

TASK FORCE ON DRUG ABUSE

Statistical Bulletin Number 2, August 1996

MORTALITY CAUSED BY OPIOIDS WESTERN AUSTRALIA 1995

INTRODUCTION

The abuse of street heroin, while involving a relatively small number of individuals, generates both risks to health and significant costs to the community.

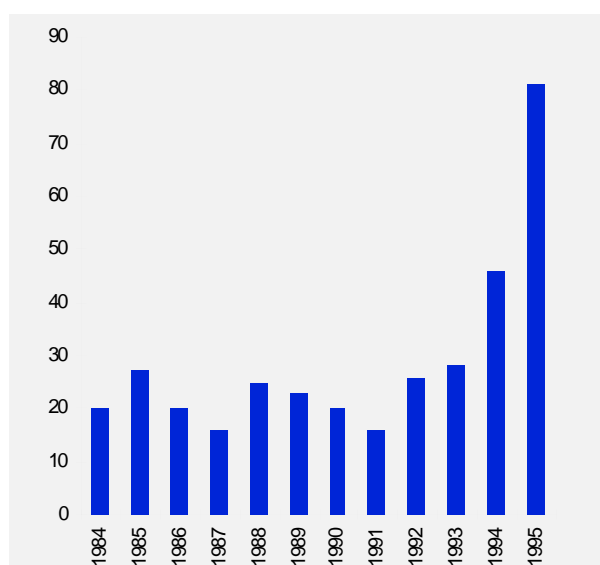
The availability of street heroin depends entirely on the vagaries of an unregulated market structure. Heroin abusers therefore face a significant risk of overdose as on most occasions the purity of this drug is unknown and it is typically diluted with adulterants. Some of these adulterants may also be toxic and as preparation and distribution of heroin does not occur under sterile conditions further problems may occur.

The likelihood of an "overdose" (ie accidental poisoning) resulting in death can be reduced if heroin users are able to obtain assistance and utilise appropriate information. It is believed that very few overdosing incidents involving heroin users result in admission to a hospital. This means that effective assistance to avoid the risk of death will often depend on peer knowledge of resuscitation technique and use of ambulance services.

This Statistical Bulletin reports the number of deaths in this State between 1984 and 1995 and analyses mortality in 1995 due to deliberate or accidental poisoning by opioid drugs, with particular reference to heroin. As licitly manufactured opioid drugs, for instance, dextromoramide, morphine, pethidine, codeine, methadone and propoxyphene may be diverted to the black market as substitutes or supplements for street heroin, this Bulletin encompasses those deaths caused by all opioid drugs, both licit and illicit.

As it is known that opioid abusers may obtain other central nervous system (CNS)-acting drugs, either illicitly or by prescription, to supplement heroin use or to alleviate some of the withdrawals and other side effects associated with heroin dependency, results for these drugs are included if present. However, while it is expected that other CNS-acting drugs will be reported by forensic analysis, it may be difficult to determine the contribution of these drugs to some of the premature mortality reported in this Bulletin.

Figure 1: Annual deaths due to poisoning by opioids, 1984-1995



Sources: Coroner's Court; Chemistry Centre

Table 1: Deaths due to poisoning by opioids, 1984-1995

Year	Males	Females	Persons
1984	12	8	20
1985	18	9	27
1986	12	8	20
1987	13	3	16
1988	17	8	25
1989	18	5	23
1990	18	2	20
1991	13	3	16
1992	15	11	26
1993	20	8	28
1994	41	5	46
1995	65	16	81
Total	262	86	348

Sources: Health Department of WA; Chemistry Centre

Some caution should be exercised in interpreting the 1995 data presented in this Bulletin as it is derived from coronial records, for which only a provisional cause of death was available.

The Australian Bureau of Statistics (ABS) has the responsibility for producing a national database of deaths by cause, according to standardised criteria contained in the International Classification of Causes of Death Version 9 (ICD9). As there is up to an 18 month delay before the finalisation of the ABS annual mortality file according to ICD9 cause, a database has been developed by the Task Force office in conjunction with the Chemistry Centre containing details of all deaths that occurred in 1995 in this State due to CNS-acting drugs. As this database utilises the finalised toxicological and forensic information provided to the Coroner it is believed to provide reliable information.

