WA Strategy Against Drug Abuse Occasional Paper Number 1

Pre-Hospital Management of Opiate Overdoses In Perth, Western Australia

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July 2000

Published by

Western Australian Drug Abuse Strategy Office
and
Western Australian Pre-Hospital Care Research Unit

The WA Pre-Hospital Care Research Unit is a collaborative research unit between
Department of Emergency Medicine, University of Western Australia
&
St John Ambulance Australia, WA Ambulance Service Inc

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List of abbreviations and acronyms

BLS	Basic life support
CPR	cardio pulmonary resuscitation
DR	Death Register
EAR	Expired air resuscitation
GCS	Glascow Coma Score
HMDS	Hospital Morbidity Data System
IPPV	Intermittent positive pressure ventilation
IV	Intra venous
PCR	Patient care record

Executive summary

Opiate overdose remains a significant public health problem. In many cases ambulance services are involved in the emergency medical management of these patients. Over the past 5 years intervention programs including basic life support education have been undertaken in an attempt to reduce the mortality associated with these events.

In 1997 Naloxone was introduced into the ambulance service as an adjunct to existing clinical protocols for the management of opiate overdose. While pre-hospital care has a pivotal role in these events, little has been studied as to the epidemiology, clinical care and outcome of opiate overdose patients managed by the ambulance service.

This study retrospectively studied all overdose patients managed by the ambulance service from January 1998 to June 1999. Data was collected from the Ambulance Service Clinical Database and patient care record forms.

During the study period 2,458 overdoses were attended by ambulance services, of which 1,418 (54%) were opiate related. Over the 18 month period the ambulance service attended on average 4.8 overdose calls per day, of which on average 2.6 calls per day were related to opiate overdoses. It was found that two thirds of opiate overdoses involved males, and that compared to females, males were on average 2 years older (28 years vs 26 years).

Opiate related calls most frequently occurred on Fridays (18%) and more than half (55%) of calls were received between 12 midday and 8 pm. One in five of opiate related calls occurred in the Perth central business district or in suburbs close to the inner city. There was a high degree of rapid response to calls, with average of 8 minutes response time for ambulances to attend the scene of opiate overdoses.

The study identified that the pre-hospital use of Naloxone significantly improved both the level of consciousness and respiratory rate. A major finding was that approximately half the patients were sufficiently unconscious as to potentially obstruct their airway, with 44% having absent or insufficient respiration. Basic life support from a bystander was provided in less than half (43%) of these high risk patients before arrival of ambulance paramedics.

Over the period a total of 891 patients who had an opiate overdose were conveyed to hospital by ambulance, 85 (11%) of whom were subsequently admitted to hospital. The average age of the inpatient group was 30 years, most (58%) were male and stayed in hospital for an average of 2.2 days. Over half (52%) of these patients were admitted to intensive care.

The study confirms clear evidence that prompt and appropriate bystander intervention and the provision of basic life support before the arrival of ambulance paramedics are essential components in reducing the death rate of those suffering a potentially fatal opiate overdose. Additional improvements in outcomes for opiate overdose incidents will involve the expansion of programs which encourage bystanders and peers to initiate basic life support and call an ambulance in cases of opiate overdose.

1. Introduction and Background

Since the early to mid nineties the mortality associated with narcotic overdose has presented as a significant public health problem within the Western Australian community. There were 66 heroin related deaths reported to the coroner in 1995 with this number rising to 75 by 1998. This represents a 13.6% increase during this period.[1]

This problem is not unique to Western Australia.[2] In Australia during the period 1979 to 1995, the number of deaths attributable to opioid overdose in adults aged from 15 to 44 years rose from 70 to 550. The standardised mortality rate increasing overall 6.7 times (10.7 to 67 per 1,000,000) and in both males and females 6.8 and 4.7 times respectively.[3]

An International Opioid Overdose Symposium was held in Sydney during August of 1997 and extensively examined many aspects of the opioid overdose problem. A series of recommendations were made identifying strategies to address this complex social and health problem.[4] Government and community based organisations implemented a number of programs arising from these recommendations, which were designed to reduce both the number of deaths and morbidity associated with opiate overdose. These programs were directed at many aspects of the problem including drug education and prevention, user peer support and enhanced treatment strategies. While these programs are key drug abuse strategies in reducing the overall burden, they do not provide immediate assistance to the user at the critical time of overdose. That is immediately following a potentially fatal overdose.

Nearly all of the deaths associated with narcotic overdose, predominantly heroin, occur outside of hospital. The pharmacological effects of narcotics are such that they cause depression of the central nervous system and subsequently respiration. Anecdotal information from ambulance paramedics indicates that nearly all the deaths occurring outside of hospital are due hypoxia and/or obstruction of the patients airway. This being the case, then there is considerable potential to prevent such premature deaths through the provision of bystander basic life support. (BLS)

The rapid provision of BLS is a key factor in reducing these deaths heroin related deaths occurring outside of hospital. However, BLS needs to be provided in a timely manner. If the airway is maintained and breathing supported when these are depressed in response to a narcotic overdose, then death can be prevented.

