Chapter 12

Preventing Epidemics of HIV-1 among Injecting Drug Users

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In many areas, the spread of HIV-1 among injecting drug users (IDUs) due to the multi-person use of drug injection equipment has occurred with extreme rapidity. In New York City, for example, HIV-1 seroprevalence among IDUs increased from under 10 per cent to over 50 per cent in a period of five years (Des Jarlais et al., 1989); in Edinburgh, HIV-1 seroprevalence among IDUs increased from zero to over 40 per cent in one year (Robertson et al., 1986); in Bangkok, HIV-1 seroprevalence increased from 2 per cent to over 40 per cent in two years (Vanichseni and Sakuntanaga, 1990); and in the state of Manipur, India, levels increased from zero to approximately 50 per cent in one year (Naik et al., 1991).

HIV-1 has spread rapidly among populations where there has been a lack of awareness of AIDS as a local threat and mechanisms such as 'shooting galleries', 'dealer's works' and professional injectors that provide rapid and efficient mixing among large numbers of IDUs (Friedman and Des Jarlais, 1991).

There is also considerable evidence, mostly from developed countries, that most IDUs will change their behaviour in response to the threat of AIDS, given the opportunity to do so. Indeed, the great majority of subjects in the World Health Organization Multi-City Study on Drug Injecting and Risk of HIV infection reported changing their behaviour in order to avoid getting AIDS (see Chapter 4). The fact that extremely rapid spread of HIV-1 has occurred under certain circumstances, and the demonstrated capacity of many IDUs to modify their HIV-1 risk behaviour, lead to the question of whether it is possible to prevent epidemics of HIV-1 transmission among injecting drug users. The WHO Study formed the basis of the first examination of 'prevented HIV epidemics' among IDUs.

This chapter presents case histories of five cities in which HIV-1 has been introduced into a heterosexual IDU community, but where HIV-1 seropreva-
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(Papaevangelou, Ancelle-Park and Seyer, 1991) was administered to a sample of IDUs in Lund, while a questionnaire developed for a syringe-exchange evaluation study was used in Tacoma (Hagan et al., 1993). The interview data were collected between 1990 and 1993 in the different cities. Sample sizes were 919 for Glasgow, 112 for Lund, 424 for Sydney, 874 for Tacoma, and 582 for Toronto.

Local experts (including co-authors of this report) completed questionnaires describing the characteristics of the local drug-injection situation and the local AIDS prevention activities for IDUs. All of these local experts have been conducting research on HIV-1 infection among IDUs in their communities over the last five or more years. The descriptions of the local IDU situations included available data on the size of the IDU population, availability of drug use treatment, and ‘informed judgements’ on characteristics such as the geographic concentration of the local IDU population, the quality of public transportation, police tactics, and access to health care for IDUs. The description of prevention activities included recording when they were first initiated (‘early’ prevention was defined as beginning when HIV-1 seroprevalence was <5 per cent), and assessing the extent to which ready access to sterile injection equipment, community outreach, bleach distribution, drug treatment programmes, and HIV-1 counselling and testing were used as prevention methods.

The Low Prevalence Cities

Five cities were identified that met the aforementioned operational definition for stable low HIV-1 seroprevalence: Glasgow, Scotland; Lund, Sweden; Sydney, Australia; Tacoma (Washington), USA; and Toronto, Canada. Serial cross-sectional seroprevalence data were available from studies conducted in Glasgow (Frischer et al., 1992a, 1992b, 1993), in Tacoma (Hagan and Hale, 1993), in Toronto (Millson et al., 1993), and from multiple studies in Sydney (reviewed by Kaldor et al., 1993). In each of these five cities there were at least two studies of HIV-1 prevalence among IDUs not in treatment. The minimum sample size for determining seroprevalence for a given year in these studies was at least 95 subjects in each of the treatment and non-treatment samples.

