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► [Rapid decline in HCV incidence among people who inject drugs associated with national scale-up in coverage of a combination of harm reduction interventions.](#)

Palmateer N.E., Taylor A., Goldberg D.J. et al.

PLoS ONE: 2014, 9(8): e104515.

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A combination of needle exchange, methadone maintenance and a shift away from injecting meant that between 2008 and 2012, 1000 fewer Scottish injectors had to face chronic infection with the potentially deadly hepatitis C virus.

SUMMARY In 2008 the Scottish Government launched phase two of its [hepatitis C action plan](#). One of its three main aims was to prevent the virus spreading between people who inject drugs. The main driver for change was the release of [national guidelines](#) which recommended providing enough new sets of sterile injecting equipment for one to be used for every injection. To help implement those guidelines, £3 million per year was awarded to the Scottish health service. At the same time, the Scottish Government's [drug and alcohol strategy](#) sought to improve treatment services for patients dependent on opiates.

Funded by the Scottish Government, the featured study examined the impact of these changes on the transmission of hepatitis C among injectors. Specifically, the aim was to determine whether trends in the proportion of injectors newly infected with the virus between 2008 and 2012 could be linked to the adequacy of provision of sterile injecting equipment and of methadone maintenance treatment. Data on [new infections](#), use of needle exchanges and methadone treatment, and on infection risk behaviour, came from three national surveys undertaken in 2008–2009, 2010, and 2012 of [past or current](#) injectors contacted via needle exchanges (often also sites for methadone treatment) and other equipment supply services. Around two thirds of the drug users asked to complete the survey did so, resulting in samples respectively totalling 2629, 3168 and 2154. Typically respondents were men in their thirties who had been injecting for just over 10 years. Around a quarter had recently been homeless most had at some time been imprisoned.

Official national statistics provided data on the total numbers of methadone prescriptions and injecting equipment distributed, including needles/syringes, filters, sterile water, and spoons to use in preparing drugs for injection. It was assumed that as these services became more available, injectors would be more adequately supplied with injecting equipment and more would enter methadone treatment. As a result, they would less often risk infection by sharing equipment, aided by methadone treatment reducing the number of times they injected. The end result would be fewer becoming infected with hepatitis C. Analyses of these links took in to account the injector's age and sex, whether homeless, whether they injected stimulants, had injected in the past six months, how long they had been injecting, whether they had been imprisoned, and whether they had drunk to excess in the past 12 months. An initial analysis treated each injector as equal; a second gave greater weight to more frequent injectors.

Main findings

Service supply and use

Over the period 2008 to 2012, annual numbers of needles/syringes distributed fluctuated little at around 4.7 million, but injectors injected fewer times – from about 11 times a week down to 8. The result was that by the final year (2011/12), enough sets were supplied for 74% of injections to be done with fresh equipment, up from 53% in 2008/9. In reality, when injectors were themselves asked, the number of sets typically they obtained in a week fell from 15 in the first survey to 10 in the later ones. However, due to fewer injections, the proportion of injectors supplied enough for a fresh set each time rose slightly from 75% to 79% and 77%.

Six- and four-fold increases in the provision of filters and spoons meant that by the final year (2011/12), enough were supplied for fresh equipment to be used in 40% and 39% of injections, up from just 4% and 6% in 2008/9. Supply increases fed through to the reality on the ground; when injectors were themselves asked, from none obtaining enough for a fresh set each time, the proportions rose in each case to about 70%.

The number of methadone prescriptions fluctuated only slightly at around half a million a year, but surveys revealed that the proportion of injectors in methadone treatment rose steadily from 50% in 2008/9 to 64% in 2011/12.

Infection risk behaviour and infections

The causal model on which the study was based presumed the above changes in service supply and use would feed through to fewer injectors risking infection by injecting and sharing injecting equipment. Findings were consistent with this expectation. Between the first and last surveys the proportions of respondents who injected [at least daily](#) fell from 63% to 49%, sharing needles/syringes from 15% to 8%, reusing one's own needles/syringes from 64% to 45%, sharing filters from 33% to 17%, and sharing spoons from 42% to 20%.

In turn, reduced risk behaviour was expected to mean fewer injectors became infected with hepatitis C. As expected, of injectors not already infected some time ago, the proportion who had recently become infected fell from 2.1% in 2008/9 to 0.9% in 2011/12. This meant that in 2008/9, of 100 current injectors, each year nearly 14 would become infected; by 2011/12, this figure had fallen to about 7. Confirming the drop in the numbers becoming infected, among new injectors (started injecting within last year) the proportion already infected fell from about 20% to 8%.