Similar recommendations were made by Loxley et al. who suggested that first aid training for drug users would be of benefit. In addition, educational messages stressing that calling an ambulance should be the first and not the last response for overdose victims needs to be encouraged.[5]

Ambulance paramedics provide basic and advanced life support measures, however the time taken for an ambulance to arrive at an emergency event is on average 9 minutes. If no BLS is provided to the patient while waiting for the ambulance to arrive then severe morbidity or death may occur. It is imperative that simple BLS manoeuvres are commenced during this waiting period. The challenge is to identify how best to implement and encourage bystander intervention in these cases.

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[1] Western Australian Drug Abuse Strategy Office. *Accidental heroin related deaths in Western Australia, 1997-1998.* Statistical Bulletin No. 8, May 2000.
[2] Hando J, Hall W, Rutter S, Dolan K. *Current state of research on illicit drugs in Australia: An information document.* Canberra, National Health & Medical Research Council, 1999.
[3] Hall W, Darke S. "Trends in opiate deaths in Australia 1979-1995." In Hall W (ed). *Proceedings of an International Opioid Overdose Symposium, Sydney, Australia, 14-15 August 1997.* Sydney, National Drug & Alcohol Research Centre, University of New South Wales, 1998.
[4] Hall W (ed). *Proceedings of an International Opioid Overdose Symposium, Sydney, Australia, 14-15 August 1997.* Sydney, National Drug & Alcohol Research Centre, University of New South Wales, 1998.
[5] Loxley W, Davidson P. *Forgetting to breathe: Opioid overdose and young injecting users in Perth.* Perth, National Centre for Research Into the Prevention of Drug Abuse, Curtin University of Technology, 1998.

In 1997, the ambulance service in Western Australia conducted a pilot study to assess the potential of Naloxone to be used in the pre-hospital setting in Western Australia.[6] The study noted the following:

- in overdose victims that were alive upon ambulance arrival, none died when they were adequately managed using existing basic and advanced life support measures;
- that a significant proportion of victims required ventilatory assistance by ambulance paramedics during transport to hospital; and
- a proportion of events to which ambulances were called involved multiple overdose victims.

Accordingly it was decided to trial Naloxone in the pre-hospital management of narcotic overdose in Western Australia. Naloxone is a pure opioid antagonist which will completely block or reverse the effects of opiates.[7]

Clinical indications for the use of Naloxone in the pre-hospital setting by ambulance paramedics were defined as:

- unconscious patients suspected of suffering from narcotic overdose; and
- having respiratory rate of 7 breaths per minute or less.

Paramedic clinical protocols for the use of Naloxone were established.

- Assess situation and vital signs.
- If indicated commence intermittent positive pressure ventilation.
- (IPPV)
- Administer a single dose of Naloxone 0.4 mg intramuscularly.
- Continue respiratory support.
- Transport to hospital.

Coinciding with the introduction of Naloxone a clinical audit of its use was undertaken for a six month period.[6] Key findings of this audit indicated the following.

- No change in the number of opiate related deaths managed by the ambulance service.
- Naloxone was administered in 38% of cases.
- Earlier return of spontaneous ventilation and protection of the airway. Seventy five percent of patients had adequate respiration and airway control within 10 minutes of receiving Naloxone.
- Very little change in the number of patients refusing ambulance transport to hospital (approximately 20%).
- No deaths within 24 hours in those patients given Naloxone but refused transport to hospital.

The administration of Naloxone is somewhat divergent to that of other Australian ambulance services with Naloxone is most commonly administered intravenously. While this is common practice in hospital, the slower uptake, ease of administration and obviating the need for IV access, made intramuscular administration attractive in the pre-hospital setting.

In tandem with the introduction of Naloxone, awareness amongst users of simple basic life support procedures and getting medical help was emphasised. This was facilitated through opiate overdose support groups, Government agencies and St John Ambulance. It was clearly recognised that the likelihood of preventing untimely deaths would lie in a bystander initiating BLS while waiting for

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[6] Jacobs IG, Oxer HF. *The use of Naloxone in the pre-hospital management of narcotic overdose*. Perth, Western Australian Pre-hospital Care Research Unit. Perth, University of Western Australia, 1998.

[7] White JM. "Pharmacology of opioid overdose." In Hall W (ed). *Proceedings of an International Opioid Overdose Symposium, Sydney, Australia, 14-15 August 1997*. Sydney, National Drug & Alcohol Research Centre, University of New South Wales, 1998.

an ambulance. The purpose of this study was to describe the current trends in the epidemiology of narcotic overdoses in which an ambulance is called.

While the provision of pre-hospital care is considered important no significant investigation into the epidemiology, pre-hospital clinical care and outcomes of overdose patients has been undertaken in Australia.

2. Methods

Data for the study was developed through linkage of a number of existing routinely collected databases. Primary data sources were the Ambulance Service Clinical Database, the Ambulance Service Patient Care Record Form and the Western Australian Health Services Research Linked Data Set.

