


analysis

This entry is our analysis of a study considered particularly relevant to improving outcomes from drug or alcohol interventions in the UK. The original study was not published by Findings; click [Title](#) to order a copy. Free reprints may be available from the authors – click [prepared e-mail](#). [Links](#) to other documents. [Hover over](#) for notes. [Click to](#) highlight passage referred to. [Unfold extra text](#)  The Summary conveys the findings and views expressed in the study. Below is a commentary from Drug and Alcohol Findings.

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► [Evaluating the cost-effectiveness of existing needle and syringe programmes in preventing hepatitis C transmission in people who inject drugs.](#)

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Sedona S., Ward Z., Platt L. et al.

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[Consultation draft subject to amendment and correction.] What would happen to rates of infection with hepatitis C if we closed down all the needle exchanges? In three UK conurbations, the answers were predicted to be more infections, lost low-cost opportunities to improve and save lives, and in two of the areas, greater health-related costs overall. Conclusion was that these services are among the best investments UK health services can make.

SUMMARY In the United Kingdom about 200,000 people are chronically infected with hepatitis C ('prevalence ') and 90% of new infections ('incidence') occur among people who inject drugs. Serious liver disease is often the consequence. To reduce the burden of hepatitis C infection, it is crucial to reduce the incidence of infection due to injecting with used equipment contaminated by blood carrying the infection. In most settings, needle and syringe programmes ('needle exchanges') are the primary intervention for reducing injecting-related transmission of hepatitis C and other blood-borne viruses. They provide people who inject drugs with sterile needles, syringes, other injecting equipment, and infection-prevention and support services.

Research has established that needle/syringe programmes are a cost-effective way to reduce spread of HIV, but just two studies have considered the same issue in relation to hepatitis C, and neither was conducted in western Europe. Assessing cost-effectiveness in the UK context is also important because funding for needle and syringe programmes is under threat due to budget cuts and the shifting emphasis of drug policy to recovery and abstinence-based treatment.

The featured study was the first to evaluate the cost-effectiveness of needle and syringe programmes in western Europe, and the first cost-effectiveness study to use real-world data rather than assumed estimates of the efficacy of needle and syringe programmes. To gauge the value of needle and syringe programmes in retarding the spread of hepatitis C, the study predicted the impact in terms of years of life lost or of diminished quality ('QALYs') of a ten-year hiatus in programme provision. Specifically, for three UK conurbations estimates were made of what would

Key points

From summary and commentary

To gauge the value of needle and syringe programmes in retarding the spread of hepatitis C, the study predicted the long-term consequences for years of life lost or of diminished quality ('QALYs') of a ten-year hiatus in programme provision in three UK conurbations.

The main finding was that adequate usage (enough equipment obtained to use a fresh set each time) of these programmes saves and improves lives at a cost much lower than the £20,000 per year ceiling considered to be a cost-effective use of health service resources.

A weakness in the analysis was that the studies and data on which this estimate was based were not capable of establishing whether programme use actually causes a reduction in the spread of hepatitis C, though this seems likely and has been



happen to the transmission and disease burden of hepatitis C over the 50 years from 2016 to 2065, if for the first ten years there were no needle and syringe programmes, and then current levels of provision (ie, proportion of at-risk population reached) of high-coverage needle/syringe programmes were reinstated. 'High coverage' was defined as the distribution of enough needles and syringes for at least one clean set to be used for every injection. Then the analysts 'filled in' the missing 10 years, assuming current levels of provision throughout the 50 years, and recalculated impacts on hepatitis C and related ill-health. The difference between the two estimates indicated the health-related value of maintaining needle/syringe programme provision.

accepted by UK and international authorities.

The three conurbations were Walsall Bristol, Dundee and Walsall, **selected partly** for their varying prevalence of hepatitis C among people who inject drugs, and their varying reach (proportion of potential service users using these services) by harm reduction services, including high-coverage needle and syringe programmes.

Based on observations of needle and syringe programmes operating in 2014–2015, in each city, **costs** were estimated of providing these services to people who inject psychoactive rather than performance-enhancing drugs. Benefits were calculated solely in terms of hepatitis C prevention, putting aside any additional benefits in curbing HIV transmission or helping to reduce the social costs of dependence on drugs such as heroin. Potential savings included the costs of **treating infections** which might be averted by needle and syringe programmes.

The simulation model's assumptions about the effects of high-coverage needle and syringe provision (and also opioid substitution therapy like methadone maintenance) on the spread of hepatitis C in the three areas were derived from **a recent analysis** of UK and Australian surveys of people who inject drugs. The analysis **had calculated** how much their risk of having recently been infected varied when they were versus were not engaged in these services. On this basis, in the featured study the risk of infection was assumed to be reduced by 41% if people who inject were getting all the syringes and needles they needed from needle/syringe programmes, and by 59% if they were in opioid substitution therapy.

