Self-reported overdose among injecting drug users in London: extent and nature of the problem

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Abstract

Aims. To estimate the extent and nature of overdose and factors associated with overdose among injecting drug users in London. Design. Three hundred and twelve current injecting drug users were recruited and interviewed in community settings by a team of "privileged access interviewers". Measurements. A structured questionnaire was used that covered the following areas: demographic characteristics, drug use, injecting behaviour, sharing practices, severity of drug dependence, experience of overdose, injecting-related health problems and treatment history. Findings. The results showed that experience of overdose was common (38%). A majority (54%) had witnessed someone else overdose. Overdosing was not a solitary experience; over 80% of subjects who had overdosed had done so in the presence of someone else, but only 27% reported ambulances having been called. Factors found to be associated with overdose were: age at which injecting began; gender (women being more likely to experience overdose); use of alcohol; and polydrug injection. The overall rate of overdosing was one per 6 years of injecting; however, once an individual had an overdose the chance of having another increased. The risk of experiencing a first overdose fell with years of injecting. Conclusions. Harm-reduction interventions with drug injectors should educate users on the risk factors associated with overdose and actions that should be taken when someone has overdosed. Interventions designed to reduce the risk of overdose may be more effective if they are differentially targeted on drug injectors who have already experienced an overdose.

Introduction

One of the greatest health risks to drug injectors is overdose (Farrell et al., 1996). Joe, Lehman & Simpson (1982) found that overall death rates for drug abusers are many times higher than their peers of the same age, by a factor ranging from three to 14 times. UK statistics on deaths of drug addicts notified to the Home Office
indicate that around 60% of drug addicts' deaths are related to drug use, mainly overdose, and that the number of deaths of addicts has risen each year since 1984 (Home Office, 1995). In a study of patients presenting at Accident and Emergency departments, Ghodse (1977) found that 20 per 1000 of adult patients were presenting with drug-related problems, the majority of which were overdose. An 11-year follow-up study of 83 British opiate addicts found a mortality rate of 20% (Cottrell, Childs-Clarke & Ghodse, 1985). Despite such rates of overdose, little specific attention has been paid to measures which might reduce the level of overdose among drug users. Recent harm reduction campaigns have focused upon the reduction in the spread of HIV among drug injectors, yet overdose presents a considerably greater immediate health risk to drug injectors in many countries. Frischer et al. (1993) reported that over 90% of deaths of drug addicts in Glasgow were related to overdose or suicide, while only 2% were caused by HIV/AIDS.

Several factors have been found to be associated with overdose. Walsh (1991) reviewed opioid-related accidental deaths and found that in 48% of cases, alcohol had been used prior to death. Also in their study of 505 victims of fatal heroin overdose, Ruttenber, Kalter & Santinga (1990) found higher levels of ethanol in those subjects with lower levels of morphine, suggesting that ethanol enhances the toxicity of heroin. In the UK, Hammcrsley, Cassidy & Oliver (1995) have suggested that the combined use of heroin and benzodiazepinrs increases the risk of overdose. Other factors that have been found to be associated with drug overdose include: longer heroin-using career (Darkc, Ross & Hall, 1996a), greater dependence upon heroin (Darke et al., 1996a; Gossop et al., 1996), route of drug administration (Potticger et al., 1992), having been in treatment (Darke et al., 1996a) or having recently left treatment (Davoli et al., 1993), and having a criminal history (Joe et al., 1982).

A number of studies have considered non-fatal overdose. Darke et al. (1996a) recently interviewed 329 heroin users in Sydney about their experiences of non-fatal overdose. They found that non-fatal overdose was a common experience, with more than two-thirds of heroin users reporting such an experience. In a study of early and episodic heroin users in London, Gossop et al. (1996) found that about a quarter of their sample reported one or more non-fatal overdoses, and 48% reported being present when someone else overdosed. Studies that question drug users about their experiences of non-fatal overdose are of particular importance in determining the events that occurred around the time of overdose, which will help to inform us better on appropriate interventions that have not yet been formally identified or prompted. Overdose experiences were found to be almost exclusively among those who injected in an earlier study, a history of overdose was found in only 2% of heroin "chasers" compared with 31% of heroin injectors (Gossop et al., 1996). Consequently the present study reports on a group of current injectors who were interviewed about their experiences of non-fatal overdose.

