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VicHealth

This current edition follows on from Hazards 27 and 28 which focused on poisoning in early childhood. The emphasis in these was on accidental poisonings whereas for adults, the cause is more often intentional. A clarification of Hazard 38 is included on page 17 and details of the MUARC 'Injury Epidemiology & Prevention' short course are enclosed.

Adult poisoning overview - Victoria

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Summary

Poisoning, including all causes of intent, is the third major cause of injury hospital admissions, after falls and motor vehicle crashes, and a common cause of emergency department presentation for adults (>=15 years). It is a major cause of injury death. There has been a considerable rise in poisoning admissions from July 1990, particularly from July 1993 (Casemix based hospital funding introduced), with some stabilising in recent years. Length of hospital stay has reduced considerably from an annual mean in 1987/88 of 3.3 days to 2 days in 1997/98.

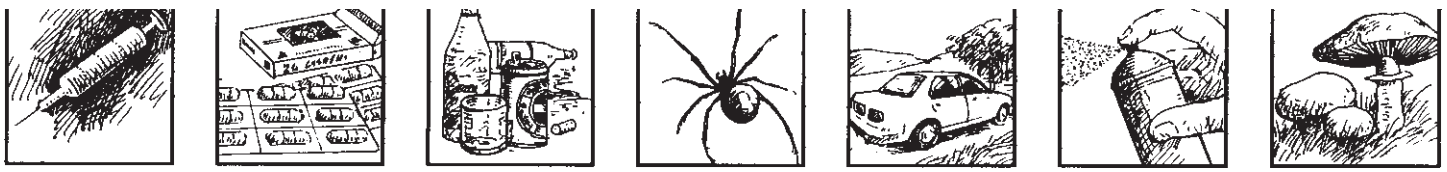
Poisoning admissions and presentations had similar age and sex distributions ie a peak age group of 20-24 years, 57% female. Fatalities were more likely to be male and older ie 71% male and a peak of 25 to 29 years. Benzodiazepines, alcohol and anti-depressants were among the leading agents involved at all levels of severity. Carbon monoxide was the most common agent for deaths, paracetamol a common agent for admissions and ED presentations and heroin for deaths and presentations. Fifty-three percent of deaths, 62% of admissions and 64% of presentations were intentional. Fatalities were more likely to co-ingest.

In recent years, new reputably more effective and less toxic antidepressants eg SSRIs have appeared in both the marketplace and as agents in poisoning. Heroin related deaths and hospitalisations have continued to rise dramatically since 1993/94. Possible explanations are the reduced street price encouraging greater numbers of users, social and economic factors, a reduction of tolerance in long-term users and an increase in purity. Household cleaners, especially bleach, were the chemicals most often associated with presentations and admissions.

Twelve percent of cases presented more than once over a three year period. Unemployment, increasing severity of suicidal ideation, previous psychiatric treatment and borderline personality disorder increased the risk of reports of previous self-harm. A Cochrane Controlled Trials register noted several promising treatments for self-harm.

The size, nature and cost of poisoning treatment highlights the importance of the problem for the health sector. Any effective preventive measures have the potential to reduce harm and free up health resources for other priorities. Complex social, economic and psychological reasons underlie the causes of self-harm and interventions which target underlying issues maybe of benefit. Several recommendations for prevention which focus on the immediate causes of poisoning are included. Additionally, the report includes several recommendations to improve data collection for poisoning.

** VEMD data extraction & chemicals section. ** Research Associate MUARC, VIMD & CFS data extraction*



Poisoning, including all causes of intent, is the third major cause of injury"hospitalisation, after falls and motor vehicle crashes, and a common cause of emergency department presentation for adults (>=15 years). It is a major cause of injury death. The size, nature and cost of treatment highlights the importance of the problem for the health sector. Any effective preventive measures have the potential to reduce harm and free up health resources for other priorities.

Despite discrepancies in the definition or interpretation of intent, it is clear that for adults the majority of poisonings are intentional. This edition focuses on the epidemiology and agents of poisoning. Complex social, economic and psychological reasons underlie the causes of intentional self-poisoning and interventions, which target underlying issues, may be of benefit but are not dealt with.

In recent years, suicide has been responsible for more deaths than road trauma, and suicide reduction, especially youth suicide, has become a priority. Drug overdose is the major suicide means for women (39% of Australian female suicides in 1996) and the fourth major means for men. There is potential to reduce total suicides by restricting agents where they are frequently taken and/or lethal in overdose. Evidence exists that the restriction of chloral hydrate and barbiturates in Australia reduced total suicides (Hassan, 1995).

The implications for public health of poisoning lie in the associated morbidity and mortality, social consequences and lost productivity. Overdose patients, especially those who harm themselves repeatedly, place a burden on medical and mental health services (Taylor & Cameron, 1998).

Several data bases provide information on poisoning eg Poisons Information Centre (PIC), Metropolitan Ambulance Service (MAS), Department of Justice – Illicit Drugs Database, Alcohol & Drug Information System (ADIS) but this article will focus on the Victorian Emergency Minimum Dataset (VEMD), Victorian Inpatient Minimum Database (VIMD) and the Coroner's Facilitation System (CFS) (page 16 for details).

The definition of poisoning in this article generally follows that of the ICD-9 CM diagnosis codes 960-989 ie poisoning by drugs, medicinal and biological substances. Overdose of these substances or the wrong substance given or taken in error are included. Mostly excluded are adverse effects of a substance properly administered, drug dependence, non-dependent abuse of drugs and pathological drug intoxication. Allergic reactions and chronic poisonings eg long term exposure to occupational hazardous chemicals, are not included.

Data

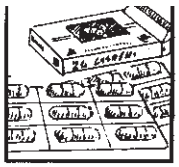
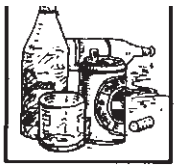
Emergency department (ED) presentations - VEMD

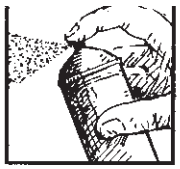
There were at least 18,269 presentations to VEMD ED's for adult poisonings (identified by the *nature of injury = poisoning, toxic effect* or *external injury cause = poisoning* codes) over the years 1996-1998, representing 4.9%

Agents for ED presentations, Victoria* **Table 1**

Agents	Presentations	Admissions	Admissions as % presentations
Benzodiazepines	3256	1645	50.5
Alcohol	2082	929	44.6
Paracetamol	1970	1073	54.5
Heroin	1535	341	22.2
Antidepressants	1347	779	57.8
TCA	*570*	*400*	*70.1*
SSRI	*557*	*259*	*46.5*
Other	*220*	*120*	*54.5*
Antipsychotics	836	506	60.5
Chemicals	510	120	23.5
Anti-convulsants	438	259	59.1
Envenomations (mostly spiders, bees, wasps)	205	37	17.9
Gas or fumes	193	30	15.5
Hallucinogens	176	25	14.2
Antihistamine	174	93	53.5
Carbon monoxide (mostly car exhaust)	165	102	61.8
Anti-inflammatories	142	66	46.5
Cardio-vascular (incl. diuretics)	138	95	70.9
Cold and flu tablets	114	60	52.6
Amphetamine	110	36	32.7
Aspirin	105	57	54.3
Narcotic analgesics (excl. methadone, heroin)	104	62	59.6
Endocrine & metabolism	91	50	54.9
Sedatives & hypnotics	83	40	48.2
Antispasmodics	82	51	62.2
Antiemetics	65	29	44.6
Plants	65	14	21.5
Aromatic oils/essences	55	19	35.0
Smoke	54	14	25.9
Anticoagulants	47	21	44.7
Muscle relaxants	44	31	70.5
Methadone	43	15	34.9
Codeine	34	15	44.1
Diet tablets	33	18	54.5
Ecstacy	25	11	44.0
Movement Disorders	23	10	43.5
CNS Stimulants	12	6	50.0
Hypoglaecemic	11	7	63.6
Other agents**	634	299	47.2
Total agents identified	**15,001**	**6,965**	**46.4**

Source: VEMD 1996 to 1998; >=15 years.
**Note: Presentations can be associated with more than one agent. **Estimate*


of all injury and poisoning presentations[1,2]. Fifty-six percent were female, 34% aged 20-29 years, 73% aged between 15-40 years and, where intent was specified, 64% noted as intentionally self-harmed, 24% accidental and 6% intent could not be determined. Medications accounted for 53% of poisonings. Fifty-seven percent of poisonings occurred at home. Almost half the poisonings were discharged home, 46% were admitted to hospital ie kept for over 4 hours, 5% transferred and almost all the remainder left before treatment was completed. The percentage admitted (46%) is extremely high compared with adult injuries overall (18%).

Repeat presentations, where each presentation is for a separate incident, are a more common occurrence for poisoning than for other forms of injury. There were 15,504 cases over the three years who accounted for 18,269 VEMD presentations (at the 23 hospitals where it was possible to identify repeat presentations). See page 15 for a discussion of self-harm and repeaters.

VEMD Bias

There is likely to be a degree of bias caused by variability in the extent to which hospitals both capture presentations and record patient details. It should be noted that the number of VEMD poisoning admissions is considerably less than the equivalent time period's VIMD admissions (8,404 VEMD v 19,865 VIMD for the latest 3 years). The discrepancy can be attributed to several factors. Firstly there are 76 low population hospitals not included in the VEMD which are included in the VIMD; secondly for 6 VEMD hospitals the collection covers less than 3 years; thirdly 1,900 of the VIMD admissions lie between the second and twelfth diagnosis fields (the VIMD has 12 diagnosis fields from which poisonings can be identified, the VEMD only one) and finally some major VEMD hospitals appear to have a poor record in capturing poisonings and other injuries and recording useful details. The 34% of narratives not identifying agents is a consequence of the latter (see page 15 for recommendations).

