TRANSITIONS BETWEEN ROUTES OF ADMINISTRATION AND CORRELATES OF INJECTING AMONGST REGULAR AMPHETAMINE USERS IN SYDNEY

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1.0 INTRODUCTION

Injecting drug use was identified as a risk factor in 9.5% of new diagnoses of HIV infection reported during 1992 in Australia[1], with the seroprevalence among injecting drug users (IDU) estimated to be between 3-5%[2,3].

With the advent of the HIV pandemic, the emphasis of treatment interventions aimed at drug users has shifted from drug use *per se* to the methods used to administer the drugs[4]. The shift has thus been from the promotion of abstinence as the only goal of intervention and treatment to the promotion of safer use within a harm reduction model. This approach advocates that if a person continues to inject, clean needles should be used every time. Other routes of administration are considered preferable to injecting, as they do not involve the risks of parenteral transmission of HIV and other blood borne diseases (e.g. hepatitis B and C). Transitions to and from injecting have major implications for the spread of these diseases by means of needle sharing[4].

As a result of this change of emphasis, recent research interest has focused on reasons for the choice of routes of administration employed by drug users[4-11]. The primary focus of these studies has been on routes of administration for heroin use, with the intention of distinguishing those who inject from those who employ other routes of administration such as chasing and sniffing. The questions posed have included: is injecting the route of administration which all persistent users will employ later in their drug career, or do these two groups represent distinct sub-populations? What are the determinants of change from non-injecting to injecting routes of administration?

Such questions have been most often asked in Britain where large proportions of heroin users in some regions do not inject. For example, 48% of treatment admissions in one recent London study were "chasers" i.e. users who inhale the vapours of heroin heated on foil[7]. The early evidence from these studies appears to indicate that not all heroin users will progress to injecting, and that users may vary in their route of administration over time[7]. Transitions between routes of administration were common, with 45% of subjects having changed to injecting, and 34% having changed from injecting to chasing or snorting heroin. A trend towards routes of administration other than injecting has also been recently reported in the United States[5,11]. Of particular relevance are the findings that those who primarily use heroin by routes other than injecting have significantly less current and lifetime HIV needle risk behaviour[7].

In Australia heroin is a drug which is almost exclusively injected[12]. This may be attributable to the prohibitively high cost of the drug in Australia in comparison to countries such as the Netherlands and the U.K.[8], and to the fact that the heroin powder available in Australia is not as amenable to smoking as the brown heroin in Europe, which comes primarily from the Golden Crescent[4].

In Australia the major illicit drug class that displays the variety of administration routes seen in heroin in Britain and Europe is the amphetamines[13,14], the use of which has increased in recent years. The NCADA National Household Survey found that there was an increase in amphetamine use between 1988 and 1991[15]. Amphetamines are particularly popular with younger drug users, with nearly a fifth (17%) of 14-24 year old males reporting having used amphetamines[15]. Experimentation with injection of amphetamines is common. Over half (55%) of a sample of Sydney amphetamine users usually injected the drug[14]. Among those who inject, high levels of needle risk behaviour have been reported. One-third of the injectors within the Hando & Hall[16] sample of Australian amphetamine users reported that they had recently shared a needle.

Amphetamine users are a group of drug users who until recently have received little attention from HIV researchers[17]. Most studies of injection practices among illicit drug users have focused on opioid users. From the standpoint of HIV transmission among drug users, a sound knowledge of the prevalence and determinants of different administration routes among amphetamine users appears essential. Such data would enable interventions to be designed which directly address the primary determinants of the choice of injecting as a route of administration. In terms of harm reduction, if large numbers of people are continuing to use amphetamines, the smaller the proportion of injecting users, the lower the prevalence of risky injecting behaviour and parenteral HIV transmission is likely to be.

The current study aimed to ascertain the factors which predict transitions in routes of administration among amphetamine users. If the factors predicting the change of route of administration can be identified, then the route of choice may be amenable to change. Preliminary work in New York has indicated that heroin users can be persuaded to change to a less risky form of administration[5]. A knowledge of what sustains various routes of administration among Australian amphetamine users may enable the design and application of similar interventions to this population.

1.1 *Study Aims*

The major aim of the current study was to examine the prevalence of transitions between routes of administration of regular amphetamine users, and the reasons given for such transitions. Specifically, there were five subsidiary aims:

1) To examine the prevalence of different routes of administration among regular (i.e. at least monthly) amphetamine users;

2) To determine the extent of transitions between different routes of administration among regular amphetamine users;

3) To examine the reasons given by regular amphetamine users for their preference for particular routes of administration, and for transitions between different routes of administration;

4) To examine correlates of risk-taking behaviour, such as physical and psychological health, needle sharing, injecting practices, sexual behaviours and criminal behaviour among regular amphetamine injectors;

5) To examine relationships between frequency of amphetamine use, route of administration and various problems associated with drug use, such as dependence, psychological symptoms and treatment seeking.

2.0 METHOD

2.1 *Procedure*

Structured face to face interviews were conducted with 301 regular amphetamine users. All subjects were volunteers who were paid A$20 for their participation in the study. Recruitment took place from February to September of 1993, by means of advertisements placed in rock magazines, local newspapers, needle exchanges, local coffee shops, by word of mouth and announcements over a radio station. Only 5% of subjects were referred to the study through treatment centres.

Subjects contacted the researchers, usually by telephone, and were screened for suitability to the study. To be eligible subjects must have used amphetamines at least monthly for the preceding 6 months and live in the Sydney region. Each interview was conducted in a location determined by the subject in an attempt to allay any hesitations they might have about participating in the study. Consequently, interview sites ranged from pubs, coffee shops, parks, shopping centres, to peoples' homes and the researchers' workplace (National Drug & Alcohol Research Centre). Subjects were guaranteed, both at the time of screening and interview, that any information they provided would be kept strictly confidential and anonymous. All interviews were conducted by one of the research team and took between 45 and 60 minutes.

A transition was defined as a change in the usual route of administration lasting 4 or more occasions of amphetamine use. The criterion for the British study cited above was a change lasting a month or longer[7]. Given the more sporadic use of amphetamines in comparison with heroin[14], this definition was considered inappropriate for amphetamine use, so four consecutive occasions of use was adopted as a criterion rather than four weeks.

2.2 *Structured Interview*

A structured interview was devised that examined demographics, drug use history, amphetamine use history (including the circumstances and reasons for transitions between routes of administration), social context of amphetamine use and psychiatric symptoms. Current drug use, HIV risk-taking behaviour, social functioning, criminal behaviour, health and psychological functioning were measured using the Opiate Treatment Index (OTI)[18] and the General Health Questionnaire[19]. Amphetamine dependence was measured by the Severity of Dependence Scale (SDS)[20].

The questionnaire was pilot tested on 20 regular amphetamine users during November 1992, and refinements were made on the basis of this. The areas covered by the interview are outlined in greater detail below (a copy of the questionnaire is available on request from the authors).

2.2.1 Demographic characteristics

The demographic details obtained included: the source of recruitment, the subject's gender, age, suburb of residence, level of high school and tertiary education, employment status, current form of drug treatment and prison record.

2.2.2 Drug use history

In order to gain some indication of overall drug use, subjects were asked which drug classes they had ever used, which ones had they ever injected, and which ones had they injected in the last 6 months. An estimation of how many days they had used each of the drug classes during the 6 months preceding interview was also sought. Further questions were asked about their main drug of choice, how old they were when they first injected any drug (if appropriate), and what the first drug was that they injected.

