Evidence for Action: A critical tool for guiding policies and programmes for HIV prevention, treatment and care among injecting drug users

Injecting drug users (IDUs) are vulnerable to infection with HIV and other blood-borne viruses as a result of shared use of injecting equipment and drug solutions, as well as through unprotected sexual practices. Since sharing or use of contaminated injecting equipment and drug preparations is a very efficient mode of HIV transmission, HIV can spread rapidly among injecting drug users. Unprotected sex between HIV-infected injecting drug users and their partners can result in further HIV transmission both inside and outside of the injecting drug user networks.

Worldwide there are more than 13 million injecting drug users (Aceijas, Stimson, Hickman, & Rhodes, 2004). In some countries, HIV prevalence among certain populations of injecting drug users have exceeded 80% (Aceijas et al., 2004). Globally, it is estimated that injecting drug use accounts for between 5 and 10% of HIV infections. Today, injecting drug use with contaminated equipment is the major HIV transmission mode in many countries in Europe, Asia and Latin America, and is also driving HIV transmission in North Africa and the Middle East. In recent years, transmission among injecting drug users has been responsible for the world’s fastest spread of HIV infection, which has occurred in Eastern Europe and Central Asia (Rhodes & Simic, 2005).

However, experience shows that it is possible to prevent and even reverse major HIV epidemics among injecting drug users through a comprehensive package of interventions. A number of countries have demonstrated substantial successes in containing HIV epidemics related to injecting drug use. Effective harm reduction strategies were first implemented some 20 years ago and their impact on HIV transmission has been evaluated and documented. Despite such positive experiences in some countries, we continue to witness explosive HIV epidemics among injecting drug users across a range of countries (Ball, 1998).

Over the past few years, we have seen increasing political commitment to respond to HIV/AIDS epidemics associated with injecting drug use, ranging from international political statements (such as the United Nations General Assembly Special Session on HIV/AIDS Declaration of Commitment on HIV/AIDS (UNODC, 1998; UNAIDS, 2000, 2001; WHO, 2003) to national and provincial level policies in support of harm reduction. At the same time, we are seeing the evidence base necessary to guide effective policies and programmes growing and reflecting the contexts of a great diversity of countries, including both low- and middle-income countries. We are also seeing that new technologies, approaches and models of service delivery are being developed, which allow for more efficient assessment of situations and delivery of effective harm reduction programmes. And never before have we experienced such a huge investment in HIV/AIDS prevention, treatment and care programmes targeting drug users through such funding mechanisms as the Global Fund to fight AIDS, Tuberculosis and Malaria, the World Bank, bilateral donors and private foundations (The Global Fund to fight AIDS, Tuberculosis and Malaria, 2005).

There is increasing consensus that there is no single intervention or approach that will effectively prevent or control HIV epidemics associated with injecting drug use. A comprehensive package of interventions is required, which includes strategies that aim to: reduce the number of people injecting drugs; prevent HIV transmission among those who use drugs and their sexual partners; and provide treatment and care for drug users who are living with HIV (UNAIDS, 2005).

For those who are already injecting drugs or at risk of starting to inject, interventions include: community outreach; behaviour change communication; supply of sterile injecting equipment and safe disposal after use; drug dependence treatment, particularly opioid substitution treatment; voluntary and confidential HIV testing and counselling; prevention of sexual transmission among drug users, including condoms and prevention and treatment of sexually transmitted infections; HIV/AIDS treatment and care, including antiretroviral therapy and treatment for co-morbidities such as hepatitis and tuberculosis; primary health care, such as hepatitis B vaccination and vein care; policy and legislative reform and public education to create a supportive environment for harm
reduction and to reduce stigma and discrimination. Drug control measures that aim to reduce the number of people using drugs, particularly those who inject, without marginalizing drug users further and increasing risk behaviours, complement these harm reduction interventions (UNAIDS, 2005).

The opportunities to significantly impact on injecting drug use-related HIV epidemics are enormous. So why has the response been so slow and insufficient in many, if not most, countries? There are many barriers to the implementation of comprehensive HIV prevention programmes for drug users. The politically and socially controversial nature of interventions such as needle and syringe access and substitution therapy presents one of the major barriers. The marginalization of most drug users makes it very difficult for them to be reached. Negative attitudes to drug users makes it difficult for programmes to mobilize the necessary financial, political and community support required for effective operations. Numerous myths exist as to the effectiveness of different interventions and the willingness of drug users to change their behaviours. Local laws and regulations may prohibit the implementation of specific programmes. The list goes on (WHO, 2004a).

Where significant HIV epidemics exist among injecting drug users, decision-makers often opt for those interventions that are least controversial. Unfortunately, those interventions selected may also be the least effective. There is a clear need for decision-makers to have ready access to the necessary information to guide the development of evidence-based policies and programmes. The World Health Organization has responded by launching the “Evidence for Action on HIV/AIDS Prevention and Treatment for Injecting Drug Users” project. This project aims to synthesize the international evidence on the effectiveness of different interventions for the prevention, treatment and care of injecting drug users and to disseminate this information to policy-makers and programme managers. Reviews were undertaken on (WHO, 2004a):

- Methods for assessing HIV risk and evaluation of programmes;
- Information, education and communication strategies;
- Needle and syringe programmes;
- Community-based outreach;
- Drug dependence treatment for HIV prevention;
- Prevention of sexual transmission of HIV among injecting drug users;
- Structural and environmental interventions;
- Interventions for young and new injecting; and
- Interventions for highly vulnerable drug injectors, including prisoners, men who have sex with men, sex workers and indigenous injectors;
- HIV/AIDS treatment and care for drug users, including antiretroviral therapy.

This journal supplement includes a series of papers developed from some of these international reviews. The project found that there was great variation in the quantity and quality of research undertaken across the different interventions. The most controversial interventions, such as methadone treatment and needle and syringe programmes, tend to be the interventions that have been most rigorously evaluated. On the other hand, there tends to be a dearth of research on the less controversial interventions, such as behaviour change communication and public information programmes. This is consistent with the political imperative to have the necessary evidence and arguments to justify the implementation of unpopular policies and programmes.

The paper by Stimson et al. Methods for assessing HIV and HIV risk among injecting drug users and for evaluating interventions looks at three levels of assessment: basic assessment, which is suitable in situations of low awareness and information, routine surveillance, and enhanced surveillance, which requires more complex research and/or analyses of data collected from routine surveillance.

The main requirements for effective assessment are clear aims and objectives, as well as indicators and appropriate methodologies. Unfortunately many interventions lack these. In many developing and transitional countries, basic surveillance data are not available to provide comparative indicators. More difficult still is measuring the macro risk environment (i.e. the broader legal, social, cultural, economic and welfare environment) that places populations vulnerable or in which injecting drug use and HIV occur and responses are undertaken. International research and programme networks have played a key role in facilitating assessment capacity, the exchange of experience, the diffusion of assessment methods and competence, and in encouraging an assessment and evaluation mentality. The authors recommend comparative international research on different intervention approaches.

All three assessment levels require a mix of methods. As a consequence, public health surveillance for any setting needs to consider the relevance of a variety of methods for a comprehensive assessment of drug use and risk behaviours, and the risk and intervention environments. The authors concluded that assessment and evaluation should not proceed in an ad hoc fashion but should be part of a strategic plan for an information system that supports national and local policy development and planning for HIV/AIDS prevention, care and treatment.

The paper by Aggleton et al. on Information, Education and Communication (IEC), HIV/AIDS and injecting drug use distinguishes between six types of individual level intervention in which IEC has a role to play (mass reach interventions, outreach work, harm minimization, drug cessation/treatment programmes, voluntary and confidential counselling and testing, and risk reduction counselling) and two different styles of structural intervention (structural and environmental outreach work to tackle the structured vulnerabilities associated with HIV/AIDS).

In order to be effective, IEC approaches (whether free standing or in combination with other work) require clear and realistic goals. They need to use language that is both credible
The study identifies some additional research questions and areas where improved research methodology is needed (i.e., pharmacy and vending machine evaluation, measures to reduce inappropriate disposal and the reform of restrictive injecting paraphernalia legislation).

Much effort has been expended on improving knowledge, changing attitudes and reducing risk behaviour, but unless the means for behaviour change also become more readily available, improved knowledge and attitudes do not result in reduced risk. Likewise, unless efforts to increase access to sterile injecting equipment are buttressed by other efforts to support behaviour change, risk reduction will remain unachieved. As such, the authors recommend the timely implementation of NSPs on a scale sufficient to impact on HIV transmission rates.

The authors note that the research questions remaining to be answered include: the utility and effectiveness of IEC interventions—either by themselves or in combination with other approaches; evaluation of IEC programmes on two levels, both in terms of their outcome (does an intervention influence behaviour?) and process (how an intervention works and assists in developing and refining programmes); comparison of the effectiveness of intervention with and without certain IEC components; and the cost-effectiveness of IEC activities both on their own and as part of structured HIV prevention programmes.

Though the evidence base is weak, the study finds that IEC can do little more than raise levels of knowledge, awareness and understanding; however, when combined with other measures, including service provision and a supportive social environment, more positive and sustainable effects can be achieved.

Over the last two decades, work with injecting drug users suggests that a ‘package’ of measures including IEC interventions, hold the potential to sensitize both the general population and injecting drug users to the potential risks associated with injecting, to the means available for safer injecting and sex, to the availability of voluntary counselling and testing (VCT) facilities, to drug dependence and antiretroviral treatment, and care options. IEC approaches can also assist policy-makers, opinion formers, religious leaders and community members develop a more realistic understanding of injecting drug users and their needs.

The authors find that principles of good practice include outreach workers (former and/or current injecting drug users) gaining the trust of injecting drug users, going to where the drug users and their networks congregate and at the times when they are at greatest risk and providing multiple means for behaviour change such as risk reduction information, needles and syringes available to vulnerable populations vary considerably.

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Planned interventions, science, and the cost effectiveness of interventions

The authors recommend an extension of current practice: plans to link existing evidence-based interventions with other technical assistance and training to enhance capacity in regions and countries. They introduce, scale up and sustain comprehensive HIV prevention outreach to injecting drug users as part of a comprehensive strategy. The paper by Des Jarlais et al. *Interventions to reduce the sexual risk behaviour of injection drug users* looks at a number of qualitative and meta-analyses reviews; most of which involved studies conducted in developed countries; while a few covered a smaller number of studies undertaken in resource-constrained countries. The paper assesses the generalizability of these results for use in developing programmes in resource-constrained countries.

The findings show that injecting drug users in both resource-rich and resource-constrained countries change their sexual risk behaviours to avoid HIV infection and to avoid transmitting HIV to their sexual partners; although the risk-reduction effect is moderate. The authors conclude that it is important to implement programmes to reduce sexual risk behaviour of injecting drug users given the current evidence of the moderate effects of interventions; the fact that ‘some’ intervention to reduce the sexual risk behaviour of injecting drug users is more effective than providing no intervention; and that different combinations of intervention components, based on theoretical models, are associated with sexual risk reduction. The authors note that it is important to bear in mind that stigmatization of HIV/AIDS, or drugs or condom use may limit an intervention’s effectiveness.

There is a significant gap in the research concerning other vulnerable groups such as female injecting drug users, injecting drug users who sell or trade sex, young injecting drug users, injecting drug users in prisons and male injecting drug users who have sex with men. There is also a need for research on adapting interventions to different cultural or national settings, and to develop and evaluate new interventions that may produce greater reductions in sexual risk behaviours. However, the current gaps in the data should not be used as a rationale for failing to implement programmes to reduce injecting drug users’ sexual risk behaviour.

The authors recommend an extension of current practice: that all interventions to reduce injecting drug user drug use contain components to reduce sexual risk behaviour. Specific recommendations include: implementing educational or informative programmes that support public discussion of reducing HIV transmission; making condoms readily available, either free or at low cost, to injecting drug users; making voluntary and confidential HIV counselling and testing available as a strategy for behaviour change; that injecting drug users should have ready access to sexual health services, particularly services for the prevention and treatment of sexually transmitted infections (STIs); retaining injecting drug users in drug dependence treatment services and ensuring access to HIV treatment and care, including antiretroviral therapy (ART), as these provide opportunities for sexual risk reduction advice and counselling, and the provision of condoms; and the inclusion of current or new intervention components.

The cost of adding intervention components is likely to be very low and as such should become a standard part of programming.

The paper by Farrell et al. *Effectiveness of drug dependence treatment in HIV prevention* considers all categories of drugs that are commonly injected (e.g. heroin, cocaine, amphetamines and buprenorphine) and all forms of drug treatment (pharmacotherapy, abstinence-based and behavioural interventions either alone or in combination with pharmacotherapy).

Agonist pharmacotherapy programmes (e.g. methadone and buprenorphine substitution treatment) are available only for drug users who are primarily opioid dependent. There are over half a million people worldwide on methadone maintenance treatment (MMT) and it is estimated that this number will double in the coming decade. Such programmes remain controversial and many authorities are resistant to their implementation. The arguments against drug substitution treatment include: doubts about the effectiveness, questions about the financial benefits, and fear of diversion of drugs and increased drug use in the community.

While the data on HIV risk behaviour are limited, there is strong evidence that substitution treatment with either methadone or buprenorphine suppresses illicit opioid use and decrease injecting drug use and sharing of injecting equipment. Data on sex-related risk behaviour change are more limited, but suggest that methadone treatment is associated with a lower incidence of multiple sex partners or exchanges of sex for drugs or money, but no change, or only small decreases, in unprotected sex. To date there has been limited research on the impact of opioid agonist pharmacotherapy on ART outcomes. ART compliance improves in the stabilization phase of MMT; however, there are significant interactions between opioid substitution and ART, and clinicians need to monitor and adjust doses or drug regimens accordingly.

The only antagonist being used for opioid dependence relapse prevention treatment is naltrexone. There is currently insufficient evidence to draw firm conclusions as to its effectiveness.Behavioural interventions add to the effectiveness of drug substitution treatment, while the effectiveness of different types of psychological therapy alone has been found to be variable. Research on the cost effectiveness indicates that there is a large saving in the social and health care costs for every single unit of spending, indicating an overall cost benefit deriving from treatment.

Policy-makers need to consider the high social, public health and budgetary costs as well as the increases in HIV infection rates and the number of deaths if drug dependence treatment is not made available.

The reviews contained in this supplement show that while there are many areas, which require further research, the available evidence clearly indicates that a wide variety of cost effective harm reduction measures are available to pre-
vent or curtail HIV epidemics among injecting drug users. Some areas for additional research include: the optimal packaging of policies and interventions into a comprehensive programme—which interventions, at what intensity and coverage, and in what different combinations; more efficient service delivery models that respond to local contexts (particularly in resource-constrained settings) and reach those most vulnerable and marginalized; and how to better link drug dependence treatment, harm reduction, HIV/AIDS treatment and care, and drug control services to ensure common public health objectives are achieved.

Just as it is important to consolidate the evidence on the effectiveness of different interventions, it is also of critical importance to document and disseminate the evidence on interventions that are found to be ineffective or have negative consequences. Countries shoulder huge opportunity costs through investment in interventions that have little or no impact. We should expect that all interventions be scrutinized equally and that the same criteria be used to evaluate all interventions whether they are controversial or not. The “Evidence for Action” review project focused on those interventions that are largely delivered through the public health sector. It did not evaluate the effectiveness of a much broader range of drug prevention and control interventions on the prevention of HIV epidemics associated with injecting drug use.

As with many aspects of the response to HIV/AIDS; it is not the “know how” that is missing but rather the will to implement what are sometimes unpopular but effective measures that is lacking. Policy-makers are in a unique position to implement these findings not just for the health and well-being of injecting drug users but for society at large.

Acknowledgements

WHO has a strategic and systematic approach to its work on HIV/AIDS and drug use. Its work is organized under a number of components: establishing the evidence base; advocating for effective policies and programmes; developing normative standards, tools and guidelines; supporting countries to implement programmes; ensuring access to essential medicines (such as methadone and buprenorphine), diagnostics and commodities; and mobilizing resources.

The Evidence for Action on HIV/AIDS and Injecting Drug Use initiative guides WHO’s work on synthesizing the existing data and disseminating evidence on the effectiveness of interventions for HIV/AIDS prevention, treatment and care among drug users. This initiative, led by the WHO Department of HIV/AIDS (UNAIDS) and the United Nations Office on Drugs and Crime (UNODC) and financially supported by the Australian Agency for International Development.

The initiative has resulted in a wide range of publications that aim to make the evidence for the effectiveness of selected key interventions among injecting drug users accessible to a policy-making and programming audience. The Evidence for Action Technical Papers summarize the published literature and discuss implications for programming with a particular focus on resource-limited settings. These documents are available from the WHO website http://www.who.int/hiv/pub/.

This special supplement of IJDP summarizes a range of review papers prepared as part of the Evidence for Action series and aims to expand the dissemination of this information.

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Methods for assessing HIV and HIV risk among IDUs and for evaluating interventions

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Abstract

A wide range of methods is now available for assessing the nature and characteristics of drug injecting populations, and for evaluating the effectiveness of interventions developed to reduce injecting related harms. The public health surveillance tasks in relation to injecting drug use populations and associated health problems are the same, in principle, as for the surveillance of other health problems. These are: to describe the patterns of the condition, the nature of the problem and the environment (context) in which it occurs; to determine the scale of interventions needed and estimated coverage required; to forecast future health care needs; to mobilise resources and target prevention; and to evaluate interventions. Countries vary in their existing levels of information as well as resources for surveillance systems, research and evaluation. We propose three levels of assessment: basic assessment, which is suitable in situations of low awareness and information, routine surveillance, and enhanced surveillance, which requires more complex research and/or analyses of data collected from routine surveillance.

Keywords: Assessment; Injecting drug use; HIV; Research; Public health surveillance; Evaluation

Key issues for assessment and evaluation

In their own national, regional and local settings, policy-makers and planners need to assess the extent and nature of the public health problem of HIV related to injecting drug use (IDU), to decide what interventions are appropriate (as described elsewhere in this supplement), to implement and evaluate them, as well as to modify policy and interventions in the light of evaluation and ongoing assessment. This paper provides an overview of research methods that provide policy-makers and planners with information for HIV prevention. It describes methods that have been developed for assessing the characteristics of injecting drug users (IDUs), IDU-related risk behaviours and the health consequences as well as for evaluation of HIV prevention interventions.

Countries are not all starting from the same place. Some have virtually no information about IDU and HIV, while others have considerable sources of information from routine surveillance systems and research. We suggest three levels of data collection, analysis and interpretation. First, basic assessment should include rapid assessment of the problem and surveys of IDUs to establish HIV prevalence. Second, attention should be given to developing routine surveillance by enhancing existing, and developing new, data sources of IDU in contact with prevention, care, treatment, social, and criminal justice services. These data will also provide the necessary information for estimating coverage. Thirdly, once baseline data have been collected further enhanced surveillance work can be undertaken to improve the evidence base, estimate incidence and evaluate specific programmes.
Public health surveillance in general is concerned with the ongoing measurement and description of a health problem as well as with influencing policy, i.e. collecting information in order to take action (Centers for Disease Control, 1992; Thacker & Berkelman, 1998). Assessment allows informed decisions about required interventions while evaluation helps decide whether interventions are having the desired results. Methods used in assessment are also appropriate for evaluation, and data generated from assessment can be used in evaluation. The assessment of IDU populations and associated health problems is set out in the left hand column in Table 1. Five questions relevant to HIV prevention for IDUs are listed in the middle column of Table 1. The right hand column translates these into specific objectives, and this framework guides the discussion in this paper.

<table>
<thead>
<tr>
<th>Public health surveillance</th>
<th>Key questions for effective HIV/AIDS policy making and planning</th>
<th>Objective (cross refer to Table 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe patterns of disease</td>
<td>What is the HIV prevalence among IDUs?</td>
<td>1. Assess prevalence of HIV</td>
</tr>
<tr>
<td>Describe nature of the problem and the environment (context) in which it occurs</td>
<td>What are the main characteristics of IDUs?</td>
<td>2. Describe the behaviour of IDU population</td>
</tr>
<tr>
<td>Determine scale of interventions needed and estimate coverage. Forecast future health care needs</td>
<td>How many IDUs are there?</td>
<td>3. Estimate numbers of IDUs and coverage of current interventions</td>
</tr>
<tr>
<td>Mobilise resources and target prevention</td>
<td>What are the current HIV prevention interventions?</td>
<td>4. Predict epidemic trends and scenarios</td>
</tr>
<tr>
<td>Evaluate prevention programmes</td>
<td>What evidence is there that interventions are working?</td>
<td>5. Evaluate interventions as well as region or country-wide programmes</td>
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</table>

**Basic, routine and enhanced assessment and evaluation**

The three levels of assessment and evaluation that are proposed are shown in Table 2 and are mapped against the public health surveillance objectives outlined in Table 1. **Basic assessment** is suitable in situations of low awareness and information, i.e. where there is little or no information on IDUs available or little information available on a particular aspect of IDU. It utilises quick methods to appraise the situation and should be linked to intervention development, advocacy, policy development and the establishment of better information including routine surveillance. Many methods of basic assessment are low cost and rapid. **Routine surveillance** involves collecting ongoing data from populations in contact with interventions. It can track changes in drug use behaviour and HIV epidemics, and be used to monitor and evaluate intervention development and effectiveness. It is ongoing as data are collected over time; routine because the information is collected as part of the work of an agency; and systematic because standardised data collection and reporting forms are used.

**Enhanced surveillance** requires either more complex analyses of data collected from routine surveillance and research, for example, the statistical modelling of the possible impact of interventions on HIV epidemics, or more rigorous evaluation of interventions, for example, randomised controlled trials of specific treatments. It requires routine surveillance information systems to be in place, supplemented by research data. While it is unlikely to be undertaken in many countries, by extrapolating the results, it can provide added value to national and global knowledge of how to respond to HIV and IDUs.

**Gaining access to injecting drug users – a ‘partially’ hidden population**

IDUs are often considered to be a hidden and difficult to reach population. A better description is a ‘partially hidden population’ (Des Jarlais, Dehne, & Casabona, 2001) and thus one which can be accessed with some effort. IDUs can be recruited from agencies such as treatment programmes, residential rehabilitation and prisons; and in the community through outreach, at drug use or other venues (shooting galleries, homes, parks and drop-in-centres) and drug dealing areas; from purposely established store-fronts, and from community based agencies, including needle syringe programmes (NSPs). The advantages of populations accessed through agencies are: institutions may help in gaining access to research subjects, availability of sampling lists enabling clear sampling procedures; and clear criteria for inclusion and the characteristics of the population may be known.
Table 2

<table>
<thead>
<tr>
<th>Objective (cross refer to Table 1)</th>
<th>Basic assessment</th>
<th>Routine surveillance</th>
<th>Enhanced surveillance (add these items to routine surveillance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower levels of awareness and information</td>
<td>Medium levels of awareness and information</td>
<td>Higher levels of awareness and information</td>
<td>Higher cost and complexity</td>
</tr>
<tr>
<td>Lower cost and complexity</td>
<td>Medium cost and complexity</td>
<td>Higher cost and complexity</td>
<td></td>
</tr>
</tbody>
</table>

1. Assess level of HIV associated with IDU

<table>
<thead>
<tr>
<th>Measure HIV prevalence</th>
<th>Selected agency and community samples</th>
<th>Sentinel surveillance using multi-agency samples</th>
<th>Cohort studies of HIV sero-converters</th>
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</thead>
<tbody>
<tr>
<td>Rapid Assessment and Response (RAR) studies</td>
<td>Sentinel surveillance using community recruited samples with repeated samples for time trends</td>
<td>Modeled incidence from serial prevalence and from serological markers and CD4</td>
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<tr>
<td>Monitor reports of HIV associated with IDU</td>
<td>HIV test reports from agencies</td>
<td>Laboratory surveillance of HIV-positive and negative test results</td>
<td>Bank calculation models of HIV incidence and future AIDS cases</td>
</tr>
<tr>
<td>Measure HIV incidence</td>
<td></td>
<td>Clinical surveillance of AIDS cases and related deaths</td>
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</table>

2. Describe the IDU population

<table>
<thead>
<tr>
<th>Describe characteristics of IDU populations</th>
<th>Selected agency and community samples</th>
<th>Sentinel surveillance using multi-agency samples</th>
<th>Geo-spatial mapping</th>
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</thead>
<tbody>
<tr>
<td>RAR studies</td>
<td>Sentinel surveillance using community recruited samples</td>
<td>Repeated samples for time trends</td>
<td></td>
</tr>
<tr>
<td>Describe HIV risk behaviours</td>
<td>Surveys in agencies and the community</td>
<td>Sentinel surveillance – questionnaires and reporting systems in agencies and community recruited samples</td>
<td></td>
</tr>
<tr>
<td>Observations, focus groups and interviews in the community</td>
<td>In-depth qualitative studies in the community</td>
<td>Behavioural sentinel surveillance (BSS) in agencies and communities</td>
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</table>

3. Estimate numbers of IDUs

<table>
<thead>
<tr>
<th>Estimate prevalence of IDUs</th>
<th>Simple enumeration (e.g. counts of IDUs in street or agency settings) and estimates from key informants</th>
<th>Case-counting from agency reporting systems</th>
<th>Extended multiplier methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAR studies</td>
<td>Multipliers</td>
<td>Capture-recapture</td>
<td>Capture-recapture with covariates</td>
</tr>
<tr>
<td>Estimate coverage</td>
<td>Collate key indicator data (e.g. number of syringes distributed, number of visits to NSPs, number in contact with treatment agencies, number of arrests)</td>
<td>Use data in capture-recapture exercises and estimates of coverage.</td>
<td>System dynamic modelling</td>
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<tr>
<td>RAR studies</td>
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<td></td>
<td>Establish ongoing surveillance system across multiple data sources</td>
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4. Predict epidemic trends and scenarios

<table>
<thead>
<tr>
<th>Predict epidemic and impact of interventions</th>
<th>Simple estimates based on RAR and comparative international data, and knowledge of evidence for action</th>
<th>More rigorous estimates based on surveillance and comparative international data, and knowledge of evidence for action</th>
<th>Statistical modelling using data from routine surveillance</th>
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<tbody>
<tr>
<td>RAR studies</td>
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</table>

5. Evaluate interventions and region or country-wide programmes

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<thead>
<tr>
<th>Evaluate specific interventions, Secondary data, inferences from international data, and site inspections</th>
<th>Implementation evaluation</th>
<th>Impact and cost effectiveness studies</th>
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<tbody>
<tr>
<td>Simple estimates of programme coverage and delivery</td>
<td>Evaluation using routine surveillance and process indicators</td>
<td>Policy impact studies</td>
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<tr>
<td>Community samples to estimate coverage and infer impact</td>
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</table>
Disadvantages are: they may be biased subsets of IDUs (by intensity of drug use, range of problems, length of drug use, geographical location, criminality, gender, sexuality and/or socio-economic status), and responses may be biased and cooperation may be perceived as coerced.

Recruitment methods for community sampling include cold-approaches such as street-based contact making, using ‘indigenous’ or ‘privileged access’ interviewers (e.g. current IDUs, people with access to IDUs), and social network recruitment (Broadhead et al., 1998; Heckathorn, 1997; Heckathorn, Semma, Broadhead, & Hughes, 2001). Site mapping can identify recruitment locations. Community recruitment has been shown to be feasible in developing, developed and transitional countries (Eicher, Crofts, Benjamin, Deutschmann, & Rodger, 2000; Panda et al., 1998). Advantages of community recruitment are: access to IDUs whose risk behaviour, characteristics and HIV status may be different to those in agencies; possibly less bias because subjects are interviewed in their own settings and not subject to fear or favour of an agency; possibility of ‘added value’ by collecting information on drug use venues and observations of behaviour; and collection of multipliers for prevalence estimation and reported coverage. The disadvantages of community-based recruiting are: accessibility; absence of sampling lists; sampling methods may be unclear; the characteristics of the population are not known; sampling sites may be biased (e.g. may recruit the more ‘visible’ IDUs in the community); and the possibility that respondents, who have similar characteristics, i.e. homophiles, will be recruited.