**Methods**

Three hundred and twelve current injecting drug users were interviewed as part of a study examining overdose and co-morbidity factors among drug injectors. The inclusion criterion for the study was that subjects had to have injected an illicit drug at least once in the month prior to
interview (summary data on overdose experiences and witnessing of overdoses are reported elsewhere (Strang et al., 1999) in the exploration of acceptability of proposal of take-home naloxone). All subjects were recruited and interviewed in community settings and the interviews were conducted in London over a 10-month period during 1994 and 1995 by a team of 24 specially recruited and trained "privileged access interviewers", who had good contact with drug users and were non-threatening to the study group. They were also chosen on the basis that they were socially and educationally equipped to conduct the interview schedule and that doing so would not be damaging to them. All interviewers were given training and the interviews were tape-recorded to ensure that they had been conducted correctly. A full de-briefing was conducted with each returned interview and how the respondent had been identified explored. This methodology relies on exploiting the peer networks of drug users or those who have contact with drug users to generate a chain-referral sample of drug users exhibiting certain pre-defined characteristics. In this case, the criterion was to have injected a drug in the month prior to interview. Samples derived from such non-probabilistic methods must obviously be interpreted with caution and cannot necessarily always be generalized to the general population from which they are drawn. However, Keubler & Hausser (1997) found that this method produces good population coverage and it has been successfully employed to study a range of hidden populations where no sampling frame is available and access by non-group members limited (for a full description of this methodology see Griffiths et al., 1993). Data were collected by means of a structured questionnaire developed especially for the purposes of this study. This took approximately 45 minutes to administer. The questionnaire included the following areas: personal demographics, present and past drug use, injecting behaviour, sharing practices, severity of drug dependence (as measured by the SDS, sec Gossop et al., 1995), experience of overdose, injecting-related health problems and treatment history. As one of the aims of the study was to explore how drug users differentiate overdose from desired effects of the drug, no standardized definition of overdose was given. Instead a set of supplementary questions were included to develop an understanding of the symptoms that subjects would classify as overdose.

Results

(a) Background characteristics of the respondents

Demographics and treatment. The sample of current injectors comprised 196 (63%) men and 116 (37%) women. The mean age of subjects was 30.6 years (range 14-54). The majority (91%, 285) described their ethnic origin as white, with 7% (21) describing themselves as African/Caribbean. Forty-eight per cent (150) of subjects were currently receiving treatment for a drugs problem and 71% (220) had at some time approached drug treatment services for help. Sixty-five per cent of the group (202) had been to a drop-in centre, 42% (129) to a hospital-based drug service, 28% (85) to an inpatient drug unit, 30% (94) to a residential
rehabilitation unit and 65% (202) had approached their GP for help with a drugs problem. Eighty-three per cent (258) of the group had been to a needle exchange programme, not included in the previous treatment category.

Drug use. Ninety-four per cent (294) of this group of current injectors had ever used heroin and 93% (290) had used it in the year before interview. The mean Severity of Dependence Score for those who had used heroin in the last year was 8.7 (range 0-15). Seventy-six per cent (238) of subjects had used cocaine, 72% (225) had used cocaine powder and 64% (199) had used crack-cocaine. Sixty per cent (186) of subjects had used the drug, either in the form of cocaine powder or crack-cocaine, in the last year. The mean Severity of cocaine Dependence Scores for those subjects who had used cocaine in the last year was 3.6 (range 0-15). Seventy-six per cent (238) of respondents had used methadone in the last year. The mean Severity of methadone Dependence Score for these subjects was 6.6 (range 0-15). Ninety per cent (279) of respondents had drunk alcohol in the year prior to interview. Of these, 39% (110) had had periods of a month or longer when they had taken alcohol every day or nearly every day. One hundred and six (34%) respondents had used alcohol in the week prior to interview. The mean number of days that they had used alcohol during this week was 5.5 (range 1-7) but 57% (60) had used alcohol daily. The mean number of units that subjects had drunk in the previous week was 20 (range 2-86). A standard British unit contains 8-10 g alcohol. Thirty-one per cent (22/72) of men and 47% (16/34) of women who had drunk alcohol in the last week reported a last-week intake of more than 21 units and 14 units, respectively.

