID participating in these studies were, at the time, required to purchase needles and syringes from pharmacies. In this respect UK pharmacy services were more embedded in the provision of harm reduction services to PWID in the community than in the other settings examined. Two studies (Doddings & Gaughwin, 1995 [+]; Philbin et al., 2009 [+]) explored views and perspectives on needle and syringe vending machines. At the time of data collection in Doddings and Gaughwin's study (1992-93), vending machines had not been widely introduced in Australia but their introduction had been recommended as a supplement to existing needle and syringe distribution programmes by an intergovernmental working party. Philbin et al. (2009 [+]) explored the acceptability and feasibility of a range of harm reduction interventions among key stakeholders in Tijuana, Mexico; a city on the Mexican-US border. Availability of harm reduction services in the city at the study was low. One further study (Parker et al., 2012 [++]) explored issues related to access to widely dispersed harm reduction services in urban and non-urban areas.

6.2.2 Findings

Pharmacies

Convenience and accessibility

Two studies (Treloar et al., 2010 [+]; Vorobjov et al., 2009b [+]) identified that convenience and accessibility were major reasons for accessing needles and syringes from pharmacies. Other reasons were given for accessing pharmacies in the study by Treloar et al. (2010 [+]) including the wider variety of equipment available in pharmacies compared to specialist NSPs in that setting (e.g. larger barrel syringes for injecting methadone).

Good and bad experiences of pharmacies

Five studies explored PWID prior experiences of pharmacies, with three of the five studies (Lutnick et al., 2012 [+]; Mackridge et al., 2010 [+]; Treloar et al., 2010 [+]) finding that participants reported both positive and negative experiences. Participants in the study conducted in Tallinn, Estonia (Vorobjov et al., 2009b [+]) reported only negative experiences. In relation to positive experiences, participants reported experiencing good attitudes from pharmacy staff (Treloar et al., 2010 [+]) and the perception that they were treated like any other customer (Lutnick et al., 2012 [+]). In a UK study (Mackridge et al., 2010 [+]), independent pharmacies were noted as being particularly associated with positive experiences as participants felt able to develop a rapport with pharmacy staff.

> *[M]ost of [the pharmacy staff] are pretty good, yeah. You do get the odd one or two, you know, that will turn their nose up at you but the majority of them just serve you as another customer that's just buying run-of-the-mill whatever. Do you know what I mean, which is the way it should be, I think.* (Treloar et al., 2010 [+])

However other PWID who had accessed needles and syringes via pharmacies reported being treated like "second-class citizens" (Treloar et al., 2010 [+]), having received poor treatment from counter staff (Mackridge et al., 2010 [+]), having been refused a purchase (Parker et al., 2012), and that they were perceived as "unpleasant and unwelcome customers" (Vorobjov et al., 2009b [+]).

> *Like I don't consider them like a, a resource that's something that would actually like really, really help me. You know… I kinda feel like they give me second looks. You know. Like there's a quick judgment or a quick something in their head that says, "Oh, this person's a drug addict." (Lutnick et al., 2012)*

A UK study (Mackridge & Scott, 2009 [+]) found that pharmacy support staff also reported both positive and negative experiences in relation to delivering harm reduction services. Vorobjov et al. (2009b [+]) again found that in general, pharmacists had overwhelmingly negative experiences with PWID accessing pharmacies. Although conducted in very different setting, the two studies that explored pharmacy staff experiences (Mackridge &

Scott, 2009 [+]; Vorobjov et al., 2009b [+]) identified instances of stealing, and examples of PWID acting aggressively or inappropriately towards staff.

> *We have also had them peeing and soiling themselves and jacking themselves up within the shop.* (Mackridge & Scott, 2009 [+])

Developing mutual respect

Mackridge and Scott (2009) highlighted the need for "mutual respect" in encounters between PWID and pharmacy support staff, a theme also borne out in the study by Treloar et al. (2010 [+]).

> *Most [pharmacy staff] you find you get what you give. Like if you walk in discreetly and don't want to push in front of people who've paid for prescriptions and so on and so forth, then they'll be OK.* (Treloar et al., 2010 [+])

Mackridge and Scott (2009) reported that it was important that such mutual respect is developed through training and education for both PWID and pharmacy staff; noting that working with PWID had improved the attitudes of pharmacy support staff.

> *Working in a pharmacy that dispenses, supervises and exchanges needles I have become much more empathetic with drug users and am pleased to make things safer for them and the community.* (Mackridge & Scott, 2009 [+])

Needle and syringe vending machines

Two studies (Dodding & Gaughwin, 1995 [+]; Philbin et al., 2009 [+]) examined perceptions about needle and syringe vending machines (NSVM) in settings with very different background levels of harm reduction services available. Dodding and Gaughwin (1995 [+]) conducted focus groups with PWID and workers in the drug use field. Participants in Philbin et al. (2009 [+]) were stakeholders involved with drug use, health policy and programme implementation.

General acceptance of benefits

Dodding and Gaughwin (1995 [+]) found general support for the idea of introducing NSVMs among PWID and drugs workers, with the main benefits perceived to be an increase in the temporal availability of injecting equipment and greater anonymity for PWID. Stakeholder who participated in the study by Philbin et al. (2009 [+]) also noted their convenience and anonymity as benefits.

> *From the point of view of individual health and public health; I think that it would be great. If you're going to inject, let's do it this way, right. In the end, it is going to reverberate in all parts of society.* (Philbin et al., 2009 [+])

> *I think it would be very practical because the drug user wouldn't have a problem with being identified as such so they can go at whichever moment is convenient for them.* (Philbin et al., 2009 [+])

Potential danger to public health and safety

Participants in both studies (Dodding & Gaughwin, 1995 [+]; Philbin et al., 2009 [+]) identified that the ease of access of NSVMs could present a danger to public health and safety; particularly children. Philbin et al. (2009 [+]) reported that many stakeholders in their study were disapproving of their implementation because of the possibility of non-injectors utilising them. Counter to this, there was a consensus among participants in the study by Dodding and Gaughwin (1995 [+]) that making needles and syringes more accessible via vending machines would not encourage people to start injecting drugs, noting the important role of social context in the initiation of injecting drug use.

> *…the thing about injecting is that it's always someone who introduces you. They're the ones who have gone face to face and got the first one [syringe].* (Dodding & Gaughwin, 1995 [+])

6.2.3 Summary and evidence statements

Eight studies identified key themes that were relevant to views and perspectives on, and experiences of, different types of NSPs.

Evidence statement 5: Pharmacies

Five studies[1-5] (all +) examined views and perspectives on, and experiences of, pharmacies as a setting for needle and syringe distribution and exchange. Two studies[1,2] identified convenience and accessibility as the main reasons for PWID accessing needle and syringes from pharmacies. Three studies[1,3,4] identified that PWID had encountered both positive and negative experiences in pharmacies. A theme relating to the need for mutual respect among PWID and pharmacy staff was identified in two studies[1,5] This evidence is directly applicable to a UK context.

[1] Trealoar et al., 2010 [+]; [2] Vorobjov et al., 2009b [+]; [3] Lutnick et al., 2012 [+] ; [4] Mackridge et al., 2010; [5] Mackridge & Scott, 2009 [+]

Evidence statement 6: Needle and syringe vending machines

Two studies[1,2] (both +) explored views and perspectives on vending machines. While participants in both studies reported a general acceptance of the benefits of NSVMs, the potential ease of access of needles and syringe via vending machines was raised as a major potential public health and safety issue. However, in one study[1] there was a consensus among participants (who were PWID and drugs workers) that making needles and syringes more accessible via vending machines would not encourage people to start injecting drugs. This evidence is likely to be directly applicable to the UK.

[1] Dodding & Gaughwin, 1995 [+]; [2] Philbin et al., 2009 [+]

6.3 Views and perspectives on, and experiences of, additional harm reduction services offered by NSPs

6.3.1 Overview of evidence identified

Nine studies identified key themes that were relevant to review question 3. Four studies explored the role of services in providing links to other services required by PWID; two of which were in relation to a range of NSPs (MacNeil & Pauly, 2011 [+]; Parker et al., 2012 [++]) and two of which were related to pharmacy settings (Mackridge et al., 2010 [+]; Lutnick et al., 2012[+]). Dodding and Gaughwin (1995 [+]) examined views in relation to whether vending machines should additionally provide information to users. Four studies (Miller, 2001; Parkin & Coomber, 2011 [++]; Smith et al., 1998 [+]; Springer et al., 1999 [+]) examined views and experiences of PWID and community members on needle and syringe drop boxes. With the exception of the study by Springer et al. (1999), studies were conducted in cities in which drop boxes had been, or were going to be, installed.

6.3.2 Findings

Specialist NSPs

Relationships facilitate engagement in additional services

Two studies (Parker et al., 2012 [++]; MacNeil & Pauly, 2011 [+]) that explored harm reduction services in urban and non-urban areas across large geographical settings in Canada identified that trusting relationships that developed between PWID and staff in specialist NSPs facilitated engagement in, and access to, additional harm reduction services and other services. A non-judgemental attitude towards PWID and drug use appeared to play an important role in building such relationships.

> *…if you go into a drug store or in the hospital, I generally don't get a very good response from a person. But when you go into these places here, the [methadone clinic or NSP], you are treated like a person.* (Parker et al., 2012 [++])

> *People here are great. My spouse is HIV positive and has hepatitis C so have a lot of questions. Had a lot of questions which I have had answered. They've given me multiple times to come back and talk to them.* (MacNeil & Pauly, 2011 [+])

MacNeil and Pauly (2011 [+]) reported that mobile only services did not facilitate the development of such trusting relationships and as a consequence they were unable to provide the same opportunities as fixed site services for accessing referrals.

Pharmacies

The potential for additional services

Pharmacy providers who participated in the study by Mackridge at al. (2010 [+]) expressed a desire to have a more formal role in referral and saw the provision of advice and referral as a

'promising area for service expansion'. PWID who participated in this study expressed a desire for more access to the pharmacist with regards to assessment, and appropriate referral and treatment. Stakeholders in Mackridge et al. (2010 [+]) identified direct intervention services such as hepatitis testing and immunisation schemes as further areas for expansion of services and it was felt that pharmacists may be able to engage with PWID more easily than other services. Expansion of services to include testing and vaccination was well-received among PWID participating in Lutnick et al. (2012 [+]) due to its potential convenience.

> *…and you can go in and say, "I need to take me a HIV test," you can go and they can do like a quick swab and stuff, and then you, you can get the results right there on the spot, right – that'd be cool.* (Lutnick et al., 2012 [+])

Lutnick et al. (2012 [+]) identified that needle and syringe disposal via pharmacies was an intervention that received the most support from the participants in their study. Discretion was reported to be key to the delivery of such as a service, with participants suggesting the provision of disposal boxes on an outside wall of the pharmacy or that disposal was carried out in a separate, private room.

Barriers to service expansion

Both Mackridge et al. (2010 [+]) and Lutnick et al. (2012 [+]) highlighted the need for negative attitudes exhibited by some pharmacy staff to be tackled if services within pharmacies were to expand; PWID participating in Lutnick et al. (2012 [+]) who had negative experiences of pharmacies were of the view they would not be interested in receiving services from people they felt were going to judge them. Lack of privacy was also raised as an important issue by participants in both studies (Mackridge et al., 2010 [+]; Lutnick et al., 2012 [+]).

> *I'd like a person to be – have compassion. You know? Or some type of understanding and quit forming an opinion of a person just because they doing this or that.* (Lutnick et al., 2012 [+])

Vending machines

While, PWID and drug workers who participated in the study by Doddings and Gaughwin (1995 [+]) did not perceive the minimal ability of NSVMs to disseminate information and advice to be a major concern, they did feel that it was still important. Participants suggested that a referral number for access to information, advice or counselling should be provided with each pack. It was also suggested that more detailed information could be made available alongside machines.

Drug-related litter bins

Two studies (Miller, 2001 [+]; Smith et al., 1998 [+]) found that the issue of discarded needles and syringes was a major concern for both community members and PWID. Despite

participants in all groups in Smith et al. (1998 [+]) perceiving that drop boxes would be under used, PWID who participated in Smith et al. (1998 [+]) and Miller (2001[+]) expressed concerns about discarded needles and syringes. This runs counter to suggestions by police officers in Smith et al. (1998 [+]) that PWID did not care enough about the community to dispose of needles and syringes safely when safe disposal options are available.

> *…as far as clean goes, you know. Disposing of fits [needles and syringes] just comes with being a tidy user. Respect and that. A needle is the most hideous thing to look at, you know. When you're walking down the street, it's a bloody ugly thing. You don't think that that's had heroin through it or speed. It's just a dirty thing altogether.* (Miller, 2001 [+])

> *"I don't like it [discarded needles and syringes]. I've done it but I don't like it".* (Smith et al., 1998 [+])

Two studies (Smith et al., 1998 [+]; Springer et al., 1999 [+]) that explored the views of community members identified mixed views towards drop boxes. Community members who participated in Smith et al. (1998 [+]) had concerns that the installation of drop boxes in their community would be sign that the community 'condoned' drug use and that they would convey a negative message about the community (*"This first thing they'll say is, 'Oh this is a drug area. Let's get out of here'... That's going to be the message"*). Police officers who participated in this study were also generally in opposition to the installation of drop boxes. In contrast, while community members in Springer et al. (1999 [+]) had concerns about children accessing the contents of drop boxes; they believed that they would be a convenient and discrete method for disposing of needles and syringes. Smith et al. (1998 [+]) found that focus groups with community members conducted following the installation of drop boxes suggested that many of their fears and concerns may be unfounded.

In three studies (Parkin & Coomber, 2011 [++]; Smith et al., 1998 [+]; Springer et al., 1999 [+]), PWID, in general, expressed support for drop boxes as a method of safe disposal. For example, PWID in Parkin and Coomber (2011 [++]) generally viewed drug-related litter bins as providing increased opportunities for disposal of needle and syringes. However, these studies also identified that PWID encountered barriers to the use of drop boxes. Parkin and Coomber (2011 [++]) identified that place mattered in the positioning of drop boxes as in one of the settings examined in this study they were not placed in areas that were 'environmentally or geographically relevant' to PWID (*"I've never seen 'em. I know they supposed to be up in [residential area], but I've never seen em. Seriously, I've never seen one"*). The fear that using drop boxes would lead to their identification as a drug user was expressed by PWID in two studies (Smith et al., 1998 [+]; Springer et al., 1999 [+]) Fear and experiences of being arrested for possession of injection paraphernalia were a barrier to the use of drop boxes identified in all four studies (Miller, 2000 [+]; Parkin & Coomber, 2011 [++]; Smith et al., 1998; Springer et al., 1999 [+]).

> *Well one thing is, I don't want to carry them because you can get busted for dirty ones. I don't want to carry dirty ones, that's why I get rid of them.* (Smith et al., 1998)

> *I think a lot of people would use it [drop box], if you wouldn't be harassed by the authorities. That's what you really looking at. That authorities pulling up, "Hey, I got you." They know they can stop you, and if you come and dispose of them, they got a case there. You got narcotics in the syringe. You know You gonna have residue in there. . . . "Well he gonna come to the machine, so we just gonna wait and as soon as he get ready to deposit-OH!, We got you. You got a syringe that got residual in it.* (Springer et al., 1999 [+])

In the second of the settings examined in Parkin and Coomber (2011 [+]), participants' experience of using drug-related litter bins and police intervention and/or arrest was characterised in the following quote:

> *(describing police interruption whilst in cubicle)… because it was the first time (I'd used in those toilets), I did feel like (the drug related litter bins) were put there purposely to catch me… Well, it did put me off for a long time... This I why I ended up (injecting) behind bushes and things… where people couldn't see me.* (Parkin & Coomber, 2011 [+])

6.3.3 Summary and evidence statements

Nine studies identified key themes that were relevant to views and perspectives on, and experiences of, additional harm reduction services offered by NSPs.

Evidence statement 7: Additional harm reduction services

Five studies[1-5] (all +) reported views and perspectives on, and experiences of, additional harm reduction services offered by specialist NSPs and pharmacies. Two studies[1,2] identified that trusting relationships between PWID and NSP staff were felt to be key to facilitating engagement in additional harm reduction services in specialist NSP settings. Two studies[3,4] explored the potential for additional harm reduction services to be delivered via pharmacies. Expansion of services was desired by both PWID and pharmacy staff. However, barriers identified to expansion including the need to tackle negative attitudes towards PWID exhibited by some pharmacy staff, and the need to identify private spaces for the delivery of such services. One study[5] acknowledged that opportunities for disseminating information to users of NSVMs were limited but participants in this study did not feel that this was a major concern. This evidence is directly applicable to the UK.

[1] Parker et al., 2012 [++]; [2] MacNeil & Pauly, 2011 [+]; [3] Mackridge at al., 2010 [+]; [4] Lutnick et al., 2012 [+]; [5] Dodding & Gaughwin, 1995 [+]

Evidence statement 8: Drop boxes and drug-related litter bins

Four studies[1-4] (1++; 3+) explored views and perspectives on, and experiences of drop boxes and drug-related litter bins. Two studies[1,3] identified that discarded needles were a concern for both community members and PWID. Two studies[3,4] that explored the views of community members identified mixed responses to drop boxes; with one study[3] finding that many fears and concerns within the community may be unfounded. Three studies[2-4] identified general support for drop boxes among PWID. However, significant barriers to their use were identified in all four studies[1-4]. One UK study[2] identified that the correct environmental and geographical positioning of drop boxes was crucial. In all four studies[1-4], participants expressed that the fear of being arrested for possession of injection paraphernalia was a barrier to the use of drop boxes. In one UK study[2], experience of arrest following the use of a drop box led to the adoption of unsafe injection practices. The evidence is likely to be applicable to the UK.

[1] Miller, 2001 [+]; [2] Parkin & Coomber, 2011 [++]; [3] Smith et al., 1998 [+]; [4] Springer et al., 1999 [+]

7 Discussion

This review was undertaken to examine new evidence on the optimal provision of NSPs. Overall, 53 studies were identified for inclusion in the review of which, 40 studies addressed research questions of relevance to the review of effectiveness and cost-effectiveness and 13 studies addressed research questions relevant to the review of qualitative evidence.

7.1 Summary of the findings of the review of effectiveness

Forty studies were identified for inclusion in the review of effectiveness and cost-effectiveness. Of these, seven studies examined issues related to injection equipment coverage and spatial access, 17 studies examined different types of NSPs, 13 studies examined additional harm reduction services delivered by NSPs, and three studies examined NSPs delivered alongside opiate substitution therapy (OST).

7.1.1 Optimal coverage

The studies identified for inclusion in the review of effectiveness provided interesting findings in relation to the optimal provision of NSPs. While studies confirmed that increasing spatial access to NSPs reduces sharing (Cooper et al., 2011; 2012a; 2012b [CS+]), in a high coverage setting, proximity to NSPs was associated with high-risk injection behaviour (Bruneau et al., 2008 [CS+]). This suggests that in high coverage settings other neighbourhood environmental factors (such as social disorder) may continue to influence injection risk behaviours through various pathways. Optimal coverage, which eliminated the relationship between needle and syringe availability and injection risk behaviour, was suggested to have been achieved at 60% coverage among PWID based on findings of a study in a high coverage setting (Bryant et al., 2012 [CS+]). The authors suggested this finding in the context that needle and syringe coverage most likely reaches a threshold after which increasing coverage will have no further effect on injection risk behaviours, but that other factors (such as gender and the need for frequent injection) may continue to do so (Bryant et al., 2012 [CS+]). Changes in self-reported injecting risk behaviours are not always a good predictor of changes in HCV incidence (Vickerman et al., 2007), but a pooled analysis of UK data showed that high NSP coverage, and in particular its combination with OST, reduced incident HCV among PWID (Turner et al., 2011 [MA+]). In relation to optimal coverage, modelling of the relationship between OST and high coverage NSPs provides supporting evidence for a reduction in HCV prevalence; however, reductions may frequently be modest and require long-term sustained coverage (Vickerman et al., 2012). To maximise coverage of NSPs, studies provided evidence supportive of NSP policies being based on distribution and the need for PWID to exchange or purchase needles and syringes to be limited (Green et al., 2010 [CO+]; Kerr et al., 2010 [CO+]); it was notable that even in high coverage settings such as Australia there remained barriers to needle and syringe access associated with restrictive dispensation policies in pharmacies.

7.1.2 Types of NSPs

There is also a need for greater variety and temporal and geographical proximity in the provision of access to needles and syringes. PWID are not a homogenous group and populations may differ according to the social and demographic patterns of injecting drug use, by the characteristics of their drug use and according to the availability and reach of harm reduction programmes. There was fairly consistent evidence from the included studies that PWID tend to have a preference for particular types of NSPs when obtaining needles and syringes, and that this may be linked to different risk profiles of users (Bryant et al., 2010 [CS+]; Rudolph et al., 2010a [CS+]; Vorobjov et al., 2009a [CS+]). Studies showed that PWID who use pharmacies tend to have higher risk profiles than those who use fixed site services. High-risk PWID, for example, injectors of cocaine or crack, are less likely to be in contact with services or they may be reluctant to approach what they perceive to be heroin-orientated services (Hartnoll et al., 2010). Outreach schemes, mobile outlets and vending machines therefore have an important role to play in attracting such users and increasing temporal and geographical access to injection equipment (Islam et al., 2008b). The studies included in this review confirmed that these types of NSPs do attract higher risk populations of PWID (e.g. Hayashi et al., 2010 [CS+]; Deering et al., 2011 [CO++]; Islam et al., 2008a [CS+]). As research has identified that there is generally a narrow time window from initiating injecting to becoming infected with HCV (Grebely & Dore, 2011), it is important to highlight accumulating evidence that users of needle and syringe vending machines tend to be younger (Islam et al., 2008a [CS+]; McDonald, 2009 [CS-]; Moatti et al., 2001 [CS+]; Obadia et al., 1999 [CS+]) and have a shorter history of injection than users of other types of NSPs (Islam et al., 2008a [CS+]; Moatti et al., 2001 [CS+]).

