



osexually transmitted AIDS cases were in partners of IDUs, and in Italy a recent rapid increase in heterosexually transmitted cases has been attributed to partners of IDUs.<sup>9</sup>

One way to characterise the risky behaviour of IDUs is in terms of adherence to a hierarchy of behavioural goals, which have been accepted by many drug treatment agencies as appropriate for both seropositive and seronegative clients.<sup>10</sup> This hierarchy is often found in IDU pamphlets in informal language such as the following:

Preferably, don't use drugs

If you must use, don't inject.

If you must inject, don't share.

If you can't help sharing, clean your needles with bleach.

The behaviours in this hierarchy — injecting, sharing, failure to clean with bleach — as well as unsafe sexual behaviour and changes in behaviour since hearing about HIV/AIDS are the behaviours of most concern to those whose task it is to design interventions to reduce the transmission of the virus in this population.

The Australian National AIDS and Injecting Drug Use Study (ANAIUS) was designed to examine the risk behaviour of IDUs in relation to HIV infection, and to assess the seroprevalence in this group. In 1989 the study included five autonomous centres (Sydney, Canberra, Brisbane, Melbourne and Perth), studying a total of 2000 IDUs, with equal numbers of IDUs being drawn from treatment and non-treatment populations. In Perth the study is being undertaken at the National Centre for Research into the Prevention of Drug Abuse in collaboration with the Western Australian Alcohol and Drug Authority.

As of 30 September 1990, Western Australia had the fourth highest cumulative per capita incidence of cases of AIDS in Australia with 7.5 cases per million (New South Wales had 26.9, Victoria 11.6 and Australian Capital Territory 11.5 cases of AIDS per million).<sup>4</sup> Anecdotal information from local IDUs indicates that many believe there is a lower risk of becoming infected in Perth than there would be in Sydney or Melbourne. Detailing the risk behaviour of IDUs, then, becomes an important aspect of designing strategies to minimise or eliminate these risky behaviours.

## Methods

One hundred and ninety-six IDUs were interviewed in Perth in 1989, 54% of whom were recruited from within treatment centres, and 46% of whom were not currently in treatment. The treatment sample was representative of the drug treatment population in Perth as of May 1989 in terms of sex (65% male, 35% female) and type of treatment. Attempts were made to obtain the non-treatment sample from as wide a range of respondents as possible. Four main types of recruitment procedures were used: advertising, referrals of individuals by staff at various agencies, direct approach to individuals by interviewer, and snowballing. The comparability of samples recruited by different means is not known.

Respondents were all interviewed individually by the same trained interviewer. The questionnaire covered

demographics, drug use, needle sharing, needle cleaning, disposal of needles, the social context of injecting drug use, sexual behaviour, knowledge of and attitudes towards AIDS, and behaviour change. Questions were derived from preliminary interviews between IDUs and treatment workers, and were used in a pilot study of 100 IDUs in Sydney. No standard measures were used. Interviews took place at locations negotiated between respondents and interviewer, often local coffee shops. Some treatment respondents preferred to be interviewed at their clinic, and in these cases the independence of the study from the treatment process and the confidentiality provisions were emphasised.

At the conclusion of the interview respondents were invited to provide blood for HIV antibody testing. If they agreed, their little finger (usually) was pricked by Glucolet and lancet, the blood was absorbed on blotting paper, numbered, dried and sealed in a plastic bag for analysis. All interviews concluded with the provision of health information and referral when required.

The aims and processes of the study were explained to all subjects before the interview commenced. The need for anonymity made it inappropriate to ask subjects to sign consent forms, but completion of an interview was taken as tantamount to consent. During the interview, subjects were free to give whatever first name they chose and all interviews were fully confidential with no identifying information being collected. Respondents were paid \$20 for their participation. The study had received clearance from Curtin University's Human Research Ethics Committee.

The data were coded and punched for analysis at the Albion Street Clinic in Sydney which is the coordinating centre for the ANAIUS. All analysis was carried out with SPSS<sup>11</sup> using the Curtin University mainframe. Further details of the methodology and characteristics of the study sample are available in a separate report.<sup>11</sup> To date, data from 196 respondents are available but smaller numbers for some variables occur because of missing data.