2.2.3 Amphetamine use history

Information collected regarding subjects' use of amphetamines included: the age at which they had first used the drug, route of administration on the first occasion of use, the age at which they commenced regular use of amphetamines (that is, using the drug once a month or more) and the age at which they had first injected amphetamines.

Subjects were also asked to indicate their usual method of amphetamine administration. If one route of administration had been used exclusively, subjects were asked to give their two main reasons for doing so.

Subjects who reported having used both parenteral and non-parenteral routes of administration were asked whether they had ever made a transition away from snorting or swallowing to injecting. Those subjects who had experienced such a transition were questioned about the last time the change occurred. Data collected included: the number of times such a transition had taken place, how old they were when it last occurred, how long ago this was, how the transition had affected the quantity of amphetamines and other drugs that they were using; how it had affected the route by which they administered other drugs; the route of amphetamine administration used by their friends and people that they were living with at the time. The two main reasons for making the transition were also recorded. The same information was collected about transitions away from injecting.

In cases where amphetamines had mainly been snorted or swallowed and only occasionally injected, subjects were asked how often they had used the parenteral route since beginning to snort or swallow, why they had used it the last few times and what their reasons were for not continuing to use that route. Subjects who had mainly

injected amphetamines were asked similar questions about their occasional non-parenteral use.

2.2.4 Social context of amphetamine use

Details obtained regarding the subject's social network consisted of: how their regular partner used amphetamines; how many of their friends used the drug; what proportion of their amphetamine using friends were injectors; how much of their free time subjects spent with amphetamine users; how often they used amphetamines by themselves and where they had used the drug in the preceding 6 months.

2.2.5 Current drug use

Estimates of the frequency of drug use in the month preceding interview were obtained using the drug use section of the OTI. Estimates were obtained for the following drug classes: heroin, other opiates, alcohol, cannabis, amphetamines, cocaine, benzodiazepines, barbiturates, hallucinogens, inhalants and tobacco.

2.2.6 HIV risk-taking behaviour

The HIV Risk-taking Behaviour Scale (HRBS), a component of the OTI, was used in assessing injecting and sexual behaviours that placed subjects at risk of either contracting or spreading the Human Immunodeficiency Virus (HIV). Additional questions asked included: who had used a needle before and who had used a needle after the subject in the last month; what was the gender of the people they had sex with in the last month; whether the subject been paid for sex in the last 6 months; how long they had been in a steady relationship and how many people had they had sex with in the last 6 months.

2.2.7 Social functioning

Social functioning was evaluated using the OTI Social Functioning Scale. This consists of 12 items which address issues such as employment, residential stability, interpersonal conflict, social support and involvement of the individual in the drug sub-culture. Higher scores on this scale are indicative of poorer levels of social functioning.

2.2.8 Criminal behaviour

Using the Criminality Scale of the OTI, a record was taken of any property crimes, drug dealing, fraud and violent crimes committed during the month preceding interview. Higher scores on the Criminality Scale denote greater criminal involvement. As in the OTI, subjects were also asked whether they were currently facing any charges.

2.2.9 Health

The Health Scale of the OTI was used to gain some indication of the subject's current state of health. This scale is divided into items addressing signs and symptoms in each of the major organ systems, with one section specifically focusing on injection-related health problems. The higher the score obtained, the poorer the overall health of the subject.

Subjects were also asked whether they had ever tested positive for HIV, hepatitis B or hepatitis C.

2.2.10 Psychological functioning

Psychological adjustment was assessed using the 28 item version of the GHQ. This scale gives a global measure of non-psychotic psychopathology and is made up of the following 4 sub-scales: (A) Somatic symptoms, (B) Anxiety, (C) Social dysfunction, and (D) Depression. Global scores range from 0-28, with 4/5 being the most commonly used cut-off point in determining the number of 'cases' of psychopathology in a sample[21]. Subjects were given the GHQ to complete themselves.

2.2.11 Amphetamine dependence

Amphetamine dependence was assessed by giving subjects the SDS to complete. This is a 5 item scale which asks subjects how they have felt about their amphetamine use in the last year. The scale is comprised of questions such as: "Did you ever think your amphetamine use was out of control?" and "Did the prospect of missing a `shot' or `snort' make you very anxious or worried?" SDS scores range from 0-15, with higher scores being indicative of greater amphetamine dependence.

2.3 ***Analysis***

For continuous variables t-tests were employed. Categorical variables were analysed using chi^2, with corresponding odds ratios (O.R.) and 95% confidence intervals (C.I.). Where distributions were highly skewed, medians were reported. Highly skewed continuous data were categorised for the purpose of analysis. In order to determine which factors were independently associated with transitions between routes of administration, multiple logistic regressions were conducted. Backwards elimination of variables was used to select the most appropriate models. All analyses were conducted using SYSTAT[22].

3.0 RESULTS

3.1 *Sample Characteristics*

The sample consisted of 301 subjects, of whom 53% were male. The mean age was 25 years but this differed significantly according to sex, with males being on average older than females (26 yrs v 23 yrs, t_{299}=5.1, p<.001). Subjects were recruited from all areas of Sydney, as shown in Table 1. A quarter (27%) of the sample came from the inner west, 15% from the inner city or inner east, 18% from the north, 18% from the west, and 23% from the south or south west.

The mean number of years of school education was 10.6 (SD 1.3; range 6-12), with 33% of subjects having completed 10 years of schooling and 39% having completed 12 years. Females were more likely than males to have completed 6 years of high school (47% versus 31%, O.R. 1.89, 95% C.I. 1.18-3.03). The majority of subjects (64%) had no tertiary education, with 26% having completed a trade or technical course and only 10% having acquired a university or college degree.

Almost half of the sample was unemployed (47%), with only 12% in full-time and 19% in part-time/casual employment. A small proportion (6%) reported being engaged in full-time home duties and 15% of subjects stated that they were currently students.

One fifth (20%) of the sample reported having a prison record, but this differed significantly according to sex. Males were more likely than females to report ever having been in gaol (30% v 8%, O.R. 5.15, 95% C.I. 2.55-10.39)

Most subjects (79%) were not currently in treatment, and two thirds (68%) had never been in drug treatment. Methadone maintenance was the most common form of therapy for those currently in treatment (73%).

Table 1: Demographic characteristics of 301 regular amphetamine users.

	Males	Females	Persons
N	159	142	301
Age in years (Mean)	26	23	25*
Employment: (%)			
Not employed	53	41	47
Full time	13	10	12
Part time/casual	21	16	19
Student	11	20	15
Home duties	-	12	6
Disability Pension	3	1	2
School Education (mean years)	10	11	11*
Tertiary Education: (%)			
No tertiary education	65	63	64
Trade/technical	26	25	26
University/college	8	12	10
Trade & college	1	-	0.3
Place of residence: (%)			
Inner city/east	15	16	15
North	14	22	18
South/South west	26	19	23
Inner west	24	30	27
West	21	14	18
Current treatment: (%)			
Not in treatment	77	82	79
Methadone	16	14	15
Detoxification	2	1	1
Therapeutic community	3	-	1
Narcotics anonymous	1	2	2
Drug counselling	1	1	1

* statistically significant difference between males and females

3.2 *Amphetamine use*

By definition, all subjects had used amphetamines. As shown in Table 2, the mean age of first amphetamine use was 17.4 years (SD 4.0; range 12-59) and 19.2 years (SD 4.6; range 10-59) for commencement of regular use. The mean length of time at interview since first amphetamine use was 7.3 years (SD 5.8; range 0-27), but this differed significantly according to sex with males having used amphetamines for longer periods than females (mean=9.0 v 5.4, t_{299}=5.56, p<.001).