PERIOD 1984-1995

Over much of the 12 year period there has tended to be a cyclical pattern in opioid deaths, with the number of deaths fluctuating between about 15 and 25 per year. However, since 1994 there has been a sharp increase in total annual fatalities due to opioid poisoning, with 46 deaths and 81 deaths reported in 1994 and 1995, respectively (Figure 1, page 1).

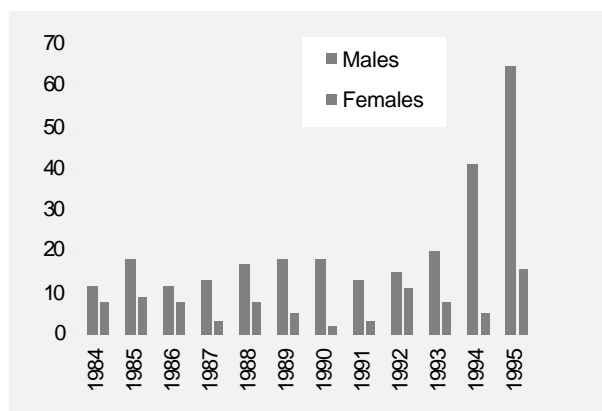
There was a total of 348 opioid-related deaths in this State over period 1984 to 1995, of which 262 (75%) involved males and 86 (25%) involved females (Table 1, page 1). Over most of this period there have been cyclical fluctuations in the annual number of male and female deaths, even though the greatest proportion of deaths has consistently involved males.

There is an indication of time lags in the pattern of male and female deaths over the 12 year period, following the first peak in opioid deaths in 1985, when 18 and 9 deaths were recorded, respectively (Figure 2, Page 2). Since the early 1990s there has been a sharp jump in the number of male opioid deaths. From 1991 to 1995 there has been a five-fold increase in the number of male deaths with the effect of a gender-related time lag, as female deaths have started to increase in the mid 1990s (Figure 2, page 2).

The overall pattern of sex-related opioid deaths in Western Australia for the period 1984 to 1995 indicates that:

- the number of male deaths per year increased more than five-fold; and
- the number of female deaths per year doubled.

Figure 2: Deaths due to poisoning by opioids by sex, 1984-1995



Sources: Health Department of WA; Chemistry Centre

Table 2: Deaths due to poisoning by opioids, 1995

Month	Heroin	All opioids
January	1	2
February	4	6
March	6	9
April	7	10
May	1	1
June	6	7
July	7	9
August	6	7
September	6	8
October	7	9
November	7	8
December	5	5
All deaths	63	81

Sources: Coroner's Court; Chemistry Centre

1995 IN DETAIL

In 1995 there were 81 deaths caused by poisoning due to opioids, of which 65 (80.2%) involved males and 16 (19.8%) involved females (Table 1, page 1). There were two broad peaks in the number of deaths over the course of the year - 19 deaths occurred in the first peak, in the March-April period, and 25 deaths occurred in the second peak, in the September-November period (Table 2, page 2).

Type of opioid

A total of 63 (77.8%) of the 81 opioid deaths were determined by the Chemistry Centre as primarily caused by heroin by the presence of diacetylmorphine or monoacetylmorphine through toxicological analysis. It is possible that a male death recorded as caused by an unknown opioid may also be heroin-related (Table 5, page 5).

There were nearly five times as many deaths of males due to heroin compared to females, with the number of deaths for both sexes peaking in the 30-34 age group (Table 4, page 4; Figure 4, page 4).

There were a further 11 deaths that were primarily caused by an opioid other than heroin of which:

- 3 (3.7%) were due to morphine,
- 3 (3.7%) were due to dextromoramide,
- 2 (2.5%) were due to propoxyphene,
- 1 (1.2%) was due to codeine/paracetamol,
- 1 (1.2%) was due to oxycodone, and
- 1 (1.2%) was due to an unknown opioid.

The remaining 7 (8.6%) deaths were due to the combined effect of one or more opioids and other types of CNS-acting prescription drugs - minor tranquillisers (eg benzodiazepines), anti-depressants or sedatives. It is not known how many of the licit opioids were obtained directly on prescription or by diversion into the illicit drug market.

Alcohol

Toxicological results of the blood alcohol concentrations (BACs) for each of the 81 *opioid* deaths indicate that alcohol was detected in 29 (35.8%) of all cases (Table 6, page 6). Out of these 29 deaths, seven (24.1%) involved had BAC levels of less than 0.05% and the remaining 22 (75.9%) involved BACs of 0.05% or greater (Figure 5, page 6).