## Laboratory analysis

The dried blood specimens were sent to the National HIV Reference Laboratory and eluted. Eluates initially reactive by the Genetic Systems enzyme immunoassay (LAV EIA) were assayed again in duplicate. Repeatedly reactive eluates were then tested by western blot. The western blot method routinely used by the National HIV Reference Laboratory was adapted to the Immunetics miniblotted system (MN45). Results of blood sample testing were not returned to individual respondents because appropriate counselling before and after testing could not be provided.

## Results

### Sample recruitment and demographics

There were 196 respondents, 65% of whom were male and 35% female. They were recruited as follows: advertising 19 (9.7%); referral, 103 (52.5%); direct approach, 38 (19.4%); and "snowballing", recruitment of friends and acquaintances by respondents, 36 (18.4%). The mean age of the sample was 27.9 years (SD, 6.3); 17% were aged between 16 and 20; 16% between 21 and 25; 28% between 26 and 30; 31% between 31 and 35; and 9% were older than 35 years. Sixty-one per cent had not completed secondary school; 18% had completed secondary school; 17% had attempted some tertiary study and 4% had completed tertiary study. Sixty-five per cent were receiving

pensions or sickness or unemployment benefits; 17% were in full-time employment; 13% were in part-time or casual employment and 5% were students. None of the respondents gave full-time domestic duties as their primary occupation. Sixty-three per cent of the sample had no children. Forty-two per cent had been in prison, 64% of these within the previous four years.

Demographic differences between those currently in treatment and not in treatment were assessed. Only age was found to be significantly different, with those under the age of 23 being disproportionately represented among those not in treatment.

### HIV seroprevalence

Seventeen (8.7%) respondents refused testing for HIV antibody. Of the remaining 179, four were found to be HIV antibody positive, a seroprevalence rate of 2.2% for this population. Each of the four respondents who proved to be antibody positive had been previously tested and three knew that they had been infected. A further two stated that they were positive but were found to be negative.

### Treatment

At the time of the interview, 72% of the sample were, or had previously been, receiving treatment for drug-related problems. Fifty-four per cent were currently receiving treatment, with 75% of these in methadone maintenance (53%) or withdrawal (22%) programs. The remainder were in detoxification programs (5%), outpatient treatment (4%), or receiving counselling, rehabilitation or were part of a therapeutic community (14%). Two per cent were obtaining help from Narcotics Anonymous. Of those who had previously been in treatment, 57% had most recently been in methadone programs, 16% had been in detoxification programs, 9% in rehabilitation, and the remainder in other treatment programs.

### Drug use

Respondents had injected drugs for an average of 8.4 years (median, 8.0; SD, 5.9). Males had "used" for an average of 9.1 years (SD, 5.9) and females for 7.2 years (SD, 5.6) and the duration of drug use ranged from an average of 1.8 years (SD, 1.8) for those under 23 years of age to an average of 13.9 years (SD, 5.5) for those over 34.

There were two measures of alcohol and other drug use — "ever" and within the "most recent typical using month," as interpreted by the respondent. Heroin, methadone, morphine, opium, pethidine, codeine, Palfium (dextromoramide), amphetamines, LSD, cocaine, barbiturates, benzodiazepines, alcohol, cannabis and nicotine had all been tried by more than 60% of the sample, Ecstasy (methylenedioxymethamphetamine) had been tried by 46.9%, crack (heroin and cocaine mixed) by 35.7% and crack (cocaine) by 6.1% of respondents. The

**TABLE 1: Use of drugs at least once in the "most recent typical using month"**

Drug	Drug injected		Drug inhaled/ingested	
	% Respondents	Mean frequency of use in month	% Respondents	Mean frequency of use in month
Heroin	71.4%	39.5	0.5%	2.0
Methadone	4.1%	21.0	25.5%	26.6
Morphine	3.1%	1.5	0.5%	8.0
Opium	2.5%	1.6	0	0
Pethidine	2.0%	22.5	0	0
Codeine	2.6%	43.2	9.3%	28.1
Palfium	9.2%	29.2	0.5%	28.0
Amphetamines	47.4%	17.7	4.6%	4.7
LSD	3.1%	2.5	4.6%	1.1
Ecstasy	6.1%	2.3	2.0%	8.0
Cocaine	2.6%	1.0	0	0
Crack†	0.5%	1.0	0	0
Barbiturates	1.0%	1.0	1.5%	335.0
Benzodiazepines	2.6%	16.4	30.6%	108.1
Alcohol	0	0	77.0%	24.2
Cannabis	0	0	82.7%	59.8
Nicotine	0	0	91.3%	113.7

\*196 respondents †Heroin and cocaine mixed

number of occasions of use in the "most recent typical using month", are shown in Table 1, which lists the drugs that were injected and inhaled or ingested ("smoked, snorted or swallowed") by respondents at least once in that month.