One problem is that IDU social networks from which IDUs are recruited may also be HIV transmission networks, and this can bias overall results and associations. Some control over potential bias may be attempted by using multiple contact points and quotas to control for location and social network effects. Some randomness may be introduced into sampling when there is a choice of subjects. Homophilic effects are minimised by increasing the length of recruitment chains (Heckathorn et al., 2001). Repeat studies using the same recruitment methods tend to produce similar samples, indicating some reproducibility using the method (Rodés & Pérez, 2000; Stimson et al., 1996). The WHO study of Drug Injecting and HIV infection (Stimson, Des Jarlais, & Ball, 1998) sampled from both community and treatment agency settings in order to reduce the bias that might result from recruiting in one setting only.

Objective 1: Assess level of HIV infection associated with IDU

A fundamental question is ‘How much HIV infection is related to IDU?’ (Table 1). Therefore, a basic assessment priority is to assess the level of HIV infection associated with IDU (Table 2). HIV testing should be done in the community as well as in agency settings because risk behaviours and prevalence of HIV infection may differ in different IDU populations (e.g. younger IDUs, people not in contact with services or people in prison). HIV testing of community recruited IDUs has been successfully carried out in, inter alia, central and eastern Europe, Africa (Adelekan, 2000), South America (Mesquita, 2000), North America (Des Jarlais et al., 1994), China (Wu, 1998), South and South East Asia (Hien, 2000; Samson & Francis, 2000), Russia (Rhodes, Fitch, & Stimson, 2002; Rhodes, Lowndes, et al., 2002) and Western Europe. Many community studies use oral fluid samples for HIV testing which is less invasive than a blood sample. Single measures of HIV prevalence are insufficient because policy-makers need to know about trends (is the problem getting worse – or likely to get worse? has it improved since interventions were introduced?). Repeat surveys using similar recruitment methods enable description of time trends in risk behaviour and HIV prevalence (Fig. 1). In Barcelona, Spain, the WHO Multi City survey has been conducted with community recruited IDUs in 1993, 1996 and 1999 allowing cross-sectional time trend data on drugs consumed, risk behaviour and HIV infection (Rodés & Pérez, 2000). Other time trend examples include New York (Des Jarlais et al., 2000), Amsterdam (Van Ameijden & Coutinho, 1998) and London (Stimson et al., 1996). The interpretation of serial prevalence studies is discussed in detail by Ades (1995).

HIV surveillance systems assist in targeting prevention activities, planning responses and monitoring the national response (Walker et al., 2001). In 1988, WHO proposed the introduction of sentinel surveillance to monitor the extent of and trends in HIV epidemics. Most surveillance programmes measure the incidence of HIV/AIDS through the collation of clinical and laboratory reports of people who have AIDS or have undergone an HIV test, and AIDS-related deaths. Surveillance of IDU populations should be part of national surveillance systems and include exposure category.

HIV prevalence data should be interpreted cautiously taking into account changes in the IDU population. It is reasonably safe to infer HIV trends from prevalence data using repeat cross-sectional sampling in relatively stable IDU populations and when prevalence is rapidly rising. Ideally, HIV/AIDS policy-makers need data about HIV incidence – the number of new cases that are occurring over time.

Normally, HIV incidence studies only form part of enhanced surveillance. For example, the information can be...
obtained from cohort studies (time-consuming and expensive but which give high quality information) where a sample of IDUs, who are not HIV-positive, is followed over time to measure how many people become HIV infected (Des Jarlais et al., 2003; Van Ameijden, Van den Hoek, Mientjes, & Coutinho, 1993).

Alternatively, statistical models can be used to estimate incidence. Epidemiologists have developed a technique of fitting incidence to cross-sectional data (by age and ideally over time), which are used to estimate incidence from information on antibody status for HIV from antenatal seroprevalence data. In theory, incidence estimates could be fitted to IDU data on prevalence by years of injecting, but there are few examples to date. Incidence could also be estimated by using "detuned" assays (which test samples with a sensitive assay that can identify infection within days or weeks and a less sensitive assay that can only identify infection months later) to estimate the number of sero-converters and thereby estimate incidence. This method has been used in many different populations, including drug users (Turchi et al., 2002).

Prevalence of other health problems in addition to HIV

IDUs are at risk of other health problems, including hepatitis B and C, overdose, endocarditis, septicaemia, abscesses and bacterial infections, drug dependence, neonatal withdrawal and violence. Drug related morbidity and mortality vary because of differences in drug taking, risk behaviour, the risk environment, including the legal and policy environment and the availability of treatment. It is important to monitor these in their own right, as well HBV, HCV and overdose as these are also surrogate markers for IDU. Sexual behaviour is also important. In Eastern Europe, for example, there have been major increases in STI transmission notably syphilis, which increased 60-fold in many parts of the former Soviet Union (Tichonova et al., 1997). At the same time, there are major epidemics among IDUs of HIV and evidence of high levels of STIs. Modelling is being used to estimate the contribution of IDU to HIV epidemics in the non-IDU population (Grassly et al., 2003; Saudel et al., 2003).

Objective 2: Describe the IDU population

In order to develop and target interventions policy-makers and planners need to know about the characteristics of IDUs, their risk behaviours and where they may be found (Table 1). Describing the IDU population is a priority for basic assessment and routine surveillance (Table 2).

Characteristics of IDU populations

Characteristics of IDUs vary between and within countries with implications for the associated risks, how IDUs can be contacted, the types of interventions that are needed, IDUs potential access to interventions and amenability to interventions. Factors to be considered include ethnicity (e.g. Estrada, 1998), gender, sexual orientation, age, drugs injected (e.g. heroin or cocaine) (Dunn & Laranjoeta, 2000), other drugs used, socio-economic status, literacy, history of imprisonment, contact with services, and relative deprivation or advantage. IDU populations change over time, so one off cross-sectional studies need to be supplemented by historical and epidemiological trend analyses (see below). For example, Asian countries adjacent to the Golden Triangle have witnessed an evolution in drug use from traditional opium smoking to heroin eating, smoking, and finally heroin injecting (McCoy et al., 2001). Information about IDUs can be collected from the agencies and the community by means of quantitative surveys and qualitative investigation.

HIV risk behaviours

Risk behaviours such as sharing of injecting equipment and drugs as well as sexual behaviour, which place a person at risk of HIV infection, are influenced by individual predispositions, community norms, and social, economic and political contexts (Rhodes, Fitch, et al., 2002; Rhodes, Lowndes, et al., 2002; Stimson, 1990). Basic assessment usually utilises surveys in agencies and the community and qualitative methods and rapid assessments in the community (Fig. 2). Routine surveillance allows for collection of behavioural data from questionnaires and reporting systems in agencies, and more in-depth ethnographic studies (Table 2).

HIV risk behaviours can be measured using short questionnaires in routine surveillance (e.g. Jenkins et al., 2001; MacDonald, Robotoin, & Topp, 2001; Valenciano, Emmanuelli, & Lert, 2001) and more detailed questioning in agency (e.g. Li, 2000) and community settings (e.g. Wu et al., 1997). The World Health Organization Multi-City Study of drug injecting and HIV infection (Stimson, Jones, Chalmers, & Sullivan, 1998) provides questions on sexual and drug using risk behaviours and has been translated into Chinese, Farsi, Malay, Portuguese, Russian, Spanish, Thai, and Vietnamese. Quantitative surveys are an efficient means for collecting standardised information on a large number of people. Repeat surveys of risk behaviour (often including HIV testing) have shown reductions in risk over time, e.g. cross sectional studies in New York (e.g. Des Jarlais et al., 2000) and Glasgow (Taylor, Goldberg, Hutchinson, Cameron, & Fox, 2001) and follow-up of cohorts in Amsterdam (e.g. Van Ameijden, Langendam, Notensoom, & Coutinho, 1999).

Some policy-makers believe that IDUs do not tell the truth in surveys. However, the evidence is that drug users are sufficiently reliable and able to provide descriptions of drug use, drug-related problems, their history of drug use, criminality and HIV-risk behaviours (Darke, 1998). There is a high correlation between self-reports of syringe sharing and DNA analysis of the contents of used syringes, and between self-report of HIV status and antibody tests carried out on used syringes (Menoyo et al., 1998). An Australian study found that IDUs were motivated to participate in studies because of
Fig. 2. Basic assessment: rapid assessment and response (RAR) development.

Behavioural sentinel surveillance

'First generation' surveillance systems focus on HIV prevalence trends, especially in the general population. 'Second generation' surveillance systems (WHO and UNAIDS, 2000) include data on behaviour and focus on population sectors where most new infections are likely to be concentrated. Family Health International's Behavioural Surveillance Surveys (BSS) are designed to track trends in HIV knowledge, attitudes and risk behaviours to inform HIV/AIDS prevention programmes (Family Health International, in press). BSS uses a set of quantitative indicators, which focus on behaviours that are determinants of HIV transmission (i.e. condom use, multiple partners and needle sharing). In IDU populations BSS should become part of routine surveillance (Table 2), as a by-product of surveys to establish HIV prevalence. BSS among IDUs can monitor changes in behaviours over time, which can provide some basis for making inferences about the effects of public health interventions, when used with other serological and qualitative data. For an example, see Fig. 3.

Qualitative research on risk

Quantitative surveys can miss some of the specific details of IDU risk behaviours, the meanings that IDUs give to their behaviour and how the social, legal and policy contexts influence risk behaviour. Qualitative research by contrast involves the description and interpretation of risk behaviours, social meanings and their context. Methods include observation, focus groups, in-depth interviews and, less commonly, biographies, diaries or analysis of written and visual media.

Fig. 3. Behavioural sentinel surveillance (BSS) and government decision-making in Bangladesh.

Since the first recorded HIV infection in 1987, Bangladesh has been considered a low-prevalence country. Debates about the future course of the epidemic required data for decision making. In 1998, the Government, supported by UNAIDS and with technical advice from IHR, undertook expanded surveillance. This included screening for HIV and syphilis, and assessing risk behaviours among selected groups with high-risk behaviour. The BSS data was used by the National AIDS Program and shows to advocate for increased investment in prevention as well as to measure the effect of interventions. In 2000, the BSS of IDUs in North-western Bangladesh showed that those who received some clean needles from an NGO programme were less likely to share needles than other IDUs.

help identify intervention sites (Stimson, Fitch, & Rhodes, 1996) and is an important component of basic assessment and routine surveillance.

Geo-spatial mapping of IDUs is in its infancy and only suitable for enhanced surveillance (Frischer & Heatlie, 2001; Table 2). In Brazil, Barcellos and Bastos (1996) showed that HIV transmission among IDUs was roughly coincident with the major cocaine trafficking routes. The western region of Sao Paulo (the richest and most industrialised Brazilian state, free of malaria for decades) functioned as a cross-road for IDUs moving between two regions subjected to malaria, generating a syringe-borne outbreak of malaria in a network of IDUs, many of whom were HIV-positive (Bastos, Barcellos, Lowndes, & Friedman, 1999).

A simpler analysis in South East Asia combined knowledge of drug trafficking and migration routes with key epidemiological dates to reconstruct the spread of HIV in the region (Stimson, 1994). This was later confirmed by the geographical distribution of molecular epidemiology of HIV sub-types (Beyer et al., 2000). Mapping can be used to predict areas vulnerable to IDU and HIV within countries and across borders.

Objective 3: Estimate the numbers of IDUs

Estimating the number of IDUs (prevalence) can assist in calculating the level of resources required and in measuring the coverage and impact of interventions. As populations cannot be counted directly, various “indirect” methods have been developed for estimating the size of IDU populations (Hickman et al., 2003).

Simple enumeration (e.g. counts of IDUs in agencies) and estimates from key informants can provide some rough information for basic assessment, and the implementation of routine surveillance (Table 2) can improve case-counting from agency reporting systems.

Routine data, though partial as they miss people in the target population who are not in contact with agencies, are essential for two purposes. First, they are the data sources or raw material for indirect methods of estimating prevalence. Second, these data sources are needed to estimate coverage, i.e. for establishing the number of IDUs in contact with specific services, and then dividing this by the estimate of IDU prevalence to estimate the proportion of IDUs in contact with services. There are a number of guidelines and discussion papers on prevalence estimation (see EMCDDA, 1997, 2000a, 2000b; Hser, Anglin, Wickens, Brecht, & Homer, 1992; Taylor & Hickman, 2002).

Indirect estimation methods start from information about drug users from partial and limited sets of data and – under different assumptions depending on the method – estimate the proportion of the total population observed in the data sets to arrive at an estimate of the total population. Estimation methods require good basic data, and cannot be done routinely unless ongoing reporting systems are in place (Table 3). An assessment of the availability of data sources and potential solutions and injecting equipment is not only pragmatic or economic but also influenced by shared rules and norms in drug user relationships. Principal among these can be the communication or display of reciprocity and trust within social relationships.

The sharing of drug solutions and injecting equipment have social meanings for IDUs, highlighting that there are multiple meanings of ‘sharing’ that complement epidemiological measures of ‘sharing’ (Fig. 4). Semi-structured interviews have found multiple interpretations of sharing, with some IDUs understanding sharing only to mean the use of another’s syringe during the same injecting episode. Qualitative work on injecting in prison has also noted that re-using equipment from a different injecting occasion was viewed as “just using old works” – rather than ‘sharing’ (Tumblin et al., 1996).

Qualitative research helps to target interventions in cognisance of local drug use norms and practices, and show how different social, economic and other structural factors influence drug users’ capacity for initiating and sustaining behaviour change. Furthermore, an understanding of the social processes shaping everyday drug use is a prerequisite for developing interventions which are meaningful and useful. Research highlights the pragmatic contribution of qualitative research to intervention and policy development, particularly with regard to the design and evaluation of community-based initiatives. Qualitative research is a means of ‘action-oriented’ research and intervention development (Stimson et al., 1999) and has a role in basic assessment. Routine surveillance involves more in-depth qualitative research, undertaken on a periodic basis among the clients of agencies but especially in the community as a necessary complement to quantitative agency data.

Mapping the location of IDUs

Where IDUs are to be found is important for intervention planning. At a local level, micro mapping is used in ethnographic and rapid assessment studies to examine the interaction between risk behaviour and the local context to help identify intervention sites (Stimson, Fitch, & Rhodes, 1998).
for prevalence estimation should be part of a RAR if carried out. Two basic types of indirect methods are multiplier and capture–recapture.

Multiplier methods require the total number of IDU recorded by the data source and an estimate of the proportion of IDU in contact with the data source. Capture–recapture methods require preferably three or more data sources to identify the number of IDU on one, two or all three data sources.

Multiplier methods can be used with a variety of data sources, and need (a) benchmark data on IDUs that have experienced an event – such as the number of IDUs in treatment agencies, or in residential care and (b) an estimate of the proportion of IDUs that have experienced an event – such as the number of IDUs in treatment agencies, or in residential care or are in contact by outreach workers. Other sources, and need (a) benchmark data on IDUs that have experienced an event – such as the number of IDUs in treatment agencies, or in residential care or are in contact by outreach workers. These require information collected on IDUs from two or more data sources. The number of matches – i.e. the number of people that occur in more than one data source – is identified of each other, which is un-testable and probably not justifiable in many instances. For example, if people on methadone maintenance treatment (MMT) were more likely to be arrested then the calculation would over-estimate the true prevalence, and if people on MMT were less likely to be arrested then the calculation would under-estimate the true prevalence. Studies with three or more data sources use log–linear models to estimate prevalence and the “unobserved” number of IDUs. The advantage of log–linear models is that they can model “dependencies” and adjust the estimates accordingly. As more data sources need to be collected, the statistical complexity increases but these techniques can be easily taught and should become part of routine surveillance. The critical issue is to identify three or more data sources that collect information on IDUs. Once a prevalence estimate has been made, consideration can be given to how the data sources can be organised in order to allow regular prevalence estimates in future. Examples of studies can be found in the general texts in the references and increasingly multiple data source capture–recapture studies are being carried out in developing and transitional countries.

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There are other techniques or advances that could be utilised as part of an enhanced surveillance programme given the statistical expertise and/or available data sets.
Objective 4: Predict epidemic trends and scenarios

Intervention need, appropriateness and feasibility can be demonstrated using the assessment techniques described above. This is not enough for many HIV/AIDS policy-makers and planners: they want to judge the likely impact and cost-effectiveness of interventions when deciding on the allocation of resources (Table 1). Such judgements may be made using assessments from basic or routine surveillance data, together with (a) knowledge of the course of epidemics elsewhere, and (b) knowledge about the effectiveness of different interventions.

Decision-making could be improved by using statistically derived models of the current and future course of an epidemic so as to understand what is driving the epidemic and to estimate epidemic trends under different scenarios.

Methods include: (a) direct models, which simply extrapolate from existing data series into the future; (b) back calculations, which use current cases (e.g. AIDS or opioid overdose deaths) and known time lags (e.g. from HIV infection to AIDS, probability of an overdose) to calculate the likely underlying trend (e.g. HIV infection or IDU prevalence) (Brookmeyer & Gail, 1994; Law et al., 2001); (c) transmission dynamic models, which use a series of parameters such as the size of IDU populations, recruitment to and exit from injecting, rate of needle and syringe sharing, number of sexual partners and HIV transmission probabilities to model the epidemic and likely change following an intervention.

Models require data from routine surveillance, particularly information on current HIV prevalence, injecting risk behaviour and the size of the population. However, such data may not always be collected in a way that can be used by modellers so better liaison is needed to improve data collection for input to models. For example, modelling the spread of HIV from IDU into the general population requires data on the sexual behaviour of IDUs and the general population as well as data on the size of the IDU sex worker population.

Various models have been developed that estimate the impact of NSPs on IDU behaviour and epidemic course (Kaplan, 1989; Vickerman & Watts, 2002). It has been estimated that the NSP in Svetlogorsk, Belarus, averted 414 HIV infections between 1998 and 2000, and caused a 6.5% decrease in IDU HIV prevalence compared to if there had been no intervention. The model also estimated the detrimental impact of a funding gap in 1998–1999 (Vickerman & Watts, 2002).

Modelling is still in its infancy and is not feasible except with enhanced surveillance. Modellers are beginning to make their tools more accessible: for example, HIV tools is a set of models and costing guidelines developed for UNAIDS that can be used to estimate the cost-effectiveness of HIV prevention packages (www.unaids.org). Using models does not require high-level statistical competence but the data inputs can be complex. Costing guidelines for HIV/AIDS prevention strategies for IDUs have been developed (Kumarananayake et al., 2000).

Objective 5: Evaluate specific interventions and region or country wide programmes

Policy-makers and planners want to know the impact on the HIV epidemic of the interventions that they have funded (Table 1). Evaluations answer common questions about interventions such as: their coverage, whether they have worked as intended, effectiveness, cost, and unintended or negative effects (Rossi & Freeman, 1993). Evaluations and subsequent adjustment to programmes can help maximise the effectiveness of interventions; assist in advocacy; justify them to communities, governments and the public; improve accountability; and identify both their positive and negative effects. Evaluation uses the same methods of assessment outlined in this paper, to answer questions about outputs, outcomes and impact.

Outputs are the deliverables of an intervention (for example, number of media slots where HIV and IDU are mentioned, the number of people treated with drug substitution maintenance therapy or the number of needles and syringes distributed). Outcomes are changes that occur in the target population (e.g. in risk behaviour as a result of receiving
A key question is ‘Did the intervention cause the outcome?’. Many evaluations report relationships between interventions and outcomes. It is harder to prove causality, i.e. whether the change(s) observed in the target population is/are a result of the intervention. Impact is the extent to which a programme causes the desired change in the target population over and above what would have occurred without the intervention. It can be difficult to assess due to varying degrees of plausibility and it is necessary to rule out confounding factors.

All interventions are in principle capable of being evaluated, e.g. a project that delivers services to clients (substitution treatment, NSPs); a mass media campaign aimed at a specific target population (HIV media campaign); a law (e.g. whether it is appropriately enforced, or has the intended impact); a government policy (e.g. is it understood by the target population, how it is implemented and what is its impact). The main requirements for effective assessment are clear aims and objectives, as well as indicators and appropriate methodologies. Unfortunately many interventions lack these.

There are different types of evaluation: (a) implementation evaluation (process evaluation or programme monitoring) assesses how the intervention is being implemented; (b) impact evaluation assesses the negative and positive impact of an intervention on the target population and other people; and (c) economic evaluation assesses whether an intervention is good value for money. Evaluation as part of basic assessment uses existing data (such as how many people are in treatment facilities) and reports (e.g. project activities), project site inspections and inferences from knowledge of how such projects operate elsewhere as a benchmark comparison to make a judgment about the adequacy of the intervention. Evaluation using routine surveillance data indicates project activity and trends using key indicators (e.g. HIV prevalence among IDU, self-reported risk behaviours, the number of HIV tests and results, number of clients seen, number of methadone prescriptions written). Evaluation of enhanced surveillance involves specially designed outcome studies of various levels of sophistication and cost.

Evaluating how an intervention has been implemented requires data on the target group, how it is delivered and its immediate outputs. Many studies of IDU/HIV interventions have been observational studies that focus on implementation rather than impact. Basic assessment and routine surveillance usually do not go beyond evaluation of implementation.

HIV/IDU interventions are complex – delivering a wide range of activities (e.g. needle and syringes, condoms, counselling, referral to treatment, etc.) in unusual settings (e.g. outreach in the community) and using unconventional staff (e.g. indigenous and peer delivered interventions). It may be unclear to staff and evaluators what item of service or combination of item being delivered actually are having an effect (Booth & Koester, 1996). Describing the activities that are delivered is also important for assessing whether the programme is being delivered as intended.

Coverage is the extent to which the intervention reaches its target population. Common problems are poor and incorrect coverage. Key questions are: Who is reached? What proportion are they of the larger target population? Is there bias in the coverage of the project? Who is not reached (e.g. female IDUs)? Data are required on the number and characteristics of those reached (e.g. from project records or surveys) and estimates of the size and characteristics of the target population. (See for examples, Wiessing (2000) for estimates of coverage of harm reduction interventions in Europe, and Parsons et al. (2002) for an estimate of coverage of NSP distribution in United Kingdom.) An alternative is to survey suitable community recruited samples to assess how many IDUs have been reached.

There should be a clear description of activities which are undertaken and actually delivered. Common problems are interventions which were funded but were never established, interventions that were not fully implemented, interventions which were implemented across the wrong areas of the target population. Common problems are poor and incorrect coverage. Key questions are: What are the actual methods used for contacting the target population (e.g. outreach, referral)? What are the organisational arrangements, project procedures and activities? What is provided (e.g. needles, syringe, condom, medication, counselling and health leaflets)? Is the product appropriate and acceptable to the target population? Data are required on staffing and training; intervention organisation, procedures and activities; measures of activity (e.g. hours worked, people contacted, frequency of contacts, materials); ‘customers’ views (and non-customers); quality of the intervention and the context in which the project operates.

Finally, what resources (paid and unpaid) were used? Data required, include project budgets, staff numbers (administrators, project workers, volunteers, peer educators and outreach workers) and their costs including training, accommodation and other facilities (e.g. vehicles), materials purchased and used (such as leaflets, medications, needles, syringes and condoms), communications (telephone, postage) and transport/travel.

Impact assessments are made by comparing information on participants and non-participants or by comparing the same participants over time. Rigorous impact evaluation, i.e. ruling out confounding factors is complex and expensive and normally conducted as part of enhanced surveillance.

Economic evaluation assesses ‘value for money’, e.g. the cost, how economically efficient, how it compares with other interventions and benefits compared with costs. This can assist decision-makers in choosing between competing interventions. Cost effectiveness is the efficacy of an intervention in achieving its desired outcomes in relation to its cost (see Fig. 6). Cost benefit assesses all the benefits and costs of a project usually translated into monetary terms. Cost benefit analysis can be at different levels: to the individual – what

needles and syringes, in drug injecting as a result of drug substitution maintenance treatment or reduction in HIV incidence).

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benefit the individual obtains from the project and what they lose (e.g. direct payments, time off from work); to the sponsor – a government agency might invest in a work training programme for migrant youth, and the benefits to the government might be more people in employment, increases in tax revenue; or the whole community – this considers all costs and benefits to different groups.

International comparative evaluation

A more ambitious evaluation approach is to assess what factors make whole cities or countries differ in their HIV epidemic history. Underlying this question is why epidemics have developed differently and to understand the links between policy and interventions, risk behaviours and the course of an HIV epidemic. This has taken the form of single country case studies (e.g. Stimson, 1995); city case studies (e.g. Harvey et al., 1998; Schechter et al., 1999); and comparisons between countries with different levels of interventions (Des Jarlais et al., 1995).

The methodology of comparative studies is difficult and underdeveloped – for example, countries cannot be randomised to different interventions. Some progress has been made with developing internationally comparative ‘core’ indicators of drug use, e.g. the UN Global Assessment Programme on Drug Abuse (McKeon, 2000; UNDCP, 2001) and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), which has developed key indicators for drug use and HIV for reporting national level drug use prevalence in the general population, young people and high risk populations as well as the extent of HIV and HCV infections. Another project by EMCDDA attempts to measure coverage of harm-reduction measures for IDUs in Europe (Wiessing, 2000).

However, in many developing and transitional countries, basic surveillance data are not available to provide comparative indicators. More difficult still is measuring the macro environment (i.e. the broader legal, social, cultural, economic and welfare environment) that makes populations vulnerable (Barnett, Whiteside, Khodakevich, Kruglov, & Steshenko, 2000) or in which IDU and HIV occur and responses are undertaken. There is an urgent need to do more comparative international research on different intervention approaches.

Conclusion

As a consequence of stereotypes concerning IDUs’ behaviours and motivations, some policy-makers may be apprehensive about research into IDUs. Drug use is relatively hidden, drug users may be hard to find and there are no definitive lists from which to draw random samples. Such problems may lead policy-makers to consider abandoning the task of collecting good information. This pessimism is contradicted by the experience of researchers. As this paper shows, there is considerable evidence garnered over the past 20 years supporting a range of research methodologies for assessing drug use and evaluating interventions.

There is no single, simple, assessment and evaluation method applicable in all settings. Firstly, no single discipline, research method or data source exists that can provide a complete picture of IDU behaviours, HIV epidemics and intervention effectiveness. Second, countries are at different stages in awareness of and knowledge about IDUs and HIV/AIDS. This paper has described different methodologies in the context of a threefold schema of basic, routine and enhanced surveillance.

All three assessment levels require a mix of methods. For example: epidemiological and survey studies measure associations between exposure and outcome, whilst qualitative research can help identify the key exposures and sampling sites as well as assist in interpreting findings. Some methods depend on data collected from other data systems; for example, enhanced surveillance cannot be done without routine surveillance data. As a consequence, public health surveillance for any setting needs to consider the relevance of a variety of methods for a comprehensive assessment of drug use and risk behaviours, and the risk and intervention environments. Furthermore, because of the need for a mix of methods, and the interdependence of different methods and data sources, assessment and evaluation should not proceed in an ad hoc fashion but should be part of a strategic plan for an information system that supports national and local policy development and planning for HIV prevention, care and treatment.

There is still a gap between what researchers want to research and what is needed for policy and intervention development. Researchers need to be more aware of advocacy, policy and interventions; while policy-makers and planners need to learn more about research, assessment and evaluation. What is most needed is for researchers, policy-makers and planners to develop an assessment and evaluation mentality oriented towards intervention development.
International networks have played a key role in facilitating assessment capacity, the exchange of experience, the diffusion of assessment methods and competence, and in encouraging an assessment and evaluation mentality. An example of the role of rapid assessment and response (RAR) in building capacity and in leading to the development of interventions is given in Fig. 2. There are other examples of such international efforts. The WHO Multi-City Study of Drug Injections led to a large number of publications in many countries, which have fed into policy and interventions (Barnett et al., 1996). The Global Research Network on HIV Prevention in Drug-Using Populations (GRN) provided an infrastructure for HIV prevention researchers and others to exchange information on HIV/AIDS epidemiology and HIV prevention (GRN, 2000). The EMCDDA in the European Union has promoted assessment capacity through its work on pan-European indicators. The harm reduction networks established with the support of the International Harm Reduction Association have also facilitated intervention capacity and advocacy. Harm reduction networks now operate in Central and Eastern Europe (Honti, 2000), Africa, Asia, Latin America, North America and Oceania (Déaney, 2000). An example of how networks can facilitate rapid collection of data and its dissemination is the Hidden Epidemic report (Asian Harm Reduction Network, 1998) which gave an overview of IDU and HIV infection in South and South-East Asia. The exchange of experience internationally provides information, knowledge and builds capacity in assessment and evaluation in the ever widening circle of people responding to IDU HIV-related epidemics.

