

Opioid drug deaths in Western Australia: 1974 - 1984

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1. Introduction

There is a high level of community concern about mortality from opioid drugs, even though this type of drug is responsible for only a small proportion of drug-related deaths. Two drugs, alcohol and tobacco, account for the majority of drug related deaths in Australia.² For instance, a survey in 1980 of the 15-34 year age group found that two thirds of the 1,484 drug-related deaths were due to alcohol-related motor vehicle traffic accidents, almost 20% of them were due to suicide and just over 5% were identifiably related to the use of opiates.³

Mortality from opioid use has been well documented, though this has usually been in the context of addict populations,⁴ of specific opioids⁵ or compared to other causes of death.⁶ The best Australian data have come from a study of drug related deaths for the year 1980, by estimation of the proportion of such deaths by cause, from Australian Bureau of Statistics (ABS) mortality data. There were estimated in the age group 15-34 to be 6.3 drug (other than alcohol or tobacco) deaths per 100,000 population, consisting of a rate of 1.7 for opioids, 2.2 for barbiturates and 2.4 for other pharmaceutical drugs.⁷

Given the perception that the use of opioids is associated with a high mortality rate, it is essential that accurate information be obtained of the features of opioid related deaths. For instance, if we were able to distinguish between the frequency and role of licit and illicit opioids in drug related deaths, we could then establish policy objectives. It is arguable that death due to licit opioid use is largely preventable by the adoption of conservative prescribing practices to minimize excessive use and diversion and death due to heroin use, the principal illicit opioid, could be reduced by the development of highly attractive and accessible treatment resources.

The purpose of this paper is to undertake a descriptive review of the number of deaths directly caused by the use of opioids, and secondly, to evaluate any trends and statistical findings associated with these deaths.

¹ Published in *Australian Drug and Alcohol Review*, 1988, 7: 181-185.

² Drew LRH. 'Death and drug use in Australia, 1969 to 1980.' (1982) 69 *Technical Information Bulletin* 1-44; Walsh RA. 'Narcotic mortality: some implications for drug programs.' (1983) 2 *Australian Alcohol and Drug Review* 90-99.

³ Drew LRH. 'Death and drug use in Australia, 1969 to 1980.' (1982) 69 *Technical Information Bulletin* 1-44.

⁴ Ghodse AH, Sheehan M, Taylor C & Edwards G. 'Deaths of drug addicts in the United Kingdom 1967-81.' (1985) 290 *British Medical Journal* 1985 425-428; Harvey JG. *Addict mortality in inner London*. Paper presented at 11th International Conference of Institute on the Prevention and Treatment of Drug Dependence, Vienna, June 1981; James IP. 'Suicide and mortality amongst heroin addicts in Britain.' (1967) 62 *British Journal of Addiction* 391-398. Joe GW, Lehman W & Simpson DD. 'Addict death rates during a four year post-treatment follow-up.' (1982) 72 *American Journal of Public Health* 703-709.

⁵ Finkle BS, McCloskey, Kiplinger GF & Bennett IF. 'A national assessment of propoxyphene in post mortem medicolegal investigation.' (1976) 21 *Journal of Forensic Science* 706-742; Liddy MJ. *Epidemiology of fatalities related to the abuse of narcotic analgesic drugs in NSW and ACT 1974-1977*. Sydney, Health Commission of New South Wales, Division of Analytical Laboratories, 1978; Litman RE, Diller J & Nelson F. 'Factors related to propoxyphene or codeine or both.' (1983) 28 *Journal of Forensic Science* 128-38.; Richards RG, Reed D & Cravey RH. 'Deaths from intravenously administered narcotics: a study of 114 cases.' (1976) 21 *Journal of Forensic Science* 467-82; Rutenber AJ & Luke JL. 'Heroin-related deaths: new epidemiologic insights.' (1984) 226 *Science* 14-20.

⁶ Drew LRH. 'Death and drug use in Australia, 1969 to 1980.' (1982) 69 *Technical Information Bulletin* 1-44; Gottschalk LA, McGuire FL, Heiser JF, Dinovo EC & Birch H. 'A review of psychoactive drug involved deaths in nine major United States cities.' (1979) 14 *International Journal of Addiction* 735-756.

⁷ Drew LRH. 'Death and drug use in Australia, 1969 to 1980.' (1982) 69 *Technical Information Bulletin* 1-44.

