

Deaths of heroin users in a general practice population

AIDAN B.V. BUCKNALL, BSc
Research Associate, Edinburgh

J. ROY ROBERTSON, MRCP
General Practitioner, Edinburgh

SUMMARY. Recent evidence suggests that heroin users in the UK are 16 times more likely to die than otherwise expected, although causes of death are varied. The present investigation examines deaths of heroin users at a large Scottish general practice over a four-year period prior to 1 July 1985. A mortality rate of 9.72 per 1000 heroin-user patients per year was observed, roughly half that previously reported, although this difference did not prove to be statistically significant. A higher proportion of the observed deaths were attributed to heroin, and fewer to the misuse of other drugs, and it is speculated that this may reflect the practice's policy of not prescribing opiates to heroin users. Factors associated with heroin-user deaths are examined and areas identified where general practitioners may help to avert some of these deaths.

Introduction

THE rising number of heroin users in the United Kingdom¹ will inevitably lead to increased contact between those dependent on illicit drugs and general practitioners. Despite the directive of last year's Department of Health and Social Security guidelines,² many doctors remain reluctant to treat these patients, who are often seen as troublesome and unrewarding to treat.³ Nevertheless, for the many doctors who are prepared to become involved in the care of heroin users one of the foremost concerns is the alarming number of deaths among these patients.

In reviewing the mortality of notified drug addicts in the UK between 1967 and 1981, Ghodse and colleagues estimated that the crude mortality rate had fallen from 23.5 per 1000 heroin-user patients per year for the period 1968–70 to 18.4 per 1000 per year for 1978–80.⁴ This latter mortality rate was 16 times higher than otherwise expected when adjusted for age and sex, and is similar to that observed in a recent 11 year follow-up study of drug users attending a drug dependence clinic.⁵ Reports from the USA estimate the mortality rate of heroin users there to be about 1% annually.⁶

While a 1–2% annual mortality rate is probably lower than is popularly believed, it must represent a major cause of death within the appropriate age groups. Within the context of our wider investigation, it seemed important to examine the mortality rate of heroin users from our own study population, and particularly to identify factors associated with these deaths which may enable general practitioners to reduce the risk of death for heroin users who attend.

Investigations into cause of death

Ghodse and colleagues clearly indicated that the mortality of heroin users cannot be attributed solely to heroin itself.⁴ Only 74% of the deaths in his study were directly related to drugs,

heroin being implicated in only 7% of these. It was concluded that medically prescribed drugs, rather than illicit 'street' drugs, were at the core of the problem.

In a similar survey of Home Office records in 1968, Bewley and colleagues reported that accidental overdose and sudden death following opiate administration accounted for only 29% of deaths of heroin users.⁷ Suicides accounted for around 23%, the remainder being either death by violence, septic conditions such as septicaemia, pulmonary infection and endocarditis, or by 'natural causes'.

A similar pattern was observed in a large American study, 28% of deaths being attributed to violence, 17% to 'natural causes', 11% to unknown causes, and 44% to drug-related causes.⁸ Many deaths of drug users are therefore not directly the result of drug usage, although deaths by violence and suicide may reflect the personal deterioration and the life-style exhibited by many addicts. It is well known that there is no clear evidence that heroin directly causes tissue damage in humans.^{9,10} This may be because heroin is similar to a substance which occurs naturally in the bloodstream.¹¹ The dangers of heroin use are therefore thought to be related to aspects of the psychology of the user, and the way in which the drug is used.⁹ This being so, it may be that without too great an effort on the part of doctor and patient alike many of these deaths may be preventable.

Method

The investigation formed part of a two-year research programme funded by the Scottish Home and Health Department. Over recent years, 184 heroin users have attended a large Edinburgh group practice of about 18 000 patients. Of these, over 120 are currently registered with the practice. Details of the practice itself and a number of these patients have previously been reported.^{12,13}

A retrospective search was conducted and each case of death and the relevant information regarding the death was recorded at one of the following stages. First, by consultation with the practice's doctors, attached staff and practice records, or secondly, in a search of the records of the General Register Office for Scotland. Finally the patients were 'flagged' by that office which resulted in the doctor being quickly notified of a patient's death and provided with the appropriate details in the form of death certificates. One hundred and eighty patients were successfully flagged in this way, four remaining untraced at the time of writing. The period 1 July 1981 to 1 July 1985 was taken to be the study period.