In Lund (and the surrounding Skane province), there has been extensive voluntary HIV-1 counselling and testing of IDUs, with individually coded reports for all HIV-seropositives (as described in Ljungberg et al., 1991). Each positive case is investigated to determine where the person was living when the seroconversion occurred. There is also post-mortem HIV-1 testing for all known IDUs in Skane, and there have been no cases of deceased HIV-positive IDUs who had not been previously reported. (For full details on the seroprevalence studies in each of the cities, see Frischer et al., 1992a, 1992b, 1993; Hagan and Hale, 1993; Millson et al., 1993; Kaldor et al., 1993; Ljungberg et al., 1991).

Three of these cities (Glasgow, Sydney, Toronto) had participated in the WHO Multi-City Study, so that risk behaviour data were already available from IDUs in those cities. The European Community Multi-Site Study questionnaire...
HIV-1 Infection in the IDU Population

How HIV-1 was first introduced into a local population of IDUs usually cannot be known with certainty, but there is some evidence as to probable means of virus entry for the five cities described here. In Glasgow, HIV-1 was probably introduced by travellers to and from Edinburgh, less than 80 km distant, where HIV-1 seroprevalence among IDUs has been high since the mid-1980s (Robertson et al., 1986). In Lund, HIV-1 was almost certainly introduced by immigration of HIV-positive IDUs from other parts of Sweden and by travellers to and from nearby Copenhagen, Denmark (Ljungberg et al., 1991). In Sydney (Ross et al., 1992, in press), Tacoma (Hagan and Hale, 1993), and Toronto (Millson et al., 1992), HIV-1 probably entered through IDUs who were initially infected through male-with-male sex, as these cities have substantially higher HIV-1 seroprevalence rates among IDUs reporting male-with-male sex than among other IDUs.

Seroprevalence studies in the five cities are presented in Table 12.2. In the four cities where seroprevalence was studied through serial cross-sectional designs (Glasgow, Sydney, Tacoma and Toronto), the observed rates were all within narrow ranges, with no increasing trend over time in any city. In Lund, where HIV-1 counselling and testing of IDUs is conducted on a continuous basis, the HIV-1 infection level has remained low and stable.

Table 12.2 Injecting drug users in five cities with stable low HIV seroprevalence

<table>
<thead>
<tr>
<th>Cities</th>
<th>Estimated IDUs</th>
<th>City population</th>
<th>Drugs injected</th>
<th>Drug treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glasgow</td>
<td>8500</td>
<td>700000</td>
<td>buprenorphine</td>
<td>1000 methadone, 100 detoxification, 2500 outpatent, 30 residential</td>
</tr>
<tr>
<td>Lund</td>
<td>500 city</td>
<td>90000</td>
<td>heroin</td>
<td>60 methadone, 12 detoxification, 6 residential</td>
</tr>
<tr>
<td>(Skane province)</td>
<td>(3000 province)</td>
<td></td>
<td></td>
<td>500 outpatent, 6000 methadone, 200 detoxification, 700 residential</td>
</tr>
<tr>
<td>Sydney</td>
<td>8-10000</td>
<td>3100000</td>
<td>heroin</td>
<td>240 methadone, 12 detoxification, 700 outpatent</td>
</tr>
<tr>
<td>(Pierce county)</td>
<td>(3000 county)</td>
<td></td>
<td>amphetamine</td>
<td>200 methadone, 12 detoxification</td>
</tr>
<tr>
<td>Toronto</td>
<td>8-10000</td>
<td>635000</td>
<td>heroin</td>
<td>128 detoxification, 329 residential</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cocaine</td>
<td></td>
</tr>
</tbody>
</table>

Number of IDUs in a community is estimated by: capture/recapture in Glasgow; multiple methods in Lund and Sydney; synthetic area analysis in Tacoma. Data on 'drug treatment' include treatment provided to non-injecting drug users. City population is from most recent census data for each city.
HIV-1 Prevention Activities

There have been a variety of HIV-1 prevention efforts in each of the five cities. Only brief comparative summaries are provided here (for more detailed descriptions of the HIV-1 prevention activities in these cities, see Ljungberg et al., 1991; Hagan et al., 1991; Frischer and Elliot, 1993; Friedman, de Jong and Wodak, 1993; Des Jarlais and Friedman, 1992; Millson et al., 1991).