References


HIV/AIDS and injecting drug use: Information, education and communication

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Abstract

Information, education and communication (IEC) has an important role to play in HIV/AIDS prevention and harm reduction among injecting drug users and their sexual partners. This paper reviews what is known about the effects of IEC within this context. It distinguishes between six types of individual level intervention in which IEC has a role to play (mass reach interventions, outreach work, harm minimisation, drug cessation/treatment programmes, voluntary and confidential counselling and testing, and risk reduction counselling) and two different styles of structural intervention (structural and environmental outreach work to tackle the structured vulnerabilities associated with HIV/AIDS). Though the evidence base is weak, evidence relating to IEC’s contribution and effects in each of these fields is reviewed. Overall, and by itself, IEC can do little more than raise levels of knowledge, awareness and understanding; however, when combined with other measures, including service provision and a supportive social environment, more positive and sustainable effects can be achieved.

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Keywords: Information; Education; Communication; IEC; HIV/AIDS; Injecting drug use

Introduction

The number of countries reporting HIV infection among injecting drug users (IDUs) continues to rise. Developing countries, in general, and countries in transition, in particular, are highly vulnerable to drug misuse and its associated risks, which places a heavy burden on already fragile health and social infrastructures. In the Russian Federation and adjoining countries in Eastern Europe, and in several countries in Asia—there has been, or there is, the potential for major outbreaks of HIV among IDUs (UNAIDS and WHO, 2003).

A wide range of interventions have been used to reduce HIV-related risks among IDUs. They include needle and syringe exchange programmes, various forms of outreach work, voluntary counselling and testing (VCT), peer-led education, treatment programmes, and substitution maintenance therapy for opioid dependence. Significantly, there is a large and growing body of evidence, mainly but not exclusively from developed countries, to suggest that IDUs can and will change their behaviour to reduce their own risk of HIV infection, and to a lesser extent the risk to others (Stimson & Donoghoe, 1997). This is encouraging to those working in the field of HIV prevention.

Yet despite such advance, many questions remain to be answered. Central among these are those relating to the utility and effectiveness of information, education and communication (IEC) interventions—either by themselves or in combination with other approaches. IEC programmes need to be evaluated on two levels, both in terms of their outcome (does an intervention influence behaviour?) and process (how an intervention works and assists in developing and refining programmes). Studies also need to be undertaken which compare the effectiveness of intervention with and without certain IEC components. While the gold standard in evaluation study designs is the randomised control trial, ethical constraints and practical considerations such as attributing effectiveness to a particular intervention may make this impossible. Nevertheless, it is possible to use non-design criteria to assess the evidence and infer causation from observational studies (Wodak & Cooney, in press, published in this supplement).
This paper reviews much of the relevant evidence, focusing on programmes and activities in which IEC has been used as a means of HIV prevention among IDUs.

**Methodology**

Searches on IEC approaches to HIV prevention among IDUs were conducted using Index Medicus/Medline and Gateway. Keywords used and their variants were: injecting drug users, HIV prevention, effectiveness, information, education and communication. Additionally, a comprehensive literature review was undertaken on IEC approaches to HIV prevention among IDUs at a specialist library in the United Kingdom (Drugscope). Hand searches of key journals complemented the more formal database searches. An expert panel convened by the World Health Organization (WHO), including members from a range of developed and developing countries, assisted in the process of identifying appropriate ‘grey’ literature from within their regions.

**Principles for success**

Three factors have long been known to be necessary for successful HIV prevention—good quality information/education, appropriate health services and a supportive societal environment (Mann, 1993). Alone, any one of these factors is unlikely to be sufficient; together, however, they establish a formula for success. Among IDUs, effective HIV prevention activities tend to have several components (Burrows, 2001; see Fig. 1 for an example). These include providing information/education on how to prevent transmission, a variety of means to prevent transmission (e.g. sterile needles and syringes, bleach and condoms), a supportive peer environment, and access to health, welfare and other services. Also crucial is the active involvement of IDUs themselves: in situation and needs assessment, in programme development and delivery, and in monitoring and evaluation (Ball & Crofts, 2001).

In principle, IEC has an important role to play in HIV prevention, though it should be combined with other approaches if it is to prove effective. There are many different IEC strategies, including the provision of information about HIV/AIDS-related risks through posters, pamphlets, newsletters, videos, face-to-face work, and radio and television broadcasts.

**Levels of intervention**

**Individual level approaches**

Much of the international literature on IEC approaches to HIV prevention focuses on change at the individual level, exploring how individual IDUs and their partners (either sexual or injecting) can be persuaded to reduce or eliminate known risk-related behaviours and/or embrace safer practices.

Mass reach information and education programmes have been widely used to promote behaviour change, either within the general population or with a more targeted audience. They include population-based communication approaches warning of the risks of injecting drugs, information campaigns and other interventions to educate hidden or hard to reach populations.

Amongst the two most frequently used forms of outreach intervention among IDUs are community outreach work and peer-based approaches. While community outreach work usually aims to take health education messages into communities and mobilise IDUs to bring about individual level risk reduction, peer-based approaches have been used to educate IDUs about HIV-related risks and risk reduction options.

An IEC approach can also be used in harm reduction and drug cessation/treatment programmes. IEC has been used to educate IDUs about HIV/AIDS-related risks and to provide training either in basic skills or in the skills required for harm reduction, such as accessing clean syringes and needles, safer injecting methods, etc.

Voluntary counselling and testing programmes have also used IEC to effect changes in HIV/AIDS-related risk behaviour among drug users. Information and education can be used to increase IDUs’ awareness of, and access to, clinics and testing sites where VCT can be obtained.

Risk reduction counselling uses interpersonal communication to help IDUs clarify their feelings and thinking to
enable them to act to protect themselves and their partners against infection.

**Structural level approaches**

Structural level interventions aim to change the political, economic, social, and community context in which individuals live their lives. IEC approaches of this type used in relation to injecting drug use and HIV/AIDS have included structural and environmental outreach work, which goes beyond the provision of IEC to individuals to promote the development of safer community structures, including safe(r) injecting communities and spaces in which safer patterns of drug use can occur.

Further to these interventions is work to challenge the structured vulnerabilities to HIV/AIDS and drug injecting use created by socio-economic status, gender, race, sexuality and disability. While much of this activity aims to intervene politically to promote respect for the rights of especially vulnerable communities and groups; IEC approaches have also been used as part of HIV prevention efforts among systematically disadvantaged, stigmatised and ostracised groups including migrants and refugees, sex workers, sexual minorities and people with disabilities.

**Evidence of effectiveness**

What evidence is there for the effectiveness of the above models or different types of intervention? And, what specific contribution can IEC make in circumstances where it is but one element of a multi-component approach? The answers to these questions are complex, not least because relatively few good quality evaluation studies have been reported in the international literature. As has already been implied, there is an urgent need to increase the evaluation of IEC interventions and programmes, establish the casual link of such interventions to outcomes, and to undertake research covering vulnerable populations in developed and developing countries as well as countries in transition.

**Individual approaches**

**Mass reach interventions**

Evidence of the effectiveness of mass reach prevention interventions is difficult to come by, and determining the impact of HIV/AIDS-related media campaigns is not, in general, an easy task. (Hastings, Caraher, Aston, & Rose, 2001). The situation is even more complex when it comes to trying to determine whether people have changed their HIV/AIDS-related risk behaviour as a result of an IEC initiative as opposed to other factors (Drugscope, 2001). Evidence suggests, however, that mass reach interventions are rarely effective in directly reducing drug use or bringing about reductions in risk-related behaviour, although they can be effective in raising awareness and changing knowledge (Dorns & Murji, 1992; Flay & Burton, 1990). Designers of media-based drugs prevention campaigns have often assumed the existence of a hierarchy of effects, namely, that knowledge change will be followed by modifications in attitudes and that this, in turn, will be followed by changes in behaviour. However, research, including Tobler’s (1986) meta-analysis of 143 adolescent drug prevention programmes, questions the idea that increased awareness necessarily results in clear-cut behaviour change. Moreover, increases in knowledge about drugs following an informational initiative can be short-lived (De Haes, 1987).

Controversy exists concerning the use of fear in the drug prevention field. While Leventhal (1965, 1970) and Dyer (1988) have suggested that fear messages can produce beneficial effects, other researchers (e.g. Sternthal & Craig, 1974; Tripp & Davenport, 1988/1989) have concluded that such methods can be counter-productive. Audiences may simply avoid or rationalise away frightening communications (e.g. Hastings, Eadie, & Scott, 1990; Leathar, 1980; Sherr, 1987, 1990). The effectiveness of fear-arousing messages also depends on audience social background (Leathar & Davies, 1980), age (Hale & Dillard, 1995), anxiety levels (Higbee, 1969), how easy or difficult it is to take action (Sutton, 1962), and proximity to the behaviour concerned (Ray & Wilkie, 1970).

Several large-scale fear-based mass media drugs prevention campaigns in the 1980s attracted ambivalent or negative responses. They included the United Kingdom Department of Health’s campaign ‘Heroin Screws You Up’. In a subsequent evaluation, Rhodes (1990) concluded that ‘(the campaign had inadvertently) . . . fostered and reinforced negative attitudes and beliefs about heroin misuse’. Moreover, there was a failure to acknowledge that, for certain IDUs, the use of heroin may be safely managed without resulting in poor mental or physical health.

The 1980s saw the launch of major ‘Just Say No’ campaigns in the United States. These were criticised for using messages and approaches, which the literature suggests are likely to be ineffective, including the overuse of shock tactics (Hale & Dillard, 1995) and simplistic messages (Schilling & McAlister, 1990). Importantly, there is evidence that such initiatives reinforced the anti-drugs feelings of those who were already opposed to illicit drug use, but offered little to those with different attitudes and experiences (Strasburger, 1989).

Overall, a number of elements are necessary if mass reach media-based interventions are to be effective. These include: an emphasis on the positive benefits of changing behaviour; stressing short-term effects and benefits, which are likely to have more of an impact than stressing longer term outcomes (Backer, Rogers, & Sopory, 1992); language, vocabulary and mode of address are important in ensuring success (Burrows, 2001); multi-faceted and integrated interventions, in which mass media advertising is complemented by in-school programmes and other activities, have been found
Audience segmentation—the TRIBES Project, Australia. It is important, however, to take into account the different circumstances and needs of particular population groups. Lack of audience segmentation is one of the main reasons why health promotion initiatives, involving the use of national mass reach media, have often been ineffective (Frain, 1986). The example in Fig. 2 demonstrates that targeting different population groups with different messages can be effective.

Audio-visual media have been used both as a means of prevention and to promote harm reduction among those who inject (Martin et al., 1990). Several studies have reported the successful use of videotaped recordings to educate IDUs on how to clean injecting equipment using bleach (Booth & Watters, 1994; Hoffman, Klein, Clark, Boyd, & Rodriguez, 1996; McCoy, Dodds, & Nolan, 1990). Media such as leaflets, ‘buttons’, calling cards and information packs have also been used to promote HIV/AIDS-related risk reduction (e.g. Mainliners, 2000). However, few of these types of interventions have been evaluated.

Outreach interventions

Research on social influence highlights the power of the media in generating awareness, and the importance of interpersonal sources as triggers for the adoption of new behaviours (Aronson & Gonzales, 1990). For this reason, outreach interventions have been heavily promoted in relation to risk reduction for HIV prevention. The IEC component of outreach activity usually aims to take health education messages into the community to mobilise IDUs and their networks to take action to reduce HIV-related risks.

In Argentina, a research and intervention project to promote HIV prevention among IDUs was set up in 1998 by a non-governmental organisation, Intercambios, with UNAIDS support. A key objective was to initiate risk reduction interventions among IDUs in Buenos Aires, focusing on a poor and socially marginalised neighbourhood, Anchorena. Two interventions were developed with the assistance of current drug users. The first took the form of regular meetings in the homes of IDUs, while the second involved street-based outreach work. In each case, IEC materials were distributed along with clean syringes and condoms. By linking IEC and other services to a stabilised and marginalised population, and by incorporating drug users themselves into the teams, the project was able to break down barriers and facilitate IDUs access to health and other services (Rossi et al., 2000). Elsewhere in Buenos Aires, the El Retorno project has established a community-based reduction centre with the support of the National HIV/AIDS Programme. IEC approaches and the active participation of users and co-users in the programme have been central to its success. Efforts have been made to address gender-related concerns and to promote access to education and other services among IDUs who are otherwise socially marginalised. Marked progress is being made with respect to social mobilisation and capacity building (Equipo de Trabajo de El Retorno, 2001).

Outreach programmes have been used to provide HIV prevention information, and to establish links with services such as drug treatment, HIV counselling and testing, medical care and social services. These programmes also often provide materials for reducing risk behaviours such as clean syringes, bleach for cleaning used syringes and condoms for safer sex. Many have employed ex-IDUs as peer outreach workers. Outreach interventions have been found to be particularly effective both in reaching IDUs who have never been in contact with services and in reducing HIV risk behaviours (Abdul-Quader, Des Jarlais, & Tross, 1992; Center for Disease Control, 1993; Neaigus, Sufian, & Friedman, 1990; Weibel, Jimenez, & Johnson, 1993).

A review found that outreach work could be successful in reducing baseline drug-related behaviours among IDUs (Coyle, Needle, & Normand, 1998). However, while outreach interventions produced significant changes in injecting risk behaviour, they led to much smaller changes in sexual risk behaviour (Kumar, Mudaliar, & Daniels, 1998).

While some community focused IEC initiatives have utilised professional outreach workers, others have used ‘peer-driven intervention’ to secure their goals. Here, peers provide information, generate peer support and utilise the culture of the target group to effect and sustain changes in behaviour (Burrows, 2001; Kinder, 1995). Several studies point to the success of such an approach among IDUs (Hangzo et al., 1997; McCalman, 1994).

Evaluations strongly suggest that, with guidance and nominal incentives, IDUs can play a more extensive role in community outreach efforts than traditional models often allow (Broadhead et al., 1998). Peers often have an advantage in

Fig. 2. Audience segmentation—the TRIBES Project, Australia.

Fig. 3. The importance of outreach work—Intercambios and the El Retorno Project, Buenos Aires, Argentina.
that they are more likely to be able to engage with other peers, reinforce safer injecting and sexual practices, and link IDUs with services. Peer-driven interventions, in particular, can reach a larger and more diverse set of IDUs, doing so at a lower cost. For example, in shooting galleries in Ho Chi Minh City and Hanoi, Vietnam, professional injectors have been trained to implement risk reduction interventions during different stages of the drug preparation and injecting processes, including interventions targeting the use of shared needles and communal ‘drug pots’ (Power, 1994).

IEC in harm reduction and drug treatment/cessation programmes

Several studies suggest that the inclusion of IEC within a harm reduction programme can have a significant impact on HIV-related risk behaviour. In the Ukraine, for example, IEC materials increased the use of condoms, decreased the reported number of sexual partners and promoted harm reduction through the use of sterile injecting equipment (Gagarkin & Vanenkova, 2000). The role of IEC in facilitating the work of needle and syringe exchange programmes has also been documented (Burrows, 2001). (See also example in Fig. 4.)

IEC approaches can also be used to alert IDUs to the existence of treatment facilities and programmes, including those for substitution maintenance therapy. Posters and leaflets may be made available in places where IDUs are likely to meet, as well as in general health service facilities. Television and radio ‘spots’ and commercials can advertise the existence of treatment services and facilities. Unfortunately, few of these approaches have been systematically evaluated and the results published.

Once enrolled in treatment programmes, IEC programmes and interventions may be part of the package of measures offered (Dengelegi, Weber, & Torquato, 1990; Hart, Woodward, & Carvell, 1989). Glaser (1993) has described five broad types of treatment modality. The psychological and socio-cultural modalities of treatment are those most likely to use IEC in order to promote understanding and involvement. In the course of this review, however, no studies that had undertaken an evaluation of the IEC component of such work were found.

Access to HIV testing and counselling

Voluntary counselling and testing seeks to effect changes in HIV-related risk behaviour among many population groups including IDUs. Gibson, McCusker, and Chesney (1998) reviewed 19 studies involving VCT and found substantial reductions in both injecting-related and sexual risk behaviours. Moreover, among IDUs knowledge of HIV antibody status has been shown to facilitate short-term risk reduction (Colon, Robles, Marrero, Reyes, & Sahai, 1996). However, evidence for longer term change is less conclusive (MacGowan et al., 1997; Marlink & Foss, 1987), with Skrondal, Eskid, and Thortvaldesen (2000) reporting on a cohort of asymptomatic HIV-positive individuals that IDUs were among those least likely to use condoms following diagnosis.

Risk reduction counselling

Counselling approaches that encourage active decision-making among IDUs have been shown to be effective in producing sustained behaviour change (Kotranski et al., 1998). However, the IEC component of such counselling remains to be evaluated.

Many resource-constrained settings cannot afford to have dedicated drug or HIV counsellors. In these contexts, peer counsellors may be effective in delivering relevant and affordable information and education to hard to reach IDUs (Ball & Crofts, 2001). Again, the effectiveness of such work has not been evaluated.

Structural approaches

Structural and environmental outreach work

Combining individual level and structural interventions including the community mobilisation of IDUs and the creation of safer environments is effective in HIV prevention (Ball & Crofts, 2001; Wodak & Des Jarlais, 1993). The development of safer community structures can include establishing IDU organisations. Drug user organisations can take the lead in community advocacy, give useful advice to health departments and be credible providers of information to IDUs (Abdul-Quader, Des Jarlais, Chatterjee, Hirky, & Friedman, 1999).
Efforts to shape the group norms of IDUs can lead to increased and consistent HIV awareness and safer drug-related behaviours (Friedman et al., 1992). Network intervention techniques, including using group sessions to reinforce behaviour change, have been used to promote risk reduction among IDUs. Studies have shown that IDUs involved in network interventions modify their risk behaviours more substantially than do IDUs who receive an individually focused intervention (LaTkin, Mandell, Vlahov, Oziemkowska, & Celentano, 1996). Involving IDUs in the design and implementation of interventions may result in increased ownership and effectiveness of the programme and can, in itself, be considered a 'meta-structural' intervention (Des Jarlais, 2000).

Interventions using media advocacy (Wallack & Scandra, 1991) or 'unpaid publicity' to generate coverage of an issue by the media have been used to lobby for policy change (Reid, Killoran, McNeill, & Chambers, 1995). These can generate public interest or controversy leading to pressure being put on policy-makers. They can also enlist support for lobbying by key community and opinion leaders (Murray & Douglas, 1988; Reid et al., 1995; Wylie & Casswell, 1992). In the United States, media advocacy has been used to persuade television companies to incorporate messages about drug use in soap opera story lines (Montgomery, 1990), although the effectiveness of such work remains to be evaluated.

Finally, opinion concerning the use of celebrities is mixed.

Structured inequalities and their effects

Like many activities, drug injecting is a gendered practice with different consequences for women and men (Klee, 1996; NIDA, 2001). While generalisation is dangerous, available evidence suggests that drug use is more stigmatising for women than for men (Lex, 1991). The twin stigmas of drug dependence and injecting, often in association with sex work, can make female IDUs one of the hardest to reach populations. Perhaps as a result of stigma, female IDUs are more likely than men to have a drug-using partner in their primary sexual relationship (Barnard, 1993; White, Phillips, Mulready, & Cupitt, 1993). Women’s vulnerability can also be enhanced by virtue of the fact that male IDUs not infrequently prefer non-using partners to drug-using ones (Cohen, Hauer, & Wofsy, 1989; Des Jarlais, 1991; Klee, Faugier, Hayes, Boulton, & Morris, 1990).

Poverty and race intersect with gender to make poor women from minority or heavily discriminated against communities particularly vulnerable. Panda et al. (2000) found that in Calcutta, India, 45% of wives of socially marginal men who injected were found to be HIV-positive. Several studies have attempted to use IEC to address these and other concerns. One option is to encourage both partners to discuss safer sex and safer drug use options (Barnard, 1993; Miller, 1991).

An alternative strategy is to bring together vulnerable women for discussion of appropriate strategies for health protection. This has been tried with some success with condom use (Schilling, El-Bassel, Schinke, Gordon, & Nichols, 1991). In this study, 91 female methadone users were randomly assigned to either an information-only control group or a skills-building intervention. The intervention consisted of five sessions of small group activities involving the identification of the women’s own high risk sexual behaviours and the negative associations of condoms. Women then practiced skills which involved asking partners to use condoms. Compared with the control group, intervention group respondents reported initiating discussion of sexual issues with their partners more frequently, feeling more comfortable talking with them about safer sex and using and carrying condoms more frequently. A key feature of this approach involved women themselves acting as peer leaders in the development and delivery of the intervention (cf. Mondanaro, 1987; 1990; Rossi & Touze, 1994).

Important issues have been raised in relation to women’s access to treatment and harm reduction services (Brunceau et al., 2001; Powers & Penn, 1990; Tross, Abdul-Quader, Simons, Sanchez, & Silvert, 1993). Frequently such services are not operated in a ‘women friendly’ manner. IEC has a potentially important role to play in promoting awareness of what services are on offer and in facilitating access.

Issues of culture and race impact on illicit drug use by different ethnic communities and need to be taken into account when developing IEC interventions. Streetwise Communications in Australia has worked actively to address such concerns in their written materials and literature. Their work highlights the importance of linguistic and cultural sensitivity. For example, when working with Aboriginal and Torres Strait Islander communities, it was found important to avoid using phrases such as ‘avoid sharing needles and syringes’, since in koori/nunga cultures ‘sharing’ is seen as a positive cultural practice. Instead, phrase like ‘Don’t use someone else’s needle . . .’ were used (Skelton, 2000). (See also the example in Fig. 5.)

There is clear evidence from Canada and the United States that people of colour and minority ethnic communities are vulnerable both to injecting drug use and HIV/AIDS. Icard, Schilling, El-Bassel, and Young (1992) have suggested that among people of colour in the USA, sexual minorities are disproportionately affected. Future IEC interventions will need to take into account the complex cultural, economic, and social factors involved, and the need to develop racially and ethnically sensitive resources.

In Australia, the United Kingdom and the United States as well as many European countries, gay and bisexual men were among the first to be affected by HIV and in many industrialised nations the majority of AIDS cases still occur among these groups. While many HIV interventions have been developed in response to the needs of gay and bisexual men, relatively few IEC interventions targeted at gay-identified IDUs exist, and of these, few have been evaluated.
advertisements placed in gay newspapers, addressing issues of HIV prevention in the gay community in Sydney, Australia. The campaign was an important step in acknowledging that injecting was, for some gay men, a preferred means of consuming recreational drugs. Denial of the practice and its association with negative ‘junkie’ stereotypes, created a context in which risk reduction practices were not addressed. This campaign aimed to bring injecting drug practices out into the ‘open’.

The Five Gyms Study in London, United Kingdom (Bolding, Sherr, Maguire, & Elford, 1999) investigated the injecting and sexual risk behaviours of gay men who use anabolic steroids or other fitness-enhancing substances. It has been estimated that about two-thirds of men using anabolic steroids in London inject (Korkia & Stimson, 1997). Bolding and co-workers found that, although one in ten gay men surveyed reported being an IDU, none reported sharing needles. However, steroid use was associated with higher levels of unprotected anal intercourse and the study recommended the development of targeted information and education interventions to address this issue.

Generalisability and sustainability

What are the implications of the above for global efforts to tackle HIV/AIDS among IDUs? Can successful approaches be brought to scale in resource poor contexts? Although there is only a small body of literature on the effectiveness of IEC approaches for IDUs in developed countries, much less is known about the situation in resource constrained countries and countries in transition. Having said this, many of the interventions introduced in these settings mirror those earlier implemented in developed countries (Ball, 1998; Narain, Jha, Lal, & Salunkhe, 1994).

While mass reach population-based materials focusing on the dangers of injecting drug use and identifying the links between injecting drug use and HIV/AIDS have been produced; more targeted materials tend to be less common, perhaps because of the assumption that focused interventions may appear to condone what are illegal activities in most countries. However, IEC approaches can successfully reach members of marginalised groups and there is evidence that simple, well-designed IEC materials may be as effective as those with high production costs (Ball & Crofts, 2001).

While IEC interventions may be feasible in many resource-constrained countries; it is unlikely that explicit HIV prevention messages targeted at IDUs will be socially acceptable in all communities. Such messages may encounter opposition from the general public similar to that expressed in relation to safer-sex messages for young people, sex workers and men who have sex with men (MSM). Language differences, the inappropriate use of terminology, illiteracy, learning difficulties and the diversity of drug-using practice set further limitations on the use of mass reach (and even some targeted) IEC approaches.

Several studies have looked at the cost-effectiveness of HIV prevention interventions, including those directed towards IDUs (Richter, Brandeau, & Owens, 1999; Schrappe & Lauterbach, 1998; Vickerman & Watts, 2000). However, more research is needed to investigate the cost-effectiveness of IEC activities both on their own and as part of structured HIV prevention programmes.

Conclusions

Over the last two decades, work with IDUs suggests that a ‘package’ of measures is needed to bring about successful HIV prevention. IEC interventions are one component of such an approach. They hold the potential to sensitise both the general population and IDUs to the potential risks associated with injecting, to the means available for safer injecting and sex, to the availability of VCT facilities, to drug dependence and anti-retroviral treatment, and care options.

IEC approaches also have an important role to play in outreach work including peer-led education programmes. Information about HIV/AIDS-related risks and ways of reducing risk and minimising harm may be made available through leaflets and booklets, as well as by word of mouth. In some circumstances, audio–visual media has been used to good effect such as in programmes to teach IDUs how to sterilise and clean injecting equipment.

Beyond this, however, IEC can be used to establish a policy climate supportive of working with IDUs and sensitive to the most effective approaches. It can do this through advocacy with politicians and political decision-makers, religious leaders and community groups. ‘Unpaid publicity’ and media advocacy can help create a climate in which HIV prevention
issues among IDUs can be tackled. IEC interventions such as these, operating at a structural level, can prepare the ground for more focused interventions around IDUs and their needs.

IEC approaches should not be regarded as a panacea or implemented in a vacuum. In order to be effective, IEC approaches (whether free standing or in combination with other work) require clear and realistic goals. They rely on the use of language that is both credible and familiar, addressing sex- and drug-related differences as well as injecting-related concerns. Networks of peers have an important role to play in spreading messages and supporting individuals in adopting risk reduction practices.

In order to engage with the structured inequalities that render some groups of IDUs more vulnerable than others, IEC programming should always be ‘fine tuned’ so as to meet the needs of different communities of drug users. Messages and approaches should be broken down to include actions aimed at groups differentiated on the basis of gender, sexuality, ethnicity, age and social class, among other variables. The direct involvement of drug users themselves in designing IEC materials and approaches is critical for ensuring that messages are appropriate to and well accepted by the target audience.

Finally, more explicit recognition should be given to the role of IEC in preparing the way for a range of programmes and interventions that are known to work in relation to HIV prevention. These can help policy-makers, opinion formers, religious leaders and community members develop a more realistic understanding of IDUs and their needs. They can also result in the overall desegmentation of injecting drug use, which is an important pre-requisite for service use.