1 Note database descriptions page 19.
2 Return visits for the same event were excluded (n=105).

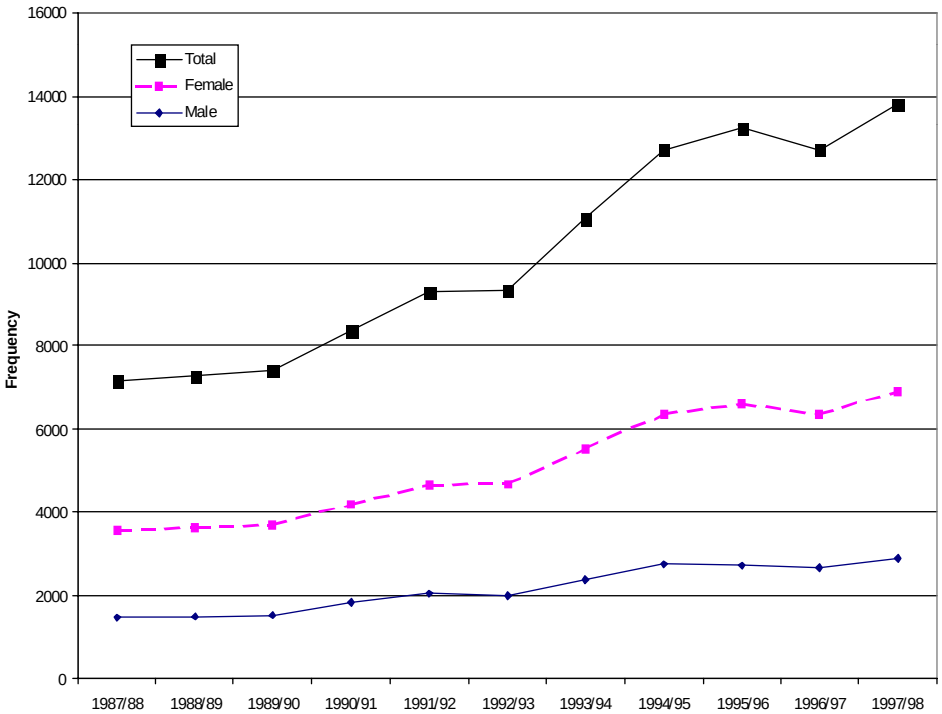
Agents

Co-ingestions were common such that a total of 11,681 presentations accounted for 15,001 agents. An estimated 18% of presentations ingested 2 or more agents, 5% 3 or more. Alcohol was commonly included. Overall the most common agents were clearly benzodiazepines (particularly temazepam), followed by alcohol, paracetamol, heroin, antidepressants (both Selective Serotonin Reuptake Inhibitors (SSRIs) and tricyclic antidepressants (TCA)) and antipsychotics. The more severe cases, as indicated by percentage admitted, ingested cardio-vascular medications, muscle relaxants, TCAs, antispasmodics and antipsychotics or inhaled carbon monoxide (CO). Agents involved in poisoning were specified in only 64% of VEMD case narratives, the only means of identifying specific drugs, medications, chemicals and envenomations in the ED data system. An estimated 34% of narratives were blank, simply noted ingestion, overdose or poisoning or were otherwise unspecific in identifying the agent. Agents with spelling errors, not able to be identified by "word search", were estimated to account for 2.2 % of presentations (Table 1).

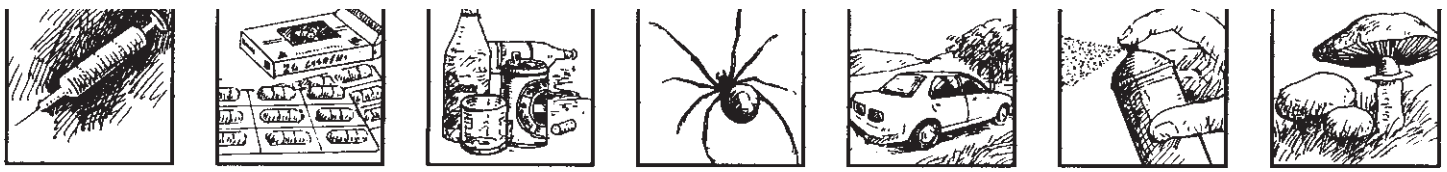
In addition to ED presentations, surveys of self-harm and anecdotal reports from patients suggest that a significant proportion (5-15%) of poisonings do not present for medical care. It is not known if these are significantly different from those who do (Platt et al, in Buckley et al, 1995a). Advice given by the Poisons Information Centre (PIC) at the Royal Children's Hospital is likely to be the only treatment for many poisonings.

In 1997 the PIC had inquiries concerning 27,240 exposures to persons of all ages. Of these, 7,910 cases (29%) were aged over 19 years and 1,078 (4%) 13-19 years. Six percent of all exposures were deliberate self-harm. Assuming the latter

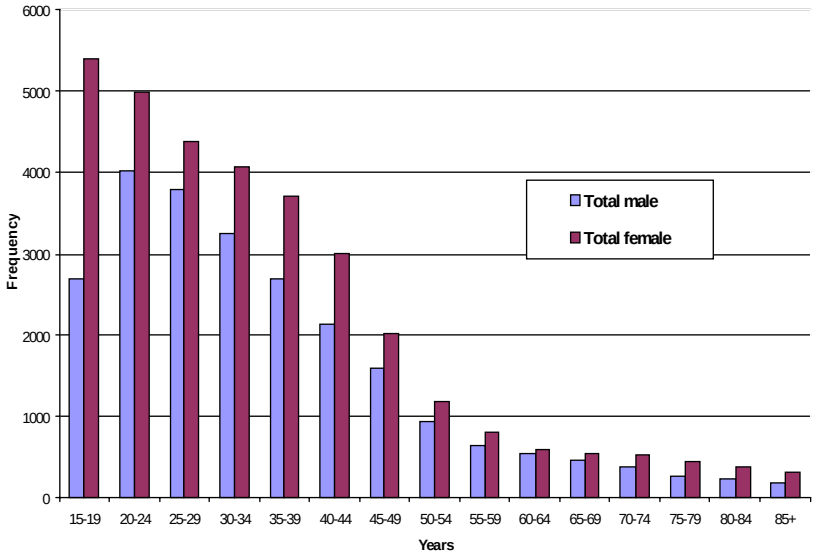
Trends in adult poisoning admissions, Victoria **Figure 1**



Source: VIMD July 1987 to June 1998; >=15 years



Adult poisoning admissions by age and sex, Victoria **Figure 2**



Source: VIMD July 1987 to June 1998; >=15 years

were aged over 13 years, 7,219 accidental or unknown intent poisonings advised by the PIC remain, considerably more than are treated annually by the hospitals. It is PIC practice to recommend all intentional poisonings attend hospital ED's, even if the poisoning is not of a very toxic dose (VPIC, 1997; Hender, 1999).

Hospital admissions - VIMD

Although "E", or external injury cause codes, within the International Classification of Diseases, are traditionally used to extract admissions in injury and poisoning research, for poisoning, diagnosis or "N" codes have more specific categories for agents, especially for intentional and "intent unspecified" poisonings eg heroin has a specific diagnosis code (965.01) and an accidental cause code (E850.0) but lies within a broad category for intentional (E950 ie analgesics, antipyretics & antirheumatics). The latter includes other agents such as paracetamol. The more specific the information, the more useful it is for prevention. Diagnostic codes have therefore been used in this analysis. Since there are 11 years of VIMD data, this database is most appropriate for analysis of trends.

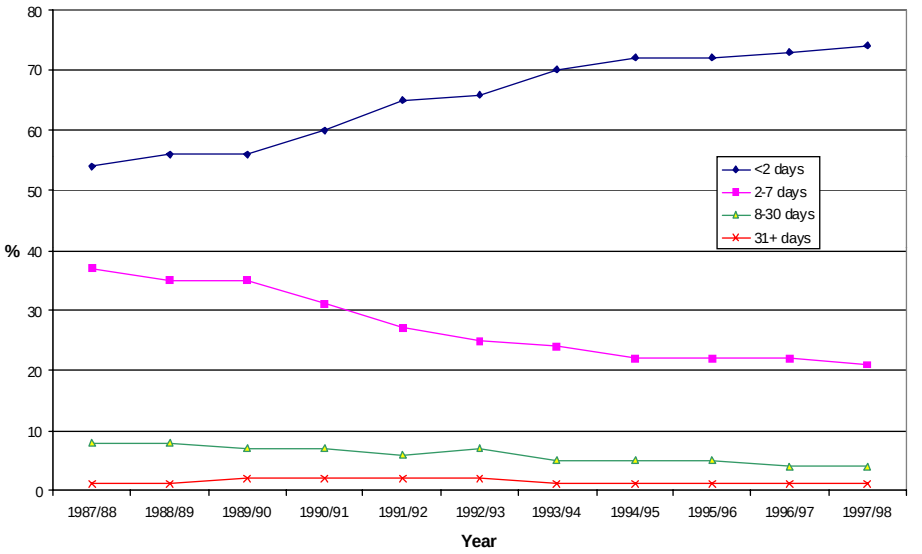
There were 56,147 poisoning admissions over the 11 year period. There has been a considerable rise in poisoning admissions from July 1990, particularly from July 1993 (Casemix based hospital funding introduced), with some stabilising in recent years (Figure 1). An admission is defined as a length of stay (LOS) greater than 4 hours. Hence a probable reclassification has occurred of what would previously have been a short stay in an ED into an admission, which may relate to funding, from July 1993. The rise in poisonings has occurred for both sexes. In all years, female frequencies were considerably greater than for males, a pattern consistent with other studies, both nationally and internationally.

Figure 2 makes clear the domination of females at every age group, such that overall 58% were female, though as high as 67% for 15-19 year olds. The peak for males and total poisoning occurs at 20-24 years, as is typical for male injury, the peak for females is earlier at 15-19 years.

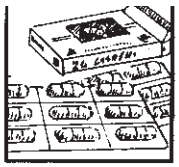
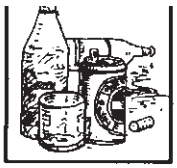
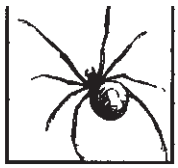
Length of stay has reduced considerably from 1989/90, as reflected in both the reduction in the annual mean from 3.3 days in 1989/90 to 2 days in 1997/98 and in the increase in the percentage staying less than 2 days (Figure 3). The cost therefore of treating poisonings is likely to have reduced (Watson, 1999).

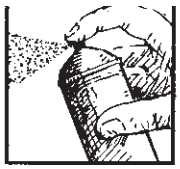
There was an average of approximately 5,100 poisonings admitted p.a over the 11 year period, July 1987-June 1998, representing 7.2% of total injury and poisoning admissions. Sixty-two percent were intentional self-harm, 35% unintentional. The agents most frequently associated with admissions were

Adult poisoning admissions – Length of stay, Victoria **Figure 3**



Source: VIMD July 1987 to June 1998; >=15 years




Hospital admissions for adult poisonings, Victoria Table 2

Agent group	Total admissions	Average annual	% of total agents
Benzodiazepines	17,371	1,579	19.0
Anti-depressants	10,224	929	11.2
Paracetamol	8,611	782	9.4
Alcohol	6,500	591	7.1
Phenothiazine-based tranquillizers	4,328	393	4.7
Sedatives & hypnotics	4,138	376	4.5
Venom – snake, lizard, spider, bee, wasp bites	2,769	251	3.0
Anticonvulsants	2,393	217	2.6
Cardiovascular	1,757	160	1.9
Heroin	1,663	151	1.8
Other opiates & related narcotics	1,387	126	1.5
Water, mineral & uric acid metabolism drugs (incl. diuretics)	1,120	102	1.2
Antiallergic & antiemetic	1,103	100	1.1
Hormones & synthetic substances	1,045	95	1.1
Antirheumatics	947	86	1.0
Amphetamines & hallucinogens	921	84	1.0
Gases, fumes & vapours (non- CO)	916	83	1.0
Aspirin	890	81	1.0
Parasympatholytics & spasmolytics	872	79	1.0
Carbon monoxide (CO)	835	76	0.9
Other	21,824	1,984	23.8
Total agents*	**91,614**	**8,325**	**100**

**Up to 12 injuries/poisons can be noted per case. Source: VIMD July '87–June '98*

benzodiazepines, anti-depressants, paracetamol, alcohol and phenothiazine-based tranquillisers for both total poisonings and intentional self-harm (Table 2). The positions of the latter two agent groups were reversed for unintentional poisonings.