Table 1 shows that apart from alcohol, cannabis and nicotine, the only drugs that were used by significant numbers of respondents more than once in the typical month were heroin and amphetamines (by injection) and methadone and benzodiazepines (by mouth).

**Injecting and sharing needles**

In their "most recent typical using month", the mean estimated frequency of injection for 195 respondents was 43.6 (SD, 83.6) while the mean estimated number of new needles used was 33.7 (SD, 52.4). This may indicate that some sharing of needles occurred, or that respondents used needles more than once themselves. When directly questioned about this, respondents stated that on average each needle was used 3.9 (SD, 3.9) times before being discarded. However, these needles were usually used, on average, by only 1.3 (SD, 1.8) people (including themselves) before being discarded.

**Recency of sharing injecting equipment and injecting**

Questions about sharing were asked in a way that ensured respondents understood that sharing with a lover was to be included. Figure 1 shows the time that had elapsed since the last occasion of injecting or sharing for all respondents. It will be seen that while 70% had injected relatively recently (within weeks or days of the interview), 60% had not shared needles for years or months and a further 8% reported that they had never shared.

Respondents were asked to estimate the proportion of time during which they accepted used needles when they were last injecting; these data are shown in Figure 2. It is clear from

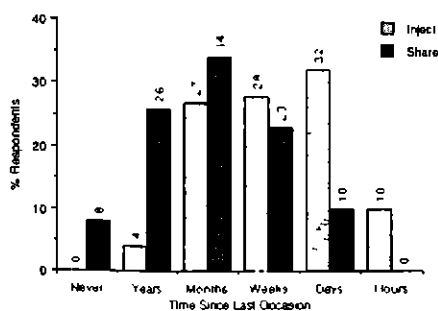


FIGURE 1: Time elapsed since respondents last injected and/or shared needles. (n=196)

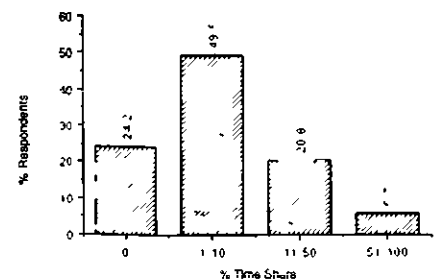


FIGURE 2: Distribution of proportion of time when used needles were accepted when respondents were last injecting (n=194)

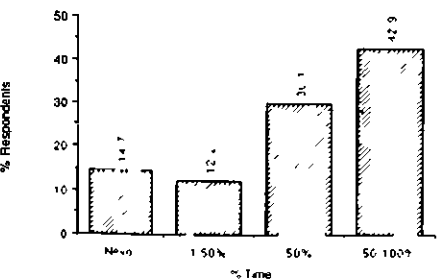


FIGURE 3: Distribution of the proportion of time that respondents reported using the needle first when sharing (n=156)

this Figure that the majority of respondents shared needles only up to 10% of the time. Respondents were also asked how frequently

they used the needle first when they shared; these data are shown in Figure 3. This Figure shows that a substantial majority claimed to use the needle first half or more than half of the time when they were sharing. Respondents had accepted used needles and syringes during the previous six months from an average of 1.5 people (SD, 2.9).

Respondents who shared were asked from whom they would accept a used needle and syringe; 28% said from lovers; 24% from close friends; 3% from regular sexual partners; and 4% from anyone. Thirty-five per cent of the responses were unclassified, but the largest single group of these related to such responses as "people I knew didn't have AIDS".

Table 2 shows the reasons given for sharing needles. Respondents were most likely to share if they were "hanging out" (withdrawing from a drug), or were with close friends or lovers and/or found new equipment difficult to acquire.

