

Drug-Related Deaths Among Recently Released Prisoners in the Strathclyde Region of Scotland*

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ABSTRACT: Drug abuse and its consequences are everyday problems encountered globally, and Scotland is no exception. During a study of drug-related deaths in the Strathclyde region of Scotland it was noted that known drug users who had recently been released from prison were at high risk of dying from a drug overdose. The majority of deaths occurred within one week of the release date and polydrug use was prevalent. Morphine was the most frequently encountered drug and this was found in combination with benzodiazepines in a significant number of cases. This paper highlights the dangers of resuming drug consumption following a period of abstinence.

KEYWORDS: forensic science, drug-related deaths, Strathclyde, recently released prisoners, tolerance

Drug abuse and consequently drug-related fatalities are recognized problems in the West of Scotland. While the incidence of both has risen dramatically since the eighties, that of the latter has risen approximately 13-fold. The Forensic Medicine and Science Department, University of Glasgow, is responsible to the Crown Office for the provision of pathology and toxicology services in the Strathclyde Region of Scotland. This area encompasses most of the Southwest of Scotland and has a population of approximately two and a quarter million (Fig. 1). During a retrospective study on drug-related deaths (DRDs) in Strathclyde, it became evident that a population at high risk of dying from drug misuse were recently released prisoners. This paper presents the results of epidemiological and toxicological analyses of all DRDs among recently released prisoners over the eight-year study period, 1990 to 1997.

Methods

At the postmortem examination, blood samples are obtained from peripheral veins (subclavicle or femoral) and sent to the Department of Forensic Medicine and Science for routine analysis for the presence of alcohol and drugs using immunoassay, gas liquid chromatography and high-pressure liquid chromatography. All positive samples are confirmed and quantified by gas chromatography/mass spectrometry following extraction from a nonhy-

drolyzed sample. Data relating to age, sex, cause of death and results of toxicological analysis were obtained from the postmortem and toxicology reports, respectively. Information regarding medical history and circumstances surrounding the death was extracted from the sudden-death report issued by Strathclyde Police. For the purpose of this study, a drug-related death was defined as an unexpected death where drugs were implicated as a cause of death either through circumstance or toxicology.

Results

Throughout Strathclyde, from 1990 to 1997, a total of 670 DRDs were identified of which 87 (13%) involved a drug user who died within one month of release from prison. These deaths accounted for between 3.4 and 20.1% of the total number of DRDs per annum (Table 1). The deceased was known to be an intravenous drug abuser in 95% ($n = 83$) of cases. The majority of deaths occurred in the male population (76%) and the male:female ratio over the study period was approximately 3:1. The average age observed was 27 years (19 to 44 years).

Mode of Death

The majority of deaths (93%) were unexpected as a result of an acute fatal overdose. There were a small number of cases ($n = 4$) where the cause of death was recorded as "unascertained." In all four cases, the deceased was a known drug user; however, toxicology analysis was impossible in two cases as the bodies were in an advanced state of decomposition, making the procurement of a suitable blood sample impossible. In both instances, drug paraphernalia was found at the locus, a used syringe near the body in one case and a syringe and needle protruding from the deceased's left arm in the other. In the other two cases, toxicological analysis did not reveal any trace of drugs. However, in one of these instances, the presence of a used syringe and needle near the body and fresh needle puncture marks present in both groins strongly suggested that the death was drug related. In the fourth case, no sign of natural disease was identified and no real explanation could be found.

The circumstances surrounding two cases where death followed a significant period of survival are as follows. In the first case, the deceased was witnessed to be heavily under the influence of drugs, unsteady on his feet and had slurred speech. He fell asleep on a sofa and was found dead 14 hours later. Methadone and diazepam were detected at levels within the therapeutic range. The cause of death was certified as bronchopneumonia. The other case involved an inebriated individual who was thought to have consumed his week's quota of methadone. He collapsed outside his parent's house and was taken to hospital where he was