2. Method

The causes of all deaths in Western Australia (WA) are classified by the ABS according to the criteria of the Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death.⁸ By this method each death by an underlying (ie major) cause is classified according to a 4 digit ICD code in the Tabular List of the Manual. With respect to deaths due to the use of drugs, including opioids, a number of classifications are routinely used, namely *Drug dependence* and *Non dependent abuse of drugs* and so called external causes of death, namely *Accidental poisoning*, *Suicide*, *Assault by poisoning* and *Unclear* (whether accidentally or purposefully inflicted).

A number of ICD codes, detailed in Table 1, were used to obtain a population of drug-related deaths, including all opioid deaths. In Australia up to 1978 the Eighth Revision (ICD8), and from 1979 the Ninth Revision (ICD9) of the Manual was used to classify all causes of death in Australia.

Table 1
ICD classifications and causes used for case selection

Cause	ICD8	ICD9
Drug dependence	304	304
Non dependent abuse of drugs	-	305
Accidental poisoning	E853	E850
Suicide	E950	E950
Assault by poisoning	E962	E962
Unclear	E980	E980
Unknown	796.9	799.9

The responsibility for the registration and maintenance of records of all deaths is that of the Registrar General's Office (RGO). Cases were identified by inspection of annual computer printouts supplied by the ABS to the RGO.

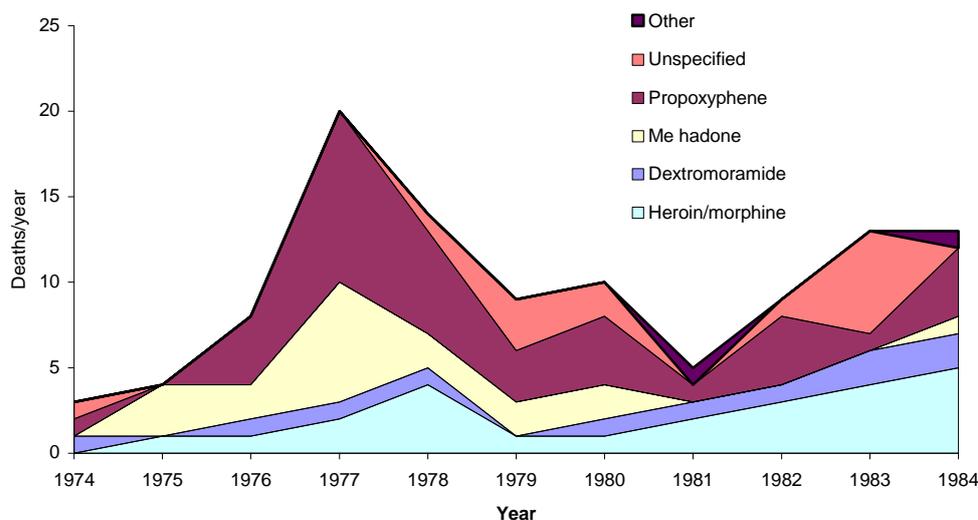
A case was selected as an opioid drug death when the coronial finding was that an opioid, singly or in combination with other drugs was the major cause of death. Drugs defined as opioids for the purpose of the study were heroin, morphine, methadone, dextromoramide, propoxyphene, codeine, pentazocine, pethidine, oxycodone, dihydrocodeine, dihydromorphine and papaveretum. Unspecified opioids variously described in coronial findings as analgesics, opiate or narcotic were also included in the sample. Minor analgesics, such as salicylates, paracetamol and phenacetin were excluded.

3. Results

From examination of individual records, 108 (18.7%) of the 578 drug deaths in WA in the period 1974 to 1984 were found to be directly due to the use of opioids. As shown in Figure 1, there was a bimodal distribution of these deaths - they rose from three in 1974 to a peak of 20 cases in 1977, decreased to five in 1981, then increased in 13 in 1984, at the end of the study period. There were 78 males (72.2%) and 30 females (27.8%).

⁸ World Health Organization. *Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death. Ninth revision.* Geneva, World Health Organization, 1977.

Figure 1
Number of annual opioid deaths by type of opioid, 1974-1984



3.1 Type of opioid

Licit opioids were the most significant cause of these 108 deaths, accounting for 69 (63.9%) of cases. Propoxyphene was the most frequently detected licit opioid and was responsible, either singly or in combination with other drugs, for 36 deaths (33%). It was a cause of death in every year except in 1975 and reached a peak of nine deaths in 1977.

Dextromoramide was also regularly reported, but at a lower frequency. The most significant change in the frequency of a licit opioid was in the number of cases of methadone, as can be seen in Figure 1. Methadone as a cause of death was not reported in WA prior to 1975, reached a peak of seven cases in 1977, and was not reported after 1980, except for one further case in 1984.