If the featured analysis calculated that high-coverage needle and syringe provision saved one QALY (year of life adjusted for quality) at a cost of no more than £20,000, they would be considered a cost-effective life-saving/improving intervention; £20,000 is accepted by the UK's National Institute for Care Excellence (NICE) as the amount society is willing to pay to preserve life for a year. To test how robust this calculation was, the analysts conducted multiple simulations using different values for the factors affecting disease spread and related ill-health.

Main findings

Compared to having no needle and syringe programmes over the first ten of the 50 years, projections in the three conurbations were that typically from 84 to 199 infections would be averted by maintaining these programmes, representing 8% of the infections which would otherwise have occurred in Bristol and Walsall, and 40% in Dundee. Averting these infections would prevent 2 to 20 deaths from injecting-related hepatitis C infection, 1% of the deaths which would otherwise have occurred in each area. Differences in infections averted are partly due to variations in the proportions of those infected with hepatitis C whose infection is treated (greatest in Dundee), and in each area the projections could lie within a wide range due to uncertainty about many of the factors involved. Nevertheless, all the simulations assuming different values for these factors predicted that needle and syringe programmes would prevent infections and resultant deaths.

The next step was to calculate how much achieving these health gains would cost health services, including the costs of needle and syringe programmes themselves, treatment of hepatitis C infection, and opioid substitution therapy. Despite extra spending on needle and syringe programmes, in Bristol and Dundee operating these programmes throughout the 50 years and not having a ten-year break would

Needle and syringe programmes would save health services money yet also generate health gains

slightly reduce total costs. The central estimate of the savings amounted to £159,712 out



of about £304 million in Bristol and £2.5 million out of £95 million in Dundee. Though total costs would be reduced, over the 50 years not having a break in needle and syringe programme provision would gain 502 and 195 years of life adjusted for quality in Bristol and Dundee respectively. In other words, maintaining needle and syringe programmes would save health services money, yet also generate health gains.

In Walsall, maintaining needle and syringe programmes for the first ten of the 50 years would raise overall health costs by £114,442 on top of nearly £154 million, but this extra spending would gain 192 years of life adjusted for quality. The resultant cost per year of just £596 would be well below NICE's £20,000 ceiling for a cost-effective intervention.

If a monetary value of £20,000 was placed on each quality-adjusted year of life saved, in the three areas the gain over the 50 years would equate to between £3.7 and £10.2 million. Further simulations assumed different values for the factors influencing ill-health and deaths due to hepatitis C and associated health costs. In each conurbation, over 90% of these scenarios (and in Bristol and Walsall, virtually all) still left needle and syringe programmes accruing quality-adjusted years of life at below NICE's £20,000 ceiling.

Among the assumptions varied in these scenarios was the effectiveness of high-coverage needle and syringe programmes in reducing spread of hepatitis C. The [source](#) for the central estimate of a 41% reduction had also found that given conventional criteria for ruling out the most unlikely figures, the actual figure **might range** from just 4% to 64%. It was this uncertainty over the effectiveness of the programmes which most affected predictions of overall costs and quality-adjusted years of life saved.

Another analysis estimated how many years after the initial ten it would take before savings in quality-adjusted life years accumulated sufficiently for each to have cost less than NICE's £20,000 ceiling. This cost-effectiveness threshold was reached in Bristol and Walsall by two and six years respectively, while in Dundee, even at zero years the previous ten years of needle and syringe programme provision would have saved health-related costs overall.

The authors' conclusions

The analyses suggest that in the United Kingdom, needle and syringe programmes are a highly cost-effective way to curb transmission of hepatitis C and prevent associated ill-health and death, and that in some settings these programmes reduce overall health-related costs. For example, in Dundee the estimate was that these programmes would net long-term savings of up to 250% of the initial investment. Relative to other health interventions, needle and syringe programmes can be considered a very strong investment choice, highlighting the need to maintain their funding.

However, recent NHS reforms mean that the authorities responsible for commissioning these programmes often differ from those which benefit from any cost-savings; joint financing would more accurately reflect the overall societal benefits of the investment. Different agencies may also need outcomes on different time scales. NICE recommends a life-time perspective, while policymakers and funders are more concerned with short-term outcomes. In this context, it may be important that the cost-effectiveness threshold was passed within six years. Short-term gains may also result from the psychosocial and welfare benefits of needle and syringe programmes.