Injecting behaviour. Subjects first injected a drug at a mean age of 20 years (mode 17, range 11-38). At interview most had been injecting for a considerable time, with the mean length of time being 10 years, although this ranged from less than 1 year up to 40 years. Ninety-four per cent (294) of the group had injected heroin, 63% (197) had injected cocaine and 53% (164) had injected benzodiazepins. The mean number of days in the month prior to interview that subjects had injected was 19 (range 1-31). The majority of the group were current heroin injectors, with 87% (272) having injected heroin in the last month. Twenty-six per cent (81) had injected cocaine in the last month.

(b) Frequency of non-fatal overdose
Subjects were asked to describe how they would identify an overdose. The main ways that respondents said they would be able to tell if someone had overdosed was if they had collapsed (44%, 138), in their facial appearance (turned blue or eyes rolling back) (27%, 84), if they had stopped breathing (11%, 34) or were visibly dead or almost dead (11%, 34). Thirty-eight per cent (117) of the sample reported at least one overdose. In total, subjects had had 580 overdoses over a total of 3347 years injecting, giving a rate of 0.173 overdoses per person per year—or about one overdose per person per 6 injecting years. The following analysis assesses the rate of overdosing in the sample and differences between subjects' risks of experiencing a
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non-fatal overdose.

for the 117 subjects who had overdosed, the mean number of times they had overdosed was 5 (mode of 1). of these, 9% (11) reported having had 10 or more overdoses and these together accounted for 47% (272) of the reported overdoses, spread over 223 years of injection, an average rate of 1.22 per person per year. this rate was six times the average overdose rate for the group as a whole.

only 56% (66/117) of subjects who had overdosed reported having gone to hospital as a result of any overdose. those subjects who had been to hospital had done so on a mean of five occasions (mode of 1), a total of 342 attendances at hospital; hospital attendances for non-fatal overdoses therefore represent only 59% of all the non-fatal overdose incidents. the 117 subjects who overdosed were relatively young when they first overdosed (mean age of first overdose was 22.6 years; range 12-39) and their mean length of time injecting before first overdose was 3 years (range less than 1 year to 12 years, mode of 1). twenty of these subjects who had done so within their first year of drug injecting, representing an overall chance of 0.064, or one in 16, of having a non-fatal overdose in the first year of injecting.

(c) last occasion of overdose

the 117 subjects who had overdosed were asked in more detail about the time they had last overdosed; on average this was 5 years prior to interview although 30 of the 117 overdoses occurred during the last year. for these 117 subjects, this last occasion was on average 7.6 years after first injecting (range 0.0-26.5).

the majority of overdosers (81%, 95) were with someone else when they last overdosed. of these subjects 60% (57) were with a close friend, 34% (32) were with sexual partner and 26% (25) were with a casual acquaintance. forty-three per cent (50) had been taken to hospital when they had last overdosed; for two-thirds of these (32) an ambulance had been called to take them to hospital. eleven subjects (4% of all subjects or 10% of those who had overdosed) reported that the last time they had overdosed was a suicide attempt.

subjects were using drugs mainly by injection (80%, 94/117) when they last overdosed, and the remainder were taking the drugs orally. sixty-one per cent (71/117) of subjects on this last occasion of overdose had been using only one drug (excluding alcohol) and the remaining 39% (46/117) had used more than one drug on their last occasion of overdose: 23% (27/117) had used two drugs, 12% (14) had used three drugs and 4% (5) had used four or more drugs. the majority of those subjects who had used only one drug on their last occasion of overdose had used heroin (83%, 59). respondents who had used more than one drug on the last occasion of overdose had used heroin (83%, 38), benzodiazepines (43%, 20), methadone (30%, 14), other opiates (17%, 8), stimulants (22%, 10) and barbiturates (7%, 3). of all subjects who had overdosed, 83% (97/117) had used heroin on the last occasion of overdose.

over half the subjects (52%, 61) had been using alcohol on the day that they last overdosed. the mean number of units that these subjects had drunk on the day of overdose was 17 units, with one subject having drunk 70 units (minimum 3 units).