The first two characteristics across the five cities were that prevention efforts were initiated relatively early and that they included large-scale provision of sterile injection equipment. In Glasgow, a syringe exchange and a programme to sell sterile needles and syringes in pharmacies to IDUs were both begun in 1987; in Lund, a syringe exchange programme was begun in 1986; in Sydney, the law requiring prescriptions for the purchase of needles and syringes was repealed, and a programme of over-the-counter sales and syringe exchange was begun in 1987 — indeed, an educational campaign to ‘Never share needles’ was launched by the wife of the Australian prime minister in 1987. In Tacoma, a syringe exchange programme was begun in 1988; and in Toronto, a street outreach/bleach-distribution programme for IDUs was begun in 1987, followed by a syringe exchange programme initiated in 1989. As indicated in Table 12.2, seroprevalence was <5 per cent among IDUs in each of these cities at the time these prevention efforts were initiated.

In each of the five cities, an estimated one-fifth to one-third of the IDUs were regular users of the local syringe exchanges. Moreover, many of these regular participants also exchanged injection equipment on behalf of others who did not directly participate in the exchanges. The exchanges in Sydney, Tacoma, and Toronto did not place limits on the number of needles and syringes that could be exchanged at one visit, which enhanced the likelihood that IDUs coming to exchange would also provide sterile injection equipment to others. In addition, while it was not possible to generate numerical estimates of the percentage of IDUs who regularly obtained sterile injection equipment from pharmacies in these five cities, legal pharmacy sales were also, in the assessment of the local experts, an important source of sterile injection equipment in all of the cities except Lund. (Pharmacy sales of equipment for injecting illicit drugs are illegal in Lund, and IDUs would have to take a half-hour ferry ride to Copenhagen to purchase injection equipment from a pharmacy).

The third common characteristic of the prevention programmes in the five cities was that they all involved community outreach to IDUs to disseminate AIDS information and risk-reduction supplies, and to build trust between healthcare workers and IDUs. All outreach programmes also provided referrals to other services, such as drug abuse treatment and HIV-1 counselling and testing. Several outreach programmes also provided some services ‘on-site’. In Glasgow, outreach was conducted both in association with the original pharmacy sale programme and concurrent with the expansion of the syringe exchange programme, and ‘drop-in centres’ were established for female sex workers (many of whom were IDUs) (Taylor et al., 1993; Carr et al., 1992). In

Lund, health-care workers went out into the community to recruit participants for the syringe exchange (Christensson and Ljungberg, 1991); and in Sydney, ‘drug users’ groups’ were supported with government funding to advise the design of AIDS prevention efforts and to operate some of the services (including syringe exchanges) (Friedman, de Jong and Wodak, 1993). In Tacoma, the syringe exchange programme was initiated in a high-drug-use area by a former drug use treatment programme staff person who had developed ongoing good relationships with IDUs (Hagan et al., 1991); and in Toronto, among other efforts, the outreach included an ‘ambassador’ component, in which active drug users were trained to serve as outreach workers to their peers (Millson et al., 1991). Moreover, in each of these cities, the information imparted by community outreach workers, and the resulting climates of trust, were further disseminated throughout the oral communication networks of IDUs themselves, thus reaching persons who were not in direct contact with the outreach workers (Hagan et al., 1991; Friedman, de Jong and Wodak, 1993; Neaigus et al., 1994).