**TABLE 2: Reasons for sharing needles**

Reason	% Respondents
I find it difficult to get hold of new ones	11.3%
When I'm hanging out, the dangers don't seem so important	48.1%
When I'm really hanging out for a taste I don't care if I share or not	34.0%
Sharing needles is something that you do with your friends and/or lovers	28.8%
I know that it's not safe to share but when I'm stoned or drunk or high I don't care so much	25.6%
I realise that it's dangerous but sometimes I just don't care	25.0%
It's easier to just use someone else's	23.7%
I don't keep clean needles and syringes around because the cops harass you if they find them	21.2%
I only use occasionally so when I get the opportunity I don't have new needles and syringes on me	16.7%
I accepted a used needle and syringe the first time I used	15.4%
I'm trying to give up but sometimes I bust	9.0%
Because I can't use a needle and syringe by myself I get someone else to do it for me and this means I usually end up sharing the equipment	4.5%
I don't think it's all that dangerous	2.6%

\*194 respondents, includes multiple responses

**TABLE 3: Reliance on different methods of cleaning**

Method	No. of respondents
Cold and hot water	39 (20%)
No cleaning	35 (18%)
Bleach only	35 (18%)
Hot water only	31 (16%)
Bleach and hot water	21 (11%)
Cold water, hot water and bleach	21 (11%)
Cold water only	6 (3%)
Bleach and cold water	5 (2%)
Boiling only	2 (1%)
Total	195 (100%)

### Cleaning of injecting equipment

Eighty-nine percent of the sample claimed to clean used needles before use — 88% of these said they did so 99%–100% of the time. Table 3 shows the respondents' answers when questioned about cleaning methods used recently. Eighteen per cent reported not using any of those suggested, possibly because they had not shared recently. Almost all possible cleaning methods (hot water, cold water, bleach, boiling) has been used in the most recent typical using month, but only two respondents had boiled needles.

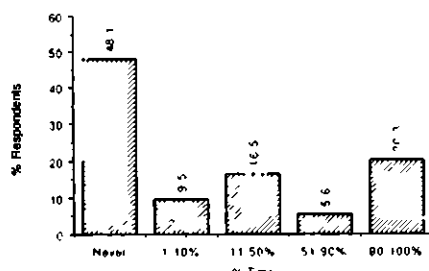


FIGURE 4: Distribution of the proportion of time that respondents reported using bleach when cleaning used needles ( $n = 196$ ).

The extent to which respondents used bleach as a cleaning agent is shown in Figure 4. Almost half of the group had not used bleach at all, and fewer than 10% used bleach at all consistently. Most of those who cleaned with bleach used a reasonable approximation to the recommended  $2 \times 2 \times 2$  method.\*

TABLE 4: Sex of currently preferred sexual partners

Preferred partners	% Men ( $n = 128$ )	% Women ( $n = 65$ )
Only women	93.0%	6.2%
Mostly women	1.6%	0
Mostly men	0	13.8%
Only men	4.7%	73.8%
No current partner	0.8%	6.2%

### Sexual behaviour

The sexes of the respondents' current sexual partners are shown in Table 4. Male respondents had had an average of 4.6 sexual partners (median 2.0; SD, 6.0) during the previous 12 months. Female respondents had had an average of 13.5 sexual partners (median, 2.0; SD, 29.0), with six women stating they had had in excess of 98 partners. Nine men (7.1%) and five women (8.1%) said they had been paid for sex. This was a regular income for all of these women but none of these men. Four of the six women with more than 98 partners were regular sex workers.

Respondents were asked to state whether they had ever engaged in a number of specified

\*The  $2 \times 2 \times 2$  method refers to flushing the needle twice with cold water, twice with bleach and a further twice with cold water.

sexual practices during the previous six months. They were deemed to have been involved in unsafe sexual practices if they had ever engaged in any of the following: vaginal intercourse without condoms; vaginal intercourse with withdrawal without condoms; insertive anal sex without condoms; receptive anal sex without condoms; insertive anal sex with withdrawal without condoms; receptive anal sex with withdrawal without condoms; oral sex to the anus. Using this measure, 92.3% of the full sample (93.8% of men and 89.6% of women) had engaged in some unsafe sexual behaviour, most commonly vaginal intercourse without condoms, during the previous six months.

### HIV testing

Seventy-eight per cent of respondents had had at least one HIV antibody test. Of these, 75% had had between 1 and 5 tests, with the majority of these people having been tested twice.