7.1.3 Additional harm reduction

While NSPs typically offer other harm reduction interventions alongside the distribution of sterile needles and syringes, few studies have examined the effectiveness of these types of interventions. Only one study directly examined the relationship between uptake of injection paraphernalia and paraphernalia sharing; finding that uptake of injecting paraphernalia from NSPs was associated with reduced odds of sharing among PWID (Aspinall et al., 2012 [CS+]). A further study examined a theory-based intervention designed to increase safer injecting practices, finding that it had positive short-term effects on the adoption of safer injection practices, but that these effects were not sustained over the longer term (Gagnon et al., 2010 [RCT+]). In addition to reducing sharing of injection equipment, reducing injecting frequency, or increasing the transition to non-injecting routes of drug use, is important in reducing HCV transmission (Grebely & Dore, 2011). However, good evidence for whether the distribution of drug-taking equipment via NSPs promotes non-injecting modes of drug administration is lacking. One poor quality study found that the distribution of safer crack kits in a setting with a high proportion of crack smokers among PWID was associated with reductions in injecting drug use (Leonard et al., 2008 [RCS-]). A UK-based evaluation of the distribution of foil kits in a setting with a pre-existing culture of heroin inhalation (Pizzey &

Hunt, 2008[15]) suggested that the availability of such products via NSPs may be encourage reductions in injecting. Other intervention approaches that may impact on HCV transmission, include the distribution of low dead space syringes via NSPs (Bobashev & Zule, 2010). Direct estimates for the protective impacts of low dead space syringes on HIV or HCV incidence are not available. However, modelling studies (Zule et al., 2013; Vickerman et al., 2013) suggest that even partially transferring to low dead space syringe use could result in important decreases in HIV prevalence.

Linking PWID to other medical and social support services through referral is an important objective for many NSPs. However, few studies have examined the effectiveness or cost-effectiveness of interventions that aim to link PWID with other services. One study identified for this review found that the co-location of nurse-led services with an NSP facilitated access to HCV testing and referral for treatment among PWID (Islam et al., 2012a [CO+]) and an economic evaluation study (Hu et al., 2008 [CEA/CUA]) found that targeting PWID for various HBV vaccination strategies through NSPs was both more effective and less costly than a no vaccination strategy. Concerns about the unsafe disposal of injection equipment by PWID may community influence views on the acceptability of NSPs (Broadhead et al., 1999). Drop boxes are one type of syringe disposal intervention that have been trialled in cities in North America and the UK. While a small pilot study (Riley et al., 1998 [CBA+]) did not find a significant change in the number of discards, a larger scale evaluation of drop boxes (de Montigny et al., 2010 [TS+]) showed that their installation was associated with significant reductions in discards; suggesting that PWID had changed their disposal behaviour in response to the installation of a safe disposal option.

As evidenced by the outcomes of modelling analyses (7.1.1), the development of strategies to increase enrolment in drug treatment among PWID is required. Studies that reported on a trial of a motivational referral intervention showed that participants who received monetary incentives were more likely to enrol in MMT over the short- and long-term than participants assigned to the motivational referral only intervention or to standard care (Kidorf et al., 2009; 2012 [RCT+]). The study also demonstrated the importance of developing effective strategies for reengaging PWID in drug treatment, as this study and others have found low rates of treatment retention among PWID. Participants assigned to the motivational referral intervention and monetary incentives were, following discharge or drop out, more likely to reengage with the intervention and to reenrol in MMT (Kidorf et al., 2011a [CO+]).

7.2 Summary of the findings of the review of qualitative evidence

Thirteen studies were identified for inclusion in the review of qualitative evidence. None of the included studies addressed review question 1, regarding suitable types of NSP or coverage, or review question 4, regarding NSP delivered in parallel to OST services. Eight studies identified key themes that were relevant to review question 2 on different types of

[15] This study was excluded from the update review on the basis of study design.

NSPs and nine studies identified key themes relevant to review question 3 on additional harms reduction services.

7.2.1 Different types of NSPs

In England, community pharmacies account for around four in five NSPs (Abdulrahim et al., 2007). Convenience and accessibility were identified as the main reasons for PWID accessing needle and syringes via pharmacies in the studies included in this review (Trealoar et al., 2010 [+]; Vorobjov et al., 2009b [+]). However, PWID participating in studies conducted in a range of settings reported both positive and negative experiences of using pharmacy-based NSPs (Lutnick et al., 2012 [+]; Mackridge et al., 2010 [+]; Treloar et al., 2010 [+]). Pharmacy staff also had positive and negative experiences in delivering harm reduction services to PWID (Mackridge & Scott, 2009 [+]). In relation to this, the need for mutual respect among PWID and pharmacy staff, and the promotion of this through training and education, was identified (Mackridge & Scott, 2009 [+]; Treloar et al., 2010 [+]).

Needle and syringe vending machines have been introduced in several European countries, Australia and New Zealand in an attempt to provide an anonymous and private service and increased temporal access to sterile injection equipment (Islam et al., 2008a). A general acceptance of the benefits of NSVMs was reported in two studies (Dodding & Gaughwin, 1995 [+]; Philbin et al., 2009 [+]). However, the potential ease of access to needle and syringes provided by vending machines was also raised as a major potential health and safety issue. In one study (Dodding & Gaughwin, 1995 [+]), a consensus was reached among participants that increasing the accessibility of needle and syringes via vending machines would not encourage people to start injecting drugs; in part due to the important role that social context plays in the initiation of injecting drug use.

7.2.2 Additional harm reduction services offered by NSPs

Beyond the supply of sterile needle and syringes, specialist NSPs may also provide a range of additional services, including education on HCV, HIV and other BBVs, and they can act as important first points of referral to a range of health and social welfare organisations (Wodak and Cooney, 2006). In two studies, trusting relationships between PWID and NSP staff were felt to be key to facilitating engagement in additional harm reduction services in specialist NSP settings (Parker et al., 2012 [++]; MacNeil & Pauly, 2011 [+]). Community pharmacies in England have a long history of providing services to people who use drugs, primarily in NSP and dispensing OST. Expansion of harm reduction services in pharmacies was desired by both PWID and pharmacy staff in two studies (Mackridge et al., 2010 [+]; Lutnick et al., 2012 [+]). However, the need to tackle negative attitudes towards PWID exhibited by some pharmacy staff, and the need to identify private spaces for the delivery of such services were identified as barriers to expansion.

One of the main disadvantages of NSVMs is the possibility that they reduce staff-user contact (Islam et al., 2007). While opportunities for disseminating information to users of

NSVMs were acknowledged as limited in one study, this was not considered to be a major concern (Dodding & Gaughwin, 1995 [+]).

Public health concerns about the spread of infectious diseases may be intensified in communities that experience discarded needles (Parkin & Coomber, 2011). Studies identified concerns about discarded needles among both community members and PWID (Miller, 2000 [+]; Smith et al., 1998 [+]), running counter to suggestions that PWID do not care enough about the communities they live in to seek safe disposal options. Community members may have mixed responses to the proposed installation of drop boxes; however one study (Smith et al., 1998 [+]) found that many fears and concerns about drop boxes may be unfounded. There was general support for the installation of drop boxes among PWID (Parkin & Coomber, 2011 [++]; Smith et al., 1998 [+]; Springer et al., 1999 [+]) but PWID may encounter significant barriers to their use, in particular fear and experience of arrest (Miller, 2000 [+];Parkin & Coomber, 2011 [++]; Smith et al., 1998 [+]; Springer et al., 1999 [+]). One UK study (Parkin & Coomber, 2011 [++]) identified that the correct environmental and geographical positioning of drop boxes was crucial.

7.3 Parallel synthesis

There were few points of overlap between the review of effectiveness and cost-effectiveness and review of qualitative evidence, however, the evidence identified allowed for the findings to be contrasted in relation to pharmacy-based NSP and drop boxes.

The quantitative and qualitative evidence suggests that pharmacies are an important type of NSP; with the convenience and accessibility of such services fundamentally important to PWID. The quantitative evidence suggests that PWID who primarily use pharmacy-based NSPs represent high-risk users who may be more disengaged with services. That the qualitative evidence found that PWID had both positive and negative experiences of pharmacy NSPs suggests the need for efforts to improve training and education of pharmacy staff in relation to the delivery of NSP and other services to PWID. There was qualitative evidence of a desire for the expansion of harm reduction services in pharmacies, but there was no evidence for the effectiveness of such services as methodologically sound quantitative studies were lacking. How trusting relationships and mutual respect can be fostered between PWID and staff in pharmacy NSPs needs to be an important consideration in any strategies to expand pharmacy NSP services.

The balance of the evidence from the review of effectiveness and qualitative research suggests that drop boxes can provide an important means of safe disposal for PWID. Whilst community members and police may have concerns about the installation of drop boxes, these fears and concerns appear to be largely unfounded, much in the same way that community fears about NSPs are. Both qualitative and quantitative evidence suggests that PWID will use or seek out safe disposal options where these are available but environmental and geographical constraints may limit the use of drop boxes. The qualitative studies

highlighted the impact that fear and experience of arrest played in deterring PWID from using a safe disposal option.

7.4 Conclusions and recommendations

7.4.1 Conclusions

This review was undertaken to support the update of guidance on the optimal provision of NSPs. Since the previous guidance, evidence has accumulated on the optimal provision of NSPs enabling some tentative conclusions to be drawn about what may work most effectively within the range of harm reduction services available to PWID.

There is good evidence that a high coverage of NSPs may reduce sharing behaviours and that the combination of a high coverage of NSPs and uptake of OST can reduce the risk of HCV transmission. Strategies are therefore required that increase drug treatment enrolment among PWID. There is evidence that treatment engagement and re-engagement may be enhanced through the use of motivational approaches and incentives. A range of services should be available that meet the needs of PWID with different risk profiles and this review identified evidence that PWIDs may have a preference for particular types of NSP. Needle and syringe vending machines and outreach schemes (including mobile outlets) play an important role in out of hours provision for NSPs and attract PWID with higher risk profiles than may commonly use mainstream services such as fixed-site or pharmacy-based NSPs. The evidence base on which to draw conclusions about the effectiveness of additional harm reduction services offered by NSPs is fragmented. While there is evidence that uptake of injecting paraphernalia appears to be associated with safer injecting practice, evidence for whether the distribution of drug-taking equipment via NSPs promotes non-injecting modes of drug administration is lacking. Evidence is also lacking on effective and cost-effective interventions that link PWID to other medical and social support services through referral at NSPs; though there is evidence that NSPs may provide a cost-effective setting for delivering HBV vaccination. Trusting relationships between PWID and NSP staff appears to be key to facilitating engagement in additional harm reduction services, and a lack of trusting relationships may be a barrier to the expansion of services in non-specialist setting such as pharmacy-based NSP. There is evidence that some PWID are as concerned as non-PWID about discarded needle and syringes in communities and that they may change their disposal behaviour in response to the availability of safe disposal options. As such the wide scale installation of drop boxes appears to be an effective means of reducing discarded needles and syringes.

7.4.2 Recommendations for practice

The results of this review reinforce the evidence underpinning the previous guidance on optimal provision of NSPs. While NSP provision in England is extensive and increasing, there continues to be a need to further increase the amount of injection equipment distributed. Community pharmacies account for a high proportion of NSPs in England and

this review identified the need for training and education to promote mutual respect between PWID and pharmacy staff.

7.4.3 Recommendations for research

As identified in the previous review of effectiveness and cost-effectiveness, further research to determine the effectiveness and cost-effectiveness of different configurations of NSP services in England and the rest of the UK is required. Studies concerning the feasibility and acceptability of vending machines and drop boxes should be undertaken to inform future commissioning decisions about their potential role in the expansion of NSP services in England.

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Appendix 1. Evidence statements from previous reviews

Review of effectiveness and cost-effectiveness

Question 1: What level of coverage of needle and syringe programmes (NSPs) is the most effective and cost-effective?

ES6.1a. There is evidence from one poor quality cross-sectional study to suggest that higher syringe coverage is associated with lower levels of injection risk behaviours among IDUs who participated in NSPs, including sharing needles and syringes, sharing cookers and syringe re-use. IDUs who are homeless, report recent heroin injection or crack cocaine use, or are not in treatment have lower levels of syringe coverage.

Applicability: As this study was conducted in the USA, it is unclear whether the findings are applicable to the UK given the differences in the political acceptance of NSPs and wider harm reduction services for IDUs. However, the concept of coverage is applicable in terms of NSP provision in the UK.

ES7.1b. There is evidence from two CEAs to suggest that intervention coverage may be increased to higher levels at a low cost per HIV infection averted.

ES7.1c. There is evidence from one CEA to suggest that cost-effective allocation within a multi-site NSP requires that sites are located where the density of IDUs is highest and that the number of syringes exchanged per client is equal across sites.

Applicability: Cost and benefit estimates were either based on locally derived data or from studies conducted in North America, and a range of assumptions were made limiting the applicability of the findings beyond the individual studies.

Question 2: What types of NSPs are effective and cost effective?

Availability and accessibility

ES6.2a. There is evidence from two poor quality cross-sectional studies to tentatively suggest that close proximity to NSPs can lead to greater utilisation of NSP facilities, resulting in reduced syringe sharing.

Applicability: Both studies were conducted in the USA and it is unclear whether the findings are applicable to the UK given the differences in the political acceptance of NSPs and wider harm reduction services for IDUs.

Setting

ES6.2b. There is evidence from two RCTs, one good quality and one moderate quality, to suggest that NSP setting does not impact on injection risk behaviours. The evidence from six poor quality observational studies is inconsistent; however there is evidence from three poor

quality cross-sectional studies that mobile van sites and vending machines may attract younger IDUs and IDUs with higher risk profiles.

Applicability: As all of these studies were conducted in countries where the pharmacy sale of needles to IDUs predominated (i.e. USA, Russia and France), rather than free distribution as is the norm in the UK, it is unclear whether the findings are applicable to the UK given the differences in the political acceptance of NSPs and wider harm reduction services for IDUs.

ES6.2c. There is evidence from one good quality RCT to suggest that providing hospital-based NSP services may increase accessibility to outpatient services among IDUs attending NSPs.

Applicability: As this study was conducted in the USA, it is unclear whether the findings are applicable to the UK given the differences in the political acceptance of NSPs and wider harm reduction services for IDUs. However, as NSPs are available in A&E departments in some areas of the UK this finding may be applicable to NSP provision in the UK.

Syringe dispensation policy

ES6.2d. There is evidence from two moderate quality and one poor quality cross-sectional studies to suggest that syringe dispensation policies have a limited impact on behavioural outcomes such as sharing but some impact on syringe re-use.

Applicability: As all three studies were conducted in the USA, it is unclear whether the findings are applicable to the UK given the differences in the political acceptance of NSPs and wider harm reduction services for IDUs. In addition, the majority of needle exchange services in the UK do not place limits on the amount of equipment exchanged.

Prison-based NSPs

ES5.1d. There is evidence from one systematic review that prison-based syringe exchange may be feasible in small prisons, but there is insufficient evidence to determine the effectiveness of these programmes on a larger scale.

ES6.2e. There is limited evidence from two poor quality uncontrolled before and after studies to tentatively suggest that the provision of vending machines in prisons does not have adverse effects on HIV and HCV seroconversion and reduces syringe sharing and other injection risk behaviours.

Applicability: Both uncontrolled before and after studies were conducted in Europe, however, these findings are currently of limited applicability to the UK because of the political and ethical issues surrounding prison-based NSPs.

Question 3: Which additional harm-reduction services offered by NSPs are effective and cost effective?

ES6.3a. There is evidence from one moderate quality RCT to suggest that strength-based case management delivered via NSPs may support drug treatment entry among clients who request drug treatment. There is evidence from one poor quality RCT to suggest that MI has no impact on the treatment interest and enrolment of NSP participants.

ES6.3b. There is evidence from one moderate quality cohort study to suggest that the provision of NSP-based health care services may decrease emergency department utilisation.

Applicability: As all these study were conducted in the USA, it is unclear whether the findings are applicable to the UK given the differences in the political acceptance of NSPs and wider harm reduction services for IDUs. In addition, differences in the funding of drug treatment services between the UK and USA limit the applicability of these findings.

ES6.3c. There is evidence from one moderate quality cohort study and one poor quality cross-sectional study to suggest that IDUs who exclusively obtain their needles from NSPs are less likely to engage in high risk injection behaviours than those who obtain them via secondary distribution. However, there is evidence from two poor quality cross-sectional studies to suggest that IDUs who obtain needles via secondary distribution engage in high risk injection behaviours less than IDU who do not obtain any needles, directly or indirectly, from NSPs.

Applicability: As all these study were conducted in the USA, it is unclear whether the findings are applicable to the UK given the differences in the political acceptance of NSPs and wider harm reduction services for IDUs. In addition, the majority of needle exchange services in the UK do not place limits on the amount of equipment exchanged, but there is little consistency regarding service providers' attitudes towards secondary distribution (NTA 2007).

Question 4: Are NSPs delivered in parallel with, or alongside, opiate substitution therapy (OST) effective and cost-effective?

ES6.4a. There is evidence from one poor quality uncontrolled before and after study to suggest that participation in low-threshold MMT programmes delivered by NSPs can reduce injection risk behaviours among drug users.

Applicability: This study was conducted in Canada and given the broad similarities in approaches to harm reduction between the UK and Canada, this finding is likely to have good applicability to the UK.

ES6.4b. There is evidence from one moderate quality cohort study to suggest that the combination of methadone treatment and full participation in NSPs reduces the incidence of HIV and HCV among drug users. There was insufficient evidence to determine the cost-effectiveness of NSPs delivered in parallel with, or alongside, OST.

Applicability: This study was conducted in the Netherlands and given the similarities in approaches to harm reduction between the UK and the Netherlands this finding has good applicability to the UK.

Review of qualitative evidence

Question 1: Suitable types of programmes and ideal level of coverage

ES1. There is evidence from one moderate quality (+ rating) US study that the features of a successful NSP include: flexibility in process and management models; knowledge; coalition building and community involvement; strong leadership; staging debate with sensitivity to political and cultural norms; access to resources; use of research; overcoming fear.

Question 2: Types of NSPs valued and accessed by IDUs

ES2. There is evidence from one good quality (++ rating) UK study and two moderate quality (+ rating) UK studies to suggest that immediate availability of injecting equipment is more important to injecting drug users than perceptions of risk associated with injecting behaviour.

ES3. There is evidence from two good quality (++ rating) UK studies and three moderate quality (+ rating) studies, two of which are from the UK, that pharmacy-based needle and syringe programmes are popular with injecting drug users. Pharmacies were rated more highly than drug agency based NSPs for accessibility in 3 UK studies; although in another 2 UK studies, embarrassment, negative staff attitudes or fear of exposure led to negative feelings about pharmacy based NSPs, particularly in women

ES4. Convenience or otherwise (specifically opening hours, location and queues) of NSPs are very important to IDUs and can influence decisions on whether to obtain equipment from them or from street sellers or secondary exchange.

ES5. There is evidence from two good quality (++ rating) studies, one of which is from the UK, and seven moderate quality (+ rating) studies, two of which are from the UK, to suggest that IDUs are not a homogeneous group: there are different cultures, largely based on socioeconomic status, some of whom disapprove of others' drug using behaviours. Fear of being caught and publicly exposed as a drug user, whether to police (USA studies), neighbours or family (UK studies) is a prominent theme and can impact upon use of NSPs and other services. For this reason some IDUs prefer secondary syringe exchange.

Question 3: Additional harm reduction interventions valued and accessed by IDUs

ES6. There is evidence from three good quality (++ rating) studies, one of which is from the UK, and six moderate quality (+ rating) studies, one of which is from the UK, that secondary syringe exchange is a valued method for obtaining clean syringes because it is convenient and relieves the fear of exposure.

ES7. There is evidence from two moderate quality (+ rating) UK studies of gender differences in patterns of equipment sharing and use of services. Women are less likely than men to share equipment with friends, preferring to share only with their sexual partner. Women are also more likely to have negative feelings about using pharmacy-based NSPs and to obtain equipment by secondary exchange, particularly with their sexual partner.

ES8. There is evidence from three good quality (++ rating) and one moderate quality (+ rating) study to suggest that a range of harm reduction interventions (referrals to drug treatment and other services; HIV testing; medical care) in addition to needle and syringe programmes were accessed and valued by injecting drug users.

Question 4: Opiate substitution therapies and NSPs.

ES9. In two UK studies (one good quality ++ rating, one moderate quality + rating), IDUs obtained oral methadone prescriptions from the same pharmacy they used for needle exchange. A need for privacy when collecting needles and taking oral methadone was expressed.

Question 5: Perceptions of the general public

ES10. There was evidence from one good quality (++ rating) US study and two moderate quality (+ rating) studies, one of which was from the UK, that the general public, particularly religious groups, had concerns about the ethics or morality of providing syringes and needles to injecting drug users, with some stating that it was helping them (IDUs) to harm themselves; others were more concerned that it discouraged IDUs from taking personal responsibility for their drug use.

ES11. There was evidence from three moderate quality (+ rating) studies, one of which was from the UK, that the general public and IDUs themselves had some concerns about the environmental and health consequences (e.g. discarded needles, increased crime) of fixed site NSPs. In some cases direct opposition came from a vocal, more affluent, minority.

Question 6: Perception of families and carers

No qualitative studies were found that were conducted with families or carers of IDUs, therefore there was no evidence available that related to this question.