The median number of days on which amphetamines were used in the 6 months prior to interview was 24, approximating weekly use. Less than 10% of subjects (9%) had used amphetamines 6 times in the preceding 6 months, while a quarter of subjects (23%) reported use on 60 or more days, and 13% on 90 or more days. Daily use over the previous 6 months was only reported by 2% of subjects. The mean score on the SDS for amphetamines was 4.3 (SD 3.2; range 0-14).

Table 2: History of amphetamine use

	Males	**Females**	**Persons**
N	159	142	301
Age first used amphetamines (mean)	17.5	17.3	17.4
Age first used amphetamines regularly (mean)	19.6	18.8	19.2
Mean length of time since 1st used amphetamines (years)	9.0	5.4	7.3*
Median number of days used in last 6 months	30	24	24
Mean score on SDS	4.4	4.2	4.3

* statistically significant difference between males and females

3.3 *Routes of amphetamine administration*

Injection of amphetamines was prevalent among the sample, with two thirds (67%) of subjects having injected at some time during the 6 months preceding interview (see Table 3). A quarter of subjects reported having used both parenteral and non-parenteral routes of administration in that 6 month period, while 42% reported that injection had been the sole method employed. The remaining third (33%) of the sample had exclusively snorted or swallowed the drug.

Overall, 68% of subjects reported ever having injected amphetamines, of those, 7% always and 45% mostly injected the drug. The mean age of first amphetamine injection was 18.8 years (SD 4.1; range 12-34). Only 23% of subjects had injected amphetamines the first time that they used them. For those subjects who did not inject the first time that they used amphetamines, the mean length of time to first injection was 2.5 years (SD 3.0; range 0-19). Amphetamines were the first drug injected by the majority (56%) of subjects who had ever injected.

The frequency of amphetamine use was associated with route of administration, with those who had injected amphetamines in the preceding six months reporting significantly more days of amphetamine use in that period than other subjects (50.9 v 22.9, t=6.0, p<.001). Route of administration remained a significant predictor of frequency of amphetamine use after age and sex were controlled for by a multiple linear regression (t=5.2, p<.001).

Table 3: Routes of amphetamine administration (%)

	Males	Females	Persons
N	159	142	301
First method of amphetamine use:			
Injected	21	25	23
Snorted	62	52	58
Swallowed	16	23	19
Smoked	1	0	1
Method of amphetamine use over last 6 months:			
Injected only	47	36	42
Injected & Snorted/Swallowed	25	25	25
Snorted/Swallowed only	28	39	33
Overall method of amphetamine use:			
Injected every time			
Injected most times	6	9	7
Injected about 1/2 of the time	54	36	45
Snorted/Swallowed most times	6	3	5
Snorted/swallowed every time	8	15	11
	26	37	32
First drug injected:			
Amphetamines	56	64	59
Opiates	38	29	34
Other	7	7	7
Mean age when 1st injected amphetamines (years)	19.2	18.4	19

3.4 *Amphetamine Dependence*

The mean SDS score for amphetamines was 4.3 (SD 3.3; range 0-14). This is higher than the mean of 2.0 reported by Hando and Hall[16] in an earlier study of amphetamine users. The earlier study, however, recruited a broader range of amphetamine users, whereas the current study interviewed *regular* amphetamine users so a higher level of dependence was to be expected.

The measure of dependence used in this study, the SDS, showed good psychometric properties. Cronbach's alpha was 0.81, indicating excellent internal reliability. The structure of the SDS was explored by submitting scores on the five items to principal components analysis. A one factor solution emerged that accounted for 57% of the variance, with all items having loadings of 0.71 or greater.

Hando and Hall suggest a cut-off of 4/5 as being indicative of amphetamine dependence. Using this cut-off, 42% of subjects were classified as amphetamine dependent. There was no difference between males and females in levels of dependence (4.4 v 4.2).

Route of administration was related to severity of dependence, with those subjects who had injected amphetamines in the preceding six months having significantly higher levels of dependence than subjects who had only used non-parenteral routes of administration (5.1 v 2.4, t_{298}=6.4, p<.001).

SDS scores were positively correlated with both the number of days amphetamines were used in the preceding six month (r_s=0.46, p<.001) and length of amphetamine use (r_s=0.31, p<.001).

In order to ascertain which factors were independently associated with dependence simultaneous multiple regressions were conducted. Variables entered into the model were age, sex, route of administration in the preceding six month (injecting v non-injecting), frequency of amphetamine use and length of amphetamine using career. The final model was significant (F=16.7, p<001), and accounted for 20% of the variance. Both the injecting of amphetamines (β=.25, p<.001) and more frequent amphetamine use (β=.30, p<.001) were independently associated with higher levels of amphetamine dependence.

3.5 *Other drug use*

As shown in Table 4, poly-drug use was common among this group of regular amphetamine users. The median number of drugs ever used was 8 (range 4-10), with a median number of 5 drug classes used in the last 6 months (range 3-10).

The use of opiates was common, with 68% of subjects having ever used them, as was use of benzodiazepines, which had been tried by 74% of subjects. Use of other psychostimulants was common, with 66% of subjects having ever tried cocaine and 95% of subjects having ever used hallucinogens. The use of cannabis (100% ever used and 93% used in the last 6 months), alcohol (99% ever used and 94% in the last 6 months) and tobacco (97% ever used and 92% in the last 6 months) was almost universal.

Among those subjects who had ever injected, 68% had injected amphetamines and 66% had injected them in the last 6 months. With respect to opiates, 56% had ever injected them and 51% had injected them in the last 6 months. Amphetamines and opiates were thus the most commonly injected drugs. About one third of subjects had injected cocaine (39%) and hallucinogens (28%). Eighteen per cent of subjects had injected benzodiazepines and 11% had injected barbiturates. In the last 6 months, 17% of subjects had injected cocaine, 10% had injected both hallucinogens and benzodiazepines and 1% had injected barbiturates. The median number of drug classes ever injected was 3 (range 1-6) and median number of drug classes injected in the last 6 months was 2 (range 1-6).

Tobacco was used daily for the last 6 months, cannabis was used for a median of 96 of the last 180 days and alcohol was used for a median of 72 days in the last 6 months. Opiates were used for a median of 30 days, benzodiazepines for 12 days, hallucinogens and barbiturates for 5 days, inhalants for 4 days and cocaine for 3 days.

Table 4: Drug use history of regular amphetamine users (N=301)

Drug Class	Ever Used %	Ever Injected %	Used lst 6 months %	Injected lst 6 months %	Days Used lst 6 months*
Amphetamines	100	68	100	66	24
Opiates	68	56	61	51	30
Cocaine	66	40	35	17	3
Hallucinogens	95	28	64	10	5
Benzodiazepines	74	18	56	10	12
Barbiturates	26	11	4	1	5
Alcohol	99	N/A	94	N/A	72
Cannabis	100	N/A	93	N/A	96
Inhalants	79	N/A	38	N/A	4
Tobacco	97	N/A	92	N/A	180
Poly-drug use (mdn # drugs)	8	3	6	2	-

* Median number of days used in the last 6 months by those who had used the drug class in that period

As shown in Table 5, the preferred drugs were amphetamines (chosen by 30% of subjects), opiates (27%), cannabis (20%) and hallucinogens (15%). Very few subjects chose cocaine (7%), alcohol (1%) or inhalants (0.3%) as their drug of choice. There were a number of significant gender differences in drug of choice, with females being more likely than males to select amphetamines (38% v 23%, O.R. 2.02, 95% C.I. 1.23-3.34) and hallucinogens (20% v 10%, O.R. 2.29, 95% C.I. 1.19-4.43) and males being more likely than females to select cocaine (9% v 3.5%, O.R. 2.85, 95% C.I. 1.01-8.07) and cannabis (27% v 12%, O.R. 2.73, 95% C.I. 1.47-5.05).