In Figure 4 the most dramatic rise for all agents again coincides with the introduction of Casemix funding in July 1993. Over the 11 year period admissions associated with phenothiazine-based tranquillisers, benzodiazepines and antidepressants approximately doubled, those with paracetamol increased 3.5 times and alcohol, commencing below and ending up higher than the phenothiazine-based tranquiliser poisonings, increased 12.5 times.

Intent

Over the 11 years there has been an increase in the proportion of intentional at the expense of unintentional poisonings (from 54 to 74% intentional, 38 to 21% unintentional). The reason for the relatively high proportion of adult poisoning cases assigned an unintentional code is unclear, as is the reduction in this proportion over time. The unknown intent category is relatively minor and has changed very little. Average annual hospital admission rates for intentional self-inflicted poisonings were highest for females in the 15-19 and 20-24 age groups at 226 and 201/100,000 respectively (Stathakis, in process).

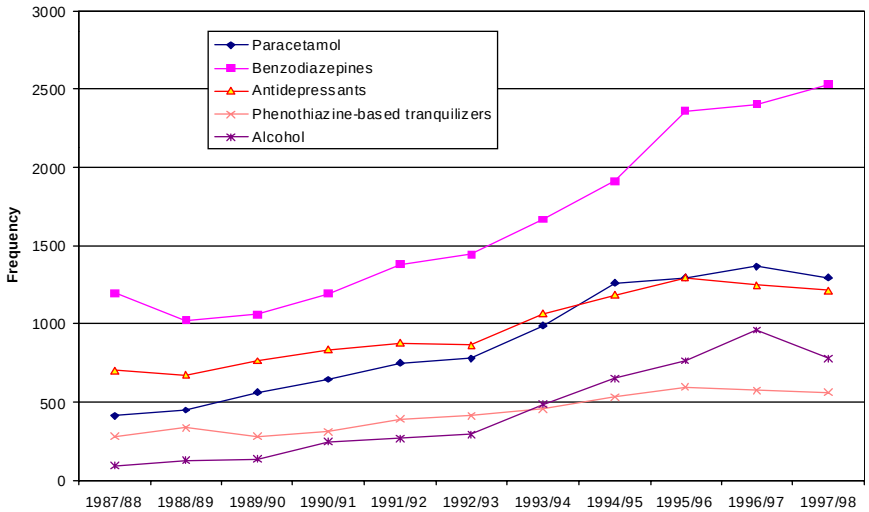
Deaths - VCFS

Over the period July 1989 to June 1995 there was a total of 2,238 poisoning deaths recorded on the Victorian Coroner's Facilitation System database.[3] Annual deaths ranged from 361-393, with no clear trend. Deaths were predominantly male (71%) and the majority (55%) occurred between 20-40 years of age. Seventy-three percent occurred in the home, 12% in transport areas. Fifty-three percent were intentional self-harm, 32% unintentional and 15% of unknown intent. Half the unintentional poisoning deaths could be attributed to heroin overdoses, half the self-harm to carbon monoxide exhaust gassing suicides. In regard to employment status 38% were employed, 24% unemployed, 12% retired, 11% receiving government benefits, 5% home duties and 7% unknown. Greater proportions were unemployed or receiving government benefits and less retired than for injury and poisoning deaths as a whole.

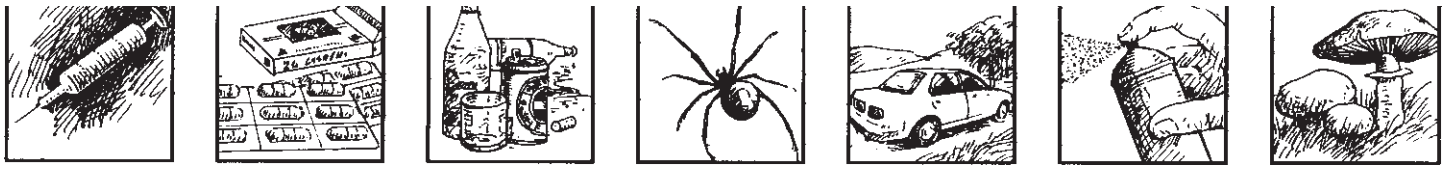
In regard to the manner of death, there were 997 deaths from drug overdoses, 318 from the combined effects of drugs and alcohol, 108 from alcoholic poisoning, 677 from vehicle exhaust

3 Medical misadventure poisonings are included due to a miscoding of most heroin and amphetamine deaths into this category. The true number of medical misadventures is relatively small at only 1.5% of poisonings.

Adult poisoning admission trends, major agents, Victoria Figure 4



Source: VIMD July 1987 to June 1998; >=15 years



Adult poisoning deaths, most common agents, Victoria **Table 3**

Agents	N	Annual average	%
Carbon monoxide (CO), mostly car exhaust	685	114	34.7
Alcohol	487	81	24.6
Heroin	408	68	20.7
Benzodiazepines	89	15	4.5
Smoke & fire fumes	64	10.6	3.2
Antidepressants	39	6.5	2.0
Amphetamines	39	6.5	2.0
Methadone	35	5.8	1.8
Chemicals	23	3.8	1.2
Gases and fumes, non-CO	21	3.5	1.1
Morphine *	15	2.5	0.8
Antipsychotics	12	2.0	0.6
Codeine	11	1.8	0.6
Paracetamol	8	1.3	0.4
Hallucinogens (LSD & Marijuana)	7	1.1	0.4
Other	29	4.8	1.4
Total agents	1972**	329	100

Source: CFS July 1989 to June 1995; >=15 years.
**Nine of these are suspected to be heroin rather than morphine, as coded.*
*** Note total agents & deaths won't match due to co-ingestion & unspecified agents*

gassings (CO), 58 from chemical ingestions, 62 from inhaling smoke from fires and 14 from inhaling poisonous substances. The mechanism of death was 58% drug overdose, 32% chemical inhalation and 8% chemical ingestion. Unlike hospital admissions there was no clear rise or even trend in intent, despite in the longer term Australian suicide poisoning data exhibiting a decline. The most common agents involved were CO, alcohol, heroin and benzodiazepines (Table 3). An estimated 40% of deaths were co-ingestions.

The VCFS has now ceased data collection. The State Coroner's Database, a similar although to some extent complementary collection is continuing and is contributing to the National Coroner's Information System (NCIS), the development of which was outlined in *Hazard 38*. The development of Drug and Suicide modules for the NCIS are proceeding, the coding system and manual are currently being refined.

Comparisons - Deaths, Admissions and Presentations

The major agents for deaths, hospital admissions and presentations are summarised in Table 4. Clearly benzodiazepines, alcohol and anti-depressants are among the leading agents involved at all levels of severity. CO is the leading agent for deaths, paracetamol a leading agent for admissions and presentations and heroin a leading agent for deaths and ED presentations. The proportion of fatalities who either presented and/or were admitted to hospital will vary according to agent and other factors such as intent and likelihood of being found.

Fifty-three percent of VCFS deaths, 62% of VIMD admissions and 64% of VEMD presentations were intentional. The lower percentage of intentional for CFS deaths, than admissions and presentations, can partly be attributed to the difference between the legal and medical definitions of suicide. The Coroners use the legal definition, which is most strict, the ABS and hospital admissions the ICD E code definition which is more aligned with self-inflicted injury leading to death, and is consistent with world health practice (Moller, 1997).

In a London study, comparing fatal and non-fatal self-poisoning cases, those who died had taken a higher mean number of substances (Neeleman & Wessely, 1997). Confirming this, 18% of VEMD presentations were co-ingestions compared with 40% of deaths.

Admissions and presentations had similar age and sex distributions ie a peak age group of 20-24 years and approximately 57% female. Fatalities were more likely to be male and older ie 71% male and a peak of 25-29 years.

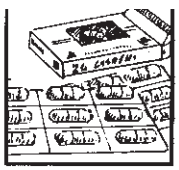
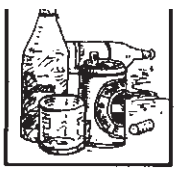
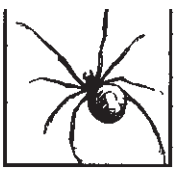
Platt et al in Buckley et al (1995) noted that only 12 of 83 drug deaths presented to hospital and for most of these death was inevitable at presentation.

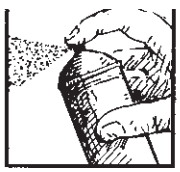
Comparison with child poisonings

The curve for all-age poisoning admissions is bimodal. Children under 5 years, particularly 2 year olds, constitute the first peak, the second 20-24 year olds. Almost all child poisonings (<15 years) are unintentional (93%) compared with 35% for adults. Clearly those child poisonings which are intentional

Adult poisonings, agent rankings, Victoria **Table 4**

Deaths 1989/90-94/95 CFS	% total agents	Admissions 1987/88-97/98 VIMD	% total agents	Presentations 1996-98 VEMD	% total agents
Carbon monoxide	34.7	Benzodiazepines	19.0	Benzodiazepines	21.6
Alcohol	24.6	Antidepressants	11.2	Alcohol	13.8
Heroin	20.7	Paracetamol	9.4	Paracetamol	13.1
Benzodiazepines	4.5	Alcohol	7.1	Heroin	10.2
Amphetamines, antidepressants	4.0	Phenothiazine-based tranquillizers	4.7	Antidepressants	8.0




describe the beginning of the adult rise (12+ years). The agents ingested vary. Young children tend to access the medications and poisons around them eg liquid paracetamol, cough and cold preparations, eucalyptus oil, rodenticides. Adults are more likely to select medications which are prescribed to alleviate their health conditions or can be easily purchased eg paracetamol tablets/capsules. They more often co-ingest medications and recreational drugs eg alcohol, heroin. Access is an issue for children, for adults it is more the underlying causes of discontent triggered by life stressors. Making an agent less accessible however has its place in prevention for both adults and children eg bubble packs enable time for a suicide attempter to change their mind and also may make it difficult for young children to gain access. *Hazard* editions 27 and 28 provide an in-depth overview of early childhood poisonings.

Individual agents

Prescription drugs

Crombie & McLoone (1998) noted that the availability of prescribed drugs is directly related to their use for self-poisoning. Prescription statistics, in addition to agent poisoning data, are therefore included in this section. The agents responsible for frequent and severe poisonings are discussed in detail.