2.1 Ambulance service clinical database

The Western Australian Pre-hospital Care Research Unit developed this database. This computerised database contains demographic and limited clinical information for each episode of care provided by the ambulance service. Information for this database is obtained from computer and manual extraction of data from the Ambulance Service Patient Care Record (PCR). Time and location data are automatically extracted via the computer aided dispatch system. This information is stored in database format facilitating data retrieval and statistical analysis.

2.2 Patient care record form

This is a paper form that details patient identifiers, the presenting clinical problem, a short narrative history of the event and the pre-hospital clinical management that is given. The ambulance paramedic records this information on the PCR after the completion of each ambulance call. This is the source document given to hospitals as a record of pre-hospital care.

In addition, each "presenting problem" is coded by the ambulance paramedic and allows easy identification of the nature of the call. For example, overdoses due to opiates are identified as code 335, which is different to the code for overdoses due to other causes. This code is allocated on the best information available to the paramedic.

2.3 Western Australian health services research linked data set

This database is a unified data set of the Hospital Morbidity Data System (HMDS) managed by the Health Department of Western Australia and the Death Register (DR) held by the Registrar General. The HMDS records all hospital separations in Western Australia and codes, inter alia, age, gender, length of hospital stay, principal diagnosis (ICD coded) and discharge status.

The DR records age at death, gender, place and cause of death (ICD coded.) Linkage of these disparate data sets allows for outcome associated with each episode of care to be determined. This database was developed jointly by the Department of Public Health at the University of Western Australia and the Health Department of Western Australia.

The Western Australian Pre-hospital Care Research Unit has subsequently linked the ambulance service clinical database to the health services research linked database. As such, this has now provided clinical outcome data for patients managed by ambulance services.

All overdose cases were identified from the ambulance service linked database for the period January 1998 to June 1999 to form a unique overdose database. For each case identified the PCR was manually retrieved and reviewed. In particular, the clinical narrative was recorded along with additional patient and clinical information. Linked hospitalisation data was unavailable for the period January 1999 to June 1999. Accordingly analysis of hospitalisation data incorporates only data from the 1998 calender year.

Analysis was undertaken using the software Statistical Package for the Social Sciences (SPSS).

3. Results

3.1 All drug overdoses

There were a total of 2,629 cases of overdose identified during the study period. This represents approximately 4.8 calls per day.

3.1.1 Demographics

There were a total of 2,458 cases, of whom 1,384 (56%) were male and 1,074 (44%) were female, with an overall mean age of 28.8 years (SD ± 13.1 years; median 25 years) These are summarised in Table 1

	Male	Female	All
No of cases	1,384	1,074	2,458
Mean	28.6	29	28.8
SD	±11.5	±15	±13.3
Median	26	24	25
25 percentile	21	19	20
75 percentile	34	34	34

Table 1: Age descriptives in years for all overdose patients.

Approximately 45% of all overdose patients were aged between 15 and 24 years with a further 16% being between 25 and 29 years. (Table 2)

Age group	Male		Female		All cases	
	N	%	N	%	N	%
14 years or less	30	2.2	32	3.0	62	2.5
15 – 19 years	201	14.5	241	22.5	442	18.0
20 – 24 years	392	28.3	272	25.3	664	27.0
25 – 29 years	236	17.1	163	15.2	399	16.2
30 – 34 years	184	13.3	107	10.0	292	11.9
35 – 39 years	146	10.5	78	7.3	224	9.1
40 – 44 years	87	6.3	49	4.6	136	5.5
45 – 49 years	38	2.7	43	4.0	81	3.3
50 – 54 years	23	1.7	23	2.1	46	1.9
55 – 59 years	14	1.0	11	1.0	25	1.0
Greater than 60 years	33	2.4	54	5.0	87	3.6

Table 2: Distribution of all overdose patients in 5 year age groups

3.1.2 Day of week

The day in which overdoses occurred marginally increased throughout the week falling to the lowest frequency on Sundays. (Figure 1)

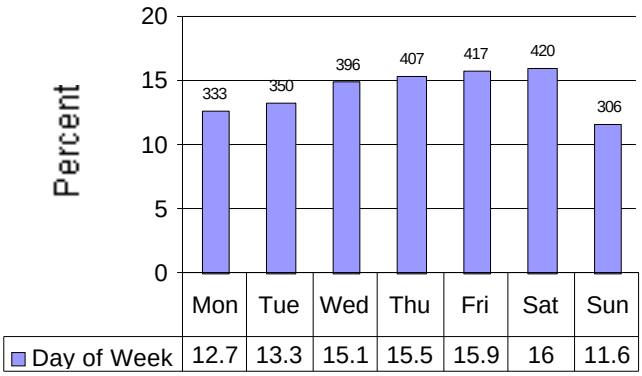

Figure 1: Proportion of ambulance calls for all overdose patients by day of week.

