Royal Adelaide Hospital
Emergency Department

Designer Drug Early Warning System (D_2EWS)

12-month Technical Report
August 2005 to July 2006

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A collaborative project between Drug & Alcohol Services South Australia, Southern Adelaide Health Service; Royal Adelaide Hospital Emergency Department, Central Northern Adelaide Health Service; and Forensic Science SA.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

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ABBREVIATIONS AND DEFINITIONS

BAL	Blood alcohol level
BP	Blood pressure
bpm	Beats per minute
CNAHS	Central Northern Adelaide Health Service
CVS	Cardiovascular System
D_2EWS	Designer Drug Early Warning System
DAIS	Department of Administrative and Information Services
DASSA	Drug and Alcohol Services South Australia
DAWN	Drug Abuse Warning Network
DMA	Dimethylamphetamine
DOM	2,5-dimethoxy-4-methylamphetamine
DUMA	Drug Use Monitoring in Australia
ECG	Electrocardiograph
ED	Emergency Department
EDRS	Ecstasy and related Drugs Reporting System
EECU	Emergency Extended Care Unit
ELISA	Enzyme linked immunosorbent assay
FSSA	Forensic Science South Australia
GCS	Glasgow coma score
GHB	Gamma-hydroxy butyrate (“fantasy”)
GI	Gastrointestinal
HDU	High Dependency Unit
ICU	Intensive Care Unit
IDRS	Illicit Drug Reporting System
IDU	Injecting drug user
LOS	Length of stay
LSD	Lysergic acid diethylamide (“acid”)
MAM	6-monoacetylmorphine
MDA	3,4-methylenedioxyamphetamine
MDMA	3,4-methylenedioxymethamphetamine (“ecstasy”)
MVAs	Motor vehicle accidents
NR	Normal range
OD	Overdose
PMA	Paramethoxyamphetamine
PRN	Project Research Nurse
PSC	Project Steering Committee
RAH	Royal Adelaide Hospital
REU	Regular ecstasy users
RR	Respiratory rate
SAPOL	South Australian Police Force
SAAS	South Australian Ambulance Service
THC	Tetrahydroxycannabinol

Definition of categories & terms

Illicit Drug Use	In the context of this report, the term Illicit Drug Use (capitalised) is defined as excessive or non-sanctioned use of both licit and illicit substances, including alcohol, across the spectrum of use from occasional to regular to dependent.
Illicit Drug User/s	Illicit Drug Users are those patients who were categorised as using substances as defined above, on attendance to the RAH ED.
Self-Harm	The primary intention of drug use was to cause suicide, as a “cry for help”, or for other deliberate self destructive purpose; the category that these patients were assigned to on presentation to the RAH ED.
Drink Spiking	The deliberate administration of a drug (or drugs) to a person by addition of the drug to their drink, without their permission; the category of attendees who alleged their intoxication and presentation to the RAH ED was due to drink spiking.

EXECUTIVE SUMMARY

This technical report presents findings of the Designer Drug Early Warning System (D_2EWS) from the 12-month period commencing August 2005 and is the second annual technical report of the D_2EWS project. Arising jointly from recommendations of the SA Drugs Summit in 2003 and research interests of the Royal Adelaide Hospital Emergency Department (RAH ED), this project monitors the incidence and clinical effects of intoxicating substances in patients presenting clinically intoxicated to the RAH ED. Initially envisioned to focus principally on psycho-stimulant use in young ecstasy and related drug users, the project's unique design and methodology has allowed identification of patterns of use across the full spectrum of drugs of abuse and has done so in three broad groups of users: Illicit Drug Users (defined here as excessive or non-sanctioned use of both licit and illicit substances, including alcohol, across the spectrum of use from occasional to regular to dependent), drug users intending deliberate Self-Harm, and the victims of Drink Spiking.

D_2EWS is a clinically based, prospective monitoring system, in which blood analysis of intoxicated patients provides precise identification of the intoxicating substances as well as the levels of these drugs in the patients' blood. This information is then able to be correlated with the patients' clinical and demographic details to provide a unique data-set.

As was the case in the first twelve month reporting period, alcohol was overwhelmingly the major cause of intoxication in patients attending the RAH ED. The next most frequently detected drugs were, in order: benzodiazepines, cannabis, psychostimulants (amphetamines) and opioids. Overall, there was a small fall in the incidence of psychostimulant detection compared to the previous reporting period. Other, less frequently detected drugs, such as gamma-hydroxy butyrate (GHB), ketamine and lysergic acid diethylamide (LSD) continue to be associated with significant clinical harms.

Multiple drug use by individuals is a major feature of the project's data with nearly 60% testing positive to more than one drug, and almost 20% to 3 or more drugs. This problem has been shown to extend across all drug groups, all ages, and all presentation categories.

We report continued strong evidence of high levels of diversion of prescription medication for illicit use, particularly the benzodiazepines and methadone. The strong association between drug abuse and psychiatric illness is also once again highlighted and remains alarming. Violence and trauma also featured prominently in the reason for presentation to the ED in drug-positive patients.

During the reporting period two notifications of emerging drug issues were alerted to both health and police agencies. Following a cluster of pethidine related presentations to the RAH ED in June 2006, a *Drug Alert* was published. Similarly, following 2 simultaneous presentations of datura poisoning, an alert was issued highlighting the dangers, signs and symptoms of such seasonal presentations.

The project is a unique collaboration between the RAH ED Research Group, which designed and manages the project, clinical staff of the RAH ED, Forensic Science South Australia (FSSA), which performs all drug analyses, and the Drug and Alcohol Services of South Australia (DASSA), which provides expert advice and sourced funding for the project.

OVERVIEW AND COMBINED RESULTS

Enrolments

In the reporting period August 2005 to July 2006 there were 1440 completed enrolments. Of these 1279 (89%) patients tested positive to drugs. This compares with a drug-positive rate of 77% for the previous reporting period.

Demographics

Male patients testing positive to drugs outnumbered females 3 to 2. Nearly 90% were Caucasian, 6% Indigenous, and 2% were Asian. Although the majority of drug positive enrolments (67%) were aged 18 to 35 years, 4% were aged less than 18 years.

Close to half of all patients presented over the weekend (between Friday 6 pm and Monday 6 am) and the most likely time of day to present was between midnight Saturday and 6 am Sunday. The most frequent location of drug use was a private residence (55%), usually the patient's own home, whilst 28% reported drug use at licensed premises.

Patterns of Drug Use

A total of 75 different pharmaceutical and illicit drugs were detected with a total of 2749 positive drug tests. Most patients presented as a result of Illicit Drug Use (61%), followed by Self-Harm (25%), and alleged Drink Spiking (5%). The latter was slightly less than the 8% of enrolments in the previous 12 months.

Once again alcohol was the most common drug detected (776 of 1279 (61%) drug positive patients). Benzodiazepines were the next most commonly detected drugs with 595 positive tests in 409 patients (32% of total drug positive patients), followed by cannabis (tetrahydroxycannabinol (THC)) with 355 patients (28%), psycho-stimulants (amphetamines) with 374 tests in 224 patients (18%), and opioids with 175 tests in 144 patients (11%). Antidepressant and antipsychotic drugs were also commonly detected (in 109 and 22 patients respectively). The incidence of patients testing positive to psycho-stimulants was slightly lower than that seen previously (18% compared to 22%).

The incidence of poly-substance use (>1 drug per person) was the same as reported in the previous year (58% of drug-positive patients). The proportion of patients testing positive to 3 or more drugs was also unchanged at 18%. The most number of drugs detected in any 1 patient was 7. The most common combination of drugs in Illicit Drug Users was alcohol plus THC, whilst in Self-Harming patients it was alcohol plus benzodiazepines.

Clinical Correlates

In those patients from whom the data could be collected, almost a third (27%) had a documented past history of drug abuse or dependency. 40% of intoxicated patients had a history of psychiatric illness, which was less than that seen previously (58%). Of these patients, those with a history of depression generally presented as a result of deliberate Self-Harm however, those with a history of a major psychotic illness were more likely to present intoxicated as a result of Illicit Drug Use.

Once again the majority of drug-positive patients were determined to require immediate or urgent medical assessment compared to a rate of 23% for ED attendances generally during the same period. An altered heart rate was the most common abnormal clinical sign (3% having a bradycardia and 30% a tachycardia), with an abnormal temperature also commonly seen (5% of patients were hypothermic, 3% hyperthermic). Almost 10% of patients had severely depressed conscious state with a Glasgow Coma Score of less than 8. Additionally, an agitated delirium or acute psychosis was seen in 11% of patients at presentation. The admission rate for drug-positive patients was 47%, compared to an overall admission rate for all ED patients of 36%.

Although drug-positive patients presenting to the ED generally required more urgent treatment and had higher admission rates than average, the majority (approximately 80%) were able to be discharged from hospital to home in less than 24 hours. However, 12% of patients required Intensive Care or High Dependency admission, and 7 patients died. Although the reported rate of patients leaving hospital against medical advice had fallen significantly during this period (5% compared to 12%) this rate remains worryingly high.

Only 1 of the 7 fatalities was aged more than 50 years; only 1 was aged less than 30 years. Five deaths were the direct result of trauma, with only 1 due to deliberate Self Harm.

RESULTS BY PRESENTATION CATEGORY

Illicit Drug Use

Enrolments:

Illicit Drug Use remained the most commonly cited reason for the drug exposure of all enrolled patients (58%) and was the group with the largest number of drug positive results (61% of all drug-positive patients).

Demographics:

Male Illicit Drug Users outnumbered females 7 to 3. The average age of Illicit Drug Users was approximately 31 years, with 4% under 18 years of age and 8% older than 50 years.

Almost 90% of Illicit Drug Users were Caucasian. Indigenous patients constituted 8% of this group and were more likely to present as a result of Illicit Drug Use than other ethnicities (83% of Indigenous enrolments, 59% of Caucasian, and 67% of Asian).

The most commonly reported venue of drug exposure was a private residence (28%) which contrasts with the commonly held perception that most drug and alcohol exposures resulting in hospital attendance occur in licensed venues. Although 74% of Illicit Drug Users were brought to the ED by the ambulance service, a significant minority (6%) were brought by SAPOL or other custodial services. This compares with a custodial rate of 1.7% for all ED attendances.

Patterns of Drug Use:

A total of 1513 positive drug tests were returned from the 781 patients categorised as Illicit Drug Users. Alcohol (detected in 69% of patients), THC (33%), benzodiazepines (24%), psycho-stimulants (22%), and opioids (9%) were the most commonly detected drugs. These detection rates were broadly in line with those of the previous reporting period.

Indigenous patients were more likely to return tests positive for benzodiazepines and THC, and less likely to test positive for a psychostimulant, or for substances such as GHB, LSD or ketamine.

Detection rates for psycho-stimulants remained much higher than was anticipated prior to study commencement (22% of Illicit Drug Users were positive for a psycho-stimulant as compared to the pre-study estimate of 5% of all users). The large majority (80%) of psycho-stimulant results were returned in Illicit Drug Users. Once again the most frequently detected psycho-stimulant was methamphetamine (46%), followed by MDMA (20%), and amphetamine (22%).

Overall detection rates for opioids continued to be significantly lower than expected pre-study. Very low rates of heroin detection may relate to its rapid metabolism to morphine and /or delayed presentation. Evidence persists suggesting significant diversion and abuse of the prescription opioids morphine and methadone with up to 50% of opiate related presentations testing positive to these drugs.

Although benzodiazepines were the third most frequently detected drug group in intoxicated Illicit Drug Users, their use remained very much under-reported by the patients who tested positive to them when compared to the reporting rates for other drug types. It is possible this low reporting rate reflects a perception by patients that they are not a drug of abuse, either because many are prescribed or, as has recently been suggested, they may be commonly used to self-medicate against adverse effects of other “primary” drugs of abuse such as opiate and amphetamine withdrawal.

The large majority of patients testing positive for one or more of the “club drugs” were in the Illicit Drug Use category. Of these MDMA (ecstasy) was by far the most frequently detected (60 patients). By comparison GHB was detected in 28, ketamine in 1, cocaine in 4, and LSD in 1 patient in the Illicit Drug User group.

Poly-substance abuse remained prominent with 56% testing positive for more than 1 drug, which was marginally down from the 59% in the previous reporting period. However, the proportion testing positive to more than 3 drugs had increased from 6% to 8%. Apart from those cases listed as “drugs misuse”, the largest proportion of patients presented as a result of trauma (99 patients, 31%), cardiovascular or neurological complications (86 patients (11%) and 72 patients (17%) respectively), or psycho-social complaints (98 patients (13%)).

Self-Harm

Enrolments:

A total of 317 drug-positive patients (25% of total) presented intoxicated as a result of drug use in association with deliberate Self-Harm.

Demographics:

The male to female ratio of intoxicated patients presenting as a result of deliberate Self-Harm was approximately 3 to 4, except in those aged less than 18 years where the gender ratio was reversed (5 male to 2 female). All patients aged over 74 years were male. Nearly all patients (92%) were Caucasian with a much smaller proportion of Indigenous patients than in the Illicit

Drug User category (2% of Self-Harm patients compared to 8% of Illicit Drug Users). The average age was 35 years, with 4% aged less than 18 years and 13% aged over 50 years.

The day of the week and time of day that patients in this category presented was more evenly spread than was seen in Illicit Drug Users. The venue of drug exposure was almost exclusively a private residence.

Patterns of Drug Use:
Benzodiazepines, opioids, antidepressants and antipsychotics were proportionally more common and alcohol, amphetamines, and ecstasy and related drugs, proportionally much less frequently detected when compared to Illicit Drug Users.

Benzodiazepines and alcohol were the most frequently detected drugs with 283 positive tests in 185 patients (58%). Cannabis (THC) was the next most frequent being detected in 14%. Codeine was the most commonly detected opiate in this group (55%). The most frequently detected psycho-stimulant was methamphetamine (63% of psycho-stimulant positive patients).

Multiple drug use was again a feature with 687 positive drug tests returned from the 280 patients. More than two thirds of patients (71%) tested positive to more than 1 drug compared to 56% in Illicit Drug User group.

Drink Spiking
Enrolments:
The number of patients enrolled alleging drink spiking was slightly less than the previous reporting period (61 compared to 99). Of these 58 (95%) returned blood tests positive for the screened compounds (5% of all drug-positive enrolments).

Demographics:
The male to female ratio was 1 to 2. This was the reverse of that seen with enrolments generally and of the Illicit Drug User group specifically. There was no significant difference between the genders in those aged over 35 years.

The majority of patients were Caucasian (90%). The average age was lower than other enrolment groups at 24.5 years. Only 3% were aged less than 18 years old compared to 10% during the last reporting period.

Most drug exposures occurred in a licensed venue (52% in public bar, 24% in a night club). The most likely time of presentation to the ED was between midnight and 6 am Sunday.

A smaller proportion of victims of Drink Spiking arrived at the ED via ambulance compared to the other enrolment groups.

Patterns of Drug Use:
A total of 82 positive drug tests were returned from the 58 victims of alleged Drink Spiking giving an average of 1.4 drugs detected per patient.

Alcohol was the drug most commonly detected (93% of patients), and was the sole drug detected in 62%. A lower average alcohol concentration than illicit users (0.157g/100mL compared to 0.172 g/100mL) was seen. Only 5 cases (8%) had a BAL greater than 0.25g/L (cf. 16% of Illicit Drug Users). These facts, once again, may suggest comparative alcohol naivety in this group.

THC was the next most frequently detected drug (12% of patients) followed by a psychostimulant (detected in 6 patients (10%), with 10 positive tests), and benzodiazepines (5% of patients). No GHB was detected in this series. Nineteen patients (33%) tested positive for more than 1 drug, with 2 testing positive for 3 or more.

Nine patients (9%) required admission to hospital, including 2 patients requiring Intensive Care. All were eventually discharged, generally within 24 hours.

Unknown Drug Use

A total of 114 drug-positive patients (10%) were enrolled with insufficient information to determine drug use intent. Demographic data and patterns of drug use of patients in this category broadly matched that seen in the Illicit Drug User category.

Other

This enrolment category incorporated those patients presenting as a result of Iatrogenic or Accidental Poisoning. The number of patients with positive drug screens in this category was small (9 patients in total), therefore significant patterns or trends in drug exposure could not be detected.

RESULTS BY DRUG TYPE

Alcohol

Enrolments:

More patients tested positive to alcohol than any other drug with 776 (61%) of the 1279 patients returning alcohol-positive blood tests.

Demographics:

Of the patients testing positive for alcohol, 87% were Caucasian, 7% Indigenous and 1% Asian. The average age was 31.8 years, and 4% were aged less than 18 years. The male to female ratio was 3 to 2, other than for those less than 18 years old where the ratio was 1 to 1. The most likely time of presentation was between midnight and 6am Sunday, and over 50% presented between 6pm Friday and 6am Monday. Approximately 30% of the alcohol exposures occurred at a private residence compared to 26% at licensed premises.

Patterns of Drug Use:

Most alcohol-positive enrolments were in the Illicit Drug User category (69%). However, proportionally, the victims of Drink Spiking category had the highest percentage of alcohol positive patients (93% compared to 69% of Illicit Drug User group and 45% of Self-Harm drug use group).

Only 42% of alcohol-positive patients did not return a positive test for another drug. A total of 672 tests positive for drugs other than alcohol were returned from the 776 patients: 259 benzodiazepines, 166 THC, 116 psychostimulants, 59 opioids, 43 antidepressants and 9 antipsychotics. Methamphetamine was the psycho-stimulant most frequently associated with alcohol.

The incidence of injecting drug abuse previously documented in case records of patients testing positive for alcohol was moderate (11%) and twice that of the previous reporting period (6%). However, an established past history of drug abuse was reported in 211 patients (27%) who tested positive to alcohol.

Psycho-stimulants

Enrolments:

Of the 1279 enrolled patients returning positive drug tests, a total of 224 patients (18%) tested positive to a psycho-stimulant. This was slightly less than the detection rate of 22% of the previous reporting period.

Demographics:

The male to female ratio of psycho-stimulant positive patients was 3:2 other than for those under 18 years of age where the gender ratio was reversed. Almost 90% of patients were Caucasian. Although only 5% of all patients testing positive to these drugs were Indigenous this represented a detection rate of nearly 20% (12 of the 64 Indigenous patients) within this ethnic group. .

The average age of patients testing positive for psycho-stimulants was 28.4 years with 3% aged less than 18 years. Patients testing positive to MDMA were on average more than 4 years younger than those testing positive to methamphetamine.

Almost two thirds (58%) of patients presented over the weekend (between 6pm Friday and 6am Monday), and the most likely time of presentation was between midnight and 6am Sunday.

Over 30% of psycho-stimulant exposures occurred in a private residence and 15% occurred in licensed premises. This ratio however was reversed with MDMA exposures where 14% occurred at a private residence and 42% at a licensed venue.

Patterns of Drug Use:

A total of 374 drug tests positive for psychostimulants were returned in the 224 patients at an average of 1.66 psychostimulants per patient. Proportional rates of detection were similar in Illicit Drug Users.

As was the case in the previous reporting period, methamphetamine was the most frequently detected psychostimulant (48%) followed by amphetamine (23%) and MDMA (17%). Much of the amphetamine and MDA detected may be as a result of metabolism of methamphetamine and MDMA respectively. Small numbers of MDA and MDEA positive results were returned and were most likely additives to MDMA tablets.

There were 307 tests positive to drugs other than psychostimulants in this group of which 27% were benzodiazepines, 27% alcohol, 22% THC, 2% opioids. Almost a third (35%) of patients testing positive to a psycho-stimulant were injecting drug users (IDU) and 13% of patients were Hepatitis C positive.

Benzodiazepines

Enrolments:

Of the 1279 enrolled patients returning positive drug tests, a total of 409 patients (32%) tested positive to benzodiazepines; this was second only to alcohol with 776 patients.

Demographics:

The male to female ratio among patients testing positive for benzodiazepines was less than for other groups, at 5 to 4. Most (89%) were Caucasian, however, benzodiazepines were detected in 29 Indigenous patients representing a detection rate of 45% of all drug positive Indigenous patients.

The average age of benzodiazepine-positive cases (36.3 years) was older than that seen for other drug types, including that for opioids. Less than 1% were less than 18 years of age.

The most likely time of presentation for those testing positive for benzodiazepines was between 6pm and midnight on a Wednesday, with only 36% having presented over the weekend (between 6pm Friday and 6am Monday), the least of any drug-positive group.

Just over 60% of drug exposures occurred in a private residence with only 9% in licensed premises.

Patterns of Drug Use:

Equal numbers of patients presented as a result of Illicit Drug Use and Self-Harm (45% each). There were 555 tests positive to drugs other than benzodiazepines among this group: 47% alcohol, 27% THC, 8% opioids, and 14% psycho-stimulants. Thirty percent had a documented past history of injecting drug use, 47% of whom were hepatitis C positive.

Cannabis

Enrolments:

Of the 1279 enrolled patients returning positive drug tests, a total of 355 patients (28%) tested positive to THC, the main indicator of cannabis use. This was the third most commonly detected drug after alcohol (61%) and benzodiazepines (32%).

Demographics:

The male to female ratio among patients testing positive to THC was 3 to 1, and 85% of patients were Caucasian. THC was detected in 34 Indigenous patients, representing a detection rate of 53% amongst the Indigenous patient group (34 of the 64 patients), the third highest after alcohol (83%) and benzodiazepines (45%). The average age of patients testing positive to cannabis was 29.6 years, and 5% were under 18 years of age.

Time of presentation was much more evenly spread across the week and time of day when compared to other drug types. Over 60% of drug exposures were at a private residence and 9% were in a licensed venue.

Patterns of Drug Use:
Rates of THC detection were slightly higher than the previous reporting period (28% vs 23%) and approximated our pre-study estimated detection rate of 25%. The large majority (70%) presented as a result of Illicit Drug Use. THC was rarely detected in isolation with only 19% testing positive to THC alone. A total of 539 positive drug tests were returned on the 355 THC-positive patients, equating to an average of 2.5 positive drug tests (including THC) per patient. Eleven percent of patients tested positive to 3 or more drugs additional to THC. The highest average THC blood levels were seen among the Drink Spiking and Unknown group.
Of those testing positive to THC, 103 patients (30%) had a documented history of being an injecting drug user and 55 were Hepatitis C positive. Thirty six percent of those testing positive for THC had a documented past history of psychiatric illness (128 specific conditions), and 31% had a history of drug/and or alcohol abuse. Two of the 7 deaths that occurred among drug positive enrolments to the study tested positive to THC.

Opioids
Enrolments:
Of the 1279 enrolled patients returning positive drug tests, a total of 144 patients (11%) tested positive to opioids; slightly less than the 13% of the previous year.

Demographics:
The majority (92%) of opioid-positive patients were Caucasian, with only 4% Indigenous patients. However, the rate of opioid detection within Indigenous patients was 10%, which was similar to that for Caucasians.

The average age of those testing positive to opioids was 35.8 years, the oldest of all drug types, apart from benzodiazepines. Males predominated but in a less pronounced fashion than in other drug groups. Presentations were relatively evenly spread across the week and time of day. Over 60% of drug exposures occurred at a private residence with only 2% of exposures occurring in licensed premises, the lowest of any drug group.

Patterns of Drug Use:
Rates of detection of opioids were similar to the pre-study estimates (11% compared to an estimated 10%). The most common presentation category was Illicit Drug Use (49%). Most of those presenting as a result of Self Harm were positive for codeine in combination with paracetamol.

Surprisingly low rates of heroin detection were thought likely due to rapid metabolism of the drug prior to blood sampling being performed. Substantial rates of detection of morphine and methadone suggest a problem with diversion of these restricted prescription drugs.
A total of 172 opioid-positive drugs tests were returned in the 144 patients, with 29 patients (20%) testing positive to more than 1 opioid. There were 364 tests positive for drugs other than opioids: 38% benzodiazepines, 14% alcohol, 13% THC, and 8% psycho-stimulants.

Over a third (37%) of the opioid-positive patients had documentation of previous injecting drug use, and 21% were Hepatitis C positive.

Gamma Hydroxy Butyrate (GHB)

Thirty patients (2% of drug-positive enrolments) tested positive to GHB. The average age was 26.6 years. All of the GHB-positive patients were Caucasian, and the majority presented as a result of Illicit Drug Use (28 of 30 patients, 93%). The two remaining patients presented as a result of Deliberate Self Harm. No alleged victims of drink spiking tested positive to GHB during this reporting period, which compares to a detection rate of over 10% for the previous 12 months. The most likely time of presentation was somewhat later than other drug groups, between midnight and mid-day, but once again the majority presented over the weekend. A fifth of GHB exposures occurred in licensed premises, whilst 23% occurred at a private residence and 30% at a private party or rave.

Only 4 patients (13%) tested positive to GHB alone, with 64 positive tests for drugs other than GHB returned in the remaining 26 patients. The most common additional drugs detected were psycho-stimulants, particularly methamphetamine. In contrast to other drug groups, alcohol, THC and benzodiazepines were relatively infrequently detected in combination with GHB. A large number (43%) of GHB-positive patients had GHB blood levels in the toxic range at the time of sampling.

Patients testing positive to GHB typically presented as a result of collapse with an altered conscious level. Only 1 case received physostigmine as treatment, and as has previously been the case, the clinical effects were unclear.

Cocaine

Detection rates of cocaine were once again low. Six patients (0.5% of drug-positive enrolments) tested positive for cocaine or its metabolite benzylecognine. Five were Caucasian and 1 Indigenous. Four patients were aged between 18 and 35 years, and 2 between 36 and 50 years. Of the 6 patients 1 presented as a result of attempted Self Harm and 1 was enrolled as an accidental poisoning.

All of the patients tested positive to other drugs, mostly benzodiazepines and amphetamines. Four of the six patients had documented previous injecting drug use, and 2 were Hepatitis C positive.

Ketamine

Four patients (0.3% of drug-positive enrolments) tested positive for ketamine. All were Caucasian and in all but 1 the nature of drug use was Unknown. These 3 received the drug as part of their medical management and it is likely this was the sole source of the ketamine. However, of these 2 tested positive to other drugs of abuse. Two had a previous known history of IDU.

Lysergic acid diethylamide (LSD)

Only 1 patient tested positive to LSD; a 25 year old Caucasian male, presenting as a result of illicit drug use.

Antidepressants and Antipsychotics

One hundred and nine patients (9% of positive enrolments) tested positive for antidepressants, and 22 for antipsychotics (2%). These detection rates are very similar to those of the previous reporting period. Caucasians accounted for all antipsychotic positive enrolments and 96% of

antidepressant positive enrolments. The majority were between 18 and 35 years of age. Of those testing positive for antidepressants 6% were less than 18 years of age. Females outnumbered males 2 to 1 in the antidepressant group. Most of the drug exposures occurred at a private residence.

Not unexpectedly the large majority of patients who tested positive to an antidepressant or antipsychotic presented in association with Self-Harm (84% and 86% respectively), the remainder presenting as a result of Illicit Drug Use. Fluoxetine (19%) and Venlafaxine (19%) were the most frequently detected antidepressants, Olanzapine (43%) and Chlorpromazine (30%) the most frequent antipsychotics. The majority of patients tested positive to more than 1 drug, with 40% testing positive to more than 3 drugs. The most commonly detected drugs were benzodiazepines, alcohol, and THC. A past history of IDU was reported in 19% of antidepressant positive patients and 23% of antipsychotic positive patients.

Miscellaneous Drugs and Presentations

Datura:
Two cases of Datura poisoning presented to the ED, with clinical manifestations of anticholinergic poisoning. Both admitted to consuming plants in the Botanic Garden and required aggressive resuscitation and supportive treatment.

Solvents:
There was one case of solvent abuse in whom toluene and acetone were detected. The patient had been “chroming” at home, and required supportive treatment and a psychiatric review before being discharged home.

Paraquat:
This case involved the deliberate ingestion of paraquat in an effort at self -harm. He presented with fulminant symptoms of paraquat poisoning and died within 2 days.

SUPPLEMENTS

S1 Trauma
Of the 1279 drug positive enrolments, 224 (17.5%) presented as a result of trauma.

Motor vehicle accidents (MVAs) were once again the most common cause of trauma although the incidence fell from the previous reporting period (53% to 41%). Presentations associated with assault were the next most frequent trauma-related presentation in intoxicated patients (32%). The majority of drug-positive patients were male (70%), Caucasian (85%), and aged between 18 and 35 years of age (70%). The most likely time of presentation was between midnight and 6am Sunday, with 46% presenting over the weekend, and 68% ‘after hours’. Nearly half of the drug exposures recorded occurred in licensed premises, and most (77%) were Illicit Drug Users.

The most frequently detected drugs were alcohol (71% of trauma patients), THC (43%), amphetamines (21%), and benzodiazepines (14%). Poly-substance abuse was common with 51% of all trauma and 44% of MVA patients positive to more than 1 drug.

S2 Injecting Drug Users (IDU)

Of the 1279 drug-positive enrolments, 117 patients (9%) were identified as having used drugs intravenously in association with the current presentation. Eighty-two percent were Caucasian, and 15% Indigenous. The male to female ratio was approximately 5 to 2, and just over 80% presented as a result of Illicit Drug Use.

The most frequently detected drugs in these patients were: benzodiazepines (53%), amphetamines (45%), THC (54%), opioids (30%), and alcohol (32%). Of the ‘party drugs’, only 1 case of ketamine was detected in the IDU patients. Poly-substance abuse was prominent with 82% testing positive to more than 1 drug, and 22% to more than 3 drugs (an overall average of 3.7 drugs per patient).

SECTION1 INTRODUCTION

The Designer Drug Early Warning System (D_2EWS) was one of 14 priority initiatives announced by the Premier of South Australia, The Hon Mike Rann, in September 2003, arising from recommendations of the SA Drugs Summit. The focus of the Summit was illicit drug use, with an emphasis on amphetamine-like substances (including 'designer drugs') and broader substance use issues as they relate to young people and Aboriginal people. The need for more detailed information on the patterns of use of such substances was identified at this summit.

The D_2EWS Project is designed to be a sentinel monitoring system with the primary aims of objective data collection and of improving the timeliness of reporting of changing trends in illicit drug use. As such, the system might better enable health and law enforcement authorities to provide relevant harm reduction and prevention strategies.

Demographic, clinical and toxicological data is collected from patients presenting to a tertiary referral emergency department (ED) with acute intoxication or toxicity as a result of drug use. This data is correlated with precise drug identification and blood drug levels through blood testing. The combination of medical assessment, patient interview, accurate drug identification, and precise blood drug level determination provides a unique dataset in Australasia. It is anticipated this dataset might also contribute to clinical information on the harms associated with illicit drug use.

D_2EWS is a collaborative project between the Central Northern Adelaide Health Service (CNAHS) Royal Adelaide Hospital (RAH) ED, the Drug and Alcohol Services of South Australia (DASSA), and Forensic Science of South Australia (FSSA).

This is the second annual technical report of the project presenting the completed findings for the twelve months of the D_2EWS project (formally known as the Sentinel Monitoring System) to August 2006.

For further background information relating to the D2EWS project, the reader is directed to the first project report - *Royal Adelaide Hospital Emergency Department Designer Drug Early Warning System (D2EWS): 12-month Technical Report. DASSA Monograph No. 19, Research Series.*

OBJECTIVE

The primary objective of D_2EWS is to enhance the evidence available to guide health and law enforcement activities in reducing harm arising from psycho-stimulant and other illicit drug use. In particular, the initiative is designed to enable the development and implementation of timely prevention and intervention strategies in line with the changing picture of substance misuse and the potentially fatal consequences.

This has been done by establishing a clinical toxicology database and monitoring process for drugs of abuse in patients presenting to the RAH ED.

Information from the D_2EWS is to be used for:

- The early identification of new illicit substances of abuse;
- The early identification of changing trends in substance abuse;
- Determining the relationship between quantified blood drug levels and the clinical features of presentation;
- Assessing the accuracy of physician suspicion of illicit drug use by patients; and,
- Determining the demographics and patterns of drug abuse in the target population.

SECTION 2 METHODS

PROJECT DESIGN

D_2EWS is a sentinel monitoring system for illicit drug use in South Australia. The project prospectively collects and records data on illicit drug use in clinically intoxicated or poisoned patients presenting to the RAH ED. Two broad categories of data are recorded:

- The results of qualitative and quantitative analysis of patients' blood for the presence of specific drugs;
- Patient demographic information and clinical details of the presentation;

SETTING

The RAH is a public, 620 bed, adult-only, tertiary referral teaching hospital situated in the centre of Adelaide, a city of approximately 1 million people. It is a major trauma centre and provides state-wide emergency retrieval services. The RAH ED sees approximately 62,000 patients per annum, is the only public inner-city ED and therefore provides emergency services to most of the after-hours city entertainment venues.

SUBJECTS

All patients aged 15 years and over presenting to the RAH ED with clinical suspicion of drug overdose or intoxication for whom it is clinically indicated to perform diagnostic venous blood sampling are eligible for inclusion. Persons aged less than 15 years, or refusal by a mentally competent patient to have clinically indicated diagnostic blood sampling are excluded, as are those in whom blood testing is not clinically indicated. Patients are medically assessed and managed in all other ways in the usual manner. Enrolment is convenience-based by the treating ED clinicians.

INTERVENTIONS AND MEASUREMENTS

Patients presenting to the ED with a diagnosis of overdose or clinical intoxication are assessed and managed in the usual manner. The clinical details of their presentation are recorded on a specifically designed *pro forma* Toxicology Data Sheet (UR 9.7T) that constitutes the medical record of attendance and remains with the patient's case records.

Each presentation is classified according to what the treating clinician felt the most likely cause or intent of the drug exposure was. Seven presentation types (or categories) are defined:

- Illicit Drug Use[a]: the primary reason for the drug exposure was for self gratification;
- Self-Harm: the primary intention of drug use was to cause suicide, as a "cry for help", or for other deliberate self destructive purpose;
- Accidental Poisoning: the drug exposure occurred inadvertently;
- Drink Spiking: the drug was administered by a third person by addition to a patient's drink without their permission;

[a] *In the context of this report, the term Illicit Drug Use (capitalised) is defined as excessive or non-sanctioned use of both licit and illicit substances, including alcohol, across the spectrum of use from occasional to regular to dependent. Illicit Drug Users therefore, are those patients who were categorised as using substances in such a manner, on attendance to the RAH ED.*

- Iatrogenic Poisoning: resulting from the action of healthcare professionals;
- Suspected: patient's presenting condition is thought likely due to intoxication or poisoning from a drug exposure but there is no information available on likely cause or intent; and,
- Unknown: where no classification is recorded.

Within two weeks of discharge from hospital the Project Research Nurse (PRN) reviews the patient's case notes to complete data collection on both demographic and clinical details.

The following strategies to maintain accuracy and minimise inconsistencies in the data collection were implemented:

- ED medical staff enrolling patients received a period of instruction and training in completion of the RAH Data Collection Form,
- The PRN and investigators involved in Case Records reviews received a period of instruction in data abstraction prior to commencement of the study;
- Data variables were pre-defined;
- Regular meetings of the Project Team to review coding rules and interpretations, and to monitor the chart abstractions are held; and,
- The data abstractors are blinded to the results of the blood tests.

Each enrolment is ascribed a specific randomly assigned project number which relates to a corresponding Project Pack. An additional 5ml of blood is drawn from enrolled patients at the time of their other routine blood tests, and is placed in 2 designated fluoride oxalate bottles. These are placed in secure, refrigerated storage until forwarded to the Forensic Toxicology laboratory at the Forensic Science Centre, FSSA (Department of Justice).The analyses of primary interest include: ethanol, opioids, amphetamines[b], benzodiazepines, cannabinoids, GHB, ketamine, LSD and cocaine. Drug screening results using immunological based enzyme linked immunosorbent assay (ELISA) testing indicate the presence of a drug group and is used to identify blood samples which are drug free. Identification and quantification of specific drugs proceeds on the remainder. Details of the analytical methods used in the analysis of blood samples can be found in the coresponding "Methods" section of the first annual D2EWS Technical Report.

PRIMARY DATA ANALYSES

On completion, data is entered into an Access Database program by the PRN. Patient identifiers (name, UR number, date of birth) are not entered into the database.

Outcome Measure:

The primary outcome measure of Phase 1 of D_2EWS was the proportion of eligible patients able to be successfully entered into the study. Using data from the review by the Hazardous Substances Section of the Environmental Health Service of South Australia on poisoning cases assessed at the RAH 2002[1], we estimated approximately 500 enrolments during the initial 6 month period. The estimated relative proportions of each drug group are shown in Table 1.

[b] *The term "amphetamine" here refers to the class of drugs that includes the specific compounds: amphetamine, methamphetamine, MDMA (ecstasy), MDA, MDEA, PMA, ephedrine, pseudoephedrine.*

Table 1: Anticipated drug enrolments by proportion.

Drug Type	Relative Proportion (%)
Alcohol	75
Benzodiazepines	25
Cannabinoids	25
Opioids	10
Amphetamines	5
GHB	5

ETHICAL CONSIDERATIONS

Informed Consent:

The nature of the Project is such that a requirement to obtain consent for enrolment would lead to the exclusion of a significant proportion of patients, thereby rendering the results much less meaningful. Informed consent would be unobtainable from a large number of patients for a variety of reasons, including (but not limited to) the effects of the drugs that are to be studied. In this setting, an explanation of the complex measures taken to ensure confidentiality is unlikely to be understood or accepted. The Principle Investigators of this project note that, in similar vein, many of the referenced, published, prospective trials examining the relationship between drug use and trauma did not appear to require informed consent for sample collection or analysis[2,3,4].

It is current standard practice that all patients presenting to the ED with notable medical conditions routinely have an intravenous cannula placed and blood drawn from that cannula at the time of its insertion. This is sent for various analyses as clinically indicated. In intoxicated or poisoned patients this is done on the basis of implied consent.

The National Statement on Ethical Conduct in Research Involving Humans (Commonwealth of Australia, 1999) states:

"It is ethically acceptable to conduct certain types of research without obtaining consent from participants in some circumstances, for example, the use of de-identified data in epidemiological research..."[5]. This is consistent with the study methodology, which has been designed to ensure patient anonymity.
Accordingly, for the reasons outlined above, specific informed consent for the sampling of blood, or for the testing of the blood sample for the specified drugs, is not sought.

The Royal Adelaide Hospital Ethics Committee gave ethics approval for the study.

GOVERNANCE

A Project Steering Committee (PSC), comprising RAH ED, FSSA and DASSA representatives oversees this project. It provides direction, monitors outcomes, and reviews progress. This committee has met approximately bi-monthly since the early development phase of the project.

Since commencement of the project, the PSC has had one complaint brought to its attention. This related to concerns over confidentiality of data results raised by an enrolled patient. These concerns were allayed after an explanation of the nature of the de-identification process and a guarantee of anonymity were given.

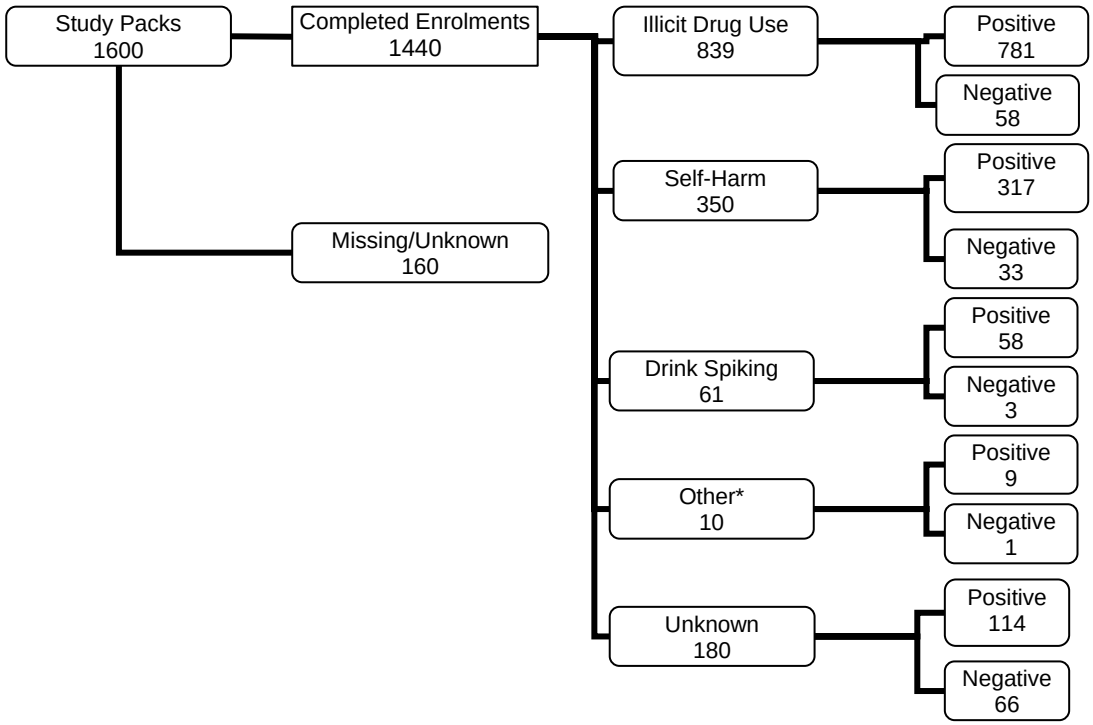
SECTION 3 RESULTS AND DISCUSSION

3.1 OVERVIEW AND COMBINED RESULTS

3.1.1 Enrolments

In the 12 months of the reporting period (August 2005 - July 2006), a total of 1600 study packs were used with 1440 enrolments completed (Figure 1). No data was returned for 160 of the study packs.

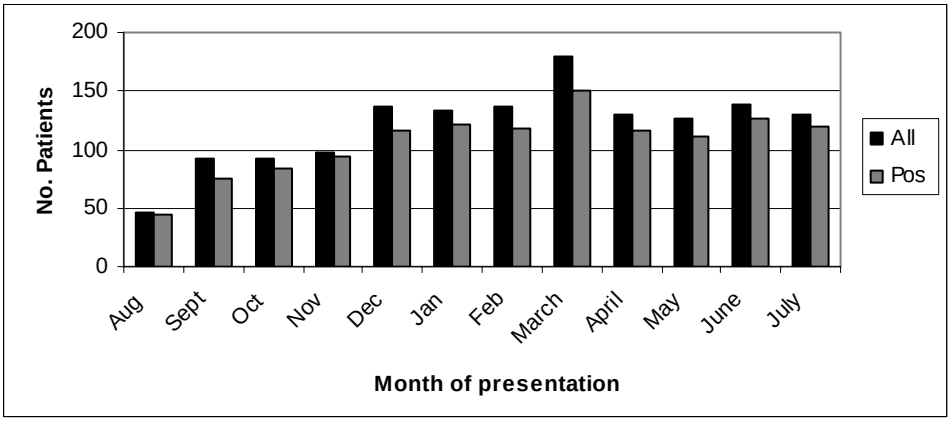
Figure 1: Enrolment figures for period August 2005 to July 2006.



(* Other = iatrogenic poisoning and accidental poisoning)

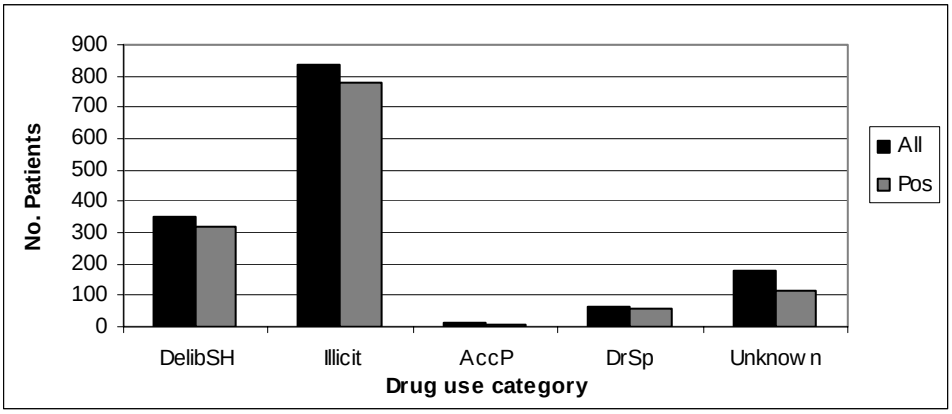
Precise determination of the number of eligible enrolments for the period is not possible. However, crude estimation may be made using the ED diagnostic discharge codes (ICD-9s and ICD-10s) related to poisoning. Analysis of this data suggests an enrolment rate of approximately 77% for patients with a principal discharge diagnosis of poisoning due to substance use. This enrolment rate compares with the previous 12 months rate of 80%. Of the 1440 completed enrolments, 1279 (88.8%) returned positive test results (Figures 1 & 2). This data suggests relatively good enrolment specificity. It should be noted that drug testing is obviously not performed on all ED attendances and that ED discharge diagnostic coding suffers from error rates and uncertainties. Therefore enrolment sensitivity estimation remains imprecise.

Figure 2: Comparison of all enrolments each month and the number of enrolments testing positive for drugs



With only 2 years of data available for analysis it is not possible to say with confidence whether there is true seasonal variation in drug-affected ED attendances. However, a trend to increased presentations during the late summer, peaking in March to April, is suggested by both this and last year's monthly enrolment figures.

Figure 3: Number of patients testing positive for drugs compared to all enrolments in each drug use enrolment category.



(DelibSH = Self-Harm, Illicit = Illicit Drug Use, AccP = Accidental Poisoning, DrSp = Drink Spiking)

The majority of drug positive enrolments (781 of 1440, 61%) were classified by the ED Medical staff to have been the result of Illicit Drug Use, followed by deliberate Self-Harm (317 of 1440, 25%), and Drink Spiking (58 of 1440, 5%)(Figure 3). These results are very similar to the previous 12 months (Illicit drug use 60%, deliberate Self-Harm 25%) although there was a 3% fall in drug positive Drink Spiking enrolments (previously 8%).

3.1.2 Demographic Details

Ethnicity:

The majority of drug positive patients enrolled were Caucasian (88%, Table 2). Six percent of drug-positive enrolments were Indigenous in origin, which was a slight rise from the 4.5% in the previous 12 months.

Table 2: Number of enrolled patients testing positive on drug screening according to ethnicity and gender.

Ethnicity	Positive Toxicology		Total (%)
	Male	Female	
Caucasian	683	439	1122 (88)
Indigenous	55	2	77 (6)
Asian	16	11	27 (2)
African	4	3	7 (0.5)
Arab	4	0	4 (0.3)
Other/unknown	30	12	42 (3)
Total (%)	792 (62)	487 (38)	1279

The proportion of Indigenous and Asian patients presenting as a result of Illicit Drug Use (64 of 77 drug positive patients, 83% and 18 of 27, 67% respectively) remains higher than that for Caucasian patients (666 of 1122, 59%). Conversely the proportion of Caucasian patients presenting as a result of deliberate Self-Harm (293 of 1122, 26%) is higher than that for both Asian (5 of 27, 19%) and Indigenous enrolments (7 of 77, 9%).

Age and Gender:
Enrolment by age group was very similar to the previous 12 months. The majority of positive enrolments (801 of 1279, 63%) were aged between 18 and 35 years of age (Figure 4) and predominantly male (498 of 801, 62%). However, a reasonable minority (51 of 1279, 4%) were less than 18 years of age, with an almost even gender ratio in this age group (47% and 53%). The proportion of drug positive enrolments aged over 50 years doubled from 5% in the previous 12 months to 10% (119 of 1279).

The gender ratio of drug-positive enrolments was the same as the overall enrolment ratio (3 male to 2 female, Table 3) suggesting that the gender difference in enrolment is not likely due to selection bias, but represents true presentation rate differences between the genders. This data is broadly consistent with the gender ratios of treatment episodes with both government funded and other drug treatment agencies in South Australia[6]. Of note is that this gender ratio of 3 to 2 extends across all age groups except for under 18 years of age where the numbers are almost even (24 male to 27 female drug positive patients). All drug-positive patients over 74 years of age were male, however the numbers enrolled in this age group remain too small to allow for reliable comment.

Figure 4: Age distribution according to gender and drug testing result.

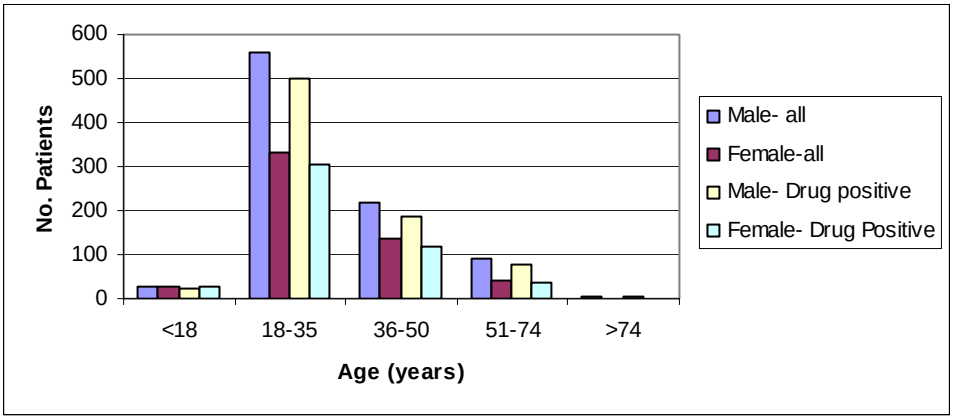


Table 3: Gender comparison between all enrolments and those testing positive for drugs across the age groups (numbers of patients).

Age	All Enrolments			Positive Toxicology		
	Male	Female	Total	Male	Female	Total
<18	29	28	57	24	27	51
18-35	559	331	890	498	303	801
36-50	217	135	352	186	120	306
51-74	91	42	133	78	37	115
>74	5	1	6	4	0	4
Unknown	2	0	2	2	0	2
Total (% of group total)	903 (63%)	537 (37%)	1440	792 (62%)	487 (38%)	1279

Males predominated in the Illicit drug use category, (Table 4) but this trend was reversed in both the deliberate Self-Harm and Drink Spiking categories. The pattern of gender dominance in the Unknown/Suspected group closely mirrored that of the Illicit use category. These proportions were essentially unchanged from the previous 12 months. The numbers in the Other category were too small to make comment.

Presentation Category:

Intoxication as a result of Illicit Drug Use constituted the largest proportion of presentations (61%), with attendances for Self-Harm the next most frequent (25%, Table 4). This pattern was identical to the previous 12 months. The proportion of patients presenting following alleged Drink Spiking was lower than for the previous 12 months at 5% of all enrolments. The similar gender ratios, and similar patterns of the drugs detected suggest that most of the Unknown group may have been due to illicit drug use.