Benzodiazepines

These drugs are prescribed for their anxiolytic, hypnotic, muscle relaxant or anti-convulsant actions. In overdose they can cause respiratory or circulatory collapse, although this is uncommon when this is the only class of drugs ingested. When mixed with other drugs, tranquillisers greatly reduce alertness and judgment of time, space and distance (ABCI, 1997). Combining alcohol and benzodiazepines may result in death. Their status as the leading agents used in self-poisoning may reflect their availability as frequently prescribed drugs, or the frequency with which they are used to treat individuals with affective disorders, or adjustment disorders with depressed mood and personality disorders, who may be at increased risk of self-poisoning (MUARC, 1994). Use of benzodiazepines, in conjunction with heroin, to supplement heroin use or to alleviate some of the withdrawal and other side effects associated with heroin dependency, is well reported (Lynskey and Hall, 1998; Darke, et al 1997; WA Task Force on Drug Abuse, 1996).

Examples of brand names and associated agents are temazepam, nitrazepam, flunitrazepam, oxazepam, diazepam, lorezepam, clobazam, bromazepam and alprazolam (MIMS, 1998; H&FS, 1997) (page 17 for associated brands). Clonazepam, a benzodiazepine, which is also used as an anti-convulsant, is included under the latter.

Temazepam, diazepam and alprazolam prescriptions have been increasing in recent years; other benzodiazepine agent groups and benzodiazepines overall have been reducing (Table 5).

Presentations, admissions and deaths for benzodiazepine poisonings peaked in the 25-29 year age group and approximately 72% occurred between the ages of 20-44 years. Fatalities were predominantly aged 20-34 years. Two thirds of deaths were males, two thirds of presentations and admissions were females. Of the VIMD admissions, as for VEMD presentations, 73% were intentional self-harm yet only 20% of deaths were intentional. The latter can be attributed to a high incidence of co-ingestion with alcohol and heroin.

Diazepam and to a lesser extent alprazolam and flunitrazepam appear to be over-represented compared with their script numbers (Table 5).

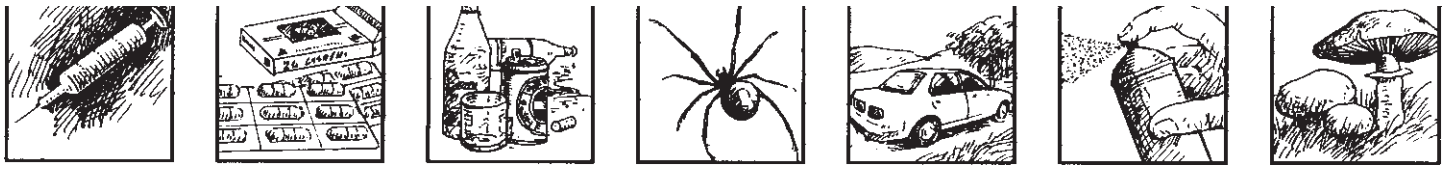
Seventy-two percent of admissions stayed for less than 2 days. Poisoning admissions doubled over the 11 years (Figure 4). Agents commonly co-ingested with benzodiazepines were paracetamol, alcohol, phenothiazine-based tranquillizers and anti-depressants.

The 89 benzodiazepine deaths were most commonly associated with diazepam (54), followed by flunitrazepam (15) and oxazepam (10). Four deaths were benzodiazepines only, consistent with the ABCI (1997) "Very few cases of death due to benzodiazepines alone have been documented in the literature, the toxicity of benzodiazepines is greatly increased by the administration of other drugs". Frequently benzodiazepine deaths had co-ingested alcohol, heroin and other pharmaceuticals.

Benzodiazepines: Comparison of scripts dispensed in Australia,* 1991 & 1997 Table 5

Agents*	N Scripts 1991	N Scripts 1997	% Scripts 1997	N Deaths 1989/90-94/95 CFS	% Deaths	N VEMD 1996-98	% VEMD 1996-98
temazapam	3,182,084	3,275,343	38.2	6	6.7	811	25.6
oxazepam	2,767,456	1,808,973	21.1	10	11.2	286	9.1
diazepam	1,197,581	1,829,980	21.3	54	60.7	1393	44.0
nitrazepam	1,623,259	957,673	11.2	4	4.5	195	6.2
alprazolam	155,112	308,810	3.6	-	-	276	8.7
flunitrazepam	336,062	218,409	2.5	15	16.9	185	5.9
other	365,728	176,483	2.2	-	-	10	0.3
Total	**9,627,282**	**8,575,671**	**100**	**89**	**100**	**3,156****	**100**

**Tablets, capsules only. Clonazepam included with anti-convulsants. ** Another 100 did not differentiate the agent. Source: Commonwealth Department of Health and Aged Care, 1991,1997*



Paracetamol

Paracetamol (acetaminophen) is commonly used as a minor analgesic and antipyretic. For adults it is most often sold in 500 mg tablets/capsules in bubble packs of 12 or 24 at a wide variety of retail outlets, or at pharmacies in larger quantities under prescription. Higher strength preparations are co-formulated with other agents eg codeine. It is sold under a wide variety of brand names (see page 17 for associated brands). In overdose, although there are often no symptoms in the first 24 hours, there may be nausea, vomiting and abdominal pain. After 2-4 days liver function deteriorates, possibly permanently, leading to jaundice, confusion and loss of consciousness. Liver failure may result in death or the necessity for a transplant. Treatment of overdose is mainly by administration of the antidotes activated charcoal (within 4 hours of overdose) or NAC (N-acetylcysteine) which can reverse the toxic effects. The latter should be administered within 12 hours of overdose although it can still be beneficial up to 48 hours (Paracetamol Information Centre, 1997). Alcohol abuse, anticoagulants and fasting elevate the risk of poisoning from paracetamol (Newgreen, 1998).

In Victoria, paracetamol was the third most common poisoning agent both for hospital admissions and ED presentations. There were relatively few deaths, although they are more common in the UK and US (known as acetaminophen). In a study of 80 paracetamol overdose patients in the UK, and their reasons for overdose, 62% chose the agent because it was available, one third because they knew it was dangerous, one half had obtained the drug specifically for an overdose, few thought an overdose was safe and over three quarters thought it could cause death. Forty percent knew that paracetamol could cause damage to or failure of the liver. Most thought the effects would show quickly, only 22% realised that the effects could take 24 hours to appear (Hawton et al, 1995). In reference to the greater problem paracetamol poses in the UK, McLoone & Crombie (1996) wrote that "Rapid increases in self-poisoning particularly among young adults present a serious health problem. Controlling this epidemic is made difficult because the principal drug involved, paracetamol, is readily available".

For both paracetamol admissions and ED presentations, approximately 70% were female. Seventy-three percent of admissions were intentional self-harm (80% presentations), 23% were coded as accidental (12% presentations). Paracetamol admissions peaked in the 15-19 age group and numbers increased dramatically from 14 years of age. One half of admissions were aged between 15 and 24 years (43% presentations). Paracetamol overdosers are of a younger age than other agent groups.

Fifty-four percent of presentations were admitted to hospital, a relatively high admission rate. Unintentional poisonings were typically desperate attempts to relieve severe pain eg "*Toothache worse today. Taken 30 tablets of paracetamol in last 16 hours*", "*Took 16 paracetamol for migraine*". Fifty-four percent overdosed with paracetamol only, 46% with other agents, particularly alcohol. The number of paracetamol tablets taken in overdose was usually between 10 and 30 but there were extreme cases of 120 and 108 in a single dose and 150 over 5 days. All cases overdosed with the tablet/capsule form of paracetamol.

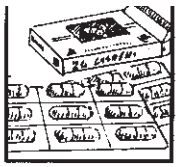
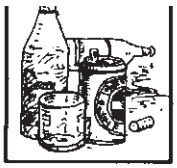
There has been a steady rise in paracetamol admissions over the period of data collection with a tripling of annual numbers (Figure 4). As with other agents, the most dramatic rise coincided with the introduction of Casemix based funding. There has been a steady increase in cases coded as intentional over the study period (from 61 to 77%). Sixty-three percent were hospitalised for under 2 days, 33% for between 2 and 7 days. Co-ingested agents were commonly alcohol, aspirin and codeine/morphine ie mostly other analgesics.

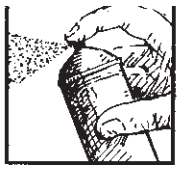
Paracetamol was associated with 8 deaths. Four were paracetamol only, another combined with antidepressants, another with CO, another with morphine, benzodiazepines and amphetamines and the last with amitriptyline, benzodiazepines and propoxyphene. The latter has been a common co-agent of paracetamol deaths in the UK.

An extensive, informative report " Review of non-prescription analgesics", prepared by David Newgreen for the Therapeutic Goods Administration was published February 1998. Often discussed in the literature, especially in the *British Medical Journal*, is the addition of an antidote, methionine, to paracetamol. If included in all paracetamol preparations, it would remove the necessity for medical intervention and its associated costs. In the US these, including admissions to hospital and days off sick, have been estimated to be $US86.9 million/year (Jones et al, 1997). However in the literature there has been concern expressed regarding its possible side effects eg nausea and headaches in some cases. It has not been evaluated in the long term for possible carcinogenesis. A possibility is that lesser amounts of methionine are sufficient to eliminate these concerns (Jones et al, 1997). Paradote (500mg paracetamol, 100mg methionine) is currently available in the UK but being relatively expensive, compared with other preparations, is not competitive. The Paracetamol Information Centre in the UK contributes considerably to discussion on this issue but, as an industry body, may be biased.

Prevention

- Further research be undertaken into the side-effects, determination of safe dosage & costs/benefits of methionine.
- Introduce labelling which draws attention to unpleasant side-effects eg nausea, stomach pain, possible permanent liver damage.
- Provide additional information for patients, pharmacists and doctors regarding the toxicity of paracetamol


in overdose, especially when associated with chronic alcohol abuse.

- Restrict sales of paracetamol to pharmacies only.

Antidepressants

As for benzodiazepines, antidepressant admissions peaked in the 25-29 year age group (20-29 years presentations) and 65% were female (also for presentations). Seventy-five percent were intentional self-harm (81% presentations) increasing from 63-80% over the 11 years. Antidepressant poisoning admissions doubled over this period (Figure 4). Benzodiazepines, alcohol and paracetamol were most often co-ingested. SSRIs and TCAs had a similar age and sex distribution.

There was anecdotal evidence of considerable quantities of antidepressants obtained by doctor shopping eg 1,300 tablets in two hours (Victorian Suicide Taskforce, 1997).

Tricyclic antidepressants (TCAs)

These drugs act as antidepressants and sedatives (or tranquillisers). They are used to treat endogenous depression, depression accompanied by anxiety and sleeping problems. They are usually supplied in blister or foil strip packs, to slow an impulsive ingestion of large numbers of the tablets in suicidal patients (MUARC, 1994). Agents are amitriptyline, clomipramine, doxepin, dothiepin and imipramine (H&FS, 1998) (page 17 for associated brands). Despite increases in the use of dothiepin and clomipramine, the numbers of TCA scripts are reducing. Retrospective reviews of published series of TCA overdoses found that coma is present in 35% of cases, hypotension in 14%, respiratory depression in 11% and seizures in 8%. ECG changes are common, as are arrhythmias. Cardio-respiratory arrest occurred in 3.6% of cases, and overall mortality in 2.2 to 2.6% (Callahan M, Kassel D, 1985).