TABLE 5: Lasting changes in drug using behaviour since hearing about AIDS

Behaviour change	% Respondents*
Reduced amount of sharing	49.4
Reduced number of sharing partners	4.3
Stopped sharing	27.8
More discerning in sharing partner selection	17.5
Started cleaning with bleach	15.1%
Started always cleaning with bleach	10.5%
Reduced intake of drugs	5.6%
Increased cleaning with bleach	2.4%
Stopped taking drugs	0.8%
Stopped injecting drugs	0.8
Changed route of administration	0.8

\*1-3 respondents, includes multiple responses

### Behaviour change

Respondents were asked if they had changed their drug using or sexual behaviour since hearing about AIDS, and then to give details of these changes. One hundred and twenty-three respondents (64%) said they had changed their drug using behaviour since hearing about AIDS. Those changes that were said to have lasted are detailed in Table 5. This Table demonstrates that the most common changes in risk behaviour were those that reduced, but did not eliminate, risk.

Seventy-four respondents (38%) said they had changed their sexual behaviour since hearing about AIDS as shown in Table 6. This Table indicates that, as with changes in drug taking behaviour, changes in sexual behaviour were generally related to risk reduction rather than risk elimination.

### Discussion

Before discussing the result of this study, some qualifications should be placed on the data. It should be recalled that subjects were self-selected, and indeed the payment of \$20 for

participation may have encouraged those who were most in need of money — and perhaps most in trouble with drugs — to respond. Moreover half of the sample were drawn from treatment clinics with 80% of these from a methadone clinic and it is not known whether the non-treatment sample was representative of the full IDU population since the characteristics of this population in Perth (or any other city) are not known. The sample, then, cannot claim to be representative of the Perth IDU population. The use of a number of different recruitment strategies, however, has resulted in a sample with considerable demographic variation. Compared with similar studies both Australian and overseas, where the proportion of men to women is generally 3:1,<sup>13,15</sup> our study has a greater proportion of women in its sample. The mean age and range is similar to that found in Sydney<sup>14</sup> although somewhat older than that found in the UK.<sup>13,15</sup> The sample is also relatively small, although it should be recalled that it is part of a national sample of over 2000 IDUs.<sup>14</sup> Nevertheless, useful studies similar to this one have been performed with samples as small as 50<sup>13</sup> and 100.<sup>14</sup>

The reliability and validity of self-reporting by illicit drug users has been a matter of considerable interest in overseas research. There is a growing consensus across studies demonstrating that researchers can obtain valid self-reported data from IDUs, providing the respondents are able to understand the interview or questionnaire, that the interviewers are not perceived as people who can have an effect on drug treatment or legal proceedings, and that researchers are able to convince respondents that their privacy will be protected and the confidentiality of the information they provide will be maintained.<sup>17</sup> These conditions were met through the use of structured interviews rather than self-completion, the independence of the research team from treatment or law enforcement agencies, and the anonymity of the respondents.

Further investigation of cases found in this centre and in other study centres of respondents falsely reporting themselves as antibody positive is proceeding. In terms of the method used to assess the seroprevalence of the population, it should be noted that at least two studies have

TABLE 6: Lasting changes in sexual behaviour since hearing about AIDS

Sexual practice	% Respondents*
Increased use of condoms	30.3
Increased discernment in partner selection	28.9
Reduced number of sexual partners	25.0
Started using condoms	13.2
Started always using condoms	10.5
Changed to other safer sexual practices	9.2
Stopped having sex	3.9
Reduced amount of sex	2.6
Other	6.6

\*74 respondents, includes multiple responses

shown antibody testing for HIV by paper-absorbed fingerstick blood specimens to be equivalent to the serum antibody assay of venepuncture specimens, as well as being more convenient for surveys.<sup>18,19</sup> The fact that half of our sample were undergoing treatment, mainly in the methadone program, which is more readily available to antibody positive clients than to other clients, suggests that our assessment of 2.2% HIV seroprevalence may be higher than it would be for IDUs in Perth generally, although because of the refusal rate (8.7%) our figure may be an underestimate. Future years of the study should indicate the development of infection within this population if similar sampling strategies are used.

The results can be summarised in terms of the stages of the risk hierarchy presented above. These stages are:

*Preferably, don't use drugs. If you must use, don't inject.* Since respondents were selected for inclusion into the study because they were, or had recently been, IDUs, they were unlikely to have stopped using drugs as a risk reduction strategy. When respondents were asked what changes to their drug using behaviour they had made since hearing about AIDS, less than one per cent said they had stopped using drugs, and a similar number said they had stopped injecting drugs and/or changed their route of administration. The majority of the sample (70%) were recent injectors, despite the fact that 54% were currently in treatment.