Large-scale expansion of drug treatment programmes as a method of preventing HIV-1 infection among IDUs was utilized only in Sydney. Expansion of methadone maintenance treatment was begun there in 1985 (when there were only 840 persons in methadone programmes in the state of New South Wales), and increased until 5829 persons (out of an estimated total of 8000 IDUs) were in methadone treatment in 1991. In the other four cities, there has been modest (Glasgow, Lund, Toronto) or no (Tacoma) expansion of drug treatment. The community outreach efforts did, however, lead to increased demand for pre-existing drug treatment slots among IDUs in all five cities. Indeed, in several cities, the outreach programmes became very important sources of referral to drug treatment.

The distribution of bleach for disinfecting injection equipment was an HIV-1 prevention strategy used extensively in Sydney, Tacoma and Toronto. In Sydney and Tacoma, bleach distribution was primarily in conjunction with syringe exchange, while Toronto had begun conducting a bleach-distribution outreach programme prior to initiating its syringe exchange programme.

Extensive voluntary HIV-1 counselling and testing as a principal method of AIDS prevention was utilized only in Lund, where the syringe exchange/outreach greatly increased the numbers of IDUs who received voluntary HIV-1 counselling and testing. All the other cities did provide some HIV-1 counselling and testing to IDUs, often through referral from the outreach efforts and as part of research studies. (In Tacoma, some co-ordination difficulties occurred between the syringe exchange/outreach programme and the local counselling and testing site, so that this city probably had the least amount of voluntary HIV-1 counselling and testing among IDUs.)

The prevention activities for IDUs in these cities received substantial coverage in the local mass media. Even though some of the prevention activities — such as syringe exchanges — were controversial, the news coverage was generally favourable.

Of the six different aspects of prevention programming outlined here, three
— beginning early, community outreach, and ready access to sterile injection equipment — were present in all five cities; bleach distribution was present in three cities; and large-scale expansion of drug treatment and extensive HIV-1 counselling/testing were each present in only one city. While the number of cities in this report is modest, it is large enough to assess the likelihood of observing this pattern of prevention activities against a no-association null hypothesis that a particular prevention component is equally likely to be present or absent (p = 0.5) in a set of stable low-seroprevalence cities.

Under this null hypothesis, the probability that any one prevention component would be found in all five cities is \( (0.5)^5 = 0.03125 \). The probability of any three prevention components occurring in all five cities under the null hypothesis stated above is 0.00016. The null hypothesis that the three common prevention components are equally likely to be present or absent in these cities can therefore be rejected.

### HIV Risk Behaviour among IDUs

Table 12.3 shows selected demographic characteristics, as well as selected drug-use and sexual HIV-1 risk behaviours of the IDU respondents. In all five studies, a large majority of the subjects reported that they had changed their behaviour because of concern about AIDS. Complete elimination of HIV-1 risk behaviour did not occur in any of the cities; moderate-to-large percentages of the subjects reported that they had recently injected at least once with needle and syringes previously used by others. Much smaller proportions reported having recently engaged in the particularly high-risk behaviour of injecting in ‘shooting galleries’

<table>
<thead>
<tr>
<th>Cities</th>
<th>Drugs commonly injected</th>
<th>Male %</th>
<th>Mean age (years)</th>
<th>Injection with previously used n/s %</th>
<th>Unsafe sex with casual partners %</th>
<th>Change in behaviour because of AIDS %</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glasgow</td>
<td>Buprenorphine Heroin</td>
<td>73</td>
<td>25</td>
<td>36</td>
<td>3</td>
<td>22</td>
<td>84</td>
</tr>
<tr>
<td>Lund</td>
<td>Amphetamine Heroin</td>
<td>71</td>
<td>30</td>
<td>58</td>
<td>3</td>
<td>35</td>
<td>82</td>
</tr>
<tr>
<td>Sydney</td>
<td>Heroin</td>
<td>76</td>
<td>27</td>
<td>41</td>
<td>1</td>
<td>13</td>
<td>84</td>
</tr>
<tr>
<td>Tacoma</td>
<td>Heroin</td>
<td>70</td>
<td>37</td>
<td>30</td>
<td>9</td>
<td>53</td>
<td>73</td>
</tr>
<tr>
<td>Toronto</td>
<td>Heroin Cocaine</td>
<td>86</td>
<td>28.3</td>
<td>46</td>
<td>9</td>
<td>21</td>
<td>87</td>
</tr>
</tbody>
</table>