3.1.3 Time of day

Almost 50% of ambulance calls for overdose patients occurred between 12 midday and 8pm. Twenty three percent of calls occurred between 8pm and midnight. (Figure 2)

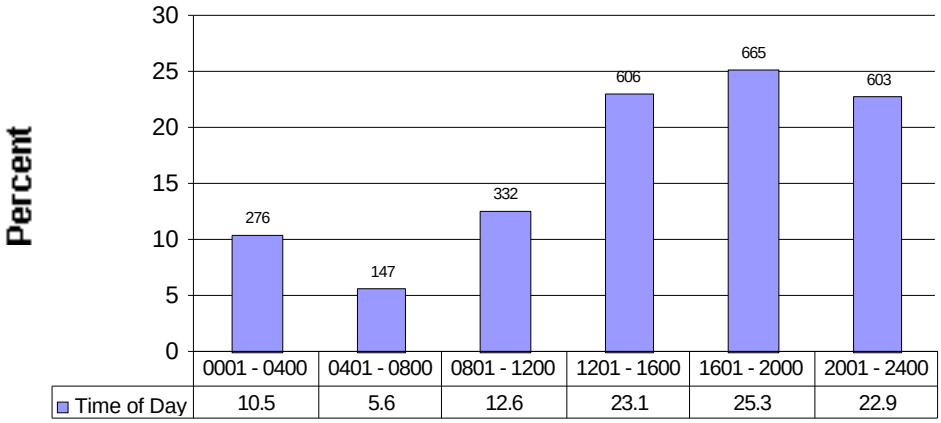

Figure 2: Proportion of ambulance calls for all overdose patients by time of day

3.2 Opiate overdoses

Opiate overdose was the most common overdose type presenting to ambulance services – 54% (n = 1,439) of all overdoses. Ambulances are called to opiate overdose patients on average 2.6 times per day. The proportion of opiate cases described includes those in which other drugs and/or alcohol may have concomitantly been used.

3.2.1 Demographics

Approximately 64% and 36% of these patients were male and female respectively. For all cases of opiate overdose the mean age was 26.8 years (± 9.6 years; median 24 years) On average males were 2 years older than females. (Table 3)

	Male	Female	All
No of cases	828	495	1,323
Mean	27.5	25.6	26.8
SD	±8.9	±10.6	±9.6
Median	25	23	24
25 percentile	21	19	20
75 percentile	33	29	31

Table 3: Age descriptives in years for opiate overdose patients

Approximately 52% of opiate patients were aged between 15 and 24 years with a further 16% being between 25 and 29 years. (Table 4)

Age group	Male		Female		All Cases	
	N	%	N	%	N	%
14 years or less	4	0.5	2	0.4	6	0.5
15 – 19 years	108	13.0	125	25.3	233	17.6
20 – 24 years	288	34.8	174	35.2	462	34.9
25 – 29 years	156	18.8	77	15.6	233	17.6
30 – 34 years	104	12.6	58	11.7	163	12.3
35 – 39 years	90	10.9	21	4.3	111	8.4
40 – 44 years	45	5.4	13	2.6	58	4.4
45 – 49 years	18	2.2	10	2.0	28	2.1
Greater than 50 years	15	1.7	14	2.9	29	2.2
Total	828	100.0	495	100.0	1,323	100.0

Table 4: Distribution of opiate overdose patients in 5 year age groups

3.2.2 Day of week

The proportion of patients opiate overdose patients called an ambulance steadily rose during the working week with a decline in calls during the weekend. (Figure 3)

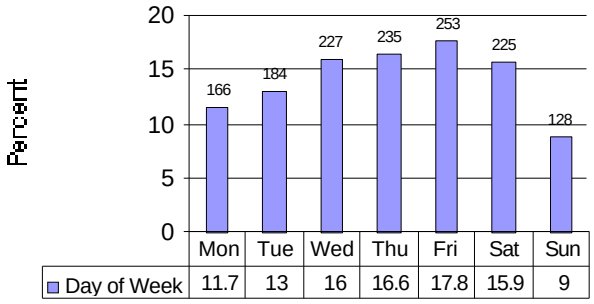

Figure 3: Proportion of ambulance calls for opiate overdose patients by day of week.

3.2.3 Time of day

Fifty five percent of ambulances calls for opiate overdoses occurred between 12 midday and 8pm with a further 20% occurring between 8pm and midnight. (Figure 4)

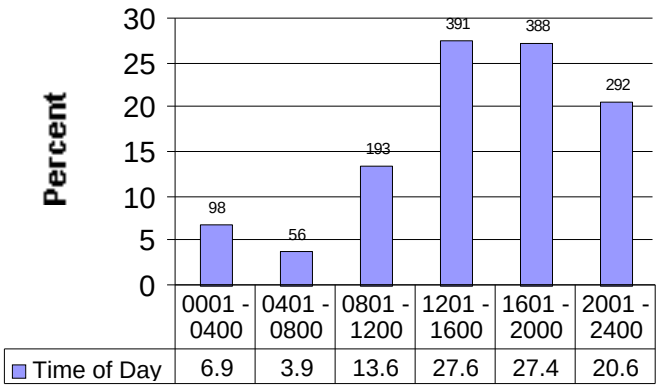

Figure 4: Proportion of ambulance calls for opiate overdose patients by time of day.