Results

Six male and one female patients using heroin were found to have died in this period. The average age of the men was 28.3 years; the age of the one woman was 22 years. The age of onset of heroin use could only be established in three cases, with an average duration of use of 3.7 years, ranging from one to seven years.

Five of the patients were born locally, the others in other parts of Scotland. The marital status of five of the patients was established: three of the men were divorced, one was single, the female victim was re-married and a sister of one of the dead males. There was, therefore, an unusually high divorce rate among these individuals. In keeping with the overall practice

population, the dead patients were predominantly of social class 4 and 5, four were (or were married to) labourers, one was a welder, one a hairdresser and the occupation of one was unknown.

Cause of death

Death certificates were obtained in six cases, the seventh patient died abroad and no details were available. Three patients were reported to have died of heroin overdose — two on tenement block staircases and one in a public house toilet. For one of these patients pulmonary oedema was also recorded as a cause of death. In none of these cases was a post-mortem examination conducted, the cause of death being recorded by the certifying doctor.

Two other patients suffered death by poisoning, both in hospital; the drugs implicated in one case were methadone, dihydrocodeine, temazepam and diazepam. Post-mortem examination of the other case revealed pulmonary and cerebral oedema, hepatic failure, haematemesis and melaena, apparently due to the ingestion of paracetamol and suicide was assumed. In both of these cases, drug addiction was also referred to on the death certificate. The final patient died in hospital, suffering an intracerebral haemorrhage following a violent incident.

Mortality rates

Of the 180 patients successfully traced who were known to be heroin users, seven were shown to have died in the study period. From this a mortality rate of 9.72 per 1000 patients per year, approximately 1%, was estimated. This figure is roughly half that observed in previous British investigations although this difference did not prove statistically significant, the 95% confidence limits for seven deaths in 180 individuals over four years extending from nearly three to 14 deaths. Adjusted for age and sex, this represents an increase in the likelihood of death by a factor of 11.6 as compared with Scottish mortality figures.

Discussion

Although not statistically significant, the incidence of death among heroin-users in the present study does appear to be lower, nearly half, than that of previous British investigations, giving a similar incidence to that in the USA.^{4,6} Various factors may account for this, such as the larger number of apparently non-addicted heroin-users attending general practice, and the steady decrease in mortality among these patients reported by Ghodse and colleagues.^{4,12,13} However, this decline in mortality since 1968 has been very gradual, and it is reported that 'novice' and experimental users have the same risk as long-standing users.^{4,14}

An alternative explanation may be found in the causes of death of these patients. Suicide and violence played a role, as previously reported, although no deaths from septic conditions were observed, despite the high rate of hepatitis and bacterial endocarditis previously reported among this practice population.¹² The low mortality may perhaps reflect the practice's policy of non-prescription of opiates to drug users, since there was a low number of deaths in which medically prescribed drugs were implicated, compared with the number found by Ghodse and colleagues.⁴ Further research is clearly needed to confirm this impression, which has implications for the current controversy regarding the prescription of opiates to heroin users.

The elusive cause of heroin overdose

No revision of prescribing policies could prevent all drug-related deaths. Indeed, the high proportion of heroin overdose deaths observed in this general practice population demanded an examination of the causes of heroin overdose which are little

understood and obscure.^{11,15} Several mechanisms have been suggested, each with both supportive and contradictory evidence, each probably responsible on certain occasions.

Overdoses of heroin actually kill by respiratory failure and pulmonary oedema, probably caused by hypoxia.^{16,17} Why this is induced is unclear. In some cases a hypersensitivity reaction to adulterants and impurities in the 'street' heroin may occur. Such adulterants include quinine (rarely seen in the UK), bicarbonate of soda, sugar and talcum powder and even brick dust.^{9,10} Also considered a major cause of 'overdose' is the dangerous interaction of opiates and alcohol, even at very low doses.¹⁵ There is considerable evidence to support this latter hypothesis.^{8,18,19}