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Effectiveness of sterile needle and syringe programmes

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Abstract

This is the first comprehensive international review of the evidence for needle syringe programmes. The major, and now overwhelmingly strong, finding is that needle syringe programmes reduce HIV transmission effectively, safely and cost effectively. The size of the benefit is substantial. There is compelling evidence that needle syringe programmes reduce HIV incidence and HIV prevalence by reducing HIV risk behaviour. The Bradford Hill criteria, generally regarded as the most robust method of assessing public health interventions, were used for the evaluation framework. Conservatively, six of the nine Bradford Hill criteria were fulfilled (strength of association, replication of findings, temporal sequence, biological plausibility, coherence of evidence, and reasoning by analogy). Three of the Bradford Hill criteria were not fulfilled (specificity of association, biological gradient and experimental evidence). Five additional criteria were clearly fulfilled (cost-effectiveness, absence of negative consequences, feasibility of implementation, expansion and coverage, unanticipated benefits, and application to special populations). The findings in this review are consistent with seven published national reviews conducted by, or on behalf of, United States government agencies, which had previously found that needle syringe programmes were effective in reducing HIV infection among injecting drug users and did not increase illicit or injecting drug use. Countries affected or threatened by HIV infection among injecting drug users should carefully consider the convincing evidence now available for the effectiveness and safety of needle syringe programs with a view to establishing or expanding needle syringe programs to scale. Although some research questions still remain unanswered, and areas exist where improved research methodology is needed, the failure to implement needle syringe programmes in time and on a sufficient scale cannot be justified by a lack of available evidence.

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Keywords: Needle syringe programme; HIV prevention; HIV/AIDS; Injecting drug use; Harm reduction; Bradford Hill criteria

Introduction

HIV/AIDS is probably the most serious global public health threat since the plague. Injecting drug use is the major or second major risk factor for HIV in seven of the ten UNAIDS regions, accounting for 90% of the world’s population.

The establishment of needle and syringe programmes (NSPs) can be traced to an epidemic of hepatitis B and hepatitis C (and HIV as discovered later) among injecting drug users (IDUs) in Edinburgh, Scotland between 1982 and 1984. A local pharmacist began providing sterile injecting equipment but was soon stopped by authorities (Burns, Bretchelle, Gore, Pfeuter, & Robertson, 1996). It was not until 1983 in Amsterdam, the Netherlands, that the first official NSP was established also in response to a hepatitis B outbreak. HIV/AIDS soon became the rationale for this NSP and similar programmes were rapidly established in many parts of the world. NSPs, which are services dedicated to providing needles and syringes, including exchange of used for sterile needles and syringes, now operate officially in over 65 countries (Aceijas, 2004). Evaluation of the effectiveness and safety of these programmes began soon after their establishment and there exists a vast literature supporting their effectiveness.

Providing access to and encouraging utilisation of sterile needles and syringes for IDUs is now considered a fundamental component of any comprehensive and effective HIV prevention programme (WHO, 2003). A wide variety of measures have been developed to improve access to and utilisation of sterile injecting equipment such as NSPs,
strategies for disinfecting needles and syringes in settings where they are reused or shared, pharmacy based distribution, sale or exchange schemes, vending machines and other distribution programmes, policies and programmes to encourage more appropriate disposal of used needles and syringes and liberal injecting paraphernalia legislation.

Much effort has been expended on improving knowledge, changing attitudes and reducing risk behaviour, but unless the means for behaviour change also become more readily available, improved knowledge and attitudes do not result in reduced risk. Likewise, unless efforts to increase access to sterile injecting equipment are buttressed by other efforts to support behaviour change, risk reduction will remain unaffected. Interventions to improve access to sterile injecting equipment have been implemented in many countries throughout the developed world and to a lesser extent in transitional and developing countries. In the absence of an effective vaccine against HIV, measures to improve access to sterile needles and syringes will remain the most effective tool available to reduce HIV transmission among and from IDUs.

This review examines whether NSPs have been demonstrated scientifically to reduce the spread of HIV among IDUs.

Methodology

This review should be considered in the light of several limitations. The only literature reviewed was in English. Most of this literature originated from developed countries, which although peer reviewed, may still be subject to one or more forms of publication bias. The overwhelming majority of studies were quantitative and there were limited qualitative data to illuminate them. The literature regarding the effectiveness of NSPs is so vast that there is little need to review the grey literature.

Research findings not supported by randomised controlled trials are often questioned by clinical medicine and public health specialists. However, conducting a strictly randomised controlled trial to evaluate a NSP is impossible due to insurmountable ethical and logistical impediments. In the absence of randomisation other methodological problems arise including the accurate measurement of needle sharing and injecting frequency. In addition, evaluation studies are generally conducted at different stages of HIV epidemics with wide variations in seroprevalence and seroincidence.

In addressing such methodological concerns, a USA National Academy of Sciences’ Institute of Medicine report concluded that to reject NSPs, based on limitations of the design of single studies, ignores both the preponderance and pattern of the evidence and ‘is both poor scientific judgment and bad public health policy’ (Normand, Vlahov, & Moses, 1995), citing in support Bradford Hill who has argued that if certain criteria are met in a number of evaluations of observational studies, then there is an increased probability that a statistical association is causal.

The Bradford Hill criteria to infer causality have increasingly been used to assess evidence from studies evaluating interventions. These original criteria and five additional criteria have been applied to this evaluation of NSPs. The null hypothesis used for this study is that measures to increase the availability and utilisation of sterile injecting equipment do not reduce HIV risk behaviour, HIV seroprevalence or the HIV seroincidence among IDUs. The criteria discussed below have been categorised as either Bradford Hill Causal Criteria or Additional Feasibility and Implementation Criteria.

Bradford Hill Causal Criteria

Strength of association

The strength of a supposed association between an exposure factor and an outcome is gauged by the relative risk or odds ratio with associated confidence intervals used to measure the protective effect of an intervention.

Replication of findings

Also referred to as “consistency”, this criterion examines whether different studies conducted in different locations by different investigators have reported similar findings.

Specificity of association

Specificity is said to be present when the alleged exposure factor (or intervention) is exclusive to the outcome and when the outcome has no other known cause or associated risk factors.

Temporal sequence

For a cause-and-effect relationship to be supported, the introduction of an intervention must be followed by a reduction in the outcome factor.

Biological plausibility

This criterion refers to the presence or absence of a likely biological mechanism linking the risk exposure or intervention to the observed findings.

Biological gradient

Evidence that increasing exposure to an intervention or risk factor results in a commensurate positive or negative change in an outcome.
**Experimental evidence**

This criterion often provides the strongest support for causation and measures the effect of an action.

**Reasoning by analogy**

Causality is supported by analogy if there are similar associations or causal relationships in other clinical or epidemiological areas of relevance.

**Coherence**

When the evidence from different disciplines and different sources “hangs well together”, this criterion is considered to be fulfilled.

**Additional feasibility and implementation criteria**

**Cost-effectiveness**

Although estimated in a number of different ways, authorities pay increasing attention to the magnitude of benefit achieved from the allocation of public resources.

**Absence of negative consequences**

Consideration of possible inadvertent adverse consequences has a major impact on adoption or expansion of interventions.

**Feasibility of implementation, expansion and coverage**

Is it feasible to implement in diverse settings, including resource-poor settings, and to expand these interventions to a scale commensurate with public health need?

**Unanticipated benefits**

Does the intervention lead to other unintended and welcome benefits?

**Special populations**

How successful are interventions in reaching special populations that are particularly at risk or of considerable public health significance?

**Results: the effectiveness of needle syringe programmes**

**Strength of association**

Forty-five studies from 1989 to 2002 with NSP implementation as an intervention and HIV seroconversion, HIV seroprevalence or HIV risk behaviours among IDUs as outcome variables were examined. Some studies assessed multiple outcomes. Six out of ten studies, which evaluated HIV seroconversion or seropositivity as outcomes, found that NSP use was protective (Des Jarlais et al., 1996; Health Outcomes International, 2002; Heimer, Kaplan, Khoshnood, Jariwala, & Cadman, 1993; Hurley, Jolley, & Kaldor, 1997; Ljungberg et al., 1991; Monterrosos et al., 2000); outcomes in two studies were negatively associated with NSP use (Bruneau, Lamothe, & Franco, 1997; Stratthde et al., 1997) and two studies showed no effect (Patrick, Strathde, & Archibald, 1997; Schechter, Stratthde, & Cornil, 1999).

HIV risk behaviour outcomes were examined in 33 studies with the majority focused on syringe sharing, borrowing, lending or reuse: 23 were positive (Bluthenthal, Kral, Erringer, & Edlin, 1998; Bluthenthal, Kral, Gee, Erringer, & Edlin, 2000; Cox, Lawless, Cassin, & Geoghegan, 2000; Donoghoe, Stimson, & Dolan, 1989; Des Jarlais et al., 1994; Frischer, Elliot, & Taylor, 1993; Gibson & Flynn, 2001; Gleghorn, Wright-De Aguro, & Flynn, 1998; Guydish, Bucardo, Clark, & Bernheim, 1998; Guydish, Clark, Garcia, & Bucardo, 1995; Hartgers, Buning, van Santen, Verster, & Coutinho, 1989; Heimer, Khoshnood, Bigg, Guydish, & Junge, 1998; Kaplan, 1991; Kaplan & Heimer, 1995; Kaplan, Khoshnood, & Heimer, 1994; Keene, Stimson, Jones, & Parry-Langdon, 1993; Monterrosse et al., 2000; Oliver, Maynard, & Friedman, 1994; Paone et al., 1994; Peak, Rana, Maharjan, Jolley, & Crofts, 1995; Power & Natalya, 2002; Schoenbaum, Hartel, & Gourevitch, 1996; Singer, Himmelgreen, Weeks, Radda, & Martinez, 1997; Vlahov, Junge, & Brookmeyer, 1997; Watters, Estilo, Clark, & Lorvick, 1994), one negative (Klee, Faugier, Hayes, & Morris, 1991) and five were indeterminate (Donoghoe, Dolan, & Stimson, 1992; Hartgers, Van Ameijden, van den Hookey, & Coutinho, 1992; Klee & Morris, 1995; Van Ameijden et al., 1994; Van Ameijden & Coutinho, 1998; Van Haastrecht et al., 1996); while six studies examined diverse outcomes including ‘injecting frequency’ – one positive (Watters et al., 1994), ‘proportion of syringes exchanged’ – one indeterminate (Van Ameijden & Coutinho, 1998), ‘syringe return rate or exchange rate’ – three positive (Kaplan, 1991; Kaplan et al., 1994; Kaplan & Heimer, 1995) and ‘mortality among NSP users versus non-users’ – one indeterminate (Van Haastrecht et al., 1996).

Overall, these studies provide strong evidence to reject the null hypothesis that attendance at NSP does not confer protection against HIV. However, it is not possible to exclude the possibility that selection bias may account for the findings in studies comparing IDUs who attend NSPs with those who do not.

Several authors have offered explanations for findings in some studies that HIV was more prevalent in attenders compared with non-attenders (Bastos & Stratthde, 2000; Coutinho, 2000; Lurie & Drucker, 1997; Schechter et al.,

observed higher HIV seroconversion rates among NSP attenders compared to non-attenders (Lowndes & Alary, 1998; Schechter et al., 1999). Bastos and Strathdee (2000) notes that evaluations of NSPs typically employ dichotomous categorisations (such as NSP attenders versus non-attenders, frequent versus infrequent attenders). This simplistic approach overlooks the fact that non-attenders may have only used sterile injecting equipment. For example, in an analysis of NSP attenders in Amsterdam, the Netherlands, a city where sterile syringes are readily available through pharmacies, irregular NSP attenders, but not non- or frequent attenders, were at highest risk of HIV seroconversion (Van Ameijden & Coutinho, 1998). The authors concluded that irregular NSP attenders had the least exposure to sterile injecting equipment and consistent prevention messages, which placed them at highest risk of infection.

Studies examining NSP effectiveness have generally relied on self-reported outcome measures. At least one study compared self-reported risk behaviour with actual programme data and concluded that self-reported risk behaviour data underestimated the protective association of NSP attendance by 18% (Safaesan et al., 2002). Strong as the evidence is for NSP effectiveness, these data are confounded by the presence or absence of alternative availability of sterile injecting equipment through pharmacies. A systematic review (Gibson, Flynn, & Perales, 2001) identified 42 studies evaluating NSP effectiveness. The potential confounding of pharmacy access to syringes was examined. Twenty-eight studies concluded that NSP use had positive effects (reduced risk behaviour or seroconversion), 12 showed no effectiveness and two found negative effects. Thirteen of the 14 studies with no effect or negative effects compared clients with non-clients of NSPs. When these 13 studies were examined carefully and an additional 12 studies that compared users with non-users of NSPs were considered, all 13 studies with negative or null findings were found to have been conducted in settings where IDUs had legal access to syringes from pharmacies as well as NSPs. By way of contrast, in settings with NSPs but without additional legal access to sterile injecting equipment, there were no negative or null findings. Five studies found positive effects (reduced risk behaviour and/or seroconversion) despite legal access through NSPs and pharmacies. Nevertheless, the relationship between pharmacy access (yes/no) and positive versus negative findings was significant at the P = 0.002 level. Finally, when studies in settings where legal pharmacy access was available were excluded, 23 of the remaining 24 studies showed positive effects for NSP use.

Replication of findings

The above findings strongly support the effectiveness of NSPs as interventions that reduce risk behaviour such as syringe sharing among IDUs and HIV infection. The number of studies showing protective effects far outweighs those with ambiguous or negative effects. The preponderance of positive findings is strengthened by their replication by different authors, at different stages of the HIV epidemic, at different times and geographical locations and with diverse study designs. Furthermore, in instances where NSP use has been statistically associated with increased HIV incidence or higher risk behaviours, convincing arguments for possible sources of confounding have been presented.

The efficacy of individual NSPs has been reported in at least 10 different countries, including several resource-poor countries. In addition, ecological studies have found strong associations between NSP and lower HIV incidence and prevalence in comparisons involving diverse countries. Most notably, the Return on Investment study (Health Outcomes International, 2002) compared HIV prevalence in 103 cities in 24 countries of which 16 countries had NSPs. HIV seroprevalence declined by a mean annual 18.6% for 36 cities with NSPs compared to an 8.1% increase in 67 cities without NSPs. Hurley et al. (1997) compared HIV seroprevalence among IDUs in 52 cities without NSPs and 29 cities with NSPs in Asia, Europe, North America, South America and the South Pacific. On average, seroprevalence increased by 5.9% per year in the 52 cities without NSPs and decreased by 5.8% per year in the 29 cities with NSPs.

In a recent systematic review, results favouring the efficacy of NSP use were recorded from six studies with longitudinal/prospective designs, four studies with multiple cross-sectional designs, eight observational studies, five ecological studies and several modelling studies (Gibson et al., 2001). There is sufficient evidence to consider that the criterion of replication of findings has been fulfilled.

Specificity of association

Many studies have demonstrated other health and social benefits of NSPs apart from a reduction in HIV infection though these benefits are less well documented and do not seem to be as powerful as the impact on HIV infection. Additional benefits include improved entry to primary health care and drug treatment, prevention of other blood-borne viral infections, reduced proximal bacterial infection (e.g. abscess and cellulitis) and reduced distal bacterial infection (e.g. subacute bacterial endocarditis, brain abscess), reduced frequency of injecting and improved quality of life. NSPs offer a ‘package’ of different services including education about protection against other blood-borne viruses and sexually acquired HIV, education about cleaning injecting equipment and information about drug treatment. However,
reductions in risk behaviour and HIV seroconversion could be
the result of other services such as acquiring clean syringes
from pharmacies, using condoms and other safer sexual prac-
tices. There do not appear to be any studies showing a declin-
ing HIV incidence in a population with high prevalence levels
in the absence of NSPs.

There is insufficient evidence to consider that the criterion
of specificity of association has been fulfilled.

Temporal sequence

While NSPs are not the only intervention credited with
achieving reduced risk behaviour, in the large majority of
settings where NSPs exist, there was a subsequent reduc-
tion in risk behaviour and, where measured, HIV serocon-
version. As discussed above (see Strength of association),
in settings where NSP implementation has been followed
by increased risk behaviour and/or seroconversion among
actual NSP users, the availability of pharmacy access to clean
syringes for some weeks. The presence of HIV-1 RNA in
needles and syringes indicates the risk associated with shar-
ing of needles and syringes, and also paraphernalia and wash
waters. Shapshak et al. (2000) found 39% of rinses from 36
needles and syringes containing visible blood collected from
shooting galleries in Miami, United States, had detectable
amounts of HIV-1 RNA with 94% of the sample containing
antibodies to HIV-1 polypeptides.

Earlier studies found HIV-1 in 3% of blood-contaminated
needle and syringes collected from exchange programmes in
Sydney, Australia (Wodak et al., 1987), 10% of needle and
syringes from shooting galleries in South Florida, United
States (Chitwood et al., 1990), 50% of used needles and
syringes obtained from shooting galleries in Miami, United
States (McCoy et al., 1995; Shah et al., 1996) and in New
Haven, Connecticut, United States, HIV-1 was detected in
67.5% of used “street” syringes and in 91.7% of needles from
a shooting gallery (Heimer et al., 1993).

Further evidence of a link between the use of shared inject-
ing equipment and HIV seroconversion is provided by field
studies of the biological mechanisms of HIV transmission
among IDUs. Practices such as registering, “booting” and
“backloading” have been shown to increase the risk of HIV-1
transmission by directly placing blood within the needle and
syringe (Inciardi et al., 1994; Page, Chitwood, Smith, Kane,
& McBride, 1990; Samuels, Vlahov, Anthony, Solomon,
regression analysis adjusted for age, gender and race to
determine risk factors associated with HIV-1 seroconversion
among IDUs and found that sharing needles and syringes
in the year prior to conversion was the primary independent
risk factor. Other studies have broadened the definition of
sharing to include injecting paraphernalia such as cookers,
cottons and rinse water, as well as to the practice of
“frontloading”.

IDUs with a history of diabetes have a significantly
lower HIV seroprevalence rate (9.8%) compared with non-
diabetic IDUs (24.3%; P = 0.03). This result highlighted that
increased access to sterile syringes and less use of contami-
nated equipment were important factors contributing to lower
HIV infection rates (Nelson et al., 1991).

Latkin and Forman (2001) in a cross-sectional study of
741 IDUs in Baltimore, United States, investigated where
IDUs obtained needles and syringes from prior to the estab-
lishment of the NSP, finding that 85% obtained at least some
needles from street needle sellers. The authors concluded that
street needle sellers were an important source of needles for
IDUs and few injectors were able to determine whether these
needles were actually sterile. There is sufficient evidence to

Biological plausibility

Although the minimum quantity of HIV necessary for
infection is not known, viable HIV has been detected in
syringes stored at room temperature for up to 4 weeks
(Abdala, Stephens, Griffith, & Heimer, 1999). Field stud-
ies confirm that HIV can be detected in blood-contaminated
syringes for some weeks. The presence of HIV-1 RNA in
needles and syringes indicates the risk associated with shar-
ing of needles and syringes, and also paraphernalia and wash
waters. Shapshak et al. (2000) found 39% of rinses from 36
needles and syringes containing visible blood collected from
shooting galleries in Miami, United States, had detectable
amounts of HIV-1 RNA with 94% of the sample containing
antibodies to HIV-1 polypeptides.
consider that the criterion of biological plausibility has been fulfilled.

**Biological gradient**

Heimer et al. (1993) found in their syringe tracking study in New Haven, United States, that HIV prevalence in syringes decreased as the exchange rate increased. However, no studies were found measuring a possible relationship between an increase in NSPs and reduced HIV infections. There is insufficient evidence to consider that the criterion of biological gradient has been fulfilled.

**Coherence of the evidence**

The arguments for coherence of the evidence span several of the Bradford Hill criteria including biological plausibility, strength of association and replication. To minimise repetition, material which has already been presented will not be repeated in this section.

There is strong evidence that HIV can be transmitted when contaminated injecting equipment is shared and such sharing is the strongest risk factor predicting HIV seroconversion among IDUs. Studies of IDUs risk behaviour in settings without NSPs show that most engaged in needle sharing and other unsafe injecting practices. For example, Gleghorn, Jones, Doherty, Celentano, and Vlahov (1995) found that in a cross-sectional survey of IDUs in Baltimore, United States, almost 50% of respondents said their usual source for needles and syringes was street dealers while a further 4.1% reported friends/neighbours or shooting galleries. A number of studies investigating the main risk factors for HIV seroconversion found syringe borrowing to be an independent determinant (Van Ameijden, Langendam, Notenboom, & Coutinho, 1999) while some studies found backloading and frontloading to be independent predictors.

Modelling studies have demonstrated that obtaining clean needles from NSPs reduces the circulation time of each syringe, whether for reuse or for sharing. Evaluations of numerous NSPs in many countries have concluded that IDUs who attend NSPs reduce their HIV risk behaviours compared with those who do not attend, and that the evidence is particularly consistent in areas where non-attenders cannot obtain clean needles from any other sources. Even in areas where pharmacy and other sources exist, the large majority of studies show that NSP use is significantly associated with a decline in risk behaviour (Gibson et al., 2003). Evidence that a reversal to the status quo occurs after an intervention is withdrawn adds further to the coherence of arguments for causality (Broadhead et al., 1999). Some large ecological studies show a clear association with NSP implementation and declining HIV incidence and prevalence over time.

Evidence for the efficacy of NSPs in stemming the spread of HIV has been questioned because of an apparent lack of reduction in HCV transmission. HIV entered drug-injecting populations in New York, United States, during the mid-1970s and in Australia in the early 1980s while hepatitis C first spread among IDUs in the 1960s and therefore had a comparatively higher baseline prevalence when NSPs were established in the early 1980s (Crofts, Aitken, & Kaldor, 1999). Furthermore, hepatitis C is about an order of magnitude more infectious by blood–blood contact than HIV (Coutinho et al., 1998; Crofts et al., 1999). Despite reported disparities there is increasing evidence that NSPs have led to significant reductions in both hepatitis B and C (Hagan, Des Jarlais, Friedman, Purchase, & Altm, 1995). There is sufficient evidence to consider that the criterion of coherence of the evidence has been fulfilled.

**Experimental evidence**

An appropriate experiment could theoretically be provided by a randomised controlled trial whereby IDUs were randomly allocated to an experimental group who would be issued with an adequate supply of sterile syringes at an exchange and a control group who would not be provided with sterile syringes. The experiment would need to take place in a controlled setting isolated from access to pharmacy or vending machines.

Other factors would need to be measured and controlled such as rate of incarceration, availability and quality of drug treatment (especially methadone treatment for heroin dependence), utilisation of strategies to reduce sexual transmission (such as condoms and treatment of sexually transmitted infections) and overlap with special populations such as men who have sex with men and sex workers. As discussed, there are strong logistical and ethical arguments against conducting such experiments. There is insufficient evidence to consider that the criterion of experimental evidence has been fulfilled.

**Reasoning by analogy**

The provision of sterile injecting equipment to reduce HIV infection among IDUs is analogous to the provision of condoms to reduce the sexual transmission of HIV as both may be controversial in most countries, there are myths surrounding both, yet both have high biological plausibility.

Condom provision is well accepted to have strong support from empirical evidence of effectiveness (Weaver, Smith, & Kippax, 2005). It could be argued that both are implemented less vigorously than would be justified by the evidence of effectiveness, safety and cost-effectiveness. Concern has often been expressed that condom provision might increase the frequency of sexual activity, especially among unmarried partners and result in an earlier sexual initiation. There is no
convincing evidence to support these concerns (Weaver et al., 2005). Drug use and sexual activity are sensitive issues in virtually all countries, especially when these occur among teenagers. Like NSPs the benefits of condom provision go beyond protection from HIV to reducing the incidence of sexually transmitted infections and unwanted pregnancies. Condom provision and NSPs are both cost-effective interventions. There is sufficient evidence to consider that the criterion of reasoning by analogy has been fulfilled.

Cost-effectiveness

Many studies have demonstrated that NSPs are cost-effective and cost-saving. In a retrospective analysis, Lurie and Drucker (1997) estimated that the number of HIV infections that could have been prevented in the United States had NSPs been implemented in the early stages of the HIV/AIDS epidemic was between 4394 (with a 15% incidence reduction due to NSPs) and 9666 (with a 3% incidence reduction) with the cost of treatment calculated at between US $244 million and US $538 million, respectively. Furthermore, Lurie, Gorsky, Jones, and Shompe (1998) also estimated the cost per syringe distributed through five syringe distribution strategies (a NSP, a pharmacy-based NSP, free pharmacy distribution of pharmacy kits, sale of such pharmacy kits to IDUs and sale of syringes in pharmacies) finding that with NSPs were the most expensive and syringe sales the cheapest. At an annual seroincidence exceeding 2.1%, all strategies were estimated to be cost-saving.

Others have used mathematical modelling to estimate the cost per HIV infection averted by NSPs. Holtgrave, Pinkerton, Jones, Lurie, and Vlahov (1998) estimated that 100% coverage of a previously unmet need for sterile syringes in the USA would require 954.8 million syringes at a cost of US $423 million. This would prevent 12,350 cases of HIV infection averted for a year by a NSP, free pharmacy distribution of pharmacy kits, sale of such pharmacy kits to IDUs and sale of syringes in pharmacies. A cost-effectiveness analysis applied a simplified Yale Needle Circulation Model to four hypothetical NSPs in four United States cities with differing HIV prevalence and incidence rates. Reductions in HIV incidence rates varied across cities from 17% to 70% across the four settings. Higher reductions were associated with more needles per client-year and greater efficiency was associated with low cost per needle exchanged. The estimated cost savings per HIV infection averted ranged from US $12,000 to US $99,000 (Kahn, 1998).

Most cost-effectiveness studies have been conducted in developed countries with far fewer conducted in resource poor settings. However, a cost-effectiveness study of NSPs in Svetlogorsk, Belarus, evaluated a comprehensive strategy that included NSPs, safe sex counselling, condom promotion, bleach distribution and referral to STD services. The average cost per HIV infection averted was estimated at about US $68 (estimated range: US $54–US $100; Kumararayake et al., 2000). If the cost of the mass-media campaign was included, the cost per HIV infection averted rose between US $240 and US $442, still notably cost-effective. This study confirms the cost-effectiveness of NSPs as an HIV prevention measure in a resource poor setting. There is sufficient evidence to consider that the criterion of cost effectiveness has been fulfilled.

Absence of negative consequences

Studies have searched for and found no convincing evidence of the following unintended complications associated with NSPs: greater injecting frequency (Hartgers et al., 1989; Watters et al., 1994); increased illicit drug use (Guydish, Bucardo, Young, Woods, & Grinstead, 1993; Wolk, Wodak, Guinan, Macaskill, & Simpson, 1990); a rise in syringe lending to other IDUs (Hartgers et al., 1989; Schechter et al., 1999); recruitment of new IDUs (Heimer et al., 1993; Van Ameijden & Coutinho, 2001; Watters et al., 1994); social network formation (Junge, Valente, Larkin, Riley, & Vlahov, 2000); greater numbers of discarded used needles (Broadhead et al., 1999; Doherty et al., 2000; Oliver, Friedman, Maynard,
Magnuson, & Des Jarlais, 1992); less motivation to change (i.e. reduce) drug use (Bluthenthal, Gogineni, Longshore, & Stein, 2001); and increased transition from non-injecting drug use to injecting drug use (Guydish et al., 1993).

There is sufficient evidence to consider that the criterion of absence of negative consequences has been fulfilled.

Feasibility of implementation, expansion and coverage

NSPs have been shown to be successful in a variety of settings but their expansion remains a challenge. In Germany, establishing NSPs in larger cities was easier than in smaller cities and more conservative states, while establishing NSPs in prisons was considered desirable but only possible as limited pilot projects (Weber et al., 1999).

An evaluation of a Hawaiian NSP showed that the following characteristics were required to achieve sustainable high coverage: broad based political support; allocation of public funds; progressive expansion and removal of counterproductive aspects; peer-educators; links to other services, especially drug treatment; and periodic formal evaluation (Vogt, Breda, Des Jarlais, Gates, & Whiticar, 1998).