Appendix 2. Example search strategy

Ovid MEDLINE® [1946 to November Week 3 2012]

1. exp Needle-Exchange Programs/ (1239)
2. ((needle* or syringe* or inject*) adj3 exchange).tw. (1264)
3. shooting galler*.tw. (140)
4. harm reduction/ (1375)
5. (harm adj reduc*).tw. (1595)
6. 1 or 2 or 3 or 4 or 5 (3984)
7. limit 6 to ed=20080701-20121204 (1396)
8. ((needle* or syringe* or inject* or citric acid* or foil or steril* or bleach* or disinfect*) adj3 (suppl* or access* or provision or provid* or distribut* or dispens* or pack*)).tw. (6399)
9. ((needle* or syringe* or inject*) adj3 (program* or service* or center* or centre* or scheme* or facility or facilities or area* or prison* or pharmacy or pharmacies or unit or units or room*)).tw. (5551)
10. ((needle* or syringe* or inject*) and (steril* or bleach* or disinfect* or clean* or safe*)).tw. (37258)
11. (nsp or nep or nsep or nsps or neps or nseps or sep or seps).tw. (10135)
12. 8 or 9 or 10 or 11 (57040)
13. limit 12 to ed=20080701-20121204 (14283)
14. ((needle* or syringe* or inject* or slot or dispensing or vending) adj3 (machine* or (peer adj distrib*))).tw. (596)
15. (electronic adj dispens*).tw. (5)
16. ((needle* or syringe* or inject* or sharps or cin or "drug-related litter") adj3 (dispos* or bin* or container*)).tw. (1841)
17. (disposal adj3 (bin* or container* or safe*)).tw. (497)
18. (fitpack* or distribox* or steribox* or fitbin* or (drop adj box*)).tw. (11)
19. 14 or 15 or 16 or 17 or 18 (2816)
20. 13 or 19 (16999)
21. Substance Abuse, Intravenous/ (11605)
22. ((substance* or drug* or stimulant* or opioid* or morphine or heroin or methadone or opiate or cocaine) adj3 (abus* or misus* or dependen* or use* or addict* or inject* or intravenous)).tw. (194285)
23. substance-related disorders/ or cocaine-related disorders/ or exp opioid-related disorders/ (93747)
24. Street Drugs/ (7319)
25. ((needle* or syringe* or inject*) adj3 (share or sharing or sharer*)).tw. (1606)
26. 21 or 22 or 23 or 24 or 25 (235253)
27. 20 and 26 (1159)
28. 7 or 27 (2228)

29. animals/ not humans/ (3720385)
30. 28 not 29 (2112)
31. 30 (2112)
32. limit 31 to english language (1993)

Appendix 3. Details of data extraction

For quantitative studies the following information was extracted (where available):

- Study details (including author(s), year, citation, country of origin, aim of study, study design, quality score and external validity score)
- Population and setting (including source population(s))
- Method of allocation to intervention/control (including method of allocation, intervention(s) description) (where applicable)
- Outcomes and methods of analysis (including outcomes, follow-up period and methods of analysis)
- Results (including results for all relevant outcomes, total sample)
- Notes by review team (limitations identified by the authors, limitation identified by the review team, evidence gaps, sources of funding)
- Additional data for the Effective Interventions Library (e.g. effect sizes)

For economic evaluation studies, the following information was to be extracted (where available):

- Study details (including author(s), year, citation, country of origin, type of economic analysis, economic perspective, quality score and applicability)
- Population and setting (including source population(s), setting and data sources)
- Intervention/comparator (including description of the intervention(s) and comparator(s), and sample sizes)
- Outcomes and methods of analysis (including outcomes, time horizon, discount rates, perspective, measures of uncertainty and modelling method)
- Results (including results for primary and secondary analyses, as applicable)
- Notes by review team (limitations identified by the authors, limitation identified by the review team, evidence gaps, sources of funding)
- Additional data for the Effective Interventions Library (TBC with CPHE team)

For qualitative studies, the following information was extracted (where available):

- Study details (including author(s), year, citation, and quality score)
- Research parameters (including research questions, theoretical approach and how data were collected)
- Population and sample selection (including details of the population the sample was recruited from, how the sample were recruited, number of participants, inclusion and exclusion criteria)
- Outcomes and methods of analysis (including description of method and process of analysis, key themes relevant to the review)

- Notes by review team (limitations identified by the authors, limitation identified by the review team, evidence gaps, sources of funding)
- Additional data for the Effective Interventions Library (TBC with CPHE team)

Appendix 4. Details of quality assessment checklists

Quantitative intervention studies

Quantitative intervention studies were assessed according to the using the quantitative studies checklist (from Methods for the development of NICE public health guidance):

Section 1: Population
1.1 Is the source population or source area well described?
1.2 Is the eligible population or area representative of the source population or area?
1.3 Do the selected participants or areas represent the eligible population or area?
Section 2: Method of allocation to intervention (or comparison)
2.1 Allocation to intervention (or comparison). How was selection bias minimised?
2.2 Were interventions (and comparisons) well described and appropriate?
2.3 Was the allocation concealed?
2.4 Were participants or investigators blind to exposure and comparison?
2.5 Was the exposure to the intervention and comparison adequate?
2.6 Was contamination acceptably low?
2.7 Were other interventions similar in both groups?
2.8 Were all participants accounted for at study conclusion?
2.9 Did the setting reflect usual UK practice?
2.10 Did the intervention or control comparison reflect usual UK practice?
Section 3: Outcomes
3.1 Were outcome measures reliable?
3.2 Were all outcome measurements complete?
3.3 Were all important outcomes assessed?
3.4 Were outcomes relevant?
3.5 Were there similar follow-up times in exposure and comparison groups?
3.6 Was follow-up time meaningful?
Section 4: Analyses
4.1 Were exposure and comparison groups similar at baseline? If not, were these adjusted?
4.2 Was intention to treat (ITT) analysis conducted?
4.3 Was the study sufficiently powered to detect an intervention effect (if one exists)?
4.4 Were the estimates of effect size given or calculable?
4.5 Were the analytical methods appropriate?
4.6 Was the precision of intervention effects given or calculable? Were they meaningful?
Section 5: Summary
5.1 Are the study results internally valid (i.e. unbiased)?
5.2 Are the findings generalisable to the source popu**lation (i.e. externally valid)?**

Quantitative studies reporting correlations and associations

Quantitative studies reporting correlations and associations were assessed according to the quantitative studies reporting correlations and associations checklist (from Methods for the development of NICE public health guidance):

Section 1: Population
1.1 Is the source population or source area well described?
1.2 Is the eligible population or area representative of the source population or area?
1.3 Do the selected participants or areas represent the eligible population or area?
Section 2: Method of selection of exposure (or comparison) groupa
2.1 Selection of exposure (and comparison) group. How was selection bias minimised?
2.2 Was the selection of explanatory variables based on a sound theoretical basis?
2.3 Was the contamination acceptably low?
2.4 How well were likely confounding factors identified and controlled?
2.5 Is the setting applicable to the UK?
Section 3: Outcomes
3.1 Were the outcome measures and procedures reliable?
3.2 Were the outcome measurements complete?
3.3 Were all the important outcomes assessed?
3.4 Was there a similar follow-up time in exposure and comparison groups?
3.5 Was follow-up time meaningful?
Section 4: Analyses
4.1 Was the study sufficiently powered to detect an intervention effect (if one exists)?
4.2 Were multiple explanatory variables considered in the analyses?
4.3 Were the analytical methods appropriate?
4.4 Was the precision of association given or calculable? Is association meaningful?
Section 5: Summary
5.1 Are the study results internally valid (i.e. unbiased)?
5.2 Are the findings generalisable to the source population (i.e. externally valid)?

Economic evaluation studies

Economic evaluation studies were assessed according to the economic evaluations checklist (from Methods for the development of NICE public health guidance)

Section 1: Applicability (relevance to specific topic review question(s) and the NICE reference case[a])
1.1 Is the study population appropriate for the topic being evaluated?
1.2 Are the interventions appropriate for the topic being evaluated?
1.3 Is the system in which the study was conducted sufficiently similar to the current UK context?
1.4 Was/were the perspective(s) clearly stated and what were they?

1.5 Are all direct health effects on individuals included, and are all other effects included where they are material?
1.6 Are all future costs and outcomes discounted appropriately?
1.7 Is the value of health effects expressed in terms of quality-adjusted life years (QALYs)?
1.8 Are costs and outcomes from other sectors fully and appropriately measured and valued?
There is no need to complete section 2 of the checklist if the study is considered 'not applicable'.
Other comments:
Section 2: Study limitations (the level of methodological quality)
2.1 Does the model structure adequately reflect the nature of the topic under evaluation?
2.2 Is the time horizon sufficiently long to reflect all important differences in costs and outcomes?
2.3 Are all important and relevant outcomes included?
2.4 Are the estimates of baseline outcomes from the best available source?
2.5 Are the estimates of relative 'treatment' effects from the best available source?
2.6 Are all important and relevant costs included?
2.7 Are the estimates of resource use from the best available source?
2.8 Are the unit costs of resources from the best available source?
2.9 Is an appropriate incremental analysis presented or can it be calculated from the data?
2.10 Are all important parameters whose values are uncertain subjected to appropriate sensitivity analysis?
2.11 Is there any potential conflict of interest?

Systematic reviews and meta-analyses

Systematic reviews and meta-analyses were assessed according to the following checklist items (from previous review of effectiveness and cost-effectiveness):

1. The study addresses an appropriate and clearly focused question.
2. A description of the methodology used is included.
3. The literature search is sufficiently rigorous to identify all relevant studies.
4. Study quality is assessed and taken into account
5. There are enough similarities between the studies selected to make combining them reasonable
6. Overall assessment

Qualitative studies

Qualitative studies were assessed according the following items on the qualitative studies checklist (from Methods for the development of NICE public health guidance):

Theoretical Approach

1. Is a qualitative approach appropriate (appropriate, inappropriate, not sure)

2. Is the study clear in what it seeks to do (clear, unclear, mixed)

Study design

3. How defensible/ rigorous is the research design/ methodology? (defensible, indefensible, not sure)

Data collection

4. How well was the data collection carried out? (appropriately, inappropriately, not sure/inadequately)

Trustworthiness

5. Is the role of the researcher clearly described? (clearly described, unclear, not described)

6. Is the context clearly described? (clear, unclear, not sure)

7. Were the methods reliable? (reliable, unreliable, not sure)

Analysis

8. Is the data analysis sufficiently rigorous? (rigorous, not rigorous, not sure/not reported)

9. Is the data 'rich'? (rich, poor, not sure/not reported)

10. Is the analysis reliable? (reliable, unreliable, not sure/not reported)

11. Are the findings convincing? (convincing, not convincing, not sure)

12. Are the findings relelvant to the aims of the study? (relevant, irrelevant, partially relevant)

13. Conclusions (adequate, inadequate, not sure)

Ethics

14. How clear and coherent is the reporting of ethics? (appropriate, inappropriate, not sure/not reported)

Overall Assessment

15. As far as can be ascertained from the paper, how well was the study conducted? (++, +, -)

Appendix 5. References to unavailable and excluded studies

References unavailable for screening

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Appendix 6. Evidence tables: Review of effectiveness and cost-effectiveness

What level of coverage of needles, syringes and other types of injecting equipment are most effective and cost-effective?

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Bruneau et al. (2008) **Country**: Canada **Objectives**: To investigate associations between injection risk behaviour and distance to and patterns of utilisation of NSPs **Study design:** Cross-sectional (nested in a cohort) **Quality score**: + **External validity**: +	**Entry criteria:** 14 years of age or older, having injected drugs within the past 6 months, and providing informed consent **Participant characteristics** Number of participants: 456 Gender (% male) 84% Ethnicity Mean age (SD) 40 y (9) Homeless NR Mean injection duration (SD) 15 y (10) **Programme description** 21% consistent NSP users (only NSPs as source of sterile syringes in past 6 months) 20% consistent pharmacy users (only pharmacies) 18% mixed reliable source users (used both NSPs and pharmacies) 41% mixed unreliable source users (obtained syringes from a combination of access points, including unreliable sources such as street, friends or dealers)	**Outcomes measured:** Syringe-acquisition patterns, spatial proximity (expressed as straight-line distance between NSPs/pharmacies relative to dwelling places). Main outcome variable was engaged in ''high-risk injection behaviour'' in past 6 months (having borrowed a syringe or shared injection equipment at least five times; having injected with groups of strangers at least five times; or having borrowed a syringe or shared injection equipment with a known HIV-positive person). **How measured:** Questionnaire administered by trained interviewer and venous blood sample **Methods of analysis:** Generalised additive model procedure (with LOESS and spline smoothing); logistic regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** *Distance to NSPs* The association with high-risk injection behaviour was non-linear. Positive association for PWID living within 1600 m of the nearest NSP, for each 200 m increment, there was a 13% increase in odds of high-risk injection behaviour (OR 1.13, 95% CI 1.00-1.28). Null relation between 1600 m and 3000 m. Negative association (i.e. lower prevalence of risk sharing) for PWID living >3000 m away. *Distance to pharmacies* No apparent association was found with high-risk injection behaviour. A negative trend (and correspondingly lower high-risk injection prevalence) was found for PWID living >1000 m from the nearest pharmacy. *Syringe access patterns* Lower prevalence of high-risk injection behaviour among PWID who consistently used NSPs or pharmacies as their sole syringe supply. Prevalence of high risk injection behaviour (OR, 95% CI vs. mixed unreliable): Consistent NSP users: 25.3% (0.36, 0.19 to 0.71) Consistent pharmacy users: 20.9% (0.38, 0.17 to 0.83) Mixed reliable source users: 37% (0.65, 0.33 to 1.28) Mixed unreliable source users: 44.4%	**Limitations identified by the authors:** Participants were not randomly selected (overrepresented in terms of males and chronic cocaine users); distance measures used and could not account for mobile van distribution. **Limitation identified by the review team:** **Evidence gaps:** Need for better understanding of how, and under what spatial conditions, syringe-supply strategies should be implemented. **Funding source**: Canadian Institutes of Health Research; Canadian Foundation for Innovation; Reseau SIDA et Maladies Infectieuses du Fonds de la Recherche en Sante du Quebec

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Bryant et al., 2012 **Country**: Australia **Objectives**: To examine individual-level syringe coverage among a sample of PWID **Study design:** Cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** Pharmacies were ranked by volume of syringe distribution; those in the 80% percentile of distribution were selected. Surveys were distributed to people who bought or exchanged needles and syringes during a 1 week period. **Participant characteristics** Number of participants: 417 Gender (% male) 61% Ethnicity Aboriginal 18% Median age 36 y Homeless (past 6 months) NR Injection duration (median) 16 y Drug most recently injected Heroin 43% Methamphetamine 21% Methadone 14% Cocaine 12% **Programme description** 40 pharmacies accounting for 49% of the pharmacy-based needle distribution in the State.	**Outcomes measured:** Syringe coverage (number of retained syringes, divided by total number of injections in the previous month and multiplied by 100); patterns of acquisition of equipment; risk practice measures **How measured:** Questionnaire **Methods of analysis:** Multivariate logistic regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** Syringe coverage: <50%, 23%; 50-99%, 14%; 100-149%, 11%; ≥150%, 51%. Respondents who had not used an NSP in the previous month were twice as likely to report inadequate coverage (AOR 2.25; 95% CI 1.25–4.05). Syringe coverage was not correlated with syringe sharing once other known correlates of syringe sharing were accounted for.	**Limitations identified by the authors:** Non-probability sampling methods to recruit respondents; based on self-report; possibility of unknown confounders; recruitment of sample from pharmacies **Limitation identified by the review team:** **Evidence gaps:** None identified **Sources of funding:** NSW Health, Australian Government Department of Health and Aging

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Cooper et al., 2011 **Country**: USA (New York City) **Objectives**: To examine relationships of spatial access to NSPs and pharmacies **Study design:** Repeat cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** Participants in the Risk Factors for AIDS among Intravenous Drug Users study; injected drugs in the past 6 months; participated in study between 1995-2006 **Participant characteristics** Number of participants: 4,003 Gender (% male) 79% Ethnicity Hispanic/Latino 51% Black/African American 21% White and Other 28% Mean age (SD) 38 y (18-75) Homeless 34% Injection duration 14 y (0-52) **Programme description** Included NSPs located in New York City and within 1 mile of the city's boundaries (80 sites during study period) and all pharmacies registered to sell over-the-counter (OTC) syringes from the New York State Department of Health (97% of 1,316 pharmacies included). Between 1995 and 2006, one quarter of districts experienced absolute increases of ≥20% in the percentage of their surface area located within 1 mile of an SEP.	**Outcomes measured:** Spatial access to NSPs and pharmacies (sites geocoded to street address or nearest intersection; walking distance buffer created that extended *r* distance from the site; proportion of a district's surface area within *r* distance of an NSP calculated); self-reported sterile syringe use and HIV status **How measured:** Cross-sectional surveys; **Methods of analysis:** Hierarchical generalized linear modelling **Length of follow-up:** Repeated 1995-2006 **Number of participants lost to follow-up:** NA	**Injection risk behaviours** The model indicated that a 1-unit increase in the natural log of the percentage of a district's surface area within a mile of an NSP in 1995 was associated with higher odds of injecting with a sterile syringe at least 75% of the time (AOR 1.26, 95% CI 1.03-1.54). A 1-unit increase in this exposure over time also increased these odds (AOR 1.23, 95% CI 1.01-1.52). From 2003 on, a 1-unit increase in the natural log of spatial access to an OTC pharmacy was associated with an increase in the odds of always or almost always injecting with a sterile syringe (AOR 1.15, 95% CI 1.03-1.27).	**Limitations identified by the authors:** Measures of access did not account for public transport and excluded satellite NSPs and illegal NSPs; number of syringes distributed not measured. **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: National Institute on Drug Abuse

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Cooper et al., 2012a **Country**: USA (New York City) **Objectives**: To explore the relationship between district-level access to syringes and the odds of injecting with an unsterile syringe in >75% of injections in the past 6 months **Study design:** Repeat cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** Participants in the Risk Factors for AIDS among Intravenous Drug Users study; injected drugs in the past 6 months; interviewed between 1995 and 2006; ≥18 years old; valid New York city postcode. **Participant characteristics** Number of participants: 4,067 Gender (% male) 80% Ethnicity Latino/a 51% Black 21% White 28% Age (years) 18–30 19% 31-40 38% >40 43% Homeless 34% Injection duration 14 y (5-25) **Programme description** In 1995, half of districts (n=21) had no access to sterile syringes distributed by NSPs and varied considerably in the remaining 21 districts (area-weighted average number of syringes in each district ranged from approximately 22 to 58,962). Median annual change scores were tracked for three groups of districts: (1) no syringe access in 1995 (N=21); (2) districts in the 3rd quartile of the syringe access variable in 1995 (N=10); and (3) districts in the fourth quartile of the variable in 1995 (N=11). Group (1) essentially continued to have no access throughout the study period; group (3) districts experienced substantial changes in access over time (annual median change score was 1,703 in 1996 vs. 6,000 in 2000, declining to 1,744 by 2006); group (2) districts also peaked in 2000 and then fell.	**Outcomes measured:** Spatial access to sterile syringes from NSPs (sites geocoded, assumed syringes distributed within 1 mile and decaying exponentially with distance, finally a district-wide average of distributed syringes was generated) **How measured:** NA **Methods of analysis:** Hierarchical generalized linear model **Length of follow-up:** Repeated cross-sectional survey between 1995-2006. **Number of participants lost to follow-up:** NA	**Injection risk behaviours** The relationship between district-level access to syringes and the odds of injecting with an unsterile syringe depended on district-level arrest rates. In districts with low drug-related arrest rates in 1995, a 1-unit difference in the log of the syringe access variable across districts at baseline inversely associated with a 5% difference in the odds of frequently injecting with an unsterile syringe (AOR 0.95; p=0.004). In districts with no syringe access in 1995, a 1-unit difference in baseline drug-related arrest rates across districts was positively associated with a 2% difference (AOR 1.02, p=0.06). The AOR for the interaction of syringe access and drug-related arrest rates in 1995 indicated that the adverse relationship between arrest rates and unsterile injecting was attenuated in districts with better spatial access to syringes (AOR, 0.99; p=0.04). A 1-unit increase in the log of syringe access over time was associated with a non-statistically significant 6% decline in the odds of frequently injecting with an unsterile syringe (AOR, 0.94; p=0.09). A 1-unit increase in the log of spatial access to an ESAP pharmacy over time was associated with a 14% decline in the odds of frequently injecting with an unsterile syringe (AOR, 0.86; p=0.002).	**Limitations identified by the authors:** Assumptions regarding the distribution of syringes within the local area; possibility of incomplete control for confounding factors **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: National Institute on Drug Abuse

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Cooper et al., 2012b **Country**: **Objectives**: To investigate the relationship between district-level exposures to drug-related arrests and access to NSPs over time and the odds of injecting with an unsterile syringe. **Study design:** Repeat cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** Same study population as Cooper et al (2012a). See for details and participant characteristics. **Programme description** *See Cooper et al. (2012a)*	**Outcomes measured:** Spatial access to NSPs and pharmacies selling over the counter syringes (see Cooper et al., 2011 for methods); drug-related arrest rates; injecting with an unsterile syringe. **How measured:** NA **Methods of analysis:** Hierarchical linear models **Length of follow-up:** Repeated cross-sectional survey between 1995-2006. **Number of participants lost to follow-up:** NA	**Injection risk behaviours** The odds of injecting with a sterile syringe ≤25% of the time increased 10% annually on average until 2001 (AOR 1.10, p=0.0003).With the onset of OTC syringe sales in 2001, this trend reversed course (AOR 0.96, p=0.003). In districts with no NSP access in 1995 (n=23), a difference across districts of 10 arrests per 1,000 residents at baseline was on average positively associated with a 13% difference in the odds of rarely injecting with a sterile syringe (AOR 1.13; p=0.092). In districts with low drug-related arrest rates in 1995, a 1-unit difference in the log of NSP access across districts at baseline was on average negatively related to a 7% difference in the outcome (AOR 0.93, p=0.05).In districts that had both NSP access and higher drug-related arrest rates in 1995, higher drug-related arrest rates appear to erode protective effects of local NSPs on sterile syringe use, and vice versa (AOR 0.96; p=0.07).	**Limitations identified by the authors:** Redistribution of syringes not accounted for; volume of syringes distributed by site not included as a measure; possibility of residual confounding; non-random sample; possibility of misclassification of exposure. **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: National Institute on Drug Abuse

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Iversen et al., 2012 **Country**: Australia **Objectives**: To estimate individual-level syringe coverage as a proportion of monthly injections covered by a new syringe and to model the associations with injecting risk, anti-HIV and HCV prevalence **Study design:** Cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** All attendees of participating NSP services **Participant characteristics** Number of participants: 1,568 Gender (% male) 66% Ethnicity Indigenous Australian 11% Age <30 years 29% Homeless NR Injection duration NR Drug injected most recently Heroin 38% Methamphetamine 21% Methadone/buprenorphine 15% Pharmaceutical opioids 17% Other 10% **Programme description** 51 of the 73 primary NSP services in Australia participated. Participation in harm reduction defined as poor (no OST or NSP), full (both NSP and OST), and partial (NSP only; or OST only).	**Outcomes measured:** Individual-level syringe coverage; injecting risk and participation in harm reduction interventions **How measured:** Self-administered questionnaire **Methods of analysis:** Multivariate logistic regression to model associations between demographic characteristics, anti-HIV and HCV serostatus, self-reported HCV status, injecting risk behaviour, and syringe coverage. **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	Procurement of syringes from an NSP and participating in full harm reduction associated with syringe coverage of ≥100%. OST and NSP: AOR 3.62; CI 2.43–5.43 NSP only: AOR 2.96; CI 2.03–4.33 Participants who reported syringe reuse were less likely to have ≥100% syringe coverage than those who used a sterile syringe for all injections (AOR 0.56; CI 0.42–0.74). Participants who self-reported anti-HCV positive serostatus were more likely to have ≥100% syringe coverage compared to those who did not know their HCV status or reported their status as negative (AOR 1.39; CI 1.06–1.82). Procurement source and median syringes retained in the last month NSP: 15 (5–40) Pharmacy: 4 (2–5) Vending machine: 5 (3–5)	**Limitations identified by the authors:** Restricted to NSP attendees; participants with missing and inconsistent data reported higher rates of syringe reuse. **Limitation identified by the review team:** Receptive syringe sharing dropped as a variable from the final model. **Evidence gaps:** None identified **Funding source**: Australian Government Department of Health and Ageing

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Williams & Metzger, 2010 **Country**: USA (Philapdelphia) **Objectives**: To understand how distances among PWID' residences, drug purchase and use locations, and NSPs are associated with injection behaviours. **Study design:** Cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** Participants in the HIV Prevention Trials Network 037 (2002-2006); injected drugs in the past 6 months **Participant characteristics** Number of participants: 2,599 Gender (% male) Ethnicity White 41% Black 45% Latino 14% Mean age (range) 39 y (18-75) Homeless NR Injection duration **Programme description** 37% of the sample used NSPs as their usual source of syringes.	**Outcomes measured:** Participants were asked the nearest intersections to their residence, where they buy and use drugs, and about their injection behaviours. **How measured:** Questionnaire **Methods of analysis:** Multiple regression analysis; multinomial regression; logistic regression; ordinal regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** Odds of using a syringe or other injection equipment after someone else decreased by 11% (OR 0.89, 95% CI 0.83-0.96) and 3% (OR 0.97, 0.91-1.03), respectively, with each mile increase in average distance among the 4 locations. Regular use of non-NSP sources of syringes increased the odds of receptive syringe sharing by 60% (OR 1.60, 95% CI 1.25-2.04), but had no effect on the use of water, cooker, and cotton after someone (OR 1.05, 95% CI: 0.85- 1.31).	**Limitations identified by the authors:** Non-random and cross-sectional data; missing data. **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: National Institutes of Health

What types of NSPs are effective and cost-effective?