There appears to be a small over-representation of dothiepin and amitriptyline for ED presentations, imipramine and desipramine for deaths (Table 6).

Dothepin and amitriptyline were most commonly associated with deaths (9 each), followed by doxepin (7) and imipramine (6). A UK study found 82% of deaths from antidepressant overdose were due to amitriptyline and dothiepin. The overall rate of deaths per million prescriptions was 34.1 for tricyclic drugs, 13.5 for MAOIs, 6.2 for atypical drugs and 2.0 for SSRIs. The numbers of deaths per million prescriptions for dothiepin and amitriptyline were significantly higher than expected (Henry et al, 1995).

Selective Serotonin Reuptake Inhibitors (SSRIs)

SSRIs raise the serotonin levels in the brain. Serotonin is necessary for sleep and emotional stability, as well as pain regulation. Low brain levels of serotonin have been implicated in some cases of depression, obsessive-compulsive disorder, impulsivity and aggression, including violent actions or suicide. (http://www.nutrimart.com/5-HTP.htm, 1999).

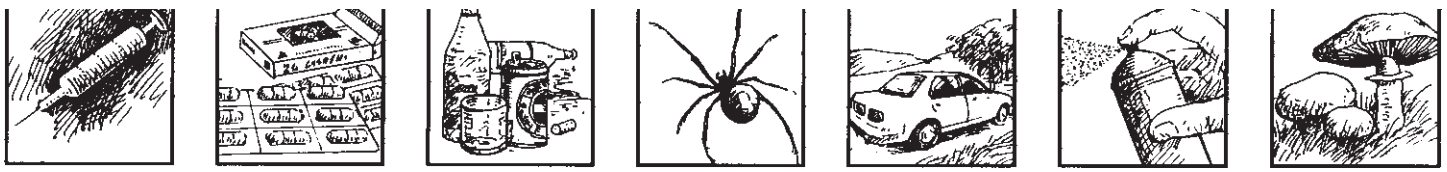
As reflected in script numbers, SSRI availability increased 3.5 times over a 3 year period. These appear to have partly replaced older TCAs. Agents are citalopram, fluoxetine, fluvoxamine, paroxetine and sertraline. (Commonwealth Dept. Health & Family Services, 1998) (page 17 for associated brands).

The State Coroner's System, which has collected data beyond the VCFS, has to date, recorded 56 fluoxetine deaths from July 1995, 36 paroxetine deaths from August 1995 and one citalapram and one fluvoxamine death from January 1999, excluding those awaiting an inquest. On the original VISS database (1988-95, five selected hospitals) there were 34 cases of SSRI poisoning (1% of poisoning cases), mostly fluoxetine. Over the 3 year period 1996-98, there were 557 VEMD SSRI presentations (4.8% of cases where agent known), reflecting their greater availablity and popularity since the introduction of the first SSRI, fluoxetine in 1990. Agent presentations approximately correlated with script numbers. It is not possible to determine the number of hospital admissions for SSRIs due to a lack of a specific code in the ICD coding system. They fall into the group which covers antidepressants generally (969.0).

Tricyclic antidepressants: Comparison of scripts dispensed in Australia, 1991 & 1997 Table 6

Agent	N Scripts 1991	N Scripts 1997	% Scripts 1997	1997 cost $	Deaths CFS 1989/90-94/95	% Deaths	N VEMD 1996-98	% VEMD
Dothiepin	1,034,734	1,220,503	33.6	9,018,151	9	26	188	39.6
Amitriptyline	1,221,228	926,358	25.5	5,792,451	9	26	153	32.2
Doxepin	1,278,815	737,824	20.3	5,035,548	7	21	78	16.4
Imipramine	654,688	410,512	11.3	2,873,009	6	18	27	5.7
Clomipramine	115,580	123,619	3.4	3,515,640	1	3	19	4.0
Nortriptyline	189,979	99,793	2.8	771,938	-		3	0.6
Trimipramine	208,180	81,500	2.2	208,180	-		6	1.2
Desipramine	65,827	28,705	0.8	333,685	2	6	1	0.2
Total	**4,769031**	**3,628,814**	**100**	**27,548,602**	**34**	**100**	**475***	**100**

* **There were another 95 tricyclic antidepressant VEMD presentations for which the specific agent was not specified.**
Source: Commonwealth Department of Health & Family Services, 1991/97



Other antidepressants

These were principally moclobemide (611,630 scripts in 1997, 109 VEMD presentations), venlafaxine (a serotonin & noradrenaline reuptake inhibitor (SNRI), 202,039 scripts in 1997 at a cost of $14m, 86 VEMD presentations) and mianserin (a tetracyclic antidepressant, 177,121 scripts in 1997, 15 VEMD presentations).

Comparison of older and newer antidepressants

Treatment of clinical depression with antidepressant medications is thought to reduce suicide risk (Isacsson et al, 1996 in NIPAC, 1999). Some of the substances prescribed are sufficiently toxic to offer effective means for suicide. Suicide by means of antidepressant drugs is relatively uncommon, although, if it occurs, is likely to involve drugs prescribed to the person who is poisoned (Ohberg et al, 1996; Isacsson et al 1994 in NIPAC, 1999). However evidence generally suggests that under-diagnosis and under-treatment of depression accounts for more suicide than does poisoning by means of prescribed antidepressants (Isacsson et al, 1996; Ohberg et al, 1996; NIPAC, 1999).

The percentage of VEMD presentations admitted, is higher for TCAs than SSRIs (69% v 47%), perhaps reflecting the reputed lower toxicity of SSRIs.

The assumption that admission is determined by the severity of overdose should be made with caution since it may also reflect the severity of underlying psychiatric illness. Safety in overdose should be considered in risk-benefit and cost-benefit considerations of antidepressants. A switch in prescribing, from drugs with a high number of deaths per million prescriptions to drugs with a low number, could reduce the number of deaths from overdose. Although this form of suicide prevention can be implemented relatively easily and immediately, its introduction needs to be considered in the context of the higher cost of some of the newer drugs (Henry et al, 1995) (Tables 6 & 7). In a US study of antidepressant critical care unit costs, the dollar cost of patients who overdosed on TCAs was 4 times greater than that for patients who overdosed on SSRIs (D'Mello et al, 1995).

Despite differences in the toxicity of anti-depressants, findings are inconsistent on translating this into different risks of suicide or attempted suicide (Edwards et al, 1995; Ohberg, 1996; Jick et al, 1995 in NIPAC, 1999). Caution suggests, however, that preference should be given to the less toxic compounds (Buckley et al, 1995).

Antipsychotics

Antipsychotics tranquillise disturbed patients. They are also known as 'neuroleptics' or 'major tranquillizers'. In schizophrenic disorders, they diminish hallucinations, delusions and thought disorder (Victorian Medical Postgraduate Foundation, 1989). Agents are chlorpromazine, clozapine, haliperodol, lithium, pericyazine, risperidone, thioridazine and trifluoperazine (page 17 for associated brands). In overdose there are distressing neurological effects including behavioural changes, depression of consciousness and muscle spasms (Routley, et al, 1996).

Most frequently presenting to ED were chlorpromazine (33%), thioridazine (29%), lithium (16%), trifluoperazine (8%) and haloperidol (8%). Deaths were mostly from thioridazine (9).

Phenothiazine-based tranquillisers (VIMD only)

The ICD-9 category contains mainly, but not exclusively, anti-psychotics. Antipsychotics, however, can also be found in two other VIMD psychotropic agent groups *(butyrophenone-based tranquillizers and other antipsychotics, neuroleptics and major tranquillizers).*

The pharamacologic actions for phenothiazine-based tranquilisers include CNS depression, prolongation and potentiation of the effects of narcotic and hypnotic drugs, hypotensive activity, and antispasmodic, antihistaminic and antiemetic activity (W.B.Saunders & Co, 1988). Examples are chlorpromazine antipsychotic, fluphenazine (anti-psychotic), prochlorperazine (anti-emetic) and promazine (antipsychotic) (MIMS, 1999).

Admissions demonstrated a very similar pattern to benzodiazepine admissions and to antipsychotic presentations. The peak age group was 25-29 years, 62% were female, usage doubled over the collection period (Figure 4), 70% were intentional self-harm and 67% were admitted for under 2 days. They were frequently co-ingested with benzodiazepines.

Anticonvulsants

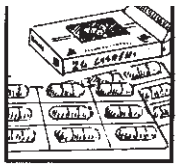
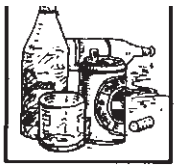
Most often used to treat epilepsy, this group includes: Tegretol (carbamazepine), Rivotril (clonazepam), Dilantin (phenytoin), Epilim (sodium

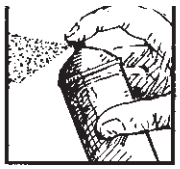
SSRI's: Comparison of scripts dispensed, Australia, 1991 & 1997 **Table 7**

Agent	N Scripts (Aust) 1991	N Scripts (Aust) 1994	N Scripts (Aust) 1997	1997 cost $	N Presentations VEMD 1996-98	N Deaths CFS 89/90-94/95
Sertraline	-	83,906	1,134,018	47,578,333	241	-
Paroxetine	-	48,218	811,561	35,394,593	149	-
Fluoxetine	4,886	648,677	793,032	31,186,780	153	24
Fluvoxamine	-	-	17,806	716,043	12	-
Total	**4,886**	**780,801**	**2,756,417**	**114,875,749**	**555***	**24**

* **There were 2 Selective Serotonin Reuptake Inhibitor cases for which the agent was not specified.**

Source: Commonwealth Department of Human Services & Health, 1997.


valporoate) and Neurontin (gabapentin). Overdoses increase respiration rate, provoke ataxia and confusion, followed by respiratory failure (MIMS, 1998)

Carbamazepine was associated with 3 deaths. Two thirds of ED presentations occurred between 20-40 years of age, 60% were female, 77% were intentional self-harm. Forty-five percent of presentations were associated with clonazepam, 32% with carbamazepine, 14% phenytoin and 9% sodium valproate. Sixty-one percent were admitted, a relatively large percentage, reflecting their high toxicity. Females predominated for all agents with the exception of phenytoin. An explanation for this is its unlikelihood of being prescribed for females due to its Category D listing ie it is suspected to carry a risk of foetal damage.

Clonazepam, also a benzodiazepine, is mostly used as an anticonvulsant to treat epilepsy. Its over-representation in poisoning can possibly be attributed to the large quantities and easily accessible container in which it is supplied (100, 200 tablets in a bottle with a screw top lid) plus its frequent use.

Cardio-vascular (including diuretics)

There was a large number of agents in this group. Principally these were propanolol, nifedipine, verapamil, atenolol, lisinopril, sotalol, digoxin, prazosin, spironolactone, clonidine, diltiazem, metoprolol and frusemide.