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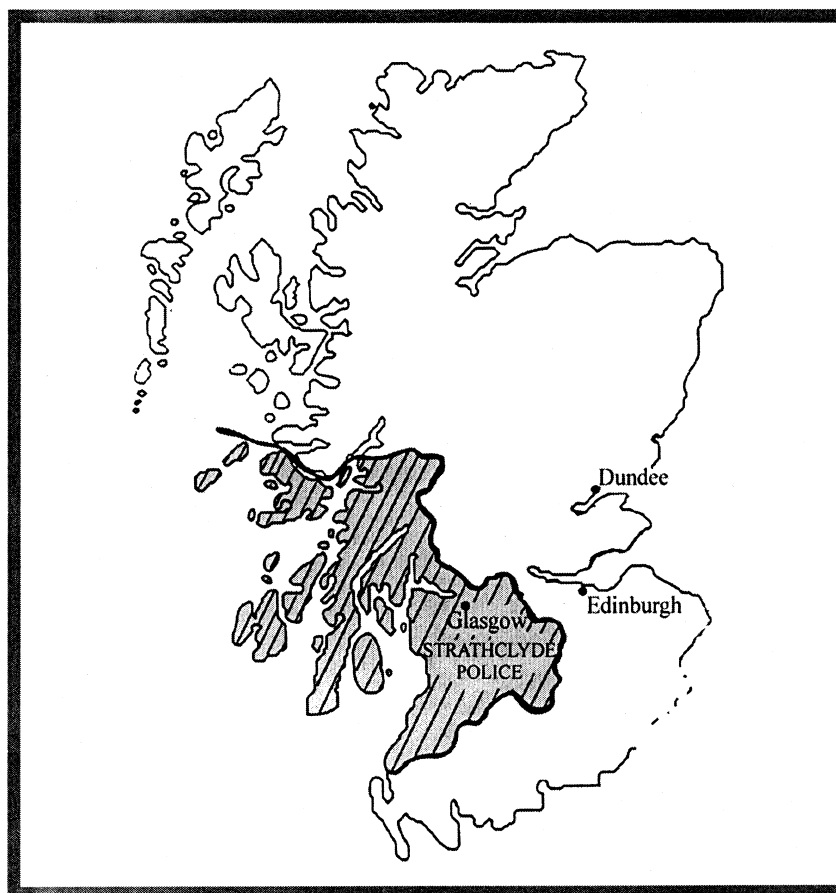


FIG. 1—The Strathclyde region of Scotland.

TABLE 1—Recently released prisoners (RRPs) as a percentage of the total number of drug-related deaths (DRDs) per annum in Strathclyde.

Year	DRDs in Strathclyde	DRDs in RRP's in Strathclyde	Percentage (%)
1990	29	1	3.4
1991	45	6	13.3
1992	81	6	7.4
1993	73	6	8.2
1994	117	17	14.5
1995	119	24	20.1
1996	116	18	15.5
1997	90	9	10.0

declared brain dead. He died three days later with cause of death being recorded as cerebral oedema due to anoxia following drugs and alcohol intoxication.

Time Period Between Release from Prison and Death

Figure 2a shows that the majority of deaths occurred within one week of release from prison (62%), with approximately one third of these deaths occurring on the day of release or the day following release from prison (Fig. 2b). Of the 19 deaths occurring on either of these two days, 47% ($n = 9$) were due to heroin intoxication and four (21%) were due to temazepam and morphine intoxication. The

causes of death for the remaining six cases were recorded as follows:

- Temazepam, morphine and chlordiazepoxide intoxication
- Methadone and morphine intoxication
- Pulmonary congestion and oedema (morphine detected in blood)
- Methadone intoxication
- Morphine and diazepam intoxication
- Temazepam poisoning

Toxicology

There were three cases where no blood sample was obtained. In two of these cases the bodies were in an advanced state of decomposition. In the third, the deceased survived for a period of time in hospital and the admission sample was disposed of prior to seizure. A total of 84 blood samples were received for toxicological analysis. In two cases, no drugs were detected and only alcohol was detected in another two cases; however, these deaths were still considered to be drug related due to circumstantial evidence.

Of the blood samples that tested positive for drugs ($n = 80$), 29% ($n = 23$) were positive for one drug, primarily morphine presumed to be as a result of the misuse of heroin (74%) generally supported by circumstantial evidence. In the remaining 71% of cases, two or more drugs were detected demonstrating the prevalence of poly-drug use (Fig. 3).