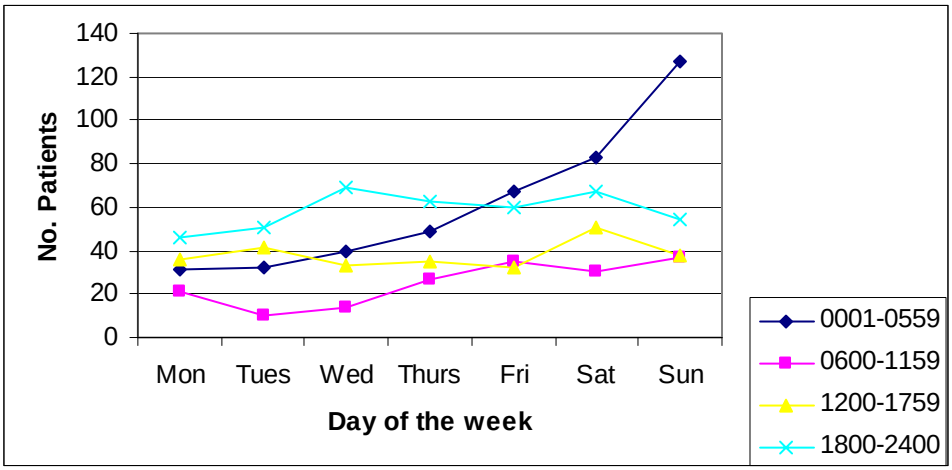
Table 4: Gender comparison between presentation categories for drug-positive patients.

Presentation Category	Male (% of type)	Female (% of type)	Total (% of total)
Self-Harm	129 (41)	188 (59)	317 (25)
Illicit Drug Use	562 (72)	219 (28)	781 (61)
Other	4 (44)	5 (56)	9 (<1)
Drink Spiking	17 (29)	41 (71)	58 (5)
Unknown	80 (70)	34 (30)	114 (9)
Total (% of total)	792 (62)	487 (38)	1279

Time of Presentation:

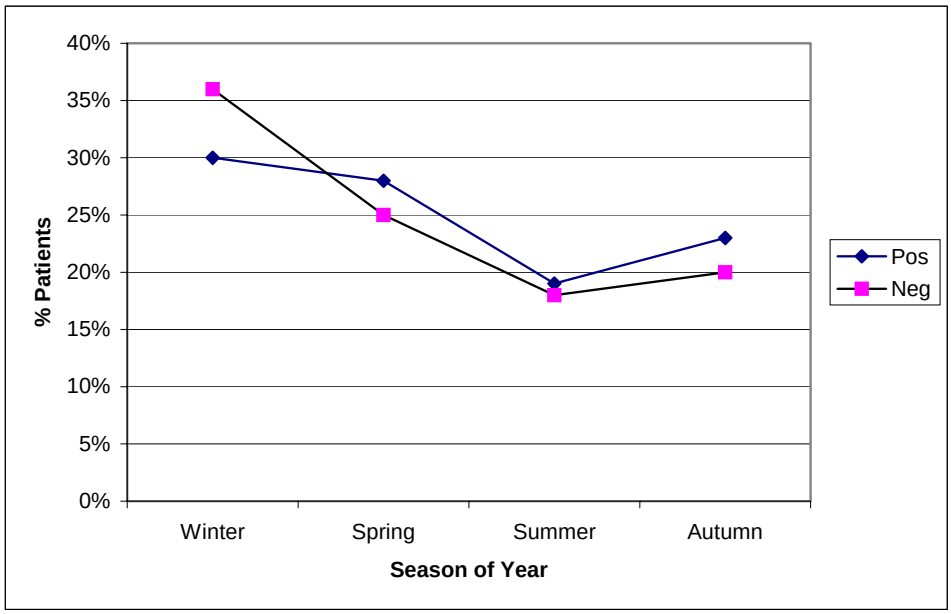
Overall presentation patterns were very similar to those seen in the previous 12 months. Just under half of all enrolments testing positive to drugs (45%) presented to the ED between the hours of 6 pm Friday and 6 am Monday (Figure 5). Two thirds of patients presented between the hours of 18:00 and 06:00 (65%). The most likely time of presentation was between the hours of midnight and 6am on Sunday morning (127 of 1279, 10%), followed by Saturday morning (6%) and Friday/Saturday nights between 6pm and midnight (5% each).

Figure 5: Day and time of presentation to the ED of patients testing positive to drugs.



A seasonal variation in enrolments is suggested (Figure 5a) by the monthly enrolment figures of both this and last year's reports. However, it remains too early to be certain if this is the case.

Figure 5a: Seasonal variation of drug positive v drug negative enrolments



Venue of Exposure and mode of transport to ED:

Location of drug use was known in 78% of cases (926 of 1279), with the remainder being recorded as 'unknown' (353 of 1279, 28%). Of those for whom it was documented, 55% (505 of 926) used substances at home or another place of residence, whilst only 28% (263 of 926) reported use at a licensed venue (public house, bar or night club). These numbers are unchanged from the previous 12 months, indicating a stable pattern in drug use location. The Unknown group was most likely to have an 'unknown' location of use (97 of 114, 85%) followed by the Illicit drug use group (219 of 781, 28%). The Drink Spiking group was least likely to have a location unrecorded (3 of 58, 5%).

Figure 6: Proportional representation of venue of drug exposure for all drug-positive enrolments.

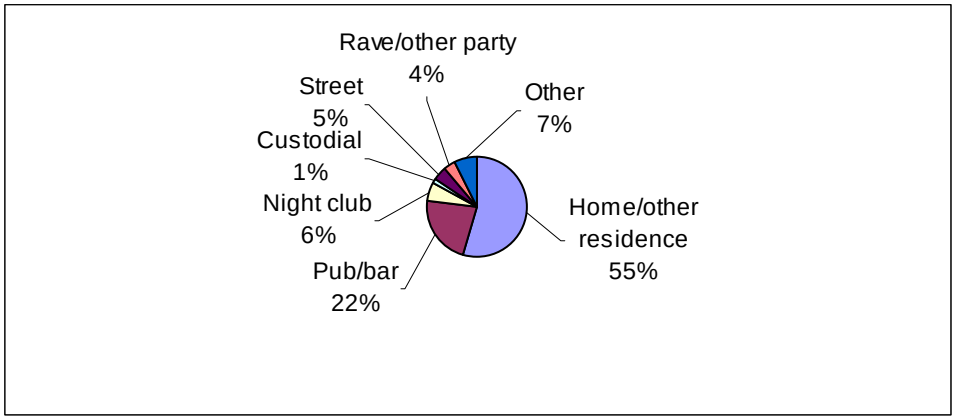


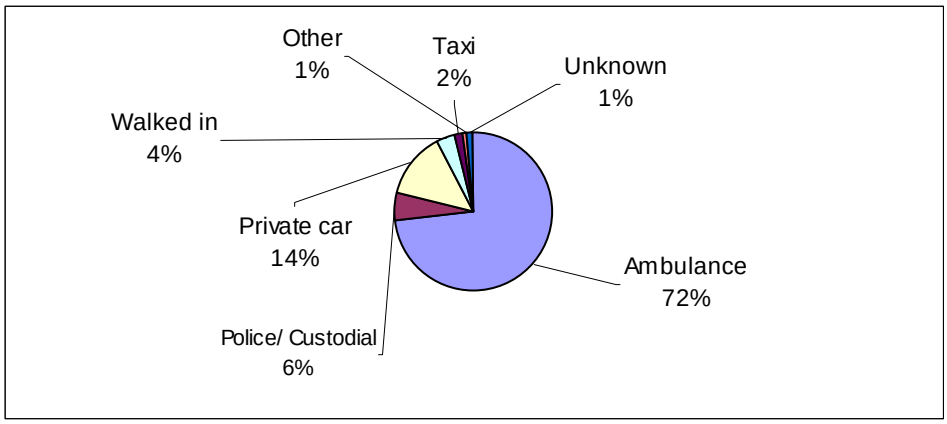
Table 5: Venue of drug exposure for each presentation-type.

Venue	Self-Harm	Illicit	Other	Drink Sp	Unk	Total
Home	244	194	7	2	8	455
Other Residence	20	27	1		2	50
Pub/bar	5	167		33	1	206
Night club	1	41		15		57
Custodial	2	6			4	12
Street	2	41				43
Rave		1				1
Other party	2	30		3		35
Other	8	55		2	2	67
Unknown	33	219	1	3	97	353
Total	317	781	9	58	114	1279

(All drug-positive enrolments) (Other = Accidental Poisoning and Iatrogenic Poisoning, Drink Sp = Drink Spiking, Unk = Unknown intoxication)

The large majority of patients (930 of 1279, 73%; Figure 7) were transported to hospital by the South Australian Ambulance Service (SAAS). The number presenting via the police, prisons or other custodial agencies remained stable (71 of 1279, 6%). These transportation rates to the ED by SAAS or custodial services for poisoned and intoxicated patients are much higher than those for overall ED attendances (43% by SAAS and 2% in police custody[7]). Given the nature of the substances involved, and the resultant physical effects and behavioural issues it is probably not surprising that the proportion of enrolled patients brought by police and custodial services is greater than that for other patients generally. The greater use of ambulance services also suggests the severity or acuity of illness of intoxicated patients may be greater than the overall average of ED attendance. This is also supported by clinical data from the study to date (see Clinical Correlates and Table 15 showing triage category comparison all ED attendances versus drug-positive enrolments). In any case, there is no evidence of reluctance to use ambulance services on the part of illicit drug users, due to perceived risk of prosecution.

Figure 7: Proportional representation of mode of arrival to hospital.



3.1.3 Patterns of Drug Use

Of the 1440 completed enrolments 1279 patients (89%) tested positive to over 75 different drugs with a total of 2749 positive drug tests returned (Appendix B).

The Main Drug Types:
Alcohol was clearly the most common drug detected, with 776 (61%) of the 1279 drug positive patients testing positive for alcohol. Benzodiazepines were the next most frequently detected compound (409 of 1279, 32%), followed by cannabinoids (355 of 1279, 28%), psychostimulants (224 of 1279 18%), and opioids (144 of 1279, 11%). Paracetamol was detected in 18% of all enrolments (228 of 1279)(Table 6).

Table 6: Number of positive drug tests for each major drug group and the percent of all positive drug results.

Drug Type	Number of patients testing positive *n* = 1279 (% of drug-positive patients)	Number of positive drug results (% of total positive test results)
Alcohol	776 (61)	776 (28)
Benzodiazepines	409 (32)	595 (22)
Psychostimulants	224 (18)	374 (14)
THC	355 (28)	355 (13)
Opioids	144 (11)	175 (6)
GHB	30 (2)	30 (1)
Ketamine	4 (<1)	4 (<1)
Cocaine	6 (<1)	6 (<1)
LSD	1 (<1)	1 (<1)
Antidepressants	109 (8)	115 (4)
Antipsychotics	22 (2)	23 (1)
Other pharmaceutical	58 (4)	62 (2)
Other nonpharmaceutical	4 (<1)	5 (<1)
Paracetamol	228 (18)	228 (8)
Total number of positive drug tests*		2749 tests

(*Total is greater than the total number of patients testing positive to drugs (1279 patients, Fig. 1) as many tested positive to more than 1 compound)

Although, as a group, benzodiazepines[c] remained the most commonly detected compounds (595 of 2749 positive results (approx. 22%), see Table 6), tests positive for both the metabolites as well as the ingested parent compound in the same patient account for many of these. A total of 409 patients (32%) tested positive for benzodiazepine compounds (See Section III “Benzodiazepines”). The number of patients testing positive to THC or to one of the psychostimulants[d] was similar at 355 (28%) and 224 (18%) patients respectively, and 144 (11%) patients tested positive to opioids[e]. All of these results were consistent with the previous

[c] *benzodiazepines tested = diazepam, temazepam, nordiazepam, clonazepam, oxazepam, alprazolam, nitrazepam, amino-nitrazepam, lorazepam, bromazepam, triazolam, flunitrazepam*
[d] *psychostimulants = amphetamine, methamphetamine, MDMA, MDA, MDEA, ephedrine, pseudoephedrine*
[e] *opioids = heroin, methadone, morphine, codeine, oxycontin, dextropropoxyphene*

12 months, with the exception of THC, which rose by 4% and psychostimulant detection, which fell by 4%. As before, analysis of the nature of drug use revealed that most alcohol, THC, and psychostimulant use was associated with Illicit Drug Use, whilst most benzodiazepine and other prescription drug use were associated with Self-Harm (Appendix B).

The proportion of patients testing positive for psychostimulants remained higher than pre-commencement predictions. The number of enrolments testing positive for psychostimulants remained greater than that for opioids (18% v 11%), with the gap between the two narrowing slightly compared to the previous 12 months. It is possible that the programmes put in place to educate injecting opiate users re safe use and the ongoing policy adjustments to allow safe and efficient management at the scene continue to reduce the need for Emergency Department presentation. Conversely our data shows significant levels of agitation, aggression, psychosis and other behavioural issues particularly associated with the use of psychostimulants that are not easily managed outside of the ED.

Methamphetamine remains the most commonly detected psychostimulant (181 cases (48% of positive psycho-stimulant drug tests)) followed by MDMA (65 cases (17% of positive psycho-stimulant drug tests)). The vast majority of psychostimulants were detected in Illicit Drug Users (179 of the 781 patients in the Illicit Drug User group (23%)), representing a fall of 5% from the previous 12 months. In contrast the proportion of psychostimulant positive results found in the alleged Drink Spiking group fell from 24% to 10% (6 of 58, 10%) (see Section III "Psychostimulants", Table 110).

Excluding codeine, the most common opiate detected was morphine (58 cases, 33% of positive opiate drug tests), followed by methadone (28 cases, 16% of positive opiate drug tests), representing a fall of 6% from the previous 12 months. Only 1 patient tested positive to heroin. This is in marked contrast to the proportional use and availability of these drugs reported elsewhere[8]. The number of RAH ED patients with a discharge diagnosis of heroin overdose remained stable over the two 12 month periods (33 in 2004-05 v 30 in 2005-06), after a sudden rise in presentations in 2005[7], leading to the publication of an alert (see Table 7).
Likewise, 4 cases of norpethidine (major metabolite of pethidine) were detected within a week of each other, leading to an alert being published (see Appendix A).

It should be noted that, due to its rapid metabolism, a delay in blood testing of more than a few hours after intravenous heroin use may result in only morphine being detected[8].It is probable that heroin was the parent compound in a number of the enrolled patients who test positive to morphine.

Table 7: Number of patients at RAH ED with discharge diagnosis of heroin related toxicity.

Year/Month	Number of Patients
1999 – 2000	221
2000 – 2001	121
2001 – 2002	30
2002 – 2003	38
2003 – 2004	25
2004 – 2005	33
2005 – 2006	30

There were a total of 200 positive tests for prescription drugs other than benzodiazepines, paracetamol or opioids. Of these the large majority were either antidepressants (109 patients with 115 tests positive for antidepressants) or antipsychotics (22 patients with 23 tests positive for antipsychotics). The large majority (16 of 22 patients, 73%) of presentations testing positive for an antipsychotic or antidepressants (84 of 109, 77%) were the result of deliberate Self-Harm. The detection rate of anti-depressants amongst Illicit Drug Users was considerably less than was seen in the previous 12 months (17% compared to 28%) (Table 210, Section III, Antidepressants and Antipsychotics).

Those testing positive for paracetamol represented 18% (228 of 1279) of the total drug positive population. Presentation categorisation for these patients was fairly evenly split between deliberate Self-Harm (103 of 228, 45%) and Illicit drug use (94 of 228, 41%). Whether the use of paracetamol was for therapeutic purposes in many cases was difficult to determine.

Of the other frequently mentioned drugs of abuse, there were 30 cases of GHB, 6 cases positive for cocaine, 4 for ketamine, and 1 for LSD. (see Section III, sections on each drug). Newly detected substances included datura (clinically determined), toluene and acetone in a ‘chroming’ presentation, and paraquat/diquat.

Following careful investigation only 3 cases of lignocaine were unable to be otherwise accounted for in this series. It remains likely that the majority of positive lignocaine tests are the result of local skin infiltration prior to venous cannulation for blood sampling by the ED medical staff. There remains a very small possibility of it being a contaminant of other administered drugs of abuse or, even less likely, of it being abused primarily.

There has been some change in the relative rates of detection compared to the previous 12 months, with alcohol, amphetamines, benzodiazepines, opioids and GHB all falling by between 1 and 4%. The rate of THC detection rose by 5%. The relative rates of detection of the major drugs of interest continue to differ markedly in some cases from our pre-study estimates (see Outcome Measures,). For example, the detection rate of 18% for all patients testing positive to a psychostimulant remains much higher than the pre-study estimate of 5%.

Poly-substance abuse:
Poly-substance abuse continues to be a feature of our results; the majority of patients testing positive to a drug of abuse were positive for multiple substances. Poly-substance abuse was proportionally greatest in the Self-Harm group with an average of 2.6 drugs per patient (see

Table 8). In the Illicit Drug User group this dropped to 2.06 drugs per patient. The most common combinations of drugs were alcohol with cannabinoids among Illicit Drug Users and alcohol with benzodiazepines in the Self-Harm subgroup. The frequency with which additional specific drugs were found for each major drug of interest is tabulated in Section III, results by drug type.

Table 8: Number of patients in each presentation category and the number of tests giving the number of drugs per patient.

Number of Drugs	Number of Patients	Number of Drugs	Number of drugs/patient
Self-Harm	317	832	2.60
Illicit Drug Use	781	1611	2.06
Other*	9	22	2.40
Drink Spiking	58	82	1.40
Unknown	114	209	1.80

(*Other: Accidental Poisoning and Iatrogenic Poisoning combined)

3.1.4 Clinical Correlates[f]

Clinical suspicion of drug used:
A comparison of what the enrolling clinician suspected had been taken and what was actually detected in the blood tests is shown in Table 9. In general, clinician suspicion that a specific drug was taken was derived from what the patient or accompanying friend or relative stated the patient had used, rather than from specific clinical signs or symptoms. Some drugs show a marked difference between rates of reporting or suspicion of use and the rates of detection of the drug. In the setting of Illicit Drug Use, this might support the contention that a number of drug users do not know what drug they are using. As discussed elsewhere, the large discrepancy between suspected heroin use and rates of detection may however, in part, be due to the rapid metabolism of heroin to morphine[9].

In the case of methamphetamine and amphetamine it is possible that clinicians have recorded, and patients reported, suspicion of amphetamine use, meaning the broad class of drug, rather than defining the specific drug within the class. It may also highlight a lack of knowledge among medical staff, of the differences between the amphetamine substances. Interestingly, there is relatively close correlation between what was reported as being taken and what was detected for both GHB and MDMA, which may reflect a special interest taken in these drugs by the Department staff.

The large discrepancy between clinician suspicion and detection rates for THC and benzodiazepines may be due to a lack of consideration of these drugs by the clinical staff when enquiring about drugs of abuse.

[f] *The clinical effects of drugs of abuse are extremely varied and complex. However, some broad generalisations can be made. Most drugs are abused because of their effects on mood and conscious state. These effects may be classified as either central nervous system (CNS) depressants or stimulants. Those drugs that are abused for their stimulant or mood elevating effects (eg amphetamines) generally cause CNS depression as intoxication progresses to severe toxicity.*

Table 9: The number of patients suspected of taking the drug by the treating clinician, compared to the actual number of positive blood tests for the drug.

Drug Type	Number of patients suspected of using the drug	Number of positive blood tests for the drug
Alcohol	784	776
THC	154	355
Amphetamines (Class)		
Amphetamine	70	87
Methamphetamine	88	181
MDMA	64	65
Pseudoephedrine	1	4
Opioids (class)		
Methadone	12	28
Heroin	25	1
Morphine	23	58
Codeine	40	80
Pethidine	0	4
Unspecified opioids	7	1
Cocaine/benzylecognine	9	6
GHB	32	30
LSD	4	1
Ketamine	4	4
Paracetamol	85	228
Benzodiazepines	184	409

Past History:

There were 1485 data entries specific to chronic medical, drug abuse/dependency, behavioural issues or psychiatric illness. Of these nearly 40% were psychiatric in nature compared to only 14% being general medical or surgical conditions (Table 10). A past history of drug abuse/dependence was recorded in 27% of drug positive enrolments and 3% reported past behavioural issues.

As seen in the previous 12 months, the large majority of enrolments with an established past history of attempted suicide or a diagnosis of depression presented as a result of deliberate Self-Harm. However many of those with with a past history of a major psychotic illness (for example schizophrenia) presented as a result of Illicit Drug Use (Table 11). The data fits well with current research into drug use and mental illness, which shows a very high incidence of drug abuse and dependence amongst in-patients of psychiatric units. This is especially the case in those suffering psychotic illnesses such as schizophrenia[10]. Although this data does little to clarify the question of whether illicit drug use leads to mental illness or alternatively, whether mental illness lends itself to drug abuse, it does highlight the problem of drug use amongst mental health patients.

Table 10: Incidence of past history of psychiatric, drug abuse/dependency, and significant general medical or surgical illness in drug-positive enrolled patients.

Recorded Past Medical/Psychiatric Illness	Number of Patients (%)
Psychiatric Illness	508 (40)
Drug abuse or dependency	350 (27)
Other Significant Chronic Medical	175 (14)
Behavioural issues	33 (3)
Total number of recorded entries*	1485

(* Patients may have had more than one medical or psychiatric condition, and data was not recorded for all drug-positive patients)

Table 11: Incidence of previous psychiatric diagnoses recorded for drug-positive enrolments.

Past Psychiatric History	Self-Harm	Illicit Drug Use	Other	Total
Schizophrenia	24	40	12	76
Paranoid Schizophrenia	2	6	5	13
Bi-Polar Affective Disorder	30	27	6	63
Psychotic Episode	14	26	6	46
Schizoaffective Disorder	8	11	2	21
Depression	200	86	25	311
Anxiety	33	17	10	60
Self-Harming	64	28	8	100
Suicide risk/ attempt	7	1	0	8
Personality Disorder	66	38	7	111
Other	14	12	3	29
Total	462	292	84	838

(Patients may have had more than one psychiatric condition, and data was not recorded for all drug-positive patients)

Table 12: Incidence of previous drug abuse diagnoses recorded for drug-positive enrolments.

Past Drug Abuse Diagnosis	Self-Harm	Illicit Drug Use	Other	Total
Alcohol Abuse	60	142	12	214
Poly-substance abuse	10	71	9	90
Opiate dependence/abuse	24	51	14	89
Chronic THC use	3	11	1	15
Benzodiazepine abuse	5	4	1	10
Total	102	279	37	418

(Patients may have had more than one condition, and data was not recorded for all drug-positive patients)

An established past history of drug abuse was reported in 350 patients (Table 10). There were 227 patients documented as having an established past history of injecting drug use. Of these 5 (2%) were known to be Hepatitis B positive, 86 (38%) Hepatitis C positive and 3 (1%) HIV-positive.

Triage Category[g]:

A comparison of the relative proportions of patients in each of the triage categories of those enrolled in the study to those of all ED attendances is shown in Table 13. As was the case in the previous 12 months, over half of drug-positive enrolled patients (56%) were determined to require either immediate management or management within 10 minutes of arrival (triage priority 1 and 2 respectively)[11]. This compares with only 23% for ED attendances generally during the same period[7].

From Table 14 it can be seen that the distribution across the triage categories of drug-positive enrolments broadly carries through to each of the major drug types examined. The notable exceptions are GHB and ketamine. In the case of GHB, 97% of cases were so unwell they were given a triage priority 1 or 2. All four cases involving ketamine warranted a triage priority 1.

Table 13: Comparison of the triage priority distribution of all patients attending the RAH ED and enrolled patients testing positive to drugs or alcohol.

Triage Priority	All ED attendances: Number of Patients (%)	Drug positive enrolments: Number of Patients (%)
1	1797 (3)	225 (18)
2	11507 (20)	489 (38)
3	21518 (38)	424 (33)
4	18034 (32)	133 (10)
5	4385 (8)	8 (<1)

[g] Triage is a clinical assessment tool that classifies patients at initial presentation according to their urgency for medical care. Although, as such, it is not a direct measure of illness severity, there is usually a strong correlation. This assessment is made on arrival and prior to consideration of enrolment into D_2EWS.

Table 14: Triage priority of patients testing positive to each of the major drug types.

Drug Type	Triage Priority					Total Patients
	1	2	3	4	5	
Alcohol (%)	146 (19)	299 (39)	230 (30)	99 (13)	2 (<1)	776
Benzodiazepines(%)	55 (13)	156 (38)	160 (39)	34 (8)	4 (1)	409
THC (%)	65 (18)	142 (40)	117 (33)	29 (<1)	2 (<1)	355
Amphetamines (%)	48 (21)	31 (14)	71 (32)	13 (6)	1 (<1)	224
Opioids (%)	16 (11)	62 (43)	59 (41)	6 (4)	1 (<1)	144
GHB(%)	16 (53)	13 (43)	1 (3)	0	0	30
Cocaine (%)	1 (17)	3 (50)	0	0	2 (3)	6
Ketamine (%)	4 (100)	0	0	0	0	4
LSD (%)	0	1 (100)	0	0	0	1
Antipsychotics (%)	3 (14)	13 (60)	6 (27)	0	0	22
Antidepressants (%)	14 (13)	52 (48)	39 (36)	4 (4)	0	109

(Number of patients and percent (%) of patients testing positive for that drug type)

The proportion of patients with a triage priority of 1 in both the Drink Spiking and Other enrolment groups was much less than the overall average (Table 15).

Table 15: Comparison of number of patients in each triage category for each presentation category.

Presentation Category	Triage Priority					Total Patients
	1	2	3	4	5	
Illicit Drug Use	148	281	247	100	5	781
(%)	(19)	(36)	(32)	(13)	(<1)	
Self-Harm	37	147	119	13	1	317
(%)	(12)	(46)	(38)	(4)	(<1)	
Drink Spiking	5	11	29	13	0	58
(%)	(9)	(19)	(50)	(22)		
Other	1	3	3	1	1	9
(%)	(11)	(33)	(33)	(11)	(11)	
Unknown	34	47	26	6	1	
(%)	(30)	(41)	(23)	(5)	(<1)	114
Total	225	489	424	133	8	
(%)	(18)	(38)	(33)	(10)	(1)	1279

Clinical Vital Signs:

An altered heart rate was the most frequently encountered abnormal clinical vital sign. Approximately 3% of patients had bradycardia (heart rate < 60 beats per minute (bpm)), whilst nearly 30% had a tachycardia (heart rate > 100 bpm); almost 1% had rates in excess of 150 bpm. An electrocardiograph (ECG) was performed in 530 patients (Table 16). A systolic blood pressure of less than 90mmHg (implying a shocked state) was recorded in 3% of patients.

Table 16: ECG heart rhythm results.

ECG Rhythm	Number of Patients (%)
Normal Sinus Rhythm	375 (29)
Sinus Bradycardia	5 (<1)
Sinus Tachycardia	137 (11)
Supraventricular Tachycardia	5 (<1)
Atrial Fibrillation/flutter	2 (<1)
Asystole/Ventricular fibrillation	4 (<1)
Junctional	1 (<1)
Wolf Parkinson White syndrome	1 <1)

(ECG data not recorded for all enrolled patients)

Body temperature was abnormal in 8% of cases (99 of 1279) with 5% of patients noted to be hypothermic (temperature < 35ºC) and 3% hyperthermic (temperature > 37.5ºC).

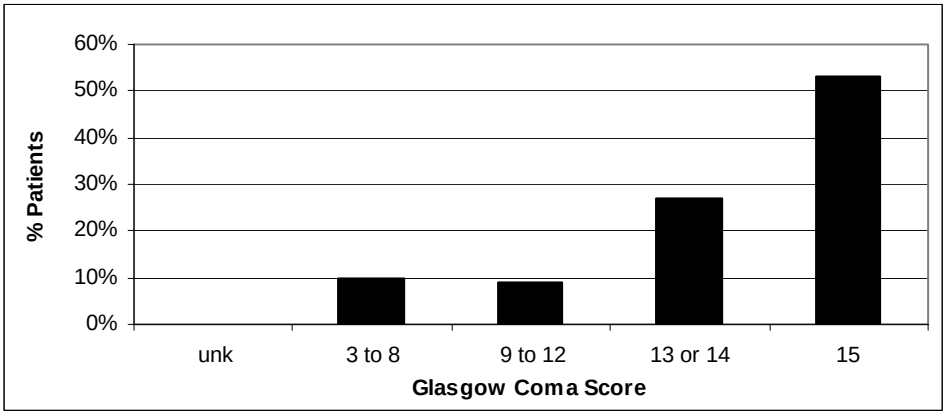
Parameters of respiratory function measured included: respiratory rate (RR), presence of abnormal breath sounds on auscultation, and arterial oxygen saturation (SaO_2). A degree of hypoxia ($SaO_2 \leq 95\%$) was seen in 9% (122 of 1279) of patients, and severe hypoxia ($SaO_2 \leq 90\%$) was seen in 2% (30 of 1279 patients). An abnormal RR (< 10 or > 20 breaths per minute) was seen in 2%. Abnormal breathing sounds were infrequently detected (3%).

Of the 1277 patients in whom it was recorded, 19% (245 of 1277) had a moderate to severely decreased conscious level with a GCS of 12 or less at the time of presentation to the RAH ED (Figure 8). Of these, 51% (124 of 245)) had a severely depressed conscious state (GCS ≤ 8), including 47 patients who were completely unresponsive (the lowest possible GCS score of 3).

The drug most commonly detected in patients with a GCS of 8 or less was alcohol either alone or in combination with others. However, GHB was overwhelmingly the drug most likely to cause severe depression of conscious state. Of the 30 patients in whom GHB was detected 19 (63%) had a GCS of 8 or less.

The gag reflex was recorded as diminished in 81 patients (6%) and absent in another 18 (1%) of the 1279 patients in whom the data was collected. Essential in protecting the airway from aspiration, depression of this reflex is indicative of high risk in the setting of poisoning or intoxication, and is typically associated with significantly depressed conscious levels.

Figure 8: Conscious levels of patients as measured by the Glasgow Coma Score. (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).



Of the other neurological clinical indicators recorded: seizure activity was seen in nearly 5% of patients (Table 17); depressed or absent deep tendon reflexes were noted in almost 5%: and abnormal pupillary reaction to light was seen in 10% of patients.

Table 17: Number of patients in each presentation category recorded as having seizure activity.

Seizure Activity	Illicit Drug Use	Self-Harm	Other	Drink Sp	Unk	Total (%)
Nil	700	284	7	53	94	1138 (89)
Myoclonus	0	0	0	0	1	1 (<1)
Focal	1	0	0	0	0	1 (<1)
Single Grand Mal	9	6	2	0	6	23 (2)
Multiple Grand Mal	5	2	0	0	1	8 (<1)
Other	0	0	0	0	1	1 (<1)
Unknown	66	26	0	5	11	108 (8)
Total	781	317	9	58	114	1279

(Other= Accidental Poisoning and Iatrogenic Poisoning combined, Drink Sp = Drink Spiking, Unk = Unknown)

Altered Mental State:

The rate of psychosis and agitated delirium[h] recorded in enrolled patients remained surprisingly high at 11% (147 of 1279 patients, Table 18). Proportionally, rates were higher in the Illicit Drug Use group (12%) than in the Self-Harm group (8%). However the rate of psychosis in the 'Unknown' enrolment group was 24%. A total of 285 positive drug tests were returned on these 147 patients, again indicating high rates of poly-substance abuse. There were no positive results returned for antipsychotic medication in this group. This may reflect either a high level of prescribed medication non-compliance amongst patients acutely unwell

[h] *At the time of presentation, and often early in the ED attendance when enrolment for D_2EWS is considered, it is difficult to distinguish between a primary psychotic disorder, a drug induced psychosis, and an agitated delirium. For this reason enrolling clinicians were not asked to try and distinguish between them at the time of enrolment.*

with an established diagnosis of a psychotic illness, or alternatively perhaps, high levels of acute drug induced psychosis untreated at the time of presentation.

Table 18: Number of patients in each presentation category recorded as suffering acute psychosis or agitated delirium at presentation.

Psychosis/ Delirium	Illicit Drug Use	Self-Harm	Drink Spiking	Unk	Other	Total(%)
No	655	276	54	78	9	1072 (84)
Yes	95	24	1	27	0	147 (11)
Unknown	31	17	3	9	0	60 (5)
Total	781	317	58	114	9	1279

(Unk = Unknown)

Alcohol was the most common drug detected in psychotic patients, followed by THC, benzodiazepines and psychostimulants (Table 19). However, as a proportion of the total number of positive test results for each drug overall (Table 19, column 3) it can be seen that there appears to be a strong correlation between acute psychosis and agitated delirium and psychostimulant use, with 22% (32 of 147) of psychotic patients testing positive for psychostimulants.

Table 19: Rate of detection of the most common drugs found in patients suffering acute psychosis or agitated delirium at presentation, and proportional representation to overall detection rate for that drug.

Drug detected	No. of psychotic patients positive (%)* *n* = 147	No. of patients positive overall	Drug type psychosis rate %
Alcohol	66 (45)	776	9%
THC	69 (47)	355	19%
Psychostimulants	32 (22)	224	31%
Methamphetamine	31 (21)	181	17%
Amphetamine	20 (14)	87	23%
MDMA	10 (7)	65	15%
Opioids (Class)	10 (7)	144	7%
Methadone	3 (2)	28	11%
Morphine	3 (2)	58	5%
Codeine	5 (3)	80	6%
GHB	1 (0.7)	30	3%
Benzodiazepine	57 (39)	409	14%
Paracetamol	20 (14)	228	9%

(*The percent of the 147 drug-positive psychotic patients)

Disposition from the Emergency Department:

The rate of admission to hospital for drug-positive enrolments was high at 47% when compared to the overall ED admission rate of approximately 36%[7]. The highest admission rate (209 of 317 patients, 66%) was seen in the Self-Harm group (Table 20). The rate of direct admission to a psychiatric unit from the ED increased substantially from the previous 12 months (5% compared to 1%). A proportion of patients, particularly in the Self-Harm group, were initially

admitted to a general medical or high dependency unit to enable treatment or monitoring of the medical adverse effects of the drug(s), before being transferred to a specialist psychiatric ward. Table 21 shows that 8% of patients were eventually discharged from the RAH to specialist psychiatric inpatient units.

Table 20: Immediate destination of drug positive patients after leaving the ED.

Disposition from ED	Illicit Drug Use	Self-Harm	Drink Spiking	Unknown	Other	Total (%)
Discharged	447	95	53	41	3	639 (50)
Admitted	312	209	5	67	6	602 (47)
EECU	134	98	2	15	1	250 (20)
General Ward	86	28	0	15	1	130 (10)
ICU/HDU	60	53	3	30	4	150 (12)
Spinal	2	0	0	0	0	2 (<1)
Cardiology	1	3	0	0	0	4 (<1)
Psych. Ward	29	30	0	7	0	66 (5)
Transferred	20	9	9	5	0	34 (3)
Died in ED	1	0	0	0	0	1 (<1)
Unknown	1	1	0	1	0	3 (<1)

(EECU = Emergency Extended Care Unit, ICU/HDU = Intensive care Unit/High Dependency Unit, Psych Ward = specialist psychiatric unit, transferred = care transferred to another health facility)

Of those patients admitted to hospital, the majority (42%) were to the Emergency Extended Care Unit (EECU) attached to the ED. This unit functions as a short- term observation unit for clinically stable patients expected to be discharged to home within 24 hours.

Ultimately, 83% of patients were discharged from hospital to home, and 90% of these had a length of stay of 24 hours or less[i]. Ninety -three patients (7%) had a length of stay (LOS) in hospital of greater than 7 days. Eleven percent of admitted patients (68 of the 602) left hospital against medical advice or absconded (Table 21), predominantly from the Illicit Drug User sub-group.

[i] *Need for admission to hospital (disposition from ED) and hospital length of stay (LOS) are indirect markers of severity of illness, as well as indirect markers of the duration of adverse effect of drug intoxication/poisoning.*

Table 21: Ultimate destination of patients at time of leaving the hospital.

Disposition from Hospital	Illicit Drug Use	Self-Harm	Drink Spiking	Unknown	Other	Total (%)
Home	665	254	56	73	9	1057 (83)
Absconded/Left AMA	46	12	2	8	0	68 (5)
Psych services	41	45	0	13	0	99 (8)
SAPOL custody	15	1	0	5	0	21 (2)
Rehabilitation	6	1	0	10	0	17 (1)
Died	3	1	0	3	0	7 (<1)
Other hospital	0	0	0	1	0	1 (<1)
Other/Unknown	5	3	0	1	9	9 (<1)

(Left AMA = left hospital against medical advice, Psych services = specialist psychiatric unit, SAPOL = South Australian Police)

A total of 150 patients (12%) required admission to Intensive Care (ICU) or the High Dependency Units (HDU). Of these, 84 patients (56%) required airway intubation for ventilatory support or airway protection. There were 7 deaths recorded (see below) and 17 patients (1%) required treatment in rehabilitation facilities after the acute hospital admission. This represents an overall mortality rate of 0.5% and a major long-term adverse outcome rate (excluding death) of approximately 1% (Table 21). These cases were predominantly from the Unknown and Illicit Drug Use category.

Fatalities:

There were 9 fatalities amongst all D_2EWS enrolments for the 12- month period, of which 7 (78%) tested positive for drugs. The following data relates only to those returning positive drug tests.

All were Caucasian; 6 were male and 1 female. All but 1 were aged less than 50 years (Table 22). Drug exposure occurred at the patient's home in 2 cases and was unknown in the other 5 (Table 23).

Table 22: Gender and ages of fatalities.

Age (years)	Male	Female
<18	0	0
18-35	1	0
36-50	4	1
51-74	1	0
Total	6	1

At the time of enrolment 1 case was recorded as the result of deliberate Self-Harm, 3 were classified as a result of Illicit Drug Use, and 3 were classified as suspected drug abuse ("Suspected"). Five cases were as a result of trauma, involving falls, motor vehicle accidents, an assault and 2 penetrating injuries. All five died as a result of their traumatic injuries. The other two were classified as poisoning as a result of drugs misuse (case 7) and an unconscious collapse (case 3).

One case died in the Emergency Department, while the others were admitted to the ICU for treatment, but died during admission.

Table 23: Demographic and drug details of fatalities.

Case	Gender	Age	Nature of Drug Use	Venue	Drug	Level
1	Male	41	Unknown	Unknown	Alcohol THC	0.15 3
2	Male	37	Illicit	Home	THC	4
3	Male	29	Unknown	Unknown	Amphetamine Methamphetamine	0.1 1.0
4	Male	60	Illicit	Home	Alcohol	0.19
5	Male	48	Unknown	Unknown	Paracetamol Diazepam	28 0.20
6	Female	48	Illicit	Unknown	Alcohol	0.14
7	Male	39	Deliberate SH	Unknown	Alcohol Nordiazepam Paraquat/Diquat	0.16 0.02

3.1.5 Summary

Enrolments:

- In the reporting period August 2005 to August 2006 there were 1440 completed enrolments with 1279 patients (88.8%) testing positive to drugs.

Demographics:

- The male to female ratio for drug-positive enrolments was 3:2
- 88% were Caucasian, 6% Indigenous, and 2% Asian
- The majority of enrolments (63%) were aged between 18 and 35 years; 4% were aged less than 18 years
- Most patients presented over the weekend (45% between Friday 6 pm and Monday 6 am).
- The most likely time of day to present was between midnight Saturday and 6 am Sunday.
- Location of drug use was most frequently at a private residence (55%) usually the patient's own home
- 28% reported drug use at a licensed premise.

Patterns of drug use:

- A total of 75 different pharmaceutical and illicit drugs were detected with a total of 2749 positive drug tests
- Most patients presented as a result of Illicit Drug Use (61%), followed by Self-Harm (25%), and Drink Spiking (5%).
- Alcohol was the most common drug detected in 776 (61%) of the 1279 drug positive patients
- Benzodiazepines were the next most commonly detected drugs with 595 positive tests in 409 patients (32% of total), followed by THC with 355 tests (28%), psychostimulants with 374 tests in 224 patients (18%), and opioids with 175 tests in 144 patients (11%)
- Poly-substance abuse (>1 drug per person) was present in 58% of drug-positive patients
- The most common combination of drugs among Illicit Drug Users was alcohol + THC, in Self-Harming patients it was alcohol + benzodiazepines
- 18% of patients tested positive to 3 or more drugs
- The most number of drugs detected in any 1 patient was 7.

Clinical Correlates:

- Clinical suspicion of specific drug used was most accurate with alcohol, GHB and Ketamine but was poor with other drugs
- 40% of patients had a history of previous psychiatric illness
- 27% of patients had a documented past history of drug abuse or dependency
- Over half of drug-positive patients were determined to require immediate or urgent medical assessment compared to a rate of 23% for ED attendances generally during the same period.
- An altered heart rate was the most common abnormal clinical sign, with 3% having a bradycardia and 30% a tachycardia
- 5% of patients were hypothermic, 3% hyperthermic
- 10% of patients were comatose with a Glasgow Coma Score of less than 8
- 11% of patients had an agitated delirium or acute psychosis at presentation
- The admission rate for drug-positive patients was 47%, compared to an overall admission rate for all ED patients of 36%
- 5% of admitted patients, mainly Illicit Drug Users, left hospital against medical advice
- All but 1 of the 7 fatalities were aged 50 years or less; 1 was aged less than 30 years
- Only 1 death was the result of deliberate Self-Harm.
- 5 deaths were directly attributable to trauma

3.2 RESULTS BY PRESENTATION TYPE

3.2.1 Illicit Drug Use

Enrolments:
Illicit Drug Use (defined as excessive or non-sanctioned use of both licit and illicit substances, including alcohol, across the spectrum of use from occasional to regular to dependent) was the most commonly cited reason for the drug exposure of enrolled patients (839 of 1440 enrolled patients) and was the group with the largest number of drug positive results (781 of 1279 drug-positive enrolments, 61%). This was more than twice as frequent as the next most common presentation group, deliberate Self-Harm (317 of 1279 drug positive enrolments, 25%).

Results and discussion in this and the following sections are limited to drug positive enrolments only.

Demographic Details:
Ethnicity:
Nearly 85% of Illicit Drug Users were Caucasian, 8% Indigenous and 2% were Asian (Table 24). Indigenous drug affected patients were proportionally far more likely than other ethnic groups to have presented as a result of Illicit Drug Use with approximately 83% of all Indigenous enrolments in this category (compares with 59% of Caucasian and 67% of Asian patients). The gender ratios for Caucasian and Indigenous patients were similar at approximately 5 male to 2 female patients. Unlike the previous 12 months, the male to female ratio of Asian enrolments was 2:1 (previously exclusively male).

Indigenous patients were as likely as Caucasians to present via police or custodial services (6% each), were more likely to present on a week -day (73%) rather than the weekend (27%), but were less likely to present between the hours of midnight and 6am (34%). They also had different patterns of drug use (see Table 28).

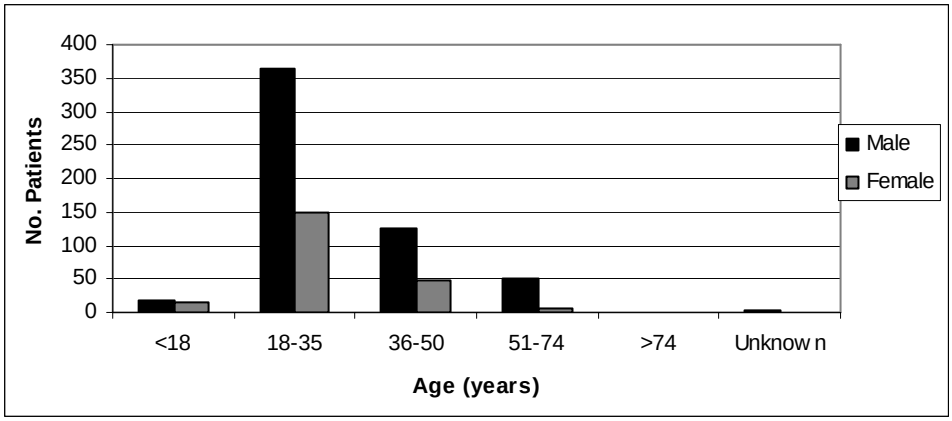
Table 24: Ethnicity and gender distribution of patients presenting as a result of Illicit Drug Use.

Ethnicity	Male	Female	Total (%)
Caucasian	475	191	666 (85)
Indigenous	50	14	64 (8)
Asian	11	7	18 (2)
African	3	2	5 (1)
Arab	1	0	1 (<1)
Other/unknown	22	5	27 (3)
Total	562	219	781

Age and Gender:
The average age of patients presenting as a result of Illicit Drug Use was just under 31 years, with approximately 3 years between the genders (male average age 31.7 years and female 28.3 years). Those under the age of 18 years made up 4%, and 8% were older than 50 years (Figure 9). As with drug positive enrolments generally, males predominated with a male to

female ratio of 7:3. This ratio roughly held across all age groups except for those aged less than 18 years, where it was far less pronounced (19 male and 14 female patients).

Figure 9: Age and gender distribution of patients presenting as a result of illicit drug use.



Time of Presentation:
The most likely time of presentation to the Emergency Department of Illicit Drug Users was between midnight and 6 am Sunday (13% of all presentations). Half of all presentations were between 6 pm Friday and 6 am Monday (Table 25). There was some variation from month to month in the number of presentations, and a suggested seasonal variation may become evident with continuing monitoring (range 20% in Spring, 28% in Summer, 30% in Autumn and 23% in Winter).

Table 25: Day and time of day of Illicit Drug Use presentations.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0600- 1159	103	21	19	25	30	46	51	295 (38)
1200-1759	26	14	2	6	10	26	22	106 (14)
1800-2400	24	11	18	17	21	15	25	131 (17)
0001-0559	33	27	21	47	39	39	43	249 (32)
Total (%)	186 (24)	73 (9)	60 (8)	95 (12)	100 (13)	126 (16)	141 (18)	781

Venue of exposure and mode of transport to ED:
Data regarding the location of drug exposure was recorded in 562 cases, with the remainder (219 of 781, 28%) recorded as unknown. The most commonly reported venue for the drug exposure was a private residence (28%, Table 5). As was the case in the previous 12 months' report, this data appears to contradict perceptions that most presentations to the RAH ED are sourced from inner city licensed venues. This data does correspond however, with reports from IDU of the location of injecting[12]. It should be noted though, that the majority of our enrolled patients' drug exposure were oral rather than intravenous. Approximately 208 patients (27%) reported the drug exposure occurred at a licensed venue. A proportion of those recorded as 'other' in Table 5 (7% overall) may also represent administration of drug in a public place adjacent to licensed venues (eg street, car park, park land), or at a public outdoors event. Even if this is not the case, the fact that just over one third of all patients in this category came from a licensed venue is cause for some concern. Six patients (1%) were recorded as being in

police or correctional services custody at the time of their drug exposure, half the rate reported in the previous 12 months.

Data on mode of transport to the ED was recorded for all patients (Table 26). In 74% of cases this was via ambulance (SAAS); in 6% it was via police or custodial services. As discussed in Section I, the high rates of ambulance transport may suggest a higher than average degree of medical urgency than the average general patient attending the ED. It may also indicate that an hypothesized past reluctance on the part of illicit drug users to use SAAS services, due to a perceived risk of police involvement, is currently less of an issue.

Table 26: Mode of arrival to the ED for patients in the Illicit Drug Use category.

Mode of Arrival	Number of Patients (%)
Ambulance	576 (74)
Police/Custodial	47 (6)
Private car	85 (11)
Walked in	35 (4)
Taxi	18 (2)
Public Transport	4 (<1)
Unknown	1 (<1)
Volunteer transport	4 (<1)
Other	11 (1)
Total	781

Patterns of Drug Use:

A total of 1513 positive drug tests were returned from the 781 drug positive patients in this enrolment category. The detection rates of the major drug groups are shown in Table 27. Alcohol was the most common drug detected, followed by THC, benzodiazepines (as a group) and psychostimulants. The gender ratios were broadly similar at 3 or 4 male to 1 female for most of the drug groups in which reasonable numbers were enrolled. The gender ratio for psychostimulants was the notable exception. All LSD, ketamine and cocaine enrolments were male.

Table 27: Gender distribution and total number of patients with positive drug tests for the major drug groups in Illicit Drug Users.

Drug Type	Male (%)	Female (%)	Total Number of Drug-Positive Individuals (%)	Total No. of Positive tests
Alcohol	391 (73)	146 (27)	537 (69)	537
Benzodiazepines	135 (73)	50 (27)	185 (24)	257
Psychostimulants	117 (65)	62 (35)	179 (23)	307
THC	195 (76)	60 (24)	255 (33)	255
Opioids	51 (72)	20 (28)	71 (9)	80
GHB	16 (57)	12 (43)	28 (4)	28
Ketamine	1 (100)	0	1 (<1)	1
Cocaine	3 (100)	0	3 (<1)	3
LSD	1 (100)	0	1 (<1)	1
Datura	2 (100)	0	2 (<1)	2
Solvents	1 (100)	0	1 (<1)	2
Antidepressants	11 (61)	7 (39)	18 (2)	19
Antipsychotics	2 (67)	1 (33)	3 (<1)	3
Other	11 (69)	5 (31)	16 (2)	17
Total	562	219	781	1513

The patterns of drug use detected in Indigenous patients were quite different from that of the group as a whole (Table 28). Although alcohol detection rates were similar (71% and 68% of positive drug results respectively), proportionally, benzodiazepine and THC use were much more frequent (38% and 45% respectively compared to 23% and 32% in the group as a whole), and detection rates for psychostimulants were much lower (14% compared to 24% incidence). Additionally, no positive results were returned for ecstasy (MDMA) and related drugs such as GHB, ketamine, or LSD; 1 patient returned a positive test for cocaine.

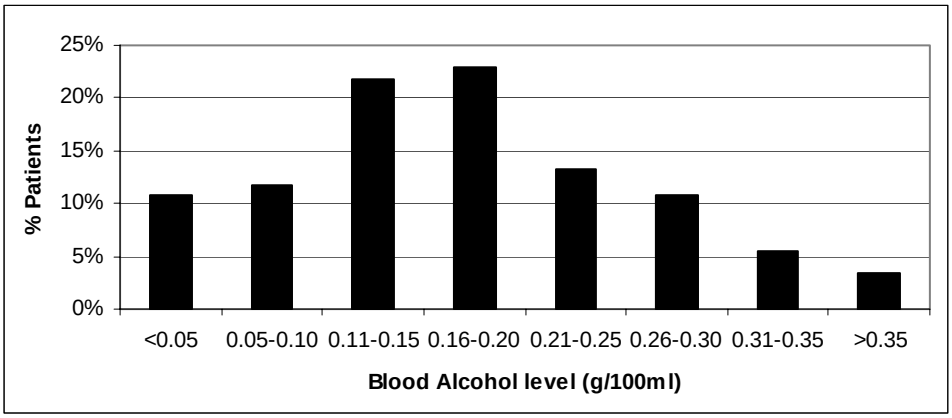
Table 28: Incidence of positive drug results for major drug groups in Indigenous Illicit Drug Users.