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Bravo et al., 2008 **Country**: Spain **Objectives**: To evaluate access to sterile syringes and its association with injection risk behaviour **Study design:** Cross-sectional **Quality score**: - **External validity**: -	**Entry criteria:** Had used heroin on at least 12 days in the previous 12 months and on at least 1 day in the previous 3 months. Excluded from analysis if did not respond to questionnaire. **Participant characteristics** Number of participants: 443 Gender (% male) 73% Ethnicity NR Mean age 26 y Homeless NR Injection duration (mean) 7 y **Programme description** Not described. % participants obtaining all syringes free of charge: Barcelona 45%; Madrid 32%. Sources of syringes free of charge (Barcelona; Madrid) Buses/vans: 63%; 83% Pharmacies: 21%; 0.5% Fixed site: 8%; 8% Street-based outreach:6%; 3% Other: 3%; 6% Sources of purchased syringes (Barcelona; Madrid) Pharmacies: 67%; 35% Street:32%; 65%	**Outcomes measured:** % of sterile syringes obtained free of charge; service obtained most free syringes; place purchased syringes. **How measured:** Questionnaire and dry blood spot test **Methods of analysis:** Chi square test; ANOVA/ Scheffé's test; logistic regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** Not sharing and no reusing associated with obtaining all sterile syringes free of charge. Not sharing: OR 1.69; 95% CI 1.11-2.56 Not reusing: OR 4.02; 95% CI 2.59-6.24 Among those who purchased syringes, a significant association was seen between not reusing and buying most syringes in the street (OR = 1.85; 95% CI 1.02-3.34). Not sharing was not associated with the way syringes were purchased.	**Limitations identified by the authors:** Uncertainty about the representativeness of the sample **Limitation identified by the review team:** Did not control for confounding **Evidence gaps:** None identified. **Funding source**: Foundation for AIDS Research and Prevention in Spain

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Bryant et al., 2010 **Country**: Australia **Objectives**: To examine whether point of access to sterile equipment is independently correlated with BBV risk behaviours. **Study design:** Cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** All individuals buying or exchanging needles and syringes approached during a 3 week or 1-2 week period, in selected pharmacies and NSP sites, respectively. **Participant characteristics** NSP / PH / NSP + PH Number of participants: 53 / 65 / 214 Gender (% male): 65% / 75% / 66% Ethnicity Aboriginal and/or TSI: 14% / 12% / 19% Mean age (SD): 35.7 (9.8) / 36.3 (9.6) / 34.0 (9.0) Homeless (past 6 months): NR / NR / NR Mean injection duration (SD): 17.7 (9.5) / 15.2 (9.5) / 14.3 (8.8) Last drug injected Heroin: 26% / 44% / 48% Meth/amp: 26% / 24% / 22% Cocaine: 19% / 9% / 12% Methadone: 4% / 12% / 6% Other: 25% / 12% / 13% **Programme description** Participants grouped into four categories based on reported points of access of needle and syringe acquisition in the last month: exclusive use of NSP, exclusive use of pharmacies, use of both; and use of neither	**Outcomes measured:** Patterns of needle and syringe acquisition; sharing behaviours; self-report HIV and HCV status **How measured:** Questionnaire **Methods of analysis:** Multivariate logistic regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** Point of access independently correlated with receptive equipment sharing. Participants who had exclusively used pharmacies in the last month were more likely to report receptive sharing of any equipment* compared to those who had exclusively used NSPs (AOR 5.9, 95% CI 2.02–17.14) as where those who used both (AOR 5.8, 95% CI 2.35–14.40). * needles and syringes and/or ancillary equipment	**Limitations identified by the authors:** Non-probability sampling methods used; more volunteer bias in NSP-recruited sample; based on self-report; difference in survey questions between NSP and pharmacy-recruited groups may have contributed to differences in ancillary equipment sharing. **Limitation identified by the review team:** **Evidence gaps:** None identified **Funding source**: NSW Health; Australian Government Department of Health and Aging

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Deering et al., 2011 **Country**: Canada (Vancouver) **Objectives**: To examine the determinants of using a peer-led mobile outreach program among female sex workers who use drugs **Study design:** Cohort **Quality score**: ++ **External validity**: ++	**Entry criteria:** Women aged 14 years or older; had smoked (not including marijuana) or injected illicit drugs in the last month; actively engaged in street-level sex work in Vancouver. **Participant characteristics** Van / No van Number of participants: 97 / 145 Gender (% male): NA / NA Ethnicity Ethnic minority: 48% / 50% White: 52% / 50% Age <25 y: 14% / 25% 25-34 y: 30% / 23% 35+ y: 56% / 52% Homeless/unstable housing: 11% / 18% Drug use Inject cocaine: 42% / 26% Inject heroin: 56% / 43% Inject/smoke methamphetamine: 14% / 18% **Programme description** Mobile outreach van operating between 10:30 pm and 5:30 am. Staffed by a driver, support worker and peer support worker, the van provided a safe space and staff distributed prevention resources including clean needles.	**Outcomes measured:** Use of the mobile outreach program in the previous 6-months period; in/outpatient drug treatment use; drug-related harms **How measured:** Detailed semi-structured questionnaire administered by peer researchers **Methods of analysis:** Bivariate and multivariate GEE analyses **Length of follow-up:** 18 months **Number of participants lost to follow-up:** NR	Compared to women who did not use the mobile outreach program, women who did were more likely to have injected cocaine in the last 6 months (p = 0.01), to have accessed the WISH Drop-In Centre in the previous 6 months (p<0.001) and to have accessed inpatient addiction treatment of detoxification (p<0.001) and residential drug treatment (p = 0.04). No statistically significant differences in use of other health services. Use of the mobile outreach program was independently correlated with using inpatient addiction treatment services (AOR: 4.16, 95% CI 2.14–8.06) and use of a drug and alcohol counsellor (AOR 6.06, 95%CI 2.58–14.23), but not inpatient methadone treatment (AOR 1.7, 95% CI 0.82–3.77).	**Limitations identified by the authors:** **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: Canadian Institutes of Health Research

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Green et al. (2010) **Country**: USA (Hartford, Oakland & Chicago) **Objectives**: To quantify and characterise the transition probabilities of NSP attendance typologies before compared to after a change in syringe access policy **Study design:** Cohort **Quality score**: + **External validity**: ++	**Entry criteria:** Participated in the Diffusion of Benefit through Syringe Exchange (DOB) Study; reported injecting drugs within the previous 30 days. Oakland participant data were not included in the policy analysis. **Participant characteristics** Number of participants: 228 Gender (% male): NR Ethnicity: NR Mean age (SD): NR Homeless (past 6 months): NR Injection duration: NR **Programme description** *Hartford NSP* Exchange volume: Small, average. <5 syringes exchanged per participant Policy: cap of 10/1-for-1; cap increased to 30 (Sept 1999) *Chicago NSP* Exchange volume: Large, >100 syringes exchanged per participant Policy: No cap; 2-for-1 to 10; 1-for-1 thereafter. From June 2000 then 1-for-'as needed'.	**Outcomes measured:** Change in NSP attendance typologies (four defined: direct NSP users; secondary exchange users [i.e., received syringes and equipment from someone who attends an NSP]; knows a direct NSP user but does not receive any NSP syringes or materials from them; and does not know an NSP attendee and does not receive SEP syringes or materials) **How measured:** Self-reported use and involvement with NSPs **Methods of analysis:** **Length of follow-up:** Post-policy change **Number of participants lost to follow-up:** NR	Overall, following policy change there was a stronger maintenance of Indirect NSP user status over time than the other attendance typologies (transition probability = 0.736 Indirect NSP user vs. 0.560 for Isolated IDUs vs. 0.557 for Direct NSP users). There was a higher increase in the prevalence of Indirect NSP users (from 43.2% to 50.6%) than of Direct NSP users (29.2% to 31.5%). The prevalence of Isolated IDUs declined (from 27.6% to 17.8%). Indirect NSP users were more likely to maintain their status (transition probability = 0.736) or to become Direct NSP users (0.245). Direct NSP users were more likely to maintain their group (0.557) or to become Indirect NSP users (0.391). Isolated IDUs at had a greater probability of becoming an Indirect NSP user (0.269) than becoming a Direct NSP user (0.170), but were most likely to maintain their status (0.560).	**Limitations identified by the authors:** **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: National Institutes of Health, National Institute on Drug Abuse, National Institute on Mental Health

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Hayashi et al., 2010 **Country**: Canada (Vancouver) **Objectives**: To evaluate a peer-run outreach-based NSP **Study design:** Cross-sectional (nested in a cohort study) **Quality score**: + **External validity**: +	**Entry criteria:** Injecting drugs a minimum of once in the previous month, residing in the greater Vancouver region and providing written informed consent. These analyses included data from participants who completed follow-up visits between 1 December 2000 and 30 November 2003 and who reported having injected drugs during the 6 months prior to their visits. **Participant characteristics** Number of participants: 854 Gender (% male) 69% Ethnicity Aboriginal ancestry 34% Median age 37 y Homeless NR Injection duration NR **Programme description** VANDU Alley Patrol; peer-based outreach programme involving the distribution of sterile injection equipment and condoms, collection of used syringes, and provision of harm reduction education to PWID in areas where public drug use was concentrated.	**Outcomes measured:** Use of the VANDU Alley Patrol NSP **How measured:** Interviewer-administered questionnaire and blood sample **Methods of analysis:** Generalised estimating equations (GEE); GEE multivariate logistic regression model **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	Use of the VANDU Alley Patrol was associated with: unstable housing (AOR 1.83, 95% CI: 1.39–2.40); frequent heroin injection (AOR 1.31, 95% CI: 1.01–1.70); frequent cocaine injection (AOR 1.34, 95% CI: 1.03–1.73); injecting in public (AOR 3.07, 95% CI: 2.32–4.06); and needle reuse (AOR 0.65, 95% CI: 0.46–0.92). Use of the service was not associated with the following factors: gender; HIV positive; sex work, injecting with others; requiring help with injecting, difficulty accessing syringes; borrowing syringes; unsafe syringe disposal, or non-fatal overdose.	**Limitations identified by the authors:** Cannot infer causation, may not be generalisable to other populations of PWID. **Limitation identified by the review team:** **Evidence gaps:** **Sources of funding:** US National Institutes of Health, Canadian Institutes of Health Research

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Islam et al., 2008a **Country**: Australia **Objectives**: To examine risk behaviours of users of syringe dispensing machines **Study design:** Cross-sectional **Quality score**: + **External validity**: -	**Entry criteria:** PWID who used a syringe dispensing machine in the past month **Participant characteristics** Number of participants: 167 Gender (% male) 59% Ethnicity NR Median age (range) 34 years (15-57) Homeless NR Median injection duration 14 years Had methadone or buprenorphine treatment in past month 60% Primary user Dispensing machines 65% Staffed NSPs/chemists 43% **Programme description** Syringe dispensing machines. Dispense a FITPACK®, a rigid plastic container holding injecting equipment. Used weekly: 46% Used machines only during business hours (9am-5pm): 25% Used machines both within and outside business hours: 24% Used machines only outside of business hours: 51% Major reasons given for using machines were: 24-hour service (36.7%); easy to get to (17.2%); user wanting to hide identity as a drug user (17.2%); not liking the way they are treated at chemists/NSPs (16.8%).	**Outcomes measured:** Injecting behaviours, HIV and hep C status; disposal habits **How measured:** Self-completed questionnaire (face-to-face and reply paid envelope survey methods) **Methods of analysis:** **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	71.4% of younger (age ≤30) participants were primary users of vending machines (32.4% VM vs. 13.0% NSPs/pharmacies, p=0.03). Primary users of vending machines were more likely to report a shorter history of injecting (<16 years, 46.3% vs. 18.5%, p=0.00). Primary users were 9.5 times more likely than primary users of NSPs/chemists to identify stigma as a reason for using dispensing machines (p<0.01). Younger PWID (age≤30) were more likely to identify stigma as a main reason for using machines than older users (p=0.01). **Injection risk behaviours** Primary users of dispensing machines and primary users of staffed NSPs/chemists did not differ significantly in terms of sharing of injecting equipment (machine only vs. staffed NSP/chemist: OR 2.1, 95% CI 0.8-5.0) **BBVs** Self-reported hepatitis C and HIV prevalence was 57.5% and 3.0%.	**Limitations identified by the authors:** **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: Robert Wood Johnson Foundation

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Kerr et al., 2010 **Country**: Canada (Vancouver) **Objectives**: To assess the effects of NSP policy on rates of HIV risk behaviour and HIV incidence mong PWID **Study design:** Cohort study **Quality score**: + **External validity**: +	**Entry criteria:** Participants in the Vancouver Injection Drug Users Study (VIDUS) **Participant characteristics** Number of participants: 1,228 Gender (% male) 62% Ethnicity Aboriginal 29% Median age 33 y Homeless (past 6 months) Injection duration **Programme description** The authors defined the period after the NSP policy change as 2001–2003. During this time the focus shifted from syringe exchange to syringe distribution. The change in policy involved decentralisation of NSP services (increasing the number of sites distributing syringes, diversifying methods used to distribute syringes and removing limits on the number of syringes that could be obtained). Local health clinics were also required to provide sterile syringes to local PWID and programmes already providing outreach were asked to include syringe distribution in their activities. Further, PWID were able to acquire sterile syringes without having used syringes to exchange, and syringe distribution and collection programs were separated.	**Outcomes measured:** Self-reported syringe sharing (borrowing and lending) and HIV incidence. **How measured:** Interviewer-administered questionnaire and blood sample **Methods of analysis:** Generalized linear regression model; fixed multivariate generalized estimating equation (GEE) analyses; multivariate Cox proportional hazards regression analysis to estimate adjusted relative hazards of HIV seroconversion **Length of follow-up:** Six years; three years before policy change and three years after **Number of participants lost to follow-up:** 91% (n=1114) participants seen in 3 years before policy change; 60% (n=854) seen in 3 years after; 60% (n=740) participants seen in both periods.	During the study period, reductions in the proportion of participants reporting syringe borrowing (from 20.1% to 9.2%) and syringe lending (from 19.1% to 6.8%) were observed. Analysis of the factors independently associated with syringe borrowing and lending included the period following the change in NSP policy. Syringe borrowing: AOR 0.57, 95% CI 0.49-0.65 p<0.001 Syringe lending: AOR 0.52, 95% CI 0.45-0.60, p<0.001 The period following the change in NSP policy was also independently associated with HIV incidence (AOR 0.13, 95% CI 0.06-0.31, p<0.001). The authors noted that the rates of access to various sources of sterile syringes changed significantly over time with the changes in policy. Whilst, the proportion of participants accessing pharmacies, the fixed SEP, and the SEP vans declined over time, there was an increase in the proportion of participants who accessed other types of NSPs (e.g. street nurses, hotel-based SEPs, health clinics, and a 'Health Van'); in particular use of a drug user–led NSP increased quickly after the programme was implemented.	**Limitations identified by the authors:** Cannot infer causation; new policies were unlikely to have been implemented in a uniform fashion **Limitation identified by the review team:** **Evidence gaps:** **Sources of funding:** National Institutes of Health and the Canadian Institutes of Health Research

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Knittel et al., 2010 **Country**: USA (Michigan) **Objectives**: To determine whether a small NSP would demonstrate behavioural risk reduction effects **Study design:** Before and after **Quality score**: - **External validity**: -	**Entry criteria:** Not reported. **Participant characteristics** BL / FU / BL + FU Number of participants: 74 / 17 / 14 Gender (% male) 78% / 53% / 79% Ethnicity Black 54% / 12% / 57% White 43% / 0% / 36% Native American 3% / 0% / 0% NR 0% / 88% / 7% Mean age (SD) 48 (12) / 47 (9) / 54 (8) Homeless NR / NR / NR Injection duration NR / NR / NR **Programme description** Outreach van (parked three days a week in designated locations) providing sterile syringes, safer injection materials, condoms, HIV testing and counselling, and substance use specialist available to coordinate entry into treatment.	**Outcomes measured:** Injecting risk behaviours **How measured:** Structured survey **Methods of analysis:** Logistic regression **Length of follow-up:** Participants interviewed between 2003 and 2006 **Number of participants lost to follow-up:** 74/88 (84%)	**Injection risk behaviours** Compared to the baseline group, individuals at follow-up were significantly less likely to report giving another IDU a previously used syringe (OR 0.38, p = 0.042). Other measures of injection-related risk behaviour showed non-significant trends; NSP users at follow-up were: Less likely to report sharing syringes (OR 0.66), sharing equipment other than syringes (OR 0.70), or reusing syringes (OR 0.34). More likely to report exchanging syringes for another individual (OR 2.77).	**Limitations identified by the authors:** Use of multiple questionnaires; individuals who entered treatment were not captured at follow-up; use of dichotomised variables; small sample size. **Limitation identified by the review team:** Confidence intervals not reported **Evidence gaps:** None identified **Funding source**: University of Michigan

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
McDonald, 2009 **Country**: Australia **Objectives**: To evaluate the 12-month trial of syringe vending machines **Study design:** Cross-sectional study **Quality score**: - **External validity**: -	**Entry criteria:** NR **Participant characteristics** Number of participants: 147 Gender (% male) 57% Ethnicity NR Mean age (SD) 33 y Homeless (past 6 months) NR Injection duration NR **Programme description** Four vending machine installed on the outside walls of Community Health Centres. Dispensed FITPACKS® contained four 1ml 27 gauge syringes, alcohol swabs, a plastic spoon, water, cotton wool balls and a 'safer injecting' advice card. An extensive though narrowly targeted advertising campaign was implemented when the machines commenced operation. Sterile injecting equipment was also available to purchase from >30 community pharmacies and free of charge from approx. 15 other NSP outlets.	**Outcomes measured:** Characteristics **How measured:** Self-administered questionnaire distributed through NSPs and pharmacies. **Methods of analysis:** NR **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	NSVM users appeared to be younger than the NSP users (mean 33 years vs. 36 years) and a higher proportion were female (43% vs. 36%). 53% of VM users reported obtaining sterile injecting equipment from any outlet daily or almost daily, and 40% reported obtaining it from NSVMs daily or almost daily. 59% stated that NSVMs are their usual source of injecting. NSVM users reported using the machines for a variety of reasons: because other outlets were closed (73%), because it was more convenient to use the NSVM (53%); and because they did not like going to other outlets (28%). **Injection risk behaviours** 84% of NSVM users stated that having the NSVM "reduces the incidence of needle sharing among IDUs".	**Limitations identified by the authors:** Approach to obtaining data through the distribution of questionnaires through other community agencies. **Limitation identified by the review team:** **Evidence gaps:** **Sources of funding:**

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Miller et al., 2002 **Country**: Canada (Vancouver) **Objectives**: To characterise risk-taking behaviour according to primary source of clean needles accessed by an open cohort study of IDUs. **Study design:** Cross-sectional study **Quality score**: ++ **External validity**: ++	**Entry criteria:** VIDUS participants; had ever accessed an NSP, reported primarily accessing pharmacies or fixed/mobile NSP within the previous six months. **Participant characteristics** PH / Fixed / Van Number of participants: 62 / 768 / 190 Gender (% male) 81% / 64% / 59% Ethnicity Aboriginal 15% / 27% / 33% Median age (IQR) 36 (29-41) / 35 (28-41) / 32 (26-39) Homeless (unstable housing) 66% / 72% / 69% Median injection duration (IQR 16 (10-22) / 13 (5-23) / 10 (5-17) **Programme description** Three mobile NSP vans operating at staggered times between 17:30 and 08:00 with regular stops. N/S also available through a fixed site NSP operating from 08:00 to 20:00, 7 days a week and through purchase in pharmacies.	**Outcomes measured:** Injection risk behaviours; HIV; HCV **How measured:** Interviewer-administered questionnaire, venous blood sample for testing **Methods of analysis:** Cochran-Armitage trend test, ordinal logistic regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	Van users were more likely to inject cocaine daily (32% pharmacy; 46% fixed site; 46% van; p=0.024; AOR 1.35, 95% CI 1.01-1.80) and to have been paid for sex (15% pharmacy; 24% fixed site; 31% van; p=0.04; no independent association). Van users had a shorter history of injection than other users (p=0.002; AOR 0.97, 95% CI 0.95-0.98). **Injection risk behaviours** There was no significant trend for needle borrowing or lending, although pharmacy users were more likely to report needle sharing behaviours. *Needle sharing behaviours* Borrow: 47% pharmacy; 26% fixed site; 31% mobile van Lend: 45% pharmacy; 36% fixed site; 36% van **Blood borne viruses** The authors reported that there was no significant trend for HIV or HCV prevalence, although HIV prevalence was lower among pharmacy users than participants who reported using the van or fixed sites NSPs. *BBV serostatus* HIV+: 16% pharmacy; 25% fixed site; 21% mobile van HCV+: 89% pharmacy; 83% fixed site; 78% van	**Limitations identified by the authors:** Reliance on self-report data. **Limitation identified by the review team:** **Evidence gaps:** Developing gender and culturally appropriate programming. **Sources of funding:** Michael Smith Foundation for Health Research, Canadian Institute for Health Research,