(d) factors associated with non-fatal overdose subjects who were regular alcohol users over
the last year (those who in the last year had a period of at least a month when they had drunk every day) were more likely to have overdosed in the last year than others. Sixty-three per cent (19) of these regular drinkers had overdosed, compared to only 37% (11) of those who had not had regular periods of alcohol consumption in the last year (y^2 = 11.36, df = 1, p< 0.001).

There were gender differences in the rate of overdosing, with females overdosing throughout their injecting history at an overall rate of 0.215 per year and males at 0.156. No significant difference was found in current severity of heroin dependence between those who had and had not overdosed' (t = 1.21, df = 283, p = 0.23).

The injecting of benzodiazepines was significantly related to rate of overdose. The 159 people who had ever injected benzodiazepines had on average 2.98 overdoses over 12.42 years of injecting, a rate of 0.238 overdoses per person per year; this compares with 0.716 overdoses on average over 9.08 injecting years, a rate of 0.079, among those who had never injected benzodiazepines (72 = 118.84, p < 0.0001). The injecting of cocaine was also found to be a significant factor in overdose experience: the 195 who had ever injected cocaine had an overdose rate of 0.217 over an average of 11.6 years injecting, compared with a rate of only 0.081 over an average of 9.4 years injecting for those who had never injected cocaine (y^2 = 76.27, df = 1, p<0.0001).

Differences were also found in history of overdose and the body site at which subjects normally injected. Only 31% (61) of subjects who normally injected in their arm had overdosed at some time, compared to 46% (56) of those who usually used other injection sites. Allowing for the differing length of injecting histories, averaging 8.9 years and 13.8 years, respectively, the resulting rates of cvcr overdosing were 0.116 and 0.230 (x^2=61.73, df = 1, p<0.0001).

To separate the effects of duration of injecting from other influences such as age, drug dependence and gender, a multiple risk analysis of time to first overdose was carried out. A multiple logistic regression was used of "ever overdosed" against "time since first injecting to time of first overdose" as the measure of exposure to risk of first (ever) overdose. In addition to duration of injecting, other factors were included in the analysis, namely age first injected, ever attended treatment, severity of dependence on heroin, and gender. Duration of injection with an odds factor 1.0563 (Wald 9.0556, df 1, p<0.005) suggests that the risk of having a first overdose is about 6% a year on average for each year injecting. However, the rate of first overdosing was not constant but fell with increased years of injecting by an odds factor of 0.83 (Wald test 11.487, p<0.001), a feature of simple survival models when there is heterogeneity between individuals in their risk of overdosing. Additionally, age at first injecting was a significant factor, decreasing the rate of ever overdosing by about 11% per year of delay (odds factor of 0.89, Wald test 8.022, p<0.001). Being female was significant in contributing to a higher rate of first overdosing (odds factor 1.21, Wald test 5.201, p < 0.001). Ever attending treatment was additionally identified as having a significant effect. This factor, however, covering attendance at treatment before or after first overdose should be interpreted with caution since having had an overdose may be a cause or a result of seeking treatment.

Discussion
There has been concern about overdose among heroin users for many years (Ghodse, 1977). This issue has recently become a focus of attention. In a survey of overdose among heroin users in Sydney, Australia, Darkc et al. (1996a) reported a life-time prevalence of 68%. In a study of early and episodic heroin users, Gossop et al. (1996) found that 23% had previously overdosed—a lower rate than reported by Darkc and colleagues and a lower rate than found in the study reported here, presumably due partly to the different sample characteristics. In the present study, all heroin users were injectors whereas the previous study sample included non-injecting drug users among whom virtually no overdoses had occurred.