Drug Type	Number of Positive Tests (%)
Alcohol	46 (71)
Benzodiazepines	24 (38)
THC	29 (45)
Psychostimulants	9 (14)
Opioids	5 (8)

The average number of drugs detected per person in the Illicit Drug User group was 2.06, marginally less than the average of 2.15 for all drug-positive enrolments. However, only 44% of patients in this group tested positive to 1 drug, mostly alcohol, whilst 8% tested positive to more than 3 drugs (Table 8). The most number of drugs detected in any patient was in the Illicit Drug Use category (7 drugs detected).

Alcohol:
Once again alcohol was the most frequent drug detected, present in 69% of Illicit Drug Users. This was up slightly from the previous year (63%). This compares with the average rate of detection amongst all drug-positive enrolments of 61%. As seen in Figure 10, around 55% of these patients had blood alcohol levels in excess of 0.15 g/100mL (moderate to severe intoxication) and 3% had levels in excess of 0.35 g/100mL (potentially fatal). The average blood alcohol level was 0.172 g/100mL, which was the highest of all presentation categories other than “Unknown” (Section II, “Unknown Drug Use”).

Figure 10: Blood alcohol levels of Illicit Drug Users.



Benzodiazepines:
One hundred and eighty five patients returned 257 positive benzodiazepine test results, with nordiazepam, the major metabolite of diazepam, most commonly detected (Table 29). Although the largest number of benzodiazepine-positive tests was returned by Illicit Drug Users, proportionally these drugs were more commonly detected in the Self-Harm group (24% of Illicit Drug Use patients compared to 58% of Self-Harm patients returned positive benzodiazepine tests).

Table 29: Incidence of detection of benzodiazepines in Illicit Drug Users.

Drug Name	Number of Positive Tests (%)
Temazepam	17 (6)
Clonazepam	5 (2)
Diazepam/Nordiazepam	151 (59)
Oxazepam	35 (14)
Alprazolam	43 (17)
Nitrazepam	4 (2)
Lorazepam	2 (<1)
Total positive tests	257

(nordiazepam is the principle metabolite of diazepam)

Psychostimulants:

One hundred and seventy nine patients returned 307 positive test results for psychostimulants (Table 30). The large majority of psychostimulants were detected in Illicit Drug Users (80%) and proportionally psychostimulant use was highest in the Illicit Drug User group (23% of patients in the group testing positive, Table 110, Section III, “Psychostimulants”). The most frequently detected psychostimulant was methamphetamine (46%), followed by amphetamine (22%) and MDMA (ecstasy, 20%). Other drugs in the class were detected in only very small numbers. It is likely that a large proportion of the amphetamine (the drug) positive results were a result of metabolism of methamphetamine (see discussion Section III, “Psychostimulants”)

Table 30: Incidence of detection of psychostimulants in Illicit Drug Users.

Drug Name	Number of Positive Tests (%)
Methamphetamine	142 (46)
MDMA	60 (20)
Amphetamine	69 (22)
Pseudoephedrine	1 (<1)
MDA	25 (8)
MDEA	9 (3)
Total positive tests	307

THC:

THC, the major psychoactive constituent of cannabis was present in 33% (255 of 781) of the patients presenting as a result of Illicit Drug Use, and 72% of all THC positive patients were Illicit Drug Users. This rate of detection is broadly comparable with the pre-study estimates of 25% but, as discussed below, is surprising in that it is not dis-similar to the detection rates of both amphetamines (18%) and benzodiazepines (28%).

Opioids:
The incidence of opioids detected in Illicit Drug Users was surprisingly low at 80 positive tests in 71 patients (Table 31). This represents only 9% of Illicit Drug Users (71 of 781 patients). It is possible that many of the cases positive for codeine may have been where the drug was used for therapeutic purposes, further lowering the proportion of cases presenting as a result of opiate abuse (see Section III, "Opioids" for further discussion).

No patients testing positive to heroin were Illicit Drug Users, despite the fact that 20 reported using heroin prior to presentation. It is probable that a proportion of those testing positive to morphine had used heroin but the parent compound had been metabolised to morphine by the time of arrival to the ED. This is suggested by the fact that heroin was reported or suspected to have been used more frequently than morphine (20 versus 12 cases) but detection rates were much higher for morphine (32 morphine versus 0 heroin). None the less, morphine was reported to have been the primary compound of abuse in a number of cases, and when combined with the rate of detection of methadone, a concerning level of diversion of prescribed opiate medication is suggested. The low number of heroin cases may also be related to the national shortage of heroin, experienced since 2001[9,13].

Table 31: Incidence of detection of opioids in Illicit Drug Users.

Drug Name	Number of Positive Tests (%)
Morphine	32 (40)
Methadone	17 (21)
Codeine	30 (38)
Heroin	0
Norpethidine*	1 (1)
Total positive tests	80

(*metabolite of pethidine)

Others:
The large majority of patients testing positive to gamma hydroxy butyrate (28 of a total of 30 patients), ketamine (1 of 4 patients), and cocaine (4 of 6 patients), and the one case of LSD were Illicit Drug Users (see specific drug categories in Section III for further discussion). Both the users of datura and the 'chromer' positive for toluene and acetone, were classified as Illicit Drug Users.

Drug Habit:
The self-reported current Illicit Drug Use by patients was relatively well recorded with data from 667 of the 781 patients obtained (87%) (Table 32). A total of 1355 major drugs of interest were reported as being abused. This equates to an average of 2.0 drugs per person, which is consistent with the detection rate among Illicit Drug Users of 2.06 drugs per person.

Not surprisingly, cigarettes and alcohol were the most commonly self-reported drugs and their reported use was 'frequent' (daily or weekly). The self-reported use of methamphetamine was 19%, which correlates well with an actual detection rate of 18%. The self-reported rate of cannabis use was considerably lower than the detected rate (25% v 33%).

Benzodiazepine abuse in Illicit Drug Users was reported relatively infrequently compared to the actual rates of detection (6% of drug use reports compared to a detection rate of over 24%)[i]. It is possible this low self-reporting rate reflects a perception by patients that they are not a drug of abuse, either because many are prescribed or, as has recently been suggested, they may be commonly used to self-medicate against adverse effects of other "primary" drugs of abuse such as opiate, alcohol and psychostimulant withdrawal. As previously noted, the recorded clinician suspicion of benzodiazepine abuse was also well below the detection rates which may suggest a failure on their part to appreciate the potential for abuse of this class of drugs.

Table 32: Frequency of drug use reported by Illicit Drug Users.

	Frequency of Use							
Reported Drug Use	**Never**	**Daily**	**Weekly**	**Monthly**	**Yearly**	**Not specified***	**Past use only**	**Total Responses**
Alcohol	1	139	57	4		349		550
Cigarettes		161	5			10	1	177
Cannabis		61	11	3	2	88	2	167
Amphetamines		10	10	9		55	1	85
Methamphetamine		13	13	4	2	93	1	126
Heroin		3	6	2		45	6	62
Benzodiazepines		17	2			23		42
MDMA (ecstasy)			3	1	1	41	1	47
GHB/Fantasy		3	3	2	1	21		30
LSD/Acid				1		12		13
Cocaine			1	1	4	10		16
Ketamine				1	1	3		5
Solvents				1		3		4
Opiates		7				17	1	25
Mushrooms				1		5		6

(*Stated drug used but frequency of use not recorded, data not recorded for all patients)

The level of self-reported use of both LSD and cocaine was much higher than our detection rates, suggesting that abuse of these drugs may be a larger problem than our data would otherwise indicate. The self-reported rates of heroin and other opioids abuse were also discordant with detection rates, the reasons for which have been discussed earlier. The self-reported rates of GHB and MDMA use were entirely consistent with our findings.

[i] *Rates of reported use would be expected to be significantly greater than detection rates as blood results will be positive only after relatively recent use for most drug types, whereas reported use may have been days or weeks prior to presentation.*

A comparison of what patients reported as having previously used (Table 32 above) and what was detected on blood testing these patients is shown in Table 33. The very high incidence of poly-drug abuse discussed in earlier sections is highlighted by this table.

Table 33: Comparison of drug use reported by patients and the drugs actually detected on presentation to the ED.

Drugs Detected on Testing	Drug Usage as Reported by Patient*																
	Cigs	Alcohol	THC	Amphet	Methamph	GHB	Ketamine	Cocaine	Benzo	Solvent	Nitrous oxide	Amyl nitrate	LSD	MDMA	Heroin	Mush-rooms	Other Opioids
Alcohol	151	590	109	46	76	9	1	11	39	1			7	29	25	5	11
THC	108	222	166	57	77	11	4	12	32	2			8	21	46	4	21
Amphetamine	30	43	19	27	45	12	1	3	5				2	14	9	1	
Methamphetamine	59	100	39	52	81	18	3	5	14	1			5	23	22	2	9
GHB	4	15	2	6	8	17	1	3					1	8	1	1	
Ketamine	1	1		1	1												
Cocaine	4	2	4	1	2			4	2						4		
Benzodiazepine	120	229	75	41	69	8	3	12	76	2			4	17	56	3	29
LSD			1										1				
MDMA (ecstasy)	13	45	11	9	13	8	2	5	1		2		28	1	1	1	
Heroin									1						1		
Methadone	10	19	8	9	9			9						2	12		7
Morphine	16	23	8	3	6		2	9						1	19		7
Codeine	22	28	11	5	8	1	2	7					1	4	10	1	3
Pseudoephedrine	2	4	1					1	1						1		
MDA	5	18	2	3	7	4		3						17	1		
MDEA	3	6			3	1	1	2						3			

(*Refers to drug use other than that leading to or associated with this ED presentation, as per Table 3)

Clinical Correlates:
Relevant data on the clinical correlates for patients in the Illicit Drug Use category has also been reviewed in “Clinical Correlates” of Section I.

Presenting Complaint:
The primary clinical reason for attending the ED was enormously varied, ranging from cardiac arrest to minor laceration (Table 34). Apart from those cases listed as “drugs misuse” (182, 23%), the large majority of patients presented as a result of trauma (239 patients, 31%), cardiovascular or neurological complications (86 patients (11%) and 72 patients (9%) respectively), or psycho-social complaints (98 patients (13%)). The cardiovascular and neurological complications were typically associated with collapse and a decreased level of consciousness. Just under 10% of Illicit Drug Users (78 of the 781 patients) had presented to the ED as a result of being involved in a motor vehicle accident.

Table 34: Primary clinical reason for attending the ED as per presentation.

Presenting Complaint	Complaint Specific	Number of Patients		Presenting Complaint	Complaint Specific	Number of Patients
CVS (11%)	Arrhythmia	5		**Psycho-social (36%)**	Behavioural	20
	Chest pain	18			OD/ misuse	182
	Collapse	25			Psych illness	44
	Unconscious	38			Other	4
Endocrine (0.5%)	High BSL	12			Situational crisis	25
	Low BSL	12			Suicidal	5
GI (2%)	Abdomen pain	69		**Single trauma (19%)**	Blunt assault	69
	Diarrhoea &/or vomiting	69			Penetrating assault	8
Musculo-skeletal (0.5%)	Back pain	1			Fall	25
	Other	3			MVA	22
Neurologic (9%)	Low GCS	48			Self harm	1
	Seizure	11			Other injury	21
	Other	13		**Skin (0.1%)**	Infection	1
Other (3.5%)	Low GCS	3		**Multi-trauma (12%)**	Blunt assault	20
	OD/Misuse	5			Penetrating assault	5
	Other	19			Fall	10
Poisoning (4%)	drugs misuse	9			MVA	56
	Other	6			Other injury	2
Low GCS		17		**Drug (1.7%)**	OD/misuse	13
Respiratory (1%)	Short of breath	6				
	Other	2		**Total**		781

(CVS = cardiovascular system, GI = gastro-intestinal, multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not requiring trauma team assessment, GCS = Glasgow Coma Score, apnoea = cessation of breathing, MVA = motor vehicle accident)

Triage Category:

The Illicit Drug Users group had the second highest proportion of patients triaged as requiring immediate medical assessment on their arrival to the ED (19%)[k], and over half of all patients in this

[k] *Although patients classified as "Other" had a higher proportion of more urgent patients, it is believed that the majority of these had used drugs in a manner similar to the Illicit Drug User group.*

category were triaged to either category 1 or category 2 (the most urgent of 5 triage categories; Table 15).

A total of 148 patients (19%) were assigned the most urgent triage category of 1. These patients returned a total of 332 positive drug results at an average of 2.24 drugs per patient (Table 35). This ratio was, unexpectedly, fairly constant across the triage categories for Illicit Drug Users, except for Triage category 4, where patients were positive for 1.6 drugs each.

Table 35: Distribution of patient triage priorities according to a positive test for a major drug of interest among Illicit Drug Users.

Drug Type	Triage Priority					Total
	1	2	3	4	5	
Alcohol	111	186	158	80	2	537
Benzodiazepines (group)	24	57	78	24	2	185
THC	45	99	88	22	1	255
Amphetamines (group)	41	71	55	11	1	179
Methamphetamine	33	57	43	8	1	142
MDMA	14	27	15	4	0	60
Amphetamine	12	30	22	5	0	63
Pseudoephedrine	0	0	1	0	0	1
Phentermine	0	1	1	0	0	2
MDA	7	10	6	2	0	25
MDEA	3	3	1	2	0	3
Opioids (group)	11	27	28	4	1	71
Morphine	5	9	16	1	1	32
Codeine	4	9	14	3	0	30
Methadone	3	11	3	0	0	17
GHB	15	12	1	0	0	28
Antidepressants (group)	2	8	5	3	0	18
Antipsychotics (group)	0	2	1	0	0	3
Cocaine	1	3	0	0	0	4
Ketamine	1	0	0	0	0	1
LSD	0	2	0	0	0	2
Total	332	624	536	163	9	1670

(Patients may have tested positive for more than 1 substance)

GHB (“fantasy”) was the drug most likely to result in the need for immediate medical management with 54% of patients (15 of 28 patients) testing positive to this drug being given a triage category of 1. Drugs most likely to be found in a patient presenting critically unwell as a result of Illicit Drug Use were: alcohol, THC, ketamine, cocaine and psychostimulants. Patients testing positive to the anti-psychotics and anti-depressants were on average, allocated a lower urgent triage category.

Clinical Vital Signs:
Data on recorded clinical vital signs is shown in Tables 36 and 37. An abnormal heart rate (rate > 100 (tachycardia) or < 60 beats per minute (bradycardia)) was the most frequently detected abnormal clinical vital sign; 30 patients (5%) had rates likely to be clinically important (rate > 150 or < 60 bpm). Tachycardia was most likely to be seen in patients testing positive to psychostimulants.

Eleven patients (1%) were very hypotensive (blood pressure < 90) and likely to have been in a shocked state, with alcohol the most frequently detected drug in these patients.

Signs suggestive of profound depression of respiratory function were seen in 24 patients (3%) with a respiratory rate < 10 and 34 patients (4%) with blood oxygen saturations of less than 90%. Opioids were most likely to depress respiratory function followed by GHB and benzodiazepines.

Twenty patients (6%) had hyperthermia (temperature > 37.5ºC) and 47 hypothermia (temperature < 35ºC).

Tables 36 and 37: Clinical vital signs measures in Illicit Drug Users.

Pulse Rate	No. Patients (%)
Not recorded	18 (2)
<60	28 (4)
60-100 (NR)	512 (66)
101-150	221 (28)
>150	2 (<1)

RR	No. Patients
Not recorded	25 (3)
<10	24 (3)
10 to 20 (NR)	594 (76)
21-30	131 (17)
>30	7 (1)

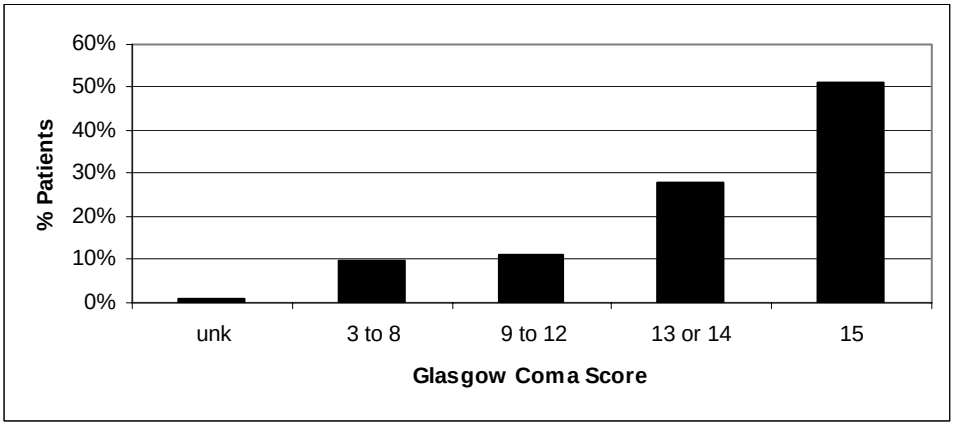
Systolic BP	No. Patients
Not recorded	22 (3)
<90	11 (1)
90-150 (NR)	681 (87)
150-200	64 (8)
>200	3 (<1)

Oxygen Saturation	No. Patients
Not recorded	111 (14)
<85	24 (3)
86-90	10 (1)
91-95	105 (13)
96-100 (NR)	531 (68)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The GCS allocated to Illicit Drug Users are depicted in Figure 11. Of the 770 patients in whom this data was collected 31 (4%) had a GCS of 3 reflecting the deepest level of unconsciousness, and 75 (just over 10%) were classified in the range 3 to 8 (‘severely’ depressed conscious state, generally requiring airway management).

Figure 11: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).



Disposition from the ED:

Approximately 40% of Illicit Drug Users were admitted to hospital (Table 38). Of these, 19% (7% of the total Illicit Drug Use group) required intensive care or a high dependency admission (Table 39). Ultimately, approximately 85% of patients were discharged home from hospital. Three patients died and 6 required treatment in a long-term rehabilitation facility.

Tables 38 and 39: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	447 (57)
Admitted	312 (40)
EECU	134 (17)
General Ward	86 (11)
ICU/HDU	60 (7)
Cardiology	1 (<1)
Psych. Ward	29 (4)
Spinal Unit	2 (<1)
Transferred	20 (3)
Died in ED	1 (<1)
Unknown	1 (<1)

Disposition from Hospital	Total (%)
Home	665 (85)
Absconded/Left AMA	46 (6)
Psych services	41 (5)
SAPOL custody	15 (2)
Rehabilitation	6 (<1)
Died	3 (<1)
Other hospital	4 (<1)
Other/Unknown	1 (<1)

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

Summary:

Enrolments:

- Illicit Drug Use was the most commonly cited reason for the drug exposure of enrolled patients (839 of 1440 patients (58%)) and was the group with the largest number of patients with drug positive results (781 of 1279 drug-positive patients (61%)).

Demographics:

- 85% of Illicit Drug Users were Caucasian and 8% Indigenous
- Indigenous patients were more likely to present as a result of Illicit Drug Use than other ethnicities (83% of Indigenous enrolments, 59% of Caucasian, and 67% of Asian)
- The overall male to female ratio was 7 to 3
- The average age of Illicit Drug Users was approximately 31 years
- 4% were under 18 years of age and 8% were older than 50 years
- 28% of Illicit Drug Users reported drug exposure occurring in a private residence
- 74% of patients arrived by ambulance; 6% via police or other custodial services.

Patterns of Drug Use:

- A total of 1513 positive drug tests were returned from the 781 patients
- Alcohol (69%), benzodiazepines (24%), psychostimulants (23%), THC (33%), and opioids (9%) were the most commonly detected drugs
- Indigenous patients were more likely to return tests positive for benzodiazepines and THC, and less likely to test positive for a psychostimulant, including ecstasy (MDMA) and related drugs such as GHB, LSD or ketamine
- 56% of patients tested positive to more than 1 drug; 8% to more than 3 drugs
- Over half of alcohol-positive tests returned blood levels greater than 0.15 g/100mL; over 3% returned levels over the potentially fatal threshold (> 0.35 g/100mL)
- Detection rates for psycho-stimulants within the Illicit Drug Use group remained much higher than anticipated pre-study (23% v 5%) but fell slightly from the previous 12- month period (28%)
- The vast majority (80%) of psycho-stimulant results were returned in Illicit Drug Users
- The most frequently detected psycho-stimulant was methamphetamine (46%), followed by MDMA (20%), and amphetamine (22%)
- Overall detection rates for opioids were lower than expected
- Very low rates of heroin detection may relate to rapid metabolism and /or delayed presentation; reported usage rates suggested it to be much higher
- There is evidence to suggest diversion and abuse of prescribed opioids morphine and methadone
- Rates of benzodiazepines use was very much under-reported by drug-positive patients compared to other drug types
- Apart from those cases listed as “drugs misuse”, the large majority of patients presented as a result of trauma (99 patients, 31%), cardiovascular or neurological complications (86 patients (11%) and 72 patients (9%) respectively), or psycho-social complaints (98 patients (13%)).

3.2.2 Self-Harm

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Poisoning or intoxication as a result of drug use in association with deliberate Self-Harm was the second most commonly cited reason for presentation to the Emergency Department with 317 drug-positive patients enrolled in this group (25% of all drug positive enrolments).

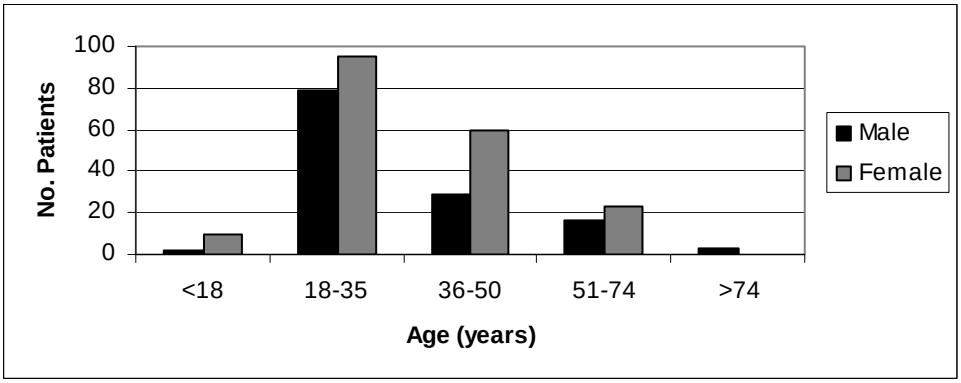
Demographic Details:
Ethnicity:
The overwhelming majority of patients in this group were Caucasian (92%), with a smaller proportion of Indigenous patients than in the Illicit Drug Use category (2% of Self-Harm patients compared to 8% of Illicit Drug Users). Other ethnic groups were enrolled in only very small numbers (Table 40).

Table 40: Ethnicity and gender distribution of patients presenting as a result of Self-Harming drug use.

Ethnicity	Male	Female	Total (%)
Caucasian	120	173	293 (92)
Indigenous	0	7	7 (2)
Asian	2	3	5 (2)
Other	7	5	12 (4)
Total	129 (41)	188 (59)	317

Age and Gender:
The average age of patients presenting as a result of Self-Harm was approximately 35 years, with little difference between the genders (male average age 34.4 years and female 34.7 years). The age distribution of patients in the Self-Harm group was very similar to that of the Illicit Drug User group with 4% aged under 18 years and 13% over 50 years of age (Figure 12). Unlike Illicit Drug Uses however, there was a female predominance with a male to female patient ratio of 3:4 (compared to 7:3 for Illicit Drug Users). This female predominance held across most age groups and was most marked in those less than 18 years of age.

Figure 12: Age and gender distribution of patients presenting as a result of Self-Harming drug use.



Time of Presentation:
The day and time that patients in this category presented to the ED was much more evenly distributed across the week and the day than was the case with Illicit Drug Users (Table 41). None-the-less, 32% of these patients' presentations still occurred between 6pm Friday and 6am Monday.

Table 41: Day and time of Self-Harming drug use presentations to the ED.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0600- 1159	5	7	10	14	9	13	10	68 (21)
1200-1759	6	3	5	4	10	3	4	35 (11)
1800-2400	11	20	16	11	12	15	20	105 (33)
0001-0559	16	15	19	18	17	12	12	103 (34)
Total (%)	38 (12)	45 (14)	50 (16)	47 (15)	48 (15)	43 (14)	46 (15)	317

Venue of exposure and mode of transport to ED:
Of the 317 patients enrolled, location of exposure was unknown in 33 (10%) cases. For those where a location was recorded, 264 (83%) occurred at a private residence. The means of transport to the ED was largely by ambulance (234 of 317, 74%) (Table 42), and the distribution across the various transport options closely matched that for Illicit Drug Use (Table 26).

Table 42: Mode of arrival to the ED for patients in the Self-Harm category.

Mode of Arrival	Number of Patients (%)
Ambulance	234 (74)
Police/Custodial	14 (4)
Private car	52 (16)
Walked in	9 (3)
Taxi	2 (<1)
Other	6 (2)
Total	317

Patterns of Drug Use:
Not unexpectedly, the patterns of drug use differed from Illicit Drug Users, with benzodiazepines, opioids, antidepressants and antipsychotics proportionally more common and alcohol, psychostimulants, and the "party drugs" proportionally less commonly detected (Table 44).

Multiple drug use was again a feature of these patients. A total of 830 positive drug tests[l] were returned from the 317 patients. The average of 2.6 drugs per person in this group was higher than the average of 1.93 for Illicit Drug Users; 71% tested positive to more than 1 drug (Table 43) compared to 56% in illicit drug use group.

Table 43: Number of patients testing positive to 1 or more drugs.

Number of Drugs	Number of Patients (%)
1	91 (29)
2	107 (34)
3	74 (23)
>3	45 (14)
Total	317

The gender ratios across the drug types were generally similar ranging from approximately 5 male to 6 to 8 female patients. The exceptions were antidepressants where the ratio was much lower at 1 male to 3 females, and THC where the male to female ratio was reversed at 8 male to 5 female patients.

[l] *Diazepam excluded on the basis that nor-diazepam, it's major metabolite, was present in all cases and is included.*

Table 44: Gender distribution and total number of positive drug tests for the major drug groups in Self-Harming drug users.

Drug Type	No. of Males (% of total)	No. of Females (% of total)	Total No. of patients testing positive	% of Self-Harm patients (n=317)	Total No. of positive tests
Benzodiazepines	77 (42)	108 (58)	185	89	283
Alcohol	64 (44)	80 (56)	144	58	144
Antidepressants	29 (35)	55 (65)	84	27	87
Opioids	20 (34)	38 (66)	58	24	75
THC	25 (56)	20 (44)	45	14	45
Antipsychotics	8 (50)	8 (50)	16	5	17
Psychostimulant	12 (55)	10 (45)	22	9	28
Cocaine	1 (100)	0	1	<1	1

Benzodiazepines:

The benzodiazepines were the most frequently detected type of drug with 283 positive tests in 185 patients. This number excludes tests positive for diazepam as its major metabolite, nordiazepam, is already included in this figure. As was the case with Illicit Drug Users, nordiazepam was the most frequently detected benzodiazepine (Table 45).

Table 45: Incidence of detection of benzodiazepines among Self-Harming drug users.

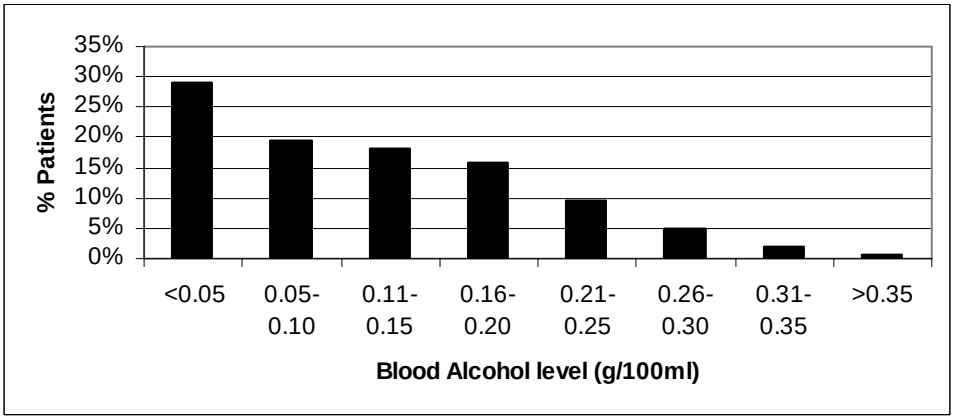
Drug Name	Number of Positive Tests (%)
Diazepam/Nordiazepam*	135 (48)
Temazepam	43 (15)
Oxazepam	48 (17)
Alprazolam	30 (11)
Nitrazepam	10 (4)
Lorazepam	7 (2)
Clonazepam	7 (2)
Bromazepam	3 (1)
Total positive tests	283

(*major metabolite of diazepam)

Alcohol:

Alcohol was found in 45% of patients, considerably less than the 69% of Illicit Drug Users. The average blood alcohol concentration was also lower in Self-Harm patients (0.117 in Self-Harm v 0.172 in Illicit users); 34% of patients had levels > 0.15 g/100mL (Figure 13) compared to 54.5% of Illicit Drug Users positive for alcohol, and only four Self Harm patients (3%) had an alcohol level in excess of 0.30 g/100mL.

Figure 13: Blood alcohol levels of Self-Harming drug users.



Antidepressants & Antipsychotics:
Eighty- four patients (26%) returned 87 positive tests for antidepressants and 16 patients (5%) returned 17 positive tests for antipsychotic medication (Table 46).

Table 46: Incidence of detection of the antidepressant and antipsychotic drugs in Self-Harming drug users.

Antidepressant Drug	Number of Positive Tests	Antipsychotic Drug	Number of Positive Tests
Amitryptiline	10	Quetiapine	4
Fluoxetine	13	Olanzapine	8
Citalopram	17	Chlorpromazine	5
Mirtazapine	9	Total	17
Sertraline	9		
Venlafaxine	18		
Raboxetine	1		
Fluvoxamine	1		
Others	9		
Total	87		

Opioids:
Opioids were the fourth most commonly detected drug in this group, with 58 patients testing positive for an opioid. The large majority of these were codeine (55%) (Table 47). Morphine or heroin was detected in 21 patients, methadone in another 7, and there were 2 cases of nor-pethidine detected. Overall, patients testing positive to these opioids represented 18% of the Self Harm group of patients. This exceeds detection rates in the Illicit Drug Use group of patients.

Table 47: Incidence of detection of opioids in Self-Harming drug users.

Drug Name	Number of Positive Tests (%)
Codeine	45 (55)
Morphine	20 (27)
Methadone	7 (9)
Dextropropoxyphene	3 (4)
Heroin	1 (1)
Norpethidine*	2 (3)
Unspecified opioid	1 (1)
Total positive tests	75
No. positive individuals	58 (18)

(*metabolite of pethidine)

Psychostimulants:
Not surprisingly, drugs in the amphetamine group were relatively infrequently detected when compared to Illicit Drug Users. The rate of detection of psychostimulants relative to each other was much the same as in the Illicit Drug User group (Table 48), with methamphetamine the most frequently detected, although no tests positive for ecstasy were returned.

Table 48: Incidence of detection of psychostimulants in Self-Harming drug users.

Drug Name	Number of Positive Tests (%)
Methamphetamine	19 (68)
Amphetamine	6 (21)
Pseudoephedrine	2 (7)
Phentermine	1 (3)
Total positive tests	29
No. positive individuals	22 (7)

THC:
Cannabis (THC) was detected in 14% of patients in the group compared to 33% of Illicit Drug Users.

Other:
Few tests for the “party drugs” were returned, with only 2 GHB and 1 cocaine positive blood test. As previously indicated, no ecstasy was detected. This group returned 103 positive tests for paracetamol (32%). This constituted 45% of all paracetamol positive tests.

Drug Habit:
The substance use habit reported by patients presenting as a result of deliberate self-harm are shown in Table 49. Interestingly, as was the case with Illicit Drug Users, benzodiazepines were markedly under-reported compared to their rates of detection. Never-the-less, benzodiazepines were still the fourth most frequently cited drug used by this group of patients after alcohol, cigarettes and cannabis.

Table 49: Frequency of drug use reported by patients in the Self-Harm group.

	Frequency of Use					
Reported Drug Use	**Daily**	**Weekly**	**Month**	**Not specified***	**Past use only**	**Total responses**
Alcohol	54	25	2	74	1	156
Cigarettes	80	2		5	1	88
Benzodiazepines	24	2		25		51
Cannabis	18	5	2	29	1	55
Amphetamines	2	1	2	14	1	20
Methamphetamine	4	3	2	30	1	40
Heroin	1		1	12	2	16
MDMA (ecstasy)			1	13		14
GHB/Fantasy				1	1	2
LSD/Acid				2	1	3
Cocaine				8		8
Ketamine				3		3
Mushrooms				1		1
Opiates	2		1	3		6

(*Stated drug used but frequency of use not recorded) (data not recorded for all patients)

Clinical Correlates:
Relevant data on the clinical correlates for patients presenting intoxicated in association with Self-Harm has also been reviewed in “Clinical Correlates” of Section I.

Presenting Complaint:
The primary reason for attending the ED was generally for psycho-social reasons (210 of 317 patients, (66%); Table 50), with 51% (161 of 317) specifically for “drug misuse” in the setting of deliberate self-harm. Just over 5% of patients presented as a result of major trauma (17 of 317 patients).

Table 50. Primary clinical reason for attending the ED as per presentation complaint.

Presenting Complaint	Complaint Specific	Number of Patients		Presenting Complaint	Complaint Specific	Number of Patients
CVS	Collapse	6		**Psycho-social**	OD/ misuse	161
	Unconscious	1			Behavioural	6
Drug	OD/Other	7			Situational crisis	16
Neuro	Altered LOC	8				
	Other	2			Other	15
Poisoning	Altered LOC	19		**Single Trauma**	Blunt- assault	1
	OD/misuse	30			Fall	3
	Other	10			Self harm	7
					Other	2
Other		7		**Multi-trauma**	MVA	1
					Self harm	3

(CVS = cardiovascular system, GI = gastro-intestinal, neuro = neurological, multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not requiring trauma team assessment, MVA = motor vehicle accident)

Triage Category:

A total of 37 patients (12%) in the Self-Harm group were assigned the most urgent triage category of 1. These patients returned a total of 114 positive drug tests, an average of just over 3 drugs per patients. The next most urgent triage category was assigned to 147 patients (46%) who returned 455 tests at approximately 3.09 drugs per person; for triage category 3 and 4 patients this ratio was 2.98 and 2.23 drugs per patient respectively. This data appears to suggest an association between poly-drug abuse and degree of medical urgency at presentation. One would intuit that with increasing numbers of drugs present the medical acuity of the presentation would increase. However, although suggested in the Self Harm group data, a clear association between medical urgency of presentation, as represented by the triage code, and the number of drugs a patient tested positive to was not demonstrated in the Illicit Drug Use group, with the average number of drugs per person ranging from 2.0 for priority 5 to 2.26 for priority 1, but with a peak in the priority 3 group of 2.38. Only 1 patient in the Self-Harm group was assigned the lowest urgency triage category of 5.

Table 51: Distribution of patient triage priorities according to a positive test for a major drug of interest in Self-Harming patients.

Drug	Triage Priority					Total
	1	2	3	4	5	
Benzodiazepines	20	84	72	8	1	185
Alcohol	20	84	35	5	0	144
Antidepressants	11	40	32	1	0	84
Opioids (group)	4	29	24	1	0	58
Codeine	1	21	18	1	0	41
Morphine	2	12	6	0	0	20
Methadone	1	4	2	0	0	7
Dextropropoxyphene	1	0	2	0	0	3
Norpethidine*	0	1	1	0	0	2
Heroin	1	0	0	0	0	1
THC	6	21	17	1	0	45
Antipsychotics	3	10	3	0	0	16
Psycho-stimulants (group)	3	12	6	1	0	22
Methamphetamine	3	11	4	1	0	19
Pseudoephedrine	0	0	2	0	0	2
Phentermine	0	1	0	0	0	1
Amphetamine	1	3	2	0	0	6
Cocaine	1	0	0	0	0	1
Other- non-pharmaceutical	7	17	14	1	1	40
Others- pharmaceutical	2	0	0	0	0	2

(*metabolite of pethidine)

Patients assessed as requiring immediate management on arrival to the ED (triage category 1) were most likely to subsequently test positive to benzodiazepines or alcohol (Table 51).

Clinical Vital Signs:
The majority of patients presenting following Self-Harm recorded vital signs within normal limits (Table 52 and 53). The most common abnormality was tachycardia (28%) followed by hypertension (8%).

Tables 52 and 53: Clinical vital sign measures in Self-Harming patients.

Pulse Rate	No. Patients (%)
Not recorded	6 (2)
<60	11 (3)
60-100 (NR)	209 (66)
101-150	89 (28)
>150	2 (1)

RR	No. Patients (%)
Not recorded	12 (4)
<10	7 (2)
10 to 20 (NR)	255 (80)
21-30	40 (13)
>30	3 (1)

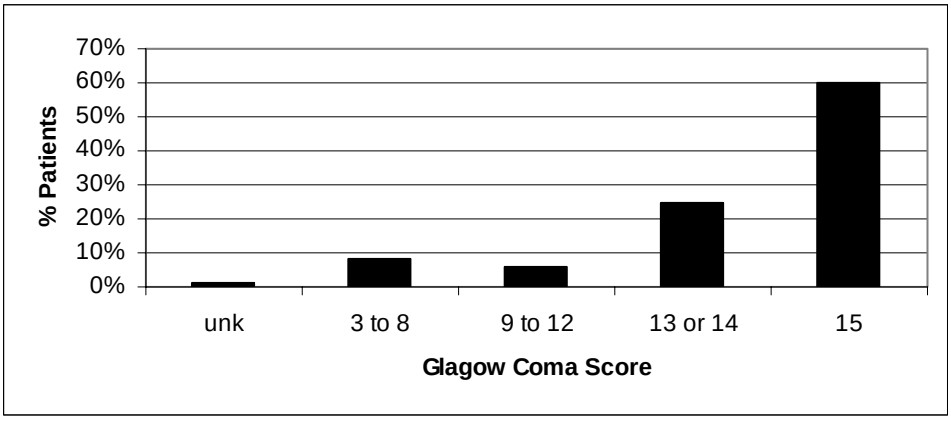
Systolic BP	No. Patients (%)
Not recorded	11 (3)
<90	10 (3)
90-150 (NR)	270 (85)
150-200	26 (8)
>200	0

Oxygen Saturation	No. Patients (%)
Not recorded	43 (14)
<85	5 (2)
86-90	5 (2)
91-95	49 (23)
96-100 (NR)	215 (23)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The GCS allocated to drug users intending Self-Harm is depicted in Figure 14. Of the 315 patients in whom this data was collected, 6 (2%) had a GCS of 3 reflecting the deepest level of unconsciousness, and 24 (8%) were classified in the range 3 to 8 ('severely' depressed conscious state). These figures are broadly similar to those seen in the Illicit Drug Use group (Figure 11).

Figure 14: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).



Disposition from the Emergency Department:
Only 30% of patients presenting intoxicated in association with deliberate Self-Harm were discharged home from the ED (Table 54). This compares with 57% of Illicit Drug Users. Of the 67% who were admitted, 25% required intensive or high dependency level care. Again, this rate was higher that for Illicit Drug Users (19%). Ultimately, approximately 80% of patients

were discharged home from hospital (Table 55), a similar rate as seen for Illicit Drug Users (85%).

The higher rates of admission for this group of patients may in part be explained by the need for psychiatric assessment that cannot easily be performed in the Emergency Department whilst the patient is intoxicated.

One patient died (see details Overview and General results, Clinical Correlates), and one remained in a long-term medical rehabilitation facility.

Tables 54 and 55: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	95 (30)
Admitted	212 (67)
EECU	98 (30)
General Ward	28 (9)
ICU/HDU	53 (17)
Cardiology	3 (1)
Psych. Ward	30 (10)
Transferred	9 (3)
Unknown	1 (<1)

Disposition from Hospital	Total (%)
Home	254 (80)
Absconded/Left AMA	12 (4)
Psych services	45 (14)
SAPOL custody	1 (<1)
Rehabilitation	1 (<1)
Died	1 (<1)
Other hospital	1 (<1)
Other/Unknown	1 (<1)

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry)

Summary:

Enrolments:

- 317 drug-positive enrolments (25% of total) presented intoxicated as a result of drug use in association with deliberate Self-Harm.

Demographics:

- 92% were Caucasian with a much smaller proportion of Indigenous patients than in the Illicit Drug Use category (2% of Self-Harm patients compared to 8% of Illicit Drug Users)
- The average age was 35 years, with 4% aged under 18 years and 13% aged over 50 years
- The male to female ratio was approximately 3 to 4 except in those aged over 74 years, where males were represented exclusively.

- The day and time of day that patients in this category presented was more evenly spread over the week and the time of day than was seen in Illicit Drug Users
- The venue of drug exposure was almost exclusively at a private residence.

Patterns of Drug Use:

- Benzodiazepines, opioids, antidepressants and antipsychotics were proportionally more common and alcohol, psychostimulants, and ecstasy and related drugs proportionally much less commonly found compared to Illicit Drug Users
- The benzodiazepines were the most frequently detected type of drug with 283 positive tests in 185 patients
- Alcohol was detected in 45%, somewhat less than the 69% of Illicit Drug Users, and average blood alcohol levels were lower
- Cannabis (THC) was detected in 14% of patients in the group compared to 33% of Illicit Drug Users
- Codeine was the most commonly detected opiate in this group (55%)
- The opioids heroin, morphine and methadone were detected at similar rates to the Illicit Drug Use group (approx 9%)
- The most frequently detected psycho-stimulant was methamphetamine (63%)
- 2 of the 4 cases of norpethidine were found in the Self Harm group
- Multiple drug use was again a feature with 687 positive drug tests returned from the 280 patients
- 71% tested positive to more than 1 drug compared to 56% in the Illicit Drug Use group.

3.2.3 Drink Spiking

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 61 patients enrolled as a result of Drink Spiking 58 (95%) returned blood tests positive for the compounds screened for. It is possible the enrolments that did not return a positive test may have been exposed to compounds not included in our panel of tests however, given the very broad range of the test suit this is thought unlikely. None-the-less, patients presenting to our ED alleging Drink Spiking have a high likelihood of testing positive to one or more of the major drugs of interest.

Demographic Details:
Ethnicity:
A somewhat higher proportion of patients in this group were Caucasian than was the case for the Illicit Drug Use group (90% compared to 85%). Only one Indigenous patient presented as a result of alleged Drink Spiking (Table 56).

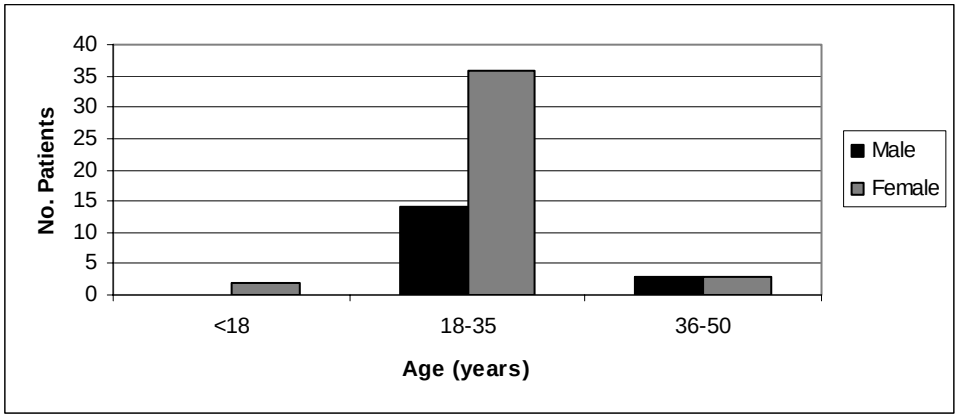
Table 56: Ethnicity and gender distribution of patients presenting as a result of alleged Drink Spiking.

Ethnicity	Male	Female (%)	Total (%)
Caucasian	15	37	52 (90)
Indigenous	1	0	1 (2)
Asian	0	1	1 (2)
Other	1	3	4 (6)
Total (%)	17 (29)	41 (71)	58

Age and Gender:
The average age of patients alleging Drink Spiking (24.5 years of age) was substantially lower than other presentation groups (4 years less than Illicit Drug Users and almost 8 years less than the Self-Harm group). Unlike the other presentation groups there was also a noticeable difference in the average ages of males and females in victims of Drink Spiking (26.7 years for males, 23.6 years for females). In this series only 3% were aged less than 18 years, compared to 10% in the previous 12 months (Figure 15).

Numbers were too small to allow gender analysis for specific ethnic groups however, the male to female ratio for the group as a whole was approximately 1:2, the reverse of that seen in the other enrolment groups (Table 56). Interestingly, the gender ratio was equal in the over 35 years of age sub-group, although numbers enrolled were very small and significance is therefore uncertain. The gender ratio reversed to male predominance when testing for the presence of drugs other than for alcohol (Table 59).

Figure 15: Age and gender distribution of patients presenting as a result of alleged Drink Spiking.



Time of Presentation:
As was the case for Illicit Drug Users, the most likely time of presentation to the Emergency Department by victims of Drink Spiking was between midnight and 6 am Saturday or Sunday. The trend observed with Illicit Drug Users to present between 6 pm Friday and 6 am Monday was even more pronounced in Drink Spiking victims (76%, Table 57).

Table 57: Day and time of alleged Drink Spiking presentations to the ED.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0600-1159	14	3	1		5	5	17	45 (78)
1200-1759	3	1						4 (7)
1800-2400	1							1 (2)
0001-0559	1				2	2	3	8 (14)
Total (%)	19 (33)	4 (7)	1 (2)		7 (12)	7 (12)	20 (34)	58

Venue of exposure and mode of transport to ED:
The venue of drug exposure was known in 52 patients (Table 5). Of these the overwhelming majority occurred in licensed premises (52% in a public bar, and 24% in a nightclub). This contrasts with both the Self-Harm and Illicit Drug Use groups where the majority of exposures were reported as occurring at a private residence, usually the patient's own home.

Mode of transport to hospital was also somewhat different from other enrolment groups in that a much smaller proportion of victims of Drink Spiking arrived by ambulance (50%, Table 58, compared to 74% of both Illicit Drug Users and the Self-Harm group). This may be due to the lower average level of medical urgency and severity seen in this group when compared to the other groups.

Table 58: Mode of arrival to the ED for patients in the Drink Spiking category.

Mode of Arrival	Number of Patients (%)
Ambulance	29 (50)
Private car	27 (46)
Walked in	1 (2)
Taxi	1 (2)
Total	58

Patterns of Drug Use:

A total of 82 positive drug tests were returned from the 58 victims of Drink Spiking giving an average of 1.4 drugs per patient. This is considerably less than the 1.94 average drugs detected per person seen in Illicit Drug Users and the 2.6 in the Self Harm group but similar to the poly-substance detection rate reported in the previous 12 months (1.36 drugs per person in the Drink Spiking category).

Table 59: Gender distribution and number of positive tests for the major drug groups in alleged Drink Spiking.

Drug Type	Male	Female	Total Number of Positive Patients
Alcohol	14	40	54
Psychostimulants	2	4	6
Benzodiazepines	1	2	3
THC	6	1	7
Opioids	0	1	1
Paracetamol	3	4	7

Alcohol:

Alcohol was the most common drug detected constituting 66% of the positive drug tests (54 of 82), and 93% of the patients in the group (Table 59). The average blood alcohol level for patients in the group was 0.157 g/100mL (Figure 16), which was somewhat less than that for Illicit Drug Users (0.172 g/100mL). Five cases (8%) had a blood alcohol level was greater than 0.25 g/100mL (cf. Illicit Drug Users with 16% and Self-Harm group with 8% of patients with levels > 0.25 g/100mL). Combined with the lower average age seen in victims of Drink Spiking this may support the perception of comparative alcohol naivety in this group.

Alcohol was the sole drug in 36 of the 58 (62%) patients, and was found in combination with other drugs in 18 (Table 60). Alcohol was most commonly found in combination with a benzodiazepine or a psychostimulant. This is in contrast to the results of the previous 12-month period which showed psychostimulants, particularly MDMA, were the drugs most commonly found in combination with alcohol in this group.

Figure 16: Blood alcohol levels of alleged victims of Drink Spiking.

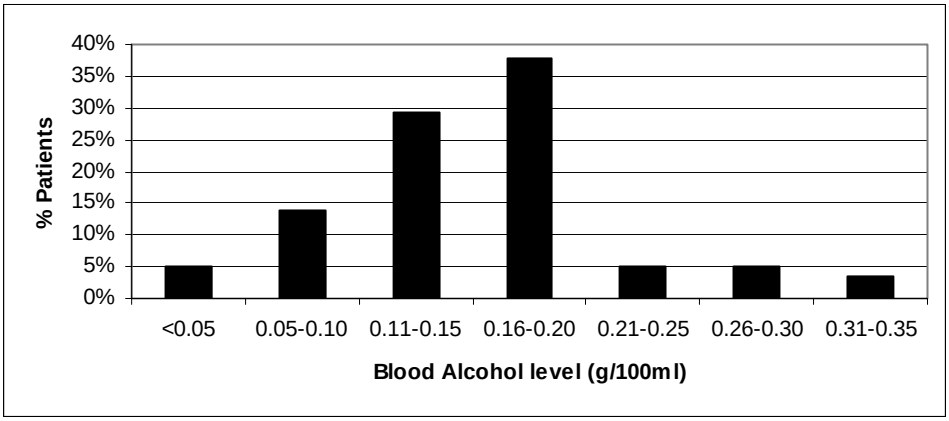


Table 60: Number of patients testing positive to alcohol alone or to alcohol in combination with other drugs.

Drug Combination	Number of Patients
Alcohol total	54
Alcohol only	36
Alcohol + psychostimulant	3
Psychostimulants only	2
THC only	2
Alcohol + THC	4
Alcohol + Benzodiazepine	3
Alcohol + Paracetamol	5
Alcohol + THC + paracetamol	1
Alcohol + Psychostimulant + Paracetamol	1
Alcohol + Codeine	1

Psychostimulants:

Psychostimulants were detected in 6 of the Drink Spiking group (10%) with a total of 10 positive test results (Tables 61 and 62). Some of the patients most likely had more than one psycho-stimulant drug exposure. The specific compound amphetamine was detected in 2 instances, both in association with methamphetamine and it is likely that the presence of amphetamine in these cases was as a result of metabolism of the methamphetamine. The other cases showing multiple psychostimulant compounds most likely represent multiple doses containing different drugs, rather than multiple compounds in the one preparation (See discussion Section III, “Psychostimulants”).