Relation between service use and risk behaviour and infections

The global, population-wide figures reported above are consistent with improved service supply and use between 2008 and 2012 feeding through to fewer injectors risking infection by injecting and sharing injecting equipment, and fewer becoming infected. If this was the case, it should also be apparent across all the surveys at an individual level. That is, individuals in whatever year who said they had been abundantly supplied with injecting equipment (at least twice their needs over the past six months – 'high coverage'), and/or were in methadone treatment at the time of the survey, should take fewer risks, and fewer should become infected. This was indeed the case.

In respect of needles/syringes, 42% of current injectors met the criterion for high coverage. Compared to injectors supplied fewer sets than they needed, high-coverage injectors were less than half as likely over the past six months to have reused this equipment after someone else. They were also less likely to have done so than injectors supplied at least what they needed, but under twice as much. Findings for filters and spoons were similar, though gradients in sharing rates were not so steep. Currently being in methadone

treatment was associated with a nearly 80% reduction in the odds of injecting at least daily over the past six months.

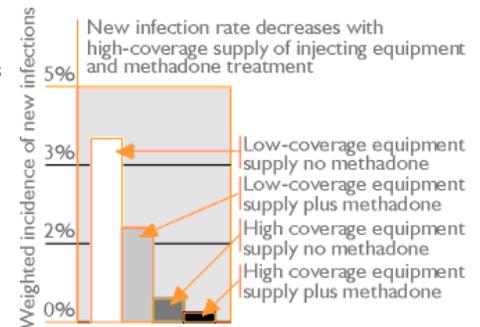
These figures indicate that high coverage equipment supply is associated with reduced risk. The final link in the chain is to establish that reduced risk really does mean fewer infections. Again, findings were consistent with this expectation. Injectors who had not shared needles/syringes in the past six months were seven times less likely to have recently become infected with hepatitis C than those who had shared. For sharing of spoons and/or filters, the corresponding figure was three times less likely.

This entire chain (high coverage supply ► reduced risk behaviour ► fewer new infections) should mean that high-coverage injectors were less likely to have recently become infected. This was the case. Whether or not the injector was in methadone treatment, those abundantly supplied with needles/syringes were less than a third as likely to have become infected as those supplied fewer than they needed. The impact on the infection rate was even greater when more weight was given to frequent injectors, and in this analysis, also being in methadone treatment further reduced risk to near zero.

Neither high-coverage supply of sterile water nor being in methadone treatment were significantly associated with the chances of becoming infected. For water, this may reflect the fact that not sharing it becomes important only if needles/syringes have been shared. Methadone treatment was associated with reduced risk, but with so many of the injectors in treatment, the sample was too small to for this link to reach statistical significance. Methadone may have an indirect effect on infection rates by significantly reducing the number of injections; the risk of sharing either needles/syringes, spoons, or filters, was three times higher among those who injected at least daily compared to those who did not.

Generally, the more comprehensively someone had been protected by a combination of high coverage equipment supply and being in methadone treatment, the less likely they were to have recently become infected. Most at risk (about 4% infected in the analysis weighted towards frequent injectors) were those not on methadone and supplied insufficient equipment for their needs. Moving from low to high coverage of needles/syringes reduced the infection rate. In the analysis weighted towards frequent injectors, the rate was at its minimum and near zero when being in methadone treatment was added to high coverage equipment supply ► chart.

Either methadone or high-coverage equipment supply seemed particularly important when the other protective shield was absent. Methadone treatment was associated with a substantially reduced risk (down by 40%) of infection when injectors did not have enough fresh injecting equipment for their needs. Similarly, when the injector was not protected by methadone, high-coverage equipment supply was associated with a greater reduction in the risk of infection.



How many infections were averted?

Finally the analysts estimated how many injectors avoided infection as a result of the declining incidence of new infections, a fall presumed to have been at least partly due to increased access to harm reduction services. Had access not increased, the assumption was that infection would have spread as rapidly in succeeding years as it did in 2008, when there were an estimated 1063 new infections. By 2010 the estimate had dropped to 697, and by 2011 and 2012, to 566, leading to an estimate that about 1400 new infections had been averted. Around a quarter of those infected clear the virus, so the number of chronic infections averted was estimated at around 1000.

