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### ► [HIV infection during limited versus combined HIV prevention programs for IDUs in New York City: the importance of transmission behaviors.](#)

Des Jarlais D.C., Arasteh K., McKnight C. et al. [Request reprint](#)

**Drug and Alcohol Dependence: 2010, 109, p. 154–160.**

From New York, a success story of the reversal of a serious epidemic of HIV among injectors, with mass needle exchange in the starring role. It adds weight to studies which collectively indicate that multi-strand approaches featuring high-coverage syringe provision can curb the spread of HIV.

**Abstract** The study aimed to document the reversal of the world's largest epidemic of HIV among drug injectors and explain how it was done. In New York City the virus spread rapidly during the late 1970s, [stabilising](#) during the 1980s with over 50% of injectors infected. In the early 1990s, each year the equivalent of nearly four in every 100 injectors became infected, [reduced 10 years later](#) to under one in a 100.

Findings detailed below indicated that this reversal was mainly due to the legalisation and public funding of needle exchanges in 1992, and the subsequent expansion of provision from about 250,000 syringes exchanged annually in 1990–1992 to 2,500,000 in 1996–1998. Additionally, in the early 2000s pharmacists were permitted to sell syringes to drug users without a prescription, and effective AIDS treatment became available to many injectors. However (see below) these did not seem major elements in the reversal of HIV incidence and prevalence. Before these enhancements, HIV prevention efforts which began around 1984 were largely [educational](#); injectors themselves, treatment services and outreach workers informed drug users of the risks of unsafe injecting and encouraged safer methods. There was also some HIV counselling and testing and, from the late 1980s, small-scale, activist-operated needle exchange. Effectively the study asked whether supplementing this provision with practical resources in the form of mass needle exchange resulting in a [multi-front](#) assault on the disease was decisive in curbing the spread of HIV.

## Separating the pre and post-needle exchange eras

The study adopted 1 January 1995 – roughly the mid-point in the rapid expansion of needle exchange – as the **dividing line** between the educational era and the era of mass needle exchange. To test the impact of the advent of needle exchange it drew on the yearly (from 1990 on) research interview surveys and HIV test results from injectors admitted to New York's Beth Israel Medical Center detoxification programme, which serves the whole city. The 261 **injectors** surveyed from 1990 to 1994 who said they had started injecting between 1984 and the end of 1994 were considered to have injected only during the educational era. The 1153 injectors **surveyed** from 1995 to 2008 who began injecting only after 1 January 1995 were considered to have injected only during the needle exchange era. The key issue was whether with the benefit of needle exchange, the later samples were less likely to have become infected.

## HIV prevalence and incidence both much lower in the needle exchange era

That was indeed how it turned out. Educational-era injectors were substantially and significantly more likely to be infected with HIV; 21% were compared to 6% who had injected only after mass needle exchange had supplemented educational efforts, amounting to a under a quarter the chance of being infected in the later era. This ratio was similar and in each case statistically significant across sexual (gender and orientation), age, and racial subgroups. Also, among **newer** injectors, the reduction in risk was similar whether the injector had been interviewed in the first or second half of the needle exchange era.

Findings so far indicated that HIV was more prevalent in the 'pre-needle exchange' educational era than later. However, the key question was whether this also applied to the rate at which new infections were acquired. These 'incidence' statistics were estimated from the increase in the proportions of injectors infected as their injecting careers extended. In the educational era, for every extra year of injecting, another 4% of injectors became infected. In contrast, the curve in the needle exchange era was practically flat – a statistically significant difference in the **slopes** which led to a significant difference in incidence estimates: about 4 in every 100 people became newly infected in the educational era, just 0.3 in every 100 when needle exchange had been widely implemented.

## Why were HIV prevalence and incidence lower?

The next stage in the analysis was to attempt to identify *how* programmes in the needle exchange era had reduced HIV prevalence and incidence. Proportions of injectors engaging in risky sexual behaviour or who injected with equipment used by someone else (about a third looking back over the past six months) had not changed since the educational era. What *had* changed was the proportion who passed on their own used equipment to another injector; in the past six months, 53% had done so in the educational era, just 31% in the later era. Among HIV positive injectors – the ones potentially capable of passing on the infection – the difference was even sharper: 47% versus 17%. Combining these figures with the prevalence of infection, the upshot was that in the educational era 1 in 10 injectors were potentially transmitting infection (they were infected and had let others use their used equipment) compared to just 1 in 100 after needle exchanges were widely established – a statistically significant **difference** in

the chances of infection transmission.

Finally the analysis tried to link infection risk behaviour (non-infected injectors injecting with used equipment; infected injectors passing their used equipment on) to participation in three types of services which might have helped reduce risk: methadone maintenance; HIV testing and counselling; and obtaining sterile injecting equipment from a syringe exchange, pharmacy or healthcare provider. The only statistically significant link was that during the needle exchange era, non-infected injectors who obtained sterile equipment were about a third less likely to use potentially infected equipment. However, at this level of detail the numbers were sometimes small, making statistical significance hard to achieve.