Table 61: Frequency of psychostimulant detection in the Drink Spiking group.

Drug Name	Number of Positive Tests (%)
Methamphetamine	4 (40)
MDMA	4 (40)
Amphetamine	2 (20)
Total positive tests	10

Table 62: Number of patients testing positive to psychostimulants alone or to psycho-stimulants in combination with other drugs.

Drug Combination	Number of Patients
MDMA only	1
Methamphetamine + Alcohol	1
Methamphetamine + Amphetamine	1
Methamphetamine + Amphetamine* + MDMA + Alcohol	1
MDMA + Alcohol + paracetamol	1
Methamphetamine + MDMA + Alcohol	1

(*Amphetamine assumed to be present as a metabolite of methamphetamine)

It is generally believed that the intention of drink spikers is to increase the vulnerability of their victim, generally by sedation. The use of psychostimulants for this purpose appears counter-intuitive as their effects are generally stimulatory. This may represent a lack of knowledge of the content of the tablet or powder used or of the effects of the drug by the perpetrator, but it is also possible that psychostimulants were deliberately chosen with the aim of dis-inhibiting the victim. It has been demonstrated that use of psychostimulants is associated with increased risk-taking in sexual as well as other behaviours [14]. MDMA in particular, is popularly believed to be associated with lowered sexual inhibitions.

Benzodiazepines:

Benzodiazepines, which are commonly held to be agents frequently used in Drink Spiking, were only detected in 3 patients (5%, Table 63). In all cases the drug detected was diazepam or its principle metabolite nordiazepam. This contrasts with perceptions that the shorter-acting benzodiazepines such as flunitrazepam (Rohypnol) are typically employed for Drink Spiking. Benzodiazepines were always detected in patients who also tested positive for alcohol (Table 64).

Table 63: Frequency of benzodiazepine detection in those alleging Drink Spiking.

Drug Name	Number of Positive Tests (%)
Diazepam/ Nordiazepam	3
Total positive tests	3

(nordiazepam is the principle metabolite of diazepam)

Table 64: Number of patients testing positive to benzodiazepines alone or in combination with other drugs.

Drug Combination	Number of Patients
Benzodiazepines total	3
Benzodiazepine + Alcohol	3

THC:
THC was detected in 7 patients, representing a detection rate of only 12% in victims of Drink Spiking (Table 65). This compares to detection rates of 14% for patients in the Self-Harm group and 33% in Illicit Drug Users (see Tables 35 & 44).

Table 65: The number of patients testing positive to THC alone or in combination with other drugs.

Drug Combination	Number of Patients
THC total	7
THC (single drug) only	2
THC + alcohol	4
THC + alcohol + paracetamol	1

GHB:
In contrast to the previous 12 months, no patients in this group were positive for GHB (Table 66). In the previous 12 months, 4 patients tested positive to GHB, representing a detection rate of 4.5% in victims of Drink Spiking.

Table 66: Number of patients testing positive to GHB alone or in combination with other drugs.

Drug Combination	Number of Patients
GHB total	0

Opioids:
Only 1 case tested positive for an opioid- codeine. This was found in combination with alcohol.

Poly-substance abuse:
Unfortunately, sufficient information regarding which drugs were voluntarily used (and the amount consumed) by alleged victims of Drink Spiking is not available. This makes it difficult to draw firm conclusions regarding some aspects of the drugs used to spike victims' drinks. However, some conclusions on drug use patterns can be drawn with reasonable confidence.

Firstly, it is likely that the majority of patients' drinks are spiked with additional measures of alcohol, as shown by the large majority testing positive to alcohol alone (Table 60). It is also possible that some patients may have simply underestimated the effects of the drugs they had taken voluntarily. Certainly in the two cases of alleged Drink Spiking that tested positive for THC only, it is likely that this was voluntarily self administered by smoking. A much less likely possibility is that the drug was unwittingly ingested in proffered food.

Secondly, it is likely that poly-substance abuse is less an issue in victims of Drink Spiking than in patients from the other enrolment groups. Although Table 67 shows 33% of alleged victims tested positive to more than 1 drug, it is probable that the second drug was the 'spiking agent' in the majority of these. If this is the case, only 7% of victims of Drink Spiking tested positive to more than one willingly ingested drug.

It is possible that a proportion of patients in this group have falsely alleged Drink Spiking, deliberately, to explain the degree of intoxication or behaviour that led to the Emergency presentation. However, there is no direct evidence to support this.

Table 67: Number of victims of Drink Spiking testing positive to 1 or more drugs.

Number of Drugs	Number of Patients (%)
1	39 (67)
2	15 (26)
3	4 (7)
Total	58

Clinical Correlates:
Relevant data on the clinical correlates for patients presenting as a result of Drink Spiking has also been reviewed in "Clinical Correlates" of Section I.

Presenting Complaint:
The primary reason for attending the ED was related to "drug misuse" (33 patients, (57%); Table 68). Only 1 patient (<1%) alleged a sexual assault had taken place in the context of drink spiking. This is in contrast to data published elsewhere,[14] that indicates a high reported rate (up to 50%) of assault, particularly sexual assault, in victims of Drink Spiking.

Table 68: Primary clinical reason for attending the ED as per presentation complaint.

Presenting Complaint	Complaint Specific	Number of Patients		Presenting Complaint	Complaint Specific	Number of Patients
CVS	Collapse-conscious	1		Poisoning	Altered LOC	5
	Chest pain	1			Other	5
GI	Nausea and vomiting	1		Psycho-social	Drugs misuse	33
Neuro	Altered conscious state	6		Respiratory	Short of breath	1
				other	Drugs misuse	4

(CVS = cardiovascular system, GI = gastro-intestinal, neuro = neurological)

Triage Category:
A total of 5 victims of Drink Spiking were assigned the most urgent triage category of 1 (9%) (Table 69). This is the lowest proportion of the various enrolment groups (19% of Illicit Drug Users, 12% of Self-Harm enrolments). All five were positive for alcohol only. This contrasts with those assigned a triage category of 1 in both the Self Harm group and the Illicit Drug Users groups, which tested positive to 3 and 2.24 drugs per patient respectively. The ratio of drugs per patient in all other triage categories for victims of Drink Spiking was also lower than other enrolment groups (range of 1 to 1.4 drugs per patient).

The average blood alcohol in those given a triage priority one was 0.188g/100 ml in comparison with an overall average of 0.157 for the whole group.

Table 69: Distribution of patient triage priorities according to a positive test for a major drug of interest in those alleging Drink Spiking.

Drug	Triage Priority					Total
	1	2	3	4	5	
Alcohol	5	11	29	12	0	57
Benzodiazepines	0	1	1	1	0	3
THC	0	2	3	2	0	7
Psychostimulants (total)	0	0	6	0	0	6
Methamphetamine	0	0	4	0	0	4
Amphetamine	0	0	2	0	0	2
MDMA	0	0	4	0	0	4
Paracetamol	0	0	5	2	0	7
Codeine	0	0	1	0	0	1

Clinical Vital Signs:
Data on recorded clinical vital signs is shown in Tables 70 and 71. An abnormal heart rate (rate > 100 (tachycardia) or < 60 beats per minute (bradycardia)) was the most frequently detected abnormal clinical vital sign, although only 1 patient had a rate likely to be clinically significant (rate < 60 bpm).

Tables 70 and 71: Clinical vital signs measures in victims of Drink Spiking.

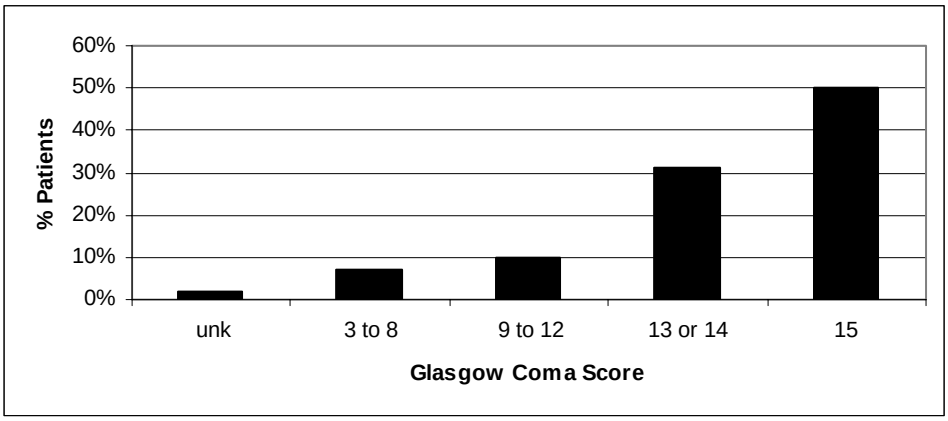
Pulse rate	No. Patients (%)
Not recorded	1 (2)
<60	1 (2)
60-100 (NR)	43 (74)
101-150	13 (22)
Systolic BP	**No. Patients (%)**
Not recorded	2 (3)
<90	1 (2)
90-150 (NR)	53 (91)
150-200	2 (3)
>200	

RR	No. Patients (%)
Not recorded	1 (2)
<10	1 (2)
10 to 20 (NR)	47 (81)
21-30	6 (10)
>30	3 (5)
Oxygen Saturation	**No. Patients (%)**
Not recorded	8 (14)
86-90	0
91-95	3 (5)
96-100 (NR)	47 (81)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The GCS was recorded in 57 patients. Seven percent recorded scores of 8 or less and a further 10% scored in the range 9 to 12 (Figure 17). Two patients scored a GCS of 3, the lowest possible score, indicating coma with complete unresponsiveness. In broad terms the distribution of GCS for victims of Drink Spiking was similar to that for the Illicit Drug Use and Self-Harm groups.

Figure 17: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).



Disposition from the ED:

Approximately 9% of victims of Drink Spiking were admitted to hospital from the ED, 67% of which (3 patients) were admitted to the EECU for overnight observation (Table 72). The remainder (33% of admitted and 3% overall) required ICU or HDU admission. All patients eventually left hospital, with only 2 patients absconding or leaving against medical advice (Table 73).

Tables 72 and 73: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	53 (91)
Admitted	5 (9)
EECU	3 (6)
ICU/HDU	2 (3)
Total	58

Disposition from Hospital	Total (%)
Home	56 (97)
Absconded/ Left AMA	2 (3)
Total	58

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

The 2 patients requiring admission to intensive care tested positive for alcohol, with an average level of 0.17g/100ml. Both were intubated and both patients survived to be discharged to home, one with a hospital length of stay (LOS) of only 1 day, the other with an LOS of 6 days.

Summary:

Enrolments

- There were 58 drug positive enrolled patients who presented as a result of Drink Spiking (5% of drug-positive enrolments).

Demographics

- The majority were Caucasian (90%)
- The average age was lower than other enrolment groups at 24.5 years; only 3% were under 18 years of age
- The male to female ratio was 1 to 2, except in the over 35 year age group where the ratio was even.
- The large majority of drug exposures occurred in a licensed venue (52% in public bar, 24% in a night club)
- A smaller proportion of these patients arrived at the ED via ambulance.

Patterns of Drug Use:

- A total of 82 positive drug tests were returned from the 58 victims of Drink Spiking giving an average of 1.4 drugs per patient
- Alcohol was the drug most commonly detected (93% of patients), followed by THC (12%), amphetamines (10%), and benzodiazepines (5%)
- No GHB was detected in this series.
- Only 7% of patients tested positive to 3 drugs and none to more than 3 drugs.

3.2.4 Unknown Drug Use

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

There were 114 patients of the 1279 (9%) with positive drug screens enrolled where circumstances of drug exposure could not be determined or where drug use was uncertain. The overall severity of illness, as indicated by the clinical correlates data, is greater than for other groups due to the inherent selection bias for this group; the more unwell a patient the less likely an accurate assessment of drug use intent will be obtainable, or whether drugs of abuse are even involved. However, both the demographic patterns and the patterns of drug use shown in the following tables and figures closely match those of the Illicit Drug Use patients, and it is likely the majority of patients in this group presented as a result of Illicit Drug Use.

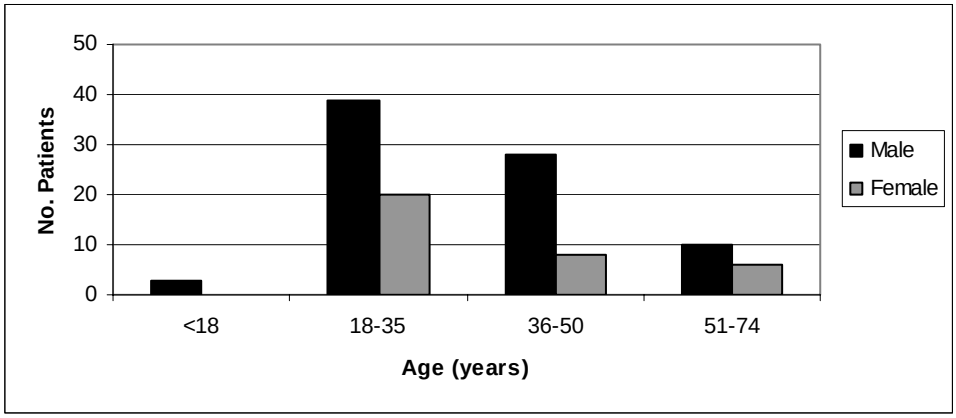
Demographic Details:
Ethnicity:
The relative proportion of presentations for the various ethnic groups is similar to that for Illicit Drug Use group (Table 74).

Table 74: Comparison of ethnicity of patients presenting with unknown drug use and Illicit Drug Users.

Ethnicity	Unknown Total (%)	Illicit Drug Use Total (%)
Caucasian	103 (90)	668 (85)
Indigenous	5 (4)	64 (8)
Asian	3 (3)	18 (2)
Other	3 (3)	33 (5)
Total	114	781

Age and Gender:
The average age of patients presenting as a result of unknown drug use was just under 35 years, with only a 1 years difference between the genders (male average age 35.1 years and female 34.1 years, Figure 18). This compares with an average age of 30.8 years for Illicit Drug Users and 34.7 years for the Self-Harm group. Approximately 3-4% of patients were under the age of 18 years in the Unknown, Illicit Drug Users, and the Self-Harm groups. As with drug positive enrolments generally, there was a male predominance across all age groups with an overall male to female ratio greater than 5 to 2 (cf male to female ratio of 7 to 3 among Illicit Drug Users).

Figure 18: Age and gender distribution.



Time of Presentation:

Enrolment numbers were too small to determine a specific 6-hour time block for the most likely time of presentation to the Emergency Department. However the trend to present over the weekend that was seen in Illicit Drug Users was also evident in the unknown group (Table 75).

Table 75: Day and time of Unknown drug use presentations to the ED.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0600-1159	5	0	1	1	5	3	4	19 (17)
1200-1759	2	3	3	4	7	5	4	28 (25)
1800-2400	2	5	7	4	1	2	6	27 (24)
0001-0559	4	4	10	2	5	7	8	40 (35)
Total (%)	13 (11)	12 (11)	21 (18)	11 (10)	18 (16)	17 (15)	22 (19)	114

Venue of exposure and mode of transport to ED:

Location of drug exposure was recorded as unknown in 97 (85%) cases in this group. As detailed in Table 76, the majority (75%) of drug-positive patients in the Unknown drug use category arrived at the ED by ambulance

Table 76: Mode of arrival to the ED for patients in the Unknown category.

Mode of Arrival	Number of Patients (%)
Ambulance	85 (75)
Police/Custodial	9 (8)
Private car	10 (9)
Walked in	3 (3)
Other	7 (6)
Total	114

Patterns of Drug Use:

A total of 208 positive drug results were returned from the 114 patients. The detection rates for the major drug groups are shown in Table 77. There is similarity between the Unknown and Illicit Drug Use groups other than for a much lower detection rate of alcohol. The average number of drugs detected per person in the Unknown group was 1.82, which compares with 2.06 for the Illicit Drug Use group and 2.3 for the Self-Harm group.

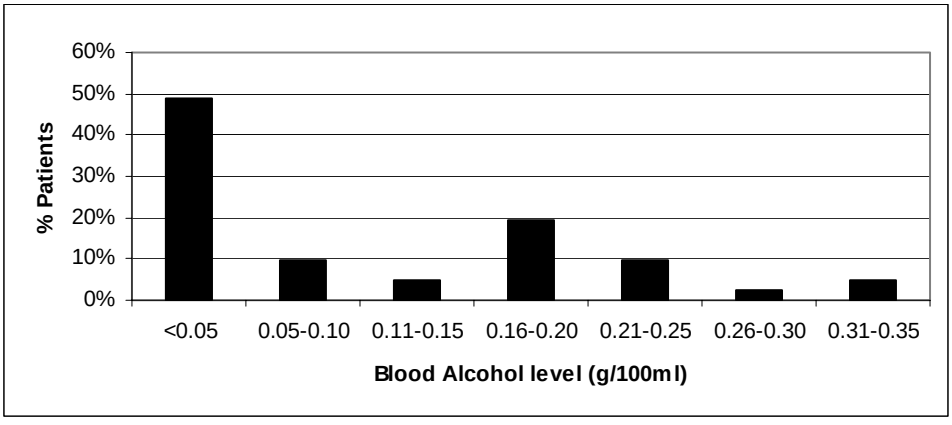
Table 77: Comparison of the number of positive drug tests returned for the major drug groups in the Unknown and Illicit Drug Use enrolment categories.

Drug Type	Unknown Total No. Positive Tests (%)	Illicit Drug Use Total No. Positive Tests (%)
Alcohol	41 (36)	537 (69)
Benzodiazepines	31 (27)	185 (24)
Psychostimulants	16 (14)	179 (23)
THC	46 (40)	255 (33)
Opioids	11 (10)	71 (10)
Ketamine	3 (3)	1 (<1)

(% is the percent of the total number of positive drug results in each category)

The distribution of alcohol levels is shown in Figure 19, and is distinct from that for the other enrolment groups in that the other groups showed a more classic distribution curve across the range. The average blood alcohol level across the group at 0.10 g/100mL was comparable with the Self Harm group and lower than the Illicit use (0.172g/100ml) and the alleged Drink Spiking group (0.157g/100ml)

Figure 19: Blood alcohol levels of Unknown group.



As was the case with Illicit Drug Use enrolments, methamphetamine was clearly the most frequent psycho-stimulant detected, with only one case each of MDMA and pseudoephedrine (Table 78). As discussed elsewhere, amphetamine (the compound) was generally detected in

conjunction with methamphetamine and likely a by-product of metabolism of the latter rather than the administered parent compound.

Table 78: Incidence of detection of amphetamines in Unknown drug use patients.

Drug Name	Number of Positive Tests (%)
Methamphetamine	15 (56)
MDMA	1 (4)
Amphetamine	10 (37)
Pseudoephedrine	1 (4)
Total positive tests	27

Opioids were detected in almost 10% of this group. Codeine was the most commonly detected (8 tests), methadone and morphine (3 each) and norpethidine (1 case).

Ketamine was found in 3 cases (<1%), Paracetamol in 19% (22 of 114). Antidepressants and antipsychotics were found in 4% and 3% respectively. Other pharmaceuticals were found in 2 cases (2%).

Drug Habit:
The history of drug use reported by patients was only recorded in 46% of cases and was therefore not as well recorded compared to other groups (Table 79).

Table 79: Frequency of drug use reported by Unknown drug use patients.

	Frequency of Use					
Reported Drug Use	Daily	Weekly	Monthly	Not specified*	Past use only	Total Responses
Cigarettes	19					19
Alcohol	5	3		16		24
Cannabis	5			11	1	17
Amphetamines				9		9
Methamphetamine			1	8		9
Benzodiazepines	1			2		2
LSD/Acid				1		2
Ecstasy		1		2		3
Heroin	1	1		7	1	10
Opiates						4

(*Stated drug used but frequency of use not recorded) (data not recorded for all patients)

Clinical Correlates:

Presenting Complaint:

The primary clinical reason for attending the ED was recorded in all patients and is shown in Table 80). The most frequent reason was for “psychosocial reasons” (38 patients, 33%) and as a result of trauma (35 patients, 32%), with 23 of these of sufficient severity that the criteria for involvement of the hospital Trauma Response Team was met.

Table 80: Primary clinical reason for attending the ED as per presentation complaint.

Presenting Complaint	Complaint Specific	Number of Patients		Presenting Complaint	Complaint Specific	Number of Patients
CVS	Chest pain	2		**Multi-trauma**	Penetrating assault	3
	Collapse	8			Blunt assault	3
	Other	1			MVA	17
GIT	Abdominal pain	2			Fall	1
Psychosocial	Drugs misuse/OD	9		**Poisoning**	Altered LOC	2
	Psych illness	14			OD/other	2
	Self harm	3		**Single trauma**	Penetrating assault	2
	Other	12			Blunt assault	1
Other	Short of breath	1			MVA	6
	Other	1			Fall	1
Neurological	Seizure	7			Self harm	2
	Altered LOC	8			Other	2
	Altered mental state	4				

(CVS = cardiovascular system, GI = gastro-intestinal, multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not requiring trauma team assessment, GCS = Glasgow Coma Score (see footnote page 51), MVA = motor vehicle accident)

Triage Category:

The Unknown group had the highest proportion of patients triaged as requiring immediate medical assessment on their arrival to the ED (30%), and over 70% of all patients in this category were triaged to either category 1 or category 2 (most urgent of 5 triage categories;

Table 15). As discussed above this likely represents a bias of selection of the most unwell into this enrolment group – the more unwell a patient the less likely a coherent history of events will be obtainable and the more likely they will be enrolled as unknown intent or as drug use only suspected. The drugs detected are compared with their allocated triage priority in Table 81.

Table 81: Triage priority of patients testing positive to each of the major drug types.

Drug	Triage Priority					Total Patients
	1	2	3	4	5	
THC	14	19	9	3	1	46
Psychostimulants	4	7	4	1	0	16
Alcohol	10	19	10	2	0	41
Benzodiazepines	11	11	8	1	0	31
Opioids	0	5	5	1	0	11
Antidepressants	1	3	0	0	0	4
Antipsychotics	0	1	2	0	0	3
Paracetamol	4	9	7	2	0	22
Ketamine	3	0	0	0	0	3
Others	0	2	0	0	0	2

Clinical Vital Signs:

In contrast to the other parameters of illness severity, the vital signs for this group of patients showed rates of clinically significant abnormalities in line with other enrolment groups (Tables 82 & 83).

Tables 82 and 83: Clinical vital signs measures.

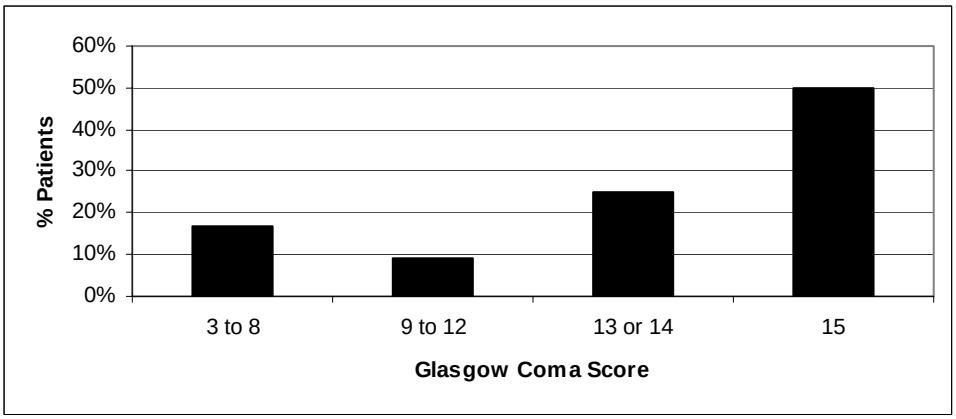
Pulse Rate	No. Patients (%)
Not recorded	2 (2)
<60	2 (2)
60-100 (NR)	71 (62)
101-150	39 (34)
>150	0
Systolic BP	**No. Patients (%)**
Not recorded	1 (1)
<90	9 (8)
90-150 (NR)	91 (80)
150-200	13 (11)
>200	0

RR	No. Patients (%)
Not recorded	6 (5)
<10	2 (2)
10 to 20 (NR)	74 (65)
21-30	28 (25)
>30	4 (4)
Oxygen Saturation	**No. Patients (%)**
Not recorded	18 (16)
<85	2 (2)
86-90	5 (4)
91-95	11 (10)
96-100 (NR)	78 (68)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The Glasgow Coma Scores were recorded in all patients and are shown grouped according to clinical severity in Figure 20; the Unknown group had the largest proportion of unconscious patients (GCS < 8) with 17% having a GCS of less than 8.

Figure 20: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).



Disposition from the ED:
Approximately 59% of the Unknown group was admitted to hospital (Table 84). Of these, 45% required an intensive care or high dependency admission. Ultimately, only 64% of patients had been discharged to home from hospital (Table 85). Three patients died, and 10 (9%) required long-term medical rehabilitation facilities. Thirteen were discharged from the hospital to community and other psychiatric facilities.

Tables 84 and 85: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	41 (36)
Admitted	67 (59)
EECU	15 (13)
General Ward	15 (13)
ICU/HDU	30 (26)
Psych. Ward	7 (6)
Transferred	5 (4)
Unknown	1 (1)

Disposition from Hospital	Total (%)
Home	73 (64)
Absconded/Left AMA	8 (7)
Psych services	13 (11)
SAPOL custody	5 (4)
Rehabilitation	10 (9)
Died	3 (3)
Other/Unknown	2 (2)

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

Summary:

- 114 drug-positive patients were enrolled with insufficient information to determine drug use intent
- Demographic data and patterns of drug use of patients in this category broadly matched that seen in the Illicit Drug Use category.

3.2.5 Other

Enrolments:
The number of patients with positive drug screens who were enrolled as a result of accidental poisoning was small (9 patients), and patterns or trends in drug exposure could not be determined.

3.3 RESULTS BY DRUG TYPE

3.3.1 Alcohol

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

More patients tested positive to alcohol than any other drug. Of the 1279 patients returning drug-positive blood tests, 776 (61%) tested positive to alcohol.

Demographic Details:
Ethnicity:
The distribution of alcohol-positive patients across the ethnic groups was very similar to that seen with Illicit Drug Users generally (Table 24); nearly 90% were Caucasian, 7% Indigenous and just over 1% Asian (Table 86).

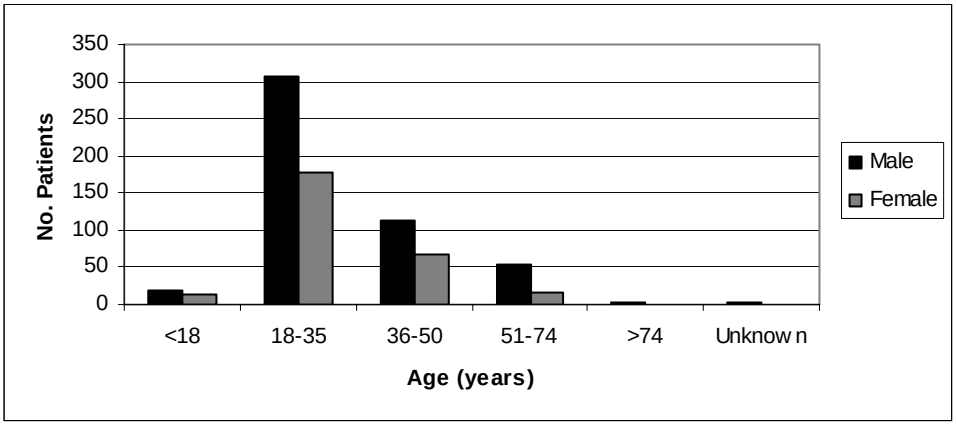
Table 86: Ethnicity of patients testing positive to alcohol.

Ethnicity	Total (%)
Caucasian	677 (87)
Indigenous	53 (7)
Asian	11 (1)
African	4 (<1)
Arab	1 (<1)
Other/unknown	30 (4)
Total	776

Age and Gender:
The average age of patients testing positive to alcohol was 31.8 years. This average was somewhat less than that for both opioids (35.6 years) and benzodiazepines (36.3 years), but was older than for all other drug types. There was a difference of 2 years between the average ages of the genders (male average age 32.5 years, female 30.5 years), the largest difference of any of the drug types. Almost 4% of patients were under 18 years of age (Figure 21); a proportion similar to that seen with psychostimulants, THC and antidepressants.

As with drug positive enrolments generally, males predominated, with a male to female ratio of 3 to 2. This male predominance held across all age groups.

Figure 21: Age and gender distribution of patients testing positive to alcohol.



Time of Presentation:

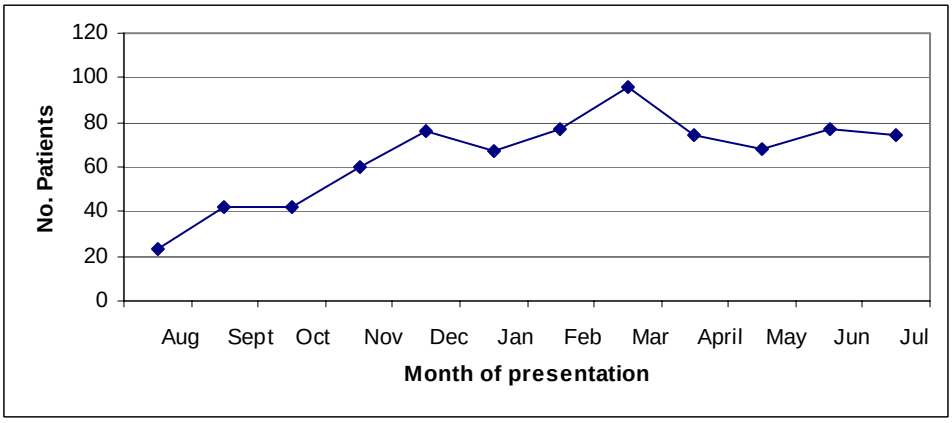
The most likely time of presentation to the Emergency Department was between midnight and 6 am Sunday. Over half of the presentations were between 6 pm Friday and 6 am Monday (Table 87).

Table 87: Day and time of presentation to the ED of patients testing positive to alcohol.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0600-1159	102	17	19	27	38	51	68	322 (41)
1200-1759	23	5	3	7	12	13	17	80 (10)
1800-2400	17	11	15	13	21	11	29	117 (15)
0001-0559	32	25	23	45	47	42	43	257 (33)
Total (%)	174 (22)	58 (7)	60 (8)	92 (12)	118 (15)	117 (15)	157 (20)	776

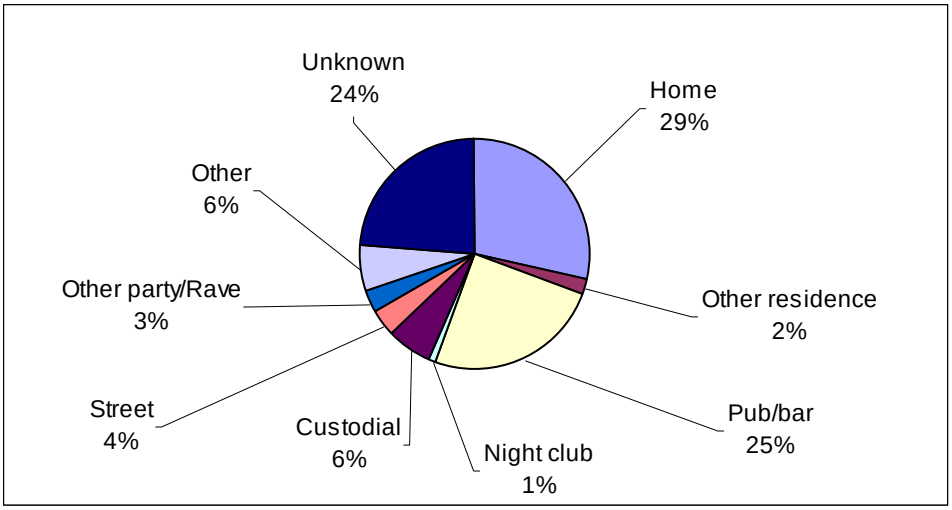
There was considerable variation in monthly enrolments of patients testing positive to alcohol (Figure 22). Although the pattern of enrolment approximates that for enrolments generally (Figure 2), a trend to increased alcohol-related presentations between December and April is suggested by Figure 22.

Figure 22: Alcohol positive patients enrolled per month.



Venue of exposure and mode of transport to ED:
The venue where alcohol exposure occurred was recorded in 76% of patients, and is shown in Figure 23. Surprisingly, of these, only 26% of exposures occurred in a licensed premises, whilst almost a third were from a private residence, usually the patient's home.

Figure 23: Venue of ingestion of alcohol.



Mode of arrival to the ED was mostly via ambulance services (Table 88). This is broadly consistent with mode of arrival of patterns seen in other enrolment categories but is quite different from ED attendances in general[7]. Ambulance and private vehicle transport rates for all patients attending the ED are approximately 41% and 39% respectively, compared to 76% and 11% for alcohol positive enrolments. Similarly, the rate of transport by police or custodial services at 5% is much higher than ED attendances generally at less than 2%.

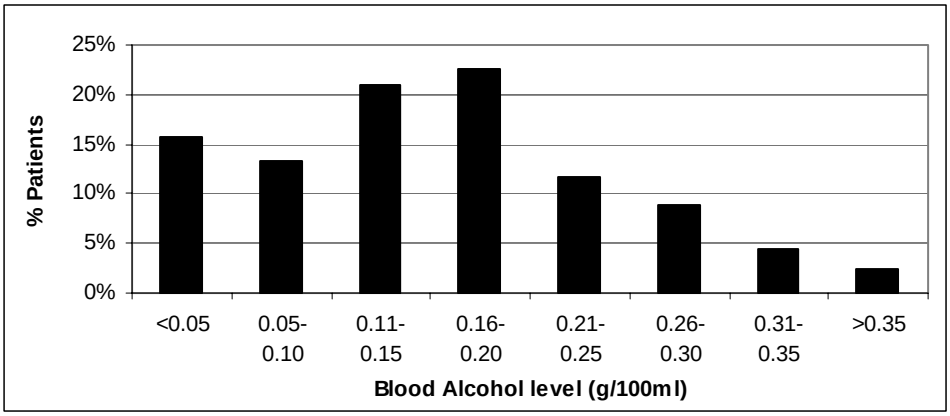
Table 88: Mode of arrival to the ED for patients testing positive to alcohol.

Mode of Arrival	Number of Patients (%)
Ambulance	592 (76)
Police/Custodial	40 (5)
Private car	92 (12)
Walked in	26 (3)
Taxi	15 (2)
Other	11 (1)
Total	776

Patterns of Drug Use:
Alcohol was the most commonly detected drug in all presentation categories other than the Self-Harm group. Most alcohol-positive patients were in the Illicit Drug Use category (69%), however, proportionally, the victims of Drink Spiking category had the highest percentage of alcohol positive patients (93%).

The distribution of blood alcohol levels among patients testing positive to alcohol are shown in Figure 24.

Figure 24: Distribution of blood alcohol levels among patients testing positive to alcohol.



The average alcohol concentrations differed according to the presentation category (Table 89). Patients enrolled in the Illicit Drug Use category had higher average blood alcohol levels (BAL) than the other categories. However, as previously discussed, victims of Drink Spiking had a relatively high average BAL of 0.16, particularly given their lower average age, and probable lower incidence of chronic alcohol abuse and tolerance when compared to Illicit Drug Users. Clinically, in non-tolerant individuals, this level equates to gross intoxication with difficulty walking, poor balance and coordination, and possibly depressed conscious levels.

Table 89: Average blood alcohol levels (BAL) across presentation categories.

Presentation Category	Average BAL (g/100mL)
Illicit Drug Users	0.17
Drink Spiking	0.16
Self-Harm	0.12
Unknown	0.10

Poly-substance detection was a feature of all presentation categories and of all major drug types examined, including those testing positive to alcohol. Only 42% of alcohol-positive patients (328 of 776) did not return a positive test for another drug. There was variation between presentation categories with victims of Drink Spiking returning the highest proportion of alcohol-only tests and patients presenting as a result of Self-Harm the lowest (Table 90).

Table 90: Number of patients in each presentation category positive for alcohol only.

Presentation Category	Alcohol Only	Total Alcohol (%)
Drink Spiking	36 (67)	54 (7)
Illicit Drug Use	245 (46)	537 (69)
Unknown	16 (36)	41 (5)
Self-Harm	31 (22)	144 (19)

(%: percent of total number of patients in that category)

A total of 672 tests positive for drugs other than alcohol were returned from the 776 patients. The detection rates of the major drug groups are shown in Table 91. Benzodiazepines (as a

group) were the most common drugs detected, followed by THC, psychostimulants (as a group), and opioids.

Table 91: Drugs present in patients testing positive to alcohol.

Drug Detected	Total Number of Positive Tests
Benzodiazepine (group total)	259 (191)
THC	166
Psychostimulants (group total)	82
MDMA	32
Methamphetamine	58
Amphetamine	20
Pseudoephedrine	2
MDEA	4
MDA	10
Opioids (group total)	50
Codeine	11
Morphine	18
Methadone	1
Dextropropoxyphene	2
GHB	6
Antidepressants	43
Antipsychotics	9
Pharmaceuticals	23
Non Pharmaceuticals	4
Datura	2
Paraquat/Diquat	1

The very high rate of alcohol being used in conjunction with sedative compounds indicated by this data is of considerable concern. As potent central nervous system depressants benzodiazepines, opioids, GHB, and ketamine would all be expected to compound the adverse effects of alcohol and increase the incidence of coma, and other, related adverse effects.

Methamphetamine was the psycho-stimulant most commonly associated with alcohol, followed closely by MDMA. As discussed elsewhere, it is likely that the presence of amphetamine was the result of metabolism of methamphetamine.

A large number of patients returning positive alcohol tests were also taking prescription medication. In addition to the benzodiazepines and prescription opioids, a wide range of antidepressants, antipsychotics, anticonvulsants, and other medications were detected. The potential for adverse drug reactions as a result of interactions between alcohol and most of these medications is well described.

Drug Habit:
The history of drug use reported by patients testing positive to alcohol is shown in Table 92. Although data was only available from a proportion of patients (619 of 776, 80%), a comparison of relative detection rates and volunteered usage rates can still be made.

Again, cigarettes and alcohol were the most commonly reported drugs used and their reported use was 'frequent' (daily or weekly). As has been noted previously, the rates of reported use of benzodiazepines were proportionally much less than other substances when compared to the rates of detection (see discussion also "Illicit Drug Use, Drug Habit").

Table 92: Frequency of drug use reported by patients testing positive to alcohol.

	Frequency of Use						
Reported Drug Use	**Daily**	**Weekly**	**Monthly**	**Yearly**	**Not specified***	**Past use only**	**Total**
Alcohol	148	56	2	1	364	1	572
Cigarettes	134	4			7	1	146
Cannabis	32	10	2	1	59	2	106
Amphetamines	3	6	6		29	1	45
Methamphetamine	3	10	3	2	54		72
Benzodiazepines	20	2			16		38
Heroin	2		2		20	1	25
Opioids (other)			1		9	1	11
MDMA (ecstasy)		4	1		23		28
GHB/Fantasy	1		1		7		9
LSD/Acid			1		6		7
Cocaine				3	7		10
Ketamine			1				1
Solvents					1		1
Mushrooms			1		4		5

(*Stated drug used but frequency of use not recorded) (data not recorded for all patients)

The incidence of injecting drug abuse previously documented in case records of patients testing positive for alcohol was relatively low (Table 93). Of these there was a surprisingly high incidence of hepatitis C, particularly in proportion to the number of cases of hepatitis B.

Table 93: Number of patients with previously documented injecting drug use and transmissible viral disease among those testing positive for alcohol.

Behaviour	Self-Harm	Illicit Drug Use	Unknown	Total (%)
IV Drug Use	18	65	5	88 (11)
Hepatitis B positive	0	5	0	5 (<1)
Hepatitis C positive	11	35	3	49 (6)
HIV positive	2	4	0	6 (<1)

Clinical Correlates:

Medical History:

There were 579 data entries specific to chronic medical, drug abuse/dependency, behavioural or psychiatric illness. Of these over 40% were psychiatric in nature compared to only 19% being chronic medical conditions (Table 94).

The high proportion of psychiatric illness in patients presenting intoxicated as a result of drugs of abuse was highlighted in the examination of the whole data set (Tables 10 & 11). The data concerning those testing positive to alcohol reveals the same patterns: the large majority of patients with an established past history of attempted suicide or a diagnosis of depression presented as a result of deliberate Self-Harm, whereas the majority of patients with a past history of a major psychotic illness (for example schizophrenia) presented as a result of Illicit Drug Use (Table 94 & 95).

Table 94: Incidence of past history of psychiatric, drug abuse/dependency, and chronic medical illness in alcohol-positive enrolled patients.

Recorded Past Medical/Psychiatric Illness	Number of Patients (%)
Psychiatric Illness	244 (31)
Drug abuse or dependency	211 (27%)
Other Significant Medical	109 (14)
Behavioural	15 (2)
Total number of recorded entries*	579

(*Patients may have had more than one medical or psychiatric condition. Data was not recorded for all patients enrolled)

Table 95: Incidence of past psychiatric diagnoses recorded for alcohol-positive enrolments.

Past Psychiatric History	Self-Harm	Illicit Drug Use	Other	Total
Schizophrenia	10	16	6	32
Paranoid schizophrenia	0	2	4	6
Bi-Polar Affective Disorder	12	12	1	25
Psychotic Episode	6	9	4	19
Schizoaffective disorder	3	6	2	11
Depression	89	52	7	148
Anxiety	16	11	4	31
Self-Harming	33	13	4	50
Suicide risk/ attempt	4	0	0	4
Personality Disorder	22	19	5	46
Other	8	6	1	15
Total*	203	146	38	387

(*Patients may have had more than one medical or psychiatric condition. Data was not recorded for all patients enrolled)

An established past history of drug abuse was reported in 167 patients who tested positive to alcohol (Table 96).

Table 96: Incidence of past drug abuse diagnoses recorded for alcohol-positive enrolments.

Past Drug Abuse Diagnosis	Self-Harm	Illicit Drug Use	Other	Total
Alcohol abuse	51	116	4	171
Poly-substance abuse	8	26	2	36
Opiate dependence/abuse	4	16	3	23
Chronic THC use	1	5	0	6
Benzodiazepine abuse	2	1	1	4
Total*	66	164	10	240

(*Patients may have had more than one medical or psychiatric condition. Data was not recorded for all patients enrolled)

Presenting Complaint:

The primary clinical reason for attending the ED in patients who tested positive for alcohol was recorded in all patients (Table 97). “Drug misuse/overdose” was the most common listed presenting complaint (31%). Of the more specific presentation descriptors, a moderate to severely depressed conscious state (“↓GCS”) was recorded in 76 cases (10%). Presentations as a result of trauma were a feature of alcohol-affected patients with a total of 212 patients (27%) presenting because of injury; 82 of these (11% overall) were of sufficient severity to require Trauma Team assessment (“multi-trauma”).

Table 97: Primary clinical reason for attending the ED as per presentation complaint.

Presenting Complaint	Complaint Specific	Number of Patients		Presenting Complaint	Complaint Specific	Number of Patients
CVS	Chest pain	13		**Poisoning**	Altered LOC	25
	Collapse	59			Drug misuse/OD	16
	Other	4			Other	12
Endocrine	↑blood sugar	3		**Psycho-social**	Drugs misuse/OD	224
GI	Pain	8			Behavioural	21
	Vomiting	4			Psych illness	24
Drug	Other	12			Situational crisis	26
Neurologic	↓GCS	48			Suicidal	11
	Seizure	7			Other	6
	Other	10		**Single trauma**	Blunt assault	57
Other	Other	21			Penetrating assault	6
Multi-trauma	Blunt assault	18			Self harm	8
	Penetrating assault	5			Fall	6
	Blunt injury	2			Other injury	10
	MVA	48			MVA	14
	Fall	9			Other	9
Respiratory	SOB	5		Systemic	Various	5

(CVS = cardiovascular system, GI = gastro-intestinal, OD = overdose, LOC- level of consciousness, multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not trauma team assessment, GCS = Glasgow Coma Score, apnoea = cessation of breathing, MVA = motor vehicle accident)

Triage Category:

Nineteen percent of patients testing positive for alcohol were assigned the most urgent triage category of 1, indicating a requirement for immediate medical assessment on their arrival to the ED (Table 98). In total 58% required either immediate or urgent assessment.

Table 98: Distribution of allocated triage categories for alcohol-positive patients in the various presentation categories (number of patients).

Presentation Category	Triage Priority				
	1	2	3	4	5
Self-Harm	20	84	35	5	0
Illicit Drug Use	111	186	158	80	2
Drink Spiking	5	10	27	12	0
Unknown	10	19	10	2	0
Total (%)	146 (19)	299 (39)	230 (30)	99 (13)	2 (<1)

Clinical Vital Signs:

Data on recorded clinical vital signs is shown in Tables 99 and 100. An abnormal heart rate (rate > 100 (tachycardia) or < 60 beats per minute (bradycardia)) was the most frequently detected abnormal clinical vital sign (33% of patients). Twenty three patients (3%) had rates likely to be clinically significant (rate > 150 or < 60 bpm). Twenty six patients (3%) were hypotensive (blood pressure < 90) and likely to have been in a shocked state. Signs suggestive of profound depression of respiratory function were seen in 6 patients (1%) with a respiratory rate < 10 and 21 patients (3%) with blood oxygen saturation concentrations of less than 90%.

Tables 99 and 100: Clinical vital signs measures in patients testing positive for alcohol.

Pulse Rate	No. Patients
Not recorded	24 (3)
<60	19 (2)
60-100 (NR)	500 (64)
101-150	229 (30)
>150	4 (1)

RR	No. Patients
Not recorded	28 (4)
<10	6 (1)
10 to 20 (NR)	588 (76)
21-30	144 (19)
>30	10 (1)

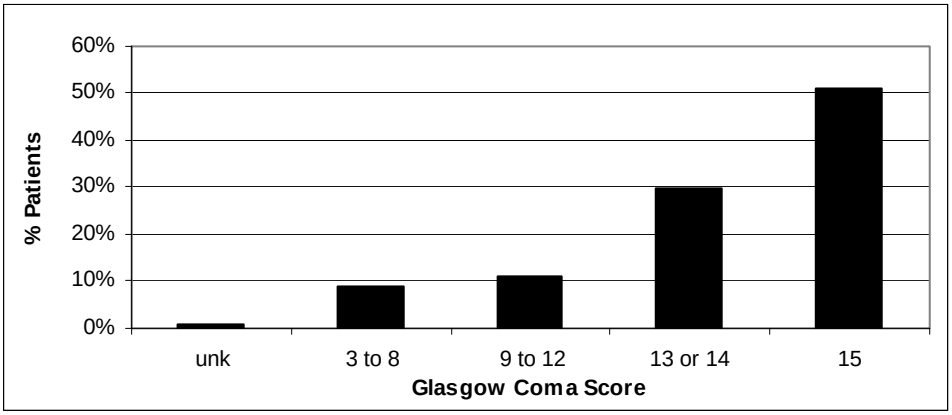
Systolic BP	No. Patients
Not recorded	25 (3)
<90	26 (3)
90-150 (NR)	668 (86)
150-200	53 (7)
>200	4 (1)

Oxygen Saturation	No. Patients
Not recorded	115 (15)
<85	7 (1)
86-90	14 (2)
91-95	111 (14)
96-100 (NR)	529 (68)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The GCS allocated to patients testing positive to alcohol is depicted in Figure 25. Of the 756 patients in whom this data was collected, 27 (3%) had a GCS of 3 reflecting the deepest level of unconsciousness, and 67 (9%) were classified in the range 3 to 8 ('severely' depressed conscious state, generally requiring management of the patients' airway). These figures closely parallel those seen for Illicit Drug Users (Figure 11).

Figure 25: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).



Disposition from the ED:

Approximately 43% of patients testing positive to alcohol were admitted to hospital (Table 101). Of these, 21% required intensive care or a high dependency admission. Ultimately, approximately 87% of patients were discharged to home. Seven patients required long-term rehabilitation and 41 were transferred to a psychiatric facility. Once again, a relatively high proportion (5%) of patients absconded or left hospital against medical advice (Table 102). Four of the enrolled patients who died during the period of the report tested positive to alcohol.

Tables 101 and 102: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	429 (55)
Admitted	332 (43)
EECU	160 (21)
General Ward	73 (9)
ICU/HDU	70 (9)
Cardiology	2 (<1)
Psych. Ward	26 (3)
Spinal Unit	1
Transferred	14 (2)
Died in ED	1 (<1)

Disposition from Hospital	Total (%)
Home	674 (87)
Absconded/Left AMA	39 (5)
Psych services	41 (5)
SAPOL custody	9 (1)
Rehabilitation	7 (1)
Died	4 (<1)
Other/Unknown	2 (<1)

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

Summary:

Enrolments:

- More patients tested positive to alcohol than any other drug with 776 (61%) of the 1279 patients returning alcohol-positive blood tests.

Demographics:

- 87% were Caucasian, 7% Indigenous and 1% Asian
- The average age was 31.8 years, with females on average 2 years younger than males
- 4% were aged less than 18 years
- Male to female ratio was 3 to 2,
- The most likely time of presentation was between midnight and 6am Sunday
- Over 50% presented between 6pm Friday and 6am Monday
- 30% of alcohol exposures occurred in a private residence compared to 26% in a licensed premises.

Patterns of Drug Use:

- Most alcohol-positive enrolments were in the Illicit Drug Use category (69%), however, proportionally, the victims of Drink Spiking category had the highest number of alcohol positive patients (93%)
- Only 42% of alcohol-positive patients did not return a positive test for another drug
- A total of 672 tests positive for drugs other than alcohol were returned from the 776 patients: 259 benzodiazepines, 166 THC, 116 psycho-stimulants, 59 opioids, 43 antidepressants and 9 antipsychotics
- Methamphetamine was the psycho-stimulant most frequently associated with alcohol
- The incidence of injecting drug abuse previously documented in case records of patients testing positive for alcohol was relatively low (11%)
- An established past history of drug abuse was reported in 211 patients (27%) who tested positive to alcohol.