Table 5: Drug of choice of regular amphetamine users (%)

	Males	**Females**	**Persons**
N	159	142	301
Amphetamines	23	38	30*
Opiates	28	25	27
Cocaine	9	4	7*
Hallucinogens	10	20	15*
Alcohol	2	1	1
Cannabis	27	12	20*
Inhalants	-	1	0.3

* significant difference between males and females

3.6 *Transitions between routes of amphetamine administration*

3.6.1 Transitions to injecting amphetamines

Forty per cent of the sample had experienced a transition from snorting or swallowing to regular injecting of amphetamines, and the median number of times that this had occurred was 1. Males were more likely than females to report such a transition (47% v 32%, O.R. 1.82, 95% C.I 1.14-2.91). The mean age of subjects at the time of the last transition to injecting was 20.3 years (SD 4.2, range 13-34), and a median of 4 years had elapsed since that change.

When subjects were asked how the transition to injecting had affected the quantity of amphetamines they were using, the majority (69%) reported that they began using more; only 8% reported using less. The remaining subjects reported no change in the quantity of amphetamines used. Nearly half (44%) of the subjects who had made a transition to injecting reported that they began using larger quantities of other drugs, with 46% injecting other drugs that they had not previously injected. The majority of subjects (56%) were not living with someone who was injecting amphetamines at the time of the last transition, but 79% reported that injection was the method being used by half or more of their friends.

Subjects were asked for the two main reasons why they changed to the regular injection of amphetamines (see Table 6). The most popular response was that they liked the `rush' (quick onset of the drug) from injecting (88%). The next two most common reasons given were that injecting was a more economical way of using amphetamines (23%), and that it was a "cleaner" or "healthier" method of administration than snorting (22%) because it avoided nasal ulcers associated with frequent snorting.

Table 6: Reasons why subjects changed to regular amphetamine injection (N=120)

Reasons	*% Yes*
Like the rush	88
More economical	23
Health reasons ("cleaner" than snorting)	22
Needle fixation	21
Friends are injecting drug users	7
Partner is/was an injecting drug user	3
Injecting other drugs anyway	2
Easier than other ways	1
Less "strung out" when coming down	0

(NB: percentages do not sum to 100% because subjects could give 2 main reasons)

Those subjects who had injected in the preceding 6 months were asked how likely it was that they would change to routes other than injecting. Only 12% stated that this was likely or very likely, and the main reason given was concern about their veins (26%).

In order to determine the factors associated with a transition to regular injecting from other routes of administration, multiple logistic regressions were performed. Those subjects who had only ever injected amphetamines were excluded from the analysis. It should be noted that as this is a cross-sectional study, it is not possible to determine cause and effect between variables and a transition. Rather, regressions show which variables are *associated* with a transition. The first regression examined the association between demographic variables (age, sex, education, length of amphetamine using career) and a transition to injecting. Only length of amphetamine using career was significantly related to a transition.

The second regression examined the relationship between current drug use and psychosocial variables (frequency of amphetamine use, amphetamine dependence, polydrug use, GHQ score, OTI health score, OTI social functioning score and OTI criminality) and a transition to injecting. Higher levels of polydrug use, greater amphetamine dependence, poorer social functioning and more frequent amphetamine use were significantly related to a transition to injecting.

Those variables that were significant from the two regressions were entered into the final model. All variables that were significant in the two regressions remained significant in the final model (Table 7). The regression equation was significant (χ^2, 5df= 55.7, p<.0005), and had a reasonable fit, Hosmer-Lemeshow χ^2=13.1, p<.11.

Table 7: Multiple logistic regression predicting a transition to injecting from other routes of administration among regular amphetamine users

Variable	O.R.	95% C.I.
Length of amphetamine career	1.06	1.01-1.12
Polydrug use	1.20	1.01-1.43
SDS	1.14	1.04-1.25
OTI Social Functioning	1.06	1.01-1.11
Days of amphetamine use	1.01	1.00-1.02

Hosmer-Lemeshow χ^2=13.1, p<.11 (Note: High p-values indicate better goodness of fit)

The results indicate that, after controlling for the effects of other variables in the model, each year of amphetamine sue increased the odds of injecting by 6%. Thus, the odds of a transition to injecting were 1.34 times higher for someone who had used amphetamines for five years. Similarly, each drug class currently being used increased the odds of a transition to injecting having occurred by 20%, each additional point on the SDS by 14%, each additional point on the OTI social functioning scale by 6%, and each additional day amphetamines were used in the last six months by 1%.

3.6.2 Transitions away from injecting amphetamines

A small proportion of the sample (9%) reported ever having made a transition from injecting to regular snorting or swallowing of amphetamines, and the median number of times that this had occurred was 1. The mean age of subjects at the time of the last transition was 23 years, with a median of 15 months having elapsed since then.

Less than half (39%) of these subjects reported using more amphetamines after making the transition away from injecting and the same proportion (39%) reported a reduction in amphetamine use. An increase in the use of other drugs was reported by only 15% of subjects, with 19% reporting a decline in the use of other drugs.

Subjects were asked how changing to snorting or swallowing amphetamines from injecting had affected the way that they used other drugs. While 69% stated that it had not had any affect, 8% reported injecting other drugs less often and 19% indicated that they ceased injecting all drugs. At the time of the last transition away from injecting the majority (54%) of subjects were living with someone who was snorting or swallowing amphetamines, but 61% reported that at least half of their friends were still injecting the drug at that time.

A multiple logistic regression was performed to determine the factors associated with a transition away from injecting, excluding those who had never injected, but no satisfactory model could be identified because of the small number (26) of subjects who had made the transition from injecting to non-injecting use.

Subjects were asked for the main reasons why they abandoned regular amphetamine injecting in favour of snorting or swallowing (see Table 8). The most popular responses given were concern for their veins (39%), a fear of HIV or hepatitis (23%), and having felt addicted to amphetamines (19%).

Table 8: Reasons why subjects changed to regular non-parenteral administration of amphetamines (N=26)

Reasons	*% Yes*
Health reasons (eg. veins)	39
Fear of HIV, HBV, HCV	23
Felt addicted	19
Easier than injecting	15
Took a break from injecting	12
Lost contact with injecting drug users	8
Broke up with IDU partner	4

(NB: percentages do not sum to 100% because subjects could give 2 main reasons)

3.6.3 Patterns of amphetamine use not involving transitions

One third of the sample (32%) had only ever snorted or swallowed amphetamines. The two main reasons given for choosing this route of administration were having a hate or fear of needles (72%) and a fear of addiction (23%). Females were more likely than males to have never injected (37% v 26%, O.R. 1.66, 95% C.I. 1.02-2.71).

Few subjects had only ever injected amphetamines (7%). The two main reasons given for never snorting or swallowing were: liking the rush from injecting (81%) and health reasons, suggesting that these users believed that injecting is somehow `cleaner' than snorting (22%).