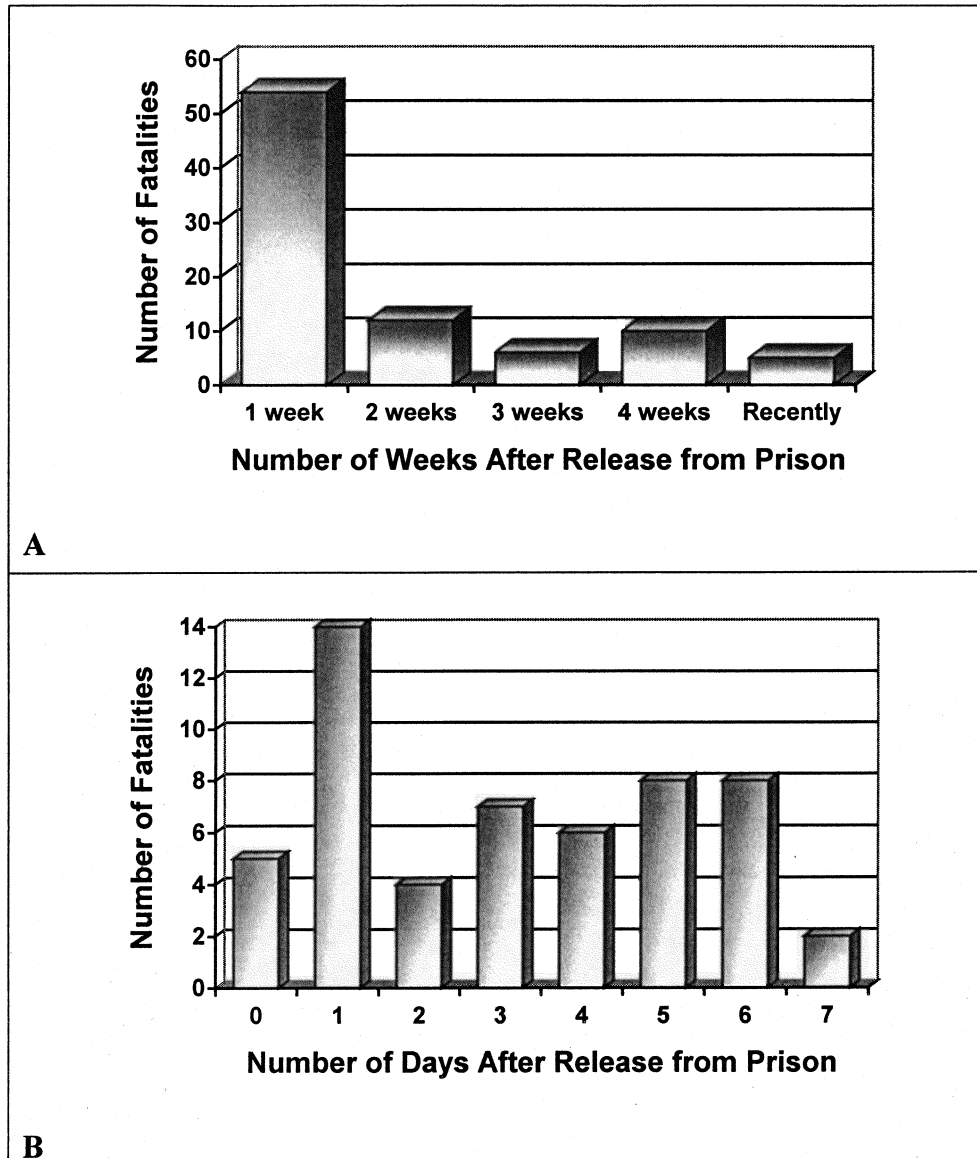


FIG. 2—Time between release from prison and date of death in weeks (A) and days (B).