3.3.2 Psycho-stimulants

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests, a total of 224 patients (18%) tested positive to psycho-stimulants. This compares with our pre-study estimated detection rate for psycho-stimulants of only 5%. Psycho-stimulants were the fourth most commonly detected drugs after alcohol, benzodiazepines and THC (Table 6).

Demographic details:
Ethnicity:
The distribution of psycho-stimulant-positive patients across the ethnic groups is shown in Table 103. Eighty nine percent of patients were Caucasian. Although psycho-stimulants were detected in 12 of the 64 Indigenous patients (19%), this represented only 5% of all patients testing positive to these drugs. This was somewhat less than that for THC, benzodiazepines, alcohol, and opioids (Table 104). All but 1 of the psycho-stimulants detected in Indigenous patients were methamphetamine.

Table 103: Ethnicity of patients testing positive to psycho-stimulants.

Ethnicity	Total (%)
Caucasian	200 (89)
Indigenous	12 (5)
Asian	5 (2)
African	2 (<1)
Other	5 (2)
Total	224

Table 104: Proportional representation of Indigenous patients in each major drug group.

Drug Type	Total No. Patients per Drug Type	No. Indigenous Patients (% of Drug Type)
Alcohol	776	53 (7)
Benzodiazepines	409	29 (7)
THC	355	34 (10)
Psycho-stimulants	224	12 (5)
Opioids	144	6 (4)
Antidepressants	109	3 (3)
GHB/Ketamine/Cocaine/LSD	41	1 (2)

Age and Gender:
Just 3% of patients testing positive to a psycho-stimulant were under 18 years of age. The average age of patients was 28.4 years. This was somewhat less than that for opioids (35.6 years), benzodiazepines (36.3 years) and alcohol (31.8 years), but was similar to that for GHB (26.6 years) and THC (28.9 years). There were also differences in the average ages of patients testing positive for the individual drugs within the psycho-stimulants group (Table 105). Patients testing positive to MDMA (ecstasy) were, on average, more than 4 years

younger than those testing positive for methamphetamine and amphetamine. Use of MDMA (ecstasy) is closely associated with the 'dance party/rave scene' and this data is supportive of the widely held perception that ecstasy users are generally younger than users of the 'traditional' drugs of abuse (e.g. opioids 35.6 years). However, regular ecstasy users in the EDRS sample report use of methamphetamine as regularly as they use MDMA[15]. Further, the apparent difference between MDMA and methamphetamine average ages in this sample of attendees to the ED may not be evident if drug user groups were more clearly separated (as we see in the EDRS sample versus the IDRS sample[12, 15]). It may be that we are seeing the more naïve end of the MDMA users among the 'dance party/ rave' population, and the methamphetamine users are a mix of both the 'dance party/ rave scene' users and 'traditional' (IDU etc) users.

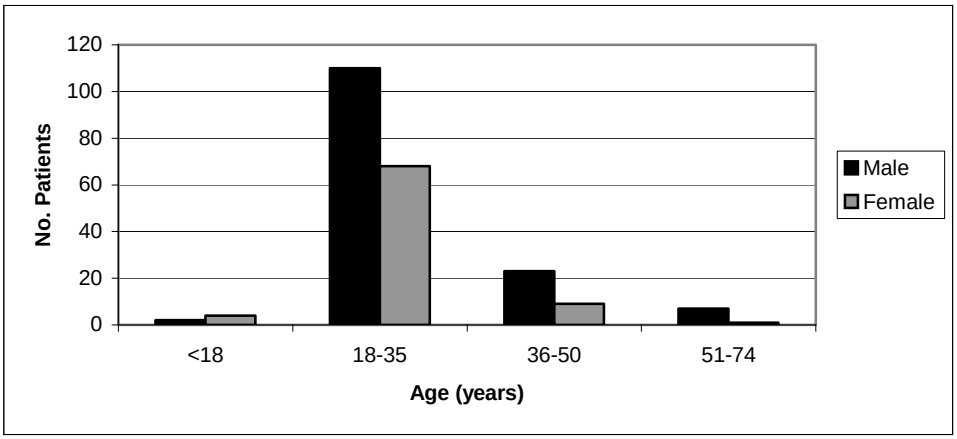
Table 105: Average age of patients testing positive for psycho-stimulants.

Drug Type	Average age (years)		
	Male	Female	All
Psycho-stimulants (Group)	29.3	26.8	28.4
Amphetamine	30.3	26.7	28.7
Methamphetamine	29.7	27.3	28.8
MDMA	24.4	23.6	24.1
Pseudoephedrine	39	40	39.5
MDA	24.9	24	24.6
Phentermine	0	32	41.0
MDEA	21.8	22.4	22.1

There was 2.5 years difference between the average ages of the genders (male average age 29.3 years and female 26.8 years) for psycho-stimulant users generally.

As with drug positive enrolments generally, there was a male predominance with a male to female ratio of 3 to 2. This male predominance held across all age groups other than for those under 18 years of age where the gender ratio was reversed (Figure 26).

Figure 26: Age and gender distribution of patients testing positive to psycho-stimulants.



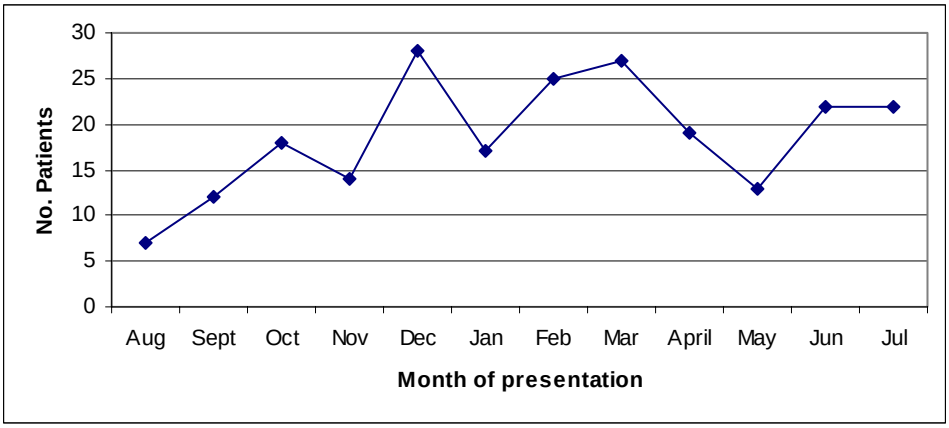
Time of Presentation:
The most likely time of presentation to the ED was between midnight and 6 am Sunday (Table 106). The proportion presenting between 6 pm Friday and 6 am Monday (58%) was greater than that seen for Illicit Drug Users as a whole (50%, Table 25).

Table 106: Day and time of presentation to the ED of patients testing positive to psycho-stimulants.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0001-0559	33	9	7	5	8	8	8	78 (35)
0600- 1159	18	9	2	2	4	9	9	53 (24)
1200-1759	10	6	4	5	6	5	8	44 (20)
1800-2400	10	7	3	5	6	7	11	49 (22)
Total (%)	61 (35)	24 (11)	13 (6)	12 (5)	18 (8)	22 (10)	25 (11)	224

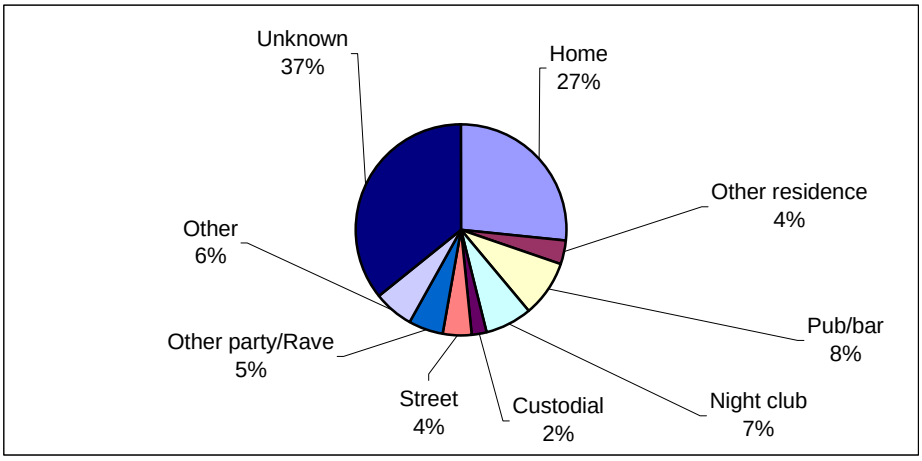
There was some variation in monthly enrolments of patients testing positive to psycho-stimulants (Figure 27). Although the pattern approximates that for enrolments generally (Figure 2), there is a trend to increased psycho-stimulant-related presentations between December and April (summer period), similar to that seen with alcohol-related presentations.

Figure 27: Number of patients testing positive to psycho-stimulants enrolled per month.



Venue of exposure and mode of transport to ED:
The venue of psycho-stimulant exposure is shown in Figure 28. Over 30% of exposures occurred in a private residence, usually the patient's home, whilst only 15% occurred in a licensed premises; a pattern seen with Illicit Drug Users generally.

Figure 28: Venue of exposure to psycho-stimulants.



A detailed breakdown of venue of exposure according to specific drug revealed a substantial difference between MDMA and methamphetamine/amphetamine (Table 107). In keeping with the perception of MDMA (ecstasy) being associated with the 'dance party/rave scene', only 14% of MDMA exposures occurred at a private residence compared to 34% for methamphetamine. Conversely, 42% of MDMA exposures occurred at a licensed venue or party/rave compared to 17% for methamphetamine/amphetamine exposures.

Table 107: Venue of drug exposure for patients testing positive to psycho-stimulants.

Drug	Home	Licensed premises	Street	Custodial	Party/Rave	Other	Unknown	Total
Amphetamine	33	6	2	2	3	5	36	87
Methamphetamine	61	22	10	3	9	11	65	181
MDMA	9	20	1	2	7	3	23	65
Pseudoephedrine	2	0	1	0	0	0	1	4
Phentermine	1	1	0	0	0	0	1	3
MDA	2	8	0	1	2	2	10	25
MDEA	0	3	0	0	2	0	4	9

(data not recorded for all patients)

Mode of transport to the ED was mostly via ambulance services (Table 108). This is broadly consistent with mode of arrival patterns seen in other study enrolment categories but, as previously indicated, is considerably different from ED attendances in general, with a greater proportion transported via ambulance (62% compared to 41%) and by police or custodial services (9% compared to < 2%).

Table 108: Mode of arrival to the ED for patients testing positive to psycho-stimulants.

Mode of Arrival	Number of Patients (%)
Ambulance	139 (62)
Police/Custodial	20 (9)
Private car	43 (20)
Walked in	11 (5)
Taxi	7 (3)
Total	4 (2)

Patterns of Drug Use:

Psycho-stimulants were detected in 224 patients, the fourth highest number of drug-positive patients after alcohol, benzodiazepines, and THC (Table 6). The rate of detection was 18% of drug-positive enrolments, which is slightly less than in the previous 12 month period (22%) but remains considerably higher than our pre-commencement estimate of 5% of enrolments based on data from the review by the Hazardous Substances Section of the Environmental Health Service of South Australia on poisoning cases assessed at the RAH 2002[1] (see "Methods: Outcome Measures"). However, caution should be used when extrapolating this data to rates of use in the general community as there is likely a degree of enrolment bias; it is probable that psycho-stimulant users are more likely to present to an ED for assessment and management compared to users of other drug types (see also Section I, "Overview and General Results, Patterns of Drug Use").

Not unexpectedly, the large majority of psycho-stimulant-positive patients were in the Illicit Drug Use category (80%, Table 109). The proportion of victims of Drink Spiking testing positive to psycho-stimulants although much less than in the previous 12- month period (10% 2005/2006 compared to 22% in 2004/2005) remains surprisingly high (Table 110). As discussed in Section II, Part C "Drink Spiking: Patterns of Drug Use" the use of psycho-stimulants by perpetrators of this crime appears initially counter-intuitive to the presumed intent of sedation of the victim. It is possible, however, that the intent is to 'dis-inhibit' the victim rather than sedate, and therefore the choice of drug may be deliberate. It is also possible that the drug was knowingly consumed by the victim in some cases.

It is likely that the majority of patients in the Unknown enrolment group were presenting as a result of Illicit Drug Use. (See Section II "Unknown and Suspected Drug Use").

Table 109: Number of patients testing positive to psycho-stimulants enrolled in each presentation category.

Presentation Category	Number of Patients (%)
Illicit Drug Use	179 (80)
Drink Spiking	6 (3)
Self-Harm	22 (10)
Unknown	16 (7)
Other	1 (<1)
Total	224

Table 110: Comparison of the percentage of patients in each presentation category testing positive to psycho-stimulants.

Presentation Category	Psycho-stimulant positives as % of Presentation Category
Illicit Drug Use	23%
Drink Spiking	10%
Self-Harm	7%
Unknown	14%
Other	11%

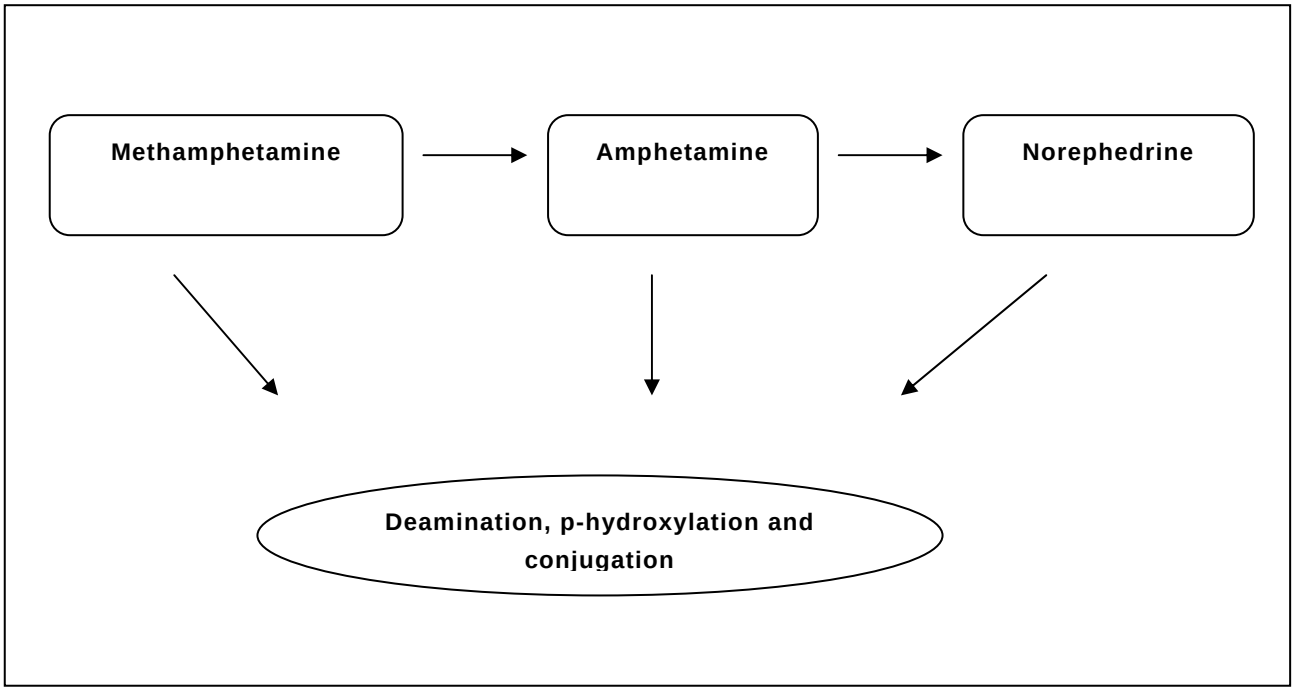
Poly-substance abuse:
A total of 374 drug tests positive for psycho-stimulants were returned in the 224 patients at an average of 1.66 psycho-stimulants per patient (Table 111). The most commonly detected drug was methamphetamine, both overall (48%) and in each of the enrolment groups. MDMA was the next most frequently detected psychostimulant. Most MDMA was seen in Illicit Drug Users, (92%).

Table 111: Number of positive tests for psycho-stimulants in each presentation category.

Drug Name	Presentation Category				Total (%)
	Self-Harm	Illicit Drug Use	Drink Spiking	Unknown/Other	
Methamphetamine	19	142	4	16	181 (48)
MDMA	0	60	4	1	65 (17)
Amphetamine	6	69	2	10	87 (23)
Pseudoephedrine	2	1	0	1	4 (1)
MDA	0	25	0	0	25 (7)
Phentermine	1	2	0	0	3 (<1)
MDEA	0	9	0	0	9 (2)
Total	28	308	10	28	374

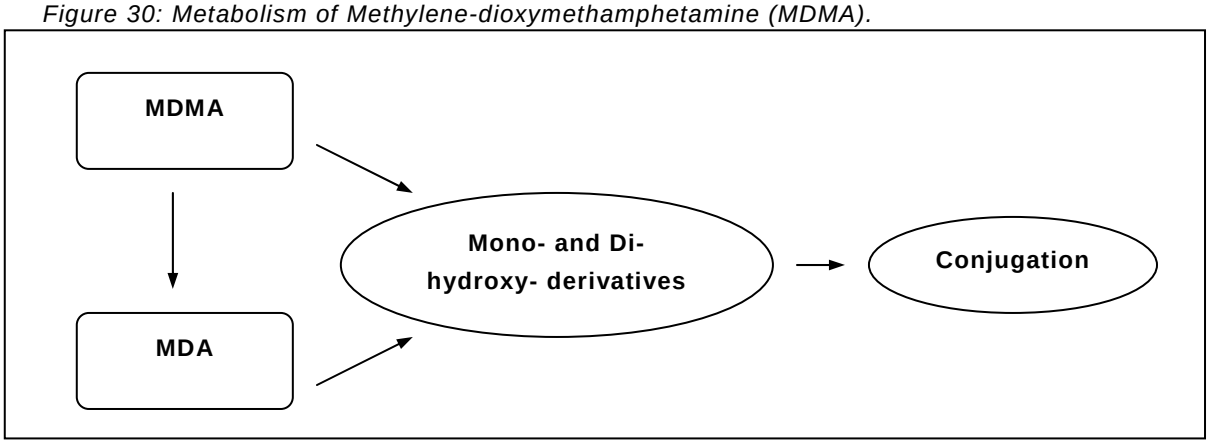
The specific compound, amphetamine, was detected in 87 cases. In all but 1 case it was found in combination with methamphetamine. The question arises as to whether the amphetamine was present as a result of metabolism of the methamphetamine or whether it was a constituent of the ingested or injected drug (see Figure 29). Quantitative analysis revealed the levels of amphetamine (average level 0.05) detected were always considerably lower than those of methamphetamine (average level 0.13). Additionally, although forensic analysis of drugs seized by South Australian police indicate high rates of impurities, cutting agents and combinations with other drug types (e.g. ketamine, caffeine) in the illicit, 'home made' psycho-stimulant preparations, the major parent compounds of amphetamine, methamphetamine and MDMA have rarely been found combined in the same formulation[16]. It is therefore highly likely that the presence of amphetamine in the majority of these cases was as a result of metabolism of the methamphetamine.

Figure 29: Metabolism of Methamphetamine.



It is most likely that the MDEA detected in one patient was an impurity in the MDMA tablet(s), as this is not a product of MDMA metabolism (See Figure 30) and this combination has been documented in forensic analysis of tablet seizures. Furthermore, MDEA, as a single component has, as yet, not been described in tablets tested in South Australia, making separate exposure to the 2 compounds unlikely. MDA is a metabolite of MDMA and was associated with MDMA in all cases in this dataset[16].

Figure 30: Metabolism of Methylene-dioxymethamphetamine (MDMA).



Beyond these exceptions, it is likely that the other cases positive for multiple psycho-stimulant compounds represent separate doses of the different drugs, rather than multiple compounds in the one preparation. The combinations of psycho-stimulants detected are shown in Table 112.

Table 112: Incidence of the combinations of psycho-stimulant detected in patients.

Drugs Detected	Number of Patients (%)
Methamphetamine only	79 (35)
MDMA only	18 (8)
Phentermine only	2 (<1)
Pseudoephedrine only	4 (2)
Methamphetamine + MDMA	8 (4)
Methamphetamine + Amphetamine	72 (32)
Methamphetamine + Amphetamine + MDA	3 (1)
Methamphetamine + Amphetamine + MDMA	8 (4)
Methamphetamine + Phentermine	1 (<1)
MDMA + MDEA/MDA	18 (8)
MDMA + Methamphetamine + MDA/MDEA	6 (3)
Amphetamine + MDMA	1 (<1)
Methamphetamine + Amphetamine + MDEA/ MDA	4 (2)
Total	224

As has been previously highlighted, poly-substance abuse was a feature of all enrolment categories and of all major drug types examined, including those testing positive to psycho-stimulants. In addition to the 374 tests positive for the psycho-stimulants, there were 307 tests positive for other drugs among this group of psycho-stimulant users, of which benzodiazepines, alcohol, and THC were the most frequently detected (Table 113). The proportion of patients testing positive for GHB who also tested positive to psycho-stimulants was particularly high (21 of 30 (70%)).

Forensic analysis of tablets seized by police has, in recent times, shown a reasonable detection rate of ketamine as an additive[18] .Our data shows only 2 cases where ketamine was detected in conjunction with psycho-stimulants. Unfortunately, we are not able to give an indication of the likelihood of them being co-ingestants or separately administered.

Table 113: Incidence of other drugs present in patients testing positive to psycho-stimulants.

Drug Detected	Total Number of Positive Tests
Benzodiazepines	84
Alcohol	82
THC	69
Opioids	5
Codeine	2
Morphine	2
Unspecified opioid	1
Cocaine	2
GHB	21
Ketamine	2
Paracetamol	27
Antipsychotic/Antidepressant	8 /7
Others	7

Drug Levels:
There was some variation in the average blood levels for the psycho-stimulants between the presentation groups (Table 114). Generally, the higher levels were seen in Illicit Drug Users. The exception was MDMA where the highest average levels were seen in victims of Drink Spiking.

Table 114: Average blood drug levels for each of the major psycho-stimulants within the group and for each presentation category.

Drug	Presentation Category			
	Self-Harm	Illicit Drug Use	Drink Spiking	Unknown
Amphetamine	0.045	0.043	0.04	0.052
Methamphetamine	0.097	0.143	0.115	0.266
MDMA		0.31	0.34	0.01
Phentermine	0.2	0.24		
Pseudoephedrine	2.195	0.32		0.12

(Concentrations all in mg/L)

The highest blood level of methamphetamine recorded was 1.5 mg/L in a Caucasian male aged in his mid 20s. This level is well above the potentially toxic range (Table 115). He presented during the early hours, following a blunt assault at his own home. He admitted to using crystal methamphetamine orally prior to presentation. He admitted to using methamphetamine, and THC daily and had been an IDU. He was triaged as a priority 2 and assessed by the trauma team. His observations were essentially normal apart from being in an agitated state. He was transferred to the ward and discharged home after 4 days. Blood drug analysis also tested positive for amphetamine (0.15mg/L, probably as a metabolite of the methamphetamine) and paracetamol.

The highest recorded level of MDMA was 1.2 mg/L, which is potentially lethal. The patient was Caucasian, female, and aged in her early 20s. She presented via ambulance late one evening from a private party following the ingestion of 2 tablets, and an unknown amount of GHB (self-administered). Upon arrival she was noted to be hypothermic (temperature 33.2), with a GCS of 3 and size 8mm sluggishly reacting pupils. She was triaged as a priority 1 and seen in the resuscitation room, where she was treated with metoclopramide, oxygen and IV fluids. She did not require formal airway management but was transferred to HDU for observation. She was ultimately discharged home 8 days later. She subsequently tested positive for MDEA and GHB (92mg/L), in addition to the MDMA.

The highest level of amphetamine was 0.22 mg/L, which is within the toxic threshold. A female in her late 20s, she was brought by ambulance following a collapse. She was given a triage category of 1 on arrival and required a medical resuscitation team assessment. It was reported that she had ingested 30ml of GHB and used crystal methamphetamine intravenously at a private party. On arrival her GCS was 7, with dilated reactive pupils (7mm) and a depressed gag reflex. Her skin was flushed and she was experiencing apnoeic episodes. She was treated with oxygen and IV fluids and recovered sufficiently to be discharged home after 2 hours. She subsequently tested positive to GHB (86 mg/L, toxic range > 80 mg/L), near toxic levels of methamphetamine (0.17mg/L), oxazepam (0.04mg/L), nordiazepam and diazepam (0.20mg/L) and codeine (0.06mg/L).

Table 115: Highest detected blood drug levels of the psycho-stimulants with therapeutic and toxic ranges.

Drug	Blood Level	Therapeutic Range	Toxic Range
Methamphetamine	1.5	0.01 – 0.05	>0.2 (L > 2)
Amphetamine	0.22	0.05 – 0.15	>0.2 (L > 0.5 - 1)
MDMA	1.2	0.1 – 0.35	>0.35 (L > 0.4 – 0.8)
Pseudoephedrine	4	0.5 – 0.8	L > 19

(Concentrations all in mg/L. L = lethal levels. All ranges referenced from The International Association of Forensic Toxicologists, internet listing of Therapeutic and Toxic Drug Levels[17])

Drug Habit:
The history of drug use reported by patients testing positive to psycho-stimulants is shown in Table 116. Although data was only available from 191 patients (85%), a comparison of relative detection rates and volunteered usage rates can still be made. The proportional representation of the major drugs shown in this table closely matches those for the various enrolment categories generally (Tables 32, 49, 79) as well as across each of the various drugs of abuse.

Cigarettes and alcohol were the most commonly reported drugs used and their reported use was ‘frequent’ (daily or weekly). Benzodiazepine abuse, once again, was reported relatively infrequently compared to the actual rates of detection. Similarly, rates of detection for GHB were higher than reported rates of use, especially when compared to the other drug types.

Reported use of the psycho-stimulants was relatively evenly divided between methamphetamine and MDMA. The high reported use of ‘amphetamine’ compared to the relatively low rates of detection may be due either to patients using the term generically or to a

lack of precise knowledge of what it is they are taking. Of those patients reporting abuse of psycho-stimulants many did not specify the frequency of use.

Table 116: Frequency of drug use reported by patients testing positive to psycho-stimulants.

	Frequency of Use						
Reported Drug Use	Daily	Week	Month	Year	Not specified*	Past use only	Total responses
Alcohol	18	21	3		83		125
Cigarettes	60	2			4		66
Cannabis	15	3	1	2	19		40
Amphetamines	5	5	3		38		51
Methamphetamine	8	6	4		63		82
MDMA (ecstasy)		1	1		35	2	39
Benzodiazepines	8	2			6		16
Heroin	1	3			16	1	21
GHB/Fantasy	2	3	1		15		21
Cocaine			1		26		9
Ketamine					3		3
LSD/Acid					5		5
Solvents			1		1	2	1
Mushrooms					2	2	2
Opiates	2				7	2	9

(*Stated drug used but frequency of use not recorded) (data not recorded for all patients)

The incidence of injecting drug abuse previously documented in case records of patients testing positive for psycho-stimulants was high (35% of patients, Table 117). Of these there was also a high incidence of hepatitis C (13% of all psycho-stimulant-positive enrolments), particularly in proportion to the number of cases of hepatitis B (<1%).

Table 117: Number of patients with previously documented injecting drug use and transmissible viral disease, among patients testing positive for psycho-stimulants.

Behaviour	Number of Patients
IV Drug Use	79 (35)
Hepatitis B positive	2 (<1)
Hepatitis C positive	30 (13)

Pill Descriptors:

Although details of the tablets ingested were only infrequently recorded, results of blood drug concentrations obtained in the 4 cases where descriptions were given are shown in Table 118. All pills contained MDMA however, 2 patients tested positive to methamphetamine as well. It is uncertain if methamphetamine and MDMA were present in the same tablets, which according to SAPOL analysis of drug seizures is uncommon, or if these patients had taken additional

tablets they did not mention. Once again the dangerously high level of MDMA detected is highlighted, with 2 of the 4 patients having levels in the potentially lethal range.

Table 118: Qualitative and quantitative blood test results of patients from whom an accurate tablet description was given.

Logo	Where consumed	Colour	Result	Level detected in patient sample
Mitsubishi	Unknown	Green	MDMA MDEA	0.05
Apple	Party	Orange	Methamphetamine MDMA	0.02 0.41
Leaf	Unknown	Green	Methamphetamine MDMA	0.02 0.41
K+	Night club	Purple	MDMA	0.10

(Concentrations in mg/L)

Clinical Correlates:
Relevant data on the clinical correlates for patients testing positive for psycho-stimulants has also been reviewed in “Clinical Correlates” of Section I.

Medical History:
There were 192 data entries specific to past medical or psychiatric illness. Of these 27% were psychiatric in nature compared to only 8% being chronic medical conditions (Table 119); These figures correspond to those for Illicit Drug Users generally and for alcohol users, but contrast with those for patients testing positive for benzodiazepines and opioids (approximately 64% and 51% respectively); THC users appear to have an incidence of psychiatric illness midway between the two (36%). The high proportion of psychiatric illness in patients presenting intoxicated as a result of drugs of abuse was highlighted in the examination of the whole data set (Tables 10 & 11). There was no difference between methamphetamine, amphetamine or MDMA in this regard. 25% of patients were noted to have formal documentation of chronic substance abuse disorder.

Table 119: Incidence of past history of psychiatric, drug abuse/dependency, and chronic medical illness in psycho-stimulant-positive enrolled patients.

Recorded Past Medical/Psychiatric Illness	Number of Patients
Psychiatric Illness	60 (27)
Drug abuse or dependency	56 (25)
Other Significant Medical	19 (8)
Behavioural issues	3 (1)
Total number of recorded entries*	192

(*Patients may have had more than one medical or psychiatric condition. Data was not recorded for all patients enrolled)

Presenting Complaint:
The primary clinical reason for attending the ED was recorded in all 224 patients (Table 120). The large majority were classified as having presented due to psycho-social issues related to drug misuse. These presentations included formal psychiatric illness, situational crises, and behavioural issues such as violence or threatening behaviour requiring police intervention and medical assessment.

Violence and trauma was a feature of the presentations of patients intoxicated with psycho-stimulants. In addition to the cases of violent behaviour included in the 'psycho-social' classification, 27 patients (12%) presented as a result of multiple trauma of sufficient severity to warrant specialist Trauma Team assessment, and 33 patients (15%) were the victims of trauma to an isolated body area. Twenty three patients (10%) attended as a result of involvement in a motor vehicle accident. Contrary to a popular perception amongst some users of MDMA being a "love drug", there was little difference between the individual psycho-stimulants in terms of association with violence and trauma.

Table 120: Major presenting complaint clinical system of patients testing positive to psycho-stimulants.

System of Presenting Complaint	Number of Patients (%)
Psycho-social	94 (42)
Poisoning	20 (9)
Multi-trauma	27 (12)
Neurological	20 (9)
Cardiovascular	15 (7)
Single trauma	33 (15)
Gastrointestinal	5 (2)
Other	10 (4)
Total	224

(Multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not requiring trauma team assessment)

Triage Category:
A total of 139 patients (61%) were assigned a triage category of 1 or 2, indicating a severity of illness on arrival to hospital requiring immediate or urgent (within 10 minutes) medical assessment (Table 121). There was no difference between the individual drugs.

Table 121: Number of psycho-stimulant-positive patients assigned to each triage category.

Triage Category	Number of Patients
1	48 (21)
2	91 (41)
3	71 (32)
4	13 (6)
5	1 (<1)
Total	224

Clinical Vital Signs:
Data on recorded clinical vital signs for psycho-stimulants as a group is shown in Tables 122 and 123. An abnormal heart rate (rate > 100 (tachycardia) or < 60 (bradycardia) bpm) was the most frequently detected abnormal clinical vital sign; 10 patients (5%) had rates likely to be clinically significant (rate > 150 or < 60 bpm).

Only 4 patients were hypotensive (blood pressure < 90) and likely to have been in a shocked state. Thirty-five patients (16%) had a blood pressure of greater than 150mmHg.

Signs suggestive of profound depression of respiratory function were seen in 3 patients with a respiratory rate < 10 and 9 patients with a blood oxygen saturation of less than 90%. These are more typically signs of opiate, alcohol, or benzodiazepine abuse, and when evident in patients abusing psycho-stimulants may represent profound toxicity in conjunction with depression of conscious state.

Eight patients had hyperthermia (temperature > 37.5ºC) and 15 hypothermia (temperature < 35ºC).

Tables 122 and 123: Clinical vital signs measures in psycho-stimulant users.

Pulse Rate	No. Patients (%)
Not recorded	4 (2)
<60	8 (4)
60-100 (NR)	122 (54)
101-150	88 (39)
>150	2 (1)

RR	No. Patients (%)
Not recorded	10 (4)
<10	3 (1)
10 to 20 (NR)	167 (75)
21-30	40 (18)
>30	4 (2)

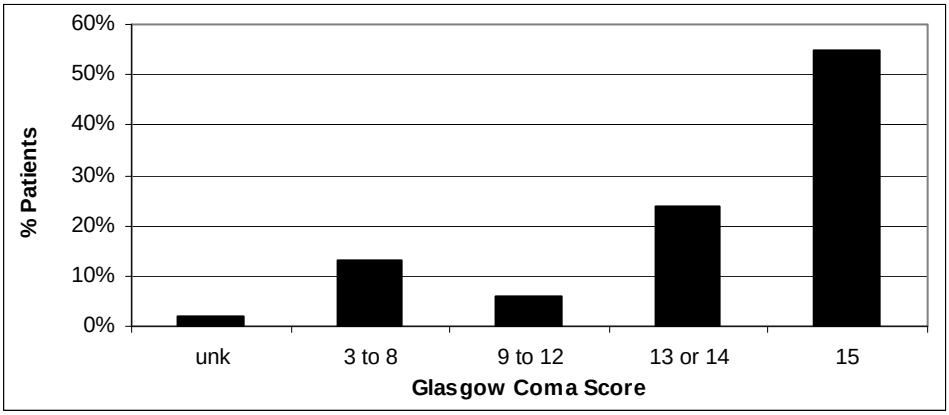
Systolic BP	No. Patients (%)
Not recorded	9 (4)
<90	4 (2)
90-150 (NR)	176 (79)
150-200	35 (16)
>200	0

Oxygen Saturation	No. Patients (%)
Not recorded	25 (11)
<85	6 (3)
85-90	3 (1)
91-95	29 (13)
96-100 (NR)	161 (72)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The GCS allocated to patients testing positive to psycho-stimulants are depicted in Figure 31. Of the 220 patients in whom it was recorded 10 (4%) had a GCS of 3 reflecting the deepest level of unconsciousness, and 28 (13%) were classified in the range 3 to 8 (‘severely’ depressed conscious state, generally requiring urgent management of the patients’ airway).

Figure 31: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).



Disposition from the ED:
Approximately 44% of psycho-stimulant users were admitted to hospital (Table 124), which is similar to Illicit Drug Users as a whole (40% admission rate). Intensive care or high dependency admission was required in 21 patients (9%). Ultimately, approximately 85% of patients were discharged to home from hospital (Table 125). One patient died, 1 required long term rehabilitation and 13 required treatment in an external psychiatric facility.

Tables 124 and 125: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	118 (53)
Admitted	99 (44)
EECU	34 (15)
General Ward	30 (13)
ICU/HDU	21 (9)
Spinal Unit	2 (<1)
Psych. Ward	12 (5)
Transferred	7 (3)

Disposition from Hospital	Total (%)
Home	191 (85)
Absconded/Left AMA	10 (4)
Psych services	13 (6)
SAPOL custody	6 (3)
Rehabilitation	1 (<1)
Died	1 (<1)
Other	2 (<1)

IICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

Fatalities:
There was 1 fatal case, which is discussed in Section I: Overview and Combined Results, Fatalities.

Summary:

Enrolments:

- Of the 1279 enrolled patients returning positive drug tests, a total of 224 patients (18%) tested positive to a psycho-stimulant.

Demographics:

- Almost 90% of patients were Caucasian. Although psycho-stimulants were detected in 12 of the 64 Indigenous patients (19%), this represented only 5% of all patients testing positive to these drugs.
- The average age of patients testing positive for psycho-stimulants was 28.4 years
- 3% of psycho-stimulant positive patients were less than 18 years of age
- Patients testing positive to MDMA were on average more than 4 years younger than those testing positive to methamphetamine
- Male to female ratio of psycho-stimulant positive patients was 3:2 other than for those under 18 years of age where it was reversed
- The most likely time of presentation was between midnight and 6am Sunday
- 58% presented between 6pm Friday and 6am Monday
- Over 30% of psycho-stimulant exposures occurred in a private residence and only 15% occurred in a licensed premises
- 14% of MDMA exposures occurred in a private residence and 42% in a licensed venue.

Patterns of Drug Use:

- Rates of psycho-stimulant detection were much greater than pre-study predictions (18% compared to predicted 5%) which likely represents a marked increase in use over this time
- There was a slight fall in psycho-stimulant detection rates compared to the previous 12-month period (18% from 22%).
- A total of 374 drug tests positive for psycho-stimulants were returned in the 224 patients at an average of 1.66 amphetamines per patient
- Methamphetamine was the most frequently detected psycho-stimulant (48%) followed by amphetamine (23%) and MDMA (17%).
- Much of the amphetamine detected is likely a result of metabolism of methamphetamine
- Small numbers of MDEA positive results were returned and were most likely additives/contaminants to MDMA tablets. MDA was most likely present as a metabolite of MDMA
- There were 307 tests positive to drugs other than psycho-stimulants in this group of which 27% were benzodiazepines, 27% alcohol, 22% THC, 2% opioids.
- 21 of the 30 GHB results were also positive for psycho-stimulants
- Some of the highest blood levels of MDMA and methamphetamine were detected in victims of Drink Spiking
- 35% of patients testing positive to a psycho-stimulant were IDU
- 13% of patients were Hepatitis C positive.

3.3.3 Benzodiazepines

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests, a total of 409 patients (32%) tested positive to benzodiazepines. This compares with our pre-study estimated detection rate of 25%. The number of patients testing positive was second only to alcohol with 776 patients (Table 6). A total of 595 tests positive for a benzodiazepine were returned on the 409 patients.

Demographic details:
Ethnicity:
The distribution of benzodiazepine-positive patients across the ethnic groups is shown in Table 126. Just under 90% of patients were Caucasian. Benzodiazepines were detected in 29 Indigenous patients, representing only 7% of all patients testing positive to these drugs. However, this represented a detection rate of 45% amongst the Indigenous patient group (29 of the 64 patients), considerably higher than amongst Caucasians. There appeared to be little difference in selection of the various benzodiazepines between the ethnic groups.

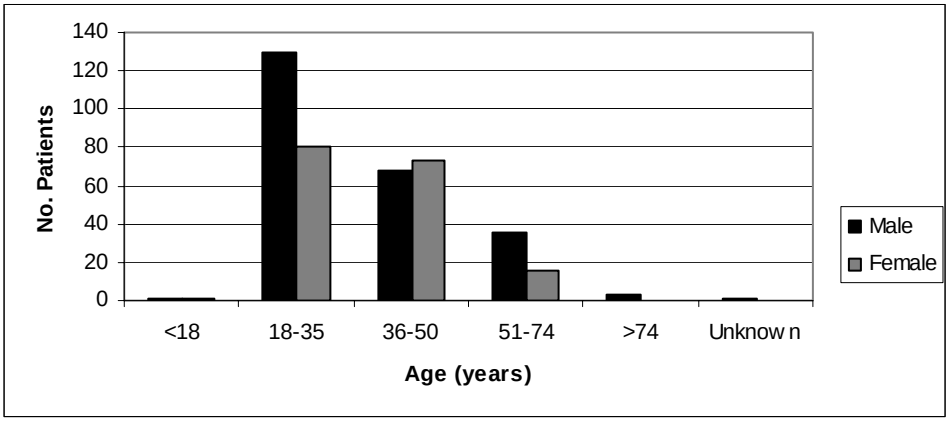
Table 126: Ethnicity of patients testing positive to benzodiazepines.

Ethnicity	Total (%)
Caucasian	366 (89)
Indigenous	29 (7)
Asian	5 (1)
Arab	1 (<1)
Other/unknown	8 (2)
Total	409

Age and Gender:
Only 2 patients testing positive to a benzodiazepine were under 18 years of age (<1% of all benzodiazepine-positive patients) (Figure 32). The average age of patients was 36.3 years, the oldest of all drug groups. Male users of benzodiazepines were on average, just over 1½ years older than females (36.6 years compared to 35.6 years respectively).

As with drug positive enrolments generally, more males returned benzodiazepine-positive tests than females. However, this male predominance was much less pronounced than with other drug types with an overall ratio of approximately 5 males to 4 females.

Figure 32: Age and gender distribution of patients testing positive to benzodiazepines.



There was some variation in gender and age between the specific benzodiazepines. Females outnumbered males only in those positive for temazepam. The temazepam group were, on average, the oldest (37.9 years) and those testing positive for clonazepam had the biggest difference in average age between the genders (male 39.2 and females 36 years). Those testing positive for nordiazepam constituted the biggest group (53% of all benzodiazepine tests), with almost no difference between the ages of the genders (males 35.8, females 35.9 years).

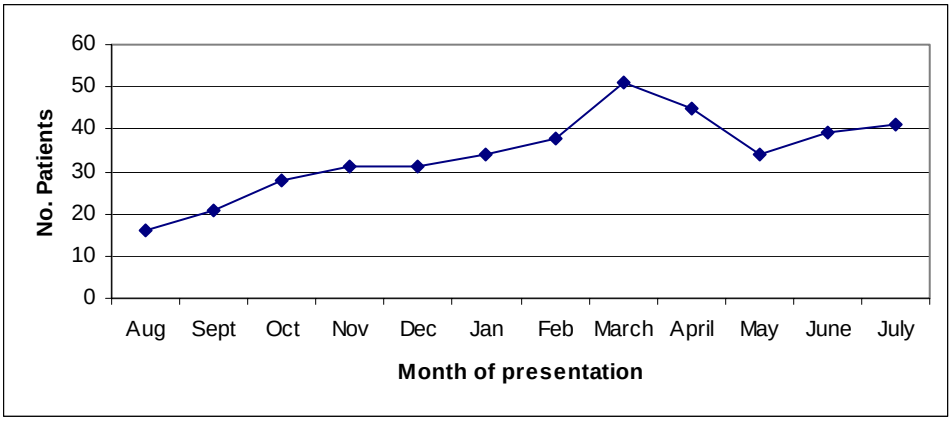
Time of Presentation:
The most likely time of presentation to the ED was between 6 pm and midnight on a Wednesday (Table 127). The proportion presenting between 6 pm Friday and 6 am Monday (36%) was much less than that seen with other drug types. There was a much more even distribution of benzodiazepine-positive patient presentations across the week although the large majority still presented 'out of hours' (233 of 409 patients (57%) between 1800 and 0600).

Table 127: Day and time of presentation to the ED of patients testing positive to benzodiazepines.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0001-0559	15	7	8	12	12	16	16	86 (21)
0600- 1159	9	4	6	9	6	16	7	57 (14)
1200-1759	12	22	20	15	16	11	23	119 (23)
1800-2400	20	17	21	27	22	18	22	147 (36)
Total (%)	56 (14)	50 (12)	55 (13)	63 (15)	56 (14)	61 (15)	68 (17)	409

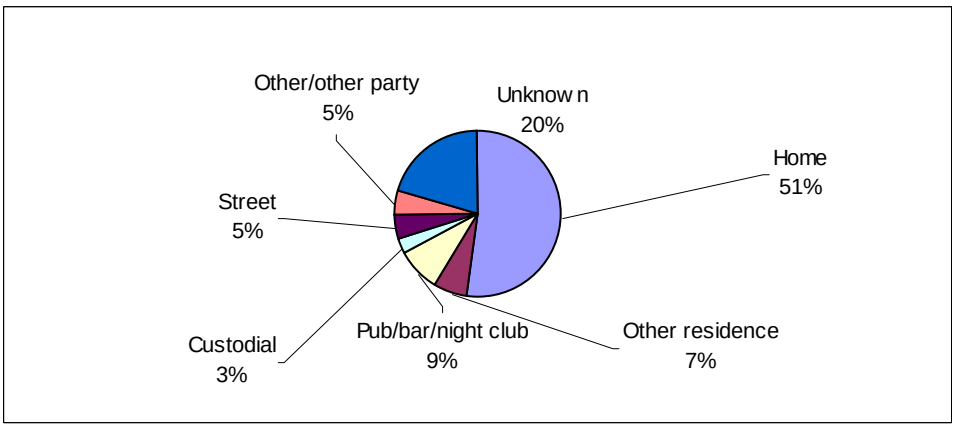
There was perhaps more variation in monthly enrolments of patients testing positive to benzodiazepines (Figure 33) than with enrolments generally. There also appears to be a trend to increased benzodiazepines-related presentations between March and June, somewhat later than that seen with alcohol or amphetamine-related presentations.

Figure 33: Number of patients testing positive to a benzodiazepine enrolled per month.



Venue of exposure and mode of transport to ED:
The venue of benzodiazepine exposure was recorded in 80% of patients and is shown in Figure 34. Almost 60% of exposures occurred in a private residence, usually the patient's home; only 9% of exposures occurred in a licensed premises, the smallest proportion of any of the major drug groups other than opioids.

Figure 34: Venue of drug exposure for patients testing positive to a benzodiazepine.



Mode of transport to the ED was mostly via ambulance services (Table 128). This is broadly consistent with mode of arrival patterns seen in other study enrolment categories.

Table 128: Mode of arrival to the ED for patients testing positive to benzodiazepines.

Mode of Arrival	Number of Patients (%)
Ambulance	305 (75)
Police/Custodial	30 (7)
Private car	45 (11)
Walked in	9 (2)
Taxi	9 (2)
Unknown/Other	11 (2)
Total	409

Patterns of Drug Use:
Benzodiazepines were detected in 409 patients, the second highest number of drug-positive patients (32% of drug-positive enrolments) after alcohol (Table 6). This rate of detection is slightly higher than our pre-commencement estimate of 25% of enrolments based on data from the review by the Hazardous Substances Section of the Environmental Health Service of South Australia on poisoning cases assessed at the RAH 2002[1] (see "Methods: Outcome Measures"). This rate of detection is slightly lower than seen in the previous 12- month period (35% of drug-positive enrolments in 2004/2005).

It had been expected that most benzodiazepine-positive patients would present to the ED intoxicated or poisoned in association with Self-Harming behaviour given the close association between the prescription of these drugs and mood related disorders. Surprisingly, almost half of the patients testing positive for benzodiazepines presented as a result of Illicit Drug Use. It is probable this reflects a major problem with diversion of these prescription drugs for non-medical drug use (Table 129). None-the-less, the proportion of patients presenting as a result of Self-Harm was greater in the benzodiazepine-positive group of patients than for any other drug type.

Table 129: Number of patients testing positive to a benzodiazepine enrolled in each presentation category.

Presentation Category	Number of Patients (%)
Illicit Drug Use	185 (45)
Self-Harm	185 (45)
Unknown	31 (8)
Other	5 (1)
Drink Spiking	3 (<1)
Total	409

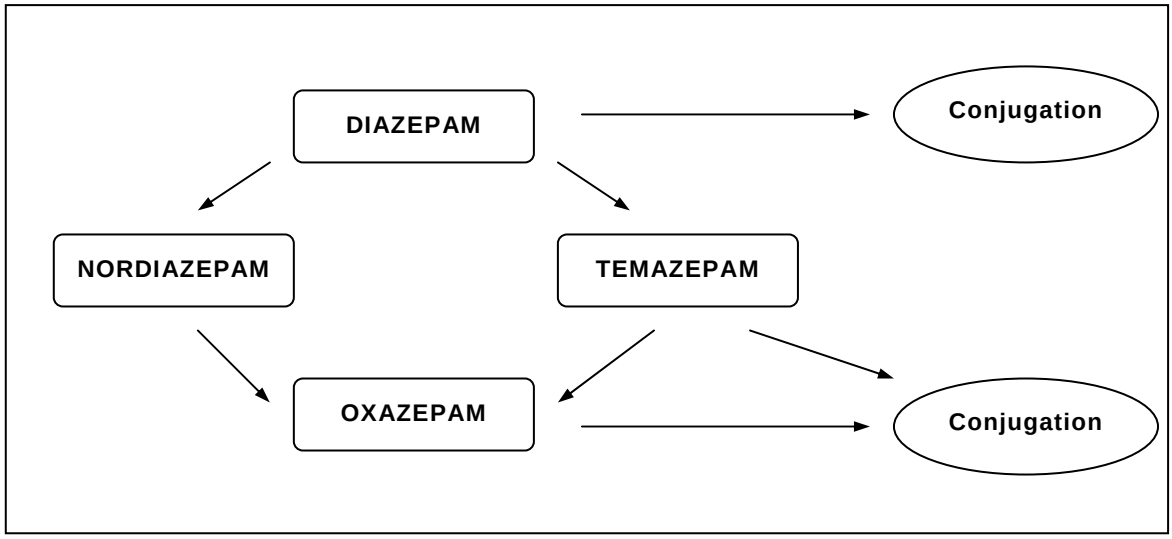
Benzodiazepines, which are widely held to be common agents used for Drink Spiking, were only detected in 3 (5%) enrolled victims of Drink Spiking (Table 61). Not only was this type of drug infrequently seen in these patients, but the actual benzodiazepines detected were unexpected; in all of the cases the drug detected was diazepam or its principle metabolite nordiazepam. This contrasts with perceptions that the shorter-acting benzodiazepines such as flunitrazepam (Rohypnol) are typically employed for Drink Spiking. In all 3 cases the benzodiazepines were detected in combination with alcohol (Table 64).

As has been previously discussed, it is likely that the majority of patients in the Unknown presentation group were the result of Illicit Drug Use. (See Section II "Unknown Drug Use").

A total of 595 benzodiazepine-positive tests were returned from the 409 patients. Of these, however, there were 315 samples testing positive to nordiazepam, which is a long acting by-product of the metabolism of diazepam and is not available as a proprietary formulation. As nearly all samples testing positive for diazepam also tested positive to nordiazepam, we have assumed that all cases of diazepam ingestion will have been included in the nordiazepam figures and, unless stated otherwise, excluded them from our calculations.

To further complicate matters, some marketed compounds may be products of metabolism of other marketed compounds (e.g. oxazepam is marketed as Murelax and may also be a product of both diazepam and temazepam metabolism). It is not possible for us to determine the number of blood samples testing positive for oxazepam that were due to ingestion of diazepam or temazepam only as against co-ingestion. As oxazepam is a frequently prescribed benzodiazepine we have made the assumption that all tests positive to oxazepam were due to ingestion of oxazepam rather than being present as a result of metabolism of another benzodiazepine parent compound. This will result in an overestimation of both the total number of benzodiazepine exposures and the number of oxazepam exposures (see Figure 35).