### The authors' conclusions

Widespread implementation of needle exchange in the mid-1990s in New York City created an environment in which several influences combined to more effectively prevent the spread of HIV among injectors than in previous years. Findings are consistent with those from other studies in New York and elsewhere demonstrating the impact of such programming. However, unusually this study found that low rates of infection in the needle exchange era were associated with very low rates of HIV transmission behaviour (passing on used syringes) among **infected** injectors, rather than very low rates of HIV acquisition risk behaviour (accepting used syringes) among non-infected injectors. Where HIV is common among injectors, reducing the proportion of HIV-positive injectors who pass on their used equipment may be a critical component in reducing HIV transmission. However, even in the needle exchange era, HIV continued to spread. From other studies in New York and elsewhere, it seems that typical anti-HIV programmes targeted at drug users (including needle exchange) reduce injecting-related risk, but have insufficient impact on sexual risk behaviour.

Though this could not be directly tested by the study, it is likely that infection transmission behaviour will be rarer when good legal access to sterile injecting equipment creates little incentive or pressure to pass equipment on, when most injectors have been tested and know whether they are infected with HIV, and when destigmatisation makes it possible for people to disclose their infection as a reason for not passing on their equipment.

### FINDINGS

The featured study strongly suggests that widespread accessible needle exchange (or at least, provision of sterile injecting equipment) can be a key ingredient in reversing a high level of HIV among injectors of illegal drugs, especially heroin. What it could not answer is whether needle exchange is sufficient in the absence of other services such as methadone treatment, HIV testing, and raising awareness of the risks of infection, nor whether other ways of making sterile equipment widely available might have been just as effective; lack of discernable impact from freeing up pharmacy sales might simply have been due to demand for sterile syringes already having been met by needle exchanges. Also the findings may be applicable only to treatment-seeking injectors in developed urban areas with concentrated numbers of drug injectors. In these areas it is feasible to meet a large part of the demand for injecting equipment, exchanges can be relatively nearby and/or easy to get to, and there is intense interaction and equipment sharing between injectors for exchanges to intercept.

Inevitably such a study is vulnerable to competing explanations for the findings, in particular in this case the trend away from injecting cocaine, which itself may have helped reduce the spread of HIV. Such concerns would be mitigated if the findings were consistent in demonstrating a convincing mechanism for how needle exchange expansion could have affected the spread of HIV. A mechanism was found in the study (less passing on of used equipment by infected injectors) but this did not consistently account for relevant findings to a statistically significant degree. However, this is just one of several studies collectively pointing to a similar conclusion: that multi-strand approaches featuring mass needle exchange can curb the spread of HIV. Such conclusions make sense because any one service or type of service will never be able to attract or be accessible to all the different 'hidden' populations of injectors. Also, different types of services can work in synergy. In particular, at a population level [methadone maintenance](#) can reduce the number of times opiate users inject, reducing the load on needle exchanges, while [needle exchanges](#) help to make the remaining injections safer.

Findings on the impact of each element of such programming and on the combination of elements might have been more clear cut and consistent had harm reduction programmes been enthusiastically and fully implemented and funded. This has rarely been the case, needle exchange for example often being trammelled by rules about how much equipment can be given out and operated from insufficient sites and unsuitable premises for a few hours a week ([1 2 3 4 5](#)), while methadone maintenance, the treatment modality with the [greatest research backing](#), has been undermined by unwillingness to prescribe high enough doses for long enough, by deterrent regulations, and by lack of capacity ([1 2 3 4 5 6 7 8 9](#)). Half-hearted implementations may help individuals which they reach and are acceptable to, but cannot be expected to make much of a dent in infection levels across the whole population of injectors ([1 2](#)).

A major remaining gap in programmes for preventing HIV spread among drug users is finding a way to tackle sexual risk behaviour, which (as the featured study found) [has become a prominent concern](#) where injecting-related risk has been controlled. Targeted interventions [can be](#) at least moderately effective, but often sexual risk is not directly addressed by drug services or among drug injectors. In England, being in a substitute prescribing programme rather than either not in treatment or in some other kind of treatment meant patients were more likely to be advised about harm reduction, but sexual risk [was the exception](#). However, effective addiction treatment [can itself](#) reduce sexual risk by reducing the need for prostitution to gain money for drugs and in other ways curtailing the number of sexual partners; impacts on condom use are less clear-cut. Some of these conclusions are expanded on below.

### About the study

The authors outlined several limitations of the study, prime among which was the absence of a comparison area similar in most respects except that there was no legalisation and/or expansion of needle exchange provision. Without this the findings are vulnerable to the impact of influences other than needle exchange availability. One mentioned by the authors is the possible cumulative impact and extended reach of pre-needle exchange approaches such as awareness-raising and risk-reduction training conducted by outreach workers, peers and services. It is for example conceivable (but on the face of it and in the light of other research, unlikely) that there is a tipping point beyond which these efforts begin to 'bite' and that this was reached at about the time that needle exchanges also became widespread.