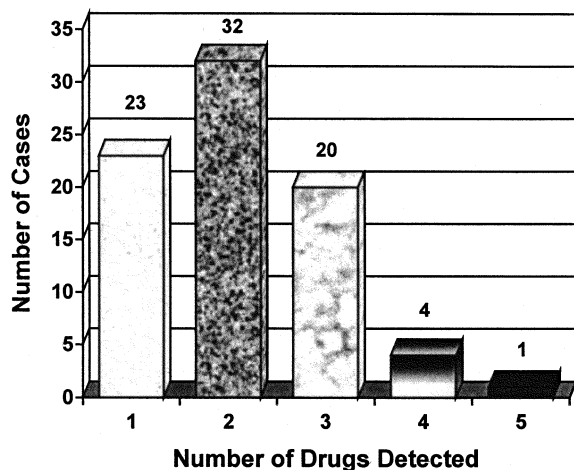


FIG. 3—Number of drugs detected in blood samples.

Figure 4 shows the distribution of drugs detected. Morphine was the most frequently encountered drug ($n = 62$, 78%), next was temazepam ($n = 38$, 48%) followed by methadone ($n = 23$, 29%) and diazepam ($n = 23$, 29%). The most frequently encountered combination of drugs was morphine (heroin) mixed with benzodiazepines, particularly temazepam. Temazepam was replaced by diazepam as the benzodiazepine of choice in the latter years following a drop in the availability of the former as a result of a legislation change in 1996.

Drug Concentrations

Morphine and methadone were mainly detected at levels that fall into the therapeutic range for tolerant individuals (0.04 to 0.5 and 0.05 to 1.0 mg/L, respectively) (1). They were found at significantly higher levels in 26 and 12.5%, respectively (Figs. 5a and b). The average morphine concentration was shown to be above the therapeutic level in cases where morphine alone or in

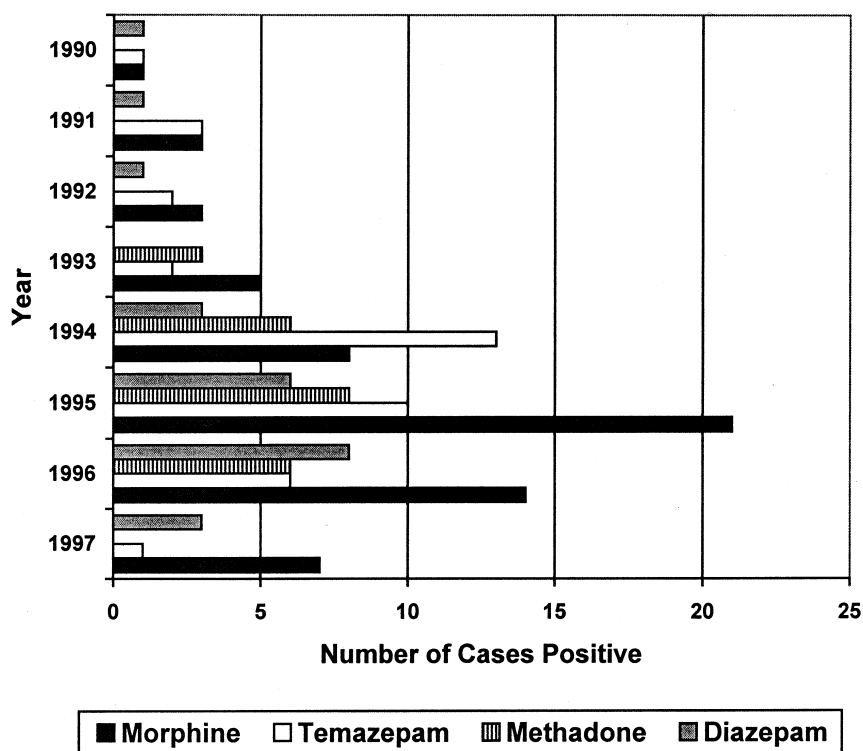


FIG. 4—Drugs detected in blood samples. Note—Other drugs detected in blood: alcohol (23 cases), cannabis (8 cases), paracetamol (6 cases), chlordiazepoxide (2 cases), dihydrocodeine, buprenorphine and trichloroethanol (1 case each). NB: Morphine was detected in urine in one case in 1994 as was methadone. There was one case in 1997 where temazepam, morphine, diazepam, and chlordiazepoxide were all detected in the urine sample. Alcohol was detected in 7 urine samples.

combination with only one other drug had been detected. There were no significant differences with regard to the concentration of methadone detected among those enrolled in a methadone maintenance program (MMP) and those who were consuming the drug illicitly. In 51% of temazepam positive blood samples the concentrations measured were consistent with levels reported in fatalities (therapeutic range: 0.36 to 0.85 mg/L) (1) and in all diazepam positive cases the levels measured were within the therapeutic range (0.05 to 2.0 mg/L).