The authors' conclusions

The study documents the falling incidence of hepatitis C infection among injectors in Scotland between 2008 and 2012, a finding corroborated by a similar trend in the prevalence of infection among recent initiates to injecting. The two different approaches used in the incidence analysis – population wide trends across the years and associations at an individual level – strengthen the inference that the changes in incidence are due to harm reduction interventions, particularly the combination of needle/syringe supply and methadone maintenance treatment. Similar conclusions emerged from a [study](#) across the UK. Though encouraging, the observed reductions in new infections of HCV incidence [may need to be sustained](#) for over a decade before the virus is substantially less common across the injecting population.

There was no statistically significant link between methadone maintenance and the incidence of hepatitis C infection, but this may have been due to too small a sample. Also there was evidence that (as expected) being on methadone reduces the number of injections and in turn the number of times injecting equipment is shared, and that this mechanism particularly reduces new infections among injectors poorly supplied with injecting equipment. Also, adding methadone treatment to high-coverage needle/syringe supply does seem to further reduce the number of new infections. Finally, in a [study](#) across the UK, consistently being in opiate substitution therapy was significantly linked to fewer new hepatitis C infections.

Adding high-coverage supply of filters, spoons or water to the intervention mix seems to make little difference to the incidence of new infections. It could be that supplying this equipment is less influential, or that it only becomes influential if needles/syringes are shared; for this equipment to pose a risk of infection, it must first become contaminated with blood from a used needle/syringe.

It should be borne in mind that the featured study can only document associations between more adequate service provision and fewer new infections, not prove that one *caused* the other. However, the other major influence – treatment of hepatitis C infections – is unlikely to have caused the findings, and if (as seems probable) the highest risk injectors not in contact with services were missed by the surveys, this is likely to have led to an *underestimate* of the impact of the harm reduction interventions.

FINDINGS COMMENTARY The featured analysis bolsters the contention that fully implemented and multi-pronged harm reduction services can dent the transmission of hepatitis C. Findings support [guidance](#) from the National Institute for Health and Clinical Excellence (NICE) which calls for needle exchange provision to be upgraded, and [European guidance](#) which sees widespread injecting equipment supply and opiate substitute prescribing as the main ways to curb infectious diseases among injectors.

One of the study's strengths is that as well as demonstrating a link between new infections and service use, it also showed how this link might operate by reducing the frequency of injecting and the proportion of injectors who continue to share injecting equipment. Completing the expected causal chain from service use, through behaviour change, to actual infection, adds credibility to the assumption that the links between service use and infection found by the study are due to an effect of the interventions.

It remains the case however that this conclusion is based on an association which could have been due to other factors. Conceivably, for example, injectors concerned and stable enough to stay in treatment and to make good use of needle exchanges would have found other ways to avoid infection, even if exchanges and treatment were unavailable. In this scenario, it would not be the services which were the essential factor, but the characteristics of the injectors who tended to use them most.

The [report](#) relied on for trends in injecting equipment supply warns that on several dimensions the reliability and completeness of the data and how it was collected could vary, creating possibly spurious 'trends'. By the time of the last two surveys of injectors, supply of filters and spoons would often have been 'yoked' to supply of needles and syringes in a whole pack of required injecting equipment, rather than being supplied only in circumstances where this might be critical to intercepting the spread of infection. This pattern would make it hard to discern any added value.

Equipment supply from a service does not always equate with effective supply to an injector. For example, homeless users might be supplied a pack of several needles and syringes yet take one and discard the rest, and filters and spoons supplied as of course by a service may not be needed or used by

the recipient. At the time of the surveys [very few services](#) were distributing sterile water, meaning it was too soon to assess its impact; at higher coverage levels, impacts might become more noticeable.

The apparent contradiction of fewer methadone prescriptions in 2011/12 than in the previous year, yet a higher proportion of injectors in treatment, could reflect an increased focus on the highest-risk opiate users (ie, injectors) as the recovery-focused Scottish national drug strategy encourages more selective use of methadone maintenance.

For more commentary see the Findings analysis of a [similar UK-wide study](#).

Thanks for their comments on this entry in draft to Leon Wylie of [Hepatitis Scotland](#). Commentators bear no responsibility for the text including the interpretations and any remaining errors.

Last revised 24 September 2014. First uploaded 17 September 2014

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