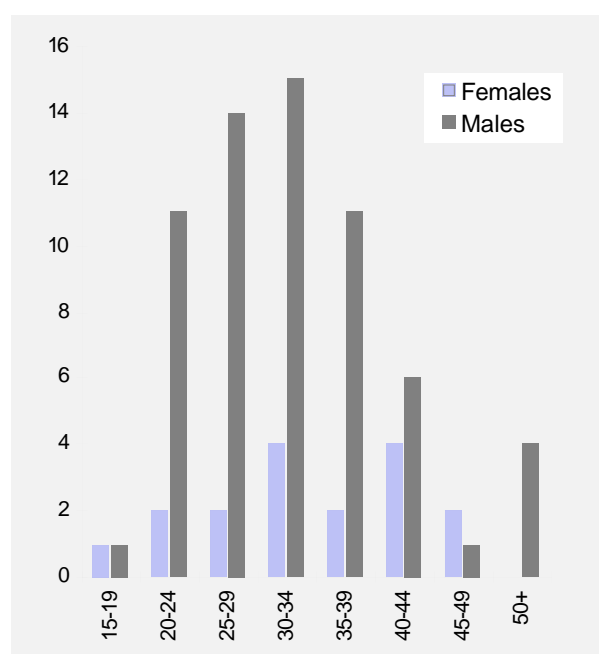
Alcohol was detected in 23 (36.5%) out of the 63 *heroin* deaths, and in a further three (42.8%) of the deaths due to a combination of opioids and other CNS-acting drugs.

Table 3: Deaths due to poisoning by opioids by age group and sex, 1995

Age group	F	M	Persons
15-19	1	1	2
20-24	2	11	13
25-29	2	14	16
30-34	4	15	19
35-39	2	11	13
40-44	4	6	10
45-49	2	1	3
50+	-	4	4
All deaths	16	65	81

Sources: Coroner's Court; Chemistry Centre

Figure 3: Deaths due to poisoning by opioids by age group and sex, 1995



Sources: Coroner's Court; Chemistry Centre

Cannabis

Cannabis is detected by the presence of the drug's major metabolite carboxytetrahydrocannabinol (THCA) and was present in 40 (49.4%) of the 81 opioid deaths that occurred in 1995.

THCA was detected as being present at concentrations of 10ug/L or less in 12 (30%) of these 40 deaths (Table 7, page 7).

There was a small number of cases with elevated THCA levels, especially in the 30-34 and 35-39 age groups (Figure 6, page 8).

Other CNS-acting drugs

CNS-acting drugs were detected in only a few of the deaths in 1995 which involved heroin. A total of five (7.9%) heroin deaths involved CNS-acting drugs with:

- ◆ one or more benzodiazepines detected in three cases;
- ◆ antidepressants detected in one case; and
- ◆ antidepressants and a tranquilliser detected in the other case.

CNS-acting drugs were more frequent in deaths involving prescription opioids compared to the cohort of heroin deaths:

- ◆ benzodiazepines were detected in two (66.7%) out of the three dexamoramide deaths; and
- ◆ in one (33.3%) out of the three morphine deaths benzodiazepines and antidepressants were detected.

Age-related details

Sex: Male opioid deaths mostly occurred in the 20-39 year age range, with the greatest number of deaths in the 30-34 age group (Table 3, page 3; Figure 3, page 3). Females had a similar age distribution to males, except for a second peak in female deaths in the 40-44 age group. The number of female deaths exceeded male deaths only in the 45-49 age group, with 2 deaths, compared to the 1 male death.

40 years and older age group: Out of the total of 81 opioid deaths, 18 (22.2%) involved persons 40 years and older. Half of the deaths of the 40 years and over age group involved heroin and the remaining 9 cases involved dexamoramide, morphine, oxycodone, propoxyphene, and other licit opioids in combination (Table 5, page 5).

15-39 year age group: Out of the total of 81 opioid deaths, 63 (77.8%) involved persons aged 15-39 years. Of these 63 deaths, 54 (85.7%) were due to heroin and the remaining 9 (14.3%) involving opioids other than heroin Table 5, page 5).