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Moatti et al., 2001 **Country**: Marseille, France **Objectives**: To compare the characteristics of PWID according to the site where they last obtained new syringes. **Study design:** Cross-sectional study **Quality score**: + **External validity**: ++	**Entry criteria:** All PWID buying or exchanging N/S through pharmacies, NSPs and at vending machines were recruited on-site. **Participant characteristics** NSVM / PH / NSP Number of participants: 88 / 141 / 114 Gender (% male): 80% / 81% / 70% Ethnicity: NR / NR / NR Age 17-24 y: 14% / 11% / 4% 25-34 y: 73% / 73% / 77% ≥35 y: 14% / 16% / 19% Homeless (not living in own house during last month): 57% / 48% / 59% Injection duration ≤10 y: 52% / 55% / 36% >10 y: 48% / 45% / 64% **Programme description** Four vending machine installed on the outside walls of Community Health Centres. Dispensed FITPACKS® contained four 1ml 27 gauge syringes, alcohol swabs, a plastic spoon, water, cotton wool balls and a 'safer injecting' advice card. An extensive though narrowly targeted advertising campaign was implemented when the machines commenced operation. Sterile injecting equipment was also available to purchase from >30 community pharmacies and free of charge from approx. 15 other NSP outlets.	**Outcomes measured:** Access to healthcare, knowledge of HIV serostatus, drug use and injection practices **How measured:** Self-administered questionnaire **Methods of analysis:** Odds ratio calculated. **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	Compared to NSP users, vending machine users were younger (age ≥35 years: OR 0.5, 95% CI 0.3-0.9), had a significantly shorter history of injection drug use (duration of injecting drug ≤10 years: OR 1.9, 95% CI 1.1-3.4), and injected less frequently (frequency of injection in past 6 months, 1-2: OR 3.5, 95% CI 1.5-7.8). While they were less likely to be enrolled in drug maintenance treatment than NSP users (methadone programme: OR 0.4, 95% CI 0.1-0.9) they were marginally more likely to be in a methadone programme than pharmacy users (OR 3.2, 95% CI 1.0-10.4). **Injection risk behaviours** No differences between vending machine users and users of NSPs or pharmacies in terms of needle and syringe sharing (10.3% NSVM; 15.0% pharmacies; 7.9% NSP). Vending machine users reported significantly lower levels of sharing cookers, cotton and water during the previous 6 months than NSP users (16.1% vs. 36.0%; OR 0.3, 95% CI 0.2-0.7) **Blood borne viruses** Of those reporting HIV test results, NSP users were more likely to report being HIV positive (20.3% NSVM; 24.8% pharmacies; 35.3% NSP; NSVM vs. NSP: OR 0.5, 96% CI 0.2–0.9).	**Limitations identified by the authors:** Low response rate in some settings and potential for bias between responders and non-responders; HIV serostatus based on self-report. **Limitation identified by the review team:** **Evidence gaps:** Need for comparison of geographic areas with different types of services; cost-effectiveness of NSVM **Sources of funding:** City of Marseille (Mission Sida-Toxicomanie); the French Sickness Fund of Social Security (CPCAM-Bouches du Rhône); French Ministry for Social and Health Affairs (DDASS-Bouches du Rhône); National Institute on Drug Abuse

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Obadia et al., 1999 **Country**: Marseille, France **Objectives**: To evaluate whether vending machines represent a useful adjunct to other approaches for promoting access to sterile syringes, especially among young IDUs. **Study design:** Cross-sectional study **Quality score**: + **External validity**: ++	**Entry criteria:** NR **Participant characteristics** Primary NSVM / Primary other Number of participants: 73 / 270 Gender (% male): 80% / 76% Ethnicity: NR / NR Age 17-30: 53% / 37% >30: 47% / 63% Homeless (not living in own house in previous month): 69% / 50% Injection duration ≤10yrs: 56% / 46% >10yrs: 44% / 54% **Programme description** Sterile needles and syringes were available for purchase from pharmacies, from four NSPs and at seven vending machines	**Outcomes measured:** Injection risk behaviours **How measured:** Self-administered questionnaire **Methods of analysis:** Odds ratio and logistic regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	Primary VM users were significantly younger (OR 1.3, 95% CI, 1.1-1.8) and less likely to live in a house they personally owned or rented (OR 0.7, 95% CI 0.5-0.9); also less likely to have been in drug maintenance treatment in the past 6 months (OR 0.7, 95% CI 0.5-0.9). **Injection risk behaviours** There were no differences between vending machine users and users of other sources in terms of sharing needles in the previous six months (11.0% vs. 11.6%; OR 1.0, 95% CI 0.5, 2.4). However, vending machine users reported that they were significantly less likely to have shared cookers, cotton and water during the previous 6 months compared to non-users (12.3% vs. 29.8%; OR 0.3; 95% CI 0.2, 0.7).	**Limitations identified by the authors:** None identified **Limitation identified by the review team:** **Evidence gaps:** Whether introduction of vending machines may facilitate injection drug use among young people. **Sources of funding:** City of Marseille (Mission SIDA-Toxicomanie), French Sickness Fund of Social Security (CPCAM-Bouches du Rhone), the French Minister for Social and Health Affiars (DDASS-Bouches du Rhone), NIDA

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Riley et al., 2000 **Country**: USA (Baltimore) **Objectives**: To compare characteristics of first-time needle exchange participants who enrolled at a mobile van-based exchange site versus a fixed pharmacy-based exchange site, in an area where both types of needle exchange programmes were available **Study design:** Cross-sectional study **Quality score**: ++ **External validity**: ++	**Entry criteria:** All first-time NSP participants at van-based site or at one of two pharmacy-based site. **Participant characteristics** Van / PH Number of participants: 124 / 162 Gender (% male) 67% / 74% Ethnicity African American 88% / 96% Age < 40 y: 56% / 50% Homeless NR / NR Injection duration: ≥18 y 50% / 54% **Programme description** Mobile van-based NSP; two vans visited six sites, four days per week, exchanging N/S for two-hour shifts at each site; two fixed site pharmacy-based NSP open for a comparable number of hours (1-for-1 exchange).	**Outcomes measured:** Injection risk behaviours, sexual behaviour **How measured:** Interviewer-administered questionnaire; pre-test counselling and oral swab for HIV testing. **Methods of analysis:** Descriptive statistics and odd ratios calculated; logistic regression. **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** The different sites attracted first-time NSP users with different characteristics. Van users were less likely than pharmacy users to be African American (OR 0.30, 95% CI 0.11–0.81), but more likely to be cocaine injectors (OR 1.76, 95% CI 1.16–2.90), inject more frequently (≥4 injections/day in past 2 weeks: OR 2.08, 95% CI 1.28–3.40), and use a needle that had already been used by someone else (OR 1.98, 95% CI 1.33–3.68). Groups did not vary significantly by age, gender, employment, duration of injection, use of heroin, or syringes:injection ratio. Race (AOR 0.21, 95% CI0.08–0.64), cocaine injection (AOR 2.82, 95% CI 1.35–5.87) and injection frequency (≥4 injections/d in past 2 weeks: AOR 2.0, 95% CI 1.20–3.33) were predictors of NSP venue type after controlling for the other independent variables.	**Limitations identified by the authors:** Based on self-reported data; police activity may have influenced attendance in different ways at each venue; **Limitation identified by the review team:** **Evidence gaps:** **Sources of funding:** NIDA and US Department of Health and Human Services.

Study details	Population and setting Intervention	Outcomes and methods of analysis	Results	Review team notes
Rudolph et al., 2010a **Country**: USA (New York) **Objectives**: To compare PWID with different self-reported primary syringe sources in the last 6 months **Study design:** Cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** Aged 18 years or older who lived or spent at least one half of their time in one of the target neighbourhoods. Analysis restricted to participants who reported having injected in the previous 6 months. **Participant characteristics** Number of participants: 285 Gender (% male) 73% Ethnicity Black 16% Hispanic 67% Median age 36 y Homeless (past 6 months) 58% Injection duration NR Primary source of syringes (past 6 months) Pharmacies 27% NSPs 55% Other 18% **Programme description** Participants were categorized according to their primary syringe source (pharmacies, NSPs or other sources*) during the past 6 months. *Obtained the majority of their syringes from family members, relatives, spouses, boy/girlfriends, sex partners, friends, acquaintances, people with diabetes, drug dealers, needle dealers, bodegas, and smoke shops	**Outcomes measured:** Injection risk behaviours **How measured:** Interviewer-administered questionnaires **Methods of analysis:** Polytomous logistic regression model **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** Compared with IDUs who obtained most of their new syringes from other sources, those using NSPs as a primary syringe source were more likely to inject daily (OR 3.32, 95% CI 1.58–6.98) and more likely to use a new syringe when injecting (OR 2.68, 95% CI 1.30–5.54) after adjustment.	**Limitations identified by the authors:** Not possible to assess causal relationship or the direction of any relationship; random sampling not possible; use of interviewer administered questionnaire; missing values conservatively coded; potential for misclassification. **Limitation identified by the review team:** **Evidence gaps:** None identified **Funding source**: National Institute on Drug Abuse

Study details	Population and setting Intervention	Outcomes and methods of analysis	Results	Review team notes
Stark et al., 1994 **Country**: Germany **Objectives**: To assess the characteristics of users of vending machines **Study design:** Cross-sectional study **Quality score**: + **External validity**: ++	**Entry criteria:** All PWID approaching the machines were asked to participate. **Participant characteristics** Number of participants: 313 Gender (% male) 65% Ethnicity NR Median age 28 y Injection duration up to 2 years 22.4% more than 10 years 29.7% Injected drugs daily 88.8% **Programme description** PWID interviewed at three vending machines (~80 % of all syringes and needles provided by vending machines were purchased via these machines).	**Outcomes measured:** History of injection drug use; frequency of injecting; HIV status **How measured:** Interviewer-administered questionnaires **Methods of analysis:** Chi-square for bivariate and logistic regression for multivariate. **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	71.6% had at some time had contacts with drug agencies, including storefront units providing NSP; but only 32.6% had such contacts **Injection risk behaviours** 24.9% of participants had borrowed injection equipment in the past 6 months. Younger PWID were more likely to have borrowed needles and syringes. **Blood borne viruses** 59.9% of participants had had an HIV antibody test in the past 6 months. Of the participants with a known HIV test result, 19.8% reported that they were HIV-seropositive.	**Limitations identified by the authors:** Not possible to assess causal relationship or the direction of any relationship; random sampling not possible; use of interviewer administered questionnaire; missing values conservatively coded; potential for misclassification. **Limitation identified by the review team:** **Evidence gaps:** None identified **Funding source**: National Institute on Drug Abuse

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Vorobjov et al., 2009a **Country**: Estonia **Objectives**: To examine the levels of risk behaviour HIV infection among PWID who primarily use pharmacies compared to those who primarily use NSPs **Study design:** Cross-sectional study **Quality score**: + **External validity**: +	**Entry criteria:** 18 years or older, Russian or Estonian language speakers, use of injection drugs in the previous two months and ability to provide informed consent. **Participant characteristics** PH / NSP Number of participants: 133 / 195 Gender (% male) 89% / 82% Ethnicity Russian 85% / 87% Estonian 15% / 13% Age < 20 years 9% / 5% 20-24 years 31% / 31% 25-29 years 37% / 36% >30 years 23% / 29% Homeless NR / NR Injection duration 0-2 years 17% / 6% 3-5 years 23% / 16% 6-9 years 32% / 41% >10 years 29% / 38% Main drug injected (past 6 months) Fentanyl 74% / 85% Amphetamine 53% / 50% **Programme description** Not described in detail. Authors noted that NSPs typically provide additional services and that syringes are available from pharmacies without prescription,	**Outcomes measured:** Risk behaviours, access, utilization of harm reduction services **How measured:** Interviewer-administered questionnaire **Methods of analysis:** Multivariate analysis based on conceptual hierarchical framework; logistic regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** *Pharmacy users vs. NSP users* Sharing syringes during last 6 months: AOR 1.42, 95% CI 0.87–2.32, p=0.159 Sharing paraphernalia during last 6 months: AOR 1.33, 95% CI 0.76–2.34, p=0.312 Sharing needles with sexual partner during last 6 months: AOR 1.48, 95% CI 0.65–3.36, p=0.346 **BBVs** Self-report disease serostatus: HIV+: AOR 0.54, 95% CI 0.33–0.87, p=0.012 HCV+: AOR 0.10, 95% CI 0.02–0.50, p=0.005 Ever received drug treatment : AOR 1.16, 95 CI 0.71–1.89, p=0.548	**Limitations identified by the authors:** Design does not allow the establishment of a causal relationship or direction of causality; non-probability sample; potential for misclassification in study groups. **Limitation identified by the review team:** **Evidence gaps:** None identified **Funding source**: US National Institute on Drug Abuse; National Institutes of Health; Norwegian Financial Mechanism/EEA; Civilian Research Development Foundation; Global Fund to Fight HIV

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Wood et al., 2003 **Country**: Canada **Objectives**: To evaluate the risk profile of the population served by the VANDU* NSP and to determine factors associated with acquiring syringes from the VANDU NSP **Study design:** Cross-sectional study **Quality score**: + **External validity**: + *Vancouver Area Network of Drug Users	**Entry criteria:** Had injected drugs in the previous month; resided in the greater Vancouver region; provided written informed consent. **Participant characteristics** Number of participants: Non-users 422, Users 165 Gender (% male): Non-users 61%, Users 58% Ethnicity Other: Non-users 70%, Users 64% Aboriginal: Non-users 30%, Users 36% Median age (IQR): Non-users 40 (33-36), Users 38 (30-44) Homeless (unstable housing): Non-users 50%, Users 69% Injection duration: Non-users NR, Users NR HIV+: Non-users 32%, Users 41% **Programme description** Unsanctioned NSP operated by VANDU volunteers from a small tent. Open 7 days a week, from 20:00 to 4:00 for 9 months. Flexible N/S policy enabled users to obtain up to 10 N/S if no N/S were available to exchange.	**Outcomes measured:** Drug use, injection risk behaviour, and drug treatment **How measured:** Interviewer-administered questionnaire and blood sample. **Methods of analysis:** Pearson's chi-square test, Wilcoxon rank sum test, logistic regression **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** Variables independently positively associated with obtaining syringes from the VANDU NSP were frequent cocaine injection (AOR 1.56, 95% CI 1.00-2.44), injecting in public (AOR 2.71, 95% CI 1.62–4.53), requiring help injecting (AOR 2.13, 95% CI 1.33–3.42), and safe syringe disposal (AOR 2.69, 95% CI 1.38–5.21). There was no difference in borrowing syringes in the last 6 months (11% non-users vs. 12% VANDU NSP users).	**Limitations identified by the authors:** Reliance on self-report, potential for socially desirable responses. **Limitation identified by the review team:** **Evidence gaps:** None identified **Funding source**: Researchers supported by Michael Smith Foundation for Health Research and Canadian Institutes of Health Research.

Which additional harm reduction services offered by NSPs are effective and cost-effective?

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Aspinall et al., 2012 **Country**: Scotland, UK **Objectives**: To examine factors associated with paraphernalia sharing, in particular uptake of paraphernalia **Study design:** Cross-sectional **Quality score**: + **External validity**: ++	**Entry criteria:** Clients attending participating NSPs and other harm reduction services who had ever injected drugs; provided informed consent **Participant characteristics** Number of participants: 2,037 Gender (% male) 73% Ethnicity NR Age >30 years 60% Homeless (past 6 months) 30% MMT (all of past 6 months) 52% Injection duration <6 years 34% 6-15 years 50% >15 years 17% Drugs injected (past 6 months) Stimulants ± other drugs 22% Heroin only 76% Body building ± other drugs 2% **Programme description** Various NSP services participated; 48% pharmacy-based NSPs and 56% specialist NSPs.	**Outcomes measured:** Paraphernalia sharing in previous 6 months; injecting frequency; 'shortfall' of paraphernalia **How measured:** Interviewer-administered questionnaire **Methods of analysis:** Logistic regression used to calculate odds of self-reported sharing. Two separate multivariate logistic regression models were fitted (Model 1 examined number of items collected and Model 2 examined shortfall) **Length of follow-up:** NA **Number of participants lost to follow-up:** NA	**Injection risk behaviours** *Filters* Odds of sharing a filter (AOR, 95% CI) compared to those obtaining no filters in average week in previous 6 months: 1-15 filters: 0.80 (0.59–1.08) 16–30 filters: 0.88 (0.64–1.23) >30 filters: 0.50 (0.32–0.79) Odds of sharing a filter (AOR, 95% CI) compared to those with no shortfall of filters in average week in previous 6 months: Shortfall of 1–10 filters: 1.20 (0.90–1.61) Shortfall of more than 10 filters: 1.55 (1.12–2.14) *Spoons* Odds of sharing a spoon (AOR, 95% CI) compared to those obtaining no spoons in average week in previous 6 months: 1–15 spoons: 0.61 (0.45–0.82) 16–30 spoons: 0.56 (0.39–0.79) >30 spoons: 0.46 (0.28–0.74) Odds of sharing a spoon (AOR, 95% CI) compared to those with no shortfall of spoons in average week in previous 6 months: Shortfall of 1–10 spoons: 1.37 (1.02–1.83) Shortfall of >10 spoons: 1.85 (1.31–2.60) *Sterile water* Odds of sharing a sterile water ampoule (AOR, 95% CI) compared to those not collecting sterile water in average week in previous 6 months: Collected sterile water: 0.36 (0.22–0.61) Odds of sharing a sterile water ampoule (AOR, 95% CI) compared to those with no shortfall of sterile water in average week in previous 6 months: Shortfall of sterile water: 5.84 (2.32–14.71)	**Limitations identified by the authors:** Interviewer-administered questionnaire may have prompted socially desirable responses; measure of shortfall may underestimate true amount. **Limitation identified by the review team:** **Evidence gaps:** How provision of paraphernalia impacts on HCV transmission among PWID. **Sources of funding:** Scottish Government

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
de Montigny et al., 2010 **Country**: Canada **Objectives**: To quantify the effect of drop boxes (DBs) on discarded needles **Study design:** Time-series approach **Quality score**: + **External validity**: ++	**Entry criteria:** Analysed a dataset of discarded needles collected from a 2.5 km squared area in central Montréal. Sites at which discarded needles were collected were noted in situ and then plotted on paper maps at monthly intervals and subsequently geocoded. Each discard collection site was given a value (magnitude) equal to the total number of discards collected at that location within the calendar month. Actual DB use could not be measured. Used monthly tallies from NSP as an estimate of the total number of needles distributed. Returned needles were subtracted from distributed needles to estimate unreturned needles. Buffers were constructed around all DB locations at 4 distances (25, 50, 100 and 200m). **Participant characteristic** NA **Programme description** DBs were placed following two strategies: installing DBs outside NSP facilities, and targeting areas with high levels of discarded needles (“hot spots”). DBs were locked stainless-steel boxes protecting a standard-issue disposable sharps container with a maximum capacity of approximately 450 needles.	**Outcomes measured:** Association between the monthly number of discards collected in a buffer and the presence/absence of a DB. **How measured**: See above **Methods of analysis:** Quasi-Poisson regression to model association **Length of follow-up:** 2001-2006 (data missing for 2004) **Number of participants lost to follow-up**: NA	**Injection risk behaviours** The presence of a DB was associated with fewer discarded needles for all four buffer sizes. When other variables were held constant, the presence of a DB was associated with the following reduction of discards: 98% within 25m; 92% within 50m; 73% within 100m; and 71% within 200m. None of the covariates were consistently associated with discards (e.g. weather).	**Limitations identified by the authors:** Omitted variables and missing data; did not investigate secondary effects of drop boxes (e.g. effects on crime) **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: Robert Wood Johnson Foundation

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Gagnon et al., 2010 **Country**: Canada **Objectives**: To evaluate the efficacy of a theory-based intervention to increase the use of a new syringe for every injection among PWID **Study design:** Randomised controlled trial **Quality score**: + **External validity**: +	**Entry criteria:** Aged 18 years or older, used an NSP, had injected at least once in the past month. **Participant characteristics** Intervention / Control Number of participants: 130 / 130 Gender (% male) 68% / 71% Ethnicity NR / NR Mean age (SD) 36 (10) / 34 (10) Homeless NR / NR Injection duration NR / NR **Programme description** Users from two NSPs were involved. The standard intervention involved needle exchange, psychosocial support and social and health referrals. **Computer tailored intervention** A website including an electronic bank of 22 audiovisual messages (four change messages and 10 reinforcement messages) delivered by a virtual character and which targeted injecting practices. Participants reported to the NSP once a week for four weeks to receive a message via a computer. On first contact this was selected via a decision algorithm after completion of an on-line questionnaire (measured intentions, attitudes, perceived behavioural control and behaviour). At subsequent contacts, only behaviours were measured and a reinforcement message chosen.	**Method of allocation:** Randomisation occurred in five successive blocks. Community workers drew cards to assign participants (half with 'experimental group' written on them and half with 'control group'). **Outcomes measured:** Proportion of 'dirty' syringes used over the last week; prevalence of 'safe' behaviour over the last week **How measured:** Questionnaire **Methods of analysis:** Generalised estimating equations (GEE); Poisson regression; GEE log-binomial regression. Site and block variables included as covariates. **Length of follow-up:** 21 days; 3 months **Number of participants lost to follow-up:** 9.6% at short-term follow-up; 33.0% at long-term follow-up	**Injection risk behaviours** A significant difference in the proportion of 'dirty' syringes used by participants was observed between groups at short-term follow-up (intervention 8.5% vs. control 19.5%; RR 0.44, 95% CI 0.26-0.72, p=0.001) but not at the long-term follow-up (intervention 12.7% vs. control 20.2%; RR 0.63, 95% CI 0.30-1.33). The adoption of safe behaviour was significantly greater in the intervention group over the short-term (intervention 53.5% vs. control 69.3%; RR 1.29, 95% CI 1.06-1.59), but again there was no difference at the long-term follow-up (intervention 59.4% vs. control 62.6%; RR 1.05, 95% CI 0.83-1.33).	**Limitations identified by the authors:** Higher frequency of contact with intervention participants than control participants; high rate of attrition may have decreased statistical power; may have limited generalisibility to other settings. **Limitation identified by the review team:** Weak method of random allocation **Evidence gaps:** **Sources of funding:** Fonds Québecois de la recherche sur la société et la culture.