The present study was based on self-reported overdose incidents and drug-taking behaviour. As ever, the potential for varying concepts and terms must lead to some caution when relating these data to harder definitions of overdose. It is encouraging in this respect to note that the respondents' understanding of the term was broadly equivalent to clinical understanding of this phenomenon. Clinically one would expect loss of consciousness and reduced respiratory rate to be among the factors associated with opiate overdose. Drug users in this study were reporting unconsciousness, appearing dead and turning blue as indicators of overdose. However, although it may be that self-identified overdoses are not likely to be defined with clinical precision, it appears likely that, if anything, drug users' definitions of overdose may be less sensitive than those used by clinicians. That said, how drug users themselves define what constitutes an overdose is a topic worthy of further exploration, as it is likely to influence the efficacy of interventions in this area. The data in this paper should be interpreted with regard to the fact that this term is unlikely to be used with clinical precision by drug users themselves. It should also be remembered that important differences may exist between fatal and non-fatal overdoses. It is unclear, for example, if all drug users who experience non-fatal overdoses are at the same risk of death or if other factors exist that disproportionately influence whether an overdose will lead to a fatality. Non-fatal overdoses are chosen for study for the same reasons that attempted suicides are investigated. As it has often been pointed out in the past, events leading to fatalities do not often lend themselves to observation and subsequent interview is obviously impossible. However, there remains a need for exploring what can be learnt from reports of drug fatalities and this is an area in which improvements in ongoing epidemiological surveillance is required. It should also be remembered that data based on the retrospective reporting of events must be interpreted with caution. Subjects in this study reported events of non-fatal overdose going back over a considerable time period. The methodological problems associated with recall arc well known, and the possibility exists that memory effects will influence how subjects recall overdose events. In addition, patterns of drug use change over time and factors historically associated with overdose cannot be simply assumed to reflect the current relationship between variables.

The injecting drug users in this study covered a range of injecting and drug-taking behaviours. The community-based "privileged access" recruitment methods that were used produced a broad (non-random) distribution of such characteristics in the study group, but it is unlikely that the procedures will systematically distort the relationship between these factors and the overdose experiences on which this study reports. The group had extensive experience of overdose; more than a third of the group reported having overdosed at least once in their lives and a minority of the subjects reported a disproportionate number of overdoses (9% reported having had 10 or more overdoses). Ten per cent of those who had overdosed reported that the overdose was taken deliberately as a suicide attempt.

More than one-third of subjects used a combination of drugs with heroin, benzodiazepines and
methadone being among the more frequently reported substances. Overdose was more frequent among drug users who reported patterns of polydrug injection (particularly involving benzodiazepins and cocaine, as well as heroin). The data do not allow us to identify the direction—or existence—of any causal relationship, for example whether the greater likelihood of overdose is a direct result of the multiple drug use or whether, alternatively, both the polydrug use and the increased incidence of overdose relate independently to some increased psychopathology.

The drug most frequently implicated in overdoses among this group of injectors was heroin. On the last occasion of overdose, heroin was used in 83% of these events. However, alcohol or other drugs were also frequently used in combination with heroin. More than half the subjects had been drinking alcohol on the day that they last overdosed, and a significant number had been drinking heavily. Those who had been drinking reported having used an average of 17 units and one person reported 70 units on the day of their last overdose. The precise effect of alcohol on the likelihood of heroin overdose is not known, although the association of alcohol and heroin in overdose has been reported previously (Darkc et al., 1996a; Zador, Sunjic & Darkc, 1996). Increased risk of overdose may be due to a pharmacological interaction or to the additive effect of another sedative drug. It is also possible that the risk of heroin-related overdose may be increased by drinking heavily because of intoxication and impaired judgement. The importance of alcohol in increasing the risk of heroin-related overdose is suggested by the postmortem study of blood samples in the United States, which found that combinations of ethanol and heroin substantially influenced mortality rates (Ruttenber & Lukc, 1984). Similarly, Zador et al. (1996) found, in their post-mortem study, that blood morphine concentration was lower in the bodies of drug users who had been drinking than among those in whom no alcohol was detected.

On average the drug users in our study had been injecting drugs for about 3 years prior to their first overdose, although about one in six of those who had ever had an overdose had done so in their first year of injecting. These findings are broadly comparable to those reported among Australian heroin users by Darkc et al. (1996a) and show higher rates than among early and episodic heroin users in London (Gossop et al., 1996). For those subjects who had had an overdose, the chance of having another one rose for each overdose reported. For those subjects who reported multiple overdoses (10 or more) the risk of overdose was calculated at 1.22 per injector per year or six times the risk of the group as a whole. Those working with drug misusers should be aware of this disproportionate risk of overdose. Drug users who report multiple previous overdoses are likely to be a particularly appropriate group for targeting interventions designed to reduce behaviours associated with overdose. It is also likely that such drug users generate considerable costs in terms of care provided by accident and emergency services. A small percentage of this sample had had multiple hospital admissions as a result of drug overdose. Targeting resources at overdose prevention could therefore generate cost savings in other areas of health care provision. Why some drug injectors appear to be particularly prone to experiencing overdose remains unclear. This study identified a small number of individuals who had repeat experiences of overdose. The development of effective interventions with this group would benefit from a detailed qualitative exploration of the behaviours that lead to these repeat experiences of overdose.