Predictions were that the largest proportion of infections averted would be in Dundee, where needle and syringe programmes would be particularly valuable in preventing re-infection after treatment of hepatitis C infection, which in that city reached the largest proportion of people who inject drugs. Needle and syringe programmes remained highly cost-effective even if (as is expected to happen) the costs of treating infection fell and more people were treated. After factoring in these and other sources of uncertainty, the programmes remained cost-effective in over 90% of the tested scenarios, and did so despite excluding other potential benefits such as reducing spread of HIV, preventing injection-site infections and injuries, and addressing the complex mental health and social support needs of




their service users. If these other benefits were taken into account, needle and syringe programmes would probably be found to substantially reduce health and social costs.

A limitation in the featured study's methodology was that assessment of the health impacts of needle and syringe programmes was based on simulated projections rather than the findings of studies, though these projections did incorporate real-world data on the link between needle/syringe programmes and reduced transmission of hepatitis C.

FINDINGS COMMENTARY The findings of this analysis will be considered good news for harm reduction in general in the UK and for needle and syringe programmes in particular, both embattled by the [policy shift](#) since 2010 towards abstinence-based recovery from addiction and away from trying to reduce harm from continuing drug use. Aware of this trend, in 2014 [NICE's Public Health Advisory Committee](#) [warned](#) that "a focus on recovery (that is, encouraging people to stop taking drugs completely) should not compromise the provision of needle and syringe programmes and any associated harm-reduction initiatives".

A [companion](#) to the featured study used data from the same three UK conurbations to predict that between 2016 and 2030, removing opioid substitution therapy and high-coverage needle and syringe provision would lead to a large increase in the prevalence and incidence of infection with hepatitis C. Across the three settings, this impact would be greatest if opioid substitution therapy were withdrawn (92–483% more new infections), and less but still substantial if instead high-coverage needle and syringe provision were withdrawn (23–64% increase). In contrast, scaling-up high-coverage needle and syringe provision and opioid substitution therapy to reach 80% of people injecting drugs would reduce the incidence of hepatitis C by 29% in Bristol, 49% in Walsall, and 100% in Dundee. In all three settings, due to its initially reaching a lower proportion of the injecting population, over 80% of the impact would be achieved by scaling-up high-coverage needle and syringe provision.

Uncertainty over causality

The featured study's authors discovered that their upbeat findings hinged most of all on the degree to which needle and syringe programmes really do prevent spread of hepatitis C. To assess this, the authors relied on a [source review and analysis](#) conducted for the [NHS's National Institute for Health Research](#). It is likely to have been critical that the findings taken from this source concerned not the impact of using needle and syringe programmes as such, but of the level of use most likely to be effective – *high-coverage use*, generally operationalised in studies as regular attendance or the service user obtaining at least enough needles and syringes to use a fresh set for every injection. Nevertheless, the evidence was not consistently robust enough to be sure that there was an association between high-coverage use and fewer infections; for details [unfold](#)  [the supplementary text](#).

[Close supplementary text](#)

Reviewing the evidence from studies resulted in the source review's best estimate of a 23% reduction in risk of new infections associated with high-coverage use, but the possibility could not be ruled out that in reality there was no reduction at all. Findings remained the same when the analysis was restricted to the four most methodologically adequate studies. Only when the analysis was restricted to studies in Europe did the association between high-coverage use of needles/syringe programmes and fewer new infections (a reduction of 56%) become strong enough to rule out the possibility that in reality there was no such link.

The reverse association was found when the analysis turned to lesser degrees of engagement with needle/syringe programmes which meant too few needles and syringes were collected to use a fresh set each time.



Contrasted with no use of these services, the risk of acquiring hepatitis C infection was actually higher – almost certainly what we [have termed](#) the ‘magnet effect’. By attracting their intended caseload of injectors at high risk of infection, needle/syringe programmes make themselves look as if they are the cause of the high risk, when in fact they may mitigate it.

When the studies the reviewers found were combined with two further datasets from Australia and the UK, the result was a statistically significant link between high-coverage use of needle/syringe programmes and fewer new infections – a 39% reduction in risk. But this combined figure incorporated findings from many studies “at severe risk of bias”.

The same source document included the analysis of UK and Australian datasets on which the featured study relied for its estimates of the impact of needle/syringe programmes on hepatitis C. This too seemed far from definitive. There was a link between high-coverage use of the programmes and fewer new infections, but it was described as “slight” and was not statistically significant, meaning that the possibility of there being no reduction at all could not be ruled out. This remained the case when the analysis took account of [factors](#) which might have elevated risk among people who chose to regularly use needle/syringe programmes.