Alcohol was found at relatively modest levels. The average blood alcohol concentration of all 23 alcohol positive cases was 70 mg/100 mL (range: 8 to 214 mg/100 mL). Morphine was detected in 21 (91%) of these cases and temazepam in 11 (48%) cases.

Methadone Maintenance Program (MMP) Involvement

From the police sudden death reports it was noted that nine decedents (37%) who tested positive for methadone were enrolled in an MMP at the time of death. Seven of these cases occurred within one week of the release date. Of these cases, three had recently started an MMP. In one case, the deceased was prescribed methadone on the day prior to death after stating to his doctor that he had developed a heroin habit while in prison. The other two cases involved the deceased being prescribed methadone on the day they were released from prison. In all three cases, the decedents were to pick up the prescription on a daily basis; however, in one case, the deceased was issued 320 mL of methadone (four-day quota), two days prior to death, due to a forthcoming holiday. Prescribing was resumed in three of the remaining four cases. In one instance, the de-

ceased was prescribed methadone at a lower dosage than he had received prior to imprisonment and in another instance the deceased was given a week's supply of methadone two days prior to death. Of all the decedents in this study who were known to be enrolled in an MMP at time of death ($n = 16$), 69% tested positive for morphine, confirming the misuse of heroin.

Discussion

There has been an increase in the number of drug-related deaths occurring in the Strathclyde region of Scotland over the study period and, coincidentally, a rise in the number of prisoners dying from DRD within one month of their release date was observed. The majority of these deaths involved the male population who were aged in their mid-twenties. Although the overall numbers identified may appear relatively low with respect to the duration of the study, they represent one drug-related death occurring approximately once per month.

Over half the cases (62%) occurred within one week of release from prison and a substantial number of these occurred either on the day of release or the day after release. This highlights the situation that an enforced period of abstinence can lead to a reduction in an individual's tolerance for a specific drug of abuse.

Approximately three-quarters of the deaths were heroin-related and toxicological analysis revealed that polydrug use was prevalent, with the heroin-benzodiazepine combination reported by Cassidy et al. (2) remaining a popular choice for the West of Scotland drug user. These findings are not significantly different to the findings in the study of all drug-related deaths in the Strathclyde region. The preference for diazepam as a mixer in the latter years owes itself to the wider availability of this drug. In 1996, Glasgow