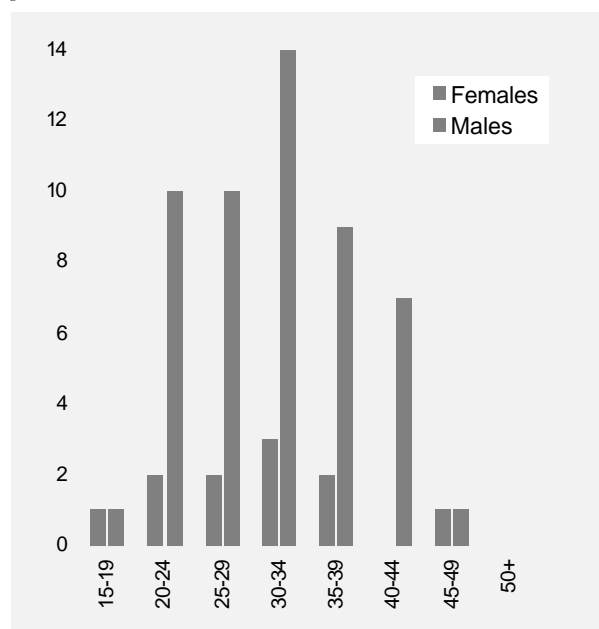
Continued on page 6

Table 4: Deaths due to poisoning by heroin by age group and sex, 1995

Age group	F	M	Persons
15-19	1	1	2
20-24	2	10	12
25-29	2	10	12
30-34	3	14	17
35-39	2	9	11
40-44	-	7	7
45-49	1	1	2
50+	-	-	-
All deaths	11	52	63

Sources: Coroner's Court; Chemistry Centre

Figure 4: Deaths due to poisoning by heroin by age group and sex, 1995



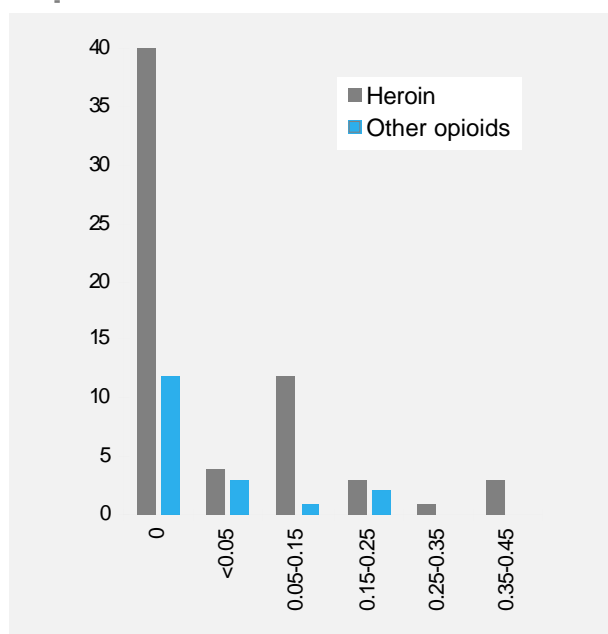
Sources: Coroner's Court; Chemistry Centre

Table 5: Deaths due to poisoning by opioids by age group, by sex and type of opioid, 1995

Age group	Codeine/ paracetamol	Dextro- moramide	Heroin	Morphine	Combi- nation	Oxycodone	Propoxy- phene	Unknown	Total
Females									
15-19	-	-	1	-	-	-	-	-	1
20-24	-	-	2	-	-	-	-	-	2
25-29	-	-	2	-	-	-	-	-	2
30-34	-	-	3	-	1	-	-	-	4
35-39	-	-	2	-	-	-	-	-	2
40-44	-	1	-	-	1	-	1	-	3
45-49	-	-	1	-	-	1	-	-	2
50+	-	-	-	-	-	-	-	-	-
All females	-	1	11	-	2	1	1	-	16
Males									
15-19	-	-	1	-	-	-	-	-	1
20-24	-	-	10	-	1	-	-	-	11
25-29	1	1	10	-	-	-	1	1	14
30-34	-	-	14	-	1	-	-	-	15
35-39	-	1	9	1	-	-	-	-	11
40-44	-	-	7	-	1	-	-	-	8
45-49	-	-	1	-	-	-	-	-	1
50+	-	-	-	2	2	-	-	-	4
All males	1	2	52	3	5	-	1	1	65
Persons									
15-19	-	-	2	-	-	-	-	-	2
20-24	-	-	12	-	1	-	-	-	13
25-29	1	1	12	-	-	-	1	1	16
30-34	-	-	17	-	2	-	-	-	19
35-39	-	1	11	1	-	-	-	-	13
40-44	-	1	7	-	2	-	1	-	11
45-49	-	-	2	-	-	1	-	-	3
50+	-	-	-	2	2	-	-	-	4
All persons	1	3	63	3	7	1	2	1	81

Sources: Coroner's Court; Chemistry Centre

Figure 5: Deaths due to poisoning by opioids, BAC levels, 1995



Sources: Coroner's Court; Chemistry Centre

Comment

On the basis of the results for 1995, prescribed CNS-acting drugs played a minor role in all but a few of the opioid deaths in this State, but one quarter of deaths showed significant levels of alcohol consumption.