Figure 35: Metabolism of Diazepam.



Poly-substance abuse:
With the factors relating to metabolism discussed above taken into account, we have estimated the total number of benzodiazepine exposures to be approximately 595 in the 409 patients (Table 130). This equates to approximately 1.45 benzodiazepine exposures per patient. If we exclude all cases of oxazepam (88 samples) as possibly being the result of metabolism of a different parent compound, the average number of different benzodiazepine exposures per patient prior to presentation would still be 1.2. As an example of the abuse by patients of multiple drugs within the class, although nordiazepam was the sole benzodiazepine detected in 178 patients, it was detected with one or more other benzodiazepines in 136 cases (43%).

Table 130: Number of positive tests for individual benzodiazepines in each presentation category.

Drug Name	Presentation Category					Total (%)
	Self-Harm	Illicit Drug Use	Drink Spiking	Other	Unknown	
Diazepam/ Nordiazepam*	135	151	3	3	23	315 (53)
Temazepam	43	17		1	6	67 (11)
Oxazepam	48	35		1	4	88 (15)
Alprazolam	30	43		2	9	84 (14)
Clonazepam	7	5		0	0	12 (2)
Nitrazepam	10	4		0	1	15 (3)
Lorazepam	7	2		0	1	10 (2)
Bromazepam	3	0		0	0	3 (1)
Triazolam	0	0		0	1	1 (<1)
Total	283	257	3	7	45	595

(*major metabolite of diazepam)

In addition to the benzodiazepines, the 409 patients also returned a total of 555 tests positive for other drugs (Table 131). Approximately 47% of these patients tested positive to alcohol, 27% to THC, 8% to an opiate, and 14% to psycho-stimulants. The proportion of results positive for ecstasy (MDMA) and related 'party drugs' such as GHB, ketamine, cocaine and LSD was less than that seen in patients in the other drug groups. Just over 16% of patients testing positive for a benzodiazepine also tested positive to an antidepressant, however only 4% returned positive tests for an antipsychotic drug.

The relatively low detection rates of ecstasy and related drugs, and high detection rates of antidepressants in this group of patients likely reflects the higher incidence of patients presenting due to Self-Harm rather than Illicit Drug Use. Additionally, because of an older average age (other than for opioids) patients testing positive for benzodiazepines might be argued to be more likely to suffer physical and mental illness, in part explaining some of these drug use patterns. This latter though would seem marginal given the small differences in average ages.

Table 131: Incidence of other drugs detected in patients testing positive for benzodiazepines.

Drugs Detected	No. Tests (% patients)
Alcohol	191 (47)
THC	111 27)
Psychostimulants (the group)	82 (58)
Amphetamine	20
Methamphetamine	54
MDMA	4
Pseudoephedrine	2
Opioids	42 (34)
Methadone	6
Morphine	11
Dextropropoxyphene	2
Norpethidine*	1
Codeine	21
Unspecified opioid	1
GHB	5
Cocaine	2
Antipsychotics	16 (15)
Antidepressants	69 (66)
Other pharmaceutical	37 (34)
Non pharmaceutical	2 (1)
Total	555

(*metabolite of pethidine)

Drug levels:

There was some variation in the average blood levels for the benzodiazepines between the enrolment groups (Table 132). In addition to the surprisingly low incidence of benzodiazepine detection in victims of Drink Spiking, the blood levels were also comparatively quite low. The highest recorded blood level of a benzodiazepine was in a person attempting self-harm. He reported taking 7 oxazepam tablets with a level of 7.0mg/l, well within the toxic range. He also reported taking Sertraline (Zoloft) (Table 133).

Table 132: Average blood drug levels for some of the major benzodiazepines for each presentation category.

	Presentation Category			
Drug	Self-Harm	Illicit Drug Use	Drink Spiking	Unknown
Nordiazepam*	0.23	0.28	0.053	0.12
Clonazepam	0.09	0.16	0	0
Oxazepam	0.73	0.69	0	0.47
Alprazolam	0.19	0.19	0	0.14
Temazepam	0.74	0.17	0	0.45

(concentrations in mg/L)(*major metabolite of diazepam)

Table 133: Highest detected blood drug levels of the benzodiazepines with therapeutic and toxic ranges.

Drug Name	Blood Level	Therapeutic Range	Toxic Range
Diazepam	3.2	0.12 – 0.5	> 1.5 (L > 5)
Nordiazepam*	1.97	0.2 – 0.8	1.5 – 2
Temazepam	3.0	0.3 – 0.9	> 2 (L > 8)
Clonazepam	0.3	0.02 – 0.07	> 0.1
Oxazepam	7.0	0.5 – 2	> 2 (L > 3 – 5)
Alprazolam	1.3	0.005 – 0.05	0.1 – 0.4

(Concentrations all in mg/L. L = lethal levels. All ranges referenced from The International Association of Forensic Toxicologists, internet listing of Therapeutic and Toxic Drug Levels[17].) (*major metabolite of diazepam)

Drug Habit:

The history of drug use reported by patients testing positive to benzodiazepines is shown in Table 134. The proportional representation of the major drugs shown in this table is similar to those for the various enrolment categories generally (Tables 32, 49, 79) as well as across the various drugs of abuse.

Table 134: Frequency of drug use reported by patients testing positive to benzodiazepines.

	Frequency of Use							
Reported Drug Use	Never	Daily	Week	Month	Year	Not specified*	Past use only	Total Responses
Alcohol	1	77	22	2		127		229
Cigarettes		108	2			9	1	120
Benzodiazepines		33	4			39		76
Cannabis		19	5	2		48	1	75
Amphetamines		3	4	4		29	1	41
Methamphetamine		3	5	2	1	58		69
MDMA (ecstasy)				1	1	15		17
Heroin		4	5	2		40	5	56
GHB/Fantasy		1	1		1	4	1	8
Cocaine					2	10		12
Ketamine					1	2		3
LSD/Acid						4		4
Mushrooms						3		3
Solvents				1		1		2
Opiates				1		19	1	29

(*Stated drug used but frequency of use not recorded) (data not recorded for all patients)

Data on drug use was obtained from 321 of the 409 patients (78%) in the group with a total of 903 responses giving an average of 2.95 drugs used per patient in the group. Cigarettes, alcohol and cannabis were the most commonly reported drugs used and their reported use was

typically daily. Similarly, the reported frequency of use of benzodiazepines was also most commonly given as daily or not specified. By contrast, use of amphetamines, ecstasy and related drugs tended to be weekly. This pattern was also evident among Illicit Drug Users generally, as well as in the Self-Harm group.

The incidence of injecting drug abuse previously documented in case records of patients testing positive for a benzodiazepine was surprisingly high (30% of patients, Table 135), which was the same as that seen in patients testing positive for psycho-stimulants. Of these 47% were hepatitis C positive. In contrast, only 4% were hepatitis B positive. The IDRS shows substantial benzodiazepine use among IDU, with greater than 70% having used recently[12].

Table 135: Number of patients with previously documented injecting drug use and transmissible viral disease, among patients testing positive for benzodiazepines.

Behaviour	Number of Patients
IV Drug Use	122 (30)
Hepatitis B positive	7 (2)
Hepatitis C positive	71 (17)
HIV positive	2 (<1)

Clinical Correlates:
Relevant data on the clinical correlates for patients testing positive for benzodiazepines has also been reviewed in “Clinical Correlates” of Section I.

Medical History:
There were 757 data entries specific to chronic medical or psychiatric illness. Of these over 34% were psychiatric in nature compared to only 8% being chronic medical conditions (Table 136). 44% were noted to have documented chronic substance abuse. As previously noted, these figures correspond to those for Illicit Drug Users generally and for psycho-stimulant users, but contrast with those for patients testing positive for alcohol and opioids (approximately 50% past psychiatric illness).

Table 136: Incidence of past history of psychiatric, drug abuse/dependency, and chronic medical illness in benzodiazepine-positive enrolled patients.

Recorded Past Medical/Psychiatric Illness	Number of Patients
Psychiatric Illness	260 (64)
Drug abuse or dependency	179 (44)
Other Significant Medical	63 (15)
Behavioural	17 (4)
Total number of recorded entries*	757

(*Patients may have had more than one medical or psychiatric condition.. Data was not recorded for all patients enrolled)

Nordiazepam (major metabolite of diazepam), temazepam, and oxazepam were detected at proportionally similar rates across patients with a past history of psychiatric, medical illness or

drug abuse, whereas clonazepam, alprazolam and nitrazepam were not generally detected in patients with chronic medical illness.

Presenting Complaint:
The primary clinical reason for attending the ED was recorded in all 409 patients (Table 137). The large majority were classified as having presented due to psycho-social issues related to drug misuse. These presentations included formal psychiatric illness, situational crises, and behavioural issues such as violence or threatening behaviour requiring police intervention and medical assessment.

Violence and trauma was less of a feature than that seen with patients presenting intoxicated with amphetamines or alcohol (Table 97, Table 120). None-the-less, 11% of presentations were related specifically to trauma.

Table 137: Major presenting complaint clinical system of patients testing positive to a benzodiazepine.

System of Presenting Complaint	Number of Patients (%)
Psycho-social	213 (52)
Poisoning	53 (13)
Multi-trauma	12 (3)
Neurological	33 (8)
Cardiovascular	34 (8)
Single trauma	35 (8)
Gastrointestinal	9 (2)
Other	20 (5)
Total	409

(Multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not requiring trauma team assessment).

Triage Category:
A total of 211 patients (51%) were assigned a triage category of 1 or 2, indicating a severity of illness on arrival to hospital requiring immediate or urgent (within 10 minutes) medical assessment (Table 138). This was similar to that seen with the other drug groups except for GHB, which had a much higher average acuity level at the time of presentation. There was no difference between the individual benzodiazepines in this regard.

Table 138: Number of patients testing positive to benzodiazepines assigned to each triage category on arrival to the ED, according to presentation category.

Presentation Category	Triage Priority				
	1	2	3	4	5
Self-Harm	20	84	72	8	1
Illicit Drug Use	24	57	78	24	2
Drink Spiking	0	1	1	1	0
Unknown	11	11	8	1	0
Other	0	3	1	0	1
Total (%)	55 (13)	156 (38)	160 (39)	34 (8)	4 (<1)

Clinical Vital Signs:
Data on recorded clinical vital signs for benzodiazepines as a group is shown in Tables 139 and 140. An abnormal heart rate (rate > 100 (tachycardia) or < 60 (bradycardia) bpm) was the most frequently detected abnormal clinical vital sign; 16 patients (4%) had rates likely to be clinically significant (rate > 150 or < 60 bpm).

A fall in systolic blood pressure is a recognised complication of benzodiazepine toxicity, and 14 patients were hypotensive (blood pressure < 90) and likely to have been in a shocked state. Two patients had a blood pressure of greater than 200, which is not associated with benzodiazepine use, and almost certainly represents effects of concomitant use of a stimulant. Signs suggestive of profound depression of respiratory function, also expected in benzodiazepine toxicity, were seen in 15 patients with a respiratory rate < 10 and 12 patients with blood oxygen saturation (SaO2) of less than 90%; 6 patients were severely hypoxic with SaO2 less than 85%.

Eleven patients had hyperthermia (temperature > 37.5ºC) and 12 were hypothermic (temperature < 35ºC).

Tables 139 and 140: Clinical vital signs measures in patients testing positive for benzodiazepines.

Pulse Rate	No. Patients (%)
Not recorded	7 (2)
<60	16 (4)
60-100 (NR)	289 (71)
101-150	97 (24)
>150	0

RR	No. Patients (%)
Not recorded	20 (5)
<10	10 (2)
10 to 20 (NR)	329 (80)
21-30	48 (12)
>30	2 (<1)

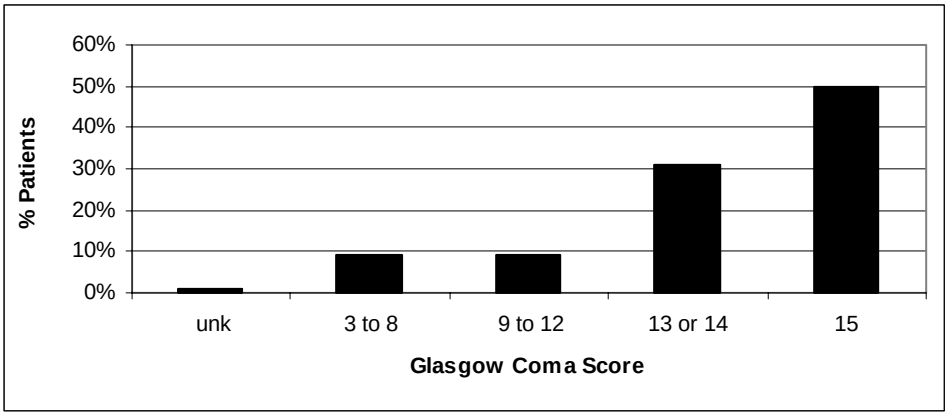
Systolic BP	No. Patients (%)
Not recorded	9 (2)
<90	14 (3)
90-150 (NR)	350 (86)
150-200	34 (8)
>200	2 (<1)

Oxygen Saturation	No. Patients (%)
Not recorded	45 (11)
<85	6 (1)
85-90	6 (1)
91-95	65 (16)
96-100 (NR)	287 (70)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The GCS allocated to patients testing positive to a benzodiazepine are depicted in Figure 36. Of the 404 patients who had a GCS recorded, 14 (3%) had a GCS of 3 reflecting the deepest level of unconsciousness, and 37 (9%) were classified in the range 3 to 8 ('severely' depressed conscious state, generally requiring urgent management of the patients' airway).

Figure 36: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe depression of conscious state), 9 to 12 (moderate depression), 13 to 14 (mild depression), 15 (normal).



Despite the protective effect of benzodiazepines against seizures 8 patients (2.5%) testing positive for these drugs were recorded as having seizure activity during the period of intoxication (Table 141). Of these, 7 patients had tonic-clonic seizures, 2 suffering multiple seizures. In all but 2 cases, patients tested positive to other drugs known to cause seizures when taken in overdose.

Table 141: Number of patients testing positive to benzodiazepines who suffered seizures during the period of intoxication.

Seizure Activity	Number of Patients (%)
Unknown	35 (9)
Nil	366 (89)
Myoclonus	0
Single Grand Mal	5 (1)
Multiple Grand Mal	1 (<1)
Total	409

Disposition from the ED:
Approximately 54% of patients testing positive to benzodiazepines were admitted to hospital (Table 142), reflective of the relatively high proportion of patients in this group presenting as a result of intentional Self-Harm (see Tables 55 and 39). Intensive care or high dependency admission was required in 48 patients. Ultimately, approximately 77% of patients were discharged home from hospital (Table 143). Two patient died (see details below), 40 required to be transferred to psychiatric facilities, and 1 was transferred to a long-term medical rehabilitation facility.

Tables 142 and 143: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	179 (44)
Admitted	221 (54)
EECU	102 (25)
General Ward	45 (11)
ICU/HDU	48 (12)
Cardiology	3 (<1)
Psych. Ward	23 (6)
Transferred	7 (2)
Unknown	2 (<1)

Disposition from Hospital	Total (%)
Home	315 (77)
Absconded	36 (8)
Psych services	40 (10)
SAPOL custody	9 (2)
Rehabilitation	1 (<1)
Died	2 (<1)
Other hospital	1 (<1)
Other/Unknown	6 (1)

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

Fatalities:
There were 2 deaths of enrolled patients who tested positive to a benzodiazepine during the study period. In one the nordiazepam level was 0.02 and was unlikely to have been the cause of death; this patient died as a result of self-administered paraquat. In the second case, the diazepam level was 0.20, within the therapeutic range of 0.12-0.5. A paracetamol level of 28

was also detected. The diagnosis at the time of transfer from the ED was hyperpyrexia, cause unknown, with a core temperature of 42 degrees Celsius. The presentation was classed as ‘unknown’ although the patient had a history of schizophrenia and self-harming behaviour. The role of the benzodiazepine is unclear in this case.

The fact that there were no deaths directly attributable to benzodiazepine toxicity is somewhat surprising given the fact that the highest recorded levels of each of the benzodiazepines were well above the cited potential fatal threshold (Table 134). In each of these cases at least one other drug was also found in clinically significant levels (Table 144), and in all cases these additional drugs were sedatives or have sedating effects in overdose. The Glasgow Coma Score was reduced in the 3 cases involving oxazepam, nordiazepam and clonazepam. In the oxazepam case the patient also had stridor on presentation, indicating partial airway obstruction. The nordiazepam case was hypotensive. This would suggest a degree of habituation to these drugs by these patients. Four of the cases presented as a result of deliberate Self-Harm, while 2 involved illicit drug use.

Table 144: Quantitative results of blood drug testing of patients returning the highest benzodiazepine levels.

Highest Level Benzodiazepine	Positive Toxicology	Blood Drug Level (mg/L)
Alprazolam	Diazepam	0.30
Self harm: 1.3mg/L	Nordiazepam	0.40
	Oxazepam	0.06
Diazepam	Alcohol	0.02
Self harm: 3.2mg/L	Temazepam	3.5
	Nordiazepam	0.44
	Oxazepam	0.05
	Nitrazepam	0.59
Oxazepam	Nordiazepam	0.02
Self harm: 7.0mg/L	Sertraline	0.04
Nordiazepam*	Alcohol	0.27
Illicit drug use: 1.97mg/L	Diazepam	1.0
	Temazepam	0.07
	Oxazepam	0.17
Clonazepam	Alcohol	0.07
Illicit drug use: 0.30mg/L	Amphetamine	0.01
	Diazepam	0.31
	Methamphetamine	0.10
	Morphine	0.06
	Codeine	0.01
	Oxazepam	0.70
Temazepam	Alcohol	0.22
Self harm: 3.0mg/L	Diazepam	0.50
	Paracetamol	40
	Nordiazepam	0.20

(*major metabolite of nordiazepam)

Summary:

Enrolments:

- Of the 1279 enrolled patients returning positive drug tests, a total of 409 patients (32%) tested positive to benzodiazepines
- The number of patients testing positive was second only to alcohol with 776 patients.

Demographics:

- 89% were Caucasian
- Benzodiazepines were detected in 29 Indigenous patients representing a detection rate of 45% of all drug positive Indigenous patients

- The average age of benzodiazepine-positive cases was 36.3 years
- <1% were under 18 years of age
- The male to female patient ratio was less than other groups at 5 to 4
- The most likely time of presentation was between 6pm and midnight on a Wednesday
- 36% presented between 6pm Friday and 6am Monday, the least of any group
- Just over 60% of drug exposures occurred in a private residence with only 9% in a licensed premises.

Patterns of Drug Use:

- Equal numbers of patients presented as a result of Illicit Drug Use and Self-Harm (45% each)
- The data suggests there is a major problem of diversion of these prescription drugs for recreational abuse
- A total of 595 benzodiazepine-positive tests were returned from the 409 patients.
- There were 555 tests positive to drugs other than benzodiazepines: 47% alcohol, 27% THC, 8% opioids, 14% psycho-stimulants
- 122 patients (30%) had documented past IDU, 47% of these were hepatitis C positive
- Generally, higher drug levels were seen in patients using drugs in association with Self-Harm.

3.3.4 Cannabis

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests, a total of 355 patients (28%) tested positive to THC, which approximates our pre-study estimated detection rate of 25%. The number of patients testing positive was second only to alcohol with 776 patients and benzodiazepines with 409 patients (Table 6).

The large majority of THC-positive patients (72%) were in the Illicit Drug Use enrolment group with only 13% of positive patients presenting as a result of intentional Self-Harm (Table 145). Higher proportional representation by the Illicit Drug Use group was seen only with GHB-positive patients (93% Illicit Drug Use) and with psycho-stimulants (80% Illicit Drug Use).

Table 145: Number of THC-positive patients in each presentation category.

Presentation Category	Number of Patients (%)
Illicit Drug Use	255 (72)
Self-Harm	45 (13)
Drink Spiking	7 (2)
Unknown	46 (13)
Other	2 (1)
Total	355

Demographic details:
Ethnicity:
The distribution of THC-positive patients across the ethnic groups is shown in Table 146. Just over 85% of patients were Caucasian. THC was detected in 34 Indigenous patients, representing only 10% of all patients testing positive to this drug. However, this represented a detection rate of 53% amongst the Indigenous patient group (34 of the 64 patients), the third highest after alcohol (53 patients, 83%) and benzodiazepines (29 patients, 45%, Table 104).

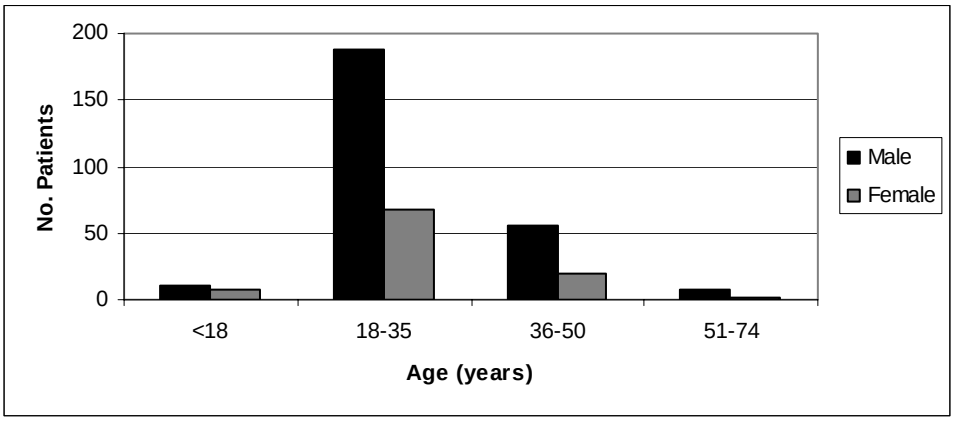
Table 146: Ethnicity of patients testing positive to THC.

Ethnicity	Total (%)
Caucasian	301 (85)
Indigenous	34 (10)
Asian	8 (2)
Other	12 (3)
Total	355

Age and Gender:
Seventeen patients testing positive to THC were under 18 years of age (5% of all THC-positive patients). The average age of patients was 29.6 years; less than that for opioids (35.6 years), benzodiazepines (36.3 years) and alcohol (31.8 years) but older than that for all other drug types. There was almost 3 years difference between the average ages for the genders.

As with drug positive enrolments generally, more males returned THC-positive tests than females (3 male to 1 female). This male predominance persisted across all age ranges unlike most other drug types (GHB was the exception) where this ratio reversed for those under 18 years of age (see Figure 37).

Figure 37: Age and gender distribution of patients testing positive to THC.



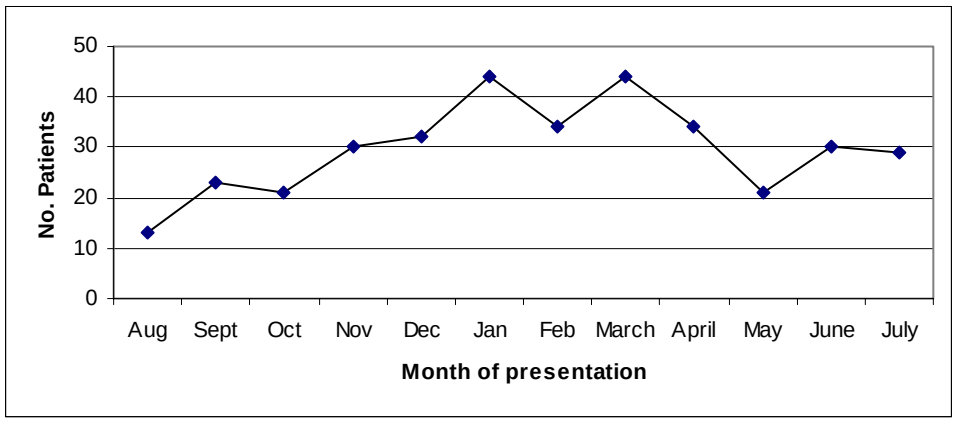
Time of Presentation:
The most likely time of presentation to the ED was between 6 pm and midnight on a Saturday or Sunday between midnight and 6 am (Table 147). The proportion presenting between 6 pm Friday and 6 am Monday (42%) approximated that seen for Illicit Drug Users as a whole (40%, Table 25).

Table 147: Day and time of presentation to the ED of patients testing positive to THC.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0001-0559	23	4	10	10	9	12	28	96 (27)
0600-1159	7	6	5	4	9	16	10	57 (16)
1200-1759	10	9	14	10	10	12	14	79 (22)
1800-2400	21	14	19	14	23	16	16	123 (35)
Total	61 (17)	33 (9)	48 (14)	38 (11)	51 (14)	56 (16)	68 (19)	355

The pattern of monthly enrolments of patients testing positive to THC showed a general rise in numbers over the summer months, peaking in December and April (Figure 38). The overall pattern was similar to that for alcohol (Figure 22) and psycho-stimulants (Figure 27), but contrasted with benzodiazepine monthly presentation rates (Figure 33).

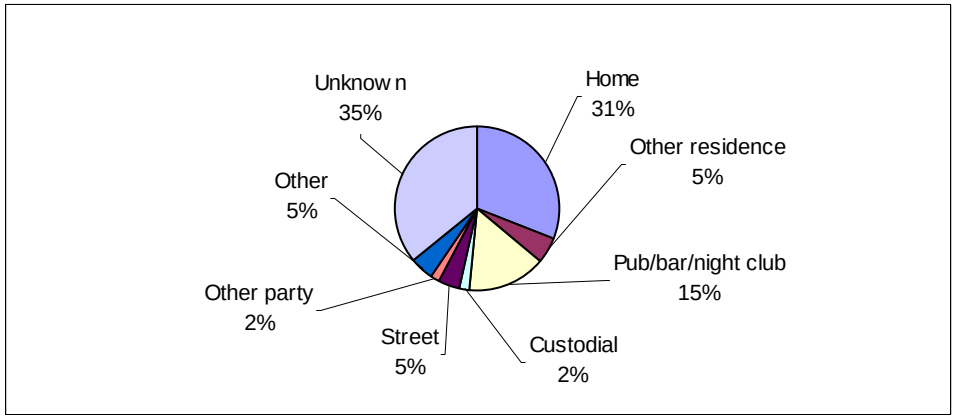
Figure 38: Number of patients testing positive to THC enrolled per month.



Venue of exposure and mode of transport to ED:

The venue of THC exposure was known in 228 (64%) patients and is shown in Figure 39. Over 36% of exposures occurred in a private residence, usually the patient's home. Only 15% of exposures occurred in a licensed premises, while 5% stated that they used the drug 'on the street'. These figures contrast with those for both alcohol and psychostimulants, with approximately 26% of exposures in licensed premises (Figures 23 & 28), and with benzodiazepines with only 9% (Figure 34).

Figure 39: Venue of drug exposure for patients testing positive to THC



Mode of transport to the ED was mostly via ambulance services (Table 148). This is broadly consistent with mode of arrival patterns seen in other study enrolment categories other than perhaps victims of Drink Spiking.

Table 148: Mode of arrival to the ED for patients testing positive to THC.

Mode of Arrival	Number of Patients (%)
Ambulance	247 (70)
Police/Custodial	27 (8)
Private car	40 (11)
Walked in	25 (7)
Taxi	7 (2)
Unknown/Other	9 (3)
Total	355

Patterns of Drug Use:
Analysis of patients' blood in this study was for the parent compound THC, rather than for its longer lasting metabolite THC acid. Measurement of the former is more indicative of acute use and intoxication, whilst the latter may indicate use up to a week prior to testing.

Just over 70% of patients testing positive to THC presented to the ED as a result of Illicit Drug Use (Table145) and THC was detected in 33% (255 of 781 patients) of all enrolled Illicit Drug Users. By comparison, the frequency of THC detection in the Self-Harm group was 14% and was 12% among victims of Drink Spiking.

Poly-substance abuse:
As can be seen from Table 149, THC was not uncommonly detected in isolation (19%) in enrolled patients (and therefore, by definition, determined to be clinically intoxicated or drug affected). This is contrary to the popular perception that THC, in isolation, rarely leads to intoxication or toxicity sufficient to indicate ED attendance, that it is the co-ingestants that cause the significant symptomatology. Additionally, it is possible that patients with a psychosis precipitated or aggravated by THC may not have been enrolled into the study, as they did not fit the classic mould of "intoxication", thereby lessening the apparent association with THC in these results.

Table 149: Number of occasions THC was detected alone or with other drugs.

Number of Drugs	Number of Patients
THC only	68 (19)
THC + 1 other	140 (39)
THC + 2 others	100 (28)
THC + 3 others	36 (10)
THC + >3 others	11 (3)

Poly-substance abuse was clearly frequent in those testing positive to THC. In addition to the THC tests, a total of 539 positive drug tests[m] were returned on the 355 patients. This equates to an average of 1.52 positive drug tests (including THC) per patient; 11% of patients tested positive to 3 or more drugs additional to the THC (Table 149). The most commonly detected drugs are shown in Table 150. The relative representation of the major drug groups follows a

[m] *Excludes diazepam and amphetamine – see discussions "Poly-substance Abuse", Section II "Amphetamines" and "Benzodiazepines".*

similar pattern to that seen among Illicit Drug Users other than for a reversal of benzodiazepines and alcohol (Table 27). This latter was a feature of the Self-Harm presentation group (Table 44).

Table 150: Incidence of other drugs detected in patients testing positive for THC.

Drugs Detected	Number of tests (Number of patients)
Benzodiazepine (group)	166 (111)
Alcohol	166
Psycho-stimulants (group)	69
Amphetamine	25
Methamphetamine	60
MDMA	18
Pseudoephedrine	1
MDA	6
Opioids (group)	10
Codeine	5
Methadone	1
Morphine	4
Norpethidine*	2
GHB	6
Ketamine	2
Cocaine	3
Antipsychotic/antidepressant	16 (15)
Pharmaceutical	10 (10)
Paracetamol	48

(*metabolite of pethidine)

Drug levels:

There was some variation in the average blood levels for THC between the enrolment groups (Table 151). The highest levels were seen in the alleged Drink Spiking and Unknown groups.

Table 151: Average blood THC levels for each presentation category (µg/L).

Presentation Category	THC Level
All Patients	6.6
Illicit Drug Use	6.15
Self-Harm	4.91
Drink Spiking	10.43
Accidental Poisoning	3.0
Suspected	10.41

Drug Habit:

The history of drug use reported by patients testing positive to THC is shown in Table 152. The proportional representation of the major drugs shown in this table is similar to those for the

various enrolment categories generally (Tables 32, 49, 79) as well as across most of the drugs of abuse.

Table 152: Frequency of drug use reported by patients testing positive to THC.

Reported Drug Use	Frequency of Use						Total Responses
	Daily	Week	Month	Year	Not specified*	Past use only	
Alcohol	51	30	2		131		214
Cigarettes	95	2			5		102
Benzodiazepines	14				16		30
Cannabis	60	10	2	2	81	2	157
Psychostimulants	7	6	4		33		50
Methamphetamine	10	7	3	1	49	1	71
MDMA (ecstasy)		4		1	14		19
Heroin	3	5	2		29	4	43
GHB/Fantasy	3	1		1	5		10
Cocaine		1		2	8		11
Ketamine				1	2		3
LSD/Acid					8		8
Mushrooms					4		4
Solvents			1		1		2
Opiates	5		1		12	2	20

(*Stated drug used but frequency of use not recorded) (data not recorded for all patients)

The incidence of injecting drug abuse previously documented in case records of patients testing positive for THC was lower than in those testing positive for psycho-stimulants (35%) and the same as benzodiazepine-positive patients (30% of patients, Table 153). Of these almost 45% were hepatitis C positive whilst only 1 patient was hepatitis B positive. Two patients were HIV positive.

Table 153: Number of patients with previously documented injecting drug use and transmissible viral disease, among patients testing positive for THC.

Behaviour	Number of Patients
IV Drug Use	106 (30)
Hepatitis B positive	1 (<1)
Hepatitis C positive	55 (15)
HIV positive	2 (<1)

Clinical Correlates:

Relevant data on the clinical correlates for patients testing positive for THC has been reviewed in “Clinical Correlates” of Section I.

Medical History:
There were 420 data entries specific to chronic medical or psychiatric illness. Of these over 36% were psychiatric in nature compared to only 16% being chronic medical conditions (Table 154). 31% were noted to have documented chronic substance abuse and 3% behavioural disorders.

Table 154: Incidence of past history of psychiatric, drug abuse/dependency, and chronic medical illness in THC-positive enrolled patients.

Recorded Past Medical/Psychiatric Illness	Number of Patients (%)
Psychiatric Illness	128 (36)
Drug abuse or dependency	110 (31)
Other Significant Medical	56 (16)
Behavioural disorders	11 (3)
Total number of recorded entries*	420

(*Patients may have had more than one medical or psychiatric condition. Data was not recorded for all patients enrolled)

Presenting Complaint:
The primary clinical reason for attending the ED was recorded for all 355 patients (Table 155). The major reason for presentation was for psychosocial reasons (142 of 355, 40%), with drug abuse or overdose accounting for 46% (69 of 142) of these. Other attendance reasons included psychiatric illness (37 of 142, 26%), situational crisis (18 of 142, 13%) and behavioural disorders (15 of 142, 11%). Trauma accounted for 32% (114 of 355) of THC presentations. Other reasons for presentation can be seen in Table 155.

Table 155: Major presenting complaint clinical system of patients testing positive to THC.

System of Presenting Complaint	Number of Patients (%)
Poisoning	22 (6)
Psycho-social	142 (40)
Neurological	21 (6)
Single trauma	57 (16)
Multi-trauma	57 (16)
Cardiovascular	25 (7)
Gastrointestinal	11 (3)
Other	20 (5)
Total	255

(Multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not requiring trauma team assessment)

Triage Category:
A total of 207 patients (58%) were assigned a triage category of 1 or 2, indicating a severity of illness on arrival to hospital requiring immediate or urgent (within 10 minutes) medical

assessment (Table 156). This was similar to that seen with the other drug groups except for GHB , which had a much higher average acuity level at the time of presentation.

Table 156: Number of patients testing positive to THC assigned to each triage category on arrival to the ED, according to presentation category.

Presentation Category	Triage Priority				
	1	2	3	4	5
Self-Harm	6	21	17	1	0
Illicit Drug Use	45	99	88	22	1
Drink Spiking	0	2	3	2	0
Unknown	14	19	9	3	1
Other	0	1	0	1	0
Total (%)	65 (18)	142 (40)	117 (33)	29 (8)	2(<1)

Clinical Vital Signs:

Data on recorded clinical vital signs for THC as a group is shown in Tables 157 and 158. An abnormal heart rate (rate > 100 (tachycardia) or < 60 (bradycardia) bpm) was the most frequently detected abnormal clinical vital sign; 19 patients (5%) had rates likely to be clinically significant (rate > 150 or < 60 bpm), most of whom had a bradycardia. The bradycardia was unexpected, as, typically in overdose, THC would be expected to cause a sinus tachycardia. Seven patients were hypotensive (blood pressure < 90).

Tables 157 and 158: Clinical vital signs measures in patients testing positive for cannabis.

Pulse Rate	No. Patients (%)
Not recorded	6 (2)
<60	18 (5)
60-100 (NR)	245 (69)
101-150	85 (24)
>150	1 (<1)

RR	No. Patients (%)
Not recorded	14 (4)
<10	8 (2)
10 to 20 (NR)	272 (77)
21-30	55 (15)
>30	6 (2)

Systolic BP	No. Patients (%)
Not recorded	12 (3)
<90	7 (2)
90-150 (NR)	305 (86)
150-200	30 (8)
>200	1 (<1)

Oxygen Saturation	No. Patients (%)
Not recorded	42 (12)
<85	3 (1)
85-90	3 (1)
91-95	42 (12)
96-100 (NR)	265 (75)

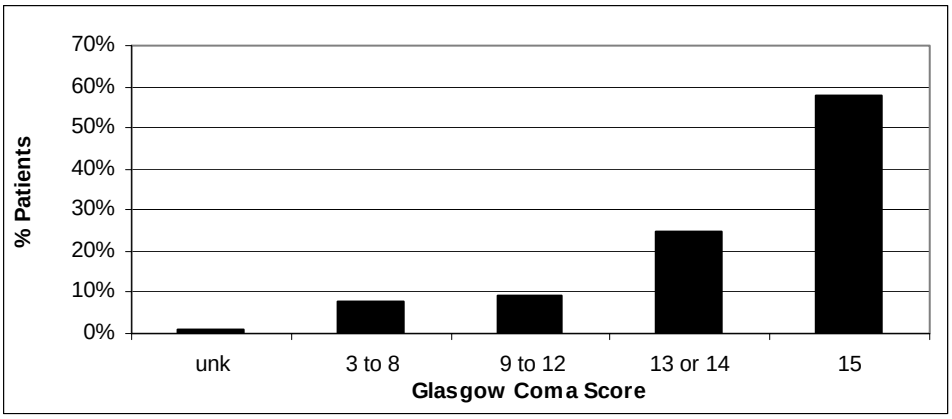
(BP = blood pressure, NR = normal range, RR = respiratory rate)

Signs suggestive of profound depression of respiratory function were seen in 8 patients with a respiratory rate < 10 and 6 patients with blood oxygen saturation (SaO2) of less than 90%; 3 patients were severely hypoxic with SaO2 less than 85%. Again, these are clinical findings not normally expected with THC overdose.

The highest recorded blood level of THC was 59 µg/L in a patient who admitted to drinking 8 standard drinks of alcohol and smoking cannabis at home. She was known to use alcohol, cannabis and cigarettes on a regular basis. This 18-year-old Caucasian female, presented with a severe headache and was given a triage priority 3. Her vital signs were unremarkable with a GCS of 15 but with abnormal pupils. She was treated with IV fluids and observed for 3 hours. Drug treatment included Stemetil for nausea, aspirin and paracetamol. Her blood alcohol level was zero, but oxazepam (0.30mg/L) was detected in her blood. She was discharged home with a diagnosis of migraine headache.

The GCS allocated to patients testing positive to THC are depicted in Figure 40. Of the 352 patients 10 (3%) had a GCS of 3 reflecting the deepest level of unconsciousness, and 29 (8%) were classified in the range 3 to 8 ('severely' depressed conscious state, generally requiring urgent management of the patients' airway).

Figure 40: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe depression of conscious state), 9 to 12 (moderate depression), 13 to 14 (mild depression), 15 (normal).



Disposition from the ED:
Approximately 48% of patients testing positive to THC were admitted to hospital (Table 159). Intensive care or high dependency admission was required in 45 (13%) patients. Ultimately, 78% of patients had been discharged home from hospital (Table 160). Two of the patients who died tested positive to THC; 33 required treatment in a psychiatric facility, and 5 were discharged to long-term rehabilitation.

Tables 159 and 160: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	169 (48)
Admitted	169 (48)
EECU	67 (19)
General Ward	39 (11)
ICU/HDU	45 (13)
Spinal	1 (<1)
Psych. Ward	17 (5)
Transferred	17 (5)

Disposition from Hospital	Total (%)
Home	278 (78)
Absconded/Left AMA	21 (6)
Psych services	33 (9)
SAPOL custody	14 (4)
Rehabilitation	5 (1)
Died	2 (<1)
Other/Unknown	2 (<1)

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

Fatalities:
Of the 7 enrolled patients who died during the study period, 2 tested positive to THC (29% of all drug positive deaths); one in combination with alcohol and one to THC alone (Table 161). Both were male aged 37 and 41, who presented as a result of multi-trauma. The nature of drug use in the first was classified as 'unknown', the second as illicit.

Table 161: Details of enrolled patients who died and tested positive to THC. (Extract from Table 25).

Case	Gender	Age	Nature of Drug Use	Venue	Drug	Level
1	Male	41	Unknown	Unknown	THC Alcohol	3µg/L 0.15
2	male	37	Illicit Drug Use	Unknown	THC	4µg/L

Summary:

Enrolments:

- Of the 1279 enrolled patients returning positive drug tests, a total of 355 patients (28%) tested positive to THC
- The number of patients testing positive was second only to alcohol with 776 patients and benzodiazepines with 409 patients.

Demographics:

- 85% of patients were Caucasian
- THC was detected in 34 Indigenous patients, representing a detection rate of 53% amongst the Indigenous patient group (34 of the 64

patients), the third highest after alcohol (53 patients, 83%) and benzodiazepines (29 patients, 45%)

- The average age of patients testing positive to cannabis was 29.6 years
- Seventeen patients testing positive to THC were under 18 years of age (5% of all THC-positive patients)
- The male to female ratio was 3 to 1
- Time of presentation was fairly evenly spread across the week and time of day compared to other drug types
- Over 50% of drug exposures were at a private residence; 9% were in a licensed venue.

Patterns of Drug Use:

- Rates of THC detection (28%) approximated our pre-study estimated detection rate of 25%
- 70% presented as a result of Illicit Drug Use, 14% Self-Harm, 12% Drink Spiking
- 19% tested positive to THC alone
- In addition to the THC tests, a total of 539 positive drug tests were returned on the 355 patients equating to an average of 2.5 positive drug tests (including THC) per patient
- 11% of patients tested positive to 3 or more drugs additional to the THC
- The highest average THC blood levels were among the Drink Spiking and Unknown groups
- 106 patients (30%) were IDU; 55 were Hepatitis C positive
- High rates of a past history of psychiatric illness (128 specific conditions) were reported
- 2 of the 7 deaths in the study tested positive to THC.

3.3.5 Opioids

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests, a total of 144 (11%) tested positive to opioids. This compares with our pre-study estimated detection rate of 10%. Opioids were the fifth most common type of drugs detected after alcohol, benzodiazepines, THC and psycho-stimulants (Table 6).

Demographic Details:
Ethnicity:
The overwhelming majority of patients were Caucasian (92%) with the next largest ethnic group, Indigenous patients, representing just 4% of all patients testing positive to these drugs (Table 162). Of all Indigenous patients enrolled into the study, however, the proportion testing positive to an opioid (6 of 64, 9%) was not dissimilar to the rates of opioid detection overall.

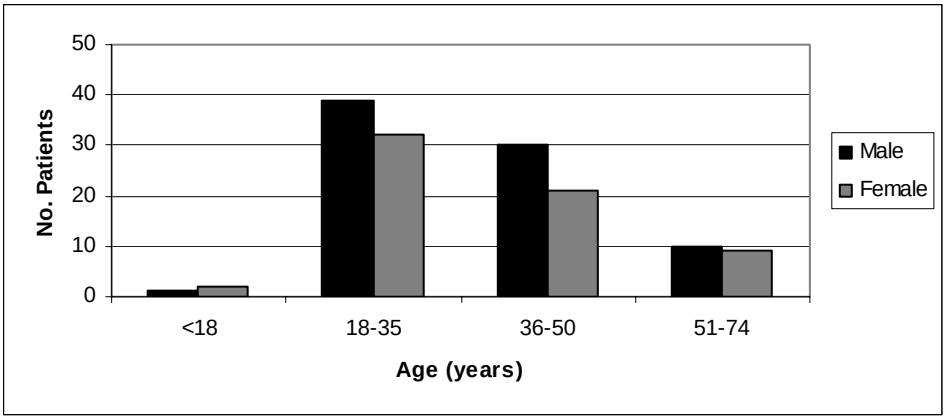
Table 162: Ethnicity of patients testing positive to opioids.

Ethnicity	Total (%)
Caucasian	133 (92)
Indigenous	6 (4)
Asian	3 (2)
Other	2 (1)
Total	144

Age and Gender:
Three patients testing positive to an opioid were under 18 years of age (2% of all opioid-positive patients), a similar rate to that seen with psycho-stimulants, alcohol and THC.The average age of patients was 35.8 years, which was older than that for all other drug types, other than benzodiazepines (36.3 years). There was little difference overall between the genders with respect to average ages or for individual drugs within the class other than for codeine, where males were on average 5 years older (38.8 compared to 34.0 years) and morphine where males were 7 years older (38.7 compared to 31.7).

As with drug positive enrolments generally, more males returned opioid-positive tests than females, although the differences were less pronounced than for other drug types. Once again this ratio reversed for those under 18 years of age, whilst there was little difference in those over 50 years of age (Figure 41).

Figure 41: Age and gender distribution of patients testing positive to opioids.



Time of Presentation:

There was a fairly even distribution of opioid-positive patient presentations across the week (Table 163). Similarly, no real pattern with respect to the time-of-day of presentations could be determined apart from a trend to present in the afternoon or evening. Although this is in keeping with presentations to the ED generally, it contrasts with all other major drug groups studied, which showed a greater likelihood to present on the weekends and between 6 pm and 6 am.

Table 163: Day and time of presentation to the ED of patients testing positive to opioids.

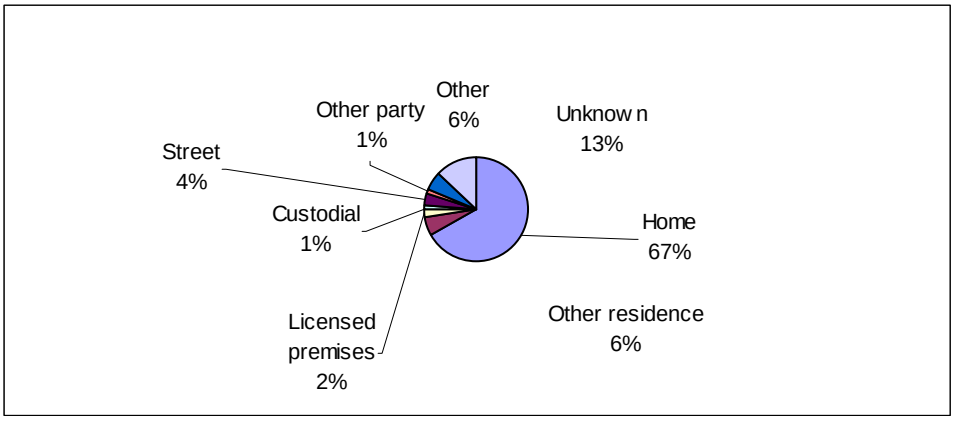
Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0001-0559	2	3	3	3	7	9	6	33 (23)
0600-1159	2	1	1	4	5	7	1	21 (15)
1200-1759	5	9	6	10	8	7	3	48 (33)
1800-2400	5	2	7	9	7	6	6	42 (29)
Total (%)	14 (10)	15 (10)	17 (12)	26 (18)	27 (19)	29 (20)	16 (11)	144

Although there was a large variation in monthly enrolments of patients testing positive to opioids the numbers were small and the differences therefore not likely significant.

Venue of exposure and mode of transport to ED:

The venue of opiate exposure was known in 107 of the 144 patients (74%) and is shown in Figure 42. Over 60% of exposures occurred in a private residence, usually the patient's home; only 2% of exposures occurred in a licensed premises, the smallest proportion of any of the major drug groups. This pattern was similar to that seen with benzodiazepine-positive patients but contrasts with the other major drug types.

Figure 42: Venue of drug exposure for patients testing positive to an opioid.



Mode of transport to the ED was mostly via ambulance services (Table 164).

Table 164: Mode of arrival to the ED for patients testing positive to an opioid.

Mode of Arrival	Number of Patients (%)
Ambulance	103 (72)
Police/Custodial	9 (6)
Private car	22 (15)
Walked in	5 (3)
Other	5 (3)
Total	144

Patterns of Drug Use:

As noted, opioids were detected in 144 patients, the majority presenting as a result of Illicit Drug Use (49%). The relatively large number of patients presenting as a result of Self-Harm (40%, Table 165) is largely due to the high rates of codeine in this group, often taken in conjunction with paracetamol (41 of 58 positive opiate drug tests in this group, Table 166). Only 1 victim of Drink Spiking tested positive to an opioid.

Table 165: Number of opioid-positive patients in each presentation category.

Presentation Category	Number of Patients (%)
Illicit Drug Use	71 (49)
Self-Harm	58 (40)
Unknown	11 (8)
Other	3 (2)
Drink Spiking	1 (1)
Total	144

Table 166: Frequency of positive blood results for opioids according to presentation category.

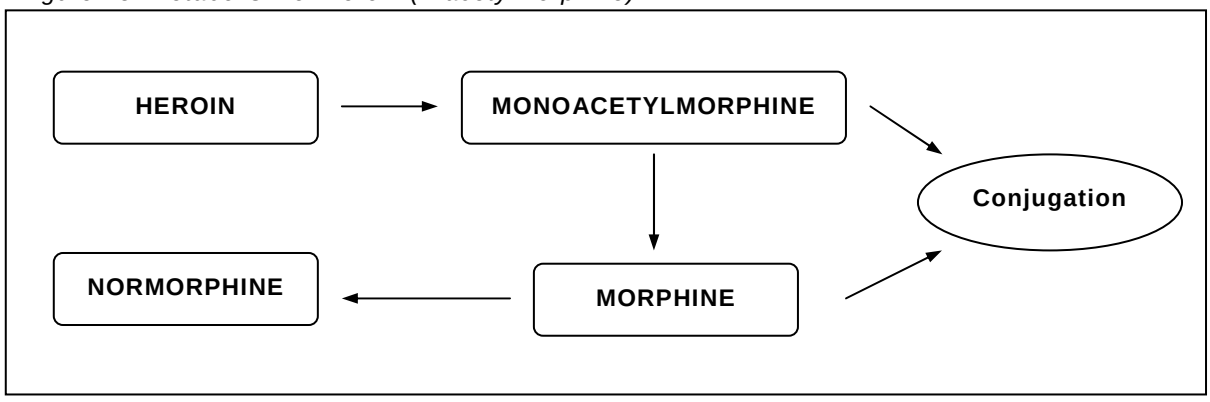
Drug Name	Presentation Category			Total (%)
	Self-Harm	Illicit Drug Use	Other/Unknown	
Codeine	41	30	0/9	80 (47)
Morphine	20	32	3/9	58 (34)
Methadone	7	17	1/1	26 (15)
Heroin	1	0	0	1 (1)
Norpethidine*	2	1	1	4 (2)
Dextropropoxyphene	3	0	0	3 (2)
Total (%)	74 (43)	80 (47)	4 (2)/ 14 (8)	172

(*metabolite of pethidine)

The significance of the high number of cases testing positive for codeine (47% of positive opioid tests, 55% of opioid-positive patients) is uncertain as, although the drug is felt to be commonly abused[n], it is also freely available and widely used for therapeutic reasons. Of the 80 patients positive for codeine, 44 (55%) had levels above the therapeutic range (0.01 to 0.05 mg/L)[17], perhaps suggesting it was taken by them for other than therapeutic reasons. Of these, only 12 were enrolled as Illicit Drug Users whilst 29 as deliberate Self-Harm. This might suggest that it was not commonly abused in this study population.