These drugs had an extremely high VEMD admission rate (70%). This can probably be partly attributed to a relatively larger proportion in the 80+ age group (11% v 1% overall). The over-representation for deaths was not so extreme (6.1% v 3.8% overall). Fifty-eight percent of presentations were intentional self-harm. Diltiazem, digoxin and verapamil were together associated with 4 deaths. Propanolol was associated with 31% of cardio-vascular presentations, digoxin 21% and frusemide 12%.

Additional agents

Antihistamines were mostly promethazine (41% VEMD) and pheniramine (28%), antiinflammatory presentations 32% naproxen and 23% diclofenac; narcotic analgesic presentations 85% morphine; endocrine and metabolism drugs 79% insulin and 21% thryoxine; antispasmodics entirely benztropine mesylate; anticoagulants entirely warfarin and muscle relaxants mostly quinine (84%) (Table 1).

Issues in prevention – pharmaceuticals

A barrier to prevention is the practice of toxicity in overdose only being able to be studied after approval for marketing has been granted. Surveillance of toxicity in overdose by pharmaceutical companies is not required for registration in Australia (or any other country) (Buckley et al, 1995a).

There has been little Australian research with respect to packaging and adult poisoning. However Buckley et al (1995b) demonstrated that following repackaging of carbamazepine, adults using this drug took significantly fewer tablets and ingested lesser amounts. It was thought however that the lesser quantities in the pack were of more consequence. The authority prescription system in Australia permits larger quantities of target drugs with minimal constraints. TCA's are available in large supplies by a prescriber telephoning the Health Insurance System and specifying the condition as “depression” (Cantor et al, 1996).

Packaging in blister or bubble packs of all brands of pharmaceuticals, which are hazardous in overdose, is likely to slow down a spontaneous suicide and enable time to rethink. However, prevention, in the form of child resistant lids, is preferred by professionals concerned to restrict access to young children. A possible compromise may be placing in opaque strip packaging.

The newer antidepressants eg SSRIs appear to be safer in overdose. However, there are significant cost considerations for widespread prescribing. A compromise may be to prescribe these where there is an assessed risk of suicide.

Prevention – prescription pharmaceuticals

- Packaging in as small a quantity as is practicable. Alternatively it may be appropriate in crisis time to ration the number of tablets dispensed at any one time eg the bottle is retained at the pharmacy or given to other family members (Wenzel,1999).

- Authority prescriptions to require the specification “depression – suicide risk assessed” and the number of repeat prescriptions for drugs most toxic in overdose be kept at a minimum level.

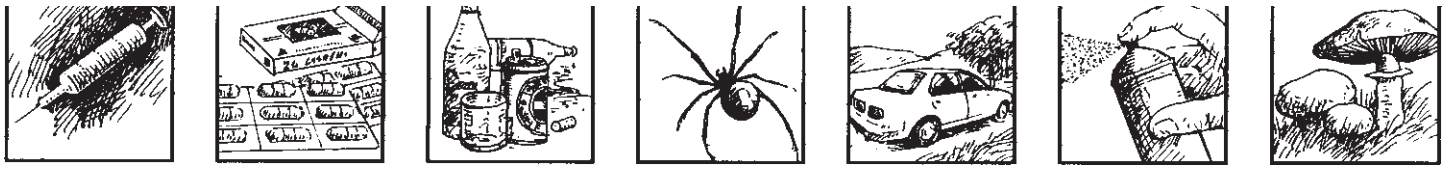
- Encourage the prescribing of newer, safer antidepressants eg SSRIs in preference to the older tricyclics where there is a risk of suicide. The high cost however should be taken into consideration in widespread prescribing.

- Raise awareness of the dangers of mixing pharmaceuticals, heroin and alcohol.

- Consider toxicity in overdose issues with respect to introduction and removal of products.

- There is potential for tighter controls on the accessibility and distribution of prescription drugs, particularly TCAs through education & available information systems for pharmacies. In addition there should be an investigation of potential changes to the Medicare system to enable more effective monitoring of prescriptions for antidepressants, sedatives and anti-anxiety drugs (Victorian Suicide Task Force, 1997).

- Develop strategies to improve diagnosis and pharmacological treatment of psychosis – to ensure cases do not go untreated, and those that are detected are managed in the most appropriate way to minimise the opportunity for overdosing by the medications prescribed (NIPAC, 1999).



• Support programs which call for or initiate the disposal of unwanted/ expired medication (Cantor et al, 1996).

Non prescription drugs

Alcohol

Alcohol is one of the leading agents associated with poisoning for deaths, hospital admissions and ED presentations, often associated with other drugs and interacting to exacerbate effects. It was associated with 472 poisoning deaths between 1989/90 and 1994/95. Drugs were combined with alcohol in 61% of these deaths, alcohol alone in 22% and car gassings in 11%. Unintentional poisoning deaths were typically heroin combined with excessive amounts of alcohol (Stathakis & Scott, 1999). Seventy-eight percent were male.

For hospital admissions, 30-34 years was the peak age group (older than for other leading agents) and 52% were female (less than other leading agents). Intentional self-harm accounted for 63% of admissions, having increased from 48% to 69% over the 11 year period, possibly due to changes in coding practice. In 78% of cases the LOS was under 2 days (higher than for other agents). Other common co-agents were benzodiazepines, paracetamol and antidepressants. Alcohol admission data exhibited a steep rise after the introduction of Casemix based funding, as did acute alcohol intoxication data held by the Victorian Department of Human Services (Figure 4).

ED presentations occurred almost equally for all age groups up to 45 years. Overall there were slightly more males than females, most likely due to the association of alcohol with other drugs. Men were more likely to overdose on beer, women on wine. An estimated 12% presented with alcohol intoxication only.

In addition to those recorded as poisonings on the VCFS, alcohol was associated with 754 injury deaths which could be attributed to other mechanisms. In confirmation, English et. al. (1995), assessed that alcohol plays a significant causative role in road trauma, falls, fire injury, drowning, assault and to a lessor extent suicide.

Haywood et al (1992), however, found that alcohol is immediately involved in 20 to 50% of suicide cases in the Australian context and suggests that this involvement can be viewed in two ways. "Firstly, alcohol, through its disinhibiting and depressant effects, can contribute to the decision to suicide, which is often impulsive. Secondly, alcohol can be used for so-called “Dutch courage”, to facilitate the fatal action or to anaesthetise against the discomfort of a slower form of death" (Routley, 1998).

In addition to the substantial literature on the reduction of alcohol abuse, the recent NIPAC report included the following preventive measures.

Prevention

• Evaluate the approach of brief advice by primary care physicians to reduce problem drinking which has been shown to be successful for at least a year in a randomised control trial (Fleming et al 1997 in NIPAC, 1999).

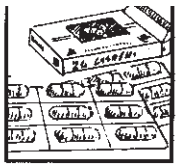
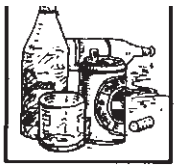
• Promote the implementation of responsible server programs (NIPAC, 1999).

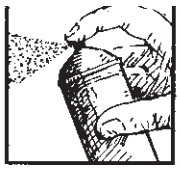
Heroin

Heroin, or diacetylmorphine, is a drug belonging to the narcotic analgesic or opioid group. It is derived from the opium poppy. Other drugs in the group are opium, morphine and codeine. The related drugs methadone and pethidine are synthetically produced (State Government of Victoria, undated). In recent years there have been increases in the worldwide production of opium, amounts detected at the Australian Customs barrier and the rate of detection of heroin trafficking. It is widely available and prices have fallen to as low as $10 to $25 a cap or even free for a first purchase (ABCI,1997; Herald-Sun, 18/2/99). Heroin related deaths and hospitalisations have risen dramatically, as illustrated in Figure 5. The rise is concerning and has understandably received much media attention. Possible explanations are the reduced street price encouraging greater numbers of users, social and economic factors, a reduction of tolerance in long-term users and an increase in purity (currently street heroin is 70-80% pure, in the early 90’s purity was 30-40%) (Gerostamoulas, 1999).

Heroin overdose is the fourth most common poisoning event requiring ED treatment. This figure however, belies the true incidence of heroin overdose in Victoria as it has been reported that up to 80% of heroin overdoses, attended by ambulances, do not attend ED's for treatment (Dietze, et al, in press). In addition, evidence from interviews of heroin users in Sydney suggests that ambulances are called in only 56% of overdose events (Darke et al, 1996). Compared with total poisoning presentations (46% admitted), only 22% of heroin presentations were admitted. A substantial proportion (16%) left the emergency department prior to, or during treatment, (1% for total poisonings). Possible explanations are that patients are treated with the antidote Narcan and therefore do not require hospitalisation or prefer to remain under the influence of heroin.

Half of VEMD and VIMD heroin overdosers were persons aged 20-29 years, with a higher representation in the early 20’s. Most overdoses occurred to males (69% VEMD, 68% VIMD). Deaths were older with a 25-29 year peak and a higher proportion of males (79%). The Ambulance Overdose Project established that most overdose victims, in Melbourne, are males aged in their late 20s (Dietze, et al, in press), consistent more with deaths than presentations or admissions. The average age of users has increased over the past 10 years (Gerostamoulas, 1999). The majority of overdoses for all levels of severity were accidental (43% of presentations, 68% admissions and 74% deaths). Consistent with deaths overall, heroin deaths were rarely coded as intentional compared with lesser levels


of severity (4% deaths v 33% presentations, 27% admissions).

An estimated 19% of presentations and 43% of deaths reported other agents used in conjunction with heroin. These were mostly benzodiazepines (13% presentations, 8% deaths) and alcohol (3% presentations, 17% deaths) plus some methadone and amphetamines. As noted under benzodiazepines, the use of central nervous system depressants eg benzodiazepines, in conjunction with heroin, to supplement heroin use or to alleviate some of the withdrawal and other side effects associated with heroin dependency, has been well reported in the literature. Zador et al (1996) in a review of 152 heroin related deaths found that, at autopsy, 71% of subjects had two or more different drugs detected and 18% had 3 or more. Morphine, a metabolite of heroin, was detected in 95% of subjects, alcohol in 45% and benzodiazepines in 26%. Men were more likely to have alcohol detected than women, while women were more likely to have benzodiazepines detected.

The National Drug Strategic Framework (1998) was produced by the Ministerial Council on Drug Strategy as an ongoing response to the licit and illicit drug problem. A growing trend identified was polydrug use, especially amongst heroin users. Frequent concomitant use of alcohol and benzodiazepines is associated with attendant increased risk of death. A Sydney study found alcohol was detected in 51% of fatal cases compared with 1% of current heroin users. There was a significant negative correlation among fatal cases between blood morphine and BAC concentrations and no significant difference for benzodiazepines (Darke et al, 1997). A cornerstone of the National Drug Strategy is the principle of harm minimisation, which encompasses supply-reduction strategies, demand-reduction strategies, and targeted harm-reduction strategies. One example of a harm-reduction strategy is the provision of sterile needles and syringes for intravenous drug users, in order to reduce the risk of spreading viruses such as HIV or hepatitis. In order to ensure efficient resource allocation, an important aspect of the National Drug Strategy is the need for policy and initiatives to be based upon, and assessed with, evidence based practice. Single and Rohl (1997) previously discussed the application of harm minimisation principles. Whereas the approach originally was developed as a narrow response to zero tolerance, harm minimisation was recently considered a more general strategy. The harm minimisation philosophy does not advocate legalisation of drugs. Instead, the National Drug Strategy focuses on a flexible approach that does not marginalise drug users.