It is arguable in most cases the purity of heroin was a key factor in the death. This proposition is partly supported from the results of analysis of samples of heroin that were found in close proximity to three cases. (Unfortunately samples of heroin are rarely found on persons who have died, as surviving associates typically remove this type of evidence from an overdose scene.)

The level of diacetylmorphine found in samples involved with deaths that occurred in February, September and November 1995 were 29%, 32% and 24%, respectively. These levels are significantly higher than the reputed historical purity levels of 5-10% in heroin typically used by abusers in this State.

As the significance of variations in heroin purity has been discounted as a primary cause of death in other studies, this point requires further investigation, to confirm its impact on West Australian heroin abusers.¹

It is also possible that the increasing age of the heroin using population is a contributing factor in the increase. The likelihood of death from overdose would be expected to increase the longer a person has been using heroin, especially when coupled with the increasing level of purity reported in both Australia and elsewhere.

Table 6: Deaths due to poisoning by opioids by BAC levels and type of opioid, 1995

Type of opioid	0	<0.05	0.05-0.15	0.15-0.25	0.25-0.35	0.35-0.45	Total
Codeine/paracetamol	-	-	-	1	-	-	1
Dextromoramide	3	-	-	-	-	-	3
Heroin	40	4	12	3	1	3	63
Morphine	2	-	1	-	-	-	3
Combination	4	2	-	1	-	-	7
Oxycodone	1	-	-	-	-	-	1
Propoxyphene	1	1	-	-	-	-	2
Unknown	1	-	-	-	-	-	1
All opioids	52	7	13	5	1	3	81

Sources: Coroner's Court; Chemistry Centre

The 1995 data also indicates another important distinction between heroin deaths in this State and heroin deaths reported in the Eastern States, where prescription drugs and alcohol are more frequent in this context than in this State. (For instance, a recently published study of 152 heroin-related deaths in New South Wales in 1992 reported that alcohol and benzodiazepines were detected in 45% and 26% of the subjects in the study, respectively.)²

It has been observed that more frequent alcohol use has been found to occur in relation to older and more dependent heroin abusers who have non-fatal overdoses.³ The lower BAC levels found in this study may be attributed to a somewhat younger population of heroin abusers in this State compared to some of the other jurisdictions.

An important finding from this study of heroin mortality in WA in 1995 is that methadone was not detected in any of the deaths investigated. It is suggested this reflects favourably on the strict adherence to guidelines set by this State's methadone program.

It is possible that the increase in deaths reported in this study, with a total of 65 heroin deaths in 1995, reflects an undetected growth in the size of the heroin market in this State. While there has probably been some increase, the other available evidence does not permit a conclusion that the increase in heroin use has been of the kind reflected in the increase in mortality.

It is much more likely that the increased availability of heroin worldwide has resulted in the availability lo-

cally of not only more heroin, but heroin of a higher purity. Where in the past heroin was normally expected to have purity levels in the range of 5-10%, the user may now expect levels of nearer 20-30% or more.

Those who deal in heroin are unlikely to warn users of the difference in quality. Heroin users may therefore find themselves injecting a substance that is significantly stronger than they had expected, with fatal consequences. The Police and others have issued warnings in recent years about the dangers inherent in using higher-strength heroin.

Responses

It is clearly important to ensure that appropriate strategies are in place to address the new and special problems generated by this increase in heroin deaths and the probable contribution of higher-quality heroin. While it is evidence from various sources that there has been a shift from amphetamines to heroin, it is not as yet clear whether there has been any significant increase in injecting drug use.

In addition to the wide ranging treatment and prevention activities currently in place, the following approaches are being developed:

- 1) Since the beginning of this year, the Drug Squad has established a special Task Force to investigate each heroin-related death with the object of building a better profile on the operation of the heroin market.