A small portion of the sample (7%) reported that they usually snorted or swallowed amphetamines but occasionally injected them. These subjects had injected less than four consecutive times and so were not regarded as having made a transition to injecting. When asked for the main reasons why they did not continue to inject, subjects reported that the effects of injected amphetamines were too intense (26%), that they feared addiction (21%) and that other routes were easier than injecting (21%). The majority of these subjects (61%) had rarely injected amphetamines since they began snorting or swallowing them.

Of greater prevalence were users who usually injected amphetamines but had occasionally snorted or swallowed the drug (33%). The predominant reasons these people gave for not continuing to snort or swallow were that they liked the rush from injecting (84%), they felt it was healthier than using the nasal or oral route (22%) and they had a needle fixation (22%). The majority of these subjects (84%) had rarely snorted or swallowed amphetamines since they began injecting. The main reasons given for snorting or swallowing on the last few occasions were circumstantial, namely, not having a needle and syringe when they wanted amphetamines or being in an inappropriate social context.

3.7 *HIV risk-taking behaviour*

3.7.1 Injecting behaviour

In the month preceding interview 62% of subjects had injected amphetamines and of those, 27% revealed that they had borrowed a used needle from someone else (see Table 9). These subjects most commonly reported only using after one other person (88%), but 10% had used a needle after 2-5 different people, and 2% after more than ten people.

Although the majority of subjects (54%) who had borrowed a needle indicated that they had only used after their regular sexual partner in that month, borrowing was not confined to regular sexual partners. Six percent indicated that they had used after their partner plus others, and 40% reported using after others only. Females were no more likely than males to have borrowed exclusively from their regular partner (62% v 46%, O.R. 1.89, 95% C.I. 0.61-5.83). It should be noted, however, that the confidence interval is wide, with an upper limit of nearly 6.0. As such, it would be unwise to conclude absolutely that there is no gender difference of the type found in an earlier study by Hando & Hall[14].

Almost one third of injectors (31%) had lent a used needle to someone else in the month preceding interview. Partners were the sole recipients in 50% of cases, partner plus others in 7% and others only in 40%. When sharing was defined as having either lent or borrowed a used needle, females were more likely than males to have shared in the last month (50% v 34%, O.R. 1.92, 95% C.I 1.06-3.48).

When injectors were asked how often they had cleaned needles (including their own) before re-using them in the last month, 42% stated that they never re-used needles, 47% said that they cleaned them every time, 8% cleaned them less frequently and only 2% said that they never cleaned needles before re-using. Those subjects who had re-used needles were asked how often they had used bleach to clean them in the preceding month and while 40% said they had bleached the needles every time, 44% said that they never used bleach when re-using.

Table 9: Injecting practices during the month preceding interview (%)

	Males	Females	Persons
N	159	142	301
Injectors who have borrowed a used needle	22	33	27
Number of times injectors borrowed a used needle (in last month) :			
No times	78	67	73
One time	9	12	10
Two times	5	8	6
3-5 times	7	8	7
6-10 times	1	4	2
> 10 times	1	3	2
Number of different people who had used a needle before subjects in last the month (*NB:involves injectors who have borrowed only*)			
One person	88	89	88
Two people	8	0	4
3-5 people	4	8	6
6-10 people	0	0	0
> 10 people	0	4	2
Injectors who had lent a used needle to someone in the last month	27	37	31
Number of times injectors lent a used needle to someone else in the last month:			
No times	73	63	69
One time	7	23	13
Two times	13	3	9
3-5 times	7	10	8
6-10 times	1	1	1
> 10 times	0	0	0
Injectors who had shared needles (borrowed or lent)	34	50	41

3.7.2 Sexual behaviour

The sample was sexually active, with 82% of subjects reporting having had penetrative sex in the month preceding interview, 34% with more than one sexual partner (see Table 10). The vast majority of subjects (92%) had been involved solely in heterosexual behaviour, with only 3% being bisexual and 5% homosexual. Condom use with regular sexual partners was not widespread and while one quarter (25%) of subjects who did have a regular partner in the last month stated that they always used condoms, more than half (56%) reported never using them. The median length of subjects' relationships was 12 months. Although 69% of subjects who had had casual partners in that month reported always using condoms, 15% said that they never used condoms with casual partners, and the remainder did so inconsistently.

Of those subjects who did have sex in the last month, 10% reported having had anal sex. Females were more likely than males to report having had anal sex, although this difference was not significant (14% v 8%, O.R. 1.71; 95% C.I. 0.76-3.82).

Only 3% of subjects had been paid for sex in the last month 90% of whom had used a condom every time and 10% (1 subject) had never used a condom. Paid sex in the last 6 months was reported by 11% of the sample.

Table 10: Sexual practices in the month preceding interview (%)

	Males	Females	Persons
N	159	142	301
% Who had sex in the preceding month	82	83	82
Number of people subjects had sex with in the last month:			
One person	62	70	66
Two people	23	18	21
3-5 people	12	7	10
6-10 people	2	3	2
> 10 people	1	3	2
Number of times subjects had anal sex in the last month:			
No times	92	86	89
One time	3	3	3
Two times	3	3	3
3-5 times	0	3	2
6-10 times	1	1	1
> 10 times	2	3	2
Number of people subjects had sex with in the last 6 months:			
None	8	4	6
One person	37	42	40
Two people	14	17	15
3-5 people	25	25	25
6-10 people	8	5	6
> 10 people	9	7	8
% Who had been paid for sex (with money, drugs, food, a place to sleep etc.) in the last 6 months	9	13	11

3.8 *The social context of amphetamine use*

Subjects reported that amphetamine use was largely a social activity. Almost half of the sample (46%) revealed that in the 6 months preceding interview they had never used the drug by themselves. A third of the sample (34%) had sometimes used amphetamines when alone and less than 10% (9%) had done so half of the time. Very few subjects (4%) always used the drug independently of other people.

The social network of amphetamine users was found to be extensive, with 78% of subjects reporting that 50% or more of their friends used the drug. A large proportion of the sample (43%) spent all or most of their free time with other amphetamine users, while only 5% of subjects reported spending none their free time with other users. When asked where they had taken amphetamines in the last 6 months, a small minority (5%) reported only using at home. More commonly, subjects had used both at home and elsewhere (80%), with 15% of subjects having used outside the home exclusively.

The vast majority of subjects (91%) reported that at least some of their amphetamine using friends were injectors and 51% of the sample indicated that this was so for more than half or all of them. Subjects with a regular sexual partner were asked how that person used amphetamines. The partner was reported to inject in 46% of cases, snort in 29%, and not to use amphetamines in only 17% of cases.

3.9 *Psycho-social correlates of regular amphetamine use*

3.9.1 Psychological adjustment

Psychological adjustment scores were obtained using the General Health Questionnaire (GHQ), with the mean GHQ score for the sample being 8.0 (SD 6.9; range 0-28). GHQ scores differed significantly according to the route of administration used in the last 6 months, with those subjects who had injected amphetamines having significantly higher GHQ scores than non-injectors (8.7 v 6.6, t_{299}=2.5, p<.05), indicating higher levels of psychological distress. In order to control for the possible confounding effects of age and gender, a simultaneous multiple regression was performed. Route of administration remained a significant independent predictor of GHQ scores, after controlling for age and gender (β=0.13, t=2.2, p<.05), with injecting being independently associated with higher scores.