Prevention

- Educate heroin users about the risks of both combining heroin with other drugs, particularly alcohol and benzodiazepines (Lynskey and Hall, 1998) and of using alone.
- Meta-analysis indicated that methadone maintenance reduced addicts' risk of death to a quarter (Caplehorn et al, 1996).
- Maximum dose and obtaining methadone from a private pharmacy were strongly associated with retention on methadone programs (Gaughwin et al, 1998).
- Home-based supplies of naloxone, an antidote, have been recommended for users (Strang et al, 1996).

Amphetamines (Psychostimulants)

There were 39 deaths associated with amphetamines between 1989/90 and 1994/95 (Table 3). Males dominated, especially those aged 20-24 years. In two thirds of the cases amphetamines were combined with heroin. Seventy percent of the cases occurred in the two years 1993/94 and 1994/95.

Other drugs & chemicals

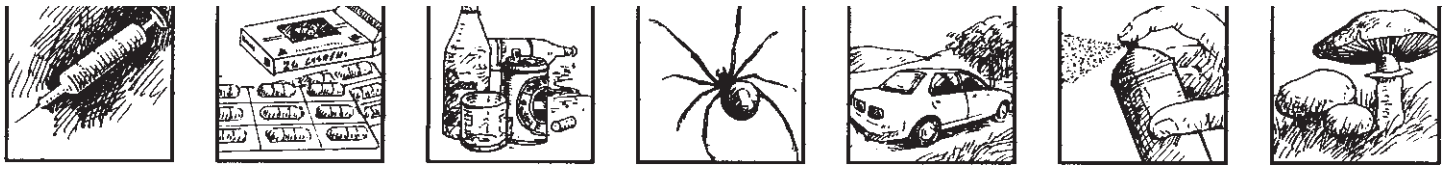
Chemicals

There were 26 deaths from chemical poisonings (Table 3) and 581 presentations recorded on the VEMD. The types of chemicals associated with these poisonings are shown in table 8.

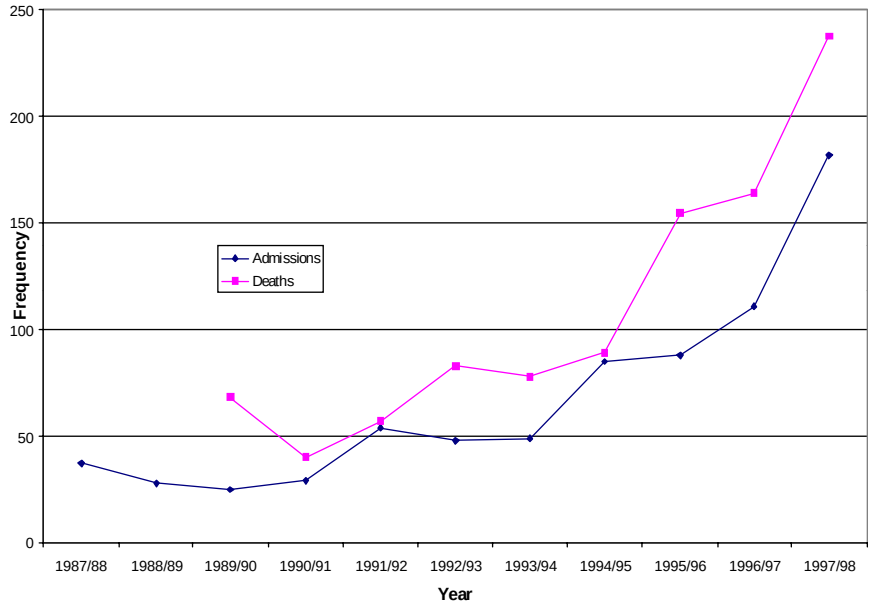
More than two-thirds of chemical presentations, including those admitted to hospital, were male. Chemical presentations were most common in the 15-34 age group (57% presentations). The VEMD admission rate was 23%. Most presentations (56%) were unintentional, a further 27% were associated with self-harming activities. In contrast, most of the deaths from chemical poisoning were intentional (65%), with 22% unintentional and the remainder of unknown intent. Inhalation was the mechanism for 45% of chemical presentations and 13% of deaths. Ingestion was far more common for deaths (61%) compared with presentations (38%). A further 3% of ED presentations were linked to injecting.

Household cleaners most often associated with presentations and admissions were bleach (36% and 45% respectively of the household cleaner total), general purpose cleaners (20%, 25%), ammonia (18% of admissions) and caustics, including drain and oven cleaners (12% of admissions). Four of the 6 fatal poisonings involving household cleaners were associated with caustics.

Items in the 'other specified chemicals' category were mostly paints (29% of this category), most of which were intentional "chroming" or paint sniffing. Other items in this category included thiox (21%), chlorine (20%), battery acid (11%), paint thinners and cyanide (each 5%). There were 7 deaths from 'other specified chemicals', 6 related to cyanide. Volatile solvents deaths, admissions and presentations were mostly methylated spirits (n=2, 79% and 78% respectively). Of the pesticide poisonings, 68% of presentations and 5 of the 6 deaths were associated with insecticides, a further 24% of presentations and 50% of admissions with rat bait.



Adult heroin admissions and deaths, Victoria **Figure 5**



Source: Admissions – VIMD[4]; Deaths - CFS 1989/90-94/95; State Coroners Office 1995/96-1997/98.

Prevention

- Household chemicals or volatile substances must not be stored in alternative containers eg drink bottles.
- Special collections of household chemicals by local councils.
- Packaging of toxic products in smaller volumes.

Carbon monoxide

There were 835 admissions (11 years) and 697 deaths (6 years) demonstrating the lethality of this gas. Almost all of these inhalations were motor vehicle exhaust gas suicide attempts. See MUARC report no. 139 "Motor vehicle exhaust gassing suicides in Australia: epidemiology and prevention", Routley,V and the Medical Journal of Australia article "The Impact of catalytic converters on motor vehicle exhaust gas suicides", Routley & Ozanne-Smith for additional information on this method of suicide. There were twice as many males as females and their incidence was spread fairly evenly between 20 and 44 years.

Prevention

Measures are outlined in Hazard 38 under 'Suicide' and in the above publications.

Envenomation

These were previously reported in detail by Winkel et al (1998) in *Hazard* edition 35. However the definition of poisonings in this current article excludes anaphylaxis and allergic reactions, included in *Hazard* 35. Hence spiders are ranked in this edition as the creature most associated with both hospitalisations (32%) (previously reported as wasps and bees in *Hazard* 35) and presentations (54%).

Other

Hallucinogens were predominantly LSD (80 VEMD, 3 deaths) and marijuana (96 VEMD, 3 deaths). Plants were almost entirely ED presentations for mushrooms (41) and lillies (8).

[4] In the VIMD, heroin admissions were also included under opiate dependence (304.7) and opiate dependence (including presence of other drugs) (304.7). Since these are not categorized as poisonings, they are not included in the hospital admissions database held at MUARC.

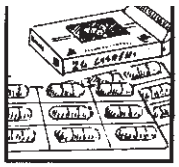
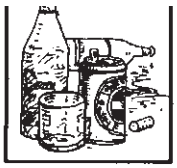
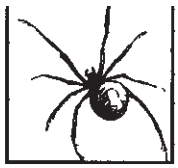
Deliberate self-harm

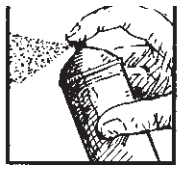
As noted earlier, the majority of presentations (64%), admissions (62%) and deaths (53%) were intentional or deliberate self-harm. For every completed suicide there are considered to be 30-40 suicide attempts (Hassan, 1995). The reasons for deliberate self-harm vary between a serious suicide attempt (impulsive or long-planned), carrying out the actions of suicide but not intending to die or desiring to escape from a current situation or physical or emotional pain without being clear of the survival intention.

Deliberate self-harm is also common in other parts of the world, especially in young people (Schmidtke et al, 1996; Wexler et al, 1978; Davis & Kosky, 1987 in Hawton et al, 1998). About half of all people who kill themselves have a history of deliberate self-harm, an episode having occurred within the year before death in 20-25% (Ovenstone & Kreitman, 1974; Foster et al, 1997 in Hawton et al, 1998).

McGrath in his study of overdose admissions to a major Brisbane hospital noted several strong themes as emerging from the medical literature. One is that those who poison themselves deliberately form a heterogeneous group and these are clearly the majority for adults. Underlying psychiatric diagnoses are numerous and range from adjustment disorders with depressed mood to major depression with psychotic features (McGrath, 1989).

According to Kreitman in the UK in Newgreen (1994) self-harm, which does not prove fatal, is more common among females, especially those under 45 years, it appears most often in lower socio-economic classes, there is no association with physical illness and psychopathology is common. There was a similar pattern demonstrated in Victorian data. Almost two thirds of VIMD admissions for intentional poisoning were female, 82% of whom were aged under 45 years. The frequency




Chemical deaths and ED presentations, Victoria **Table 8**

Chemical	N Deaths	N VEMD presentations	N VEMD admissions	VEMD % admitted
Household cleaning agents	6	130	40	30.8
Chemical ns	1	100	7	7.0
Other specified chemicals	7	95	14	14.7
Pesticides	6	89	28	31.5
Volatile solvents	2	54	19	35.2
Soaps and detergents	-	23	7	30.4
Cosmetics	1	14	3	21.4
Automotive	-	5	1	20.0
Total	**23**	**510**	**119**	**23.1**

Source: VEMD 1996 to 1998, >=15 years

for each age group declined from a peak at 15-19 years.

Suicide

Hassan noted that the young (15-34 years), especially males and the very old (80 plus) have registered considerable increases in suicide rates in recent years. He considered a number of factors to have affected the suicide rate, such as unemployment, changing family structure, increasing substance abuse, access to psychiatric services, welfare transfers, improvements in intensive care medical technology and ideological factors (Hassan, 1995).

He noted a study where suicides fell into the categories of physical and mental illness, unhappy love, family/ marital problems, shame and guilt, grief and burden (on others), drug and alcohol abuse, financial and unemployment problems, a sense of failure in life and loneliness (Hassan, 1995).

Repeaters

Of 15,504 VEMD cases in a 3 year period, 88% accounted for one, 7% for two, 2% for three and 1% for four presentations. There were 118 cases who had between 5-9 presentations, 33 between 10-16 presentations and individuals who had 26, 28, 35, 38 and 42 presentations. A current study of paracetamol overdose admissions indicates that repeaters' presentations are not necessarily confined to the one hospital. Attending medical and nursing staff often have negative attitudes towards these patients and may find them difficult to manage (Taylor & Cameron, 1998).