Evidence for an impact on *behaviour* risking infection was stronger. Contrasted with lesser use levels, high-coverage needle/syringe programme use was associated with a statistically significant 40% reduction in the chances that a survey participant had injected with used and possibly contaminated equipment. Focusing on participants not in opioid substitution therapy, there was a statistically significant halving in the likelihood of having injected with used equipment. The presumption that this behaviour change was not just associated with but a consequence of needle/syringe programmes, is reinforced by a [rare randomised trial](#) from Alaska, which found that giving people who inject drugs access to needle exchanges led to a greater proportion using safe sources for their injecting equipment.

 [Close supplementary text](#)

Most fundamentally, at best the source review could only demonstrate an *association* between high-coverage use and fewer infections. Studies and analyses of data of the kind which underpinned these estimates cannot exclude the possibility that their findings were due not to high-coverage use, but to other factors. Just as low-coverage use may falsely look like it is elevating risk due to the type of injectors attracted to the programmes, so too may high-coverage use falsely look protective. Injectors who ensure enough injecting equipment to use a fresh set each time may differ from those who do not in ways which have reduced risk, even if they had engaged in less adequate use of the services. It would not be surprising if, for example, they tend to have greater support, be more stable, or more motivated to avoid infection.

This weakness is inevitable when randomly denying injecting equipment to people at risk of a potentially deadly infection is ethically out of the question, leaving the choices they can and do make to influence service access. Nevertheless, even motivated and stable injectors will find it hard to protect themselves from infection unless they have access to injecting equipment they can be sure is uncontaminated. In other words, the implication that high-coverage use of needle/syringe programmes contributes to a reduction in risk ‘makes sense’. In contrast, it seems highly unlikely that in reality there is no reduction in risk consequent on obtaining a fresh set of equipment for each injection.



Evidence seen as strong enough to guide policy

Despite the difficulty of providing definitive proof, the evidence on needle/syringe programmes has been enough for [UN agencies](#) and other authorities to promote these as a way to curb spread of hepatitis C. Posed the question, "What level of coverage should needle and syringe programmes provide to keep HIV prevalence low and to reduce the prevalence of hepatitis C among people who inject drugs?", Britain's National Institute for Health and Care Excellence (NICE) [called on](#) commissioners to aim to provide *more* than enough needles and syringes for every injector to be able to use a sterile set each time. Public Health England [explained](#) why simply equating the number of needles/syringes to the number of injections will not be enough: "some people receive more needles than they need ... because they pass them on to partners or friends ... Also, more than one needle is often required per injection, as needles may also be used during drug preparation and an injection may require several attempts (and therefore needles) to access a vein."

How far there is to go to exceed 100% coverage has been recorded in the UK since 2011. Since then, UK-wide only around half of current injectors surveyed at drug services [have been estimated](#) to have received sufficient needles/syringes to use a fresh set each time, a figure which fell slightly from just over to just under 50% between 2011 and 2015. In the 2017 surveys in England, Northern Ireland and Wales, questions about access to injecting equipment changed slightly, meaning the figure for that year was not comparable to previous years. The new questions indicated that in these countries, 61% of people who inject drugs obtain sufficient needles/syringes to use to a fresh set each time, though some of these may have been collected for other people. These figures are for injectors *already* in contact with drug services; include those not in contact and lift the bar to over 100% coverage, and the fraction of the total population of injectors supplied with enough equipment to eliminate infection is likely to be considerably smaller.

For more on the control of injecting-related spread of hepatitis C in the UK see the [relevant hot topic](#).

Thanks for their comments on this entry in draft to research author Zoe Ward of the University of Bristol, England. Commentators bear no responsibility for the text including the interpretations and any remaining errors.

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MATRIX CELL 2017 [Drug Treatment Matrix cell E1: Local and national systems; Reducing harm](#)

STUDY 2012 [Estimating the cost-effectiveness of needle-syringe programs in Australia](#)

MATRIX CELL 2017 [Drug Treatment Matrix cell D1: Organisational functioning; Reducing harm](#)

MATRIX CELL 2017 [Drug Matrix cell A1: Interventions; Reducing harm](#)

MATRIX CELL 2017 [Drug Matrix cell C1: Management/supervision; Reducing harm](#)



STUDY 2018 [Impact of current and scaled-up levels of hepatitis C prevention and treatment interventions for people who inject drugs in three UK settings – what is required to achieve the WHO's HCV elimination targets?](#)

HOT TOPIC 2017 [Hepatitis C 'giant' still growing](#)

REVIEW 2017 [An evidence review of the outcomes that can be expected of drug misuse treatment in England](#)

STUDY 2015 [Hepatitis C virus treatment as prevention among injecting drug users: who should we cure first?](#)

REVIEW ABSTRACT 2009 [The primary prevention of hepatitis C among injecting drug users](#)