Heroin was responsible for 12 deaths (11%), either singly⁹ or in combination with other drugs.¹⁰ Morphine was also held responsible for 12 deaths, of which 10 were attributed solely to its use. The frequency of annual deaths by type of opioid, singly or in combination with other drugs, is plotted in Figure 1.

In Figure 1 cases involving heroin and morphine have been combined because of the common pharmacological origin of these drugs and the probability some of the 12 morphine cases involved heroin (diacetylmorphine) which had been metabolized to morphine.

3.2 Combinations of opioids

The majority of deaths, 69 cases, involved only one drug, 29 cases involved two drugs and ten cases involved a combination of three or more drugs. There were however only four cases that involved a combination of opioids: heroin and dextromoramide, methadone and propoxyphene, heroin, morphine and methadone and propoxyphene and codeine.

It is probable that alcohol was present in a large number of cases in the study, but not routinely reported or screened, as it has been reported as present in a high proportion of opioid and other types

⁹ Richards RG, Reed D & Cravey RH. 'Deaths from intravenously administered narcotics: a study of 114 cases.' (1976) 21 *Journal of Forensic Science* 467-82.

¹⁰ Walsh RA. 'Narcotic mortality: some implications for drug programs.' (1983) 2 *Australian Alcohol and Drug Review* 90-99.

of drug deaths.¹¹ Alcohol was reported as being present in 12 of the propoxyphene group, four of the unspecified opioid group and one of the methadone group. A larger number of propoxyphene deaths compared to other opioids (with the exception of unspecified opioids) involved a combination of drugs, such as sedatives and anti-depressants. The difference between the proportion of cases that involved a single opioid compared to opioids in combination with other drugs, was statistically significant ($X^2 = 29.33$, $P = .004$).

3.3 Classified cause of death (Table 2)

Accidental poisoning (50 cases) was the most common classification. It is noted that 23 (74.2%) of the cases of suicide involved propoxyphene. There was a weaker association between type of opioid and the other two major classifications, drug dependence and unclear. The association between the classification and the type of opioid was statistically significant ($X^2 = 51.932$, $P = .001$).

Table 2
Classified cause of death by opioid group

Opioid	Accidental poisoning	Suicide	Drug dependence	Unclear	Total
Heroin	8	-	4	-	12
Morphine	7	1	3	1	12
Unspecified	7	2	5	1	15
Methadone	12	2	3	2	19
Dextromoramide	7	2	3	-	12
Propoxyphene	8	23	1	4	36
Other opioid	1	1	-	-	2
Total	50	31	19	8	108

3.4 Treatment history

Twenty nine of the 108 cases (26.8%) had attended the Alcohol and Drug Authority (ADA) in the past for treatment for drug addiction. A high proportion of the dextromoramide group (8 cases, 66.7%) had sought treatment and in the methadone and heroin groups 8 (42.1 %) and 5 (41.7%) cases respectively had sought treatment. There was very low rates of attendance at the ADA in other groups: 2 (16.7%) morphine group; 2 (13.3%) unspecified opioid group; and 4 (11.1 %) of the propoxyphene group. It was not possible to determine whether any of these persons had attended hospitals or private practitioners for drug abuse treatment. The differences in the proportion of ADA attenders between the groups was statistically significant ($X^2 = 20.581$, $P = 0.002$).

3.5 Age

The deaths in this study mostly involved individuals in their mid twenties. The mean age of the 108 subjects was 27.2 (SD = 8.79, median = 25.0). The age range was from 17-65. Mean ages of five of the groups were similar: methadone 24.05 (SD = 6.9); unspecified 24.3 (SD = 3.56); heroin 25.42 (SD = 5.58); morphine 25.58 (SD = 7.37); and dextromoramide 26.58 (SD = 6.53). The propoxyphene group was on average older, mean age of 30.3, SD = 10.58 and had the highest proportion of females, numbering 15 (41.7%) cases.

4. Discussion

Illicit opioids appear to have played a small part as a cause of opioid death in WA from 1974 to 1984. This would suggest that most of our concern needs to be addressed to ensuring that licit (ie prescribed)

¹¹ Finkle BS, McCloskey, Kiplinger GF & Bennett IF. 'A national assessment of propoxyphene in post mortem medicolegal investigation.' (1976) 21 *Journal of Forensic Science* 706-742; Ruttenber AJ & Luke JL. 'Heroin-related deaths: new epidemiologic insights.' (1984) 226 *Science* 14-20.

opioids do not become a significant cause of premature mortality. It is known that the large number of methadone deaths that occurred in the period 1975-1980 (18 cases) is coincident with a period in WA when addicts had access to large quantities of methadone that originated from prescription, but was provided for consumption without adequate supervision.