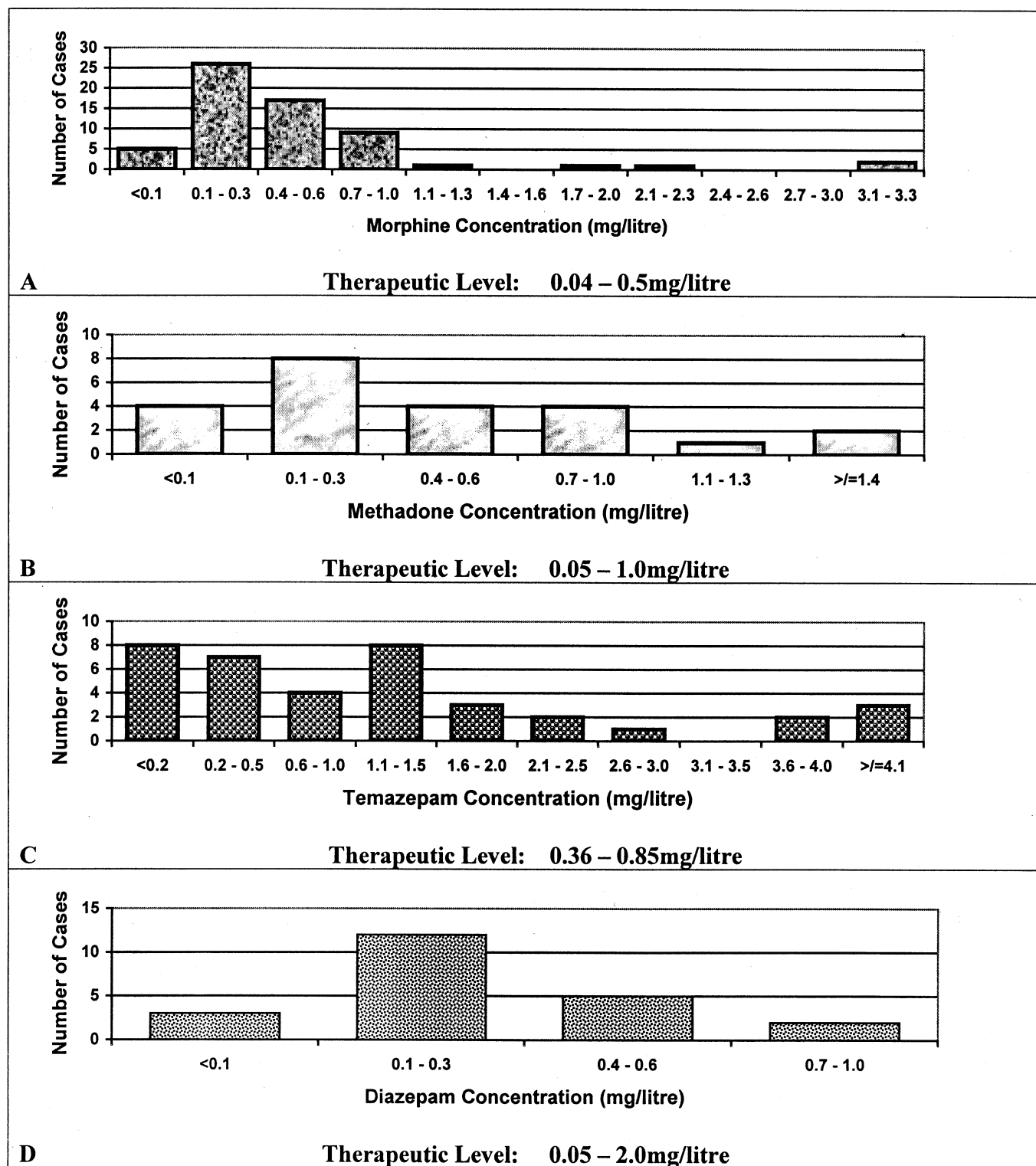


FIG. 5—Concentrations of morphine (A), methadone (B), temazepam (C), and diazepam (D) detected in blood.

general practitioners regarded the prescribing of temazepam as “not good practice” following the transfer of this fast acting benzodiazepine from schedule 4 of the Misuse of Drugs Act 1985 to schedule 3 (3). Alcohol was detected in approximately one quarter of all cases, albeit at relatively modest concentrations, unlikely to cause death alone. Morphine was the primary drug found in all

alcohol positive-drug positive combinations, followed by temazepam. Alcohol, opiates and benzodiazepines are all known to have an emetic effect and when taken in combination, this effect is additive. In the majority of methadone positive cases, the deceased had not been enrolled in an MMP (63%) and the methadone was obtained by diversion of legitimate supplies. This

was similar to the findings of a study on all deaths involving methadone in Strathclyde (4). These studies underline the need for tighter controls on methadone dispensing. For example, a requirement for the drug to be consumed under strict supervision on a daily basis. A substantial number of decedents who were in an MMP at the time of death tested positive for morphine and were apparently continuing to abuse heroin.

There appears to be a breakdown in communication between prison doctors and general practitioners and as a consequence methadone prescribing is often discontinued upon imprisonment. Glasgow general practitioners have reported that the adverse consequences of imprisonment include resumption of heroin injecting and chaotic drug use both in prison and upon release (5).

When a known drug user is released from prison in the West of Scotland, he or she is advised of the risks of overdose and is issued with helpline numbers. This study highlights that, in spite of this advice offered, a significant number of individuals clearly resort to their old habits without building up a tolerance. Comparison between the level of morphine detected in relation to the period of time of release and date of death revealed no significant differ-

ences. There is, however, insufficient data available on a day-to-day basis to draw any real conclusions regarding the level of drug misuse by the individual.

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