There are two main illicit drugs which are injected in Perth — heroin and amphetamines. Earlier work demonstrated that drug of choice was age-related: very largely, younger IDUs preferred amphetamines, and older IDUs preferred heroin.<sup>12</sup>

*If you must inject, don't share.* It is encouraging to find that only a third of the sample had shared recently (less than a month before the interview) but less encouraging that 77% had shared during the year before the interview; well within the time during which the HIV threat had been known. The apparent discrepancy between Figure 1, which shows that 8% of respondents stated that they had never shared needles, and Figure 2 which shows that 24.2% stated they had accepted used needles 0% of the time when injecting, is explained by the different time frames of the question — whether they had ever shared needles and whether they had shared "within the most recent typical using month", respectively, demonstrating a reduction in sharing behaviour during the most recent period. Few of the sample, moreover, were in the habit of sharing with large numbers of other IDUs — individual needles were used, on average, by only 1 to 1.6 people in the previous month, and respondents had accepted used needles from an average of 1.1 to 1.9 other users during the previous six months. The average number of needles obtained and the average number of injections suggest that the majority of respondents used their own needles more than once before discarding them, and that little

regular and consistent sharing occurred.

Just under half of the sample claimed to use the needle first more than half of the time when sharing, suggesting that they may have used this as a personal risk reduction strategy. This behaviour clearly reduces the specific risk for the individual IDU, but can hardly be recommended for the population, particularly when, as seems likely, seroprevalence begins to rise,<sup>20</sup> or if IDUs do not know their serostatus. The fact that a majority of the sample had been HIV tested is no cause for complacency — seronegativity is not a static state, although respondents may have believed it to be.

The reasons given for sharing suggest that lovers and close friends are seen as "safe" by many IDUs, and that not having a clean needle at moments of desperation or urgency, particularly if with intimates, is the commonest reason for sharing.

*If you can't help sharing, clean your needles with bleach.* While a majority of the sample claimed to clean needles before re-use after another person almost every time (rinsing, at the very least, is vital to remove blood so that the needle can be re-used), clearly there was less attention paid to the specifics of cleaning. Cleaning with hot water, cold water and bleach were the most common methods used, and more than half of those who had cleaned recently used bleach at least some of the time. However, only a fifth of those who cleaned used bleach 90%–100% of the time, which means that the other 80% of those cleaning needles were doing so much of the time in ways which would not kill HIV. Since the cleaning questions were only asked of those who shared needles this is clearly an issue of some concern.

#### **Behaviour change**

The majority of respondents (64%) reported that they had changed some aspect of their drug using behaviour since hearing about AIDS, the most common changes being to reduce the frequency of sharing needles and/or the number of sharing partners. However, far fewer respondents had stopped sharing altogether, and the extent of reduction in sharing and number of partners was not specified. Being more discerning about partner selection was a relatively popular strategy, but more qualitative research is needed to ascertain precisely what this means to individual IDUs. Some respondents had started cleaning with bleach, but fewer had started always cleaning with bleach. Generally, then, the changes that were made may have been in the right direction, but they may have been insufficient.

In terms of sexual behaviour, the women's higher number of sexual partners appears to have been influenced largely by a small number of women who were sex workers and had had a large number of partners. It has been common to find that there have been more changes in the drug using behaviour of IDUs than in sexual behaviour,<sup>8,9</sup> and the present study does not

contradict this finding. In general terms, our respondents, who were largely heterosexual, had multiple sexual partners and engaged in some unsafe sexual practices. Moreover, far fewer respondents reported changing their sexual behaviour since hearing about AIDS than reported changes in drug use, and, again, the changes were only in the right direction rather than being sufficient. Similarly, respondents reported relying on discernment in partner selection, but we have no details about how these judgements were made.