Two thirds of the overall sample (67%) obtained GHQ scores of 4 or greater. An earlier study by Hando & Hall[16] used a more conservative GHQ cut-off of eight or more. The reasoning behind this was that many of the effects and after-effects of amphetamines are difficult to distinguish from the symptoms of minor psychiatric morbidity assessed by the GHQ, particularly in the somatic symptoms subscale. Even at this more conservative cut-off, almost half (44%) of subjects obtained GHQ scores of 8 or greater.

3.9.2 Social functioning

The mean social functioning score, as assessed by the Opiate Treatment Index, was 18.6 (SD 6.2; range 4-35). This also differed significantly according to route of administration, with those who had injected in the preceding six months having significantly higher scores, indicating poorer social functioning, than other subjects (20.3 v 15.2, t_{299}=7.3, p<.001). Route of administration remained a significant independent predictor of social functioning after the effects of age and gender had been controlled for in a simultaneous multiple regression (β=0.39, t=7.1, p<.001).

3.9.3 Health

The mean health total for the sample was 17.2 (SD 8; range 0-40). A significant gender effect was also revealed, with females reporting a greater number of health problems than males (18.6 v 16.0, t_{299}=2.9, p<.005).

Physical health was also found to be significantly influenced by route of administration, with injectors having significantly higher OTI health scores, indicating poorer health, than non-injectors (18.5 v 14.7, t_{299}=4.0, p<.001). Route of administration remained a significant independent predictor of physical health (β=0.25, t=4.4, p<.001)

after a simultaneous multiple regression including age and sex was carried out, as did sex (β=-0.19, t=3.3, p<.001).

As part of the health section of the OTI, subjects were asked about any injection related problems experienced in the last month of use. Contaminated injections, resulting in extreme headaches and/or vomiting, were experienced by one third (31%) of subjects in the last month. Venous problems were common, with 10% of subjects experiencing abscesses at injection sites, 53% of subjects had scars from constant injecting and 40% of subjects had difficulty injecting. A significant gender effect emerged, with females being more likely than males to have experienced difficulty with injecting (24% v 16%, O.R. 3.36, 95% C.I. 1.82-6.22).

Only 2 subjects (<1% of the sample) reported ever testing HIV positive, both of whom had injected amphetamines overall at least half of the time. Of greater prevalence among the sample were self-reported diagnoses of hepatitis B (19%) and hepatitis C (15%). Subjects who had injected exclusively in the last 6 months were more likely to report having tested positive for hepatitis B, than those who had injected and snorted or swallowed (35% v 11%, O.R 4.43, 95% CI 1.95-10.05). They were also more likely to report ever having tested positive for hepatitis C (31% v 7%, O.R 6.19, 95% CI 2.31-16.54).

3.9.4 Criminality

Over two thirds (73%) of the sample had committed some form of crime during the month preceding interview. The extent of crime committed varied significantly according to route of administration used in the last 6 months, with injectors reporting significantly more crime, as indicated by the OTI crime scale, than non-injectors (2.5 v 1.5, t_{299}=3.6, p<.001). Route of administration remained a significant independent predictor of criminality after age and sex were controlled for in a simultaneous multiple regression (t=3.7, p<.001). The various types of crime that subjects were involved in are shown in Table 11.

Table 11: Crime committed in the month preceding interview by route of administration

Route:	**Inject**	**Snort/ Swallow**	**All**
%	67	33	100
% Who have committed a property crime in the last month	44	30	39
% Who have dealt drugs in the last month	48	37	44
% Who have committed fraud in the last month	35	30	33
% Who have Committed a crime involving violence in the last month	15	7	12
Mean crime total	2.5	1.5	1.5
SD	2.4	1.8	1.9
% Who are currently facing charges	15	9	13
% Any crime	77	65	73

3.10 *Regional differences*

Regional differences were apparent in terms of the route of amphetamine administration used during the 6 months preceding interview (see Table 12). The majority (51%) of subjects from the north of Sydney had only snorted or swallowed amphetamines, whereas in the west and south/south west it was more common for subjects to have injected the drug (83% and 70% respectively). As such, the implications for the spread of HIV by needle use vary between areas. Among regular amphetamine users interviewed in the northern suburbs, 15% of subjects had shared a needle in the preceding month, compared to 42% of subjects from the western suburbs.

Table 12: Route of administration used in last 6 months and psychosocial variables by region of Sydney

	INNER CITY/EAST (N=46)	NORTH (N=53)	SOUTH/ SOUTH WEST (N=69)	INNER WEST (N=80)	WEST (N=53)
% Injectors	67	49	70	64	83
% shared needles	17	15	28	24	42
SDS*	4.1	4.0	4.9	3.1	5.9
GHQ*	7.8	8.5	8.6	6.7	8.6
OTI health*	17.3	18.1	15.7	16.3	19.5
OTI Social Function*	18.9	16.9	17.9	19.1	20.3
OTI crime*	1.5	2.2	2.0	2.5	2.7

* mean score

There also appeared to be regional differences in the psychosocial variables that were found to be related to injecting. In order to illustrate these differences, the region with the highest percentage of injectors (western suburbs) was compared on these variables to the area with the lowest proportion of injectors (northern suburbs). Subjects from the western suburbs had significantly higher SDS scores (5.9 v 4.0, $t_{299}=3.0$, $p<.005$) and social functioning scores (20.3 v 16.9, $t_{299}=2.7$, $p<.01$), indicating higher levels of

amphetamine dependence and poorer social functioning respectively. There were no differences, however, in GHQ scores, physical health or criminality.

4.0 DISCUSSION

4.1 *Major findings of the study*

The use of multiple recruitment methods gave rise to a diverse sample of amphetamine users with broad patterns of amphetamine use. Subjects were recruited from all areas of Sydney, with males and females being almost equally represented. The sample was fairly young (median age=25 years) and the majority of subjects (68%) had no experience of drug treatment. A notable proportion of the sample were unemployed (47%).

While the criteria for entry into the study stipulated that subjects need only have used amphetamines on a minimum of 6 days during the 6 months preceding interview, the median number of use days was 24, which constitutes weekly use. Two thirds of the sample had injected amphetamines in the 6 months prior to interview and the remainder had exclusively snorted or swallowed the drug. Of major concern was the prevalence of transitions to injecting among the sample. The reasons given by these subjects for having made the change to injecting (discussed in detail below) have important clinical implications. Similarly, the key motivating factors cited by those subjects who had made a transition away from injecting are relevant to any harm reduction approach attempting to dissuade amphetamine users from injecting.

Many subjects who had made a transition to injecting reported that they had consequently increased their use of amphetamines and other drugs. This, in addition to the finding that injectors had greater psychological, social and health problems, highlights the importance of encouraging amphetamine users to adopt safer methods of administration.

4.2 *Data validity and sampling bias*

The findings of this study are derived from data based upon self-reported behaviour. Although the questions asked often required subjects to talk about their involvement in various illegal and socially stigmatised activities, the data are considered to be valid due to the confidential way in which interviews were conducted, and because of consistencies found between these results and those of previous studies.

Subjects were given strong assurances that any information they divulged would be treated as strictly confidential and anonymous. Other research on illicit drug use has shown that when subjects are given such guarantees the data obtained are reasonably valid and reliable[23,24,25]. In a recent Australian study on primary heroin users for instance, self-reported drug use showed respectable validity when assessed against collateral interviews and urinalysis results[18].