NSP update - Update evidence review

Review details	Review search parameters	Outcomes and methods of analysis	Results	Review team notes
Gillies et al., 2010 **Country:** UK **Objectives:** To determine whether the provision of sterile non-N/S injecting paraphernalia reduces injecting risk behaviours or HCV transmission among PWID **Review design:** Systematic review (narrative synthesis) **Quality score**: ++	**Databases and websites searched:** MEDLINE, MEDLINE In- Process & Other Non-Indexed Citations, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects, EMBASE and PsycINFO. **Other search methods:** Grey literature searched, reference lists of selected articles reviewed, citation checks **Years searched:** January 1989 and February 2010 **Inclusion criteria:** Primary research studies examining exposure to injecting paraphernalia (limited to drug cookers, filters and water) among current PWID on (i) incident HCV infection (ii) prevalent HCV infection and (iii) injecting risk behaviours, namely the self-reported sharing of drug cookers, filters and/or water. **Exclusion criteria:** Studies that did not provide one or more of the items of paraphernalia or that did not explicitly state which items of paraphernalia were provided. **Number of studies**: 13 studies	**Outcomes measured:** Incident HCV infection; prevalent HCV infection and; injecting risk behaviours, namely the self-reported sharing of drug cookers, filters and/or water. **How measured:** NR **Methods of analysis**: Narrative synthesis	No studies were identified that examined the relationship between the supply of injecting paraphernalia (other than needle and syringes) and biological measures of HCV infection. Eight studies presented adjusted odds ratios for the association between exposure to an NSP and sharing injecting paraphernalia. Effect size estimates were suggestive of a reduction in the odds of sharing injecting paraphernalia associated with exposure to NSP, but confidence intervals were wide and often included unity. Four studies that examined unadjusted temporal trends in the prevalence of sharing injecting paraphernalia reported significant reductions over time, usually coinciding with an increase in NSP use. One study that reported an adjusted temporal trend found that prevalence rates of sharing injecting paraphernalia were lower at each time point in non-NSP users compared to NSP users. Authors conclude that while current evidence suggests that attendance at NSP providing sterile injecting paraphernalia may be associated with reduced sharing of injecting paraphernalia, the evidence is limited by the number and quality of the studies.	**Limitations identified by the authors:** Not able to present overall measure of effect; did not examine all potential benefits. **Limitation identified by the review team:** **Evidence gaps:** **Funding source:**

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Havens et al., 2009 **Country**: USA (Baltimore) **Objectives**: To determine the effect of a case management intervention on retention in OST among PWID enrolled via and NSP. **Study design:** Cluster randomised controlled trial **Quality score**: + **External validity**: +	**Entry criteria:** Aged 18 or older, having been enrolled in the NSP for minimum 30 days; exhibiting symptoms of opiate dependence (DSM IV). Eligible for analysis if entered OST. **Participant characteristics** Number of participants: 127 (62 intervention, 65 control) Gender (% male) 68% Ethnicity 77% African American Median age 43 y Homeless NR Injection duration NR **Programme description** Participants randomised at an intervention site offered free case management services. Case managers assisted clients in setting treatment goals and helped clients manage their needs to achieve those goals.	**Outcomes measured:** Retention in OST **How measured:** Record linkage to verify dates of entry and exit from drug treatment. **Methods of analysis:** Stepwise Cox proportional hazards model used to conduct multivariate analyses. **Length of follow-up:** 18 months **Number of participants lost to follow-up:** NA	No differences in retention between those randomized to the intervention group versus those in the control arm (unadjusted relative hazard 1.02, 95% CI 0.67–1.56). Factors predictive of shorter retention in OST ($p<0.05$ after adjustment) were: living at least 4.5 miles from the treatment site; having lived in more than one place in the past year; buying drugs for someone else at least twice per week in the prior 6 months; and having a baseline psychiatric ASI of at least 0.1. Participants with the following characteristics were enrolled in OST for a significantly greater number of days: unemployed and not seeking employment; previously enrolled in an outpatient drug free program; and had requested a treatment slot from the NSP at least twice.	**Limitations identified by the authors:** Imprecision of distance measure used; generalizability of results may be limited; **Limitation identified by the review team:** **Evidence gaps:** Further study of impact of lack of transportation and stable housing on retention. **Sources of funding:** National Institute on Drug Abuse.

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Hu et al., 2008 **Country**: USA **Objectives**: To determine if targeting PWID for HBV vaccination through NSPs is cost-effective **Type of economic analysis:** Cost-effectiveness analysis; cost-utility analysis **Economic perspective**: Healthcare provider **Quality score**: Minor limitations **Applicability**: Partially applicable	**Source population:** Based on data from the Hepatitis Vaccine Study (participants aged ≥18 years and had injected drugs in past 30 days). Only individuals susceptible to HBV infection (i.e. –ve for HBsAB, HBcAb and HBsAg) were included in the vaccine programme. **Setting:** NSP, no further information provided. **Data sources:** Incidence of HBV infection and transition probabilities used in the model were estimated from the published literature. **Intervention description:** Participants were randomised to a standard (0, 1 and 6 months) or accelerated (0, 1 and 2 months) vaccination schedule. Vaccination strategies examined were: (i) 'standard vaccination with first dose after screening visit' (current standard recommended practice); (ii) 'standard vaccination with first dose at screening visit'; (iii) 'accelerated vaccination with first dose after screening'; and (iv) 'accelerated vaccination with first dose at screening'. **Comparator:** No vaccination strategy. **Sample size:**1,964 PWID	**Outcomes:** New acute HBV infections; QALY (scale obtained from a study of HBV-related illnesses); future medical costs **Time horizon**: Lifetime **Discount rates**: QALYs and future medical costs discounted at 3% annual rate **Perspective**: Healthcare sector **Measures of uncertainty**: Probabilities of disease progression, incidence rate of acute infection, % susceptible PWID, vaccine completion rates, successful immunisation rates, injecting cessation rates, and access to medical care **Modelling method**: Decision tree/Markov model. The model estimated the number of new acute HBV infections, QALYs and the future medical costs for each strategy. Results of the model summarised as the difference between the total costs of each strategy and costs incurred in the no-vaccination strategy.	**Primary analyses** ***Benefits (acute infection prevented; QALYs gained)*** No vaccination: 0; 0 Standard (i): 225; 0.07 Standard (ii): 264; 0.08 Accelerated (iii): 326; 0.10 Accelerated (iv): 382; 0.12 ***Costs (Medical costs [$]; Net cost [$] $10 vaccine; Net cost [$] $55 vaccine)*** No vaccination: 1,414,526; NA; NA Standard (i): 914,508; -157,967; -96,812 Standard (ii): 827,333; -238,267; -173,557 Accelerated (iii): 690,815; -358,928; -220,582 Accelerated (iv): 565,811; -473,999; -330,524 ***ICERS*** Compared with the no-vaccination strategy, the four vaccination strategies were all more effective and less costly (i.e. dominant). **Sensitivity analyses** Varying the disease progression factors did not change the cost saving result. All four strategies were no longer cost saving in comparison to no vaccination, when: • susceptibility rate was <17% • annual incidence rate <2.5% • injecting cessation rate >29% • PWID access to medical care <46%	**Limitations identified by the authors:** Suggest that these estimates are likely to be conservative. **Limitation identified by the review team:** **Evidence gaps:** None identified **Sources of funding:** National Institute on Drug Abuse

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Islam et al., 2012a **Country**: Australia **Objectives**: To examine patterns and correlates of uptake of referrals to a tertiary liver clinic, and subsequent HCV treatment initiation **Study design:** Cohort study **Quality score**: + **External validity**: +	**Entry criteria:** Accessed the Harm Minimisation Clinic between July 2006 and December 2010. **Participant characteristics** Number of participants: 479 Gender (% male) 77% Ethnicity Born in Australia 78% Aboriginal and/or Torres Strait Islander 13% Mean age (SD) 35 y (9) Homeless (past 6 months) NR History of injecting drug use 86% **Programme description** Nurse-led service (clinical nurse consultant and registered nurse specialising in primary healthcare with marginalised communities) with a case-worker and visiting medical officer. Co-located with NSP services in a multidisciplinary centre. Patients may be referred through the NSP or other community health services. On initial visit receive assessments on: drug and alcohol use; BBV risks and status; mental health; sexual health; and general health. Other services commonly offered included care and management for wounds, veins and abscesses; hepatitis B vaccination; general health consultations; welfare services; counselling; referrals to other health services; and support throughout HCV assessment and antiviral therapy.	**Outcomes measured:** Liver clinic attendance **How measured:** Extracted manually from intake assessment, progress notes and laboratory results; self-report HCV treatment initiation (verified against a database). **Methods of analysis:** Multivariate logistic regression to assess associations between attendance at the liver clinic and socio-demographic, drug use and other potential covariates. **Length of follow-up:** **Number of participants lost to follow-up:**	74% (353/479) of clients underwent HCV antibody screening and 60% (212/353) tested HCV positive. Qualitative HCV-RNA testing was performed for 93% (197/212), of whom 73% (143/197) tested positive. Liver clinic referral appointments were made for 96 clients (67%); other 47 were not referred for reasons including loss to follow-up (n=23) and unwillingness to take up referral (n=20). 71% (68/96) of referred clients attended the liver clinic (mean of 1.3 appointment bookings; SD 0.76; range 1–6). However, 78% of those who attended (53/68) did so at their initial referral appointment. HCV antiviral therapy was commenced by 11 clients; by Dec 2010, seven achieved a sustained viral response.	**Limitations identified by the authors:** Not able to examine associations between duration of infection, and referral uptake or treatment initiation; majority of clients who attended the liver clinic and commenced HCV treatment were referred from a residential treatment service and so cannot be considered representative of the overall PWID population. **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: NR

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Kidorf et al., 2009 **Country**: USA (Baltimore) **Objectives**: To evaluate the effectiveness of an intervention combining motivational enhancement and treatment readiness groups, with and without monetary incentives for attendance and treatment enrolment, on enhancing rates of substance use treatment entry among new registrants at an NSP **Study design:** Randomised controlled trial **Quality score**: + **External validity**: +	**Entry criteria:** New NSP registrants; expressed an interest in the study; current opioid dependence; aged less than 60 years. PWID who were currently receiving substance abuse treatment or had a major mental illness or severe cognitive impairment that interfered with understanding and completing study procedures were excluded. **Participant characteristics** MR / MR+I / SR Number of participants: 94 / 94 / 93 Gender (% male): 71% / 77% / 75% Ethnicity Non-White: 76% / 75% / 76% Mean age (SD): 41 / 40 / 42 Homeless: 12% / 8% / 10% Injection duration: NR / NR / NR History of opioid treatment: 73% / 81% / 67% **Programme description** Motivated Referral (MR; with and without incentives; +I): (i) eight 1-hour individual motivational enhancement sessions (two/week for first 2 months); and (ii) 16 1-hour treatment readiness groups (two/week for first four months). Also received a hand out. Incentives for attending each motivational enhancement session were $10 cash, $10 McDonalds gift certificate, and $3 day bus pass and for attending each treatment readiness group were $10 cash and $3 day bus pass. All participants entering drug treatment received a $50 voucher to help pay for intake and admission charges. Participants encouraged to attend reengagement sessions (see Kidorf et al., 2011a). Participants who received standard referral (SR) were informed about usual care referral services offered by the NSP.	**Outcomes measured:** Acquisition, modality and days of substance abuse treatment **How measured:** Baseline questionnaire, structured clinical interview for DSM-IV, treatment acquisition form **Methods of analysis:** Logistic regression **Length of follow-up:** 4 months; 12 months (Kidorf et al., 2012) **Number of participants lost to follow-up:** At final follow-up, 26 MR+I, 23 MR, and 17 SR.	***4-month follow-up*** MR+I participants more likely to enrol in any treatment (52.1%) compared to MR (31.9%) or SR (35.5%) participants (p=0.01). MR+I vs. MR: OR 2.32, 95% CI 1.27-4.23 MR+I vs. SR: OR 1.90, 95% CI 1.04–3.46 MR vs. SR: OR 1.46, 95% CI 0.85–2.49 MR+I participants more likely to enrol in methadone maintenance treatment (40.4%) than MR (20.2%) or SR (16.1%) participants (p<0.001). MR+I vs. MR: OR 2.87, 95% CI 1.48–5.58 MR+I vs. SR: OR 3.53, 95% CI 1.75–7.12 MR vs. SR: OR 1.32, 95% CI 0.62–2.8 No condition differences were found for enrolment to other treatment/ therapeutic modalities. Logistic regression detected category differences between low and high attenders (OR 8.0, 95% CI: 2.53–25.28), but not between low and medium attender groups (OR 1.65, 95% CI: 0.60–4.53). ***12-month follow-up*** No between-group differences observed for enrolment in any treatment (MR+I 62.8%; MR 52.1%; SR 50.5%). MR+I vs. MR: AOR 1.41, 95% CI 0.78–2.55 MR+I vs. SR: AOR 1.52, 95% CI 0.84–2.75 MR vs. SR: AOR 1.08, 95% CI 0.60–1.92 MR+I participants more likely to enrol in MMT (46.8%) compared to MR (26.6%) or SR (24.7%) participants. MR+I vs. MR: AOR 2.29, 95% CI 1.23–4.24 MR+I vs. SR: AOR 2.54, 95% CI 1.36–4.75 MR vs, SR: AOR 1.11, 95% CI 0.57–2.15	**Limitations identified by the authors:** Randomised sample might not represent the general population fully; could not establish independent effectiveness of the two specific interventions; infrequent measurement of treatment fidelity; expense of providing incentives more generally. **Limitation identified by the review team:** **Evidence gaps:** **Sources of funding:**

			Authors note that across all participants, most new MMT enrolment (85%; 72/85) and any treatment enrolment (72%; 112/154) occurred during the first 4 months of participation. MR+I participants averaged more days in treatment per 30-day period (6.9 [0.75]) than MR (3.5 [0.78]) or SR (1.7 [0.75]) participants (p<0.001). A comparison of mean treatment days from Months 1–6 to Months 7–12 yielded no time effect. Survival analyses showed that MR+I participants enrolled in MMT more quickly than SR participants (AHR 2.17, 95% CI 1.30–3.62); MR-only and SR participants did not differ (AHR 1.14, 95% CI 0.65–2.02). No difference in time to first any treatment. MR+I participants reported fewer days of heroin and injection drug use (18.1 [0.84]; 17.0 [0.92]) than MR (23.5 [0.88]; 21.6 [0.96]) or SR (24.1 [0.85]; 21.6 [0.93]) participants. Significant time effects indicating reduction in heroin and injection drug use were observed from Months 1–6 to Months 7–12 (p<0.001), but not across conditions. No condition differences in cocaine use or syringe sharing were observed.

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Kidorf et al., 2011a **Country**: USA (Baltimore) **Objectives**: To evaluate a novel treatment reengagement intervention for participants enrolled in treatment as part of a clinical trial (Kidorf et al., 2009) **Study design:** Cohort study **Quality score**: + **External validity**: +	**Entry criteria:** Enrolled in any modality of treatment in the original trial (Kidorf et al., 2009). **Participant characteristics** MR / MR+I / SR Number of participants: 31 / 49 / 33 Gender (% male) 74% / 61% / 61% Ethnicity Non-White 68% / 65% / 70% Mean age (SD) 42 / 40 / 40 Homeless NR / NR / NR Injection duration NR / NR / NR First treatment modality Methadone 65% / 65% / 46% Other 36% / 35% / 54% **Programme description** Participants in the two intervention arms (Kidorf et al., 2009) offered participation in up to 12 additional weekly treatment reengagement group sessions if they left treatment before resolution of the problem (modelled on the treatment readiness groups); MR+I participants received incentives for attending the group and returning to treatment ($10 cash, $3 day bus pass and additional $50 for re-enrolling in treatment). SR participants could return to treatment using usual procedures (encouraged to return to NSP if interested in new treatment referral).	**Outcomes measured:** Lifetime participation in opioid treatment; problem severity; self-report motivation to change opioid use; cognitive impairment; treatment reengagement **How measured:** Questionnaire; structured clinical interview for DSM-IV; Addiction Severity Index; Mini Mental Status Exam **Methods of analysis:** Cox proportional hazards regressions to evaluate condition differences in time to first leave treatment; logistic regression analyses used to test association between treatment reengagement group participation and any treatment reengagement and MMT reengagement (controlled for modality of first treatment and days of treatment of first treatment episode). **Length of follow-up:** 12 months **Number of participants lost to follow-up:**	MR+I participants were considerably more likely than MR participants to attend at least one reengagement group session (51% vs. 4%, p<0.001) and attended a higher mean number of sessions (3.6 [SE 5.04] vs. 0.08 [SE 0.40], p=0.001). MR+I participants were more likely to reenrol in any treatment/MMT (64.4%/44.4%) then MR (28.0%/12.0%) or SR (37.0%/3.7%) participants. Unadjusted odds Any treatment MR+I vs. MR: OR 4.66, 95% CI 1.61–13.52 MR+I vs. SR: OR 3.08, 95% CI 1.14–8.30 MR vs. SR: OR 0.66, 95% CI 0.21–2.13 MMT MR+I vs. MR: OR 5.87, 95% CI 1.53–22.45 MR+I vs. SR: OR 20.80, 95% CI 2.59–166.84 MR vs. SR: OR 3.55, 95% CI 0.34–36.56 Participation in at least one treatment reengagement group session was associated with methadone treatment reenrolment (AOR 5.51, 95% CI 1.92–15.83), but not any treatment reenrolment (AOR 2.57, 95% CI 0.96–6.88). Neither modality of the first episode of treatment or days in treatment of the first episode associated with treatment enrolment.	**Limitations identified by the authors:** Absence of an experimental design; intervention exposure may have influenced subsequent decisions to reenrol. **Limitation identified by the review team:** **Evidence gaps:** **Sources of funding:** National Institute on Drug Abuse

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Kidorf et al., 2011b **Country**: USA (Baltimore) **Objectives**: To compare drug use and high-risk behaviour in new NSP enrollees that were concurrently receiving treatment versus those not. **Study design:** Cohort study **Quality score**: + **External validity**: +	**Entry criteria:** Opioid dependent individual newly registered at the NSP (May 2003-March 2007); eligible if 18-65 years old, injecting heroin, and not currently receiving treatment. (Same sample as Kidorf et al., 2009; participants failing to provide follow-up data were excluded [n=41]). **Participant characteristics** Number of participants: Gender (% male) Ethnicity Mean age (SD) Homeless (past 6 months) Injection duration **Programme description** See Kidorf et al., 2009 for details of treatment referral conditions.	**Outcomes measured:** Treatment enrolment; opioid and cocaine use; injection drug use; syringe sharing; community resource use. **How measured:** Structured Clinical Interview for DSM-IV; Addiction Severity Index; **Methods of analysis:** Multilevel analyses; ANCOVA; Pearson and Spearman correlations. **Length of follow-up:** 4 months **Number of participants lost to follow-up:** see Kidorf et al., 2009	Treatment enrolled participants reported fewer days of opioid and cocaine use and injection drug use than no treatment participants in each 30-day observation period. No difference in equipment sharing or emergency room visits. No treatment participants used the NSP on a greater number of days per months. Treatment enrolled vs. no treatment Opioid use: 18.06 (1.61) vs. 22.78 (1.57), p<0.001 Cocaine use: 8.23 (2.03) vs. 11.89 (1.97), p<0.01 Injection drug use: 17.50 (1.74) vs. 22.58 (1.69), p<0.001 Equipment sharing: 1.02 (1.38) vs. 2.37 (1.34) Emergency room visits: 0.11 (0.06) vs. 0.06 (0.06) Syringe exchange use: 1.21 (0.61) vs. 2.58 (0.59); p=0.001 Both treatment enrolled and no treatment participants reported reducing % days of heroin and cocaine use over time; treatment enrolled participants had a greater reduction in use of heroin (p<0.001) and cocaine (p=0.05).	**Limitations identified by the authors:** Not based on random assignment; reduced generalizability of the findings; lack of observation over a longer time period. **Limitation identified by the review team:** **Evidence gaps:** **Sources of funding:**

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Leonard et al., 2008 **Country**: Canada (Ottawa) **Objectives**: To characterise the operation of the Safer Crack Use Initiative and its acceptability PWID; and to examine the impact of the initiative on injection risk behaviours. **Study design:** Repeat cross-sectional study) (mixed methods) **Quality score**: - **External validity**: +	**Entry criteria:** Street-recruited PWID; injected drugs in past 6 months **Participant characteristics** 1 2 3 4 Number of participants: 112 114 157 167 Gender (% male) 78% 68% 82% 77% Ethnicity NR NR NR NR Mean age (SD) 37 (10) 35 (10) 37 (10) 37 (9) Unstable housing (past 6 months) 65% 64% 64% 61% Age first injected (mean) 22 22 23 22 **Programme description** "Safer Crack Use Initiative": crack kits made available at all NSP sites and through some partner agencies. Kits contained a glass stem, brass screens, a rubber mouthpiece, a chopstick, alcohol swabs, condoms, lubricant, lip balm, gum, hand wipes and material emphasising non-sharing behaviour and safe disposal. NB: 1= 6 months PRE; 2= 1 month POST; 3= 6 months POST; 4= 12 months POST	**Outcomes measured:** Frequency of injecting and smoking crack **How measured:** Questionnaire, personal structured interviews and saliva sample for HCV antibody testing **Methods of analysis:** ANOVA for continuous variables; Chi-square tests for categorical variables; Fisher's exact test to detect significant associations. **Length of follow-up:** 12 months **Number of participants lost to follow-up:** NA	**Injection risk behaviours** Decreasing proportions of participants reported that they had injected drugs in the month prior to their interview: 96 % pre-implementation; 84 % 1-month post-implementation; and 78 % at the 6- and 12-month post-implementation evaluation points (p<0.001). Majority of participants (56%) reported that their level of engagement in injecting drugs had not changed since the introduction of the initiative. However, 41 % of participants at the 6-month post-implementation evaluation point and 40 % at the 12-month point reported that their level of engagement in injecting drugs had declined. Main reasons given for this decline were stated intentions to decrease overall engagement in injecting drugs and a preference for smoking over injecting as the route of administration. Access to safer smoking supplies was the third ranked reason for injecting less.	**Limitations identified by the authors:** Sample drawn from a series of cross-sectional studies with convenience samples precluded the possibility of determining within-individual drug use changes; possibility of recall bias; **Limitation identified by the review team:** **Evidence gaps:** **Sources of funding:**