Classically, overdoses are believed to occur when a user administers a dose of heroin which exceeds his limit of tolerance.¹⁵ Gossop reports that 'there seems to be no limit to the amount of opiate that the body is capable of tolerating', although a dose of 200–350 mg will probably prove fatal to a non-tolerant user.⁹ Exceeding tolerance limits may occur in several ways: an experienced user may administer a dose of unusual purity (25–35% is not unusual in the UK), or become careless in his use through desperation or alcohol use.^{9,10,19} Similarly, inexperienced users may over-estimate their tolerance limits, or simply be unaware of the dangers.¹⁴

Overdose may also occur following a loss of tolerance.¹⁰ If an individual abstains from drug use for a reasonable time, tolerance to the drug will be lost, and an attempt to administer a previously acceptable dose may prove fatal. In the present study, one case of overdose occurred in a patient who only one week before had been released from prison.

Apparent losses of tolerance occur which cannot be explained so easily. Heroin addicts have been known to overdose after the administration of quantities of heroin (from the same source) that were easily tolerated only hours before.¹¹ One possible explanation for this has been proposed by Siegal and colleagues.⁶ His model of tolerance, based on classical Pavlovian conditioning, suggests that with each administration of the drug, an association is made between the environment in which the drug-taking occurs (the conditioned stimulus) and the systematic effects of the drug (the unconditioned stimulus). The environment therefore becomes a sufficient stimulus to induce an 'anticipatory response' which attenuates the effects of the drug, contributing to tolerance.

Evidence from experiments with rats seems to confirm this, although this evidence can not be considered conclusive. The administration of a placebo in place of the drug, in the drug-taking environment, results in the converse effects of the drug, which represents Siegel's anticipatory response. Similarly, administration of normally tolerated doses in an unfamiliar environment results in an increased rate of mortality.⁶ Such a mechanism may contribute to human overdose deaths if the drug is taken in an unfamiliar environment. In the present study, all three overdose deaths could reflect this mechanism, as it is unlikely that these patients normally injected on staircases or public house toilets.

Risk reduction by general practitioners

The implications of the available evidence are readily apparent. Several factors can be identified which unnecessarily enhance the risk of death to the heroin user. General practitioners are in an excellent position to help avert some of these deaths, through the education of the user and possible revisions of prescribing policies, without encouraging the use of heroin in non-users. An increased awareness of the danger of mixing heroin and alcohol, of the importance of tolerance and purity,

and of the possible effects of changes of environment on tolerance, are all potential areas of risk-reduction for heroin overdose.

The present study has shown that not all deaths of heroin users can be attributed to heroin itself. In the 'natural experiment' of a non-prescribing practice, a low heroin-user mortality, particularly in those deaths in which medically prescribed drugs are implicated, is observed. It is perhaps time to re-examine prescribing policies, especially as no treatment has yet been shown to be any more effective than any other.²⁰

Perhaps of greater significance in the future will be deaths due to septic conditions and infectious diseases as a result of sharing of dirty and infected needles and syringes. With the advent of reliable tests for the antibody to the HTLV3/LAV virus, it is reported that in at least one British city (that of the authors' practice) at least 38% of intravenous heroin users have been infected with the virus, although to date only two cases of acquired immune deficiency syndrome (AIDS) in drug abusers in the UK have been reported.²¹ It is likely therefore that AIDS-related deaths may soon represent the leading cause of death among these patients. Prevention of the spread of infections such as HTLV3 and hepatitis B, through the increased availability of sterile needles and syringes for heroin addicts is still a controversial issue, but one that should be carefully considered.

Current treatment policies tend to assume that ultimate abstinence from drug use must be the goal of any treatment.²⁰ While naturally desirable, it has been pointed out that to talk of 'cures' is not appropriate, doctors being responsible for the welfare of many patients for whom abstinence is not immediately a realistic possibility.¹² The reduction of risk to the user is therefore a justifiable priority in the care of drug addicts, while planning a programme for the eventual achievement of abstinence.

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Acknowledgements

The authors wish to thank the staff and doctors of the West Granton Medical Group, Mr George MacKenzie and Mrs M. Mitchell of the General Register Office for Scotland, without whom this paper could not have been prepared. This project is funded by the Scottish Home and Health Department.

Address for correspondence

A.B.V. Bucknall, Edinburgh Drug Addiction Study, West Granton Medical Group, 1 Muirhouse Avenue, Edinburgh EH4 4PL.



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