3.2.4 Response time

Ambulances responded to opiate overdoses under priority one conditions (Emergency - lights and sirens) in 88% of cases. All other calls were managed as a priority 2 (Urgent – no lights or sirens) Average time taken for ambulances to arrive at an opiate overdose patient was 8 minutes (SD ± 5 mins) with on average 19 minutes being spent on scene. (Table 5)

	Response interval	Scene interval	Time to hospital	Total call interval
Mean	8	19	9	37
SD	±5	±12	±7	±14
Median	8	16	9	35
25th percentile	5	11	2	28
75th percentile	10	23	15	44

Table 5. Descriptives of ambulance time intervals in minutes for opiate overdose

3.2.5 Monthly trends

The frequency ambulances were called to an opiate overdose patient each month is given in Table 6.

Month and year	N
1998	
January	80
February	80
March	93
April	54
May	71
June	69
July	78
August	69
September	76
October	55
November	92
December	74

Month and year	N
1999	
January	99
February	98
March	98
April	82
May	92
June	58

Table 6. Frequency of ambulance calls for opiate overdoses by month

3.2.6 Locality

Just over 10% of all opiate overdose calls occurred in the Perth city precinct. When combining Perth city, East Perth, West Perth, North Perth and Highgate, almost a fifth (18%) of calls in this area. The frequency of all opiate calls to each metropolitan suburb is provided in Table 7.

Suburb	Frequency	Percent
ALEXANDER HEIGHTS	1	0.1
ALFRED COVE	1	0.1
ARMADALE	13	0.9
ASCOT	1	0.1
ATTADALE	1	0.1
BALCATTA	16	1.1
BALDIVIS	2	0.1
BALGA	41	2.9
BALLAJURA	5	0.4
BASKERVILLE	1	0.1
BASSENDEAN	4	0.3
BATEMAN	2	0.1
BAYSWATER	23	1.6
BEACONSFIELD	1	0.1
BECKENHAM	2	0.1
BEDFORD	3	0.2
BEECHBORO	6	0.4
BELDON	1	0.1
BELMONT	7	0.5
BENTLEY	9	0.6
BIBRA LAKE	1	0.1
BICTON	8	0.6
BRENTWOOD	1	0.1
BULL CREEK	5	0.4

BURNS	1	0.1
BURSWOOD	2	0.1
CALISTA	1	0.1
CANNING VALE	6	0.4
CANNINGTON	8	0.6
CARINE	4	0.3
CARLISLE	4	0.3
CASUARINA	1	0.1
CAVERSHAM	2	0.1
CHIDLOW	1	0.1
CLAREMONT	5	0.4
CLARKSON	5	0.4
CLOVERDALE	4	0.3
COMO	9	0.6
COODANUP	4	0.3
COOGEE	3	0.2
COOLBELLUP	3	0.2
COTTESLOE	7	0.5
CRAIGIE	2	0.1
CURRAMBINE	1	0.1
DAGLISH	4	0.3
DALKEITH	2	0.1
DARLINGTON	2	0.1
DIANELLA	16	1.1
DOUBLEVIEW	4	0.3
DUNCRAIG	1	0.1
EAST CANNINGTON	2	0.1
EAST FREMANTLE	5	0.4
EAST PERTH	26	1.8
EAST VICTORIA PARK	19	1.3
EDEN HILL	1	0.1
EDGEWATER	2	0.1
EMBLETON	3	0.2
FALCON	2	0.1
FERNDALE	2	0.1
FLOREAT	1	0.1
FORRESTFIELD	5	0.4
FREMANTLE	46	3.2
GIRRAWHEEN	28	2.0
GLENDALOUGH	12	0.8
GOSNELLS	13	0.9
GREENFIELDS	2	0.1
GREENMOUNT	1	0.1
GREENWOOD	13	0.9
HALLS HEAD	3	0.2
HAMERSLEY	3	0.2
HAMILTON HILL	5	0.4
HAZELMERE	2	0.1
HEATHRIDGE	3	0.2
HIGH WYCOMBE	2	0.1
HIGHGATE	26	1.8
HILLARYS	1	0.1
HILTON	8	0.6
ILUKA	1	0.1
INGLEWOOD	17	1.2
INNALOO	17	1.2
JOLIMONT	2	0.1
JOONDALUP	3	0.2

JOONDANNA	8	0.6
KALAMUNDA	6	0.4
KALLAROO	3	0.2
KARAWARA	1	0.1
KARDINYA	2	0.1
KARRINYUP	10	0.7
KELMSCOTT	4	0.3
KENSINGTON	2	0.1
KENWICK	5	0.4
KEWDALE	2	0.1
KIARA	1	0.1
KINGSLEY	1	0.1
KOONDOOLA	1	0.1
KWINANA	1	0.1
LANDSDALE	2	0.1
LANGFORD	3	0.2
LATHLAIN	2	0.1
LEEDERVILLE	21	1.5
LESMURDIE	1	0.1
LOCKRIDGE	3	0.2
LYNWOOD	1	0.1
MADDINGTON	11	0.8
MAIDA VALE	1	0.1
MALAGA	2	0.1
MANDURAH	8	0.6
MANNING	1	0.1
MARANGAROO	12	0.8
MAYLANDS	39	2.8
MERRIWA	3	0.2
MIDDLE SWAN	1	0.1
MIDLAND	11	0.8
MIDVALE	2	0.1
MIRRABOOKA	23	1.6
MORLEY	24	1.7
MOSMAN PARK	18	1.3
MT HAWTHORN	6	0.4
MT LAWLEY	36	2.5
MT PLEASANT	1	0.1
MULLALOO	1	0.1
MUNDARING	1	0.1
MURDOCH	1	0.1
NEDLANDS	3	0.2
NOLLAMARA	33	2.3
NORANDA	4	0.3
NORTH BEACH	2	0.1
NORTH FREMANTLE	2	0.1
NORTH LAKE	1	0.1
NORTH PERTH	28	2.0
NORTHBRIDGE	38	2.7
O'CONNOR	2	0.1
ORELIA	2	0.1
OSBORNE PARK	23	1.6
PADBURY	3	0.2
PALMYRA	1	0.1
PARKWOOD	1	0.1
PARMELIA	1	0.1
PERTH	150	10.6
PORT KENNEDY	1	0.1