*Risk behaviour in the six months prior to interview for Glasgow, Lund, Sydney and Toronto; for the one month prior to interview in Tacoma
places where injection equipment is rented to an IDU, used, returned to the gallery operator, and then rented to other IDUs.

Fully comparable data on detailed specifics of risk behaviour were not available from the different questionnaires. In general, however, it appears that much of this continued 'needle sharing' was infrequent and usually confined to small social networks. For example, in Lund, where a majority of the subjects reported at least one unsafe injection in the six months preceding the interview, only 28 per cent of the total sample reported more than two unsafe injections during that time period and, for the 32 per cent of persons reporting repeated unsafe injection, this risk practice was confined to 'sharing' with sexual partners only. In Tacoma, 30 per cent of the subjects reported some injecting with needles and syringes used by others, but only 8 per cent reported that half or more of their injections were with used needles and syringes. Moreover, while 9 per cent reported injecting in shooting galleries, only 3 per cent reported that half or more of their injections took place in shooting galleries.

Table 12.4 summarizes the prevention activities and response to concerns about AIDS among IDUs in these five cities. Again, it is worth noting that the prevention activities and response among IDUs occurred while the IDU population in these cities were basically stable — that is without any notable increases in the size of the population, in-migration from other areas, frequencies of drug injected, or types of drugs injected.

**Limitations**

No search for areas of stable low HIV-1 seroprevalence that attempts to include all unpublished data is likely to be fully comprehensive. Nevertheless, the search conducted for this study was relatively extensive and, as far as we could determine, was biased neither towards any geographic region nor towards the presence/absence of any specific type of AIDS prevention programming. The most likely source of bias is that cities conducting sufficient research to permit a determination of stable low seroprevalence by our criteria might also be more likely to be those which were sufficiently concerned about HIV-1 infection among IDUs to have implemented at least some type of prevention programme.

Stable low HIV-1 seroprevalence in a population of injecting drug users, however, does not imply an absence of new HIV-1 infections or guarantee against all future outbreaks of HIV-1 transmission in these cities. There have been reports of relapses to unsafe sexual behaviour among men who have sex with men in San Francisco, despite the considerable HIV-1 prevention activities in that city (Stall et al., 1990; Ekstrand and Coates, 1990; Osmond et al., 1993). In at least three of these five cities (Tacoma, Toronto, Sydney), HIV-1 seroprevalence is substantially higher among IDUs who also engage in male-with-male sex. Relapses from either sexual or injection risk reduction among IDUs who also engage in male-with-male sex could, therefore, lead to increased HIV-1 transmission for the local IDU population as a whole. Also, as noted above, the IDU populations in these five cities were essentially 'stable' during the time periods of the study, without any notable in-migrations or changes in drugs injected or in frequencies of injection. Some types of large-scale changes in the characteristics of an IDU population might facilitate outbreaks of HIV-1 transmission. If an outbreak of increased HIV-1 transmission should occur in a low-seroprevalence area, it will be important to ensure that the public-health system can react quickly enough to contain such an outbreak.

The five case histories presented here, however, demonstrate that rapid transmission of HIV-1 is not inevitable among IDUs. Stable low HIV-1 seroprevalence can be maintained even with a substantial proportion of IDUs still engaging in some injection risk behaviour. This finding in itself has important policy implications. It clearly contradicts the opinion expressed by some public officials that the only way to prevent HIV-1 infection among IDUs is to stop their drug injection (ONDCP, 1992).