NSPs have been successfully established in a few resource-poor settings, such as Brazil, Iran, Kathmandu in Nepal (Peak et al., 1995), northern Thailand (Gray, 1995), Hanoi, Vietnam (Quan, Chung, & Abdul-Quader, 1998) and Ukraine. A report on NSPs in northern Thailand mentioned co-operation from government agencies and non-government agencies in addition to the local communities as key factors for successful implementation (Gray, 1995). The Hanoi NSP gained local acceptance by holding workshops with key community people including the local police, using outreach services to distribute needles and syringes rather than established exchange sites, collecting used injecting equipment, and recruiting and training ex-IDUs as outreach workers (Quan et al., 1998).

Successful implementation has also been achieved in some transitional countries such as in Svetlogorsk, Belarus, (Kumaranayake et al., 2000; Vickerman & Watts, 2002) and in Sverdlovsk Oblast, Russia (Power & Nalata, 2002). The latter was achieved through a process of “many months of negotiation and discussion with all relevant agencies” including the Ministry for Internal Affairs, educating officials at seminars at which international best practices were presented, a study tour to harm reduction programmes in Britain, training workshops at the pilot sites and an early evaluation report to satisfy politicians and health care providers. A number of international organisations were also involved in encouraging policy-makers and health practitioners to implement harm reduction strategies (Power & Nalata, 2002).

In a number of countries, implementation of NSP in the early stages of an HIV epidemic, combined with multiple prevention initiatives including community outreach, has been shown to have maximum impact (Des Jarlais et al., 1995). In Australia, the first NSP was established in 1986 and within a couple of years, a national network of programmes had been implemented distributing 30 million needles and syringes for a population of less than 20 million in 2000 (Health Outcomes International, 2002).

However, in many countries implementation has been delayed and the scale has been inadequate. This is especially true in developing and transitional countries, as well as those countries, which have responded to illicit drugs through a predominantly supply control perspective (Bastos & Strathdee, 2000).

There is sufficient evidence to consider that the criterion of feasibility of implementation, expansion and coverage has been fulfilled.

Unanticipated benefits

A number of studies have demonstrated additional benefits resulting from NSP use, apart from a reduction in injecting risk behaviour and HIV infection. At the New Haven and Seattle exchanges, United States, increased enrolment in drug treatment and higher treatment retention rates compared with non-users of NSPs were reported (Gibson, 2000; Hagan et al., 2000; Heimer et al., 1998). An evaluation study in Baltimore, United States, found that NSP attendance was independently associated with entry into drug treatment for HIV-infected IDUs (Strathdee et al., 1999). In San Francisco, United States, Bluthenthal et al. (2001) found that NSP clients’ attitudes and motivation to change their drug using patterns was positive, concluding that NSPs have a possible link to drug treatment.

Gibson (2000) found NSP use to be associated with substantial reduction or cessation of injecting compared to IDUs who had never attended a NSP.

During a 1 year pilot NSP conducted in a Swiss women’s prison, no abscesses were observed and there were no instances of aggressive or threatening behaviour among inmates using syringes (Nelles & Harding, 1995). Despite some reported disparities there is increasing evidence that use of syringe NSPs have led to significant reductions in both hepatitis B and C (Hagan et al., 1995).

There is sufficient evidence to consider that the criterion of unanticipated benefits has been fulfilled.

Special populations

Prisons

Mathematical modelling has been proposed as a useful technique for estimating HIV transmission through sharing in prisons (Dolan, Wodak, Hall, & Kaplan, 1998). Using conservative assumptions, where measurement of relevant variables for the model was unavailable, a relatively large number of HIV infections was estimated to occur in prisons, even though...
These observations were made in a country with a low HIV prevalence among IDUs. A pilot intervention project, which distributed 5335 syringes at a rate of 0.2 syringes/day per inmate, was carried out in a Bern prison, Switzerland, accommodating up to 110 women, of whom a high proportion injected with nearly half of these reporting sharing injecting material regularly. Sterile injecting equipment was made available from a one-to-one automatic dispenser and sharing virtually ceased during the trial (Nelles & Harding, 1995).

By December 2000, 19 prisons in three countries had syringe exchange programmes. All evaluations of these programmes have been favourable and without any reported unintended negative consequences (Dolan, Rutter, & Wodak, 2003). More recent data on NSPs in 53 prisons in six countries (Belarus, Germany, Kyrgyzstan, Moldova, Spain and Switzerland) has been recently published (Lines, Jürgens, Stöver, Laticevschi, & Nelles, 2004).

**Young IDU**

Young IDUs have been found to be at higher risk of acquiring HIV. Multivariate analysis in one study showed recent onset of injecting to be an independent predictor for seroconversion (Fennema, Van Amerijden, Van Den Hoek, & Coutinho, 1997). A study of IDUs in Rio de Janeiro, Brazil, found that younger age was the principal factor associated with high risk injecting behaviour (Telles et al., 1997). In most countries, young people appear to be under-represented among IDUs attending NSPs, which may be because attendance at a NSP amounts to a relatively public identification as an IDU.

Sears, Guydish, Weltzien, and Lum (2001) investigated an HIV prevention programme for homeless young adult IDUs in San Francisco, United States, finding significant differences between IDUs who frequented a secondary NSP intervention site and a comparison group who did not. The latter were more at risk of sharing syringes (AOR = 3.748; 95% CI, 1.406–9.988) and reusing syringes (AOR = 2.769; 95% CI, 1.120–6.847).

**Other populations**

Several studies have observed that women who attend NSPs and engage in sex work typically report greater HIV risk behaviours than non-sex worker women attending NSPs. A study comparing sex workers with non-sex workers in five United States cities found that sex workers were significantly more likely to inject more frequently (P < 0.005), to reuse syringes more than twice (P < 0.005), to engage in “back-loading” syringes (P < 0.005) and to obtain syringes from non-NSP sources (P < 0.03; Paone, Clark, Shi, Purchase, & Des Jarlais, 1999; Paone, Cooper, Alperen, Shi, & Des Jarlais, 1999).

Sex workers in a Vancouver study, Canada, engaged in heavier drug use, reported a greater variety of injecting and non-injecting drugs, injected substantially more frequently and engaged more frequently in unsafe injecting practices such as renting, buying or borrowing used syringes and using shooting galleries than both sexually active and non-sexually active women (Schechter et al., 1999). In some countries, extensive HIV infection has occurred among sex workers before a generalised epidemic, e.g. Thailand (Nelson et al., 1996; Paone, Clark, et al., 1999; Paone, Cooper, et al., 1999).

Male IDUs who have sex with men may be a population who transmit HIV between groups. Lima et al. (1994) looked at determining risk factors for HIV-1 among IDUs (n = 123) in Rio de Janeiro, Brazil, and found that being a male IDU who has had sex with other men in the previous 5 years was a significant independent risk factor for HIV infection. The authors concluded that men who have sex with men and IDUs may be a group through which HIV entered drug-injecting networks in that city.

**Developing countries**

Successful NSP interventions have been set up either as pilot programmes or ongoing services in a number of developing countries, including three remote villages in northern Thailand (Gray, 1995), Hanoi, Vietnam (Quan et al., 1998) and Dhaka and Rajshahi, Bangladesh (Jenkins, Rahman, Saidel, Jana, & Hussain, 2001). Evaluation results for these studies were reported above under Strength of association and Feasibility of implementation, Expansion and coverage. There is sufficient evidence to consider that the criterion of special populations has been fulfilled.

**Discussion**

In many countries, HIV epidemics started among IDUs, spreading rapidly to general populations. The evidence for the effectiveness and safety of some HIV prevention strategies in this population has accumulated. Beginning in some developed countries, NSPs were rapidly identified as a valuable strategy for keeping HIV under control among IDUs. Although a wide variety of different activities and operational methods are now subsumed by the term ‘NSP’, there is sufficient commonality to allow evaluation of this large and growing literature. Large numbers of research studies with widely differing designs in diverse countries have been reported. An increasing number of countries commenced NSPs and then began to expand them to scale. Although evidence supporting the effectiveness and safety of NSPs grew, HIV has continued to spread more rapidly among and from IDUs than the adoption and expansion of NSPs.

Some excellent and comprehensive reviews of the evidence for NSPs have appeared (General Accounting Office, 1993; Institute of Medicine for the National Academy of Science, 2001; Lurie et al., 1993; National Commission on Acquired Immune Deficiency Syndrome, 1991; National...
Institutes of Health Consensus Panel, 1997; Normand et al., 1995; Office of Technology Assessment of the US Congress, 1995; Satcher, 2000). All have confirmed the effectiveness of NSPs in reducing HIV transmission. This conclusion was drawn with increasing confidence in more recent reviews as more and better quality data have become available.

This study is the first systematic review to consider the extent to which evidence for NSPs fulfills the Bradford Hill criteria. These criteria, originally devised to assess inferences of causality drawn from observational studies, have been used increasingly in recent years to assess intervention studies. This review has attempted to rigorously and conservatively apply the Bradford Hill criteria but in so doing has often encountered the problem of ‘double negatives’ in drawing conclusions. Accordingly, readers are encouraged to carefully review the wording of all conclusions relating to NSPs. A somewhat tendentious interpretation of a handful of negative studies from Montreale (Bruneau et al., 1997) and Vancouver (Strathdee et al., 1997), Canada, is relied upon by critics of the proposition that NSPs are effective and safe, despite subsequent papers providing plausible alternative explanations for these negative findings (Bastos & Strathdee, 2000; Coutinho, 2000; Lurie & Drucker, 1997; Schechter et al., 1999; Strathdee & Vlahov, 2001).

This review was also inevitably limited by inherent deficiencies in the quality of the existing literature. For example, much of the literature classifies IDUs as persons who either attend or do not attend NSPs, whereas in reality this phenomenon is dimensional rather than categorical. In addition, outcome measures are usually categorical; although again the phenomenon is usually dimensional. For example, sharing is usually measured as either present or absent during a particular period, rather than estimated on a continuum (Bastos & Strathdee, 2000).

Conclusions

There is compelling evidence that increasing the availability and utilisation of sterile injecting equipment by IDUs reduces HIV infection substantially.

Overall, there is convincing evidence that NSPs, assessed conservatively, fulfill six of the nine Bradford Hill criteria and all of the five additional criteria. Measured against any objective standards, published studies support the conclusion that NSPs are effective in substantially reducing HIV transmission.

Carefully evaluated pilot programmes of NSPs have their place in allowing the introduction of this invaluable protection of public health but they also have some risks. The case for NSPs is already so compelling and the international experience so impressive that there is no longer any real justification for pilot programmes as they may further delay the much needed expansion phase.

NSPs are only one way of increasing the availability of sterile injecting equipment and these exist in many forms around the world with some cities requiring ‘one-for-one’ exchange, others attempting to achieve high levels of exchange but accepting less than 100%; while authorities in other jurisdiction provide sale or free distribution without attempting to remove used injecting equipment from circulation. There is no evidence that any one method is notably more efficacious or cost effective.

Attempts to increase the availability of sterile injecting equipment should be accompanied by endeavours to increase its utilisation, reduce the utilisation and availability of non-sterile injecting equipment and improve the disposal of used injecting equipment. These objectives are best met through education of IDUs through peer based, explicit campaigns, which generally have been found to be highly effective.

Many jurisdictions have found that a diversity of approaches is optimal with some methods working best in certain locations and conditions and other approaches better suited in other places and conditions. The aim is to reduce the circulation time of needles and syringes.

There is no convincing evidence of any major, unintended negative consequences. After almost two decades of extensive research, there is still no persuasive evidence that NSPs affect the initiation, or increase the duration or frequency of illicit drug use or drug injecting.

The studies reviewed in this report present a compelling case that NSPs substantially and cost effectively reduce the spread of HIV among IDUs and do so without exacerbating injecting drug use at either the individual or societal level. This suggests that authorities responsible for areas threatened by, or experiencing, a HIV epidemic among IDUs should adopt measures urgently to increase the availability and utilisation of sterile injecting equipment and expand implementation to scale as soon as possible. As an approximation it is reasonable to assume that providing 200 sterile needles and syringes per injecting drug user per year is a figure which is achievable and likely to control HIV infection in this population. It may take several years, starting from scratch, to reach this figure. Higher targets may be needed where seroprevalence has already reached unacceptable levels. The precise quantity of injecting equipment required is not known. Cocaine injectors require more needles and syringes than heroin injectors. Needle syringe programmes are cost-effective.

It is more difficult to generalise from studies of cost effectiveness of NSPs in one country to other similar countries, let alone from developed countries to resource poor settings. However, a number of careful studies in several developed countries and some transitional countries have demonstrated convincingly that NSPs are cost-effective.
Needle syringe programmes have additional and worthwhile benefits apart from reducing HIV infection among IDUs. There is reasonable evidence that needle syringe programmes can increase recruitment into drug treatment. Pharmacies and vending machines increase the availability and probably the utilisation of sterile injecting equipment by IDUs.

There is reasonable evidence that pharmacy availability of sterile injecting equipment does provide specific benefit in addition to the benefits of NSPs. The population attending pharmacies tends to be less disadvantaged than those attending community based NSPs, although there is often a considerable degree of overlap. Pharmacy schemes complement the benefits of NSPs; although some jurisdictions have relied entirely on pharmacy-based outlets. Vending machines increase access in some geographical locations to some special populations and/or at times of the day that are otherwise difficult to provide for.

Pharmacy based NSPs appear to complement community based schemes and may provide access to a somewhat different population of IDUs. Vending machines increase coverage geographically and across time zones but have the disadvantage of not providing information, counselling or referral.

NSP should be expanded to cover special populations. Special populations of IDUs are of great public health significance in HIV control, especially populations such as sex workers and male IDUs who also have sex with men, as these groups may transmit HIV between population groups. In most countries, a large proportion of IDUs spend a considerable proportion of their drug injecting careers behind bars; while a large proportion of prison inmates have a history of injecting drug use. Many inmates of correctional facilities continue to inject while they are incarcerated. The limited evidence available from evaluation of the few existing prison programmes; while there is no evidence to date that these programmes are inherently unsafe or counter-productive. On the available evidence, there is a strong case for establishing and expanding NSPs in correctional facilities.

Needle syringe programmes on their own are not enough to control HIV infection among IDUs. There is no evidence of a protective effect for single interventions strong enough to guarantee HIV control but the aggregate effect of several harm reduction interventions appears to be generally successful in controlling HIV. However, worthwhile it may be to increase the availability and utilisation of sterile injecting equipment with the aim of controlling HIV infection among IDUs, this appears to be a necessary rather than a sufficient intervention. Other activities that complement the benefits of sterile injecting equipment programmes include education of IDUs, increasing the capacity, range and quality of drug treatment (especially substitution treatment), and community development of IDUs.

Further study and research are required. This review has demonstrated significant gaps in studies and research. The quantity and quality of research needs to be improved in pharmacy and vending machine evaluation, measures to reduce inappropriate disposal and the reform of restrictive injecting paraphernalia legislation in countries other than the United States. More and better qualitative research would illuminate the findings of the numerous quantitative studies. Researchers should make more use of continuous measures of baseline characteristics, interventions and outcome variables. However, it is important to recognise that the limited implementation of NSPs is not fundamentally due to a lack of adequate research data. Therefore, it is unlikely that increasing the quantity of the same kind of research as exists already will increase the implementation of NSPs.

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Further readings

Effectiveness of community-based outreach in preventing HIV/AIDS among injecting drug users

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Abstract

This paper focuses on the evidence for the effectiveness of community-based outreach intervention as one component of a comprehensive HIV prevention model for preventing HIV infection in injecting drug user (IDU) populations. Three empirical questions guided the review of the evidence. This article includes primarily published literature on community-based outreach derived mostly from developing countries but also unpublished literature. Wherever possible, evidence from multi-country, multi-site studies or meta-analytical studies is included. More than 40 published studies reveal that injecting drug users (IDUs), who are reached by community-based outreach and provided with access to risk reduction services, report reducing HIV risk behaviours. The strength of the evidence was assessed using Hill’s criteria, which permit a review of multiple studies with different designs. Using the criteria, it is possible to infer causation about the evidence of effectiveness of the intervention. The evidence for the effectiveness of a community-based outreach strategy is strong. Despite evidence from 20 years of evaluation studies of the effectiveness of community-based outreach, a huge gap exists in most countries between the number of IDUs who want or could benefit from outreach services and the number of IDUs who actually receive them. Findings from evaluation studies on the effectiveness of community-based outreach must be made accessible, disseminated globally and provided to policy- and decision-makers to persuade them to take action and implement scaled-up prevention programmes. This requires ongoing advocacy and constant strengthening of the evidence base. Plans are needed to link evidence-based findings with technical assistance as well as training to enhance the capacity of regions and countries to introduce, scale up and sustain HIV prevention outreach to IDUs as part of a comprehensive HIV prevention strategy.

Keywords: HIV/AIDS; Injection drug users; Evidence-based prevention; Community-based outreach; Risk reduction

Introduction

Paragraph 52 of the Declaration of Commitment of the United Nations General Assembly Special Session on
Origins, evolution and adaptation of community-based outreach models

The community-based outreach HIV risk reduction intervention strategy was an adaptation of outreach models developed in the United States and Western Europe before HIV/AIDS emerged as a public health threat. In the United States, this model was introduced in the late 1960s in response to the high levels of heroin use. Hughes (1977) hired former heroin users to provide targeted outreach to active, out-of-treatment, hidden populations of IDUs in Chicago's drug market areas to encourage their entry into methadone maintenance treatment (MMT) programmes. In Western Europe, community-based peer outreach evolved from the tradition of reaching out to youth with drug-related problems as well as to IDUs at risk of hepatitis B and other health-related consequences of drug use.

Community-based outreach for HIV prevention has changed considerably since its introduction in the early 1980s, reflecting the changing dynamics of drug use, HIV and other blood borne infections; the availability of a greater range of prevention services; and evolutions in the knowledge base and understanding of best practices to guide implementation. Table 1 presents an overview of the conceptual basis and changes in community-based outreach models that have been implemented, evaluated and adapted for use in other countries. To a great extent, these models were developed and evaluated in Australia, the United States and Western Europe, and have been adapted for use in other countries.

The indigenous leader outreach model implemented in 1986 in Chicago, United States, relies on epidemiological and ethnographic data to target injecting drug use neighbourhoods and relies on ‘insiders’ with access to the IDU community, who know the rules of the street-based social system, to provide risk reduction information and supplies (Wiebel, 1988). The San Francisco MidCity Consortium to Combat AIDS, United States (Watters, Iura, & Iura, 1986) developed and field tested risk reduction prevention messages; also introducing the distribution of bleach and information on cleaning syringes. Early outreach efforts were characterized by repeated and time intensive contacts with IDUs. These efforts and first-generation NIDA outreach models (1987–1991) were introduced before VCT was established as a component of prevention programmes and before other services for HIV-positive IDUs were available (Brown & Beschner, 1993). In some countries, the expansion of services for IDUs included the expansion of outreach models to increase opportunities for IDUs to access a range of prevention and treatment services (Needle & Coyle, 1998; Timsman, Bullman, Chen, Burdgesdorf, & Herrell, 2001). The second generation NIDA community-based outreach programmes (1991–1998) incorporated the features of the earlier models and added a pre- and post-test HIV counselling component (Needle & Coyle, 1998). Such services are still not available in many countries. Detels (2004) recently reported that the key to slowing epidemics, providing treatment and increasing...
Table 1: Evolution and diffusion of community-based peer outreach

<table>
<thead>
<tr>
<th>Name</th>
<th>Year study published</th>
<th>Features</th>
<th>Target populations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous leader outreach model (Wiebel, 1988) (USA)</td>
<td>1988</td>
<td>Combines ethnographic and epidemiological methods for targeting neighbourhoods and drug users at risk and developing AIDS interventions</td>
<td>IDUs not in treatment</td>
<td>Adapted from earlier work of Hughes et al. and developed to respond to heroin outbreak in 1970s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relies on indigenous outreach workers</td>
<td>IDU risk networks</td>
<td>Intense street outreach focused on risk networks and individual level behaviour changes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identifies and accesses out-of-treatment IDUs</td>
<td></td>
<td>Adapted and used model in 1995 trials to facilitate entry into drug treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increases AIDS awareness</td>
<td></td>
<td>Adapted and used in some central European and central Asian countries</td>
</tr>
<tr>
<td>Community health outreach workers model (USA)</td>
<td>1987</td>
<td>Targeted recruitment of community health outreach workers</td>
<td>IDUs</td>
<td>Hierarchical risk-reduction message first developed and introduced (later to be expanded)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Created hierarchical message on risk reduction</td>
<td></td>
<td>Teach and bleach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For disinfection of injecting equipment, community health outreach workers provided: Risk-reduction information</td>
<td></td>
<td>Bleach incorporated into community-based interventions in Argentina, Belarus, Brazil, India, Malaysia, Nepal, Russian Federation, Thailand, Ukraine and Viet Nam</td>
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<tr>
<td></td>
<td></td>
<td><strong>Bleach</strong></td>
<td></td>
<td>Some debate about effectiveness, but no debate that it provides an opportunity to engage IDUs in risk reduction</td>
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<tr>
<td></td>
<td></td>
<td>Demonstrations of skills to clean equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States National Institute on Drug Abuse community-based outreach model (USA)</td>
<td>1987–1991</td>
<td>Targeted outreach</td>
<td>IDUs and sexual partners of IDUs and other people at high risk</td>
<td>First major national multi-site HIV efficacy study</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tested three different intervention models</td>
<td></td>
<td>Manuals and training materials for each model developed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Behavioral counselling Indigenous leader outreach model United States National Institute on Drug Abuse HIV counselling and educational model</td>
<td></td>
<td>Some referrals to VCT</td>
</tr>
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Table 1 (Continued)

<table>
<thead>
<tr>
<th>Name</th>
<th>Year study published</th>
<th>Features</th>
<th>Target populations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative agreement programme (USA)</td>
<td>1991–1998</td>
<td>Targeted outreach</td>
<td>Crack and cocaine smokers among IDUs</td>
<td>Relied on outreach workers to bridge out-of-treatment IDUs to voluntary testing and counselling sites. Standardized HIV pre- and post-test counselling. Adapted and used in India.</td>
</tr>
<tr>
<td>Outreach and two sessions of VCT</td>
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<tr>
<td>Messages on risk reduction and safer sex</td>
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<tr>
<td>Provided risk reduction materials (such as bleach and condoms)</td>
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<tr>
<td>Referrals to other services</td>
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<tr>
<td>Peer-driven intervention (Broadhead et al., 1998) (USA)</td>
<td>1994</td>
<td>Recruitment of network members, through use of chain referrals. Active IDU peers, IDUs actively involved in recruiting and providing risk reduction, with monetary incentives provided.</td>
<td>IDUs and their risk networks</td>
<td>Compared traditional outreach (provider-client approach) that uses professional outreach workers with peer-driven current IDUs as outreach workers (social network approach). More active role in recruiting other IDUs. Effectiveness of peers in providing information evaluated. Model implemented in Odessa and several other regions in central and eastern Europe and Viet Nam.</td>
</tr>
<tr>
<td>Use of peer leaders for HIV prevention (Latkin, 1998) (USA)</td>
<td>1994</td>
<td>Identified peer leaders participated in a 10-session training programme. Leaders asked to recruit risk network members. Outreach to networks, providing risk reduction information and discussing HIV prevention. After each outreach visit, the leaders discussed experience.</td>
<td>Risk network members including drug users and sexual partners who inject drugs</td>
<td>Shift from more individual-level community-based interventions to interventions designed to affect group-level influences and behaviour. Relies on outreach worker and formalizes training for their roles as peer leaders. Effectiveness on the diffusion of information to others in networks assessed by interviewing the network members recruited.</td>
</tr>
<tr>
<td>Center for Substance Abuse Treatment, United States Department of Health and Human Services (USA)</td>
<td>1995–2000</td>
<td>Street outreach to link high-risk populations to HIV-related services and drug treatment</td>
<td>IDUs and their sexual and needle sharing partners</td>
<td>Multi-site (n = 12) multi-year, with different populations at risk. Trial organized around two outcomes. Persuading people at high-risk to obtain HIV tests. Entering substance abuse treatment. Texted effectiveness of integrating street outreach with referral to substance abuse treatment.</td>
</tr>
</tbody>
</table>
use of services, including VCT, is the implementation of programmes to reduce stigmatization and encourage empathy for HIV infected and affected populations. While the indigenous leader outreach model focused on both IDUs and their networks in the mid to late 1990s, a number of researchers developed, field tested and evaluated other peer-driven outreach models. Conceptually, these strategies recognized that the IDUs networks are not only important determinants of HIV risk but can also be successfully used to influence IDUs to reduce HIV-related risk behaviours (Broadhead et al., 1998; Latkin, 1998). Neaigus (1998) reviewed the network approach and interventions to prevent HIV infection among IDUs. Outreach models often rely on a mix of approaches that combine individual level risk reduction with network-based components and have been introduced to reach drug-user at risk networks rather than individual IDUs. For a more thorough discussion of network-based approaches to understanding and responding to injecting drug use, see Neaigus (1998).

The link between outreach and Needle and Syringe Programmes is characteristic of the Renewal Outreach Programme model (Badrieva, 2001). Many regions and countries with recent HIV epidemics among IDUs have adopted a harm reduction approach to HIV prevention and other health-related consequences of drug use. Many of the more recent adaptations of outreach programmes rely on recruiting people from neighbourhoods where IDUs congregate and encouraging these individuals to use their residence as a venue for providing a range of services to enable IDUs access to the means for behaviour change.

Recently, outreach services have been linked to, and through, VCT programmes to facilitate access and adherence to antiretroviral therapies for HIV-positive IDUs. These models are being developed and will be field tested in countries such as Kenya and Viet Nam with the Centers for Disease Control and Prevention (CDC) Global AIDS Program.

Evidence of effectiveness of community-based outreach

The extent to which outreach to IDUs starts and sustains a process, resulting in reduced risk behaviour that, in turn, leads to a reduction in HIV transmission is the evidence required

Table 1 (Continued)

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<tr>
<th>Name</th>
<th>Year study published</th>
<th>Features</th>
<th>Target populations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youth model (Western Europe)</td>
<td>1960s</td>
<td>Focus on drug use and HIV prevention among IDUs</td>
<td>Problem youth and drug problems among youth</td>
<td>Original form of outreach and preceded the emergence of HIV. Used in Austria, Nordic countries, France, Germany and Portugal.</td>
</tr>
<tr>
<td>Catching the clients model (Western Europe)</td>
<td>Mid-1970s</td>
<td>Encourages IDUs to enter drug treatment Primary focus is to help IDUs to stop using drugs</td>
<td>IDUs in need of treatment</td>
<td>Carried out mainly by therapeutic communities and other drug treatment providers. Greece, Norway and Sweden.</td>
</tr>
<tr>
<td>Self-help Model (Western Europe)</td>
<td>Mid-1970s</td>
<td>Relies on IDUs to reach out to other IDUs</td>
<td>Active IDUs</td>
<td>Resulted in the formation of organizations of drug users Belgium, Denmark, France, Germany, Italy, Netherlands, Spain, United Kingdom.</td>
</tr>
<tr>
<td>Public health model (Western Europe)</td>
<td>Mid to late 1980s</td>
<td>Low threshold for harm-reduction services (providing services) Bridging to institutions (drug treatment, testing and counselling and HIV/AIDS treatment)</td>
<td>IDUs</td>
<td>IDUs work with physicians and nurses to reach IDUs. Most widely used model in Europe.</td>
</tr>
<tr>
<td>Renewal outreach programme (Russian Federation)</td>
<td>1999</td>
<td>Outreach linked to NSPs</td>
<td>IDUs</td>
<td>Combination of outreach and NSPs. Relies on volunteers, which allows for more efficient use of resources. Coverage of IDUs has been substantial.</td>
</tr>
</tbody>
</table>

to establish the effectiveness of outreach in HIV prevention among IDUs. The sections below provide a synopsis of findings from earlier reviews and updates the published and unpublished literature since 1998 with attention to reports from developing countries. The findings are reported in relation to the following three interrelated empirical questions:

1. Is outreach an effective strategy for reaching hard-to-reach, hidden IDU populations and providing the means for changing behaviour?
2. Do a significant proportion of IDUs receiving outreach-based interventions reduce their HIV risk behaviours—drug using, injecting equipment use and sexual—and adopt safer behaviours?
3. Are changes in behaviours associated with lower rates of HIV infection among IDUs?