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Riley et al., 1998 **Country**: Baltimore, USA **Objectives**: To evaluate the installation of drop boxes by determining changes in the number and distribution of discarded needle **Study design:** Controlled before and after study (mixed methods) **Quality score**: + **External validity**: +	**Entry criteria:** A survey team performed standardised counts of discarded needles. Counts were conducted before and after initiation of the pilot project. Control blocks were matched on levels of aggravated assault, and drug treatment admission rates. **Participant characteristic** NA **Programme description** Four drop boxes installed on street corners within a 10 block radius in an area not served by an NSP. Boxes were accessible 24 hours each day and no limits were set on the number or types of needles disposed.	**Outcomes measured:** Ratio between pre- and post-intervention discards collected in drop box blocks and control blocks. **How measured**: See above **Methods of analysis:** Chi-squared tests based on likelihood ratios; Poisson distribution used in regression models for count data. **Length of follow-up:** 2001-2006 (data missing for 2004) **Number of participants lost to follow-up**: NA	**Injection risk behaviours** Four needles sighted pre-intervention (2 in drop box blocks and 2 in control blocks) and eight needles sighted post-interventions (4 in drop box blocks and 4 in control blocks). No difference in the rate ratios when pre- and post-intervention samples were compared. Overall rate ratio for drop box blocks compared to control blocks was 0.83 (95% CI 0.27-2.60).	**Limitations identified by the authors:** None identified. **Limitation identified by the review team:** Small number of drop boxes installed. **Evidence gaps:** **Funding source**: Association of Schools of Public Health

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Rudolph et al., 2010b **Country**: USA (New York City) **Objectives**: To evaluate the feasibility and effectiveness of an intervention designed to link PWID purchasing needles in pharmacies to medical/social services **Study design:** Controlled before and after **Quality score**: - **External validity**: -	**Entry criteria:** EASP-registered pharmacies selected from two high drug activity neighbourhoods; eligible if (a) reported selling to at least three new PWID per month or at least 10 regular customers per month and had at least 1 new customer per month; (b) reported at least 2 new PWID becoming regular customers per month; (c) reported having previously engaged in conversations about treatment, disposal, or safe injection practices with approximately 25% of customers; and (d) sold non-prescription syringes with no additional requirements. Also required sufficient time, space, and interest in participating in the intervention. **Participant characteristics** Intervention / Control Number of participants: 29 / 66 Gender (% male) 84% / 80% Ethnicity AA/Black 41.7 / 13.6 Hispanic 45.8 / 68.2 White 8.3 / 9.1 Other 4.2 / 9.1 Median age 45 / 36 Homeless (past 6 months) 75.0 / 56.1 Injection duration NR / NR **Intervention description** Pharmacies as the Link to Community Services (PAT-LINK) project. Enrolled pharmacies provided PWID with information on harm reduction and referrals to medical/social services (including drug treatment programmes). Staff invited to attend two workshops. Posters and information materials provided for display. PWID using intervention pharmacies were referred to the study site by the pharmacy staff at PAT-LINK pharmacies. The control group included PWID recruited to another study.	**Outcomes measured:** Injection risk behaviours, syringe acquisition and disposal, experiences purchasing syringes in pharmacies, health care/drug treatment utilisation **How measured:** Interviewer-administered questionnaire **Methods of analysis:** NR; assumed Chi-squared? Authors note that regression analysis was not possible due to the small sample size. **Length of follow-up:** Two months **Number of participants lost to follow-up:** NR	There were significant differences between the intervention and control groups (on age, ethnicity and risky sexual activity). Compared to control group participants, intervention participants were less likely to report sharing syringes ($p<0.04$) and more likely to report pharmacy use in the past two months ($p<0.02$). No other injection risk behaviours differed by intervention and control status, including disposal practices. In terms of service utilization, intervention participants were more likely, but not significantly so, to report seeing a clinician in a private medical office compared with control IDUs ($p<0.08$). Use of any type of drug treatment, visit to a community health clinic, emergency room, or use of any type of case management, social work and/or counselling services did not differ by intervention and control status.	**Limitations identified by the authors:** Small sample size; questions in questionnaires differed between intervention and control groups; short intervention exposure. **Limitation identified by the review team:** Pilot study; small sample limits any conclusions on effectiveness. **Evidence gaps:** **Sources of funding:** National Institutes on Drug Abuse, the National Institute on Mental Health, and the Robert Wood Johnson Foundation.

Are NSPs delivered in parallel with, or alongside, services that provide opiate substitution therapy (OST) more effective and cost-effective?

Study details	Population, setting and intervention	Outcomes and methods of analysis	Results	Review team notes
Allen et al., 2012 **Country**: Scotland, UK **Objectives**: To investigate individual level associations between self-reported uptake of harm reduction interventions and HCV incidence **Study design:** Cross-sectional **Quality score**: + **External validity**: +	**Entry criteria:** Voluntary survey of individuals who had injected drugs in the past. Current injectors (having injected in last 6 months) were oversampled. Respondents who were not receiving methadone maintenance treatment (MMT) and had not injected in the last six months were excluded. **Participant characteristics** Recent infections Number of participants: 24 Gender (% male) 71% Ethnicity NR Age 16-30 y 71% Homeless (past 6 months) 58% Injection duration ≥5 years 42% **Programme description** Combined measure of intervention coverage created with high, medium and low categories. Low: not currently on MMT (in last six months) and <200% needle and syringe (NS) coverage; or no MMT in last six months and <200% NS coverage. Medium: currently on MMT and <200% NS coverage; or not currently on MMT (in last six months) and ≥200% NS coverage; or no MMT in last six months and ≥200% NS coverage. High: currently on MMT and ≥200% NS coverage; or currently on MMT and did not inject in last six months; or not currently on MMT (in last six months) and not inject in last six months.	**Outcomes measured:** HCV incidence (based on a generated estimate). Recent HCV infection defined as individuals who were anti-HCV negative and positive for RNA on testing. **How measured:** Questionnaire and dry blood spot test **Methods of analysis:** Logistic regression was undertaken to examine associations between recent HCV infection and self-reported uptake of harm reduction interventions. **Length of follow-up:** NA (cross-sectional) **Number of participants lost to follow-up:** NA	Relative to those with <200% NS coverage, individuals with ≥200% NS coverage had reduced odds of recent HCV infection (AOR 0.32, 95% CI 0.10–1.00) (adjusted for region, gender, homelessness, imprisonment, time since onset of injection and excessive alcohol consumption). After adjustment, other findings were no longer statistically significant. No significant difference in risk of recent infection in individuals with high coverage compared to those with low coverage (AOR 0.48, 95% CI 0.16–1.48, p=0.203) or those currently on MMT compared to those not currently on MMT (in last 6 months) (AOR 0.29, 95% 0.07–1.19, p=0.086). The authors identified evidence that geographical region modified the effect of MMT.	**Limitations identified by the authors:** Selection bias may be present and thus may underestimate measures of MMT effectiveness. **Limitation identified by the review team:** **Evidence gaps:** **Funding source**: Scottish Government

Review details	Review search parameters	Outcomes and methods of analysis	Results	Review team notes
Turner et al., 2011 **Country:** UK **Objectives:** To investigate whether OST and NSP can reduce HCV transmission among IDUs **Review design:** Meta-analyses and pooled analysis **Quality score**: +	**Databases and websites searched:** Web of Science, PubMed **Other search methods:** Consulted UK experts **Years searched:** 1966 to present **Inclusion criteria:** UK studies published before 2000 with individual-level data on intervention coverage and reported a measure of newly acquired HCV infection among PWID. **Exclusion criteria:** Studies published prior to 2000 or conducted in prisons. **Number of studies**: Six studies (n=2,986 participants) **Intervention description** Levels of harm reduction defined according to NSP coverage and OST status. Full harm reduction: Individuals receiving OST and needles per injection ≥100%; or receiving OST and no injections in the last month or last year. Partial harm reduction: Individuals receiving OST and needles per injection <100%; or not receiving OST and needles per injection ≥100%. Minimal harm reduction: Individuals not receiving OST	**Outcomes measured:** new HCV infections **How measured:** DBS or oral fluid test **Methods of analysis**: Three approaches: (i) a meta-analysis of the (unadjusted) effect of OST on new HCV infection (n=1,079); (ii) a meta-analysis of the (unadjusted) effect of high NSP coverage on new HCV infection (n=922); and (iii) a pooled analysis of the (unadjusted and adjusted) effects of OST and NSP on new HCV infection (n=919).	**Injection risk behaviours** *Needle sharing in last month vs. minimal HR* Full harm reduction: AOR 0.52, 95% CI 0.32–0.83. ≥100% coverage, not on OST: AOR 0.73, 95% CI 0.44–1.22 <100% coverage, on OST: AOR 1.46, 95% CI 0.89–2.40 *Mean number of injections in last month vs. minimal HR* Full harm reduction: MD -20.8, 95% CI -27.3 to -14.4, p<0.001 ≥100% coverage, not on OST: MD +4.1, 95% CI: -3.1 to 11.2, p=0.263 <100% coverage, on OST: MD -13.4, 95% CI -20.9 to -5.9, p<0.001 **HCV** Individuals receiving OST had reduced odds of new HCV infection compared with those not receiving OST (AOR 0.41, 95% CI: 0.21–0.82) as did individuals with high NSP coverage compared to those with <100% NS coverage (AOR 0.48, 95% CI: 0.25–0.93). In the combined analysis, the risk of new HCV infection was lower among those on full harm reduction compared to those on minimal harm reduction (AOR = 0.21, 95% CI: 0.08–0.52). There was no significant difference in the odds of new HCV infection for those receiving partial harm reduction compared to those receiving minimal harm reduction: ≥100% coverage, not on OST (AOR 0.50, 95% CI 0.22–1.12, p=0.09); <100% coverage, on OST (AOR 0.48, 95% CI 0.17–1.33, p=0.16)	**Limitations identified by the authors:** Number of new HCV infections was too few to compute and synthesize separate effect estimates by study site; power for testing an interaction was low; measure of NSP coverage exposure may be subject to biases. **Limitation identified by the review team:** **Evidence gaps:** **Funding source:** Scottish Government, Department of Health

Appendix 7. Quality appraisal checklist tables: Review of effectiveness and cost-effectiveness

Table 6. Quality appraisal checklist: Quantitative intervention studies

Study ID	Study design	Population[a]			Method of allocation to intervention[a]										Outcomes[a]						Analyses[a]						Summary[b]	
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	3.1	3.2	3.3	3.4	3.5	3.6	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2
Gagnon et al., 2010	RCT	+	+	+	+	++	-	NR	+	NR	-	+	+	+	+	+	+	+	++	++	+	NR	+	++	++	++	+	+
Havens et al., 2009	CRCT	+	+	+	+	++	NR	+	+	++	+	+	+	+	++	++	++	++	++	++	NR	NR	NR	++	++	++	+	+
Kidorf et al., 2009	RCT	++	++	+	NR	++	NR	+	++	NR	++	++	+	+	++	++	++	++	++	++	+	NR	NR	++	++	++	+	+
Kidorf et al., 2012	RCT	See Kidorf et al., 2009																										
Kidorf et al., 2011a	CO	+	+	+	+	++	NA	NA	+	++	+	+	+	-	++	++	++	++	++	++	+	NR	NR	++	++	++	+	+
Kidorf et al., 2001b	CO	+	+	+	+	+	NA	NA	+	++	+	+	+	-	++	++	++	++	++	+	+	NR	NR	+	+	NR	+	+
Knittel et al., 2010	UBA	+	+	-	NR	+	NA	NA	NR	NR	NR	-	-	-	+	-	+	+	NA	+	NR	NR	-	-	+	-	-	-
Riley et al., 1998	CBA	+	+	+	NA	+	NA	NA	-	NR	+	NA	-	+	NR	NR	+	+	+	+	NA	NA	NA	+	+	+	+	+
Rudolph et al., 2010b	CBA	++	+	-	NR	+	NA	NA	-	NR	NR	+	-	+	NR	+	+	+	+	-	NR	NR	-	-	-	-	-	-

RCT = randomised controlled trial. CRCT = Cluster randomised controlled trial. NR = not reported. NA = not applicable. TS = time series [a]Checklist items were assessed as follows: ++ = the study has been designed or conducted in such a way as to minimise the risk of bias. + = the answer to the checklist question is not clear from the way the study is reported, or the study did not address all potential sources of bias. − = significant sources of bias may persist. NR = study failed to report how they have (or might have) been considered. NA = study design aspects are not applicable. [b]An overall study quality grading was awarded as follow: ++ = All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter. + = Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter. – = Few or none of the checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

Table 7. Quality appraisal checklist: Quantitative studies reporting correlations and associations

Study ID	Study design	Population[a]			Method of selection of exposure[a]					Outcomes[a]					Analyses[a]				Summary[b]	
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	5.1	5.2
Allen et al., 2012	CS	++	++	+	+	NR	NR	++	++	++	+	++	NA	NA	+	++	++	++	+	+
Aspinall et al., 2012	CS	++	++	++	NR	NR	NA	++	++	+	+	++	NA	NA	NR	++	++	++	+	++
Bravo et al., 2008	CS	+	+	-	NR	NR	NA	+	+	+	+	++	NA	NA	NR	+	+	+	-	-
Bruneau et al., 2008	CS	++	++	+	NR	NR	NA	+	+	+	+	++	NA	NA	NR	++	++	++	+	+
Bryant et al., 2010	CS	++	+	+	NR	NR	NA	++	+	+	+	++	NA	NA	NR	++	++	++	+	+
Bryant et al., 2012	CS	++	+	+	NR	NR	NA	++	++	+	+	++	NA	NA	NR	++	++	++	+	+

Study ID	Study design	Population[a]			Method of selection of exposure[a]					Outcomes[a]					Analyses[a]				Summary[b]	
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	5.1	5.2
Cooper et al., 2011	RCS	++	+	+	NR	NR	NA	++	-	+	+	++	NA	NA	NR	++	++	++	+	+
Cooper et al., 2012a	RCS	See Cooper et al., 2012a																		
Cooper et al., 2012b	RCS	See Cooper et al., 2012b																		
de Montigny et al., 2010	TS	++	++	++	NA	NR	NA	+	+	+	++	++	NA	NA	NA	+	+	++	+	++
Deering et al., 2011	CO	++	++	++	+	++	++	++	+	+	++	++	++	++	NR	++	++	++	++	++
Green et al., 2010	CO	++	+	++	+	NR	NA	++	+	+	++	++	++	++	NA	++	++	++	+	++
Hayashi et al., 2010	CS	+	+	+	NR	NR	NA	++	+	+	++	++	NA	NA	NR	++	++	++	+	+
Islam et al., 2008a	CS	++	+	+	NR	NR	NA	NR	+	+	+	+	NA	NA	NR	+	+	+	+	-
Islam et al., 2012a	CO	++	+	NA	NA	NR	NA	+	+	++	++	++	NA	+	NA	+	+	++	+	+
Iversen et al., 2012	CS	+	+	++	NR	NR	NA	++	+	+	+	++	NA	NA	NR	++	++	++	+	+
Kerr et al., 2010	CO	++	NR	NR	NR	NR	NA	++	+	++	+	++	NA	+	NR	++	++	++	+	+
Leonard et al., 2008	CS	++	+	+	+	NR	NR	-	-	+	+	++	NA	NA	NR	-	-	-	-	+
McDonald, 2009	CS	+	-	-	NR	NR	NA	-	+	+	+	+	NA	NA	NA	-	-	-	-	-
Miller et al., 2002	CS	++	++	+	+	NR	++	+	-	++	++	++	NA	NA	NA	++	+	++	++	++
Moatti et al., 2001	CS	++	++	+	NR	NR	NA	NR	+	+	+	+	NA	NA	NA	NA	+	+	+	++
Obadia et al., 1999	CS	++	++	+	NR	NR	NA	NR	+	+	+	+	NA	NA	NA	NA	+	+	+	++
Riley et al., 2000	CS	++	++	+	+	NR	++	+	-	++	++	++	NA	NA	NA	++	++	++	++	++
Rudolph et al., 2010a	CS	++	++	+	+	NR	NA	++	+	+	++	++	NA	NA	NR	++	++	++	+	+
Stark et al., 1994	CS	+	++	++	NR	NR	NA	NA	+	+	+	-	NA	NA	NR	+	+	+	+	++
Vorobjov et al., 2009b	CS	+	+	+	++	NR	NA	+	+	+	++	++	NA	NA	NR	++	++	++	+	+
Williams & Metzger, 2010	CS	+	++	+	NR	NR	NA	++	-	+	+	++	NA	NA	NR	++	++	++	+	+
Wood et al., 2003	CS	++	+	+	NR	NR	NR	+	-	++	++	++	NA	NA	NA	++	++	++	+	+

CO = cohort. CS = cross-sectional. NR = not reported. NA = not applicable. TS = time series. UBA = uncontrolled before and after study. CBA = controlled before and after study. [a]Checklist items were assessed as follows: ++ = the study has been designed or conducted in such a way as to minimise the risk of bias. + = the answer to the checklist question is not clear from the way the study is reported, or the study did not address all potential sources of bias. − = significant sources of bias may persist. NR = study failed to report how they have (or might have) been considered. NA = study design aspects are not applicable. [b]An overall study quality grading was awarded as follow: ++ = All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter. + = Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions

Study ID	Study design	Population[a]			Method of selection of exposure[a]					Outcomes[a]					Analyses[a]				Summary[b]	
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	5.1	5.2

are unlikely to alter. – = Few or none of the checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

Table 8. Quality appraisal checklist: Applicability of economic evaluation studies

Study	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	Overall judgement[a]
Hu et al., 2008	Yes	Yes	Partly	Yes, healthcare providers	Yes	No, 3% annual rate	Yes	No, only considers healthcare costs	Partially applicable

Answers recorded as yes, partly, no, unclear or not applicable. [a]Judged directly applicable, partially applicable or not applicable.

Table 9. Quality appraisal checklist: Limitations of economic evaluation studies

Study	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	Overall assessment[a]
Hu et al., 2008	Yes	Yes, lifetime	Yes	No	Partly	Partly	Unclear	Unclear	Partly	Partly	No	Minor limitations

Answers recorded as yes, partly, no, unclear or not applicable. [a]Assessed to have minor limitations, potentially serious limitations or very serious limitations.

Table 10. Quality appraisal checklist: Systematic reviews and meta-analyses

Study	1	2	3	4	5	Overall assessment
Gillies et al., 2010	Yes	Yes	Yes	Yes	Not applicable	Minor limitations (++)
Turner et al., 2011	Yes	Yes	Partly	No	Yes	Minor limitations (+)

[a] Answers recorded as yes, partly, no, unclear or not applicable.

Appendix 8. Evidence tables: Review of qualitative evidence

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Doddings & Gaughwin, 1995 **Country**: Australia **Quality score**: +	**Research questions**: To examine the feasibility of and issues surround the introduction of needle and syringe vending machines. **Theoretical approach**: **How were the data collected**: Focus groups	**Population recruited from**: PWID and drug workers **Process of recruitment**: PWID were recruited via leaflets at NSPs, drug user organisations, and pharmacies. Drug workers were directly invited to participate. **Inclusion criteria**: NR **Exclusion criteria**: NR **Number of participants**: 24 participants **Demographics**: 17 males; ages ranged from 16 to 38 years.	**Methods and process of analysis**: Thematic analysis. **Key themes relevant to this review**: General perceptions about vending machines; will vending machine encourage injecting	**Limitations identified by the authors:** Small sample size and selection procedure may limit generalisibility. **Limitation identified by the review team:** None **Evidence gaps:** **Funding source**: Australian Federation of AIDS Organisations

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Lutnick et al., 2012 **Country**: USA (San Francisco) **Quality score**: +	**Research questions**: Interactions with and perceptions of pharmacists, their receptiveness to pharmacy-based interventions, and perceived facilitators and barriers to service implementation. **Theoretical approach**: NR **How were the data collected**: Semi-structured interview guide	**Population recruited from**: 'Diverse sample' of PWID **Process of recruitment**: Quota sampling based on gender, race, education, drugs injected in past 30 days, and prior use of pharmacies for syringe access. **Inclusion criteria**: NR **Exclusion criteria**: NR **Number of participants**: 11 **Demographics**: 64% female; 36% White; 27% prior use of pharmacy services	**Methods and process of analysis**: A template approach (codebook defined *a priori*) coupled with thematic analysis to identify additional themes **Key themes relevant to this review**: Good and bad experiences of pharmacies; the potential for additional services	**Limitations identified by the authors:** Responses may be biased by social desirability; based on a non-random sample. **Limitation identified by the review team:** Sample appeared well connected with drug services so might not be that representative of pharmacy users who tend to be more isolated. **Evidence gaps:** **Funding source**: National Institute on Drug Abuse

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Mackridge & Scott, 2009 **Country**: UK **Quality score**: +	**Research questions**: To explore experiences and attitudes with respect to drug users, and their treatment and to examine self-identified training needs and the desire for undertaking further training. **Theoretical approach**: Grounded theory **How were the data collected**: Self-completion postal questionnaire; opportunities for open comments were provided, one regarding experiences and perceptions with respect to drug users and their treatment.	**Population recruited from**: Registered community pharmacies in the UK. **Process of recruitment**: Random sample of 10% were recruited to participate. **Inclusion criteria**: Community pharmacy. **Exclusion criteria**: Identifiable as not being a community pharmacy. **Number of participants**: 454 respondents made comments in open questions **Demographics**: Predominantly female; included counter assistants, dispensers and technician.	**Methods and process of analysis**: Thematic coding, data was evaluated according to grounded theory. **Key themes relevant to this review**: The relationship between experiences and attitudes; pharmacy involvement in services to drug users	**Limitations identified by the authors:** May not generalizable to all support staff. **Limitations identified by the review team:** Based on postal survey rather than interviews. **Evidence gaps:** **Funding source**: British Academy

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Mackridge et al., 2010 **Country**: UK **Quality score**: +	**Research questions**: To explore the feasibility and desirability for further developing community pharmacy services to meet the needs of PWID **Theoretical approach**: NR **How were the data collected**: Focus groups (pharmacy service providers and potential service users); telephone interviews (stakeholders)	**Population recruited from**: Stakeholders with relevant experiences of pharmacy services to drug users; community pharmacies; drugs users through NSPs based in specialist drug services and service user groups. **Process of recruitment**: NR **Inclusion criteria**: NR **Exclusion criteria**: NR **Number of participants**: 7 stakeholders; 6 community pharmacists and 2 pharmacy technicians; 20 drug users with experience as pharmacy users **Demographics**: NR	**Methods and process of analysis**: NR **Key themes relevant to this review**: Experiences and view in relation to existing services; potential new services; direct interventions; barriers to expansion of pharmacy services	**Limitations identified by the authors:** None **Limitations identified by the review team:** None **Evidence gaps:** **Funding source**: Drug and Alcohol Action Team

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
MacNeil & Pauly, 2011 **Country**: Canada **Quality score**: +	**Research questions**: To explore the meaning of NSPs from the perspectives of those who access such services. **Theoretical approach**: NR **How were the data collected**: Semi-structured interviews	**Population recruited from**: People who used injection drugs and NSPs throughout the region. **Process of recruitment**: Convenience sample **Inclusion criteria**: NR **Exclusion criteria**: NR **Number of participants**: 33 participants **Demographics**: 23 males; average 40.3 years old.	**Methods and process of analysis**: Qualitative descriptive analysis. **Key themes relevant to this review**: Development of trust and linkages to other services	**Limitations identified by the authors:** None **Limitations identified by the review team:** Limited themes of relevance to the review **Evidence gaps:** **Funding source**: NR