There are also data indicating low and possibly stable HIV-1 seroprevalence among IDUs in other cities in Australia (Kaldor et al., 1993), in the United Kingdom (Stimson, 1995; Dolan et al., 1993) and in New Zealand (Baker, Tobias and Brady, 1991). Preliminary analyses of data collected through the Centres for Disease Control blinded seroprevalence surveys at drug treatment programmes suggest that low seroprevalence may also exist in a number of other US cities (Lehman, personal communication, 1994). A major limitation in identifying other cities with stable low seroprevalence was the lack of comparable data from non-treatment samples which, as noted above, is an important limitation. It is also important to note that, to the best of our knowledge, at least some of the three common prevention components identified here had been implemented in all of these other cities in which stable low seroprevalence appears to be occurring.

**Possible Causation**

While it is important in itself to demonstrate that stable low seroprevalence is possible among populations of IDUs, it is also important to consider whether the specific AIDS prevention components identified here were responsible for the observed stable low seroprevalence. Did the prevention activities implemented in these cities prevent epidemics of HIV-1 infection in the local IDU populations?

With full recognition of the limits of relying upon case histories, we believe that it is possible at least to outline the elements of a causal analysis and note the major limitations. The descriptions of the IDU populations and health care for IDUs in these five cities (Table 12.1 and accompanying text) did not identify any obvious reason why HIV-1 would not have spread rapidly in these cities in the absence of the prevention activities that were implemented.

Given the existing research literature on community outreach to IDUs (Brown and Beschner, 1993; DiClemente and Peterson, 1994) and availability of
sterile injection equipment (Lurie et al., 1993; Ljungberg et al., 1991; Tunving, Nyholm and Andersson, 1992; Hagan et al., 1991), it is certainly plausible that these two components could help prevent rapid transmission of HIV-1 in a population of IDUs. Mathematical analyses of HIV-1 transmission would also suggest that initiating behaviour change/risk reduction when HIV-1 seroprevalence is low would also be effective in limiting HIV-1 transmission (Anderson et al., 1991). Thus, it is possible to 'rule in' these three components as potential causes of stable low HIV-1 seroprevalence among IDUs (Cordray, 1986).

The prevention activities that were undertaken in some of the five cities examined here might also have contributed to reducing HIV-1 transmission among the local populations of IDUs. The media coverage of AIDS among IDUs in these cities — which often focused on the local prevention programmes — might also have contributed to awareness of AIDS and behaviour change.

As noted above, very large percentages of IDUs in each of these five cities reported behaviour change in response to AIDS. Other analyses of self-reported AIDS behaviour change among IDUs — with the same question used here — have shown that self-reported behaviour change is associated with avoiding HIV-1 infection among IDUs (Des Jarlais et al., 1994a, 1994b; Chitwood, 1994). This suggests that the self-reports of behaviour changes are valid and that these behaviour changes substantially lessen the likelihood of becoming infected with HIV-1.

The related research literature thus suggests that the HIV-1 prevention activities implemented in these five cities did greatly limit HIV-1 transmission in the local IDU populations.

Making causal inferences also requires some form of comparison for the five city case histories. We constructed an illustrative case control analysis for testing an association between the presence of stable low seroprevalence and the presence of all three common prevention components. To identify 'control' cities, we operationally defined a 'lack of stable low seroprevalence' as a seroprevalence rate of 10 per cent or greater for two or more consecutive years or a rate of 20 per cent for one year. Use of this operational definition meant that there would be cities which could not be classified as having or not having stable low seroprevalence, but this was considered preferable to the misclassification that would occur if cities with seroprevalence of approximately 5 per cent but limited available data were included in the case-control analysis.

Using the same search procedures that were used for identifying stable low-seroprevalence cities, we then attempted to identify cities where all three prevention components were present and yet stable low seroprevalence was not present. We were able to identify no cases where all three components were clearly present and yet stable seroprevalence was clearly absent.