Is outreach an effective strategy for reaching hard-to-reach, hidden IDU populations and providing the means for changing behaviour?

Outreach to IDUs has been among the most frequently implemented interventions as it can reach hidden populations of IDUs (illicit drug use is not usually performed openly in front of strangers) who are stigmatized (society views IDUs as being different and generally views them negatively). Community-based outreach can get access to and engage IDU populations in a process of risk reduction in their communities rather than intervening with IDUs who attend clinics to access services. It is essential to question the effectiveness of outreach in reaching the at-risk target population as well as how many IDUs are actually being reached. The issue of coverage is quiet complicated and includes numerical coverage (how many?), percentage coverage (what share?) and setting/geographical coverage (what groups?). The UNAIDS publication Costing Guidelines for HIV/AIDS Intervention Strategies, February 2004 should be referred to for discussion of these issues.

There is considerable variation among regional and country-specific outreach programmes in terms of reach. Developed countries with the most mature epidemics have the most experience with community-based outreach and have also developed an infrastructure for monitoring and evaluation that permits reviews and reports of data related to utilization of services and population coverage. Data from Australia, New Zealand, the United States and Western European countries demonstrate that outreach has reached large numbers of at-risk IDU populations, including male and female IDUs as well as IDUs of different ages, various ethnicities, and who use different drugs. With regards to countries with more recent epidemics, they may have implemented more outreach than is reported as these countries may be using scarce resources for programme implementation rather than for monitoring and evaluation of service use.

Country-level reports from Western Europe reveal that large numbers of IDUs are provided condoms, needles and syringes, risk reduction education and referrals to drug treatment services (Burkhart, 1999). In the 1980s, an outreach and NSP in Rotterdam, the Netherlands, greatly extended the outreach and the quantity of supplies provided by peer outreach workers, including programme participants, who took large amounts of injecting equipment (and condoms) to houses where drugs were sold and consumed (Grund et al., 1992).

The most recent data from the United States, Substance Abuse and Mental Health Services Administration Multi-Site (12 cities) Outreach Study of high-risk IDU populations, 1995–2000, found that outreach was effective in referring IDUs to drug treatment services. Each year an estimated 750,000 to 1 million outreach contacts (covers about 250,000 IDUs), including hard-to-reach IDUs such as sex workers, homeless people, men who have sex with men and transgendered people, occur in the United States (Thompson, 2002).

Of the IDUs reached in this study, 68% had been referred to treatment of whom 41% entered drug treatment. This study highlights the fact that, if services are available, outreach is an effective strategy to reach, refer and start a process that can lead to reduced HIV-related risks. The results were similar for reaching IDUs and referral to VCT.

In Latin America, Brazil and Argentina have been the most active countries in providing community-based outreach, reaching large numbers of IDUs with a range of services, including NSPs, through harm reduction centers and NGOs (Rossi, Touzé, & Weissenbacher, 2000; Touzé et al., 1999).

In Central and Eastern Europe and the newly independent states of the former USSR, very few countries have reached most IDUs through outreach (or any other method). The Czech Republic, Kyrgyzstan and Lithuania are the possible exceptions (Burrows & Alexander, 2001), and only in Kyrgyzstan has the government made a commitment to reach this group (Burrows & Holmes, 2001). In Central and Eastern Europe, most outreach programmes follow North American or Western European models (see Table 1) and are coupled with NSPs. In Central Europe, especially the Czech Republic and Slovenia, European models, including the self-help or public health models (see Table 1), are most often implemented. In Eastern Europe and Central Asia (countries such as Kyrgyzstan, the Russian Federation and Ukraine), North American models such as the indigenous leader or peer-driven intervention are frequently used.

In 1999, in Kazan, Republic of Tatarstan, the Russian Federation, a new model was developed that focuses specifically on reaching IDUs in the closed scene of apartment-based drug buying and selling (Badrieva, 2001). A total of 101 sites had been opened in the city and the programme reached 7700 IDUs (about 35% of the city’s IDUs). Unfortunately, only 35 sites are still operating, mainly as a result of continued police activities around tusovkas, places (not necessarily apartments) where IDUs meet rather than buy drugs. Funding is insufficient to increase the number of outreach staff to the level required to reach all IDUs in Kazan. However, even with a less than optimal number of outreach workers, this process has enabled the programme to reach over 100 hid-
In South Asia, Bangladesh reports having reached up to 80% of IDUs in some cities (Jenkins, 2001). In all these cases, outreach is combined with NSPs. The SHAKTI IDU intervention by CARE Bangladesh began with a rapid situation assessment in 1997 and an outreach program in 1998. Preliminary findings have been reported (Beg, 1999), and IDUs’ behavioural surveillance results in Dhaka have been provided for 1998–1999 and 1999–2000 (Government of Bangladesh and UNAIDS, 2000). By June 1999, the average number of IDUs reached daily was 1945, rising to over 2200 on some days. Between June 1998 and June 1999, a further seven drop-in centres were opened; 31 more (paid) peer outreach workers were trained and 210 peer educators (unpaid volunteers) started training with 160 completing it. In addition, 20 medicine shop sellers were trained to act as referral points for sexually transmitted infections (STIs), abscess care and NSP services. They were also encouraged not to buy needles and syringes from IDUs (to prevent leakage from the SHAKTI project). By June 1999, the project distributed 16213 condoms and 50,000 needles and syringes per month.

India also has large scale outreach programmes connected to both NSPs and buprenorphine substitution treatment in Chennai, Delhi, Kolkata (former Calcutta) and Mumbai. Outreach programmes have been implemented in some states of India. The State of Manipur is scaling up its NSPs and outreach interventions in an attempt to reach most IDUs. A village in Manipur reported reaching almost all IDUs (750 of 850). Over 18 months, they reported 5939 contacts with IDUs with 3930 bleach kits and more than 4700 condoms distributed (Hangzo et al., 1997). In a Delhi slum, a drop-in centre provides a range of services to IDUs and acts as a base for outreach workers (Dorabjee, Ravi Priya, Samson, Singh, & Varma, 2001). Although, for the evaluation, the outreach component was not separated from the drop-in services, the researchers found that the programme had been very successful in reaching IDUs, contacting 3415 between May 1999 and July 2001 compared with a target of 500 clients and served as an effective bridge to drug dependence treatment.

In Southeast Asia, there are countries scaling up outreach and other countries beginning to introduce small-scale programmes. Viet Nam has recently scaled up its outreach programmes, reaching large numbers of IDUs and referring them to newly established, anonymous VCT sites. In 2000, 21 of the 61 provincial AIDS committees in Viet Nam reported disseminating risk reduction information to increase HIV/AIDS awareness and to reduce risk behaviours among IDUs. More recently, Viet Nam has introduced community-based outreach for sex workers, many of whom are also IDUs. Small programmes, usually without NSPs (or in some places the unofficial exchanging of needles), have begun in China, Indonesia, Malaysia, Mongolia, Myanmar and Thailand. Thailand has recently introduced community-based outreach in Bangkok and this has since been extended to other parts of the country.

There are very few outreach programmes specifically for IDUs in Africa or the Eastern Mediterranean despite findings that 15 African and 12 Eastern Mediterranean countries have identified drug injecting in their communities. Of these 27 countries, 17 have found HIV among IDUs (Ball, Rana, & Dehne, 1998). Three sub-Saharan countries—Kenya, Nigeria and South Africa—have the potential for HIV epidemics in IDU populations within the context of overwhelming heterosexual epidemics. Injecting drug use has also been described as a major problem in Mauritius. Kenya is planning to introduce an outreach program for IDUs including referral to VCT and HIV treatment. The Islamic Republic of Iran is developing outreach programmes as a component of their national harm reduction strategy with most outreach services targeting IDUs being developed in association with community-based “Triangular Clinics” that provide services addressing HIV/AIDS, STIs and drug use. These services are being expanded throughout the country. A pilot outreach programme, including needle and syringe provision, is being implemented in Tehran (World Health Organization Regional Office for the Eastern Mediterranean, 2004).

In most countries, there is great difficulty in reporting how many IDUs are being reached and estimations of the number of IDUs are either not available or are problematic because of underreporting. Consequently, reports do not permit an accurate estimation of coverage or the proportion of the population reached. Furthermore, the number of IDUs is often underestimated as sampling is frequently based on drug treatment agencies and other institutional sources, such as prisons. Consequently, except for a few countries, reporting with confidence about coverage or the proportion of the IDU population reached by community-based outreach is difficult. However, recent work on estimating the number of IDUs globally and regionally has estimated that there are 13.2 million IDUs worldwide (Aceijas, Stimson, Hickman, & Rhodes, 2004).

To summarize, there is no doubt that over the years outreach has expanded regionally, nationally and locally, and has been an effective strategy to reach hidden and marginalized populations. There is also no doubt that a huge gap exists in most countries between the number of IDUs who want or could benefit from outreach services and the number of IDUs who actually receive them. There are also many countries with emerging HIV epidemics among IDUs that have yet to introduce community-based outreach programmes.

Reaching as many people as possible through outreach to enable them to change their behaviour is critical to having an impact on HIV epidemics. It is somewhat difficult to set targets for prevention coverage, since planners often do not have estimates of the size of the at risk populations. Nevertheless, the following best practices, derived from experiences over many years, will increase the reach of outreach programmes:

- Outreach workers (former and/or current IDUs) have to gain the trust of IDUs, go to where the drug users and their net-
works congregate and at the times when they are at greatest risk and provide multiple means for behaviour change such as risk reduction information, needles and syringes where possible and referrals.

Other factors that will increase the effectiveness of outreach workers in reaching as many IDUs as possible, include sufficient training, payment for services, access to services to help address issues of burnout, relapse and health-related issues as well as adequate supervision. Of great importance is a policy environment that is supportive of HIV prevention programmes for IDUs and multi-sectoral institutional support for the outreach programme (Burrows, 2003).

Do a significant proportion of IDUs receiving outreach-based interventions reduce their HIV risk behaviours—drug using, injecting equipment use and sexual—and adopt safer behaviours?

Accumulated evidence from more than 40 different studies mostly from the United States using observational and quasi-experimental designs strongly indicates that outreach-based interventions have been effective in reaching out-of-treatment IDUs and providing the means for effective behaviour change (Coyle, Needle, & Normand, 1998). Some of these include NSPs but most do not. (This is not surprising as most studies were undertaken in the United States where the Federal Government does not fund NSPs. These studies may have referred drug users to needle exchange but, by and large, NSPs did not exist at the time of these studies. As such it is not possible to compare the studies. It is recognized that where NSP exists, this is an advantage in helping IDUs reduce their risk taking behaviours.)

Specifically, these studies consistently reported significant and strong post-intervention reductions in: cessation of IDU (10 of 11 studies); injecting frequency (17 of 18 studies); multi-person reuse of syringes (18 of 22 studies); use of other injecting equipment (9 of 13 studies); and crack cocaine use (all 8 studies).

These studies also reported increased needle disinfection as, generally, outreach protocols included risk-reduction information about disinfecting needles (11 of 17 studies), increased entry into drug treatment (7 of 8 studies) and increased condom use (18 of 21 studies).

More recent research by Broadhead et al. (1998), Cottler et al. (1998), Goldstein, Deren, Kang, Des Jarlais, and Magura (2002), Latkin (1998), and a study by Kumar, Mudaliar, and Daniels (1998) in Madras, India, confirm earlier findings that community-based outreach results in self reported reductions in HIV-related risk behaviours. Post-intervention changes in IDU risk behaviour have also been reported in other countries—Belarus, India, Indonesia and the Russian Federation.

In India, Kumar et al. (1998) reported on community-based outreach to IDUs in Madras. The outreach programme included reaching IDUs on the street, face-to-face education about HIV/AIDS risk reduction information and provision of bleach and condoms. IDUs participated in three education sessions to raise awareness, reinforce perception of risk and receive information about services, including referrals to VCT. The researchers reported significant declines in injecting risk behaviour among IDUs but found that sexual risk behaviour was more difficult to change.

IDUs in communities with outreach programmes reported greater changes than those without such programmes. The effectiveness of an outreach programme in the absence of NSPs was evaluated in Denpasar, Bali, Indonesia (Desembriartista, 2001). The programme carried out research and outreach to provide information on HIV/AIDS, STIs, and hepatitis B and C; promote safer injecting and safer sex; and provide referrals and counselling. In addition, the office was used as a drop-in centre. Responses from IDUs from before the programme started were compared with those received after 1 year. Although the sample size was small, the study found increases in HIV/AIDS awareness, knowledge of how to clean needles and syringes, actual cleaning of equipment, use of new needles and syringes, increases in condom use and an overall decrease in injecting.

In Yaroslavl, Russian Federation, it has been reported that a peer-driven intervention outreach programme significantly reduced the sharing of drug preparations, injecting equipment and water used in injecting among the city’s IDUs over a 2-year period.

Studies from the United States and India reveal that IDUs are less likely to reduce risky sexual behaviour than to change drug use and needle practices. Outreach-based peer programmes have been repeatedly reported to be more effective in enabling IDUs to change drug using and needle risk behaviours than sexual behaviour (Kumar et al., 1998).

This is not surprising, as most interventions specifically targeted changing drug use and needle practices. Semaan et al. (2002) analysed 33 studies (most including outreach) and reported reduced unsafe sex and increased use of condoms among IDUs in intervention programmes. The reductions were greater than those in the comparison groups of IDUs, who were not part of the intervention programme, though this group also reported reductions. Although the findings showed reduced risk, the magnitude of the change was not significant.

Goldstein et al. (2002) reported that street outreach in combination with other interventions was effective in assisting IDUs to re-enter MMT programmes. Kwiatkowska, Booth, and Lloyd (2000) reported that opiate-dependent IDUs recruited by street outreach workers and offered free MMT were more likely to enter and remain in treatment than those who had to pay for treatment. In addition, outreach is effective if it is combined with referral programmes that make services accessible by providing transport (Tinsman et al., 2001). Tinsman et al. reported employing mobile units to provide VCT services on the street, illustrating that on-site testing increases the likelihood that these services will be used. Clients of projects with mobile units were 86 times
results support the interpretation that outreach reduces expo-
related risk behaviours. The study design is strong, and the
HIV infection in the outreach group to reductions in injecting-
linked risk behaviour related to IDU and sex among alcohol
and injecting drug users.

In summary, outreach is an effective strategy for reaching
and enabling IDUs to reduce their HIV risk behaviours. Fur-
thermore, referral of IDUs to other services such as VCT and
drug dependence treatment results in utilization of services
and can help sustain behaviour change.

Are changes in behaviours associated with lower
rates of HIV infection among IDUs?

A critical question in evaluating the effects of community-
based outreach on the HIV epidemic is determining whether
post-intervention reductions in risk behaviour result in fewer
infections. The number of empirical studies is limited. Wiebel
et al. (1996) provided the strongest evidence that participants
in outreach can reduce their HIV risk behaviour (especially
multi-person reuse of syringes) and results in reduced expo-
sure to HIV. Wiebel et al. conducted a prospective study
of intensive street-based outreach intervention in Chicago,
United States, using the indigenous leader outreach model.
Former IDUs delivered HIV prevention services in commu-
nity settings. The authors employed a quasi-experimental
design, collecting baseline and 6-month follow-up data from
IDUs who were at risk (seronegative at baseline) through their
reuse of needles, syringes or other injecting equipment
(n = 641) between 1988 and 1992. The authors added a non-
equivalent control group that was not exposed to outreach
intervention. (A non-equivalent control group does not share
identical characteristics with the experimental group in the
intervention and somewhat limits the interpretation of the
causal impact of outreach on seroconversion.)

Wiebel et al. reported that the proportion of out-of-
treatment IDUs in the intervention group reporting risk
behaviour related to injecting declined from 54% at base-
line assessment to 14% in the final sixth year of follow up.
Sexual risk behaviour also decreased, but the changes were
less dramatic. The seroconversion among outreach participants
dropped from 8.4 to 2.4 per 100 person-years. Injecting risk
was the only behavioural risk factor associated with a reduc-
tion in HIV seroconversion risk. Seroconversion was associ-
ated with injecting risk behaviour (risk ratio = 9.8). In the
non-equivalent control group not exposed to outreach inter-
ventions, 50% reported risk taking injecting practices. In the
outreach intervention group, only 14% of the IDUs reported
risk taking injecting practices. Wiebel et al. attributed reduced
HIV infection in the outreach group to reductions in injecting-
related risk behaviours. The study design is strong, and the
results support the interpretation that outreach reduces expo-
sure to HIV and prevents HIV transmission. This study has
not been replicated.

Des Jarlais et al. (1998) demonstrated in a WHO study that
intervening before HIV prevalence reaches 5% among IDUs
through the introduction of a range of prevention activities has
helped cities maintain low HIV prevalence. Des Jarlais et al.
linked seroconversion and risk behaviour data with reports
from local experts to test the hypothesis that introducing a
comprehensive HIV prevention programme that includes
early intervention, the large-scale provision of sterile inject-
ing equipment and community outreach to disseminate AIDS
information as well as risk reduction supplies in order to build
trust between health care workers and IDUs would result
in lower seroprevalence. All outreach programmes provided
referrals to other services, including drug treatment and VCT.
Des Jarlais et al. concluded that the evidence available at
the time indicated that HIV-1 epidemics can be prevented in
IDUs, who are especially vulnerable. The authors addressed
the limitations of the design and examined the data in terms of
making causal inferences about preventing HIV epidemics.
As there were multiple HIV prevention components, the rel-
ative contribution of outreach cannot be disentangled from
the other intervention components.

Investigating the causal relationships

Hill's (1971) criteria were used in earlier reviews for evalu-
ating the evidence of the effectiveness of community-based
outreach in preventing the spread of HIV infection among
IDUs (Coyle et al., 1998). These criteria are relied on to
assess the evidence and infer causation from observational
studies. Specifically, Hill's criteria include reviewing the
cumulative evidence related to a temporally correct associa-
tion (an appropriate time sequence between the intervention
and the observed outcome). An effort is made to determine
whether outreach results in post-intervention reductions in
risk behaviours associated with HIV transmission. Hill also
identified consistency among findings of similar association
by different investigators, in different places, under different
circumstances and at different times as an important crite-
rion in interpreting causation from observational studies. This
paper reports data for community-based outreach in differ-
ent countries with variation in HIV incidence and prevalence,
and differences in the infrastructure available to respond to
HIV epidemics among IDUs.

Additional criteria include the strength of association
between the intervention and observed outcome and the
specificity of the association and dose-response relation-
ship. A most important criterion is related to the behavioural
and biological plausibility of the cumulative findings. For
examples: Is it possible to attribute causation in the con-
text of current knowledge? Is there evidence available that
community-based outreach has reached the populations at
risk? Is there evidence available that community-based out-
reach has provided the means for changing behaviour, espe-
cially the means that would enable IDUs to reduce multi-

person reuse of syringes? Were reductions in risk behaviours 

associated with reduced HIV incidence? Hill’s criteria and the accumulated evidence on the effec-

tiveness of community-based outreach in preventing HIV transmission in IDUs are summarized in Table 2. Review 
of more than 40 studies indicates consistency in the direc-
tion and strength of the association between outreach and 

the specificity of behaviour change. The magnitude of post-

intervention changes in risk behaviour is substantial. Reports 

are consistent that interventions targeting IDU-specific risk 

behaviours related to drug use and needle practices reduced 

these types of risk behaviours. These findings have been 

consistently reported by different investigators, in different 

places, under different circumstances and at different times 
during the HIV pandemic.

Interventions focused on providing risk reduction infor-

mation and referrals to related services also resulted in spe-
cific behaviour changes. Outreach is designed to bridge out-
of-treatment IDUs to services, starting a process that often 
results in increased use of services. For example, those IDUs, 

who were referred to drug treatment and for whom drug treat-

ment was available, entered treatment and the results were 
similar for VCT. Most recently, reports of interventions tar-

geting IDUs who dropped out of MMT programmes reveal 

that outreach in combination with other interventions was 

effective in assisting these people in re-entering treatment 
(Goldstein et al., 2002). Initially, IDUs who dropped out of 
treatment were not willing to re-enter treatment. Repeated 
contact with the outreach worker established trust and facil-

itated treatment re-entry. Differential effects of entry into 
treatment and use of VCT occurred when investigators pro-

vided mobile services and/or introduced these services into 
their own programmes rather than referral to other agencies 
(Rowden et al., 1999; Tinsman et al., 2001).

Strong evidence indicates that outreach reaches at-risk 
HIV vulnerable populations, provides the means to reduce 
the risk associated with multi-person reuse of syringes, 

results in reports of reduced sharing of syringes and other 

injecting equipment, and increases the use of other services, 

particularly VCT and drug treatment services. Outreach 

programmes linked to NSPs and/or through referrals to NSPs 

increase the likelihood that IDUs will have access to 
the means to reduce their risk behaviours associated with 
multi-person reuse of syringes. One major study (Wiebel et 
al., 1996) indicated that reductions in multi-person reuse of 
syringes among IDUs reached by outreach were followed 
by reductions in seroconcordance. Pinkerton et al. (2000) used 
a mathematical model of sexual and injecting-related HIV 
transmission to evaluate the effectiveness of the United 
States’ National AIDS Demonstration Research Program. 
They analysed a sub-sample of 8 of 29 sites and reported, 
based on their cost threshold analysis, that 129 cases of HIV 
infection among 6629 partners were averted and that the costs 
of preventing HIV infection are much lower than treating it.

Though individual studies on the effectiveness of outreach 
have methodological limitations, the cumulative literature 
satisfies Hill’s criteria and suggests that outreach is an effec-
tive strategy for reaching and enabling IDUs to begin, and 
sustain, a process HIV risk reduction.

Discussion

In the 1980s, community-based outreach was the most 

feasible and potentially effective public health strategy to 

reach and enable hidden IDU populations to change their 

behaviours and reduce their risks of acquiring and trans-

mitting HIV and other blood borne infections. Since the 

1980s, community-based outreach programmes have been 
introduced in many settings where multi-person reuse of 

injecting equipment is prevalent and NSPs are not a viable 

option. Over time, the community-based outreach model 
has evolved, reflecting the changing dynamics of drug use, 

HIV and other blood borne infections, the availability of 
a greater range of services, and the evolving knowledge 

base and best practices to guide the implementation of this 
strategy.

Community-based outreach is designed to reach IDUs 

and other vulnerable populations at risk of HIV infec-

tion. Community-based outreach typically relies on indige-

nous members of the community (most of who are former 
IDUs and some current IDUs) to access out-of-treatment 

IDUs, establish trust and rapport, and initiate risk reduction 
activities including referral to other services on the streets 

and/or in neighbourhood settings. The outreach strategy has 
been expanded to include sexual partners of IDUs, non-

injecting drug users, IDUs’ networks and other vulnerable 
populations such as women and at risk youth. This review 
makes it clear that the adjunct services available to vul-

nerable populations (drug treatment, VCT and NSPs) vary 

considerably.

Outreach workers often provide risk reduction messages 
related to drug use, injecting and safer sex as well as risk 

reduction supplies to enable IDUs to adopt safer practices. 

When possible, outreach workers also refer IDUs to other 
services including VCT, drug dependence treatment, NSPs, 
other health services and referral for HIV treatment. Specifi-
cally, community-based outreach is designed to enable IDUs 
to reduce risk behaviours, including multi-person reuse of 
syringes and other injecting equipment, and unprotected sex-
tual intercourse, and to adopt safer behaviours such as using 
new, sterile injecting equipment, disinfecting needles and 
syringes and increasing condom use.

Evidence from more than 40 studies and additional 
unpublished reports indicate that community-based outreach 
reaches hidden populations vulnerable to HIV, provides cred-
ible risk reduction information and the means for behaviour 
change to enable IDU populations to reduce drug use, to 
reduce reuse of syringes and other drug injecting equipment, 
to increase condom use and, if IDUs are referred and the ser-
Table 2  
Interpretation and summary of evidence-based findings on the effectiveness of community-based outreach in preventing HIV transmission in IDUs

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Findings summarized</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporality—correct association with appropriate time sequence between intervention and observed outcomes</td>
<td>Post-intervention reductions in risk behaviour reported in more than 40 studies</td>
<td>Design of studies with behaviour at baseline and follow-up support the interpretation that outreach led to reduction of HIV infection risk in IDUs exposed to intervention</td>
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<td></td>
<td>Groups not in interventions do not show reduced risk behaviour</td>
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<tr>
<td></td>
<td>Post-intervention change in testing and counselling and in entering and re-entering drug treatment repeated in 10 studies targeting this behaviour</td>
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<tr>
<td>Consistency of finding similar associations by different plans under different circumstances</td>
<td>Outreach has been effective in reaching populations in all regions of the world where it has been implemented</td>
<td>Evidence strong and consistent that IDUs reached by community-based outreach over time and in different countries report reductions in risk behaviour</td>
</tr>
<tr>
<td></td>
<td>Outreach has been effective in enabling IDUs to reduce risk behaviour starting in the 1980s, continuing throughout the 1990s and into the third decade of the epidemic</td>
<td></td>
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<tr>
<td></td>
<td>Outreach has been effective in reducing risk behaviour in countries with both limited and substantial public health capacity</td>
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<tr>
<td>Specificity of association is limited to specific participants or specific outcomes</td>
<td>Outreach has been effective in reducing risk behaviour and/or increase protective behaviour</td>
<td></td>
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<tr>
<td></td>
<td>Outcomes—post-intervention changes in targeted behaviour (drug use and needle practices)</td>
<td>Outreach provides risk-reduction messages and means for behaviour change, including referral to other services</td>
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<tr>
<td></td>
<td>Post-intervention use of services referred by outreach workers</td>
<td>The IDUs reached by community outreach workers utilized services when they were available</td>
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<td></td>
<td>Smaller changes in sexual risk practices</td>
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<tr>
<td>Dose-response relationship</td>
<td>Very few data available</td>
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<tr>
<td></td>
<td>Data too limited to infer that the more outreach, the greater the change in behaviour</td>
<td></td>
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<tr>
<td>Plausibility (causation is feasible in the context of current knowledge)</td>
<td>At-risk populations reached by outreach</td>
<td>Epidemiological studies publication that multiperson reuse of syringes is related to HIV transmission, and evaluation studies of outreach indicate that:</td>
</tr>
<tr>
<td></td>
<td>Provided means to enable IDUs to reduce risk behaviour and/or increase protective behaviour</td>
<td>Outreach is an effective method of enabling IDUs to reduce their risk behaviour</td>
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<tr>
<td></td>
<td>Reductions in risk behaviour reported, especially multi-person use of syringes</td>
<td>One study directly links reduction in risk behaviour to reductions in HIV</td>
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<tr>
<td></td>
<td>Incidence of HIV transmission in IDU group exposed to outreach lower than that of IDU group not exposed to outreach</td>
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</tbody>
</table>
vices are available, to use drug dependence treatment, VCT and other services. Reducing risk behaviours greatly reduces HIV transmission.

Community-based outreach is a comparatively low-cost effective intervention for preventing HIV infection among IDUs. It is, therefore, particularly well suited to resource constrained settings and can be rapidly scaled up. Outreach is often the first step in establishing HIV prevention, treatment, care and support programmes among IDUs. There are now tools and guidelines to train outreach workers and the evidence base enables planning, implementation and evaluation of programmes designed to reach IDUs and other vulnerable populations (NIDA, 2002; World Health Organization, 2003).

Despite evidence of the effectiveness of community-based outreach from 20 years of evaluation studies, a huge gap exists in most countries between the number of IDUs who want or could benefit from outreach services and the number of IDUs who actually receive them. Findings from evaluation studies on the effectiveness of community-based outreach must be shared, made accessible, rapidly communicated and disseminated globally.