It is interesting to note that for the group as a whole the risk of experiencing a first overdose decreases with Years of injection. This finding can be interpreted in at least two ways: either that people become over time less prone to risk, or that heterogeneity between individuals in
their risk of overdosing results in those less prone surviving longest. This topic merits further
research attention. Studying the behaviour of injectors who appear to be at reduced risk of
overdose may identify strategies for avoiding overdose that can be encouraged among other
drug injectors.

The considerable individual variation in experience of overdose suggests that less risky and
more risky behaviours exist alongside each other among populations of drug injectors. Drug
education programmes should ensure that drug injectors are aware of these risks. Peer
education and other approaches have been used successfully to encourage behavioural
change among drug injectors with regard to reducing the risk of HIV infection transmitted
through the sharing of needles and syringes (Stimson, 1995). Similar approaches need to be
developed that encourage injectors to modify their behaviour in such a way that reduces their
risk of overdose.

It is known that gender affects both patterns of drug use and the harms associated with drug
use (Barnard, 1993; Dwyer et al., 1994; Powis et al., 1996). In this group of injectors females
overall had a risk factor 20% higher than males. tie study of gender influence on the relationship
between drug use and overdose is now necessary.

Overdoses, like many other features of drug taking, are predominantly a social behaviour.
Overdoses seldom occurred when the drug taker was alone. More than three-quarters of
respondents overdosing had someone with them when they last overdosed, and more than half
had been present when another drug user had overdosed. One of the contributory factors in
fatal overdoses is the , inadequacy of the responses of those present (Strang et al, 1996).
Witnesses to the overdose may delay calling an ambulance for fear of police intervention. In this
study less than half the people on their last overdose were taken to hospital and an ambulance
was called in just over a quarter of the overdoses. Darks, Ross & Hall (1996b) have also found
that among those who have witnessed an overdose, only a minority will call an ambulance as
their first course of action. Clearly the responses of drug users to these overdose situations are
currently deficient.

It may be possible to introduce measures to reduce overdose, morbidity and mortality.
Overdose was most likely to occur when others were present and the majority had had some
contact with drug treatment services. Educational and training programmes delivered through
drug treatment services could expect to reach many of those likely to have an overdose in the
subsequent year, and certainly over their remaining drug-taking career. Drug users may not
appreciate the importance of prompt summoning of an ambulance, the advantages of
cardiopulmonary resuscitation and laying the unconscious subject in the recovery position. If
methods can be developed to enable heroin users to cope more competently with the overdose
of others, then it seems likely that there are sufficient opportunities for these newly acquired
skills to be applied. Furthermore, in view of the predominance of heroin (or some other opiate)
as the main drug associated with overdose, there may be a case for considering the distribution
of take-home supplies of naloxone (Strang et al., 1996, 1999), to enable emergency
self-resuscitation or the lifesaving administration of an opiate antagonist to someone who has
taken an opiate overdose.

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References


of data collection by privileged access interviewers, Addiction, 92, 325-335.
POI I IIb GR, A., Ihiss-tii, P., INCIARDI, J. & ROsnt.t's, T. (1992) Cocaine use patterns and
female drug users: community samples of heroin and cocaine users compared, Substance Use
and Misuse, 31, 529-543.
Science, 226, 14-20.
RUI-nTNER, A., KAI.rER, H. & SAN-ITNGA, P. (1990) The role of ethanol abuse in the
response and the prevention of the epidemic, Social Science Medicine, 41, 699-716.
take-home naloxone, British Medical Journal, 312, 1435.
STRANG, J., Powis, B., BEST, 1). et al. (1999) Preventing opiate overdose fatalities with
take-home naloxone: pre-launch study of possible impact and acceptability, Addiction, 94,
199-204.
WAtsti, R. (1991) Opioid drug accidental deaths in the Newcastle area of New South Wales,
toxicological findings and circumstances, Medical Journal of Australia, 164, 204-207.