In a study of patient characteristics, habits and outcomes of recurrent overdosers (compared with single overdosers), repeaters tended to be older and to present more frequently before midnight. Significantly more repeat presentations were triaged to low priority categories 4 or 5 and this group required fewer admissions to hospital. Repeaters tended to take single drug overdoses. There were significantly more 'paracetamol only' overdoses and 'antipsychotic only' overdoses in the repeater group. More repeaters caused self-inflicted trauma during the study period. The study findings suggested the medium term suicidal risk for repeaters is relatively low (Taylor et al, 1998).

Unemployment, increasing severity of suicidal ideation, previous psychiatric treatment and borderline personality disorder increased the risk of reports of previous self-harm (Dirks, 1998).

Prevention self-harm

A systemic review of the efficacy of psychosocial and pharmacological treatments in preventing repetition of self-harm, which took into account the Cochrane Controlled Trials Register, noted that promising results were found for:

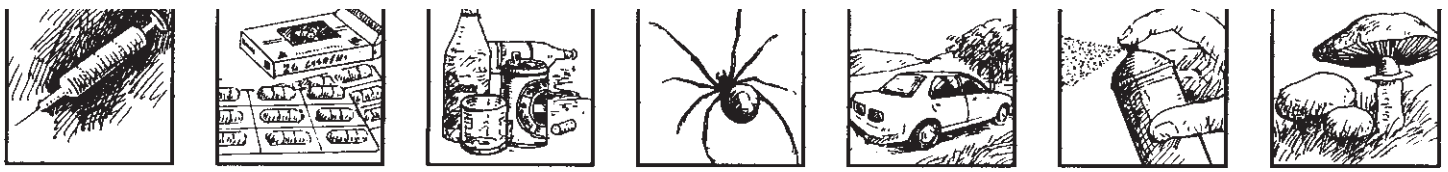
- Problem solving therapy
- Provision of a card to allow patients to make emergency contact with services
- Long term psychological therapy for patients with borderline personality disorder and recurrent self-harm.
- Flupenthixol decanoate (Fluanxol) (an anti-psychotic) for recurrent self-harm

Additionally they found a need for:

- Large trials of promising therapies since most included too few patients to detect significant differences. (Hawton et al, 1998.)
- Observational studies suggest that patients who receive psychiatric assessment as part of their initial management may have lower rates of self-harm (Crawford & Wessely, 1998).

Data recommendations

- Additional resources and/or incentives/ disincentives should be directed towards improving VEMD injury data capture and quality. Such resources could be directed towards employing staff specifically dedicated to record accurate injury and poisoning details and to enhance communication regarding the importance of good quality data for prevention purposes.
- Further staff training regarding the specific meaning of data codes and improved descriptive narratives.
- Change protocol where the VEMD injury description is collected prior to injury variables (Stokes, 1999).
- Specificity in recording poisoning agents, rather than agent groups, in hospital admissions ie ICD and emergency department data.
- Validation studies focusing on 1) the increase in intentional at the expense of unintentional poisoning admissions and 2) increases in poisoning admissions, particularly those alcohol related, which coincide with the introduction of Casemix based hospital funding. Of particular interest are changes in coding practice or admission policy.



Database descriptions

Victorian Emergency Minimum Dataset (VEMD)

The electronic VEMD database records details of injuries and poisonings treated at the emergency departments of 25 major public hospitals, 23 of which cover a general adult community (see page 19). The total number of cases on the database to December 1998 was approximately 500,000. For most hospitals the period 1996-98 is covered. The injury variables collected include injury cause, location, activity, nature of main injury, body region, human intent and a narrative describing the injury event. VEMD hospitals represent approximately 80% of statewide ED presentations. The data provided to MUARC does not include all ED presentations, only injury specific cases. Hence it is not possible to analyse any VEMD data which may have been re-categorised to a non-injury grouping. A MUARC study found that the VEMD captured only 82% of possible VEMD presentations. The agent receives its identification from the narrative. A survey of 4 sites found descriptive narratives valid in only 14.1% of narratives. Accidental poisoning and drug overdose descriptions however best fulfilled the test for validity in regard to product information. Poisoning codes were found to be under-reported (Stokes et al, in process)

Victorian Inpatient Minimum Database (VIMD)

The VIMD contains information on admissions to Victorian hospitals (1987/88-1997/98). For most of the period covered, the data was collected by Health Computing Services Victoria under the direction of Human Services Victoria. Detailed information on hospitalisation from admission to discharge is collected. The information on the nature of injury is based on the diagnosis by physicians. MUARC has access to those records which involve injury and poisoning. In this and earlier editions of Hazard admission data based on the ICD 9 version of coding has been used. However from July 1998 ICD version 10 has been applied in hospitals.

Coroners' Facilitation System

The Victorian Coroner's Facilitation System (VCFS) is a database containing all unnatural deaths and has been collated from the findings of the Victorian State Coroner over the period 1989/90-1994/95. These include deaths that were unexpected, unnatural or violent, or which resulted from accident or injury (See *Hazard* 38 for a recent overview of this database).

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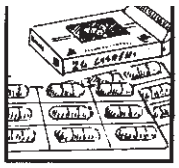
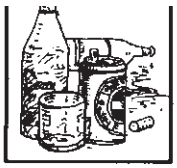


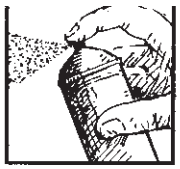


Pharmaceutical agents and associated brands*

Paracetamol
Dymadon, Herron, Mersyndol, Panadol, Panadeine and Tylenol.
Benzodiazepines
Xanax (alprazolam); Lexotan (bromazepam); Frisium (clobazam); Ducene, Valium, Antenex, Diazemuls (diazepam); Rohypnol, Hypnodorm (flunitrazepam); Ativan (lorezepam); Alodorm, Mogadon (nitrazepam); Alepam, Murelax, Serepax (oxazepam) and Euhypnos, Nomapam, Nocturne, Normison, Temaze, Temtabs (temazepam).
Antidepressants
Tricyclics (TCAs)
Amitrol, Endep, Tryptanol, Tryptine (amitriptyline); Anafranil, Placil, (clomipramine); Pertofran (desipramine); Dothep, Prothiaden, (dothiepin); Deptran, Sinequan, (doxepin); Melipramine and Tofranil (imipramine); Allegron (nortriptyline) and Surmontil (trimipramine).
Selective serontonin reuptake inhibitors (SSRIs)
Cipramil (citalopram), Erocap, Lovan, Prozac, Zactin (fluoxetine), Luvox (fluvoxamine), Aropax (paroxetine) and Zoloft (sertraline).
Other
Tolvon (mainserin), Aurorix (moclobemide) and Efexor (venlafaxine).
Antipsychotics
Largactil (chlorpromazine); Clozaril (clozapine); Serenace (haliperodol); Lithicarb (lithium); Neulactil (pericyazine); Risperdal (risperidone); Aldazine, Melleril (thioridazine) and Stelazine (trifluoperazine).
Anticonvulsants
Tegretol (carbamazepine); Rivotril (clonazepam); Neurontin (gabapentin); Dilantin (phenytoin) and Epilim (sodium valporoate).
Antihistamines
Periactin (cyproheptadine); Polaramine, Demazin (dexchlorpheniramine); Dilosyn (methdilazine); Avil (pheniramine) and Phenergan (promethazine).
Anti-inflammatories
Voltaren (diclofenac); Dolobid (diflunisal); Brufen, Nurofen (ibuprofen); Indocid, Hicin (indomethacin); Orudis, Oruvail (ketoprofen); Ponstan (mefenamic acid) and Naprosyn, Naprogesic (naproxen).
Anticoagulants
Coumadin (warfarin).
Cardiac (incl. Diuretics)
Anselol (atenolol); Catapress (clonidine); Chlotride (chlorothiazide); Lanoxin (digoxin); Auscard, Cardcal, Cardizem, Coras, diltahexal, dilzem, WL Diltiazem (diltiazen); Lasix (frusemide); Zestril (lisinopril); Lopressor (metoproolo); Nifedipine (nifedipine); Minipress (prazosin); Inderal (Propranolol); Cardol, Sotacor (sotalol); Aldactone (spironolactone) and Verapamil, Ispotin (verapamil).

Source: MIMS 1999; Commonwealth Department Health/Family Services, 1998.
** The list is not exhaustive.*

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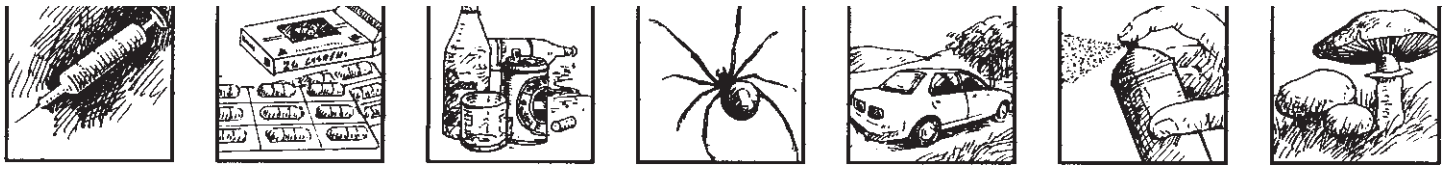
Clarification *Hazard* 38

There has been some misinterpretation of the Appendix table headed "Products & other agents associated with injury death" on page 13. Specifically, "guns, firearms and rifles" were listed under the category "Sports & recreation (incl. activity, apparel & equipment)", a decision based on a US Consumer Product Safety Commission coding system. While firearms are frequently owned as "sports and recreational equipment", they are also owned for other purposes and would perhaps have been more appropriately placed under "other".



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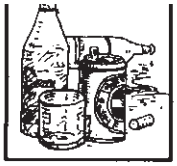



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Access to coronial data and links with the development of the Coronial's Services statistical databse are valued by VISS.

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The advice and technical back-up provided by NISU is of fundamental importance to VISS.

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VISS collects and tabulates information on injury problems in order to lead to the development of prevention strategies and their implementation. VISS analyses are publicly available for teaching, research and prevention purposes. Requests for information should be directed to the VISS Co-ordinator or the Director by contacting them at the VISS office.

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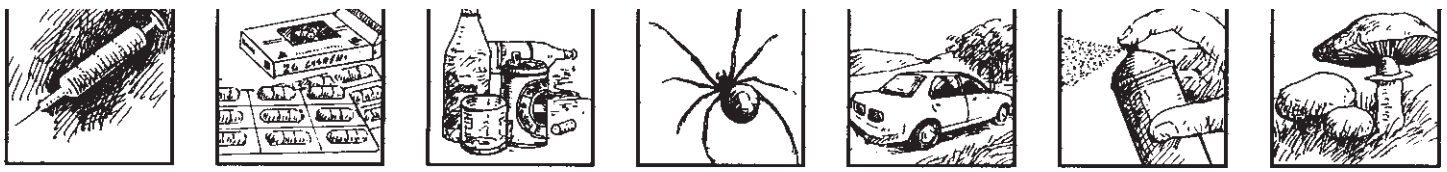

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