The evidence of effectiveness needs to be provided to policy- and decision-makers to guide their decisions. This is not always sufficient to persuade them to take action and implement scaled-up prevention programmes. Ongoing advocacy and strengthening the evidence base are required as well as plans to link evidence-based findings with technical assistance and training to enhance the capacity of regions and countries to introduce, scale up and sustain HIV prevention outreach to IDUs as part of a comprehensive HIV prevention strategy.

References


Interventions to reduce the sexual risk behaviour of injecting drug users

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Abstract

Reducing the risk of sexual HIV transmission by injecting drug users (IDUs) is important for controlling the HIV epidemic among all drug users and for controlling the larger epidemic. Over the past few years, several qualitative and meta-analyses reviews have been published. Most of these reviews involved numerous studies conducted in resource-rich countries, while a few covered the smaller number of studies undertaken in resource-constrained countries. In order to make greater strides in controlling the HIV epidemic, we assessed the generalisability of the results of the major studies and reviews for use in developing programmes in resource-constrained countries. We also discuss the implications for global research efforts and public health practice.

The reviews show that IDUs in both resource-rich and resource-constrained countries have changed their sexual risk behaviours, reflecting rational and altruistic responses to a major health threat. Findings show that IDUs changed their sexual risk behaviour to avoid becoming infected with HIV and to avoid transmitting HIV to their sexual partners. Although the risk-reduction effect is moderate, it is important to implement programmes to reduce the sexual risk behaviour of IDUs in all countries. Providing evidence-based interventions is ethically responsible compared to providing no interventions. As interventions are implemented in different settings, it is important to bear in mind that stigmatisation of HIV/AIDS, or drug or condom use may limit an intervention’s effectiveness. There is a need for research on adapting interventions to different cultural or national settings, and to develop and evaluate new interventions that may produce greater reductions in sexual risk behaviours.

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Keywords: Sexual risk; Injecting drug use; Research interventions; Global research

HIV infection and injecting drug users

The first cases of AIDS in injecting drug users (IDUs) were reported in 1981. Studies of stored serum samples and medical records suggest that HIV infection in IDUs first occurred in New York City in the mid 1970s (Ball et al., 1998). Since then, HIV infection in IDUs has been reported in 130 countries throughout the world (UNODCP, 2004). The multi-person use (sharing) of injecting equipment is one of the most efficient methods for transmitting HIV. Indeed, very rapid HIV transmission has been noted among IDUs in both resource-rich and resource-constrained countries (Des Jarlais & Friedman, 1998).

There is abundant evidence that IDUs have changed their drug using behaviour, particularly needle and syringe use, to reduce the risk of HIV infection. The research data include studies of reduced HIV incidence in IDUs participating in interventions such as needle and syringe exchange programs (Ksobiech, 2003), community outreach (Wiebel et al., 1996), and drug dependence treatment (Metzger et al., 1993). There is also strong evidence that, when HIV prevention interventions are implemented on a sufficiently large scale, it is possible to avert HIV epidemics in IDUs (Des Jarlais, Friedman, et al., 1995).

Most IDUs are sexually active so they may transmit HIV to their sexual partners through unsafe sex as well as to their drug using partners through sharing drug injecting equip-
ment. In countries, such as Italy, Spain, and the United States, sexual transmission of HIV from IDUs to sexual partners, who do not inject drugs, has long been the dominant mode of heterosexual transmission (Des Jarlais, Hagan, & Friedman, 1997). This type of HIV transmission may soon become the dominant mode of heterosexual transmission in countries such as Canada, China and Russia (UNAIDS, WHO, 2003). The extent to which IDUs will change their sexual risk behaviour is therefore a critically important question for HIV epidemiology.

There is also growing evidence of overlap between drug injecting and commercial sex networks. To a varying extent across regions, sex workers or their sexual partners may inject drugs, and drug users may sell or purchase sex. Harm reduction efforts should include effective interventions and/or referrals to address overlapping sexual and injecting risk behaviours.

In this paper, we summarise and assess the results of qualitative and quantitative reviews of intervention studies implemented to reduce the sexual risk behaviour of IDUs. We discuss the generalisability of the results for the development of programmes in resource-constrained countries and the implications for global research efforts and general public health practice.

Qualitative and quantitative reviews of studies conducted in resource-rich countries

The evidence about change in the sexual risk behaviours of IDUs to prevent HIV infection and transmission is ambiguous (Booth & Watters, 1994; Doll, 1997; Friedman, Des Jarlais, & Ward, 1994; Gibson, Flynn, & Perales, 2001). The qualitative reviews have generally concluded that interventions to reduce the sexual risk behaviour of IDUs can be effective—that IDUs will change their sexual risk behaviour in order to reduce their chances of transmitting HIV and to reduce their chances of transmitting HIV. However, these reviews have also noted the relatively large number of studies in which there were no differences at follow-up between the rates of sexual risk behaviours of participants in the intervention groups and participants in the comparison groups (e.g. Brown & Beschner, 1993).

It is in this situation, where qualitative reviews show conflicting or ambiguous results that quantitative reviews (meta-analyses) can be helpful. Meta-analysis uses formal statistical methods for combining results of studies, including the use of statistical tests for evaluating the homogeneity of the overall average effect and the application of stratified analyses to compare results of different groups of studies (Cooper & Hedges, 1994). Meta-analyses offer a more rigorous and extensive examination of data than qualitative literature reviews. For example, results from each study are often converted to a common metric, such as an odds ratios with a 95% confidence interval (CI), to calculate the overall average effect, also expressed as an odds ratio. The odds ratio is a metric which has often been used in evaluating public health and medical interventions (Fleiss, 1994). The odds ratio represents the ratio of the odds by which those in the intervention groups reduced their risk (moved to a lower risk category) to the odds by which those in the comparison groups reduced their risk (Fletcher, Fletcher, & Wagner, 1988). An odds ratio of less than 1 indicates a lower percentage of persons in the intervention groups than in the comparison groups practicing unsafe sex, and an odds ratio of more than 1 indicates a higher percentage of persons in the comparison groups than in the intervention groups practicing unsafe sex.

To date, results of two meta-analyses of intervention studies to change the sexual risk behaviour of IDUs have been published. The first meta-analytic review of 16 United States studies, published between 1990 and 1995, found that drug users increased their condom use after participating in interventions (Cross, Saunders, & Bartelli, 1998). The second meta-analytic review of 33 United States studies, published between 1988 and 1999, is more recent (Semaan et al., 2002). Well-established, standard formulas were used to conduct the meta-analysis (Cooper & Hedges, 1994; Hedges & Vevea, 1998; Pettitt, 1994) and details of the procedures used in the calculations were also reported (Johnson, Semaan, et al., 2002; Johnson, Hedges, et al., 2002). This meta-analysis included studies with rigorous research designs and contained a sufficiently large enough sample of studies to allow for stratified meta-analyses.

The overall weighted average effect size for the 33 studies was small, protective and significant (OR, 0.86; 95% CI, 0.76–0.98). This overall effect indicated that drug users in the intervention groups were slightly more likely than those in the comparison groups to reduce their sexual risk behaviours. The effect was also heterogeneous (Q = 59.17; p = 0.002), indicating that the effect differed by subgroups of studies. Stratified meta-analysis showed that studies with comparison groups that did not receive an intervention had a significantly stronger effect (k = 3; OR, 0.60; 95% CI, 0.43–0.85) than did studies with comparison groups that received an HIV prevention intervention (k = 30; OR, 0.91; 95% CI, 0.81–1.03). The effects for the two groups of studies were statistically different. Although the odds ratio for all 33 studies was small; the odds ratio for the three studies in which the comparison groups did not receive an intervention was moderate and significant. The odds ratio for the 30 studies in which the comparison groups received an intervention was weak and
The WHO study was one of the first studies that utilised standard methods for collecting data in both resource-rich and resource-constrained countries. IDUs were recruited through community outreach and from drug dependence treatment programmes in 12 cities: Athens, Greece; Bangkok, Thailand; Berlin, Germany; Glasgow and London, United Kingdom; Madrid, Spain; New York, United States; Rio de Janeiro and Santos, Brazil; Rome, Italy; Sydney, Australia and Toronto, Canada. Informed consent was obtained, a structured interview was administered and a blood or saliva sample was collected for HIV testing. The interview inquired about demographics, drug use and HIV risk behaviour. At the time of data collection (circa 1990) some HIV prevention efforts for IDUs existed in all of these cities, although the extent of the programmes varied greatly.

Results of this study showed that the participants were generally well informed about HIV infection and the development of AIDS (Stimson et al., 1998). Almost all (over 95%) of the participants at each site knew that HIV could be transmitted both sexually and through sharing drug injecting equipment. Over 70% at each site knew that a person could be carrying the HIV virus and still “look well.” These data show that drug users are capable of understanding relatively difficult concepts—the modes of HIV transmission and the extended time period required for HIV infection to progress to disease. The data also showed that IDUs understood that a person once HIV infected is infectious for life.

Table 1 shows the percentage of WHO study participants in each city who reported that they had changed their behaviour to avoid HIV infection. The percentages of participants in the two Brazilian cities, who changed their behaviour, were relatively low, consistent with the relative lack of HIV prevention programmes in Brazil at the time of data collection. Bangkok, in contrast, had one of the highest percentages of participants who reported HIV-related behaviour change. The specific behaviour changes were primarily reductions in the sharing of drug injecting equipment, increases in the use of male condoms and reductions in the numbers of sexual partners (Stimson et al., 1998). Participants in Bangkok, who reported behaviour change, were half as likely to be infected with HIV as participants who reported that they had not changed their behaviour (Vanichseni et al., 1993).

Table 2 presents the frequency of vaginal sexual intercourse with regular and casual partners. The Bangkok data show somewhat lower rates of sexual activity, while the Rio de Janeiro and Santos data show some of the highest rates. The differences are likely to be related to the primary drugs.
Table 2

<table>
<thead>
<tr>
<th>Cities</th>
<th>Frequency of vaginal intercourse (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary partners</td>
<td>Casual partners</td>
</tr>
<tr>
<td></td>
<td>Weekly Daily n</td>
<td>Weekly Daily n</td>
</tr>
<tr>
<td>Athens</td>
<td>39 11 (300)</td>
<td>7 3 (302)</td>
</tr>
<tr>
<td>Bangkok</td>
<td>16 1 (316)</td>
<td>2 1 (313)</td>
</tr>
<tr>
<td>Berlin</td>
<td>33 5 (301)</td>
<td>12 2 (301)</td>
</tr>
<tr>
<td>Glasgow</td>
<td>50 10 (406)</td>
<td>9 1 (406)</td>
</tr>
<tr>
<td>London</td>
<td>47 12 (375)</td>
<td>6 1 (377)</td>
</tr>
<tr>
<td>Madrid</td>
<td>47 5 (228)</td>
<td>9 2 (269)</td>
</tr>
<tr>
<td>New York</td>
<td>44 10 (1133)</td>
<td>11 1 (1133)</td>
</tr>
<tr>
<td>Rio</td>
<td>42 5 (390)</td>
<td>16 0 (390)</td>
</tr>
<tr>
<td>Rome</td>
<td>49 10 (421)</td>
<td>3 1 (421)</td>
</tr>
<tr>
<td>Santos</td>
<td>38 20 (152)</td>
<td>21 11 (152)</td>
</tr>
<tr>
<td>Sydney</td>
<td>39 13 (325)</td>
<td>10 1 (325)</td>
</tr>
<tr>
<td>Toronto</td>
<td>33 12 (374)</td>
<td>16 4 (373)</td>
</tr>
<tr>
<td>Total</td>
<td>(4727)</td>
<td>(4762)</td>
</tr>
</tbody>
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Figures rounded to the nearest percent. n = sample on which percentage was calculated. Source: WHO multi-site Study of HIV and Injecting Drug Use.


Table 3

<table>
<thead>
<tr>
<th>Cities</th>
<th>Frequency of condom use with primary and casual partners (%)</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Condom use with primary partners</td>
<td>Condom use with casual partners</td>
</tr>
<tr>
<td></td>
<td>Always Sometimes Never n</td>
<td>Always Sometimes Never n</td>
</tr>
<tr>
<td>Athens</td>
<td>7 17 77 (230)</td>
<td>22 18 80 (113)</td>
</tr>
<tr>
<td>Bangkok</td>
<td>12 23 65 (228)</td>
<td>35 20 45 (83)</td>
</tr>
<tr>
<td>Berlin</td>
<td>13 17 70 (187)</td>
<td>21 33 46 (96)</td>
</tr>
<tr>
<td>Glasgow</td>
<td>8 18 75 (330)</td>
<td>17 32 51 (148)</td>
</tr>
<tr>
<td>London</td>
<td>12 18 70 (284)</td>
<td>31 35 34 (140)</td>
</tr>
<tr>
<td>Madrid</td>
<td>20 27 53 (170)</td>
<td>24 41 34 (118)</td>
</tr>
<tr>
<td>New York</td>
<td>20 26 55 (871)</td>
<td>37 32 31 (436)</td>
</tr>
<tr>
<td>Rio</td>
<td>4 12 84 (231)</td>
<td>10 22 68 (268)</td>
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<td>Rome</td>
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<td>31 34 35 (186)</td>
</tr>
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<td>Santos</td>
<td>15 14 72 (81)</td>
<td>23 32 45 (73)</td>
</tr>
<tr>
<td>Sydney</td>
<td>13 26 61 (220)</td>
<td>27 30 43 (83)</td>
</tr>
<tr>
<td>Toronto</td>
<td>– – – – – –</td>
<td>36 31 33 (209)</td>
</tr>
<tr>
<td>Total</td>
<td>(3115)</td>
<td>(1933)</td>
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HIV voluntary counseling and testing (VCT) studies

VCT deserves mention as an intervention to reduce the sexual risk behaviour of IDUs. The results of VCT studies shows that IDUs who learn that they are HIV-positive greatly increase their use of condoms in order to reduce the risk of transmitting HIV to their sexual partners (Desenclos, Papavangelou, & Ancelle-Park, 1993; Vanichseni et al., 1992).
Additionally, results of a meta-analysis of 22 published studies (Weinhardt, Carey, Johnson, & Bickham, 1999), including data concerning IDUs from four studies in the United States and six studies from resource-constrained countries, showed that after VCT, HIV-positive persons were more likely to report reductions in sexual risk behaviour than either HIV-negative persons or persons who had never undergone VCT. One of the strengths of the VCT studies is that they were conducted in a large number of countries, including resource-constrained ones. It would seem that the desire to avoid infecting sexual partners is a common feature of IDUs across different cultures and countries. Knowing one’s HIV-positive status is also important as it may lead to an increase in condom use with regular (primary) sexual partners—an important result in efforts to control HIV transmission. However, not all HIV-positive IDUs use condoms and of those that do, not all use condoms 100% of the time. Furthermore, there appears to be little or no effect of VCT on the sexual risk behaviour of HIV-negative IDUs.

It is important, however, to keep in mind several points as we consider the implementation of VCT in resource-constrained countries. First, a reduction in sexual risk behaviour may be dependent on factors other than an IDU learning that he or she is HIV-positive. It may be important that HIV and drug use are not so heavily stigmatised in a local setting that an IDU cannot admit to being HIV-positive. It may also be important that an IDU receives some form of psychological support and medical care, if required, after learning that he or she is HIV-positive. Accordingly, VCT services for IDUs should include appropriate psychological support, medical follow up and treatment.

Many IDUs, living on the fringes of society, are diagnosed HIV-positive late in the course of the infection or in a coercive fashion during incarceration. This unfortunately may compromise the effectiveness of prophylaxis and HIV infection management strategies. One of the greatest perceived fringe benefits of offering IDUs access to anti-retroviral (ARV) therapy is the expectation that they will come forward earlier for HIV VCT and care. To realise this expectation, however, new approaches to care need to be developed and implemented in many localities. Furthermore, provision of ARV provides opportunities for ongoing counseling and access to prevention commodities, including condoms.

**Intervention components to reduce the sexual risk behaviour of drug users**

While the potential importance of sexual transmission of HIV from IDUs to sexual partners, who do not inject drugs, was recognised relatively quickly after HIV and AIDS were first discovered in IDUs (Des Jarlais, Chamberland, Yancovitz, Weinberg, & Friedman, 1984), this recognition did not lead to consensus on the interventions needed to reduce sexual risk behaviour. Even today, there is no agreed set of components aimed at reducing sexual risk behaviour of IDUs (Semaan et al., 2002).

A review of the intervention components delivered in United States studies (Semaan et al., 2002) showed that several different components and combinations of components were included to reduce the sexual risk behaviour of IDUs. While the different combinations of intervention components were based on theoretical models, there were not enough studies of the same combinations to allow meta-analytic comparison of the different combinations (Semaan et al., 2002). However, qualitative reviews of the intervention components show their overall effectiveness in reducing sexual risk behaviour. For example, van Empelen et al. (2003) assessed the relationship between effective intervention methods and the underlying theory; concluding that successful interventions included use of multiple theories and methods, inclusion of peers and rehearsal of skills. Sustainability of intervention efforts was important in community-level interventions. They also found that the most successful intervention methods were role modeling, skills building and social support enhancement. These methods were generally derived from the social-cognitive or diffusion of innovations theories.

In general, intervention components included in intervention studies covered: Information on how HIV is transmitted, including how to practice safer sex; assessment of personal risk and responsibility; provision of condoms to participants free or at reduced cost; technical skills training in how to use condoms correctly, for example, when and how to properly use a condom; individual or group counseling to address practical and emotional issues in practicing safer sex; skills training in “negotiating safer sex” with partners; VCT to inform participants of their HIV status; treatment of sexually transmitted infections (STIs), which may facilitate HIV transmission; and referral to drug dependence treatment to reduce both injecting and sexual risk behaviours.

**Causal processes of HIV sexual risk reduction among IDUs**

Based on the adoption and use of theoretical models, such as the Health Belief Model (Becker & Joseph, 1974) or the social learning theory (Bandura, 1993), there are sociologically, psychologically, and biologically plausible reasons as well as some empirical evidence for the effectiveness of intervention components aimed at reducing the sexual risk behaviour of IDUs (and also of any group of sexually active persons at risk for HIV infection). Understanding why participants changed their behaviour would help answer questions about the generalisation of results regarding the effectiveness of interventions to reduce the sexual risk behaviour of IDUs and would help to identify the specific components of interventions that could be locally adapted and replicated in order to develop effective programmes in different settings or countries.
Several sub-studies conducted within the larger WHO study examined the potential causal mechanisms of HIV-related behaviour change among IDUs. One sub-study examined the potential predictors of HIV-related behaviour change (Des Jarlais, Hagan, et al., 1995). This study used data from four cities in resource-rich and resource-constrained countries—and from areas where heroin was the primary drug injected (Bangkok and Glasgow), where cocaine was the primary drug injected (Río de Janeiro), and where both heroin and cocaine were injected (New York). In each city, frequent talking with IDU peers was the strongest factor associated with behaviour change in response to HIV. This result suggests that peer influence processes were central to HIV risk reduction among IDUs in different national or cultural settings.

Another WHO sub-study examined the relationship between knowing one’s HIV status and using condoms with regular sexual partners (Vanichseni et al., 1993). The result of this study was similar to those of VCT studies. In Bangkok and New York City, IDUs who knew that they were HIV-positive were much more likely to consistently use condoms with their regular sexual partners. A similar result was obtained in a European Union (EU) study of IDUs’ HIV risk behaviours in different European cities (Desenclos et al., 1993). Both the WHO and EU studies suggest that altruism—protecting a sexual partner from HIV infection—can be an important factor in reducing the sexual risk behaviour of IDUs.

A second round of the WHO study, including many new cities in resource-constrained countries, has been completed. Preliminary findings from this study indicate that IDUs in these additional sites are motivated to reduce their risk behaviour, but that the problem of unsafe sex with primary partners still persists (Des Jarlais, Perlis, & Poznyak, 2004).

The WHO study, the EU study, and the VCT studies all suggest that IDUs from both resource-rich and resource-constrained countries are capable of understanding the basic facts about HIV and AIDS, and of adopting behaviours to avoid becoming infected with or transmitting HIV. These findings show that IDUs develop “rational health beliefs” and “rational behavioural intentions” in response to learning about HIV and AIDS to protect both themselves and others from HIV infection. Despite dependence on psychoactive drugs, IDUs should be viewed as willing to change their behaviour to avoid infection with, and transmission of, HIV.

Generalisation to resource-constrained countries

The results of reviews of studies conducted in resource-rich and resource-constrained countries show that interventions to reduce both injecting and sexual risk behaviour could be effective for IDUs throughout the world. The data show that similar behaviour change processes are likely to operate among IDUs throughout the world.

There are, however, two important additional considerations: First, successful sexual risk reduction appears to operate through discussions about HIV and AIDS in IDUs’ peer groups and with IDUs’ sexual partners. These discussions lead to new peer norms that promote both safer injecting and safer sex. Such discussions are unlikely in social environments in which IDUs and people living with HIV/AIDS face discrimination. It is difficult to develop new social norms promoting safer injecting and safer sex if people cannot talk openly and honestly about these matters. Second, severe stigmatisation of HIV/AIDS or illicit drug use, as well as limitations on discussions of sex or safer sex as a result of feelings of guilt or shame may restrict access to and use of commodities for safer behaviours—condoms for safer sex, and sterile needles and syringes for safer injecting. Discrimination and stigmatisation may also restrict the willingness of IDUs to participate in VCT and reduce the willingness of HIV-positive IDUs to use sterile needles and syringes, and condoms.

Recommendations for global research efforts

The moderate average effect of interventions observed in studies that did not offer an intervention to the comparison groups and the non-significant effect observed in studies that offered interventions to all study groups suggest that there is more to be learnt about reducing the sexual risk behaviour of IDUs.

One possible line of investigation would be to consider IDUs as a heterogeneous group, with different prevention needs rather than to design single interventions that try to meet the needs of all IDUs. Developing interventions based on the HIV status of IDUs would be an example of additional refinement in HIV prevention intervention research. As most of the participants in the research studies and reviews were IDUs and few were crack cocaine users, it is important to develop interventions for different groups of drug users, including alcohol users, drug users who do not inject drugs but who use other illicit drugs and drug users who engage in same-sex risk behaviours.

Future research should also examine interventions for reducing sexual risk behaviour with multiple partners and with different types of sexual partners, including regular, casual and commercial ones. Research is also needed for reducing the risk behaviours associated with purchase or sale of sex for drugs. Additional research is needed to determine the effectiveness of different intervention components to reduce the sexual risk behaviour of IDUs and to develop more effective components and stronger interventions. Evaluation of large contrasts between interventions delivered to the intervention and comparison groups is needed. There is also a need to examine whether the theoretical methods on which interventions are based are effective in changing the psychosocial or sociological factors that facilitate behaviour change, and the reasons or causal processes for such change. Finally, additional research on changing the sexual risk behaviour...
of IDUs in different national or cultural settings is clearly needed.

Recommendations for global public health practice

Given: the current evidence of the moderate effects of interventions in reducing the sexual risk behaviour of IDUs; the fact that ‘some’ intervention to reduce the sexual risk behaviour of IDUs is more effective than providing no intervention; and that different combinations of intervention components, based on theoretical models, are associated with sexual risk reduction, it seems important to implement this research into practice. Despite incomplete research information, the potential for the rapid transmission of HIV among IDUs and from IDUs to sexual partners, who do not inject drugs, and then to a more generalised epidemic points to the importance of transferring research results into public health practice. The current gaps in the scientific data on reducing the sexual risk behaviours of IDUs should not be used as a rationale for failing to implement programmes to reduce IDUs’ sexual risk behaviour.

We therefore recommend an extension of current practice: that all interventions to reduce injecting risk behaviour among IDUs also contain components to reduce sexual risk behaviour. We believe that the following types of programmes should be implemented for all IDUs at risk of HIV infection.

First, we recommend the implementation of educational or informative programmes that support public discussion of reducing HIV transmission. Programmes that provide accurate information on how HIV is transmitted sexually and how safer sex techniques, including condoms use, can reduce the risk of transmission are extremely important, as it is very unlikely that sexual risk behaviour would change in the absence of information. While information only may not be sufficient to reduce sexual risk behaviour, accurate information is necessary for any effective risk reduction. Public discussion of sexual risk behaviour may also help develop peer norms supporting safer sex and may generate social support for reducing sexual risk. It may be particularly helpful if peer leaders or other persons who are respected by IDUs serve as role models for reducing sexual risk behaviour. Thus, social support, new social norms and role modeling can serve to initiate and reinforce the sexual risk reduction of IDUs. In addition, it should be recognised that many service providers may not have knowledge, skills or experience in sexual risk reduction, and may not be comfortable with such issues. As such, there should be adequate attention to training of outreach workers and staff of drug dependence treatment services to ensure that they can provide sexual risk reduction information and counseling as well as provide condoms.

Second, making condoms readily available, either free or at low cost, to IDUs is important in efforts to control the HIV epidemic. Making condoms publicly available, for example having condoms in open containers for IDUs to take, may also facilitate discussions of sexual practices and may help develop peer norms supporting safer sex. Furthermore, condoms should be offered routinely through a broad range of services for IDUs, such as outreach programmes, needle syringe programmes and drug dependence treatment services. While abstinence prevents HIV transmission, condoms are currently the most effective means of blocking the sexual transmission of HIV in sexually active IDUs.

Third, voluntary and confidential HIV counseling and testing activities are important for acquiring knowledge of one’s serostatus and in producing behaviour change. VCT is particularly appropriate in areas with moderate to high HIV seroprevalence in IDUs. However, the effectiveness of VCT may depend on a social climate that does not stigmatise HIV and injecting drug use, and in which there is some support for people living with HIV/AIDS.

Fourth, IDUs should have ready access to sexual health services, particularly services for the prevention and treatment of STIs. Special attention needs to be given to IDUs who sell sex or buy sex, and sex workers who inject drugs. Dedicated services for drug using sex workers may be required.

Fifth, retention of IDUs in drug dependence treatment services and ensuring access to HIV/AIDS treatment and care, particularly anti-retroviral therapy (ART), provide opportunities for sexual risk reduction advice and counselling as well as the provision of condoms.

Sixth, the inclusion of current or new intervention components remains important. This should be guided by theoretical models, causal mechanisms, empirical evidence, and cultural- or country-specific imperatives.

In conclusion, the currently available research evidence indicates that interventions to prevent sexual transmission of HIV among IDUs are effective. Although limited research on generalising research results from resource-rich countries to resource-constrained countries has been undertaken, it would be unethical from a public health perspective and in contravention of the human right to the highest attainable standard of health to deliberately withhold the knowledge from, support of, or means for, behaviour change by, IDUs at risk of HIV infection. The cost of adding intervention components to address the sexual transmission of HIV to programmes designed to prevent injecting-related HIV transmission is likely to be very low. Addressing the sexual transmission of HIV should become a standard part of programmes aimed at reducing injecting-related HIV transmission.

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Vancheri, S., Choppaisay, K., Des Jarlais, D. C., Plange-Rhyming, K., Sonchay, W., Carcello, M., et al. (1992). HIV testing and sexual behav-


Abstract

This review considers the effectiveness of drug dependence treatment in preventing HIV transmission among injecting drug users (IDUs). Substitution programmes using agonist pharmacotherapy (e.g. methadone and buprenorphine maintenance treatment) are available only for drug users who are primarily opioid dependent. There are over half a million people in receipt of methadone maintenance treatment (MMT) and it is estimated that this number will double in the coming decade. There is evidence that MMT is associated with a significant decrease in injecting drug use and sharing of injecting equipment. Data on sex-related risk behaviour change are limited, but suggest that MMT is associated with a lower incidence of multiple sex partners or exchanges of sex for drugs or money, but no change, or only small decreases, in unprotected sex. Studies of seroconversion, which is the toughest and most robust standard for assessing the role of MMT in HIV prevention, suggest that the reductions in risk behaviours do translate into actual reductions in cases of HIV infection. While the data on HIV risk behaviour are limited, there is strong evidence that substitution treatment with either methadone or buprenorphine suppresses illicit opioid use. There is also evidence that substitution treatment for HIV-positive IDUs is associated with better compliance with antiretroviral treatment and improved health outcomes. The only antagonist being used for opioid dependence relapse prevention treatment is naltrexone. There is currently insufficient evidence to draw firm conclusions as to its effectiveness. Behavioural interventions add to the effectiveness of substitution treatment, while the effectiveness of different types of psychological therapy alone has been found to be variable. There have been few comparative studies of abstinence-based treatment, however, available evidence indicates good outcomes for those who remain in treatment for three months or more. All countries with a population of IDUs should aim to develop a comprehensive range of treatments, including substitution treatment, as a critical component of HIV prevention.