Also among these influences may be changes in nature of the injecting population. The analysis of whether HIV prevalence and incidence dropped in the needle exchange era catered at least in part for **some** of these differences, but not the substantial differences in the extent of cocaine smoking and **injecting** and of heroin sniffing. In respect of cocaine injecting – which due perhaps to its frequency and less controlled nature **has been found** an important aggravating factor in the spread of infection – the effect could have been to exaggerate the apparent impact of access to sterile injecting equipment.

All the available variables including changes in drug use patterns were however taken in to account in the analysis of whether methadone treatment, HIV testing and access to sterile syringes were associated with reduced HIV risk behaviour. With everything in the mix, generally no significant association was found. The exception was a link between fewer injectors re-using injecting equipment used by someone else and more widespread access to sterile injecting equipment. However, this was not it seems the mechanism which accounted for HIV reductions in the needle exchange era. In this analysis it was less *passing on* of used equipment which seemed critical. This disjunction in the risk-reduction mechanism chain may have arisen because the measures of risk behaviour were too crude. It was known how many people had received or passed on used equipment, but not how often they did it, with how many different people, what their relationships were with these people, and what if any syringe sterilisation and/or cleaning was done, all potentially important nuances.

Both the reductions in HIV and the mechanisms via which this may have happened could have been influenced by the fact that the samples had all sought and achieved admission to an inpatient detoxification programme. Presumably their substance dependence was of a severity and kind eligible for this level of intervention, meaning the samples were unlikely to include regular but not frequent users, especially of cocaine. All had been motivated to voluntarily enter treatment and were subject to whatever influence the treatment programme could exert over their risk behaviour. They may also have been particularly likely to make use of other services such as needle exchanges. However, the authors say that these injectors were similar to those sampled in non-treatment settings.

HIV prevalence was similar whether new (under four years) injectors had been interviewed in the first or second half of the programme era, suggesting that pharmacy sales of syringes and improved **AIDS treatments** were not major risk-reduction supplements once needle exchange was fully and widely implemented.

In the featured study HIV incidence was estimated from trends in HIV prevalence depending on how long the participant had been injecting. **Another study** more directly assessed incidence among injectors at the same treatment site by using an HIV testing procedure capable of indicating whether infection was recent or long-standing. According to this study, the equivalent of about 3.6 in every 100 injectors became infected annually in 1990–1992, falling to 2.6 in 1993–1995, 1 in 1996–1998, and 0.8 in 100 in 1999–2002. The first of these estimates was about the same as for a similar period in the featured study; the dramatic reduction in incidence after needle exchanges had become fully established was also similar. Moreover, this study found a very strong link between increasing numbers of syringes provided by exchanges (also perhaps an indicator of overall service provision from exchanges) and the fall in the rate of new infections. The featured report also pointed out that studies in the same city, but of injectors sampled in other ways, have broadly confirmed the incidence levels estimated by the featured study, and the drop in the needle exchange era.

## Selected other studies

The authors cite confirmatory findings from other cities on the impact of comprehensive anti-HIV programming featuring widespread needle exchange. Similar studies in 99 cities have been combined in **an analysis** which compared trends in HIV prevalence among drug injectors in cities with versus without needle exchanges. In needle exchange cities the average proportion of injectors who were infected fell by nearly 19% a year, while in cities without exchanges it rose by 8%. The analysis argued that the difference was so great that it was very



unlikely to have been entirely due to other services implemented alongside needle exchanges.

The best way to eliminate extraneous influences on the spread of HIV is to randomly allocate injectors to have or not have access to needle exchanges. The [first such study](#) was conducted in Alaska. It randomly assigned 600 injectors to training in how to buy needles and syringes from pharmacies or to receive a card entitling them to use two local exchanges. Six months later 422 reported how they had obtained equipment during that period. Only about a quarter who could have used the exchanges had done so, but it was enough to increase the proportion who had used safe sources (ie, exchanges or pharmacies) to 33% compared to 21% in the pharmacy-only group.

These two studies are among the [many](#) which have [convinced authorities](#) of the value of needle exchange, including Britain's [National Institute for Health and Clinical Excellence](#). However, the lack of consistency in the findings across different studies and the difficulty in many studies of excluding other influences means that support is strongest for multi-strand strategies (such as that tested in the featured study) which include needle exchange, rather than for needle exchange as such, and that while needle exchange *can* prevent infection, it has not always been shown to do so. A crucial influence on whether exchanges are effective is the [coverage](#) achieved by the service – how many injections are made with sterile as opposed to potentially infected equipment.

*Thanks for their comments on this entry in draft to Tim Bingham, chairperson of the Irish Needle Exchange Forum. Commentators bear no responsibility for the text including the interpretations and any remaining errors.*

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