QUEENS PARK	4	0.3
REDCLIFFE	5	0.4
RIVERTON	3	0.2
RIVERVALE	11	0.8
ROCKINGHAM	6	0.4
ROSSMOYNE	1	0.1
SAFETY BAY	1	0.1
SCARBOROUGH	22	1.6
SHENTON PARK	1	0.1
SHOALWATER	2	0.1
SORRENTO	3	0.2
SOUTH FREMANTLE	7	0.5
SOUTH GUILDFORD	1	0.1
SOUTH LAKE	2	0.1
SOUTH PERTH	14	1.0
SPEARWOOD	7	0.5
ST JAMES	9	0.6
STIRLING	19	1.3
STONEVILLE	1	0.1
STRATTON	1	0.1
SUBIACO	10	0.7
SWAN VIEW	1	0.1
SWANBOURNE	3	0.2
THORNLIE	4	0.3
TRIGG	1	0.1
TUART HILL	25	1.8
TWO ROCKS	1	0.1
VICTORIA PARK	32	2.3
WAIKIKI	2	0.1
WANNEROO	2	0.1
WARNBRO	3	0.2
WARWICK	14	1.0
WATERFORD	1	0.1
WELSHPOOL	3	0.2
WEMBLEY	13	0.9
WEST LEEDERVILLE	1	0.1
WEST PERTH	13	0.9
WESTFIELD	1	0.1
WESTMINSTER	16	1.1
WHITE GUM VALLEY	2	0.1
WHITFORDS	1	0.1
WILLAGEE	4	0.3
WILLETTON	9	0.6
WILSON	1	0.1
WOODLANDS	3	0.2
WOODVALE	4	0.3
WUNGONG	1	0.1
YANCHEP	1	0.1
YANGEBUP	2	0.1
YOKINE	14	1.0

Table 7: Frequency of opiate overdose attended by ambulance for each Perth suburb.

3.2.7 Pre-hospital care by ambulance service

On arrival of ambulance paramedics 74 (5%) of opiate overdose patients had no detectable pulse. Seventy one (96%) of these patients died at the scene.

Upon initial assessment of ambulance paramedics 43% of patients had either no respiration or were breathing at a rate of less than 8 breaths per minute. Half of the patients had a Glascow Coma Score (GCS) of 7 or less. GCS is an indicator of level of consciousness. Patients with a GCS of less than 7 are essentially unconscious and are at high risk of obstructing their airway. A summary of the patient's vital signs is provided in Table 8.

Vital sign	No of cases	Percent
GCS		
<= 7	702	49.5
8 – 10	86	6.1
11 – 15	630	45.4
Respiration		
<= 7	620	43.8
8 – 14	368	26.0
15 – 24	330	23.1
> 24	100	7.1
Pulse		
<= 60	129	9.1
60 – 100	808	57.0
> 100	481	33.9

Table 8: Initial vital signs of opiate patients on ambulance arrival

3.2.8 Bystander assistance

A total of 695 cases required BLS from a bystander before the arrival of ambulance paramedics of which, 303 (43%) received any such intervention. Of the 74 patients who had suffered a cardiac arrest only 29 (39%) had received bystander cardiopulmonary resuscitation (CPR). Excluding the 74 cardiac arrest patients, there where 449 cases where respiration was either absent or less than 4 per minute, of which 205 (46%) received expired air resuscitation (EAR). Protection of the airway (ie positioning of the patient) occurred in a further 69 (15%) patients.

Of all opiate overdose patients 476 (34%) patients required IPPV by ambulance paramedics. In the 74 patients suffering a cardiac arrest 18 (24%) received CPR by ambulance paramedics. Only 3 (4%) of the cardiac arrest patients were taken to hospital with full resuscitative efforts being maintained. All three subsequently died at hospital.

3.2.9 Use of Naloxone

Ambulance paramedics administered Naloxone to 475 (33%) patients suffering opiate overdose. Of these 436 (92%) had a GCS of 7 or less with 419 (88%) having a respiratory rate of 7 or less. Following administration of Naloxone by ambulance paramedics both the GCS and respiratory rate had markedly improved prior to the patient reaching hospital. (Table 9) This reduction is both statistically and clinically significantly.