Keywords: HIV; Prevention; Treatment; Methadone; Buprenorphine; Risk reduction; Injection drug use

Introduction

Injecting drug users (IDUs) are vulnerable to infection with HIV and other blood-borne viruses as a result of collective use of injecting equipment and drug solutions, as well as through sexual behaviour. Since sharing or use of contaminated injecting equipment and drug preparations is a very efficient mode of HIV transmission, HIV can spread rapidly among IDUs (Des Jarlais, Friedman, Woods, & Milliken, 1992; Stimson, 1995). Unprotected sex between HIV-positive IDUs and other people can result in further HIV transmission both inside and outside of the IDU population. A recent joint review by international organisations succinctly summarises the benefits of substitution treatment for policy-makers and professionals globally (Joint WHO/UNAIDS/UNODC, 2003).

Injecting drug use-related behaviour is a significant factor contributing to HIV transmission, even though IDUs...
constitute only a very small proportion of the population. Globally, between 5 and 10% of HIV infections result from the sharing of contaminated injecting equipment and drug preparations during injecting drug use, while rates of injecting drug use-related sexual transmission are unknown.

The aim of this review is to consider the effectiveness of drug dependence treatment in reducing HIV transmission among IDUs. The review considers all types of drugs that are commonly injected (e.g. heroin, cocaine, amphetamines and buprenorphine) and all forms of drug treatment (pharmacotherapy, abstinence-based and behavioural interventions either alone or in combination with pharmacotherapy). The evidence of the effectiveness of drug dependence treatment is summarised with particular emphasis on injecting and injecting-related risk reduction interventions.

**Review methodology**

The most direct means for assessing HIV transmission prevention would be to consider seroprevalence amongst IDUs in and out of treatment, and rates of seroconversion. However, such studies are few in number and are potentially confounded by factors such as differences in the background HIV prevalence in the community from which study participants are drawn, as well as additional factors such as access to drug treatment, preventive education and clean injecting equipment, all of which will influence exposure to HIV, thereby influencing seroconversion and seroconversion rates.

The potential impact of drug dependence treatment on HIV prevention is via: reduced injecting drug use; reduced sharing of injecting equipment and drug preparations; reduced HIV-related sexual risk behaviours; and opportunities for HIV education, counseling and medical care (Sorensen & Copeland, 2000).

This review places emphasis on the effect of treatment on risk behaviours associated with a high risk of HIV transmission, but gives some consideration to rates of seroconversion.

**Agonist pharmacotherapy programmes**

Agonist pharmacotherapy programmes entail the prescription of a drug with similar action to the drug(s) used by the drug user (an “agonist” in pharmacological terms) but with a lower degree of risk. Agonist pharmacotherapy programmes are available only for drug users who are primarily opioid dependent. Although some researchers and commentators have called for the development of agonist pharmacotherapies for cocaine and amphetamine users, and some small-scale programmes have been initiated, currently such approaches are not widely available (Shearer & Gowing, 2004).

Agonist pharmacotherapy programmes are of two general types: detoxification programmes, in which doses of the agonist will be reduced over a period of time until a drug-free state has been reached; and substitution or maintenance programmes in which higher doses of the agonist are provided for longer time periods (6 months or more).

The value of substitution treatment lies in the opportunity that it provides dependent drug users to reduce their exposure to risk behaviours and stabilise themselves in health and social terms before having to face the discomfort of drug withdrawal syndrome and adapting to a drug free state.

The agonist agent that has been most widely applied and researched for treatment of opioid dependence is methadone. Typically administered orally as syrup, a single dose of methadone in most (but not all) people will prevent withdrawal symptoms for 24 h. Hence, methadone decreases the frequency and intensity of the cycle of intoxication and withdrawal. In methadone maintenance treatment (MMT), doses of 60 mg/day or more have been identified as being most effective in terms of retention in treatment and reductions in illicit drug use and criminal behaviour (Ward, Mattick, & Hall, 1998). However, lower doses are typically used in detoxification regimens (Gowing, Ali, & White, 2000).

A drug that is increasingly being used as an alternative to methadone is buprenorphine. Buprenorphine is a partial opioid agonist but has enough morphine-like action to substitute for heroin, prevent withdrawal symptoms and reduce craving. Furthermore, with increased doses the degree of respiratory depression and other opioid effects reach a plateau, consequently buprenorphine has less overdose risk associated with it. The prolonged duration of action of buprenorphine, enables it to be administered less frequently (on alternate days). Buprenorphine is not well absorbed if taken orally and is usually administered sub-lingually. A combination product containing buprenorphine and naloxone (an opioid antagonist that is poorly absorbed when taken sublingually or orally, but precipitates an opioid withdrawal when injected) has been developed to provide additional safeguards against diversion and the use of buprenorphine by injection. This is expected to enable increased provision of substitution treatment for opioid dependence in primary health care settings, particularly in the United States (Johnson, Strain, & Amaas, 2003).

Gowing, Farrell, Bornemann, and Ali (2004) have recently completed a systematic review of studies in Europe and the United States relating the incidence of HIV risk behaviours or HIV infection to oral substitution treatment for opioid dependence. In total, 28 studies were included in this review. All involved MMT and, in the majority of the studies, treatment was provided through specialist drug dependence treatment programmes. It remains unclear to what extent the conclusions of the review will apply to other agonist pharmacotherapies, such as buprenorphine maintenance treatment (BMT), and to other settings, such as office-based treatment. To date these studies have been mainly conducted in Europe and the United States. There is now an urgent need to conduct similar studies in a variety of cultural and economic settings so as to ascertain whether the findings are replicable in all settings.

Gowing et al. (2004) found that substitution treatment is associated with a significant decrease in the proportion
of participants reporting injecting drug use, and in the frequency of injection. Due to the diversity of study designs and the means of assessing and reporting injecting drug use, the authors were unable to make a quantitative estimate of the extent of the decrease. Gowing and colleagues also concluded that substitution treatment is usually associated with a significant decrease in the sharing of injecting equipment, but were unable to determine whether this was due to a reduction in injecting drug use.

From studies included in the review, data on sex-related risk behaviours were limited but were suggestive of substitution treatment being associated with a lower incidence of multiple sex partners or exchanges of sex for drugs or money. At the same time the data suggested no change, or only small decreases, in unprotected sex among heterosexual regular partners.

Gowing et al. (2004) identified four studies that reported rates of HIV seroconversion related to substitution treatment. While differing in their methods of assessing and reporting data, all four studies indicated lower rates of seroconversion associated with substitution treatment. This suggests that the reductions in risk behaviours do translate into actual reductions in cases of HIV infection.

At present, it is not possible to compare methadone with other pharmacotherapies or with other treatment approaches in terms of capacity to reduce HIV risk behaviours. Most controlled trials making such comparisons rely on urine screening (drug use) and retention in treatment as primary outcome measures with HIV risk behaviours not considered in detail. However, if it is assumed that drug use is an indicator of the likelihood of risk behaviours, then this outcome provides some indication of the probable effect on HIV risk behaviours.

Methadone does not completely stop heroin use amongst clients but it does substantially reduce use. Kreek (2000) states that methadone with adequate doses of medication and access to counselling, medical and psychiatric care as needed, leads to voluntary, 1-year retention of 60–80% of people with reduction of daily illicit opioid use from 100% of persons entering treatment to less than 20% of persons within 1 year. From a review of research literature, Ward et al. (1998) found that methadone dose showed a positive linear dose–response relationship with retention in treatment and a negative linear relationship with heroin use.

Mattick, Breen, Kimber, and Davoli (2002), from a systematic review, concluded that methadone appeared statistically significantly more effective than non-pharmacological approaches in retaining patients in treatment (RR = 3.05, 95% CI: 1.75–5.35) and in the suppression of heroin use (RR = 0.32, 95% CI: 0.23–0.44). Data from observational studies also indicate that MMT produces better outcomes than detoxification alone or drug-free treatment in terms of heroin use, criminal behaviour and sexual risk behaviour (Hall, Ward, & Mattick, 1998). The Treatment Outcomes Prospective Study (TOPS) found that retention in treatment at three months was highest for MMT (65%) followed by therapeutic communities (44%) and outpatient drug-free treatment (40%). Both MMT and therapeutic community treatment were associated with reductions in drug use (Hall et al., 1998).

Johnson (1997) in a review of clinical trials of buprenorphine in the United States concluded that in terms of retention in treatment and proportion of opioid-positive urine samples, buprenorphine, at doses between four and 16 mg/day, is more efficacious than placebo and equivalent to methadone at doses between 20 and 60 mg. Mattick, Kimber, Breen, and Davoli (2003), in a systematic review, found no advantage for high dose (6–12 mg) buprenorphine over high dose (60–80 mg) methadone in retention (RR = 0.79, 95% CI: 0.62–1.01) and high dose buprenorphine was inferior in suppression of heroin use. Buprenorphine was found to be statistically superior to placebo medication in retention of patients in treatment at all dose levels, but only high and very high doses of buprenorphine suppressed heroin use significantly above placebo. Two other recent meta-analyses have also found relative equality of methadone and buprenorphine in terms of retention in treatment and suppression of heroin use (Barnett, Rodgers, & Bloch, 2001; West, O’Neal, & Graham, 2000).

Further research is required to tease out and clarify the differences in efficacy between methadone and buprenorphine. In addition to the effects on drug use and HIV risk behaviour, there is evidence that substitution treatment for HIV-positive IDUs is associated with better compliance with treatment and improved health outcomes (O’Connor, Selwyn, & Schottenfeld, 1994). Weber, Ledergerber, Opravil, Siegenthaler, and Luthy (1999) followed a cohort of 297 current and former IDUs, all of whom were HIV-positive but asymptomatic and had similar CD4 counts at entry to the study. During follow-up (median 16 months), 80 subjects adhered to a MMT programme, 124 continued injecting drug use and 93 remained free of illicit drugs. The authors found a significantly lower probability of HIV progression in both the methadone treated group (RR 0.48) and the former drug users (RR = 0.66) than in persistent IDUs (RR = 1.78).

Opioid substitution programmes also provide opportunities for expanded HIV prevention among IDUs and a platform for HIV treatment and care, including the implementation of directly observed antiretroviral therapy for opioid-dependent people living with HIV/AIDS as well as therapy for opportunistic infections such as tuberculosis (WHO, UNODC, UNAIDS, 2004). To date there is limited research on the impact of opioid agonist pharmacotherapy on HIV/AIDS treatment outcomes, including highly active anti-retroviral therapy (HAART) adherence. Anti-retroviral treatment compliance improves in the stabilisation phase of MMT. Avants and colleagues (2001) found that at entry into MMT, less than 80% of people reported adherence to their HAART treatment regimen, however, a significant increase in adherence occurred during the first 4-week MMT stabilisation phase.

Consideration needs to be given to interactions between opioid substitution drugs and HIV/AIDS treatment. Buprenorphine’s pharmacokinetic and pharmacodynamic
interactions with antiretroviral agents have been studied and, unlike methadone, which has an adverse interaction with zidovudine (McCance-Katz, 1998), buprenorphine does not increase zidovudine concentrations (McCance-Katz, Rainey, & Friedland, 1998). The reduction in naltrexone administration, although there were individual differences between participants in these studies, the percentage of opioid-positive urine tests during naltrexone treatment ranged between 2.7 and 10.3%.

Tucker and Ritter (2000) also note that the highest rates of post-treatment abstinence occurred in highly motivated participants. For example, Cornish et al. (1997) reported 8% opioid-positive urine samples in parolees and probationers after six months of naltrexone treatment, while Washton, Gold, & Pottash (1984) reported 100% of physicians and 64% of business executives were abstinent at 12 months after naltrexone treatment. This compares with rates of 31–53% at 12 months for “more usual” participants (Tucker & Ritter, 2000). Overall the studies support the finding that good social support is associated with improved treatment outcomes.

**Behavioural interventions in combination with pharmacotherapies**

Behavioural interventions may be delivered in the context of abstinence-based treatments or in conjunction with pharmacological approaches. The provision of psychosocial support and counselling to encourage behavioural and emotional change is important to the overall process of treating drug dependence. Psychosocial interventions support the process of lifestyle adjustment, provide approaches to reduce risk behaviour and develop skills to cope with factors that could trigger drug use or to prevent an occasional lapse becoming a full-blown relapse.

Psychological conditioning is considered to play a large role in the initiation and continuation of drug use and with the euphoric effects of drugs acting as a strong positive reinforcement for further use. Behavioural interventions seek to modify drug-related behaviour by extinguishing conditioning, or by providing strategies to avoid or manage drug-related cues that are part of conditioning.

Behavioural interventions are also important to address risk behaviours associated with drug dependence, including injecting practices and sexual behaviour. As such, behavioural interventions delivered in conjunction with drug treatment are important to the prevention of HIV transmission.

In their review of opioid dependence treatment, Matick, Ward, and Hall (1998) concluded that psychosocial therapy cannot be considered a stand-alone treatment for opioid dependence. Only 5–30% of long-term heroin users respond to abstinence-based treatment (Kreek, 2000). It should be noted that behavioural interventions are generally part of a broader approach (MMT or abstinence-based programmes) and as such they cannot be evaluated alone.

However, Matick and colleagues concluded there was reasonable evidence that psychosocial therapy adds to the overall effectiveness of MMT programmes. For example, McLellan, Arndt, Metzger, Woody, and O’Brien (1993) in a randomised controlled trial, compared minimum MMT (methadone with emergency counselling and referral only) with MMT plus basic counselling (regular counselling using contingency management) and enhanced MMT (regular counselling plus social work, family and employment counselling). They...
found that minimum MMT was associated with a higher rate of opiate-positive urine samples than the MMT with basic counselling group and that enhanced MMT further reduced the rate of positive samples.

Griffith, Rowan-Szal, Roark, and Simpson (2000) from a meta-analysis of controlled trials found that contingency management interventions (i.e. the use of incentives and disincentives) are effective in reducing positive urine samples in MMT (weighted mean effect size 0.25).

Abstinence-based or abstinence focused treatment

Abstinence-based or drug-free treatment approaches vary considerably in their setting (outpatient, residential and self-help group) and orientation (Swindle, Peterson, Paradise, & Moos, 1995). This is an important component of treatment that is often sought by those seeking help for drug dependence, and is often very much supported by families and governments. Overall the evidence based for drug free community-based treatment is limited.

The effectiveness of different types of psychological therapy for cocaine use has been found to be variable, possibly reflecting differences in treatment intensity (American Psychiatric Association, 1995) or quality (Cris-Christoph et al., 1999).

Cognitive-behavioural interventions have not generally been demonstrated to be superior to other psychotherapies in initiating abstinence; however, research suggests that its effects may be more durable and as such more protective against relapse. Furthermore, cognitive-behavioural approaches may be more effective with more severely dependent drug users (Carroll, 1998).

In relation to amphetamine users, Baker and Lee (2003) concluded from a review of the research literature that relapse prevention and other cognitive-behavioural approaches are the most effective treatments. They suggested motivational interviewing as a strategy to assist those ambivalent about treatment, and note that there is some evidence that contingency management is effective while clients are in treatment.

Residential rehabilitation is based on the principle that a structured drug-free residential setting provides an appropriate context to address the underlying causes of addictive behaviour. These programmes assist the client to develop appropriate skills and attitudes to make positive changes towards a drug-free lifestyle. Therapeutic communities represent a subset of residential rehabilitation defined by the emphasis placed on accepting personal responsibility for decisions and actions (Swindle et al., 1995) and the use of the community as a method to promote the health, welfare and growth of the individual (De Leon, 2000).

Self-help or mutual support groups are generally based on the principles of alcoholics anonymous (AA) or narcotics anonymous (NA), which espouse a disease concept of drug and alcohol dependency with the promise of recovery, but not cure, for adherents. The “12 steps” of AA/NA contain a strong spiritual component, which emphasises the importance of reconstructing relationships with other people, including confession, restitution and an injunction to help other “alcoholics” or “addicts”. One of the benefits of self-help or mutual support groups is that they provide a mechanism to promote alternative social networks that do not support drug use. It has been found that abstinence is more likely in individuals who have formed new social networks (Powell & Taylor, 1989).

There have been very few comparative studies of the outcomes of therapeutic community treatment with good control of bias and confounding factors, making it difficult to form an accurate view of the effectiveness of this approach relative to other treatment modalities. However, Gowing, Cooke, Biven, and Watts (2002), in a recent review, formed a view of the effectiveness of therapeutic communities by looking at the consistency of outcome for the multiple follow-up studies that are available.

It is generally agreed that three months or more in treatment is necessary for enduring behavioural change. The studies reviewed by Gowing and colleagues indicate that between 30 and 50% of those entering therapeutic communities remain in treatment at around the three month mark. Median or mean lengths of stay reported range from 54 to 100 days. Hence the majority of those entering therapeutic communities do not remain in treatment for the length of time considered necessary for enduring change.

Some strategies, such as preparatory interventions prior to entry, have the potential to improve retention rates, as do approaches such as providing additional services to meet individual needs. Perhaps, the strongest message about the importance of linking therapeutic communities to other treatment approaches does not suit all people, and individuals are likely to vary in their receptiveness to the approach at different stages of substance dependence and recovery. This emphasises the importance of considering the effectiveness of therapeutic community treatment with good control of bias and confounding factors, making it difficult to form an accurate view of the effectiveness of this approach.
lower rates of needle-cleaning. Avants, Warburton, Hawkins, and Petry (2000) found that on a lifetime measure of drug dependence, those with anti-social personality disorder reported higher rates of injecting drug use and frequency of equipment sharing, a higher number of equipment-sharing groups are associated with significant reductions in risk behaviour, but anecdotal information suggests that such groups are in transmitting information about HIV risk behaviour, but anecdotal information suggests that such groups are associated with significant reductions in risk behaviour.

**Factors influencing outcomes**

The underlying risks for HIV infection may differ in various subgroups of IDUs. For example, in a cohort of 91 male drug users (around half currently in treatment), Kelley and Perzy (2000) found that on a lifetime measure of drug risk behaviours, those with anti-social personality disorder reported higher rates of intravenous drug use and frequency of equipment sharing, a higher number of equipment-sharing partners and lower rates of needle-cleaning. On a measure of past-month risk behaviours, those with anti-social personality disorder reported higher rates of injecting drug use and lower rates of needle-cleaning. Avants, Warburton, Hawkins, and Margolin (2000) also note previous research with drug dependent populations reporting that concurrent psychiatric difficulties are related to risk taking behaviour.

In a cohort of MMT clients, benzodiazepine users were found more likely to have injected recently, used more amphetamine and cocaine, and used more drug classes in the month preceding interview. In addition, benzodiazepine users were significantly more likely to have recently both borrowed and lent used needles. The relationship between benzodiazepine use, higher rates of drug use and risk-taking was maintained even though benzodiazepine users had been in treatment longer and were on higher methadone doses (Darke, Swift, Hall, & Ross, 1993).

The effectiveness of agonist pharmacotherapy for opioid dependence in reducing the risk of HIV infection may also be reduced by concomitant injecting use of cocaine. For example, in a study of IDUs currently in MMT, Bus, Lamb, and Iguchi (1995) found that cocaine users were significantly more likely to report injecting a drug in the previous month than non-users (85% versus 23%) and reported a greater mean number of drug injections (22.5 versus 3.7) Camacho, Bartholomew, Joe, Cloud, and Simpson (1996) reported a gender and cocaine use effect for use of ‘dirty works’ at least once in the prior 30 days.

**Major observational studies of treatment outcomes**

Large-scale observational studies have had an important impact on our knowledge and understanding of treatment and the treatment process; since they have measured the impact of treatment in a range of real life settings across large geographical areas. While these studies do not enable us to calculate treatment effect sizes (that is to provide a numerical estimate of the size of the treatment impact) in comparison with no treatment, they do provide some idea of the likely impact and outcome of treatment. These studies also allow monitoring of changes in patterns of presentation and patterns of drug use in people presenting.

A series of large cohort studies in the United States have been conducted each decade for the past three decades: the Drug Abuse Research Program (DARP) in the 1970s, the Treatment Outcome Prospective Study (TOPS) in the 1980s and the Drug Abuse Treatment Outcome Study (DATOS) in the 1990s (Hubbard, Craddock, Flynn, Anderson, & Etheridge, 1997). There was also the National Treatment Outcome Research Study (NTORS) in the United Kingdom in the 1990s (Gossop et al., 1997). The Australian Treatment Outcome Study (ATOS) began in January 2001 (Darke et al., 2005).

In these studies, clients are assessed at intake, during and after treatment. These studies provide the data to: evaluate treatment systems where clients engage in multiple treatments of varying intensities and duration; show if the desired outcomes are achieved; and identify groups of clients who change most or least.

They can also show how outcomes vary with the amount or type of treatment received. However, as these studies do not control for many other factors (e.g. non-treatment
long terms.

The two most recent studies (DATOS in the United States and NTORS in the United Kingdom) reported on the impact of treatment on injecting and other HIV-related risk-taking behaviour, which showed significant reductions over time.

In the DATOS study, all modalities of treatment are reported to have significantly reduced injecting risk behaviour, while retention in treatment is demonstrated to be linked both to greater reductions in HIV risk behaviour and to lower baseline rates of HIV risk-taking behaviour. In the DATOS cohort, it is clear that the HIV-related injecting risk-taking behaviour profile of those entering MMT is significantly different from those entering residential and community-based drug-free treatment where there were higher rates of cocaine and crack users as well as non-users. This means that those entering MMT were more likely to be heroin injectors and to have a higher HIV risk-taking profile.

In the NTORS study, a subsection of the total cohort was followed for 5 years. The majority of the original cohort had used drugs by injecting prior to treatment. The rate of injecting fell from 60% at intake to 37% at 4–5 years follow up and the rate of self-reported sharing fell from 14 to 5%. These results apply to clients admitted to both community-based and residential MMT and residential treatment.

Cost-effectiveness of treatment

The data available on the benefits of investing in treatment indicate that all the treatments are significantly beneficial when compared to not delivering treatment. The impact of reducing HIV rates in Europe and Australia through substitution treatment has been demonstrated to be highly cost effective.

Research on cost-effectiveness indicates that in the NTORS study there was a three-fold saving in the social and health care costs for every single unit of spending, indicating an overall cost benefit deriving from treatment (Gossop, Marsden, & Stewart, 1998; Godfrey, Stewart, & Gossop, 2004). An early study in the United States returned a similar, if somewhat larger cost benefit finding, reporting a seven-fold saving for every single unit cost of expenditure when criminal justice and other costs were incorporated (Gerstein & Harwood, 1994).

There is also clear evidence that incarceration is related to 90% plus relapse rates and alternatives to incarceration are highly cost effective. A recent UNODC (2003) document makes a very strong case for the cost-effectiveness of investing in treatment. There is a strong international consensus that the costs of treatment are offset by reduction in costs to the public health and criminal justice system in the medium and long term.

Scope of drug dependence treatment

The global number of persons with opioid dependence receiving prescribed methadone is estimated to be over half a million and to be on the increase in practically all regions of the world. Originally implemented in Western Europe and the United States, MMT of opioid dependence is expanding eastwards to Central and Eastern Europe, to the Eastern Mediterranean Region and to South-East Asia.

Globally, MMT has become the most frequently used pharmacological approach for heroin dependence. It covers over 80% of the estimated treatment needs in some European countries; in other countries coverage is much lower. In the European Region, 76% of substitution treatment programmes use methadone (EMCDDA 2000). Programmes, albeit on a small scale, have also been established in such diverse countries as China, Indonesia, Iran, Kyrgyzstan, Nepal and Thailand. It is estimated that a million opioid dependent people will be in MMT within the next 5 years.

BMT is currently available in 29 countries: Australia, Austria, Belgium, China (Hong Kong), Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Indonesia, Israel, Italy, Lithuania, Luxembourg, Malaysia, Netherlands, Norway, Portugal, Singapore, Slovak Republic, Slovenia, South Africa, Sweden, Switzerland, Ukraine, United Kingdom, and United States. It is also reported that BMT is available in Iran (Ahmadi, 2003). In many of these countries BMT is not available nation-wide and regulations and treatment philosophies vary enormously between countries (The Coordinating and Information Resource Centre for International Travel by Patients Receiving Methadone and other Substitution Treatments for Opiate Addiction, 2004).

France has the least restrictive regulation of buprenorphine and has allowed all registered medical doctors to prescribe buprenorphine without special license or education since 1995 (Auriacombe, Fáticas, Dubernet, Daulouède, & Tignol, 2004). By 1998, 65,000 patients per year were in buprenorphine treatment and by 2001 this had increased to 74,000, while 9600 were treated with methadone (Auriacombe et al., 2004). In Australia, buprenorphine was registered for the treatment of opioid dependence in 2001, and as of 30 June 2004, there were 8641 patients registered as receiving BMT. While buprenorphine is registered in a number of other countries; the number of enrolled patient is not available.

Globally, there is great diversity in the range and coverage of other drug dependence treatment programmes being delivered. In most developing countries, few specialist services exist, particularly outside of major urban areas. Where drug dependence treatment services do exist they are often linked to psychiatry or other mental health services, with no, or very limited, links to HIV/AIDS or other infectious diseases services. In many developing and transitional countries drug users are primarily managed through ministry of
justice, social welfare and correctional services, with limited access to HIV and other health care services. Closed drug dependency treatment and detention centres, in themselves, often pose significant risks for HIV transmission.

Conclusions and recommendations

In many countries, there has been substantial success in containing HIV transmission among IDUs, particularly where there is an aim of providing a comprehensive and varied range of treatment services.

All countries with a population of IDUs should aim to develop a comprehensive range of treatments, including drug substitution maintenance treatment for opioid dependence. Policy-makers need to be clear that the development of drug substitution treatment is a critical component of an HIV prevention strategy among injecting opioid users.

In addition, studies of treatment in the United Kingdom and the United States indicate that there is a range of a three to seven fold benefit in relation to the unit of expenditure (Gerstein & Harwood, 1994; Gossop et al., 1998; Godfrey et al., 2004).

Opioid agonist pharmacotherapy remains controversial and many authorities are resistant to the use of such treatments. The major impediments to substitution treatment are: policy-makers are often doubt the effectiveness in their setting; policy-makers question the financial benefits; policy-makers fear the adverse consequences of diversion and increased drug use in the community.

This paper has demonstrated that there is evidence that MMT is associated with a significant decrease in injecting drug use and sharing of injecting equipment. Evidence on sex-related risk behaviour are limited, but suggest that MMT is associated with a lower incidence of multiple sex partners or exchanges of sex for drugs or money, but no change, or only small decreases, in unprotected sex. Studies of seroconversion, which is the toughest and most robust standard for assessing the role of methadone in HIV prevention, suggest that the reductions in risk behaviours do translate into actual reductions in cases of HIV infection. While the data on HIV risk behaviour are limited, there is strong evidence that substitution treatment with either methadone or buprenorphine suppresses illicit opioid use. There is also evidence that substitution treatment for HIV-positive IDUs is associated with better compliance with treatment and improved health outcomes.

Policy-makers need to be made aware of the high social, public health and budgetary costs as well as the increases in HIV infection rates and the number of deaths if such treatments are not put in place. Countries without such treatment are among those currently reporting major HIV outbreaks.

This situation is also likely to continue unless comprehensive community-based treatment and prevention approaches are rapidly developed and implemented.

References