The surprisingly low rates of heroin detection in this study have been previously noted (Section I, "Overview and Combined Results", and Section II, "Illicit Drug Use"). Heroin is metabolised to 6-monoacetylmorphine (MAM) and then to morphine. However, because of the rapid metabolism of both heroin and its major metabolite, MAM, (half lives of approximately 5 and 15 minutes respectively), intravenous heroin use more than ½ to 1 hour prior to blood sampling in the ED may result in tests positive only to morphine[18] (see Figure 43).

Figure 43: Metabolism of Heroin (Diacetylmorphine).



Evidence for this might be seen in Table 167. This shows that all but 13 of the cases suspected by the clinician to be heroin, morphine or methadone related intoxications (either reported by the patient or persons accompanying, or from ambulance reports) tested positive for one of these drugs. This suggests overall reasonable accuracy of clinician suspicion of the use of these drugs. However, there was a discrepancy in the rates of reporting of the individual

[n] *Personal communication SAPOL, Chemical Diversion Desk.*

parent compounds being abused compared to their rates of detection; heroin use appears much over-reported, and morphine and methadone, under-reported compared to the blood test results. It is probable that most cases recorded as being due to heroin use were accurately reported but the heroin had been metabolised to morphine by the time of blood sampling. Alternative explanations, that morphine and/or methadone is commonly sold as heroin, or that the users are frequently confusing them seems unlikely, given differences in formulation and appearance, and there is no evidence of this being a widespread phenomenon. If we assume that all reported/suspected cases of heroin use were correct (24 cases) this would mean that 24 of the tests positive to morphine were due to heroin exposure, leaving 34 cases of morphine as the parent, abused drug.

Table 167: Comparison of the number of patients testing positive to heroin, morphine or methadone and the number reporting they had taken the drug or otherwise suspected of using the drug by the enrolling doctor.

Drug Name	Number of Positive Tests	Number of Patients Reported/Suspected
Heroin	1	24
Morphine	58	20
Methadone	26	12
Codeine	80	8
Dextropropoxyphene	3	2
Pethidine	4	0
Total	172	

Even if the above assessment of the actual incidence of morphine abuse is used (giving the most conservative estimate), a total of 34 morphine and 26 methadone-positive blood tests were recorded. Of these, only 8 methadone-positive patients were enrolled in the Self-Harm group, and all patients prescribed methadone that did not report misuse were excluded from the results. This suggests a significant problem with diversion of these restricted, prescription drugs, and is supported by reports that such opioid substances are used by IDU to substitute or supplement their heroin use[12].

Poly-substance abuse:
A total of 172 opioid-positive tests were returned from the 144 patients. This equates to approximately 1.2 different opioid exposures per patient. Twenty nine patients (20%) tested positive to more than 1 opioid (Table 168 and 169).

Table 168: Number of patients testing positive to the various combinations of opioids detected, and the number of positive drug tests returned.

Drug Combination	Number of Patients (%)
Methadone only	22 (15)
Methadone + heroin + morphine	1 (1)
Methadone + morphine	3 (2)
Codeine only	56 (39)
Morphine + codeine	22 (15)
Morphine only	32 (22)
Codeine + dextropropoxyphene	1 (1)
Morphine + dextropropoxyphene	1 (1)
Dextropropoxyphene	1 (1)
Norpethidine*	3 (2)
Norpethidine* + methadone	1 (1)
Unspecified opioid	1 (1)
Total	144

(*metabolite of pethidine)

Table 169: Number of occasions an opioid was detected alone or with other drugs.

Number of Drugs	Number of Patients
Opioid only	12
Opioid + 1 other	37
Opioid + 2 others	44
Opioid + 3 others	34
Opioid + >3	17
Total	144

The 144 opioid-positive patients returned a total of 364 positive drug tests (other than opioids, Table 170). Just over one third of these were a benzodiazepine, 14% alcohol, and 13% THC. The proportion of results positive for ecstasy (MDMA) and related drugs such as GHB, ketamine and LSD was similar to that seen in the benzodiazepine-positive patient group (Table 131), but was less than that seen in patients in the other drug groups. Eight percent of patients also tested positive to an antidepressant.

Table 170: Frequency of other drugs detected in patients testing positive for an opioid.

Drugs Detected	Number of Positive Tests (%)
Benzodiazepines	137 (38)
Alcohol	52 (14)
THC	48 (13)
Psycho-stimulants (the group)	30
Amphetamine	7 (2)
Methamphetamine	18 (5)
MDMA	2 (1)
MDA	1 (<1)
Pseudoephedrine	1 (<1)
Phentermine	1 (<1)
GHB	2 (1)
Cocaine	2 (1)
Antipsychotics	2 (1)
Antidepressants	22(6)
Paracetamol	57 (16)
Pharmaceutical	12 (3)
Total	364

Drug Habit:

The history of drug use reported by patients testing positive to opioids is shown in Table 171. The proportional representation of the major drugs shown in this table is similar to those for the various enrolment categories generally (Tables 32, 49, 79) as well as across the various drugs of abuse. Alcohol, cigarettes and heroin were the most commonly reported drugs used and their reported use was typically daily. Similarly, the reported frequency of use of benzodiazepines was also most commonly given as daily. By contrast, use of psycho-stimulants and the 'party drugs' tended to be occasional.

Table 171: Frequency of drug use reported by patients testing positive to opioids.

Reported Drug Use	Frequency of Use						Total Responses
	Daily	Weekly	Monthly	Yearly	Not specified*	Past use only	
Alcohol	21	9	1		33	0	64
Cigarettes	41	0	0		3	0	44
Cannabis	9	1	0		13	0	23
Heroin	3	3	1		20	4	31
Benzodiazepines	10	2	0		8	0	20
Amphetamines	3	3	1		7	0	15
Methamphetamine	1	3	1		14	0	19
MDMA (ecstasy)	0	1	0		5	0	6
LSD/Acid	0	0	0		1	0	1
GHB/Fantasy	0	1	0		0	0	1
Cocaine	0	0	0		3	0	3
Mushrooms	0	0	0		1	0	1
Opiates	4	0	1		8	1	14

(*Stated drug used but frequency of use not recorded, data not recorded for all patients)

The incidence of injecting drug abuse previously documented in case records of patients testing positive for opioids was approximately 37% of patients (Table 172), which was the highest recorded for any of the drug groups (compares with 35% for patients testing positive for psycho-stimulants). Of these over 40% were hepatitis C positive (23 of 53). In contrast, only 4% were hepatitis B positive (2 of 53).

Table 172: Number of patients with previously documented injecting drug use and transmissible viral disease, among patients testing positive for opioids.

Behaviour	Number of Patients (%)
IV Drug Use	53 (37)
Hepatitis B positive	3 (2)
Hepatitis C positive	30 (21)
HIV positive	0

Clinical Correlates:
Relevant data on the clinical correlates for patients testing positive for opioids has also been reviewed in “Clinical Correlates” of Section I.

Medical History:
There were 211 data entries specific to chronic medical or psychiatric illness.Of these approximately 50% were psychiatric in nature compared to only 10% being chronic medical conditions (Table 173); 31% were noted to have documented chronic substance abuse.

Table 173: Incidence of past history of psychiatric, drug abuse/dependency, and chronic medical illness in opioid-positive enrolled patients.

Recorded Past Medical/Psychiatric Illness	No. of Patients (%)
Psychiatric Illness	73 (51)
Drug abuse or dependency	52 (36)
Other Significant Medical	17 (12)
Behavioural issues	6 (4)
Total number of recorded entries*	211

(*Patients may have had more than one medical or psychiatric condition)

Presenting Complaint:
The primary clinical reason for attending the ED was recorded in all patients (Table 174). Psycho-social issues related to drug misuse was the most commonly cited reason for presentation. These presentations included formal psychiatric illness, situational crises, and behavioural issues such as violence or threatening behaviour requiring police intervention and medical assessment.

Violence and trauma was less of a feature than that seen with patients presenting intoxicated with psycho-stimulants or alcohol (Table 97, Table 120). None-the-less, 12% of presentations were related specifically to trauma.

Table 174: Major presenting complaint clinical system of patients testing positive to an opioid.

System of Presenting Complaint	Number of Patients (%)
Psycho-social	68 (47)
Poisoning	21 (15)
Multi-trauma	6 (4)
Neurological	13 (9)
Cardiovascular	12 (8)
Single trauma	11 (8)
Gastrointestinal	2 (1)
Other	11 (8)
Total	144

(Multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not requiring trauma team assessment)

Triage Category:
A total of 78 patients (54%) were assigned a triage category of 1 or 2, indicating a severity of illness on arrival to hospital requiring immediate or urgent (within 10 minutes) medical assessment (Table 175). This was similar to that seen with the other drug groups except for GHB, which had a much higher average acuity level at the time of presentation.

Table 175: Number of patients testing positive to an opioid assigned to each triage category on arrival to the ED.

Triage Category	No. of Patients (%)
1	16 (11)
2	62 (43)
3	59 (41)
4	6 (4)
Total	1 (1)

Clinical Vital Signs:

Data on recorded clinical vital signs for opioids as a group is shown in Tables 176 and 177 and, in general, differs little from that of the other major drug types; most patients had normal vital signs, and of those who did not, a heart rate outside the normal range (rate > 100 (tachycardia) or < 60 (bradycardia) bpm) was the most frequently detected abnormality.

However, the *sine qua non* of opiate poisoning is a decreased level of consciousness with respiratory depression. Consistent with this, signs suggestive of depression of respiratory function were seen in 9 patients (6%) with a respiratory rate < 10. This compares to rates of respiratory depression seen with intoxicated patients testing positive for other drug types ranging from 3% for GHB and 2% for benzodiazepines to 1% for alcohol.

Tables 176 and 177: Clinical vital signs measures in opioid-positive enrolled patients.

Pulse Rate	No. Patients (%)
Not recorded	1 (1)
<60	6 (4)
60-100 (NR)	99 (69)
101-150	38 (26)
>150	0

RR	No. Patients (%)
Not recorded	4 (3)
<10	9 (6)
10 to 20 (NR)	106 (74)
21-30	24 (17)
>30	1 (1)

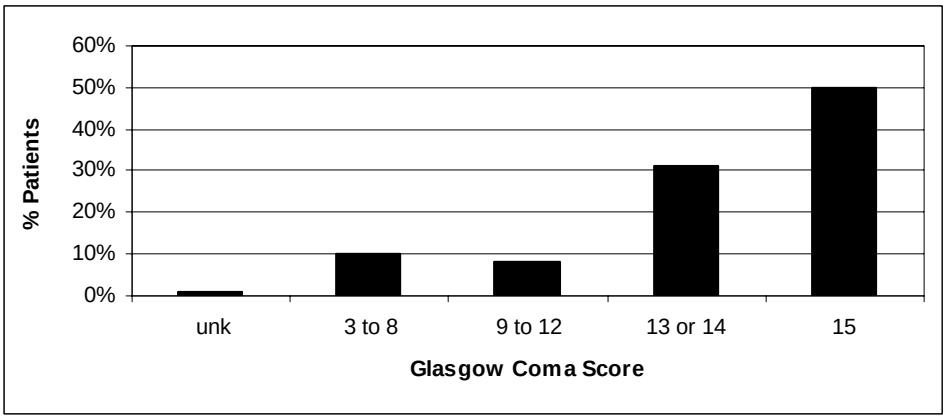
Systolic BP	No. Patients (%)
Not recorded	2 (1)
<90	3 (2)
90-150 (NR)	128 (89)
150-200	11 (8)
>200	0

Oxygen Saturation	No. Patients
Not recorded	19 (13)
<85	0
85-90	5 (3)
91-95	28 (19)
96-100 (NR)	92 (64)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The GCS allocated to patients testing positive to an opiate are depicted in Figure 44. Of the 144 patients 5 (3%) had a GCS of 3 reflecting the deepest level of unconsciousness, and 15 (10%) were classified in the range 3 to 8 ('severely' depressed conscious state). These rates are not too dissimilar to those seen with the majority of drug types other than for GHB (63% with GCS 3 to 8).

Figure 44: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe depression of conscious state), 9 to 12 (moderate depression), 13 to 14 (mild depression), 15 (normal).



Drug levels:
There was some variation in the average blood levels for the opioids between the enrolment groups (Table 178); generally the higher levels were seen in association with Illicit Drug Use. The exception was morphine and norpethidine which were higher in the Self-Harm group.

Table 178: Comparison of average blood opioid levels for Self-Harm and Illicit Drug Use presentation categories.

	Presentation Category	
Drug Name	**Self-Harm**	**Illicit Drug Use**
Morphine	0.138	0.04
Methadone	0.3	0.35
Codeine	0.38	0.41
Norpethidine*	0.08	0.04

(Concentrations in mg/L)
(*metabolite of pethidine)

Of the 58 patients testing positive to morphine, 51 (88%) were in the sub-therapeutic range and 7 were in the toxic or lethal range. The highest level was 1.1mg/L in a 52 year old female attempting self harm. She reportedly ingested 20 of her prescribed MS Contin tablets and 6 amitryptiline tablets at home. She has a GCS of 3, no gag or reflexes, with pinpoint non-reactive pupils, and a respiratory rate of 8 on arrival of the ambulance at her home. She had a history of depression. In addition to the morphine, she was also positive for amitryptiline (0.07mg/L), paracetamol (63mg/L) and codeine (0.03mg/L). She required transfer to the ICU and was discharged from hospital after 6 days.

The highest methadone level detected was 0.9 mg/L, which is also above the potential lethal threshold (Table 179). This was in a Caucasian male aged 40 years who reportedly took methadone and alprazolam at home for recreational purposes. He had a documented past history of polysubstance abuse, opiate dependence and pancreatitis, and was known to be an IVDU and to be hepatitis C positive. He was treated with naloxone and oxygen by the ambulance staff. Upon arrival at the RAH, he was assessed to be suffering from septicaemia,

with a white cell count of 20.4 and a temperature of 38.8 degrees Celsius. His GCS was 14, with some slurring of speech. He was transferred to the ward and discharged home after 4 days. In addition to the methadone, blood analysis was positive for diazepam (0.74mg/L), nordiazepam (0.62mg/L), alprazolam (0.09mg/L) and THC (3μg/L).

The highest codeine level detected was 3.14 mg/L which is well above the toxic range (Table 179). This 37 year old female Caucasian, had presented as a result of a deliberate overdose of ibuprofen, oxazepam and oxypropranolol in tablet form at home, in a serious attempt at suicide. She had a previous history of attempted suicide, opiate use, IVDU and hepatitis C. She had been diagnosed with schizoaffective disorder. She had a GCS of 14, respiratory rate of 10 and size 3mm sluggish pupils on arrival in ED and was treated with oxygen and naloxone. Other positive toxicology results included alcohol (0.02g/L), oxypropranolol (1.5mg/L), lorazepam (0.01mg/L), nordiazepam (0.04mg/L), morphine (0.02mg/L). She recovered sufficiently to be transferred to external psychiatric services within 8 hours of presentation.

Table 179: Comparison of highest detected blood opioid levels with therapeutic and toxic ranges.

Drug Name	Blood Level	Therapeutic Range	Toxic Range
Codeine	3.14	0.01 – 0.05	0.3 – 1 (L >1.6)
Morphine	1.1	0.01 – 0.12	0.15 – 0.5 (L 0.05 – 4)
Methadone	0.9	0.1 – 0.3	0.2 – 0.75 (L > 0.75)

(Concentrations all in mg/L. L = potentially lethal levels. All ranges referenced from The International Association of Forensic Toxicologists, internet listing of Therapeutic and Toxic Drug Levels)[17]

Disposition from the ED:

Approximately 49% of patients testing positive to opioids were admitted to hospital from the ED (Table 180), a rate very similar to that for patients testing positive to benzodiazepines but somewhat higher than that for other drug-positive groups. Intensive care or high dependency admission was required in 16 patients (11%). Ultimately, approximately 82% of patients were discharged home from hospital (Table 181). There were no deaths, 10 required further treatment in external psychiatric facilities and 2 were transferred to long-term rehabilitation.

Tables 180 and 181: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	68 (47)
Admitted	70 (49)
EECU	28 (19)
General Ward	15 (10)
ICU/HDU	16 (11)
Psych. Ward	11 (8)
Transferred	5 (3)
Unknown	1 (1)

Disposition from Hospital	Total (%)
Home	118 (82)
Absconded	8 (6)
Psych services	10 (7)
SAPOL custody	4 (3)
Rehabilitation	2 (1)
Other	1 (1)
Unknown	1 (1)

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

Summary:

Enrolments:

- Of the 1279 enrolled patients returning positive drug tests, a total of 144 patients (11%) tested positive to opioids.

Demographics:

- The overwhelming majority of patients were Caucasian (92%)
- Indigenous patients represented just 4% of all patients testing positive to opioids but the rate of opioid detection in Indigenous patients was 10%, similar to Caucasians
- The average age was 35.8 years- the oldest of all drug types apart from benzodiazepines
- 3 (<1%) patients were less than 18 years of age,
- Males predominated but in a less pronounced fashion than other drug groups
- Presentations were relatively evenly spread across the week and time of day
- Over 60% of drug exposures occurred at a private residence
- Only 2% of exposures occurred in a licensed premises, the lowest of any drug group.

Patterns of Drug Use:

- Rates of detection of opioids were similar to the pre-study estimates (11% compared to an estimated 10%)
- Detection rates were marginally lower than in the previous 12- month period (11% compared to 13%)

- The most common reason cited for the drug abuse was Illicit Drug Use (49%)
- Most of those presenting as a result of Self-Harm were positive for codeine taken in combination with paracetamol
- Only 1 victim of Drink Spiking tested positive for an opiate
- 47% of opioid-positive tests overall were for codeine
- It was not possible to draw conclusions as to the rates of abuse of codeine
- Surprisingly low rates of heroin detection were thought likely due to rapid metabolism of the drug prior to blood sampling being able to be performed
- High rates of detection of morphine and methadone suggest a problem with diversion of these restricted prescription drugs
- 172 opioid positive drugs tests were returned in the 144 patients, with 29 patients (20%) testing positive to more than 1 opioid
- There were 364 tests positive for drugs other than opioids: 38% benzodiazepines, 14% alcohol, 13% THC, 8% psycho-stimulants
- 37% of patients had documentation of previous IDU; 21% were Hepatitis C positive.

3.3.6 Gamma Hydroxy Butyrate

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests, 30 (2%) tested positive to GHB.

Demographic Details:
Sixty percent of GHB-positive patients were Caucasian, male, and aged between 18 and 35 years (Tables 182 and 183). The average age of the group was 26.6 years with 3 years on average between the genders in terms of ages. No patients were aged less than 18 years. The nature of GHB use is seen in Table 183.

Table 182: Age range and gender of patients testing positive to GHB.

Age Range (years)	Male	Female	Total (%)
18 – 35	15	12	29 (90)
36 – 50	3	0	3 (10)
Total (%)	18 (60)	12 (40)	30

Table 183: Ethnicity and presentation category of patients testing positive to GHB.

	Presentation Category		
Ethnicity	Illicit Drug Use	Self harm	Total (%)
Caucasian	28	2	30 (100)
Total (%)	28 (93)	2 (7)	

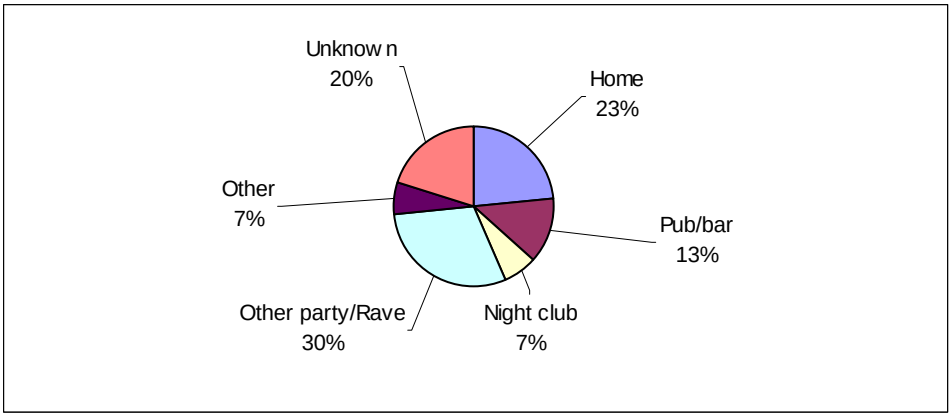
Consistent with findings for the other drugs the majority presented during the weekend, however the time of day at which they presented was typically between midnight and mid-day, somewhat later than the other major drug groups (Table 184). The majority (73%) of presentations travelled to hospital by ambulance.

Table 184: Day and time of day of presentation to the ED of patients testing positive to GHB.

Time	Sun	Mon	Tues	Wed	Thur	Fri	Sat	Total
0001-0559	8	2	1	0	0	1	0	12 (40)
0600-1159	1	4	0	1	0	5	0	11 (37)
1200-1759	2	0	0	0	1	1	0	4 (13)
1800-2400	1	1	0	0	0	1	0	3 (10)
Total	12 (40)	7 (23)	1 (3)	1 (3)	1 (3)	8 (27)	0	30

The exposure to GHB occurred in a licensed venue (pub/bar or night club) in only 20% of patients, whilst exposure occurred in a private residence in 23% of cases or at a private party or rave (30%) (see Figure 45).

Figure 45: Venue of exposure to GHB (n = 30).



Patterns of Drug Use:

The large majority of the presentations (28 of 30 patients, 93%) were as a result of Illicit Drug Use (Table 183); 2 patients presented as a result of Self- harm.

As has been the case with all other drug categories examined, poly-substance abuse was a feature of those testing positive to GHB. Only 4 (13%) of the GHB-positive patients tested positive for this drug alone (Table 185). A total of 64 tests positive for drugs other than GHB were returned in the remaining 26 patients (Table 186). The most common of these was a psychostimulant, particularly methamphetamine, whilst alcohol, benzodiazepines and THC were much less frequently seen. This contrasts with the other drug groups examined in which these 3 drugs were predominant. It also contrasts with the stated frequency of drug use by patients testing positive to GHB (Table 187), which might indicate that alcohol at least, may have been detected more frequently.

Table 185: Number of occasions GHB was detected alone or in combination with other drugs.

Number of Drugs	Number of Patients (%)
GHB only	4 (13)
GHB + 1 other	9 (30)
GHB + 2 others	9 (30)
GHB + 3 others	4 (13)
GHB + >3 others	4 (13)
Total	30

Table 186: Incidence of other drugs detected in patients positive for GHB.

Drugs Detected	No. of Positive Tests (% patients)
Methamphetamine	17 (57)
MDMA	7 (23)
Amphetamine	9 (30)
MDA	4 (13)
MDEA	2 (7)
Benzodiazepines	7 (23)
THC	6 (20)
Alcohol	6 (20)
Codeine	2 (7)
Paracetamol	3 (10)
Tramadol	1 (3)
Total	64

Table 187: Frequency of drug use reported by patients testing positive to GHB.

	Frequency of Use						
Reported Drug Use	Daily	Week	Month	Year	Not specified*	Past use only	Total Responses
Cigarettes	4						4
Alcohol	1	2	2		10		15
Cannabis					2		2
Amphetamine			1		5		6
Methamphetamine			1	1	6		8
GHB/Fantasy		2	1		14		17
Cocaine					1		1
Benzodiazepines	1	1			1		3
LSD/Acid					1		1
Ecstasy					7	1	8
Heroin					1		1
Opiates	1						1

(*Stated drug used but frequency of use not stated)

Clinical Correlates:

Relevant data on the clinical correlates for patients testing positive for GHB has also been reviewed in “Clinical Correlates” of Section I.

The most common primary, clinical reason for attending the ED was classified by treating staff as collapse with altered conscious state (13 of 30 patients (43%) (Table 188). This is in

keeping with the major clinical effect of GHB as a potent general anaesthetic agent. The next most common reason for presentation was for 'drugs misuse'

Table 188: Primary clinical reason for presentation to the ED.

System of Presenting Complaint	Number of Patients (%)
Psychosocial	10 (33)
Poisoning	7 (23)
Neurological	4 (13)
CVS	4 (13)
Other	4 (13)
Single Trauma	1 (3)

All but 1 of the patients (97%) were assigned a triage category of 1 or 2, indicating a severity of illness on arrival to hospital requiring immediate or urgent (within 10 minutes) medical assessment. This was in marked contrast to the other drug categories and indicates a much higher average acuity level at the time of presentation.

The drugs that were reported to, or otherwise suspected by, the treating staff as having been used by the patients immediately prior to presentation are shown in Table 189. In general, the suspicion or reporting of GHB use was reasonably accurate. However, the concomitant use of the psychostimulants was under-reported whilst the use of alcohol was over-reported.

Table 189: Number of patients reported to, or otherwise suspected by, clinical staff to have used the listed drugs immediately prior to presentation to the ED.

Drug Suspected to have been used	Illicit Drug Use	Self harm	Total suspected	Actual
Unknown		1	1	
Alcohol	14		14	6
Amphetamine	4		4	9
GHB	23	1	24	30
Ketamine	2		2	0
Methamphetamine	6		6	17
MDMA	6		6	7
THC	1		1	6

Review of the clinical vital signs (Tables 190 and 191) revealed a marginally higher rate of bradycardia (heart rate less than 60 bpm) than tachycardia amongst patients testing positive to GHB (3 of 30 (10%) v 2 or 30 (7%)). ECG's performed in 19 of the 30 patients showed that in

all the bradycardic cases the rhythm was sinus. One patient had atrial fibrillation with a heart rate of between 100 and 150 bpm.

Tables 190 & 191: Clinical vital signs measured in patients testing positive to GHB.

Pulse Rate	No. Patients (%)
<60	3 (10)
60-100 (NR)	25 (83)
101-150	2 (7)

RR	No. Patients (%)
<10	1 (3)
10 to 20 (NR)	22 (73)
21-30	7 (23)

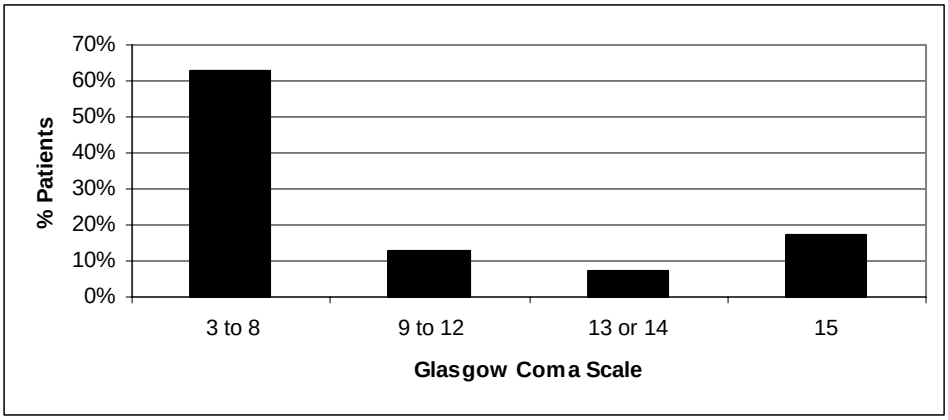
Systolic BP	No. Patients (%)
90-150 (NR)	25 (83)
150-200	5 (17)
>200	0

Oxygen Saturation	No. Patients (%)
85-90	1 (3)
91-95	6 (20)
96-100 (NR)	23 (77)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

GHB-positive patients had a much lower GCS at presentation than any other drug group (Figure 46). Eight patients had a GCS of 3 (27% of group), and 19 (63%) had a GCS of 8 or less (severe depression of conscious levels). This distribution across the GCS score ranges in Figure 46 is almost the reverse of that seen with other drug groups (Figures 25, 31, 36, 40, 44).

Figure 46: Conscious levels of patients testing positive to GHB as measured by the Glasgow Coma Score: 3 to 8, severe depression of conscious state; 9 to 12, moderate depression; 13 to 14, mild depression; 15 normal conscious state.



The quantitative analysis of GHB-positive patients revealed 43% still had toxic levels at the time of blood sampling in the ED, 4 of which were above the potentially lethal threshold (Table 192).

Table 192: Blood concentration ranges of patients testing positive for GHB.

Blood Concentration Range (mg/L)		Number of Patients
Sub-therapeutic	(< 50)	2 (7)
Therapeutic	(50 – 120)	15 (50)
Toxic	(120 – 250)	9 (30)
Lethal	(> 250)	4 (13)
Total		30

The highest GHB level recorded was 540 mg/L in a male Caucasian aged 39 years who presented as a result of self-harm. He had a history of self-harm and depression and was known to use opiates and benzodiazepines recreationally. The venue of exposure was at his own home. Naloxone given by ambulance staff had no clinical effect. On arrival at the ED he was unconscious with a GCS of 3, was hyperpyrexial, hypotensive and hypoxic. Drug use was unknown at the time. The patient was intubated and admitted to Intensive Care. He was discharged from hospital after 8 days. He also tested positive for diazepam with a level of 0.28mg/L.

Overall, 37% of patients who tested positive for GHB required intubation for airway management and 43% required admission to the Intensive Care Unit or High Dependency, the highest of any drug group (Tables 193 and 194). Despite this, all patients survived and, 87% were able to be discharged within 24 hours (3 patients discharged themselves against medical advice).

Tables 193 and 194: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	16 (53)
EECU	1 (3)
ICU/HDU	13 (43)

Disposition from Hospital	Total (%)
Home	27 (90)
Absconded/Left AMA	3 (10)

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit)

One case was administered physostigmine in the ED shortly after arrival. She was a 30 year old female who had reportedly taken unknown quantities of GHB and MDMA orally at a nightclub. Toxicological examination was positive for GHB (143mg/L), methamphetamine (0.20mg/L), MDMA (0.14mg/L), MDA (0.01mg/L) and THC (3μg/L). She was given a triage priority of 1 on arrival and treated in the resuscitation rooms. Her GCS was 7,with briskly reacting pupils and a respiratory rate of 10. She was in sinus rhythm and haemo-dynamically stable. Her temperature was low at 34.6 and she had vomited prior to arrival. She recovered rapidly and was discharged home after 4 hours of treatment and observation.

The clinical effect of physostigmine in this case is uncertain as are the reasons for its use here and not in other, similar cases. This may relate to differences in individual clinician practice, awareness of a possible role for the drug in GHB overdose, or to the debate over its effectiveness.

Summary:

Enrolments:

- Of the 1279 enrolled patients returning positive drug tests, 30 (2%) tested positive to GHB.

Demographics:

- The average age of patients was 26.6 years;
- All were Caucasian
- The most likely time of presentation was somewhat later than other drug groups, between midnight and mid-day; the majority presented over the weekend
- 20% of exposures occurred in a licensed premises, 23% occurred in a private residence and 30% at a private party or rave.

Patterns of Drug Use:

- The large majority of the presentations (28 of 30 patients, 93%) were as a result of Illicit Drug Use; 2 patients presented as a result of Deliberate Self harm.
- 4 patients (13%) tested positive to GHB alone
- A total of 64 tests positive for drugs other than GHB were returned in the remaining 26 patients
- The most common additional drugs detected were psycho-stimulants, particularly methamphetamine
- In contrast to other drug groups alcohol, THC and benzodiazepines were relatively infrequently detected in combination with GHB
- Patients typically presented as a result of collapse with an altered conscious level
- 43% of patients had blood levels in the toxic range at the time of sampling
- 1 case received physostigmine, the clinical effects of which are unclear.

3.3.7 Cocaine

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests 6 (0.5%) tested positive for cocaine or its metabolite benzylecognine.

Demographic Details:
All but one of the patients testing positive to either compound were Caucasian, one was Indigenous. All were male, and the average age was 33.5 years. A clear pattern of presentation according to time of day or day of the week was not evident with such small numbers. Similarly, little comment could be made about patterns surrounding venue of drug exposure.

Patterns of Drug Use:
Illicit Drug Use was cited in 4 of the 6 cases, one was associated with Self Harm and the other as Accidental Poisoning. Samples were tested for both cocaine and its major metabolite, benzylecognine. The presence of the former suggests use within hours of sampling whilst the latter is indicative of use within the previous 24 hours[20]. One patient tested positive for benzylecognine only, whilst the remainder were positive for either cocaine alone or for both cocaine and benzylecognine.

The average blood level of cocaine in the 4 Illicit Drug Users was 1.7 mg/L. The case involving Self Harm had a level of 1.7mg/L and the Accidental Poisoning had a very high level of 8mg/L.The quoted ranges for toxicity (0.25 to 5 mg/L) and lethal threshold (1 to 20 mg/L) for cocaine are very broad, reflecting the fact that death from the effects of cocaine alone are rare. Cocaine has been found to be the primary underlying cause of death in 25% of all cocaine related deaths[21] with other factors and other drugs involved in the remainder of cases.

Poly-drug use was again prominent. Cocaine and/or benzylecognine were not found in isolation (Table 195). Opioids were the most frequently detected followed by psycho-stimulants and benzodiazepines (Table 196).

Table 195: Number of substances found in patients positive for cocaine or benzylecognine.

Number of Drugs	Number of Patients
Cocaine only	0
Cocaine + 1 other	2
Cocaine + 2 others	0
Cocaine + 3 others	1
Cocaine + >3 others	3

Table 196: Drugs present in patients testing positive to cocaine or benzylecognine.

Other Drugs Detected	Number of Patients
Benzodiazepine	2
Opioids	3
Psycho-stimulants	2
Methamphetamine	2
Amphetamine	2
MDMA	1
GHB	1
Other	1

Four patients had documented previous injecting drug use, and 2 were hepatitis C positive.

Clinical Correlates:
There was no past history of psychiatric illness but 3 patients had a documented past history of drug abuse or dependency.

The primary clinical reasons for attending the ED ranged from an unconscious collapse, and a potentially serious case of chest pain of possible cardiac origin, to 'drugs misuse ' or 'OD' (overdose) .The allocated triage categories for 5 of the 6 patients were at the urgent end of the scale. The patient given a low triage priority of 5 deteriorated while in the department and required resuscitation and intubation (Table 197).

Table 197: Distribution of allocated triage categories for cocaine/benzylecognine-positive patients.

Triage Category	No. of Patients (%)
1	2 (33)
2	3 (50)
5	1 (17)
Total	6

In keeping with the known clinical effects of cocaine, the most common abnormalities of recorded vital signs were a sinus tachycardia and moderate hypertension (Tables 198 and 199). As mentioned previously, one patient presented with normal vital signs and GCS but collapsed after some time in the department.

A 35 year male was brought in by the Federal Police after being intercepted at the airport suspected of smuggling drugs internally. While being examined he collapsed, becoming profoundly hypotensive, tachycardic (supra-ventricular tachycardia) with a prolonged QT interval and 1st degree heart block. His GCS was 3 with no pupillary response. He suffered a tonic clonic seizure requiring midazolam. He was treated with sodium bicarbonate, adrenaline, intubated and ventilated. He was given a whole bowel lavage and activated charcoal. He was transferred to ICU, and recovered to be discharged home on day 3. His cocaine level was 8mg/L, and his benzylecognine level 6mg/L. He was also positive for alprazolam 0.03mg/L.

Tables 198 and 199: Clinical vital signs measures in patients testing positive for cocaine.

Pulse Rate	No. Patients
60-100 (NR)	4
101-150	2
Systolic BP	**No. Patients**
<90	1
90-150 (NR)	5

RR	No. Patients
10 to 20 (NR)	3
21-30	3
Oxygen Saturation	**No. Patients**
91-95	**2**
96100 (NR)	4

(BP = blood pressure, NR = normal range, RR = respiratory rate)

Summary:

- Of the 1279 enrolled patients returning positive drug tests 6 (0.5%) tested positive for cocaine or its metabolite benzylecognine
- 5 of the patients testing positive to either compound were Caucasian and 1 was Indigenous
- Four patients were aged between 18 and 35 years and 2 between 36 and 50.
- All patients were male.
- 4 of the 6 patients were reported to have used the drug in the category of Illicit Drug Use, 1 in association with deliberate Self-Harm and 1 was accidentally poisoned.
- All patients tested positive to other drugs mostly benzodiazepines and psycho-stimulants
- Four patients had documented previous injecting drug use;,2 were Hepatitis C positive.

3.3.8 Ketamine

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests, 4 (0.3%) tested positive for ketamine. As discussed below, it is possible 3 of these cases were administered the drug as part of medical management in the Emergency Department before blood sampling for the drug analyses was performed.

Demographic Details:
Patients testing positive for ketamine were all Caucasian; 3 were male and 1 female. The average age was 23 years, the lowest of any of the drug groups; 1 patient was less than 18 years of age. There was almost 7 years difference between the average ages of the genders (male average age 24.7 years and female 18 years), the largest difference of any of the drug types.

Patterns of Drug Use:
One patient presented following Illicit Drug Use (25%). The other 3 cases were enrolled as Unknown drug use as it was not clear at the time if drugs of abuse were involved.

These 3 cases were administered ketamine as a part of the clinical emergency management shortly after arrival in the ED. Unfortunately, it has not been possible to determine if the blood sampling for the purposes of the study was performed before or after this treatment. It is therefore possible that ketamine was not used by the patient prior to presentation, that it was present only as a result of their treatment in hospital. Two of the three had other drugs of abuse present upon testing- amphetamine/methamphetamine in 1 case and, THC in the other.

The overall average ketamine blood level was 0.45 mg/L, which is surprisingly low (therapeutic range 0.5 to 6.5 mg/L). This may reflect the relatively rapid metabolism of the drug with a delayed period of time between drug exposure and presentation to the ED. Alternatively it may also be due to ingestion of relatively low doses.

As discussed above, only 1 patient tested positive to ketamine alone, with up to 2 other drugs being detected (Table 200). No alcohol was present (see Table 201).

Table 200: Number of substances found in patients positive for ketamine.

Number of Drugs	Number of Patients (%)
Ketamine only	1 (25)
Ketamine + 1 other	2 (50)
Ketamine + 2 others	1 (25)
Ketamine + 3 others	0

Table 201: Drugs present in patients testing positive to ketamine.

Drug Detected	Total Number of Positive Tests
Methamphetamine	2
Amphetamine	2
THC	2

Two patients were recorded as being intravenous (injecting) drug users.

Clinical Correlates:
All of the presentations were as a result of multi-trauma, namely motor vehicle accidents (MVAs). All cases were given a triage priority 1.

Review of the clinical vital signs of these patients showed little in the way of abnormalities (see Tables 202 and 203). The significant abnormalities that were present (tachycardia, hypotension and severe hypoxia) were all seen in the one case. The Glasgow Coma Scores are shown in Table 204.

Tables 202 and 203: Clinical vital signs measures in patients testing positive for ketamine.

Pulse Rate	No. Patients
60-100 (NR)	3
101-150	1
Systolic BP	**No. Patients**
<90	1
90-150 (NR)	2
150-200	1

RR	No. Patients
Not recorded	1
10 to 20 (NR)	3
Oxygen Saturation	**No. Patients**
<85	1
91-95	11
96-100 (NR)	2

(BP = blood pressure, NR = normal range, RR = respiratory rate)

Table 204: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).

GCS	Number of Patients (%)
13	1 (25)
15	3 (75)

Tables 205 and 206 show the places to which patients were discharged from the ED and from the hospital following treatment. All 4 patients required admission to hospital; with 3 requiring admission to ICU/HDU. Two were discharged home and 2 were transferred to long -term rehabilitation facilities.

Tables 205 and 206: Place to which patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)
Discharged	0
Admitted	4
ICU/HDU	3 (75)
General ward	1 (25)

Disposition from Hospital	Total (%)
Home	2 (50)
Rehabilitation	2 (50)

(ICU = Intensive Care Unit, HDU = High dependency Unit)

Summary:

- Of the 1279 enrolled patients returning positive drug tests, 4 (0.3%) tested positive for ketamine
- All were Caucasian
- In all but 1 the nature of drug use was Unknown. All of these received the drug as part of their medical management. Of these 2 tested positive to other drugs of abuse.
- Only 1 tested positive for ketamine only. The other drugs found were amphetamines and THC.
- Two had a previous known history of IDU.

3.3.9 LSD

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests, only 1 patient tested positive to LSD.

Demographic Details:
The patient was a 25 year old Caucasian male who presented citing illicit drug use.
He stated that he had taken 4 tabs of LSD and smoked THC at home.
He had a past history of depression but was not taking any medication.

Patterns of Drug Use:
LSD was detected along with a THC level of 2mg/L, and a paracetamol level of 208.

Clinical Correlates:
Relevant data on the clinical correlates for patients testing positive for LSD has also been reviewed in “Clinical Correlates” of Section I.

The patient presented to the hospital by ambulance in the early hours of the morning. He was triaged as a priority 2 with a complaint of ‘psychosocial: drugs misuse ‘. He required urgent medical attention due to agitated, confused behaviour, necessitating both chemical and physical restraint, and was treated with midazolam and benztropine. He was tachycardic but normo-thermic and normotensive. His GCS on arrival was 8, with size 8 dilated and unresponsive pupils. He was a little tachypnoeic with a Sa02 of 100%. He had been vomiting but the presence of bowel sounds was undetermined. He was combative and rigid.

He was admitted to ICU for observation, but recovered sufficiently to be discharged home within 24 hours.

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3.3.10 Antidepressants and Antipsychotics

Enrolments:
Results and discussion in this and the following sections are limited to drug positive enrolments only.

Of the 1279 enrolled drug-positive patients, 109 (9%) tested positive for antidepressants, with a total number of 115 positive tests. Twenty- two (2%) of the 1279 enrolled patients tested positive for antipsychotics with a total of 23 positive tests (see Table 207). Not surprisingly, the largest proportion positive for either group was seen in the deliberate Self-Harm group, with 26% of this enrolment category testing positive for antidepressants and 5% for antipsychotics (see Table 44).

Table 207: Number of antidepressant- and antipsychotic-positive patients by presentation category.

Presentation Category	Antidepressants Total (%)	Antipsychotics Total (%)	Combined Total (%)
Self-Harm	84 (77)	16 (73)	100 (76)
Illicit Drug Use	18 (17)	3 (14)	21 (16)
Other	3 (3)	0	3 (2)
Suspected	4 (4)	3 (13)	7 (5)
Total	109	22	131

Demographic Details:
Ethnicity:
All enrolments that tested positive for antipsychotics, and 96% of antidepressant positive enrolments were Caucasian. Three patients testing positive for antidepressants were Indigenous (Table 208).

Table 208: Ethnicity of patients testing positive to antidepressants and antipsychotics.

Ethnicity	Antidepressants Total (%)	Antipsychotics Total (%)
Caucasian	105 (96)	22 (100)
Indigenous	3 (3)	0
Other	1 (1)	0
Total	109	22

Age and Gender:
The majority of patients for both types of drugs were aged between 18-35 years (antidepressants 48%, antipsychotics 59%). Six percent (6 patients) of those positive for antidepressants were aged less than 18 years.

There was a striking difference between the two groups in terms of gender spread. Females outnumbered males 2:1 in the antidepressants group (61:39%), whereas the ratio was reversed in the antipsychotics group (59% males compared to 41% females) (Figures 47 and 48).

Figure 47: Age and gender distribution of patients testing positive to antidepressants.

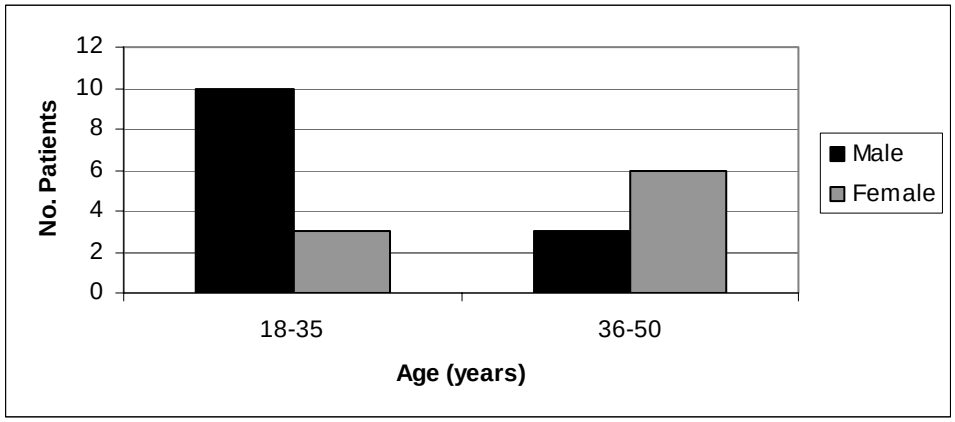
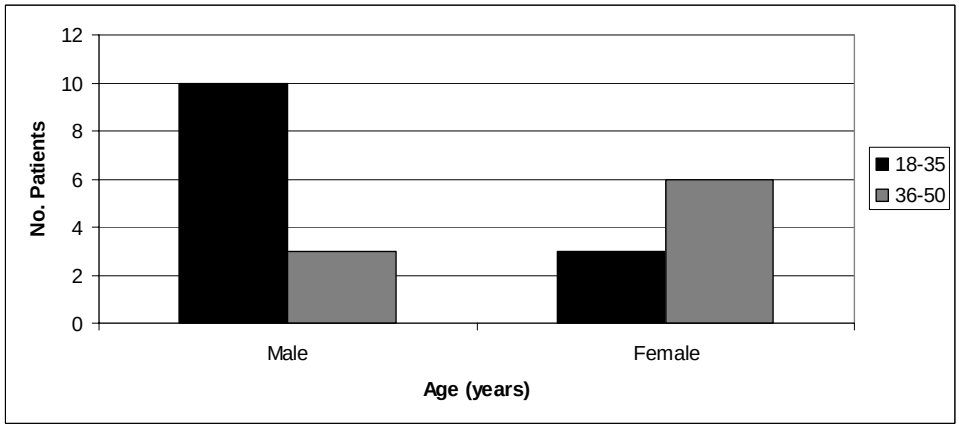


Figure 48: Age and gender distribution of patients testing positive to antipsychotics.

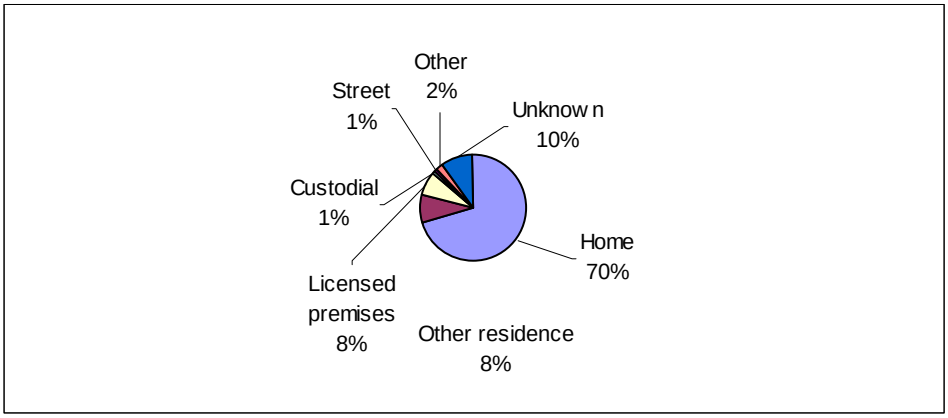


Time of Presentation:
Time of presentation for patients testing positive for antidepressants was fairly evenly spread through the days of the week and the time of day; 31% presented on the weekend. Forty five percent of those testing positive for antipsychotics presented between 1800 and 0600 and 41% presented on the weekend.

There appeared to be an increase in antidepressant positive presentations in the winter (28%) and autumn months (32%) compared to spring (21%) and summer (19%). Autumn (41%) and winter (31%) presentations were also the most common for those positive for antipsychotics, with summer (10%) the lowest.

Venue of exposure and mode of transport to ED:
Most antidepressant and antipsychotics drug exposures took place at home or another residence (69% and 77% respectively). Eight percent of antidepressant exposures took place in a licensed premise. The location was unknown in 9% of cases involving antipsychotics and 10% of antidepressants (see Figure 49).

Figure 49: Venue of ingestion of antidepressants and antipsychotics.



Mode of arrival to the ED was mostly via ambulance services (Table 209). This is broadly consistent with mode of arrival patterns seen in other enrolment categories but is different from ED attendances in general. Ambulance and private vehicle transport rates for all patients attending the ED were approximately 41% and 39% respectively.

Table 209: Mode of arrival to the ED for patients testing positive to antidepressants and antipsychotics.

Mode of Arrival	Number of Patients (%)	
	Antidepressants	Antipsychotics
Ambulance	89 (82)	22 (100)
Police/Custodial	5 (5)	0
Private car	11 (10)	0
Other	4 (4)	0
Total	109	22

Patterns of Drug Use:

Antidepressants were most commonly detected in the Self-Harm group (accounting for 77%), followed by the Illicit Drug Use group (17%, Table 210). A similar pattern is seen in the antipsychotic group, with Self-Harm accounting for 73% of all cases and Illicit Drug Use for 14% (Table 211).

Table 210: Antidepressants detected in each of the enrolment categories.

Drug	Self-Harm	Illicit Drug Use	Other	Unknown	Total (%)
Amitryptiline	10	1	1	1	13 (11)
Fluoxetine	13	7	0	2	22 (19)
Citalopram	17	3	1	0	21 (18)
Mirtazapine	9	3	0	1	13 (11)
Sertraline	9	0	1	0	10 (9)
Venlafaxine	18	2	1	1	22 (19)
Raboxetine	1	0	0	0	1 (1)
Fluvoxamine	1	0	0	0	1 (1)
Dothiepin	5	2	0	0	7 (6)
Imipramine	1	0	0	0	1 (1)
Doxepin	1	1	0	0	2 (2)
Clomipramine	2	0	0	0	2 (2)
Total	87	19	4	5	115

Table 211: Antipsychotics detected in each of the presentation categories.

Drug Name	Self-Harm	Illicit Drug Use	Unknown	Total (%)
Quetiapine	4	0	1	5 (22)
Olanzapine	8	2	0	10 (43)
Chlorpromazine	5	1	1	7 (30)
Clozapine	0	0	1	1 (4)
Total	17	3	3	23

Poly-substance was a feature of patients positive for both drug groups (Table 212), with more than one drug being detected in 93% of antidepressant cases and all of the antipsychotic cases. More than 3 drugs were detected in approximately 25% of both groups.

Table 212: Number of drugs detected for each drug category.

Number of Drugs Detected	Antidepressants (%)	Antipsychotics (%)
1	8 (7)	0
2	30 (28)	9 (41)
3	38 (35)	8 (36)
> 3	33 (30)	5 (23)

A total of 235 positive tests for other drugs were returned in the antidepressant group, with the most common being benzodiazepines (43%) and alcohol (20%). Forty-two positive tests for other drugs were found for the antipsychotic group, with benzodiazepine and alcohol again being the most common (36% and 20% respectively) (Table 213).