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Miller, 2001 **Country**: Australia **Quality score**: +	**Research questions**: To explore users' perspectives on needle disposal and what factors are responsible for discarding of these needles **Theoretical approach**: NR **How were the data collected**: Semi-structured interviews	**Population recruited from**: NSPs, friends (snowballing), methadone clinic, youth worker and ambulance officers. **Process of recruitment**: Convenience sample **Inclusion criteria**: Used heroin in the previous month. **Exclusion criteria**: NR **Number of participants**: 60 heroin users **Demographics**: mean 28.1 years (SD 9.04; range 15-51 years)	**Methods and process of analysis**: NR **Key themes relevant to this review**: Discarded needles as a major concern; laws surrounding injecting paraphernalia acting as a disincentive to appropriate needle disposal	**Limitations identified by the authors:** **Limitations identified by the review team:** **Evidence gaps:** **Funding source**:

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Parker et al., 2012 **Country**: Canada **Quality score**: ++	**Research questions**: To explore how social relationships influence the safer and unsafe practices of PWID **Theoretical approach**: Grounded theory approach. **How were the data collected**: Semi-structured interviews	**Population recruited from**: NSPs' networks of clients and other PWID in various communities **Process of recruitment**: Purposive sampling to recruit a broad spectrum of PWID (in terms of sex, location, ethnicity, sexuality etc.) **Inclusion criteria**: Aged 18 or older; reported injecting drugs within the last year. **Exclusion criteria**: NR **Number of participants**: 115 PWID **Demographics**: NR	**Methods and process of analysis**: Thematic analysis. **Key themes relevant to this review**: Challenges to accessing sterile equipment; where service is available; other benefits of harm reduction services;	**Limitations identified by the authors:** Reflects experiences of people who are generally familiar with NSP services; some interviewer had roles in delivering drug services or had previous experience of drug use. **Limitations identified by the review team:** None **Evidence gaps:** **Funding source**: Canadian Institutes of Health Research

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Parkin & Coomber, 2011 **Country**: UK **Quality score**: ++	**Research questions**: To study the views and experiences of PWID regarding drug-related litter bin provision. **Theoretical approach**: NR **How were the data collected**: Involved semi-structured interviewing, direct/participant observation, visual methods, environmental visual assessments and ethnographic enquiry.	**Population recruited from**: NR **Process of recruitment**: NR **Inclusion criteria**: Recent experience of public injecting. **Exclusion criteria**: NR **Number of participants**: 51 PWID **Demographics**: 40 males; 42 were current injectors; 35 were receiving drug treatment (typically OST). Average injecting career was 11.75 years.	**Methods and process of analysis**: Rapid appraisal design to triangulate various datasets; comparative analysis of two separate studies **Key themes relevant to this review**: Positive views but negative experiences; place matters in street-based service provision	**Limitations identified by the authors:** None identified **Limitations identified by the review team:** None **Evidence gaps:** **Funding source**: Drug and Alcohol Action Teams in the two study areas

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Philbin et al., 2009 **Country**: Mexico **Quality score**: +	**Research questions**: To explore the acceptability and feasibility of interventions to reduce drug-related harm in Tijuana, Mexico **Theoretical approach**: NR **How were the data collected**: Semi-structured interviews	**Population recruited from**: Stakeholders who had at least some direct or indirect interaction with injection drug users. **Process of recruitment**: Targeted sampling method adapted from Rapid Policy Assessment and Response (RPAR) techniques **Inclusion criteria**: NR **Exclusion criteria**: NR **Number of participants**: 40 stakeholders; 20 interactor level and 20 systems level **Demographics**: Professions were divided into five sectors: health, rehabilitation, legal, pharmacies, and religion	**Methods and process of analysis**: Content analysis. **Key themes relevant to this review**: Syringe vending machines	**Limitations identified by the authors:** Many participants had no previous knowledge of, or experience with, harm reduction interventions**.** **Limitation identified by the review team:** Few themes were of relevance to the review questions. **Evidence gaps:** **Funding source**: National Institute on Drug Abuse

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Smith et al., 1998 **Country**: Baltimore, USA **Quality score**: +	**Research questions**: To assess the acceptability of community-based needle and syringe drop boxes. **Theoretical approach**: NR **How were the data collected**: Focus groups, interviews (pharmacists only)	**Population recruited from**: Community residents, PWID, police officers and pharmacists. **Process of recruitment**: Community residents recruited through a community association, mayor's outreach office and neighbourhood churches. PWID recruited through drug treatment centres, soup kitchens, and shelters. Police officers recruited from areas containing the drop boxes. **Inclusion criteria**: Current PWID or history of injection drug use **Exclusion criteria**: NR **Number of participants**: 6 community residents; 24 PWID; 15 police officers; 4 pharmacists **Demographics**: Community residents (100% African American, 33% male; mean 54 years); PWID (92% African American; 71% male; mean 42 years); police officers (40% African American, 87% male); pharmacists (75% African American; 25% male).	**Methods and process of analysis**: Responses coded by interviewer and organised into categories that emerged during discussions. **Key themes relevant to this review**: Pre-intervention: Discarded needles as a concern (community residents; PWID); presence of drop boxes condones drug use (community residents; police officers); drop boxes convey negative messages about the community (community residents; pharmacists); concerns about attracting drug users to the area (community residents; police officers); general support for drop boxes (PWID); general opposition to drop boxes (police officers); perception that drop boxes would not be used (all groups); fear of the police and identification as a drug user (PWID). Post-intervention: Increased support for drop boxes (community residents; police officers); many fears and predictions unfounded.	**Limitations identified by the authors:** None identified **Limitation identified by the review team:** **Evidence gaps:** **Funding source**:

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Springer et al., 1999 **Country**: Atlanta, USA **Quality score**: +	**Research questions**: To explore the PWID and non PWID community members perceptions of three syringe disposal interventions: (i) a syringe collection program; (ii) a one-way drop box; and (iii) an NSP. **Theoretical approach**: NR **How were the data collected**: Interview	**Population recruited from**: **Process of recruitment**: Convenience sampling; local outreach workers recruited initial participants and snowball sampling techniques were also used to recruit PWID. Extreme case sampling was used to ensure the inclusion of PWID with a long history of injection drug use and frequent patterns of injection. **Inclusion criteria**: 18 years or older and residing in the study area; PWID had injected drugs at least once in the past month before the interview. **Exclusion criteria**: NR **Number of participants**: 32 community members; 26 PWID **Demographics**: Community members (50% male; 100% African American; mean 40 years). PWID (77% males; 96% African American; mean 40 years)	**Methods and process of analysis**: Data analysis consisted of coding of major themes, collapsing themes into categories, and constant comparison of findings. **Key themes relevant to this review**: Convenient and discrete method for disposing of syringes (community members); concerns about increasing the availability of needles (both groups); fear of being arrested or identification as a drug user (PWID).	**Limitations identified by the authors:** The study did not provide generalizable data; conducted in a city with restrictive syringe possession regulations. **Limitation identified by the review team:** **Evidence gaps:** **Funding source**:

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Treloar et al., 2010 **Country**: Australia **Quality score**: +	**Research questions**: (1) What factors influence the choice of pharmacy for injecting equipment?: and (2) What are the policy and programme implications for the pharmacy NSPs? **Theoretical approach**: NR **How were the data collected**: Semi-structured interview	**Population recruited from**: Three pharmacies among the top quartile in terms of equipment distribution were selected. **Process of recruitment**: Fliers and posters placed in pharmacies to inform PWID about the study. **Inclusion criteria**: Aged over 18 years; user of pharmacies to access injecting equipment. **Exclusion criteria**: NR **Number of participants**: 15 PWID **Demographics**: 12 males; ages ranged from 26-46 years. 11 cited heroin as their drug of choice.	**Methods and process of analysis**: Thematic content analysis. **Key themes relevant to this review**: Convenience and choice; Anonymity, surveillance, stigma.	**Limitations identified by the authors:** Results of the study cannot be generalised to all clients of pharmacies. **Limitations identified by the review team:** Small sample size. **Evidence gaps:** More generalizable data on PWID' experiences with pharmacies. **Funding source**: University of New South Wales; Australian Government Department of Health and Ageing.

Study details	Research parameters	Population and sample selection	Outcomes and methods of analysis Results	Review team notes
Vorobjov et al., 2009b **Country**: Estonia **Quality score**: +	**Research questions**: To explore attitudes of pharmacists and PWID towards the role of pharmacists in HIV prevention services for PWID. **Theoretical approach**: NR **How were the data collected**: Focus groups	**Population recruited from**: Pharmacies in Tallinn. PWID were recruited via a drop-in centre. **Process of recruitment**: Random sample of pharmacies selected and a pharmacist from each invited to participate. PWID invited to participate (no further information provided). **Inclusion criteria**: NR **Exclusion criteria**: NR **Number of participants**: 19 pharmacists; 15 PWID **Demographics**: 17 female and 2 male pharmacists, 13 retail, five managers and one owner; all male PWID	**Methods and process of analysis**: Transcript data first coded according to main study questions; subcategories for main themes formulated on second reading; after third reading, subcategories selected depending on frequency. **Key themes relevant to this review**: Convenience and accessibility; negative experiences of pharmacies; negative experiences of PWID	**Limitations identified by the authors:** Potential for self-selection bias among pharmacist participants **Limitations identified by the review team:** None **Evidence gaps:** **Funding source**: US National Institutes on Drug Abuse; CRDF

Appendix 9. Quality appraisal checklist tables: Review of qualitative evidence

Table 11. Quality appraisal checklist: Qualitative studies

Study	1	2	3	4	5	6	7	8	9	10	11	12	13	14	OA[a]
Doddings & Gaughwin, 1995,	Appropriate	Clear	Not sure	Appropriate	ND	Not sure	Not sure	Not sure/NR	Not sure/NR	Not sure/NR	Convincing	Relevant	Adequate	Not sure/NR	+
Lutnick et al., 2012	Appropriate	Clear	Not sure	Appropriate	ND	Unclear	Unreliable	Rigorous	Not sure/NR	Reliable	Convincing	Relevant	Adequate	Appropriate	+
Mackridge & Scott, 2009	Appropriate	Clear	Not sure	Appropriate	ND	Unclear	Unreliable	Not sure/NR	Not sure/NR	Not sure/NR	Convincing	Relevant	Adequate	Appropriate	+
Mackridge et al., 2010	Appropriate	Clear	Defensible	Appropriate	ND	Not sure	Reliable	Not sure/NR	Rich	Not sure/NR	Convincing	Relevant	Adequate	Appropriate	+
MacNeil & Pauly, 2011	Appropriate	Clear	Not sure	Appropriate	ND	Clear	Not sure	Rigorous	Not sure/ NR	Not sure/NR	Convincing	Relevant	Adequate	Appropriate	+
Miller, 2001	Appropriate	Clear	Defensible	Appropriate	Unclear	Clear	Reliable	Rigorous	Rich	Not sure/NR	Convincing	Relevant	Adequate	Not sure	+
Parker et al., 2012	Appropriate	Clear	Not sure	Appropriate	Clear	Clear	Not sure	Rigorous	Rich	Reliable	Convincing	Relevant	Adequate	Appropriate	++
Parkin & Coomber, 2011	Appropriate	Clear	Defensible	Appropriate	ND	Clear	Reliable	Rigorous	Rich	Not sure/NR	Convincing	Relevant	Adequate	Appropriate	++
Philbin et al., 2009	Appropriate	Clear	Defensible	Appropriate	ND	Clear	Not sure	Rigorous	Rich	Reliable	Convincing	Partially relevant	Adequate	Appropriate	+
Smith et al., 1998	Appropriate	Clear	Defensible	Appropriate	ND	Clear	Not sure	Not sure/NR	Rich	Not sure/NR	Convincing	Relevant	Adequate	Not sure/NT	+
Springer et al., 1999	Appropriate	Clear	Defensible	Appropriate	ND	Clear	Not sure	Not sure/NR	Rich	Not sure/NR	Convincing	Relevant	Adequate	Not sure/NR	+
Treloar et al., 2010	Appropriate	Clear	Not sure	Appropriate	ND	Unclear	Not sure	Rigorous	Not sure/NR	Reliable	Convincing	Relevant	Adequate	Appropriate	+
Vorobjov et al., 2009b	Appropriate	Clear	Defensible	Appropriate	ND	Not sure	Not sure	Rigorous	Not sure	Reliable	Convincing	Relevant	Adequate	Appropriate	+

OA = overall assessment. ND = not described. NR = not reported. [a]Studies were graded according to: according to the list below: ++ = All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter; + = Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter; – = Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

Appendix 10. Studies of vending machines, outreach schemes and drop boxes

Citation details for studies of vending machines, outreach schemes and drop boxes were identified via three sources: (i) based on the searches conducted for the previous evidence reviews and the update evidence review; (ii) review of studies included in two non-systematic reviews (Islam et al., 2007; Islam et al., 2008b); and (iii) and citation searching using the studies identified via (i) and (ii).

Islam et al. (2008b) included 14 studies in their review of the safety and effectiveness of vending machines in community settings. Of these 14 studies, one was included in the previous evidence review of effectiveness and cost-effectiveness (Obadia et al., 1999) and one was included in the update review (Islam et al., 2008a). Islam et al. (2007) examined 37 papers that addressed the ability of mobile vans and vending machines to reach high-risk and hidden groups of PWID.

Vending machines

Fifteen studies were identified, the status of these studies in the previous and update evidence reviews was as follows: (i) two were published prior to 1990 (the lower date limit for inclusion in the previous evidence review); (ii) six were not identified in the searches conducted for either the previous or update reviews (of which, two were conference abstracts and four were reports from the grey literature); (iii) three were screened for inclusion in the previous evidence reviews (of which, one was included and two were excluded); and (iv) three were screened for inclusion in the update review (of which, one was included and two were excluded). No new studies were identified via citation searching.

Table 12. Citation details for studies of vending machines

Citation	Country of study	Status?		Notes
		Previous evidence reviews	Update evidence reviews	
Agnoletto V, *et al*. (1993). Street work and needle exchange machines as complementary strategies of HIV harm reduction among active drug users: An Italian model. Presented at the 9th International AIDS Conference, Berlin, Germany.	Italy	Not identified	Screened & excluded	Conference abstract
Berg R. (1993). Needle and syringe vending machine trial evaluation report 1. Sydney: NSW Department of Health.	Australia	Not identified	Not available	Report not available
Berg R. (1995). Needle and syringe vending machine trial evaluation report 2. Sydney: NSW Department of Health.	Australia	Not identified	Not available	Report not available

NSP update - Update evidence review

Citation	Country of study	Status?		Notes
		Previous evidence reviews	Update evidence reviews	
Diseth TH. (1989). The syringe dispenser project in Larvik: Experience after one year. Tidsskr Nor Laegeforen, 109(32), 3345–3348.	Norway	NA	NA	Published before 1990
Dodding J & Gaughwin M. (1995). The syringe in the machine. Australian Journal of Public Health, 19, 406–409.	Australia	Screened & excluded	Screened & included	
Islam MM, *et al*. (2008). Client satisfaction and risk behaviours of the users of syringe dispensing machines: A pilot study. Drug and Alcohol Review.	Australia	NA	Screened & included	
Islam MM, *et al*. (2009). Perception of health staff of syringe vending machines as a mode of the needle syringe programme: A pilot study. Substance Use & Misuse.	Australia	NA	Screened & excluded	
Klaassen R. (1989). Syringe exchange by automat. International Journal of Drug Policy, 1, 6–7.	Netherlands	NA	NA	Published before 1990
Leicht A. (1993). Characteristics and HIV-infection of users of syringe vending-machines and exchanging programs in Berlin/Germany. Presented at the 9th International AIDS Conference, Berlin, Germany.	Germany	Not identified	Screened & excluded	Conference abstract
McDonald D. (2005). ACT syringe vending machines trial 2004–2006. Australia: Canberra.	Australia	Not identified	Screened & excluded	More recent publication
McDonald D. (2009) The evaluation of a trial of syringe vending machines in Canberra, Australia. International Journal of Drug Policy, 20, 336–339.	Australia	NA	Screened & included	
Moatti JP, *et al*.. (2001). Multiple access to sterile syringes for injection drug users: Vending machines, needle exchange programs and legal pharmacy sales in Marseille, France. European Addiction Research, 7, 40–45.	France	Screened & excluded	Screened & included	
Moloney A. (2001). Evaluation of the fitpacks vending machine trial at Kalgoorlie regional hospital, Australia. Kalgoorlie: Northern Goldfields Health Services Public & Community Health.	Australia	Not identified	Not available	Report not available
Obadia Y, *et al*. (1999). Syringe vending machines for injecting drug users: An experiment in Marseille, France. American Journal of Public Health, 89(12), 1582–1584.	France	Screened & included	Screened & included	
Stark K, *et al*. (1994). Characteristics of users of syringe vending machines in Berlin. Sozial und Praventivmedizin, 39(4), 209–216.	Germany	Screened & excluded	Screened & included	

Outreach schemes

Fourteen studies were identified, the status of these studies in the previous and update evidence reviews was as follows: (i) eight were not identified in the searches conducted for either the previous or update review (of which, seven were conference abstracts and one was a report from the grey literature); (ii) five were screened for inclusion in the previous evidence reviews (of which, three were included and two were excluded); and (iii) one was screened for inclusion in the update review (and included). No new studies were identified via citation searching.

Table 13. Citation details for studies of outreach schemes

Citation	Country of study	Status?		Notes
		Previous evidence reviews	Update evidence reviews	
De Rugeriis E *et al*. (1993). The outreach program for injecting drug users in Rome. Presented at the 9th International AIDS Conference, Berlin, Germany.	Italy	Not identified	Screened & excluded	Conference abstract
Edwige A *et al.* (1992). IVDU population of Medecins du Monde's mobile unit. "Syringe exchange". Presented at the 8th International AIDS Conference, Amsterdam, Netherlands.	France	Not identified	Screened & excluded	Conference abstract
Estebanez P *et al.* (2002). Main tendencies of injecting drug users feature in the mobile units of the programs of outreach syringes exchange programs of Medicos del Mundo. Presented at 14th International AIDS Conference, Barcelona, Spain.	Spain	Not identified	Screened & excluded	Conference abstract
Hausser D *et al.*(1992): BIPS bus itinerant prevention SIDA (mobile AIDS prevention unit) in Geneva (Switzerland) for drug injectors. Presented at the 8th International AIDS Conference, Amsterdam, Netherlands.	Switzerland	Not identified	Screened & excluded	Conference abstract
Hayashi, K *et al*. (2010). An external evaluation of a peer-run outreach-based syringe exchange in Vancouver, Canada. International Journal of Drug Policy, 21, 418-421.	Canada	NA	Screened & included	
Lhomme JP *et al*. (1992) Evaluating the first syringe exchange program in Paris. Presented at the 8th International AIDS Conference, Amsterdam, Netherlands.	France	Not identified	Screened & excluded	Conference abstract
McConnell W *et al*. (1994) The efficacy of using mobile vans while providing outreach services to high risk substance abusers. Presented at 10th International AIDS Conference, Yokohama, Japan.	USA	Not identified	Screened & excluded	Conference abstract

NSP update - Update evidence review

Citation	Country of study	Status?		Notes
		Previous evidence reviews	Update evidence reviews	
Miller CL *et al.* (2002). Risk taking behaviors among injecting drug users who obtain syringes from pharmacies, fixed sites and mobile van needle exchanges. Journal of Urban Health, 79, 257-265.	Canada	Screened & included	Screened & included	
Nigro L *et al.* (2000) Feasibility in needle exchange programme: an evaluation of a pilot programme in Catania, Sicily. International Journal of Drug Policy, 11, 299–303	Italy	Screened & excluded	Screened & excluded	Excluded on study design
Riley ED *et al.* (2000). Comparing new participants of a mobile versus a pharmacy-based needle exchange program. JAIDS, 24, 57-61	USA	Screened & included	Screened & included	
Schechter M *et al.* (1998) Maximizing needle exchange coverage among injection drug users (IDUs): do mobile programs attract those at highest risk? Presented at the 12th International AIDS Conference, Geneva, Switzerland	Canada	Not identified	Screened & excluded	Conference abstract
Subata E & Kriksciukaityte R. (2003). Harm reduction programs in Vilnius, the capital of Lithuania. In: *HIV/AIDS prevention amongst injecting drug users in Lithuania. Best practices*. Vilnius, Central and Eastern European Harm Reduction Network	Lithuania	Not identified	Screened & excluded	Non-OECD country
Wood E *et al.* (2003). An external evaluation of a. peer-run "unsanctioned" syringe exchange program. Journal of Urban Health, 80, 455-464	Canada	Screened & excluded	Screened & included	

Drop boxes

Eight studies were identified, all of which were identified through the searches conducted for the previous and update evidence reviews: (i) three were screened for inclusion in the previous evidence reviews (of which, two were included and one was excluded); and (ii) five were screened in inclusion in the update reviews (of which, two were included and three were excluded).

Table 14. Citation details for studies of drop boxes

Citation	Country of study	Status?		Notes
		Previous evidence reviews	Update evidence reviews	
De Montigny, L *et al.* (2010). Assessing a drop box programme: A spatial analysis of discarded needles. International Journal of Drug Policy, 21, 208-214.	Canada	NA	Screened & included	
Devaney, M & Berends, L. (2008). Syringe disposal bins: the outcomes of a free trial for city traders in an inner-city municipality Australia. Substance Use & Misuse, 43, 139-153.	Australia	NA	Screened & excluded	Excluded on study design
Klein, SJ *et al.* (2008). Increasing safe syringe collection sites in New York State. Public Health Reports, 123, 433-440.	USA	NA	Screened & excluded	Excluded on population
Miller, PG (2001) Needle and syringe provision and disposal in an Australian regional centre. 20, 431-438.	Australia	Screened & included	Screened & included	
Parkin, S & Coomber, R. (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, 1218-1227.	UK	NA	Screened & included	
Riley, E *et al.* (1998). Operation red box: A pilot project of needle and syringe drop boxes for injection drug users in east Baltimore. Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 18, S120-S125.	USA	Screened & excluded	Screened & included	
Smith, L. *et al.* (1998). A focus group evaluation of drop boxes for safe syringe disposal. Journal of Drug Issues, 28, 905-920.	USA	Screened & excluded	Screened & included	
Springer, KW *et al.* (1999) Syringe disposal options for injection drug users: a community-based perspective. Substance Use & Misuse, 34, 1917-34	USA	Screened & included	Screened & included	