Many of the findings are consistent with those of an earlier study by Hando and Hall of amphetamine users in Sydney[14]. The similarities include: the fact that both samples represent a younger population than that of the widely researched opiate users; the low levels of education and high rates of unemployment; the high proportions of subjects injecting amphetamines; the association found between route of administration and both amphetamine dependence and frequency of use; the social context of amphetamine use and the extent of HIV risk-taking behaviour.

In interpreting the results of the current study, it is appropriate to examine how representative the sample is of regular amphetamine users in general. Even though multiple recruitment methods were used in an attempt to access a broad spectrum of amphetamine users, the fact that the sample was self-selected implies that its characteristics should be borne in mind and care taken when generalising to other samples. At the same time, it is difficult to conceive how it would be known if a sample of amphetamine users was representative, given that the parameters of the population of amphetamine users are unknown. Reassurance is gained from the knowledge that despite having recruited subjects from a broader area of Sydney, many of the sample characteristics in this study accord with those of the aforementioned study by Hando and Hall[14].

Some indications are given by comparing the current data with data on respondents who had used amphetamines in the preceding year, derived from 1993 National Campaign Against Drug Abuse (NCADA) household survey[26]. Of all NCADA respondents who had used amphetamines in the preceding year (N=67), only 17% used them on a monthly basis, the criterion for entry into the current study. The small number of such respondents (N=11) precludes meaningful comparisons with the present study. Of all respondents who had used amphetamines in the preceding year, two thirds (64%) were aged 24 years or less, compared to 59% in the current study. Both studies had a majority of males, although this is more pronounced in the NCADA survey (64% v 53%). Approximately half of the NCADA sample had commenced amphetamine use by age 18, compared to 16 years for the regular users in the current study. The NCADA sample also indicated high levels of amphetamine injecting, with a quarter (24%) of those who had used amphetamines in the preceding year reporting injecting the drug. The larger percentage in the current study would be expected, given the longer amphetamine careers and more frequent use of the sample.

4.3 *Is there a "pure" amphetamine user?*

Considering the extent of poly-drug use amongst the sample, it would appear that there is no such thing as a `pure' regular amphetamine user. Respondents reported that they had tried a median of 7 drug classes in addition to amphetamines and had used a median of 5 additional drug classes in the last 6 months. Such poly-drug use has also been reported among opioid users[12,26]. The majority of the sample (56%) had injected opiates at some stage, and significant minorities had injected cocaine (40%),

hallucinogens (28%) and benzodiazepines (18%). While all subjects had used amphetamines on a regular basis, their actual drug of choice varied widely from amphetamines (30%), to opiates (27%), cannabis (20%), hallucinogens (15%) and other drugs (8%). As mentioned earlier, higher levels of poly-drug use were found to be associated with a transition to injecting.

4.4 ***Transitions: reasons and consequences***

A key finding of the present study was the prevalence of transitions to injecting drug use among amphetamine users. While only 23% of subjects employed the parenteral route of administration the first time that they used amphetamines, 40% of the sample had since made a transition to injecting. Injection had remained the primary route of administration in most cases, with a median number of one transition to injecting being reported. During the 6 months preceding interview 67% of the sample had injected amphetamines at some stage. Given the social nature of amphetamine use, as indicated by this and other studies[17,27], it is not surprising that 79% of subjects who made the change to injecting reported that the parenteral route was being used by half or more of their friends at the time.

The factors found to be associated with a transition to injecting were a longer amphetamine using career, higher levels of polydrug use, greater amphetamine dependence, poorer social functioning and more frequent amphetamine use. Males were found to be twice as likely as females to make a transition to injecting but this may simply be a reflection of the fact that the males were, on average, 3 years older and therefore further along in the amphetamine using careers. This rationale is supported by the results of the multiple logistic regression examining the association between demographic variables and a transition to injecting. While length of amphetamine using career was found to be significantly related to a transition gender and age were not.

The majority of subjects (69%) who had made a transition to injecting reported an increase in the quantity of amphetamines used. An added concern is that a rise in the quantity of other drugs used was reported to have followed the transition in 44% of cases, with 46% injecting other substances that they had not previously injected.

Although those subjects who had made a transition away from injecting only represent a small proportion of the sample (9%), their presence is important as it shows that injectors of amphetamines are capable of changing to alternative and potentially safer routes of administration. The change to non-parenteral administration tended to be stable, with a median number of one transition away from injecting being reported. Unlike those subjects who had made a transition to injecting, a significant proportion of these subjects (39%) reported a reduction in amphetamine use following the transition to non-parenteral administration and only 15% reported an increase in the use of other drugs.

While the majority of subjects (54%) who had made the change to non-injecting drug use reported that they had been living with someone who snorted or swallowed amphetamines at the time of the last transition, a notable proportion (61%) indicated that at least half of their friends were still injecting the drug at that time. This would suggest that something other than a change in their social network had motivated them to make the transition away from injecting and concurs with the fact that only 8% of subjects reported that they gave up injecting because they had lost contact with injecting drug users.

The most popular reason that subjects gave for having made a transition away from injecting was that they were concerned about their veins. This corresponds with the predominant response given by injectors as to why they might change from parenteral administration and highlights the clinical importance of health issues associated with injecting.

With respect to transitions, the results are analogous to those of a recent British study which looked at transitions in patterns of heroin administration[29]. Both studies reveal that transitions from non-parenteral to parenteral routes of administration are quite common, with only a small minority of subjects having made a transition away from injecting. Other similarities are that subjects generally only report having made one transition, that males are twice as likely as females to make a transition to injecting and that the longer a subject has been using the drug the more likely they are to change from non-parenteral to parenteral administration.

4.5 *Routes and their problems*

In terms of amphetamine dependence and frequency of use, interesting differences were found according to the route of administration that had been used during the preceding 6 months. Subjects who had only injected showed greater dependence and had used amphetamines on more days than those who had injected and used other routes. The latter were found to be more dependent and reported a greater number of use days than those who had snorted or swallowed only. Injectors would appear to have less control over their amphetamine use than non-injectors, which stresses the need for people to be deterred from making the transition to injecting.

The prevalence of dysfunctional behaviour and health problems among injectors of amphetamines further emphasises the need to discourage people from injecting. Subjects who had injected amphetamines in the 6 months preceding interview reported committing significantly more recent crime than non-injectors, and also exhibited significantly poorer levels of social functioning.

Physical health was significantly affected by route of administration, with non-injectors reporting fewer health problems than injectors. The responses given to the questions

focusing specifically on injection-related health problems indicate that injectors have genuine cause to be concerned about the condition of their veins. Forty per cent of injectors reported that they had experienced difficulty injecting during the month preceding interview, which suggests that they have already acquired some degree of vascular damage. Females were significantly more likely than males to report having had difficulty injecting which may be a reflection of the fact that their veins are smaller and so more prone to collapse. A considerable proportion of injectors (10%) reported having had an abscess during the preceding month, which is indicative of having used an unsterile injection technique.

Almost half of the sample (44%) obtained psychological adjustment scores suggestive of a psychiatric diagnosis and this was using the fairly stringent GHQ cut off mark of 8. Injectors showed significantly poorer levels of psychological adjustment than non-injectors. It is evident yet again that a transition to parenteral administration has serious consequences and should therefore be discouraged.