To identify areas that lacked one or more of the hypothesized critical prevention components, and that lacked stable low seroprevalence, we used only a subset of our search techniques, a single review article that contains serial seroprevalence data for a total of 17 cities (Friedman and Des Jarlais, 1991). This article was chosen because it contained more serial seroprevalence data than any other source we were able to locate, and it is publicly accessible. We are reasonably confident that further searching would only have produced still more cities that lacked one or more of the prevention components and did not have stable low seroprevalence. Table 12.5 presents the results and statistical significance for this case-control analysis.

This case–control analysis is meant to be illustrative rather than definitive. The 'controls' were selected on a convenience basis rather than on any 'matched' basis. Indeed, it would be a very difficult task to determine appropriate epidemiological criteria for selecting 'matched' control cities. The case–control data do show, however, that a strong association between the three common prevention components and stable low HIV-1 seroprevalence among IDUs will be very likely unless one can locate a moderate number of cities with stable low seroprevalence but without the common prevention components, or a very large number of cities with the common prevention components but without stable low seroprevalence.

Perhaps the most important issue in making causal inferences about 'preventing' epidemics of HIV-1 spread among IDUs is the current lack of specificity in the frequencies and types of risk behaviour that 'cause' such epidemics. The data presented here show that it is possible to maintain stable low HIV-1 seroprevalence in a population of IDUs with at least occasional injection risk behaviour in a substantial proportion of the population. We would like to conclude with a brief summary of the data presented in Table 12.5.

Table 12.5  Case-control analysis of prevention components and stable low HIV seroprevalence in 22 cities

<table>
<thead>
<tr>
<th>Prevention components</th>
<th>Stable low seroprevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>present</td>
<td>absent</td>
</tr>
<tr>
<td>present</td>
<td>5</td>
</tr>
<tr>
<td>absent</td>
<td>0</td>
</tr>
</tbody>
</table>

P < .001 by Fisher's exact test

HIV prevention components are here considered 'present' if prevention efforts began to be implemented when seroprevalence was < 5 per cent among samples of local in-treatment and out-of-treatment IDUs, and if the prevention strategy locally implemented included both community outreach/development of trust and legal access to sterile injection equipment. Otherwise, 'prevention components' are considered 'absent'.

Stable low seroprevalence is considered 'present' only in localities where seroprevalence among IDUs remained between > 1 per cent and < 5 per cent over a four-year period, with no increasing trend among data from both in-treatment and out-of-treatment samples of IDUs. Stable low seroprevalence is considered 'absent' if a locality experienced two consecutive years with seroprevalence among IDUs at 10 per cent or greater, or else one year with seroprevalence at 20 per cent or greater.

This restrictive operational definition means that there could be many cities that could not be classified as clearly having or clearly lacking stable low seroprevalence. However, this seemed appropriate, given the difficulties in distinguishing 'stable low' from 'low to increasing' seroprevalence.

Both prevention components and 'stable low seroprevalence' were present in five localities — Glasgow, Lund, Sydney, Tacoma and Toronto — while both were absent in 17 localities — New York, Sardinia, San Francisco, Rio de Janeiro, Bangkok, Bologna, Milan, Padua, Rome, Geneva, Berlin, Hamburg, Vienna, Edinburgh, Bilbao, Manipur and Detroit.
suggest that variables reflecting ‘rapid and efficient mixing’ of persons engaging in risk behaviours, or ‘high rates of unsafe partner change’ (Anderson et al., 1991), are likely to differentiate stable low seroprevalence from rapid increases in seroprevalence rather than ‘the proportion of the population with any recent risk behaviour’. With better specification of the patterns of risk behaviour that differentiate rapid transmission (epidemics) from stable low seroprevalence, it would then be possible to search for linkages between prevention activities and changes in the patterns of risk behaviour, and then to make relatively strong inferences about the causal roles of prevention programmes in avoiding epidemics of HIV-1 transmission.