It is noteworthy that after November 1980, from the effect of amendments to the *Poisons Regulations 1965* of the *Poisons Act 1964*, strict daily supervised consumption of methadone prescribed to addicts was instituted in this state. Since that date there has been a dramatic decline in the number of methadone deaths. A similar experience has been reported in Washington DC in the 1970s when methadone deaths decreased after control measures were introduced.¹²

The propoxyphene group was a slightly older group, with a higher proportion of females compared to other groups. However, only 4 cases were aged 40 or more. It is not known what kind of treatment, if any, was associated with these individuals' propoxyphene use. Given that only about one in ten had attended the ADA, it seems likely that they were not regarded as addicted to propoxyphene, or if addicted, not sufficiently to require detoxification at a drug treatment facility. The high proportion of deaths classified as suicide (23 cases; 63.9%) suggest the necessity for conservative prescribing practices with this analgesic. A comment in a study of propoxyphene and codeine deaths in Los Angeles that "*the risk of a toxic and possibly fatal drug reaction is greatly exacerbated by the presence of existing psychosocial pathology*",¹³ indicates the complexity of management of these individuals.

The possibility of misadventure in some of the deaths in this study should not be overlooked. There were 24 deaths recorded on a Saturday, which is a statistically significant difference between the expected proportion compared to other days of the week ($Z = 2.40$, $P = <0.01$). A similar finding in a study of heroin related deaths found a concentration of deaths on Fridays and Saturdays and concluded that "*heroin injection leading to overdose and death may be associated with casual or recreational rather than classic addiction*".¹⁴

It appears to be a difficult judgement to classify a death due to drug dependence without a substantial amount of collateral information of actual drug use prior to death. This has been described as the "*psychological autopsy*".¹⁵ There does not seem to have been a consistent use in WA of the classification drug dependence; indeed it would seem to have been regularly used only in recent years. There were two cases classified as drug dependence in 1982, eight cases in 1983, and six cases in 1984, while in the period 1974-1981 only three cases were recorded. More recent use of this classification may be due to changes in interpretation, as in ICD8 the definition was perfunctory, being "*addiction to, dependence on, or chronic poisoning*", whereas in ICD9 drug dependence was defined as "*(a) state, psychic and sometimes physical, resulting from taking a drug characterized by behavioural and other responses that always include a compulsion to take a drug on a continuous or periodic basis*".¹⁶

The bimodal distribution of opioid deaths in WA in the period 1974 to 1984 is a puzzling finding. The peaks in 1977 and 1984 are unlikely to be due to changes in coding procedures associated with the introduction of ICD9 in 1979, as this would have only resulted in changes in the differential use of specific classifications. The most likely cause would appear to be due to changes in the prevalence of heroin in WA. Annual reports of the ADA indicate significant increases in the number of addicts

¹² Inciardi JA. *Methadone diversion: experience and issues*. Rockville, Maryland, National Institute on Drug Abuse, 1977.

¹³ Nelson FL. 'The association of pre-existing psychosocial pathology with deaths involving propoxyphene or codeine.' (1985-86) 20 *International Journal of Addiction*, 1829.

¹⁴ Rutenber AJ & Luke JL. 'Heroin-related deaths: new epidemiologic insights.' (1984) 226 *Science*, 18.

¹⁵ Gottschalk LA, McGuire FL, Heiser JF, Dinovo EC & Birch H. 'A review of psychoactive drug involved deaths in nine major United States cities.' (1979) 14 *International Journal of Addiction* 735-756.

¹⁶ World Health Organization. *Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death. Ninth revision*. Geneva, World Health Organization, 1977.

treated in the period 1977-1979 and again in 1984-1985. It would appear that a proportion of licit opioids readily enter the illicit opioid market, especially in times when heroin use is more prevalent. The possibility of increased premature mortality when licit opioids are readily available is supported by the number of methadone deaths that occurred in WA up to 1980.

Because only one code, E853 (ICD8), E850 (ICD9) is specific to opioid mortality at the 3 digit level it is difficult to distinguish readily opioid deaths from other drug related deaths. The use of particular classifications seems to imply degrees of responsibility. For example, the person was compelled to use the drug or no one was to blame, it was accidental. thus prescribers of licit drugs are absolved from contributing to premature death due to opioid use.

The study suggests some classifications are more likely to be used with particular types of opioid death, namely suicide with propoxyphene use and drug dependence with unspecified opioids. There was also a tendency for *Accidental death* to be used in deaths involving other licit opioids. It may be a fact that propoxyphene users compared to other opioid users are more depressed or unhappy or that there is a sex linked bias against the use of other classifications, such as *Drug dependence* or *Accidental poisoning*.