4.6 *Regional differences in patterns of amphetamine use*

The discovery that some regional differences exist in terms of route of administration demonstrates the importance of sampling from a broad area. Many studies on injecting drug use have tended to be based on easily accessible samples drawn from the inner city[30] and in so doing may present a distorted view of the population being studied. Very distinct differences were found in the current study, with subjects from the north predominantly snorting or swallowing amphetamines, and those from the south, south-west and west more commonly injecting the drug. It may be worthwhile addressing these differences more fully in future research in an attempt to establish the reasons for such variation.

4.7 *Implications for HIV transmission*

The high prevalence of transitions to injecting among amphetamine users has serious implications for the spread of HIV. During the month preceding interview 41% of current injectors had shared a used needle. A quarter (27%) of injectors had borrowed used injecting equipment and almost a third (31%) had lent used equipment to someone else. The finding that females were significantly more likely to share than males (50% versus 34%) suggests that education campaigns advocating safe injecting practices may need to modify their approach in order to more effectively target this sub-population of amphetamine users.

Of those subjects who had re-used a needle (including their own) in the month preceding interview, 44% reported that they never used bleach when re-using and 40% said that they had bleached the needles every time. A recent American study[31] reports that HIV needs to be exposed to undiluted household bleach for a minimum of 30 seconds in order to be completely inactivated. In the light of these findings it is

difficult to know how effective the subjects' efforts at bleaching would have been, especially as the 2x2x2 method recommended by health agencies and often used by injectors, does not stipulate an exposure time or strength of bleach to be used.

The injection related risk-taking behaviour that has been reported by subjects in this sample highlights the necessity for encouraging amphetamine users to adopt non-parenteral routes of administration.

Another area of concern with respect to the dissemination of HIV is that of sexual risk-taking behaviour. The sample of amphetamine users was sexually active, with 82% reporting having had sex in the month preceding interview, a third of whom indicated having more than one sexual partner. The majority of subjects (92%) had exclusively engaged in heterosexual behaviour. Condom use with regular sexual partners was not common. More than half (56%) of subjects who reported having sex with a regular partner during the preceding month indicated that they had not used a condom. This is cause for concern given that the median length of a relationship was only 12 months.

An impressive proportion (69%) of subjects who reported having a casual sexual partner during the preceding month said that they always used condoms but this still leaves room for improvement. Fifteen per cent reported that they had never used a condom with casual partners in that time and 16% reported inconsistent use of condoms. There are obvious risks involved in such behaviour.

The broad social network within which amphetamine use was reported to have taken place has clear implications for the transmission of HIV and other viruses. With almost half of the sample (46%) having never used amphetamines by themselves in the last 6 months and a further third only sometimes doing so, it is apparent that these subjects would have ample opportunity for unsafe sexual encounters and for the sharing of injecting equipment. As Klee[17] indicates, injectors of amphetamines may be placing their health and that of their partners, at greater risk than injectors of heroin, given that heroin use tends to be associated with social isolation and reduced sexual activity.

The vast majority of subjects (91%) in this sample reported that at least some of their amphetamine using friends were injectors and 51% indicated that this was so for more than half or all of them. If injectors of amphetamines feel that it is acceptable to inject in the company of others, a potential concern is that non-injectors are at risk of becoming more readily desensitised to the idea of parenteral administration. The most popular reason given by those subjects who had exclusively snorted or swallowed amphetamines for never injecting the drug was that they hated or feared needles. Exposure to the use of needles could, unfortunately, assist them in overcoming this fear.

4.8 *Implications for interventions to reduce injecting*

When subjects were asked why they had changed to injecting amphetamines the last time, the most notable response given was that they liked the `rush' from injecting. While little can be done to change this, the other main reasons given, namely that injecting is cost efficient and a healthier way of using, could have important clinical implications in a harm-minimisation setting.

It may be useful to highlight the false economy underlying this reasoning. Although injectors may initially experience a greater `rush' per unit of amphetamine used, they typically end up using larger quantities of the drug because tolerance develops rapidly. They therefore use more amphetamines and spend more money on the drug in the long-term. The injectors in the current study were found to use amphetamines more frequently and be more dependent on amphetamines than the non-injectors. With respect to health, it needs to be stressed that injecting is by no means `cleaner' or `healthier' than alternative routes because of the harmful vascular effects and increased risk of contracting blood borne diseases.

Subjects who had made a transition to injecting cited concern for their veins as the reason for doing so more frequently than fear of HIV or hepatitis. Similarly, concern about veins was the most popular reason given by those subjects who thought that they might change to non-parenteral methods. These data imply that, rather than solely focusing on the risk of contracting HIV as education campaigns to date have tended to do, it may prove beneficial to place greater stress on the harmful effects of injecting on the veins. Given the high incidence of vascular damage among injectors, it seems probable that such an approach would have a greater sense of immediacy for these people. If the user continued to inject, educational messages on safer injection technique could be provided to reduce vascular and other injection related harms.

HIV tests were not conducted in this study and only two subjects reported that they had previously tested positive for HIV. With respect to hepatitis B and C,
it is interesting to note that exclusive injectors were significantly more likely to report having tested positive than subjects who had injected in addition to using alternative routes. To date, hepatitis C has been overshadowed by education campaigns focusing on hepatitis B and HIV. Considering that hepatitis C is a virus that is readily contracted through needle sharing it may be a useful issue to highlight in an attempt to persuade injectors to change their route of administration and their needle-sharing behaviour.

As has been observed among heroin users[32], it appears that education campaigns advocating harm minimisation are meeting with resistance when attempting to influence injecting and sexual behaviours that take place within the realms of a regular sexual relationship. This problem needs to be addressed by drug workers, users' groups and health educators, especially when the duration of these relationships is often short and not strictly monogamous.

4.9 *Implications for future research*

The present study raises some important issues that merit further investigation.

Firstly, an attempt should be made to replicate the regional differences that were observed in terms of route of administration. It is possible that cultural differences may exist that place amphetamine users from certain regions of Sydney at greater risk of contracting HIV and/or hepatitis.

Secondly, the prevalence of psychiatric symptoms among amphetamine users should be addressed more closely through the use of formal diagnostic criteria, thereby giving a more accurate indication as to whether or not these symptoms justify psychiatric attention. Such tests may also clarify whether the symptoms reported by subjects had been present prior to amphetamine use.

Finally, a randomised control trial of a clinical intervention highlighting concerns such as vascular damage and hepatitis C would help to establish the effectiveness of these issues in discouraging amphetamine users from injecting.

4.10 *Conclusion*

A high proportion of subjects reported having made a transition from non-parenteral to parenteral amphetamine administration. Such transitions were found to be associated with length of amphetamine using career, higher levels of poly drug use, greater amphetamine dependence, poorer social functioning and more frequent amphetamine use. These findings highlight the need to discourage amphetamine users from making the change to non-parenteral administration. The small proportion of subjects who had made a transition away from injecting are testimony to the fact that a change to non-parenteral use of amphetamines can be achieved by regular users of the drug.

While the extent of reported needle sharing and unsafe sex, particularly among regular sexual partners, has serious implications for the transmission of HIV, injectors of amphetamines appear more concerned about the risk of damage to their veins as a result of injecting. Concern for veins was the most commonly cited motivation for having made a transition to snorting or swallowing. It was also the most popular reason given by those subjects who thought they might change to non-parenteral administration.

Considering the prevalence of injection related health problems among injectors of amphetamines, it seems feasible that harm reduction messages focusing on the vascular ramifications of injecting may prove successful in motivating injectors to adopt safer routes of administration. Given the widespread popularity of

amphetamines, encouraging safer methods of amphetamine use appears to be a legitimate and achievable harm reduction intervention.

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