Table 213: Drugs present in patients testing positive to antidepressants and antipsychotics.

Drug Detected	Number of Positive Tests	
	Antidepressants	Antipsychotics
Benzodiazepine	101	15
Alcohol	46	9
THC	14	3
Amphetamines (Class)	6	1
Opioids (Class)	15	1
Others	11	3
Paracetamol	37	1
Antipsychotics	5	na
Antidepressants	na	9
Total	235	42

Drug Habit:
The pattern of drug use reported generally reflected the drugs detected. However alcohol and benzodiazepine use was under-reported in both groups. Opiate use was under-reported in the antipsychotic group. Psychostimulant abuse was over reported when compared to detection rates in both groups.

The frequency of injecting drug abuse previously documented in case records of patients testing positive for both antidepressants and antipsychotics was quite high (19% and 23% respectively, Table 214). Of these there was, once again, a surprisingly high incidence of hepatitis C.

Table 214: Number of patients with previously documented injecting drug use and transmissible viral disease.

Behaviour	Patients positive for Antidepressants (%)	Patients positive for Antipsychotics (%)
IV Drug Use	21 (19)	5 (23)
Hepatitis C positive	10 (9)	2 (9)
HIV positive	1 (<1)	0

Clinical Correlates:
Medical History:
A past history of psychiatric illness dominated both categories, with almost 90% of patients having a previous diagnosis of psychiatric illness. These diagnoses comprised, on average, 41% and 22% of the historical medical/psychiatric diagnoses recorded for antidepressant-positive and antipsychotic-positive patients respectively (Table 215). In both groups a history of drug abuse/dependency was noted in 10-15%. The relatively low number of significant medical diagnoses recorded may reflect the age of the patients.

Table 215: Incidence of past history of psychiatric, drug abuse/dependency, and chronic medical illness in antidepressant and antipsychotic-positive enrolled patients

Recorded Past Medical/Psychiatric Illness	Patients positive for Antidepressants	Patients positive for Antipsychotics
Psychiatric Illness	90	19
Drug abuse or dependency	35	5
Other Significant Medical	15	6
Behavioural issues	3	1
Total number of recorded entries*	221	52

(*Patients may have had more than one medical or psychiatric condition. Data was not recorded for all patients enrolled)

Presenting Complaint:

The primary clinical reason for attending the ED in patients who tested positive for both antidepressants and antipsychotics was psychosocial (61% and 64% respectively). Poisoning was the next most common for both (18%). Trauma accounted for 6% of antidepressant and 9% of antipsychotic presentations (Table 216).

Table 216: Primary clinical reason for attending the ED as per presentation complaint.

System of Presenting Complaint	Patients positive for Antidepressants (%)	Patients positive for Antipsychotics (%)
CVS	4 (4)	0
Neuro	9 (9)	1 (5)
Drug	1 (<1)	1 (5)
GI	1 (<1)	0
Poisoning	20 (18)	4 (18)
Psycho-social	67 (61)	14 (64)
Single trauma	4 (4)	2 (9)
Multi-trauma	2 (2)	0
Respiratory	1 (<1)	0
Total	109	22

(CVS = cardiovascular system, GI = gastro-intestinal, OD = overdose, multi-trauma = trauma severity requiring trauma team assessment, single trauma = trauma severity not requiring trauma team assessment)

Triage Category:

There was little difference between those testing positive to antidepressants and to antipsychotics (62% and 73% respectively) with regards to a need for immediate or urgent attention upon arrival to the ED according to the triage priority allocated to them (Table 217).

Table 217: Distribution of allocated triage categories for antidepressant and antipsychotic-positive patients.

Drug Type	Triage Priority				
	1	2	3	4	5
Antidepressants	14 (13)	52 (48)	39 (36)	4 (4)	0
Antipsychotics	3 (14)	13 (59)	6 (27)	0	0
No. patients (%)	17 (13)	65 (50)	45 (34)	4 (3)	0

Clinical Vital Signs:

The most common clinical abnormality was tachycardia (33% of antidepressant, 50% of antipsychotic positive patients) and hypertension in both categories (13% and 10%). Data on recorded clinical vital signs is shown in Tables 218 and 219.

Tables 218 and 219: Clinical vital signs measures in patients testing positive for antidepressants and antipsychotics.

Pulse Rate	Antidepressants No. Patients (%)
Not recorded	1 (<1)
<60	5 (5)
60-100 (NR)	67 (61)
101-150	33 (30)
>150	3 (3)
Systolic BP	**Antidepressants No. Patients (%)**
Not recorded	2 (2)
<90	7 (6)
90-150 (NR)	87 (80)
150-200	12 (11)
>200	1 (<1)
Oxygen Saturation	**Antidepressants No. Patients (%)**
Not recorded	9 (8)
<85	2 (2)
85-90	3 (3)
91-95	15 (14)
96-100 (NR)	80 (73)
RR	**Antidepressants No. Patients (%)**
Not recorded	6 (6)
<10	2 (2)
10-30	100 (92)
>30	1 (<1)

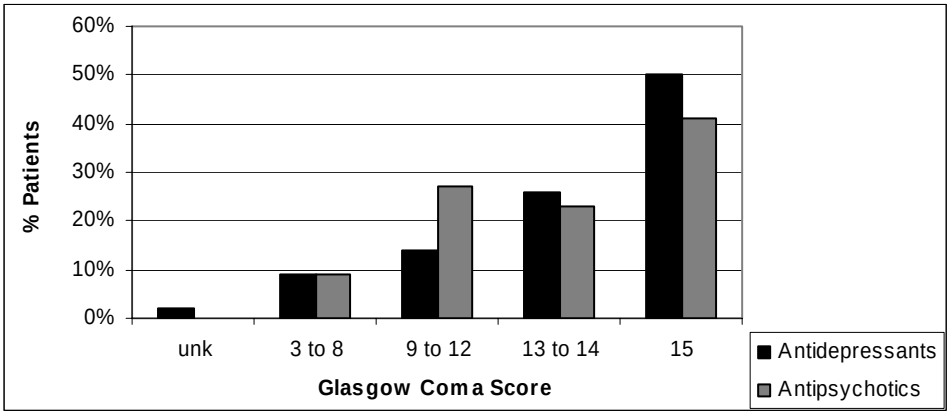
Pulse Rate	Antipsychotics No. Patients (%)
Not recorded	1 (5)
<60	0
60-100 (NR)	10 (45)
101-150	10 (45)
151-200	1 (5)
Systolic BP	**Antipsychotics No. Patients (%)**
Not recorded	1 (5)
<90	2 (10)
90-150 (NR)	17 (77)
150-200	2 (10)
>200	0
Oxygen Saturation	**Antipsychotics No. Patients (%)**
Not recorded	4 (18)
<85	0
86-90	0
91-95	3 (14)
96-100 (NR)	15 (68)
RR	**Antipsychotics No. Patients (%)**
Not recorded	1 (5)
<10	1 (5)
10-30	15 (68)
>30	5 (23)

(BP = blood pressure, NR = normal range, RR = respiratory rate)

The GCSs allocated to patients testing positive to antidepressants and antipsychotics are depicted in Figure 50. The spread was fairly even for antipsychotics, with 9% scoring a GCS of 8 or less.

Of those positive for antidepressants 9% had a profoundly affected GCS, while 50% had a normal GCS.

Figure 50: Conscious levels of patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe), 9 to 12 (moderate), 13 to 14 (mild), 15 (normal).



Disposition from the ED:
High proportions from both groups were admitted to hospital (64% of antidepressant-positive patients and 86% of antipsychotic positive), with high rates of ICU/HDU admission also (26%, and 32% respectively) (Table 220). This indicates a high acuity and complexity for these presentations.

The stay in hospital was longer for both groups than any other drug group, or indeed overall. Only 39% of those positive for antidepressants and 23% of those positive for antipsychotics were discharged home within 24 hours; 12% of cases positive for antidepressants and 18% of those positive for antipsychotics were transferred to psychiatric facilities (Table 221).

Table 220: Disposition from the ED of patients testing positive to antidepressants and antipsychotics.

Disposition from ED	Number of Patients (%)	
	Antidepressants	Antipsychotics
Discharged	37 (34)	3 (14)
Admitted	70 (64)	19 (86)
EECU	27 (25)	9 (41)
General Ward	10 (9)	2 (9)
ICU/HDU	28 (26)	7 (32)
Cardiology	1 (1)	0
Psych. Ward	4 (4)	1 (5)
Transferred	2 (2)	0

Table 221: Disposition from the Hospital for patients testing positive to antidepressants and antipsychotics.

Disposition from Hospital	Number of Patients (%)	
	Antidepressants	Antipsychotics
Home	86 (79)	18 (82)
Absconded/Left AMA	6 (6)	0
Psych services	13 (12)	4 (18)
SAPOL custody	2 (2)	0
Other/Unknown	2 (2)	0

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit, Psych = Psychiatry, SAPOL = South Australian Police)

Summary:

Enrolments:

- Of the 1279 enrolled drug-positive patients, 109 tested positive for antidepressants (9%), 22 for antipsychotics (2%).

Demographics:

- Caucasians accounted for all antipsychotic-positive enrolments and 96% of antidepressant-positive enrolments
- The majority were between 18 and 35 years of age; 6% of those positive for antidepressants were less than 18 years of age
- Females outnumbered males 2 to 1 in the antidepressant group
- The male to female ratio was reversed in the antipsychotic group (M:F 3:1)
- Most of the drug exposures occurred at a private residence.

Patterns of Drug Use:

- 84% of antidepressants were in association with Self-Harm, 16% with Illicit Drug Use
- 73% of antipsychotics were in association with Self-Harm, 14% with Illicit Drug Use
- Fluoxetine (19%) and Venlafaxine (19%) were the most frequently detected antidepressants, Olanzapine (43%) and Chlorpromazine (30%) the most frequent antipsychotics
- The majority of patients tested positive to more than 1 drug, with 40% testing positive to more than 3 drugs
- The other most commonly detected drugs in the group were benzodiazepines, alcohol, and THC
- A past history of IDU was reported in 19% of antidepressant positive patients and 23% of antipsychotic positive patients.

3.3.11 Miscellaneous drugs and presentations

Datura

There were 2 cases of clinical Datura poisoning, presenting simultaneously. Both were Caucasian male aged in their early 30's, who presented to the RAH ED by ambulance after collapsing in a nearby street.
Case 1 had a past history of asthma, controlled with inhaled steroids and was an IDU. He had used LSD, heroin and mushrooms in the past and was a regular user of THC, alcohol and cigarettes.

Both admitted to eating flowers from the Datura plant in the nearby Botanic Gardens.

Case 1 details
He was triaged as a priority 1 to the resuscitation room. Upon examination he had flushed skin, was normo-thermic, tachycardic 145 bpm, hypertensive 170/P mmHg, with a respiratory rate of 30, clear chest, Sa02 97%. Bowel sounds were present. His GCS on arrival was 3, with sluggish dilated pupils 7mm, a depressed gag, tendon reflexes unknown. His blood alcohol reading was 0.16g/100ml.

He required aggressive resuscitation, and was intubated, ventilated and fluid resuscitated. He was transferred to ICU but recovered to be discharged home 12 hours later, with a diagnosis of Anticholinergic poisoning.

Case 2 details
The second case was triaged to the resuscitation room as a priority 2. He too had flushed skin but was normotensive, in Sinus rhythm, and had a normal temperature. His respiratory rate 20, with a clear chest, Sa02 96%. Bowel sounds were present. His GCS on arrival was 11, with dilated pupils 5mm, a normal gag and tendon reflexes. He was very agitated. His blood alcohol level was 0.12g/100ml and he was positive for THC.

He was treated with oxygen and IV fluids and admitted to ICU for observation. He was transferred to the ward in due course and discharged home 5 days later, with a diagnosis of Anticholinergic poisoning.

Solvents

A 22 year old Caucasian male presented to the RAH ED by ambulance after admitting to inhaling liquid solvents at home. He had a past history of poly-substance abuse (alcohol, methamphetamines, heroin, solvents) and was an IDU.

He was triaged as a priority 2, complaining of a headache. His skin was flushed, with a heart rate of 115 bpm and a blood pressure of 140/80 mmHg. His respiratory rate was 20, with a clear chest and Sa02 of 96%. His GCS was 14 on arrival, with 4mm sluggishly reacting pupils, no nystagmus and a normal gag and tendon reflexes.
His ECG showed a sinus tachycardia with a QRSw of 94 and a QTc of 439.

He tested positive for Toluene and Acetone. He was also positive for Olanzapine.

Treatment was essentially supportive with oxygen and IV fluids.

He was detained under the Mental Health Act and received a psychiatric review.
He was admitted to the EECU for 24 hours and then discharged to his own home, with a diagnosis of Gas or fume poisoning.

Paraquat

A 39 year old Caucasian male presented via ambulance after ingesting 35ml of paraquat at home in an attempt of Deliberate Self harm.
He had no known past history and took no regular medications.

On arrival he was spitting and drooling.
He was taken to the resuscitation rooms as a triage priority one, intubated and ventilated.

He was transferred to the ICU for management but died within 2 days from the effects of paraquat poisoning. He had a blood alcohol reading of 0.16g/100ml and nordiazepam 0.02mg/L.

SUPPLEMENT

S1 TRAUMA

Enrolments:
Results and discussion in this and the following sections, unless otherwise stated, are limited to drug positive enrolments only.

Of the 1440 enrolled patients a total of 1279 (89%) returned positive drug tests. Of these, 224 patients (17.5%) presented to the Emergency Department as a direct result of trauma. The most common cause of trauma was as a result of a motor vehicle accident (MVA) (91 patients or 41%, Table S1). The next most common cause of trauma was assault (71 patients, 32%).

Table S1: Number of drug-affected patients presenting as a result of the various categories of trauma.

Nature of Trauma	Number of Patients (%)
MVA	91 (41)
Assault (all)	71 (32)
Assault with Blunt injury	55 (25)
Assault with Penetrating injury	16 (7)
Fall	24 (11)
Self-Harm	7 (3)
Other	31 (14)
Total	224

(MVA = motor vehicle accident)

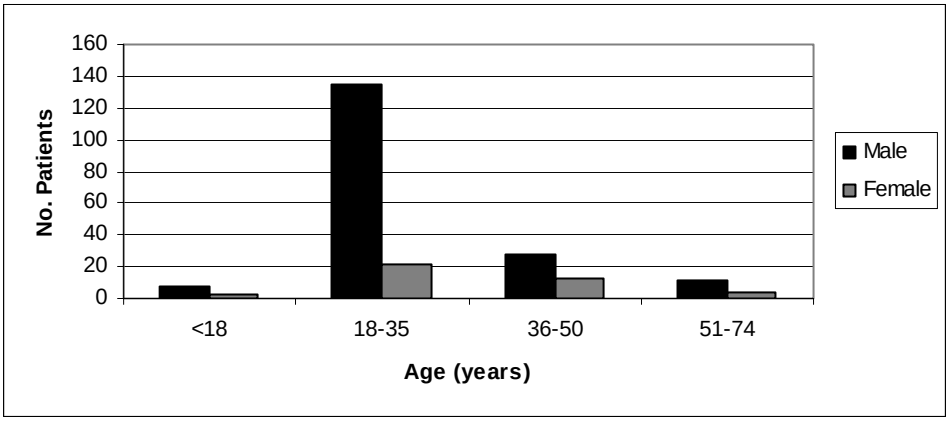
Demographic Details:
Ethnicity, Age and Gender:
The overwhelming majority of patients were Caucasian (85%) with the next largest ethnic group being Indigenous patients representing just 8% (Table S2).

Table S2: Ethnicity of all drug-positive trauma patients and those presenting as a result of a MVA.

Ethnicity	All Trauma (%)	MVA (%)
Caucasian	191 (85)	81 (89)
Indigenous	18 (8)	4 (4)
Other	15 (7)	6 (7)
Total	224	91

Approximately 70% of patients were male and aged between 18 and 35 years (Figure S1). Eleven patients (5% of the trauma group) were under 18 years of age. The male predominance held across all age groups. Similar ratios were seen in the MVA sub-group, with 8% of the group aged less than 18 years of age, and males predominating in all age ranges.

Figure S1: Age and gender distribution of all trauma patients testing positive to drugs.



Time of Presentation:

The most likely time of presentation for enrolled trauma patients was Sunday morning between midnight and 06:00 (29 of 224 patients or 13%, Table S3). Thirty nine percent of the patients presented on the weekend, 46% between 6 pm Friday and 6 am Monday, and 68% presented 'after hours' (6 pm to 6 am). The figures for the MVA sub-group were similar (31% on the weekend, and 67% 'after-hours').

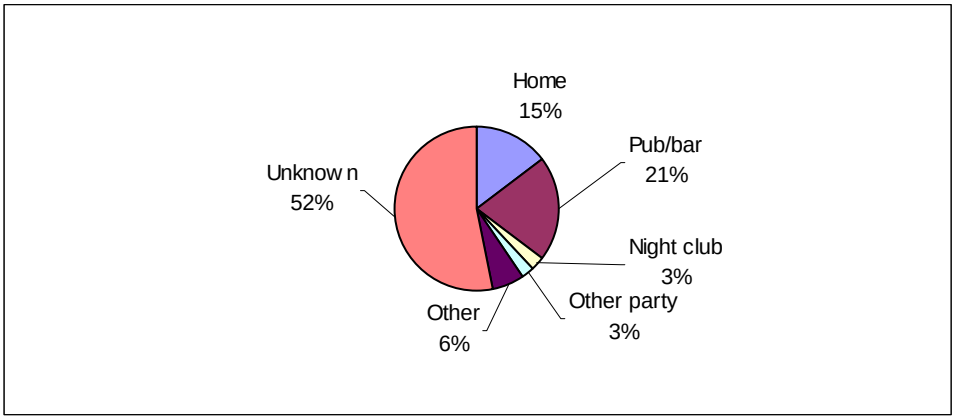
Table S3: Day and time of presentation to the ED of drug-affected patients presenting due to trauma.

Time	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Total (%)
0001-0559	29	5	5	9	7	11	20	86 (38)
0600-1159	9	5	3	1	5	12	6	41 (18)
1200-1759	5	2	6	3	4	2	8	30 (13)
1800-2400	6	11	13	10	12	11	4	67 (30)
Total (%)	49 (22)	23 (10)	27 (12)	23 (10)	28 (13)	36 (16)	38 (17)	224

Venue of exposure and mode of transport to ED:

The venue of drug exposure was recorded as known in only 105 of the 224 patients (47%) and is shown in Figure S2. Thirty one percent of the drug exposures in those for whom it was known, occurred in a private residence, whilst 50% of exposures occurred in a licensed premises.

Figure S2: Venue of drug exposure for trauma patients.



Mode of transport to the ED was primarily via ambulance services (Table S4).

Table S4: Mode of arrival to the ED for trauma patients testing positive to a drug.

Mode of Arrival	Number of Patients (%)
Ambulance	202 (90)
Police/Custodial	1 (<1)
Private car	9 (4)
Unknown/Other	12 (5)
Total	224

Patterns of Drug Use:

The drug exposure of the majority of patients was due to Illicit Drug Use (77%), with only a relatively small proportion presenting due to Self- harm (Table S5). The majority of those classified as “Unknown” are thought to be due to Illicit Drug Use, as the patterns of drug use seen in this category broadly match those in the Illicit Drug Use group (see Section II, “Illicit Drug Use”, and “Unknown drug Use”).

Table S5: Distribution across the presentation categories of trauma patients testing positive to drugs.

Presentation Category	Number of Patients (%)	
	All Trauma	MVA
Illicit Drug Use	172 (77)	66 (73)
Self-Harm	13 (6)	3 (3)
Suspected/Unknown	39 (17)	22 (24)
Total	224	91

The frequency of detection of the major drug types associated with trauma is shown in Table S6. The relative detection rates of the major drug groups differs from that seen in enrolments generally, with higher rates of alcohol and THC but approximately half the detection rate of benzodiazepines, opioids and antidepressants.

Table S6: Comparison of the number of patients testing positive to the major drug types from MVAs, all trauma, and all drug-positive enrolments.

Drug Type	Number of Patients (%)		
	MVA	All Trauma	All Drug Positive Enrolments*
Alcohol	54 (59)	158 (71)	776 (61)
THC	38 (42)	97 (43)	355 (28)
Psycho-stimulants	20 (22)	47 (21)	224 (18)
Benzodiazepines	5 (5)	31 (14)	409 (32)
Opioids	3 (3)	12 (5)	144 (11)
Antidepressants	4 (4)	8 (4)	109 (8)
Ketamine	4 (4)	4 (2)	4 (<1)
GHB	1 (1)	2 (<1)	30 (2)
Cocaine	0	0	6 (<1)
Other	13 (14)	17 (8)	313 (25)

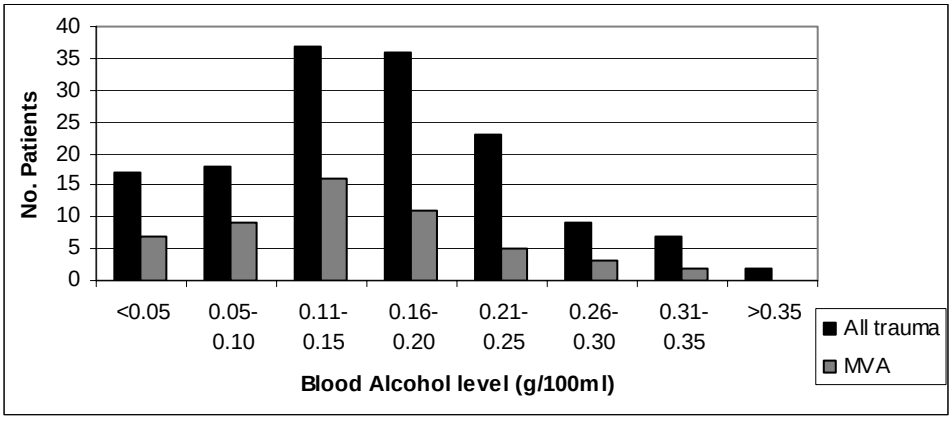
Poly-substance abuse was prominent in drug-affected trauma victims, with half of these patients testing positive for more than 1 drug (Table S7); 16% tested positive for 3 or more drugs. This is in comparison to the Illicit Drug Use group, where 23% had 3 or more drugs detected.

Table S7: Comparison of the number of patients from MVAs, all trauma patients, and all drug-positive enrolments testing positive for 1, or more drugs.

Number of Drugs	Number of Patients (%)		
	MVA	All Trauma	Illicit Use Group*
1	51 (56)	110 (49)	343 (44)
2	32 (35)	78 (35)	263 (34)
3	6 (7)	30 (13)	116 (15)
>3	2 (2)	6 (3)	59 (8)
Total	91	224	781

A total of 413 positive drug results were returned from the 224 trauma patients (an average of 1.8 drugs per patient) and 151 from the MVA sub-group (an average of 1.6 drugs per patient). Alcohol was the most frequently detected drug, followed by THC, psycho-stimulants and benzodiazepines. The alcohol levels detected are shown in Figure S3. Eighty seven percent of those in the MVA sub-group that tested positive to alcohol (46 of 53 patients) were over 0.05 g/100mL, the legal limit for driving in South Australia.

Figure S3: Blood alcohol concentration ranges of patients presenting as a result of trauma and MVA as a subgroup.



Of the psycho-stimulants, methamphetamine was the most frequently detected, both in all trauma patients and in patients from MVAs (approximately 51%) with MDMA the next most frequent (17%, Table S8). As discussed in Section III, "Psycho-stimulants", the MDA and MDEA were most likely additives to MDMA tablets, and a large proportion of amphetamine results will have been as a result of metabolism of methamphetamine.

Table S8: Frequency of amphetamine detection in trauma patients.

Drugs Detected	Number of Positive Tests	
	MVA	All Trauma
Amphetamine group	20 (22)	47 (21)
Methamphetamine	18	37
MDMA	3	12
Amphetamine	8	16
MDA	1	5
MDEA	0	1
Pseudoephedrine	1	1

Nordiazepam (main metabolite of diazepam) was the most frequently detected benzodiazepine (25 positive results) followed by oxazepam (4), temazepam (3), and alprazolam (3). Additionally, there were 8 positive drug results returned for antidepressants.

Clinical Correlates:

The triage categories allocated to drug-affected trauma patients on presentation to the ED are shown in Table S9. The overwhelming majority were allocated triage categories 1 and 2 indicating a need for immediate or urgent (less than 10 minutes) medical assessment and management. A comparison with the triage categories allocated to drug-positive enrolments generally suggests a much higher acuity of illness amongst intoxicated trauma patients than is the case for other causes of presentation of intoxicated patients. However, a specific set of triage criteria is applied to victims of trauma presenting to the RAH, and it is likely that trauma patients generally have a different distribution across the triage scale. Unfortunately a

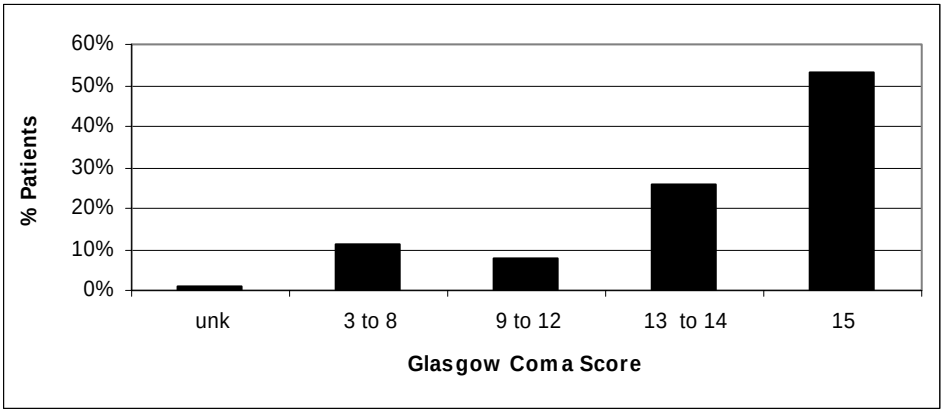
comparison of distribution across the triage categories of drug-positive and drug-negative trauma patients is not available.

Table S9: Triage category allocation for MVA patients, all trauma patients, and all drug-positive enrolments.

Triage Category	Number of Patients (%)		
	MVA	All Trauma	All Positive Enrolments
1	46 (51)	109 (48)	225 (18)
2	45 (49)	109 (48)	489 (38)
3	0	5 (2)	424 (33)
4	0	1 (<1)	133 (10)
5	0	0	8 (<1)
Total	91	224	1279

Of the 224 trauma patients approximately 11% had a GCS in the range 3 to 8 ('severely' depressed conscious state)(see Figure S4). This figure is not dissimilar to those seen with other patient sub-groups examined apart from GHB (63% with GCS 3 to 8) and THC (8% with GCS 3 to 8).

Figure S4: Conscious levels of drug-affected trauma patients as measured by the Glasgow Coma Score (GCS): 3 to 8 (severe depression of conscious state), 9 to 12 (moderate depression), 13 to 14 (mild depression), 15 (normal).



Over 20% of drug-affected trauma patients were admitted for longer than a week (Table S10), and 23% were admitted to either ICU or HDU (Tables S11 & S12).

Table S10: Length of stay in hospital for drug-positive patients presenting as a result of trauma.

Length of Stay	Number of Patients (%)	
	MVA	All Trauma
< 1 day	45 (49)	99 (44)
1 day	6 (66)	21 (9)
2-7 days	18 (20)	60 (27)
> 7 days	22 (24)	44 (20)
Total	91	224

Tables S11 and S12: Place to which trauma patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total (%)	Disposition from Hospital	Total (%)
Discharged	83 (37)	Home	186 (83)
Admitted	141 (63)	Absconded/Left AMA	9 (4)
EECU	25 (11)	SAPOL custody	4 (2)
ICU/HDU	52 (23)	Rehabilitation	14 (6)
General Ward	58 (26)	Psych services	5 (2)
Psych ward	3 (1)	Died	5 (2)
Spinal Unit	2 (<1)	Other	1 (<1)
Died IN ED	1 (<1)		

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit)

Summary:

Enrolments:

- Of the 1279 patients returning positive blood tests 224 (17.5%) presented as a result of trauma.

Demographics:

- MVAs were the most common cause of trauma (41%) followed by assault (32%)
- The majority were male, Caucasian, and between 18 and 35 years of age; 8% were Indigenous
- The most likely time of presentation was between midnight and 6am Sunday; 46% presented between 6pm Friday and 6am Monday
- In those in whom it was known 50% of drug exposures occurred in a licensed premises.

Patterns of Drug Use:

- 77% of drug exposures were due to Illicit Drug Use

- The most frequently detected drugs were alcohol, THC, psycho-stimulants, and benzodiazepines
- Benzodiazepines were proportionally much less frequently detected in trauma patients than drug-positive enrolments generally
- Poly-substance abuse was common (51% of all trauma and 44% of MVA patients positive to more than 1 drug)
- The average number of drugs per patient was 1.6 in MVA and 1.8 drugs in all trauma patients.

S2 INJECTING DRUG USERS

Enrolments:
Results and discussion in this and the following sections, unless otherwise stated, is limited to drug positive enrolments only.

Of the 1279 enrolled patients returning positive drug tests, a total of 117 (9%) were identified as having administered one or more of the drugs intravenously (IDU).

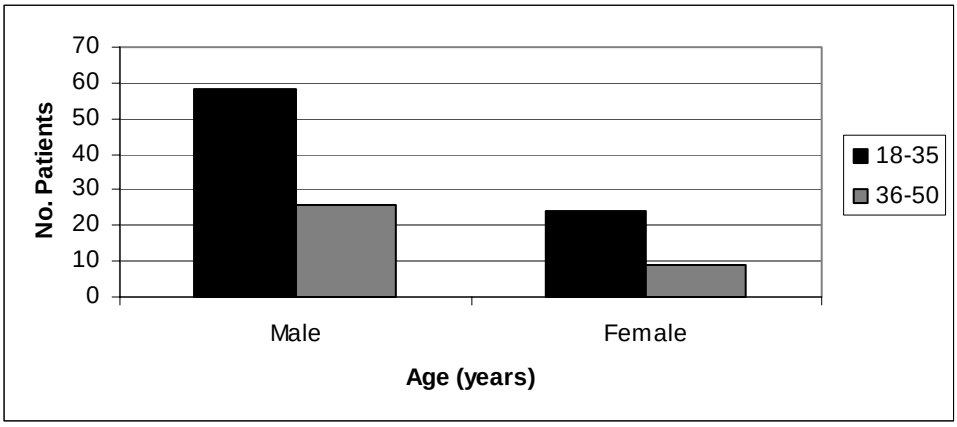
Demographic Details:
Ethnicity, Age and Gender:
The overwhelming majority of patients were Caucasian (82%) with the next largest ethnic group being Indigenous patients representing 15% (Table S13), proportions similar to that for Illicit Drug Users generally (85% and 8% respectively, Table 26).

Table S13: Ethnicity of IDU patients.

Ethnicity	Number of Patients (%)
Caucasian	96 (82)
Indigenous	17 (15)
Asian	2 (2)
Other	2 (2)
Total	117

The large majority of patients were male (72%) and aged between 18 and 35 years (70%) (Figure S5). The male predominance held across all age groups. The ages were more tightly grouped than other groups, with all aged between 18 and 50 years. The overall average age was 31 years, with two and a half years separating the genders (male 31.8, female 29.1).

Figure S5: Age and gender distribution of IDU patients.



Time of Presentation:
The distribution of time of presentation across the day of week and time of day for enrolled IDU patients was quite broad (Table S14). This may be due to the small numbers in whom this data was collected. Mode of transport to the ED was mostly via ambulance services (Table S15).

Table S14: Day and time of presentation to the ED of IDU patients.

Time	Sun	Mon	Tues	Wed	Thur	Fr	Sat	Total (%)
0001-0559	4	3	4	4	4	2	3	24 (21)
0600-1159	3	3	0	3	2	8	2	21 (18)
1200-1759	4	6	8	2	6	6	4	36 (31)
1800-2400	5	7	4	3	6	7	4	36 (31)
Total (%)	16 (14)	19 (16)	16 (14)	12 (10)	18 (15)	23 (20)	13 (11)	117

Table S15: Mode of arrival to the ED for IDU patients.

Mode of Arrival	Number of Patients (%)
Ambulance	71 (61)
Police/Custodial	13 (11)
Private car	15 (13)
Unknown/Other	9 (8)
Total	117

Patterns of Drug Use:
The large majority of IDU patients presented as a result of Illicit Drug Use (97 of 117 or 83%) with the remainder presenting due to Self-Harm (17 of 117 or 15%) or Unknown (3 of 117, 3%).

The number of IDU patients returning positive drug tests for the major drug types is shown in Table S16. Perhaps not surprisingly, the relative detection rates of the major injectable drug groups such as psycho-stimulants and opioids are considerably higher than that seen in the Illicit Drug Use group generally. The lower rates of alcohol use and the higher rates of THC and benzodiazepine use in this group of patients were comparable with the IDRS sample[12].

Table S16: Comparison of the number of IDU and Illicit Drug Use patients returning positive tests for the major drug types.

Drug Type	Number of Patients (%)	
	IDU	Illicit Drug Users
Alcohol	38 (32)	537 (69)
THC	63 (54)	255 (33)
Psycho-stimulants	53 (45)	179 (23)
Benzodiazepines	62 (53)	185 (24)
Opioids	35 (30)	71 (24)
Antidepressants	6 (<1)	18 (2)
Cocaine	4 (<1)	4 (<1)
Ketamine	1 (<1)	1 (<1)
GHB	4 (<1)	28 (4)
Total no. patients in group*	117	781

The percentages (%) are of the total number of IDU and Illicit Drug User enrolments respectively. (*Sum of columns is greater than total number of patients as many tested positive to more than 1 drug)

As has been the case with all sub-groups analysed, poly-substance abuse was prominent in IDU patients, with the 117 patients returning a total of 435 positive drug tests (an average of 3.7 drugs per patient) (Table S17). Tables S18 to S20 list the frequency with which the specific drugs within each major drug class were detected.

Table S17: Comparison of the number of IDU patients and Illicit Drug Users testing positive for 1 or more drugs.

Number of Drugs	Number of Patients (%)	
	IDU	Illicit Drug Users
1	21 (18)	343 (44)
2	43 (37)	263 (34)
3	27 (23)	116 (15)
>3	26 (22)	59 (8)
Total	117	781

Table S18: Frequency of detection of benzodiazepines in IDU patients.

Drug Name	Number of Positive Tests
Temazepam	7
Clonazepam	2
Diazepam/ Nordiazepam	45
Oxazepam	16
Alprazolam	19
Nitrazepam	2
Total	91

(nordiazepam is the principle metabolite of diazepam)

Table S19: Frequency of detection of psycho-stimulants in IDU patients.

Drug Name	Number of Positive Tests
Methamphetamine	54
MDMA	6
Amphetamine	29
MDA	2
Total	91

Table S20: Frequency of detection of opioids in IDU patients.

Drug Name	Number of Positive Tests
Morphine	18
Methadone	15
Codeine	12
Heroin	1
Norpethidine*	2
Total	48

(*metabolite of pethidine)

Interestingly, very few ecstasy and related drugs were detected in IDU patients. There were only 6 cases of MDMA, 4 of GHB, and 1 ketamine. In contrast, of the 6 positive cocaine tests for the period as a whole, 4 were detected in the IDU group.

The drugs stated to have been injected prior to presentation by the IDU patients are shown in Table S21. As discussed in “Opioids” and “Psycho-stimulants” in Section II, the detection rates of amphetamine versus methamphetamine and heroin versus morphine likely differ from the actual rates of drug use due to the effects of metabolism of the parent compounds in the interval between administration and presentation to the ED and blood sampling. It is likely that the relative prevalence of use of these drugs is more accurately reflected in Table S21 than in

Tables S19 and S20. This is also supported by the data in Table S22, which shows the frequency of drug use reported by IDU patients.

Table S21: Number of occasions a drug was recorded as being injected prior to presentation.

Drug Type	Number of Occasions
Unknown substance	6
Cocaine	2
Buprenorphine	5
Opioids – not specified	5
Heroin	21
Morphine	15
Methadone	6
Amphetamine	28
Methamphetamine	31
MDMA	2
Dexamphetamine	1
Benzodiazepines	1
Detergent	1
Tramadol	1
Other	3

Table S22: Frequency of drug use reported by IDU patients.

	Frequency of Use						
Reported Drug Use	**Daily**	**Week**	**Month**	**Year**	**Not specified**	**Past use only**	**Total Responses**
Cigarettes	47	0	0	0	1	0	48
Alcohol	24	9	1	0	27	0	61
Cannabis	13	2	1	0	19	0	35
Amphetamines	9	6	0	0	17	0	32
Methamphetamine	8	7	1	0	38	0	54
GHB/Fantasy	0	1	1	1	3	0	6
Ketamine	0	0	1	1	1	0	3
Cocaine	0	1	0	2	5	0	8
Benzodiazepines	9	2	0	0	8	0	19
Solvents	0	0	1	0	1	0	2
LSD/Acid	0	0	1	0	4	0	5
Ecstasy	0	1	0	1	9	0	11
Heroin	3	6	3	0	29	4	45
Mushrooms	0	0	1	0	1	0	2
Opioids	6	0	1	0	12	1	20

(*Stated drug used but frequency of use not recorded)

Clinical Correlates:

The triage categories allocated to IDU patients on presentation to the ED are shown in Table S23. Interestingly, a comparison with allocations for Illicit Drug Use enrolments generally shows half the rate of priority 1 cases. This result was unexpected as it was anticipated that with the higher peak blood concentrations expected with intravenous compared to oral drug exposure (with any given dose) an increased acuity of illness would be expected. This unexpected result may be due to bias from the relatively small sample size of this group.

Table S23: Triage category allocation for IDU patients compared to that for Illicit Drug Use enrolments generally.

	Number of Patients (%)	
Triage Category	**IDU**	**Illicit Drug Users**
1	11 (9)	148 (19)
2	48 (41)	281 (36)
3	44 (38)	247 (32)
4	13 (11)	100 (13)
5	1 (<1)	5 (<1)
Total	117	781

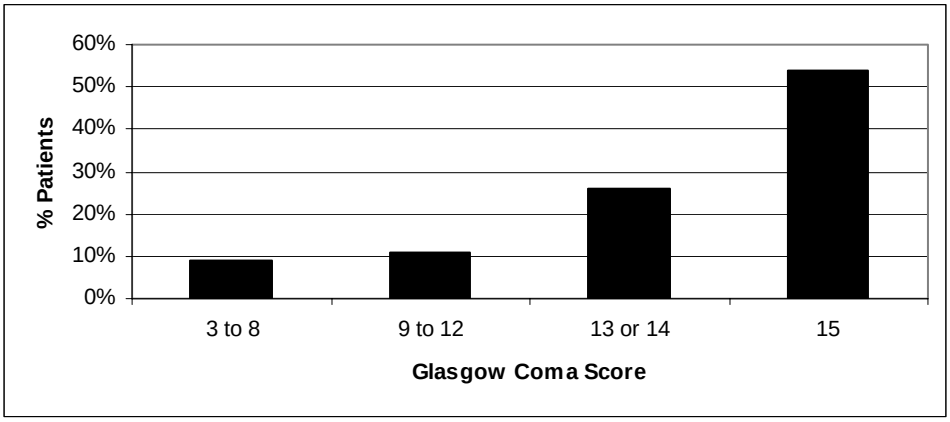
Of the 117 patients presenting following IDU, 103 (88%) had a recorded past history of IDU. Of the 117 patients, 2 were known to have hepatitis B, 33 to have hepatitis C (Table S24).

Table S24: Number of patients previously known to be an IDU, and hepatitis or HIV positive.

Behaviour	Number of Patients
IV Drug Use	103 (88)
Hepatitis B positive	2 (2)
Hepatitis C positive	33 (28)

Of the 117 IDU patients, 9% had a GCS in the range 3 to 8 ('severely' depressed conscious state, Figure S6). This percentage is similar to that seen with THC (8% with GCS 3 to 8) but approximately half that of other patient sub-groups examined apart from GHB (63% with GCS 3 to 8).

Figure S6: Conscious levels of IDU patients as measured by the Glasgow Coma Score (GCS): 3 to 8. (severe depression of conscious state), 9 to 12 (moderate depression), 13 to 14 (mild depression), 15 (normal).



The rate of admission to hospital and admission to critical care units from the RAH ED is similar to that for the Illicit Drug Use group as a whole (Tables S25 and S26).

Tables S25 and S26: Place to which IDU patients were discharged on leaving the ED and the Hospital.

Disposition from ED	Total
Discharged	59 (50)
Admitted	52 (44)
Transferred	6 (5)
EECU	30 (26)
ICU/HDU	6 (5)
General Ward	10 (9)
Psych ward	6 (5)
Total	117

Disposition from Hospital	Total
Home	34 (80)
Absconded	10 (9)
SAPOL custody	5 (4)
Psychiatric Services	8 (7)
Total	117

(ICU = Intensive Care Unit, HDU = High dependency Unit, EECU = Emergency Extended Care Unit)

Summary:

- Of the 1279 drug-positive enrolments in this period 117 patients (9%) were identified as having administered one or more drugs intravenously (IDU)
- 96% were Caucasian, 15% Indigenous
- The male to female ratio of IDU patients was approximately 5 to 2.
- 83% presented as a result of Illicit Drug Use
- The most frequently detected drugs were: benzodiazepines (45%), psycho-stimulants (45%), THC (54%), opioids (30%), and alcohol (32%).
- Few of the more common 'designer' drugs such as ecstasy (MDMA) and related drugs such as GHB or ketamine were detected in IDU patients;
- Poly-substance abuse was prominent in IDU patients, with the 117 patients returning a total of 435 positive drug tests (an average of 3.7 drugs per patient)
- 88% tested positive to more than 1 drug, 22% to more than 3 drugs.

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ROYAL ADELAIDE HOSPITAL
EMERGENCY DEPARTMENT

DRUG ALERT

DRUG & ALCOHOL SERVICES SOUTH AUSTRALIA

D2EWS - Designer Drug Early Warning System **May 2006**

The Designer Drug Early Warning System or D_2EWS is a clinical toxicology database and monitoring process for drugs of abuse in patients presenting to the Royal Adelaide Hospital Emergency Department (RAH ED). The D_2EWS Alerts are designed to inform hospital emergency workers with timely information about recent drug events within the RAH ED. The information contained within the Alerts is general in nature and more specific detail can be obtained by contacting the RAH ED.

Datura poisoning

Two cases presented to the ED simultaneously, after collapsing nearby. They both admitted to ingesting datura flowers of the Brugmansia species, sourced from the Botanic Gardens.
Of the 9 cases of anticholinergic poisoning presenting to the ED in the last 2 years, 70% had ingested datura.

Clinical Presentation

The first had ingested 2 ½ flowers and presented with a GCS (Glasgow Coma Score) of 10. The other had consumed 5 flowers and had a GCS of 3 at the scene. Both cases had a full range of anticholinergic effects, associated with tropane alkaloid toxicity.

Treatment

Both required aggressive resuscitative measures. Both required sedation with IV benzodiazepines, rehydration and oxygen. Case 1 was admitted to the High Dependency Unit and discharged from the ward 2 days later. The second required airway and ventilatory support overnight, while the toxic effects wore off. He left after 24 hours, against medical advice. Neither suffered any lasting effects.

Datura Facts

- There are 25 species worldwide, commonly known as Angel's trumpet, Thornapple and Jimsonweed.
- All parts of the plant are poisonous.
- Plants contains tropane alkaloids- atropine, scopolamine and hyoscyamine. Toxicity manifests as anticholinergic poisoning 30-60 min post ingestion.
- Toxic action: competes with acetylcholine at muscarinic receptors thereby blocking nerve impulses.
- The Anticholinergic toxidrome describes the effects: "*red as a beet, dry as a bone, blind as a bat, mad as a hatter, hot as a hare"*
- Initial symptoms: dry mucous membranes and skin, , dilated pupils and blurred vision, tachycardia, tachypnoea, hypertension or hypotension, flushed skin, hyperthermia.
- CNS effects: incoherent speech, agitation, confusion, hallucinations, seizures, coma and death.
- Hallucinations caused by ingestion are truly indistinguishable from reality.
- Treatment includes supportive measures and sedation with benzodiazepines. Gastric decontamination with activated charcoal may be considered.
- Effects may last 1-2 days as gastric emptying is delayed.
- There is no safe dose and alkaloid content varies with time of day and seasonality.

D_2EWS ALERT

Designer Drug Early Warning System **August 2006**

The Designer Drug Early Warning System or D_2EWS is a clinical toxicology database and monitoring process for drugs of abuse in patients presenting to the Royal Adelaide Hospital Emergency Department (RAH ED), and run jointly with the Drug & Alcohol Services of SA (DASSA). The D_2EWS Alerts are designed to inform hospital emergency workers with timely information about recent drug events within the RAH ED. The information contained within the Alerts is general in nature and more specific detail can be obtained by contacting the RAH ED.

Pethidine

Four cases involving pethidine misuse presented to the Emergency Department of the RAH within 7 days in mid-June.

All 4 cases involved Caucasian men aged between 25 and 39 years from a wide range of geographical locations. There appears to be no obvious connection between them apart from the time frame and the fact that they presented to the RAH.

Two cases presented as a result of deliberate self harm, one misusing paracetamol, the other oxazepam. One case presented following a fall as a result of recreational use of alcohol. The remaining case presented with the police after being detained in the Remand Centre for prescription fraud. He was suspected to have misused opioids as he responded well to a dose of naloxone.

2 required immediate resuscitative measures. None admitted to past or present narcotic misuse. All had a history of alcohol misuse, 2 used THC regularly. Only one admitted to regular use of psycho-stimulants.

All cases were discharged from the department.

Important Notes

Pethidine is one of the most commonly diverted prescription drugs, despite being a Schedule 8 controlled substance.

It is one of the most commonly requested opioid analgesics and the one most commonly abused by health professionals. It produces an anxiolytic rush before analgesia.

There have been several nationwide projects in recent years to improve the appropriate prescription of pethidine, especially in the Emergency Department.

Pethidine has been deemed to have no place in the management of migraines, lower back and chronic pain.

Common sources of obtaining

Doctor shopping

Prescription fraud/alteration

Theft

Diversion at the wholesale/retail level

Pethidine

- Pethidine hydrochloride is a synthetic opioid analgesic.
- Pethidine is indicated for short term relief of moderate to severe pain in those with severe adverse reactions to other opioids.
- It has a shorter duration of action than morphine, with no analgesic advantage.
- Pethidine is metabolised in the liver to norpethidine, which is an active metabolite.
- The half life of pethidine is 3.5 hours, longer if hepatic dysfunction is present, possibly leading to accumulation of norpethidine.
- The half life of pethidine and norpethidine exceeds the duration of analgesia, thereby requiring repeat dosing to achieve analgesia- risking toxicity
- Side effects arise primarily from CNS depression- respiratory depression, mood alteration, clouding of the sensorium
- Higher doses can cause excitation and convulsions.
- Norpethidine is half as potent as the parent drug in terms of analgesia, but twice as potent as a convulsive agent.
- Can potentiate the CNS depressive effects of other drugs such as benzodiazepines and phenothiazines.

For further information contact Dr David Caldicott, Dr Michael Davey or Jennifer Pfeiffer (Project Nurse) at the RAH ED on ph 8222 4000.

APPENDIX B NUMBER OF PATIENTS WITH POSITIVE DRUG TEST

Drug	No. positive tests	Number of patients with positive drug test					
		Self-Harm	Illicit	Other*	Drink Sp	Unk*	Total
Alcohol	**776**	**144**	**537**	**0**	**54**	**41**	**776**
Cocaine	**6**	**1**	**4**	**1**	**0**	**0**	**6**
GHB	**2**	**28**	**0**	**0**	**0**	**0**	**30**
Ketamine	**4**	**0**	**1**	**0**	**0**	**3**	**4**
LSD	**1**	**0**	**1**	**0**	**0**	**0**	**1**
THC	**355**	**45**	**255**	**2**	**7**	**46**	**355**
Benzodiazepines	**595**	**185**	**185**	**5**	**3**	**31**	**409**
Temazepam	67	43	17	1	0	6	67
Clonazepam	12	7	5	0	0	0	12
Diazepam/ Nordiazepam	315	135	151	3	3	23	315
Oxazepam	88	48	35	1	0	4	88
Alprazolam	84	30	43	2	0	9	84
Lorazepam	10	7	2	0	0	1	10
Nitrazepam	15	10	4	0	0	1	15
Bromazepam	3	3	0	0	0	0	3
Triazolam	2	0	0	0	0	1	2
Opioids	**172**	**58**	**71**	**11**	**1**	**3**	**144**
Methadone	26	7	17	1	0	1	26
Heroin	1	1	0	0	0	0	1
Morphine	58	20	32	3	0	3	58
Dextropropoxyphene	3	3	0	0	0	0	3
Norpethidine**	4	2	1	0	0	1	4
Codeine	80	41	30	0	0	9	80
Amphetamines	**374**	**22**	**179**	**1**	**6**	**16**	**224**
Amphetamine	87	6	69	0	2	10	87
Methamphetamine	181	19	142	1	4	15	181
Pseudoephedrine	4	2	1	0	0	1	4
MDMA	65	0	60	0	4	1	65
Phentermine	3	1	2	0	0	0	3
MDA	25	0	25	0	0	0	25
MDEA	9	0	9	0	0	0	9
Antidepressants	**115**	**84**	**18**	**3**	**0**	**4**	**109**
Mirtazapine	13	9	3	0	0	1	13
Amitryptiline	13	10	1	1	0	1	13

Fluoxetine	22	13	7	0	0	2	22
Citalopram	21	17	3	1	0	0	21
Dothiepin	7	5	2	0	0	0	7
Sertraline	10	9	0	1	0	0	10
Venlafaxine	22	18	2	1	0	1	22
Raboexetine	1	1	0	0	0	0	1
Fluvoxamine	1	1	0	0	0	0	1
Imipramine	1	1	0	0	0	0	1
Doxepin	2	1	1	0	0	0	2
Clomipramine	2	2	0	0	0	0	2
Antipsychotics	**23**	**16**	**3**	**0**	**0**	**3**	**22**
Quetiapine	5	4	0	0	0	1	5
Olanzapine	10	8	2	0	0	0	10
Clozapine	1	0	0	0	0	1	1
Chlorpromazine	1	0	0	0	0	1	1
Paracetamol	**228**	**103**	**94**	**2**	**7**	**22**	**228**

(*major metabolite of diazepam)

(**metabolite of pethidine)