Our findings are similar to those of other studies. In early data from the United States it was reported that 60% of drug users in treatment had changed their drug using behaviour in response to the threat of AIDS — this was generally by reducing the frequency of sharing, the number of sharing partners, or by increasing the cleaning of equipment.<sup>21</sup> In the United Kingdom, only 8% of a sample in Glasgow who were buying sterile injecting equipment at a pharmacy expressed any willingness to switch from injecting drugs to a safer route of administration because of the fear of AIDS. Although many were concerned about the risk of HIV/AIDS, most were not concerned about the possibility of sexual transmission of the virus.<sup>8</sup>

Wodak points out that although there are consistent local and international reports of reductions in unsafe injecting, and to a lesser extent sexual practices, the baseline levels of these behaviours are very high, and relapse to HIV-related risk behaviour is increasingly recognised as a problem. In Australia there are increasing levels of HIV infection among IDUs, particularly among male homosexual IDUs, and Wodak counsels against complacency.<sup>22</sup>

#### **Implications for further education, and health promotion with IDUs**

These data indicate that there are some specific elements of health education with IDUs that will need reinforcement if transmission of the virus is to be prevented. While the behaviour of IDUs in Perth, like those in Edinburgh,<sup>8</sup> and San Francisco,<sup>9</sup> demonstrates that they know that sharing unclean needles and engaging in unsafe sex are potentially dangerous, some aspects of their behaviour give cause for alarm. In the first place, IDUs need to be educated not only not to accept used needles from other IDUs, but also not to pass them on, even if they believe that they are personally uninfected. Maintaining the current low level of seropositivity in this population may, among other things, only be possible if every IDU is meticulous about his or her needles.

In the second place, IDUs clearly share needles when they are in situations where there are drugs, but a clean needle is not available. They appear to be particularly prone to do so if the sharing partner is a friend, spouse or lover. The only way to prevent these situations from arising is to encourage IDUs to plan ahead, to buy needles in bulk and store them or perhaps, as has been suggested, to encourage dealers

to supply needles at the point of sale.<sup>23</sup> More attention will need to be paid to legislative reform and changes in law enforcement practices, however, since some research has shown that IDUs will not plan ahead in this way for fear that the possession of injecting equipment will identify them as IDUs to the police, who may then harass them.<sup>24</sup>

Clearly, more attention must be paid to education about cleaning. Anecdotal information about cleaning suggests that IDUs have always rinsed needles before a second injection to remove blood clots, but that they are less concerned to clean their needles as a means of killing HIV. IDUs must be encouraged to believe that only correct cleaning with bleach or a similar agent is good enough.

Finally, IDUs and those who work with them must not become complacent about the behaviour changes that have taken place. Although it is encouraging to see these changes, continuing health promotion and education campaigns containing detailed advice and information are still needed. And, as always, more research is needed, although detailed qualitative studies about such issues as how IDUs make decisions about when to share unclean needles and have unprotected sex may be of more value now than further large surveys such as the one reported here.

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# Infection with *Nocardia* species in Queensland

## A review of 102 clinical isolates\*

Paul R Georghiou and Zeta M Blacklock

**Objective:** To review the species distribution, pathologic significance and disease associations of clinical isolates of *Nocardia* and related bacteria in Queensland, and to examine the characteristics, treatment and outcome of patients infected with these organisms.

**Design and setting:** A retrospective review of Queensland State Health Laboratory records provided microbiological data for *Nocardia* isolates referred from other laboratories during the period January 1983 to December 1988. Clinical information was extracted from hospital case notes, or obtained from detailed questionnaires

completed by attending physicians. *Nocardia* isolates were classified as "significant" if specific treatment for nocardiosis was given, or on the basis of autopsy findings.

**Patients:** One hundred and two patients had a *Nocardia* species or a related organism isolated from clinical specimens during the study period.

**Results:** The 102 isolates included *Nocardia asteroides* (45), *N. brasiliensis* (35), *N. caviae* (5) and *N. transvalensis* (5). Clinical results were available for 93 patients, of whom 74 (80%) had a significant isolate recovered. Primary pulmonary or disseminated disease occurred in 35 patients, and was caused

mainly by *N. asteroides*. Significant infections of skin and soft tissues, primarily due to *N. brasiliensis*, were found in 39 patients. Pre-existing lung disease and treatment with steroids and immunosuppression were risk factors for pulmonary and disseminated nocardiosis. A history of inoculation in an outdoor setting was frequent in patients with cutaneous disease. Antibiotic regimens that included trimethoprim-sulfamethoxazole or another sulfonamide agent were used to treat the majority of patients with significant infection. Deaths were confined to those with pulmonary and disseminated disease, with a case fatality rate of 40% in that group.

**Conclusion:** Infection with *Nocardia* species appears to be more common than is generally appreciated. The local species distribution and disease spectrum are similar to those described elsewhere. A high index of suspicion for nocardiosis should be maintained in susceptible hosts with pulmonary infiltrates, particularly when there is evidence

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