	Initial assessment	After Naloxone	% difference (95% CI)
Glascow Coma Score <= 7	436 (92%)	169 (36%)	↓ 56% (↓ 51% - ↓ 61%; p = 0.000)
Respiratory Rate <= 7	419 (88%)	132 (28%)	↓ 60% (↓ 55% - ↓ 65%; p = 0.000)

Table 9: Difference in Glascow coma scores and respiratory rates before and after administration of Naloxone

3.2.10 Refusal of transport to hospital

One hundred and fifty six patients (11%) refused to be taken to hospital. The majority of these patients (72%) were male and the mean age was 26.6 years (SD ± 7.0 years; median 25 years). These results are further summarised in Table 10.

	Male	Female	All
No of cases	112	44	156
Mean	27.5	24.6	26.6
SD	±7.2	±6.3	±7.0
Median	26.5	22	25
25 percentile	21	20	21
75 percentile	31	31	32

Table 10: Age descriptives (in years) by gender for all opiate overdose patients refusing transport to hospital

There were 35 (22%) patients administered Naloxone by ambulance paramedics who subsequently refused transport to hospital. In these cases the mean age was 27.5 years (SD ± 6 years; Median 26 years) and 83% were male. (Table 11) Age differences in those patients receiving and not receiving Naloxone and subsequently refusing transport were non-significant. (t=0.770; df=133;p=0.443)

	Male	Female	All
No of cases	29	6	35
Mean	28.0	25	27.5
SD	±6.0	±6.1	±7.0
Median	28	23	25
25 percentile	22	20	21
75 percentile	32	30	32

Table 11: Age descriptives (in years) by gender for all opiate overdose patients administered Naloxone who refused transport to hospital.

No patients were identified as dying within 24 hours following the pre-hospital administration of Naloxone and subsequently refusing transport to hospital.

3.2.11 Admission to hospital

Linkage data was available for the year 1998 and this database identified that 891 patients were taken to hospital by ambulance following an opiate overdose. Of these 85 (11%) patients were admitted to hospital, of whom the average age was 29.7 years and 58% were male. The average length of stay in hospital was 2.2 days (median 1 day) with the maximum length of stay being 22 days. Forty four (52%) patients were admitted to intensive care with an average length of stay of less than one day.

On the patients admitted to hospital seven (8%) subsequently died during their admission. In all cases the recorded cause of death on death registration was noted to be *"toxic effects of opiates resulting from accidental self administration"*. The involvement of alcohol and/or other drugs was also noted in five of the seven cases.

4. Discussion

Opiate overdose remains a significant public health problem within the Western Australian community. On average ambulances are called to 4.8 overdose events per day and 2.6 opiate overdose events per day. Two thirds of the opiate overdose patients were male with approximately three quarters being under 31 years of age. Almost 20% of the opiate overdose events occurred in the Perth city precinct or close inner suburbs. Just over half (54%) of all overdose calls managed by ambulance paramedics are due to opiates.

Approximately half the patients were sufficiently unconscious as to potentially obstruct their airway with 44% having absent or insufficient respiration. Basic life support from a bystander was provided in less than half (43%) of these high risk patients. Naloxone was administered by ambulance paramedics in about a third of the patients treated and this significantly improved the conscious level and respiratory effort in almost 60% of patients. A flow chart summarising the outcomes for opiate overdose patients attended by the ambulance service over the 18 month period of the study is contained in Figure 5.

During 1998 approximately 90% of opiate overdose patients were taken to hospital of whom only about 1 in 10 (11%) were admitted. Over half of these admissions were to intensive care. The case fatality in those patients admitted was 8% and for those dying out of hospital 5%.

The findings of this study demonstrate the real gains do occur as a result of attendance at opiate overdoses by ambulance services to reduce mortality associated these events by the administration of Naloxone and respiratory assistance. In most fatal cases death has already occurred before arrival of ambulance paramedics.