In conclusion, the data from these five cities show: the existence of stable low HIV-1 seroprevalence among some populations of injecting drug users; that low seroprevalence can be maintained despite at least occasional risky injections among a substantial percentage of IDUs in the population; and that stable low seroprevalence was associated with a distinct pattern of AIDS prevention programming, that is, prevention efforts were begun when seroprevalence was low, there was good access to sterile injection equipment, and community outreach was present, including referrals to other services and development of trust between IDUs and health workers.

The data presented here would appear to be the strongest evidence to date that it is possible to prevent epidemics of HIV-1 transmission in the very high-risk group of injecting drug users. Whether the three common prevention components identified here are necessary or sufficient to avert rapid transmission of HIV-1 among IDUs in other areas, remains to be determined. A conceptual explanation of stable low seroprevalence will require additional understanding of the specific risk-behaviour and population-mixing patterns associated with rapid transmission of HIV-1 among populations of IDUs.

Despite the need for additional information and more detailed theory, the potential consequences of permitting rapid transmission of HIV-1 among injecting drug users are such that responsible public health policy would seem to require, at the very least, utilizing the common prevention components wherever possible.

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This paper is dedicated to the memory of Dr Kerstin Tunving, who died in 1994.

Note

1 In each of the five case studies, we examined the presence/absence of six prevention components: (1) beginning early, (2) community outreach, (3) legal access to sterile injection equipment, (4) greatly expanded drug abuse treatment, (5) extensive HIV counselling and testing, and (6) bleach distribution. The probability that one city would have at least three of these prevention components present is based on combinations of 6 objects taken 3, 4, 5 and 6 at a time and \( = 0.6563 \). The probability that an additional four cities would then also have the same three prevention components \( = (0.5)^{3\times4} \). The probability under the null hypothesis of all five cities sharing the three prevention components is the product of these two probabilities, \( = .00016 \).

References


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Overview: Policies and Interventions to Stem HIV-1 Epidemics associated with Injecting Drug Use

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Few would deny that HIV infection is one of the major international public health crises of this century. The factors which have contributed to the global dissemination of both injecting drug use and associated HIV infection are extremely complex and dynamic. Whereas sexual transmission of HIV remains the most significant route at a global level, injecting drug use has played a critical role in fuelling the epidemic in various regions, particularly in some countries in Asia, certain developed country communities (including in France, Italy, Spain and the United States of America), and more recently in Eastern Europe and parts of the Commonwealth of Independent States. In previous chapters, some of these factors have been discussed, with consideration given to individual, social and environmental determinants. Recognizing the great diversity of injecting drug use patterns, the complex interplay of factors influencing drug use and sexual behaviour, and differing contexts of drug injecting, it is evident that effective strategies to minimize risks and prevent HIV spread need to be comprehensive, multi-faceted, integrated and flexible.

There is a growing body of scientific evidence that the HIV epidemic associated with injecting drug use can be prevented, slowed, stopped and even reversed. The World Health Organization Multi-City Study on Drug Injection and Risk of HIV Infection (WHO, 1994a), and a review of prevention activities and risk behaviour in five cities with a stable low HIV prevalence among injecting drug users (IDUs) (Des Jarlais et al., 1995), concluded that at least three prevention components were associated with containment of the epidemic. These three components included: early implementation of prevention initiatives while HIV prevalence was low; community outreach to IDUs which provided HIV/AIDS information and helped develop trust between IDUs and health care providers; and widespread provision of sterile injection equipment. Chapters 6, 10 and 12 describe in more detail these intervention components.

At an individual level, there is evidence that, given the opportunity, IDUs will reduce their risk of HIV infection by changing drug injecting practices (Celantano et al., 1994), and in certain circumstances by modifying sexual...