This Task Force approaches associates of those who have overdosed to gather intelligence about

Table 7: Deaths due to poisoning by opioids by age group and THCA level, 1995

Age group	0	<10	10-19	20-29	30-39	40-49	50-99	100+	Total
15-19	1	-	-	-	-	-	-	-	2
20-24	9	-	-	1	1	2	1	-	13
25-29	7	4	3	-	1	-	1	-	16
30-34	7	3	3	1	1	3	2	-	19
35-39	7	2	2	2	-	-	-	-	13
40-44	5	2	-	1	1	-	2	-	11
45-49	1	1	-	1	-	-	-	-	3
50+	4	-	-	-	-	-	-	-	4
All age groups	41	12	8	6	4	5	6	-	81

Sources: Coroner's Court; Chemistry Centre

supplysources, while also providing support and offering referral for treatment, if sought. The success of this initiative will be evaluated at the end of the year.

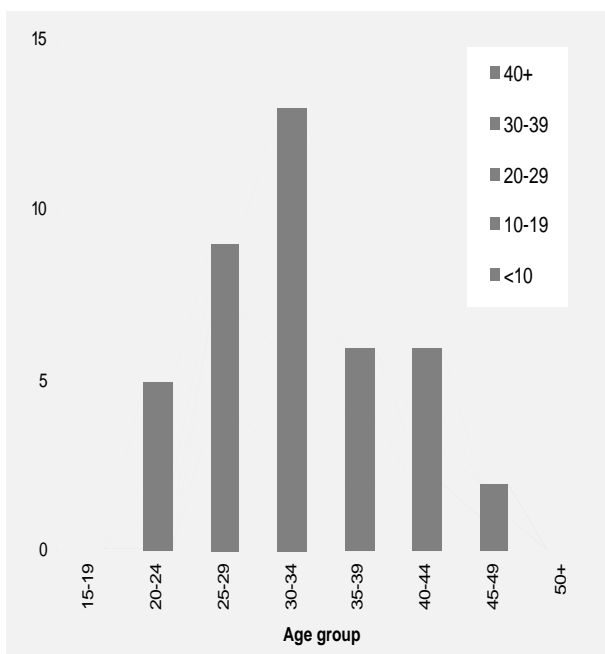
- 2) If heroin users had better knowledge of the risks of street heroin, and if they sought early medical intervention following a poisoning incident, it is possible that a significant number of the premature deaths that occur each year would be avoided.

Following initiatives elsewhere, programs are being developed to provide information to heroin users about issues such as:

- basic resuscitation methods to employ when overdoses occur;
- the risks of mixing drugs;
- warnings not to use alone;
- appropriate steps for calling ambulance services; and
- availability of after-hours advice through telephone information services.

This information will directed through appropriate media and relevant settings.

Figure 6: Deaths due to poisoning by THCA levels by age group, 1995



Sources: Coroner's Court; Chemistry Centre

- 3) Access to methadone treatment is being improved through community-based providers and an expansion of the existing specialist clinic.
- 4) Liaison with emergency services will continue to ensure that their procedures do not deter drug users from calling an ambulance if required.
- 5) Trends will continue to be monitored through the Coroner's Office, ambulance services and the analysis of street drugs.
- 6) A public education program on illicit drugs is being developed by the Health Department, alongside a range of other educational, community and service-delivery initiatives across government and the non-government sector.

References

¹ Hall WD. "Editorial: How can we reduce heroin 'overdose' deaths?" *Medical Journal of Australia*; 1996; 164: 197-198.

² Zador D, Sunjic S, Darke S. "Heroin-related deaths in New South Wales, 1992: toxicological findings and circumstances". *Medical Journal of Australia*; 1996; 164: 204-207.

³ Darke S, Ross J, Cohen J, Hall W. *Context and correlates of non-fatal overdose among heroin users in Sydney. Monograph No. 20.* Sydney, National Drug & Alcohol Research Centre, 1994.

This issue was edited by Greg Swensen and produced by Susan Jones at the Task Force on Drug Abuse.

The editor may be contacted by email at this address: gswensen@highway1.com.au.

We acknowledge the assistance given by Neil Campbell, Chief of the Forensic Science Laboratory and the Perth Coroner's Office.

The Task Force on Drug Abuse is in the Ministry of Premier and Cabinet and is located at 7th Floor, 469 Wellington Street, Perth, Western Australia, 6000. Tel: 09 264 8244, Fax: 09 322 6546.