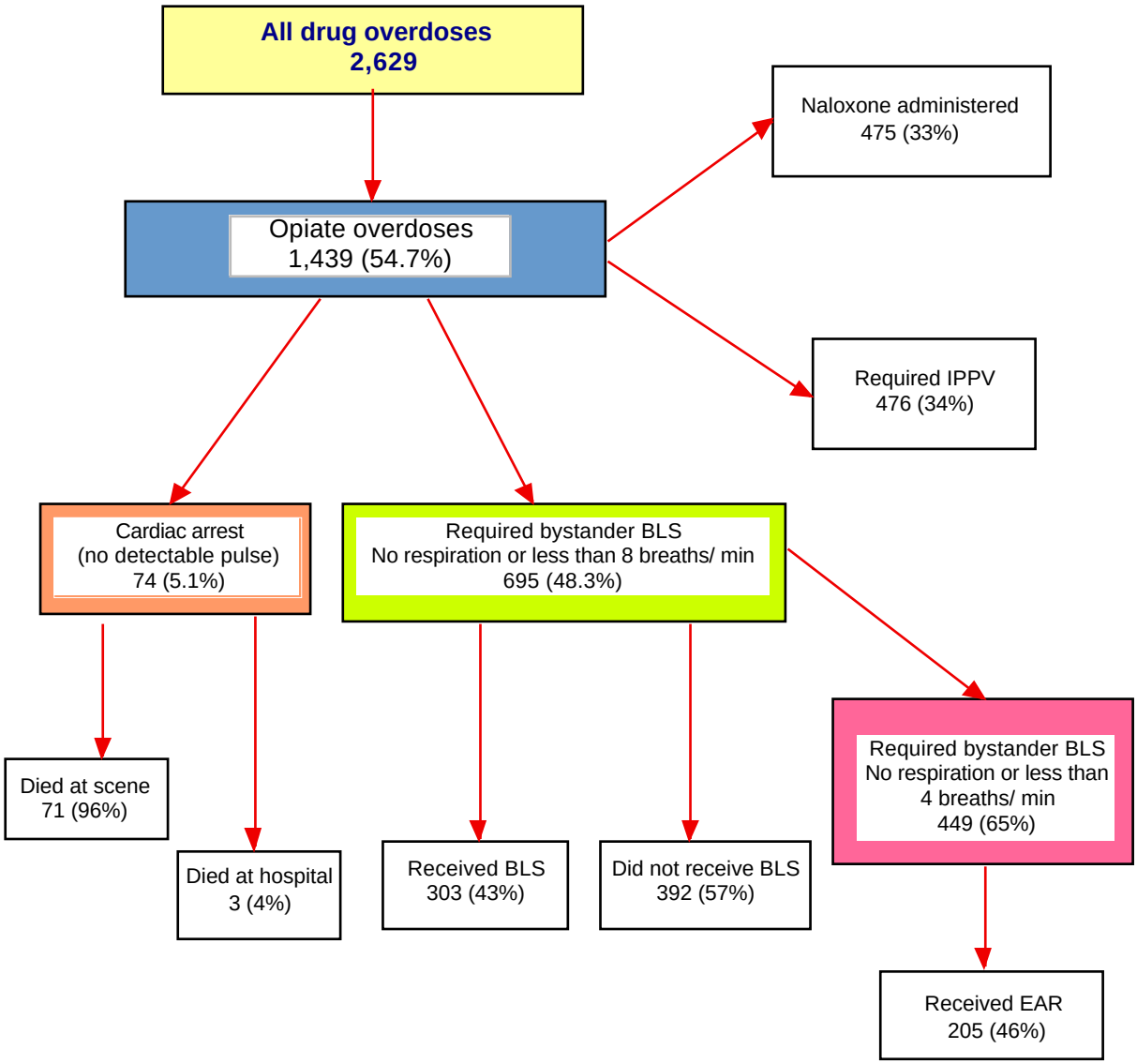

Figure 5: Overview of outcomes of overdoses attended by ambulance services, January 1998 - June 1999

There was a significant number of overdose victims at high risk of death, mainly due to inadequate respiration and/or obstructed airway. It is in these patients that the potential to prevent death lies with someone initiating BLS measures before arrival of an ambulance. Where ambulance response time is about eight minutes, BLS must commence before ambulance arrival as profound hypoxia leading to brain damage or death can occur during this period.

Unfortunately, less than half of these patients receive such immediate and crucial help. Of those at risk of death, 60% of patients who died did not receive BLS. If the patient is alive when an ambulance arrives the likelihood of death is less than 0.5%.

There is little doubt that the potential to reduce the deaths associated with opiate overdose, through pre-hospital interventions, is by the provision of bystander BLS. However, for bystander initiated BLS to be of benefit a number of associated events must also occur:

- there is recognition at the scene that the victim requires urgent medical help;
- bystander BLS is commenced immediately; and
- an ambulance is called.

There are potentially many reasons why these events are not effectively occurring. These may include the event is not recognised as an emergency, the bystander is unsure of BLS procedures, and fears that police will be involved. These and other factors form significant barriers to effective emergency care being delivered.

While a number a campaigns have been undertaken to address these concerns, the relatively low rate of bystander BLS indicates that at least during the period studied, these had only been partially effective. It is interesting to note that the proportion of overdose patients receiving bystander BLS is similar to the overall community participation rate. However, there is still room for considerable improvement and more it is noted that more recently programs have been developed to improve familiarity with the use of bystander BLS at overdose events.

The use of Naloxone by ambulance paramedics has been a useful adjunct in the pre-hospital setting. This mainly has been in facilitating the early return spontaneous respiration and/or natural protection of the airway. However, adequate airway protection and ventilation provided by ambulance paramedics, without Naloxone administration, are equally efficacious treatment options.

There is no evidence to suggest that the pre-hospital use of Naloxone by ambulance paramedics has saved any lives. In those patients who subsequently die after admission to hospital, death was due to the toxic effects associated with their overdose event. In those patients where cardiac arrest had occurred before arrival of ambulance paramedics, all patients died.

In summary, death from opiate overdose is preventable through simple BLS procedures. If deaths occurring outside of hospital due to opiate overdose are to be reduced, through pre-hospital interventions, a greater and continued emphasis on the provision of BLS measures being initiated before an ambulance arrives will be required.

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