Amphetamine-related presentations to an inner-city tertiary emergency department: a prospective evaluation

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ABSTRACT

Objective: To describe the prevalence, characteristics and outcomes of amphetamine-related presentations to a tertiary hospital emergency department (ED).

Design, setting and participants: Prospective observational study of amphetamine-related presentations to the ED of the Royal Perth Hospital (RPH), an adult, inner-city, tertiary referral hospital, between 3 August and 2 November 2005. For all patients presenting to the ED, the treating doctors were automatically prompted by the computerised data entry system to consider amphetamine use.

Main outcome measures: Proportion of ED presentations related to amphetamine use; demographic features and usage practices of amphetamine users; characteristics of presentations and admissions; associated psychiatric illnesses and use of other drugs.

Results: Over the study period, there were 13 125 presentations, of which 156 (1.2%) were judged to be causally related to amphetamine use. Of those 156 patients, over half were habitual drug users (89 [57.1%] used amphetamines at least weekly), and the majority were men (111 [71.2%]). The mean age was 28 years (range, 16–55 years). Presentations were of high acuity: 104 patients [66.7%] were rated 1, 2 or 3 on the Australasian Triage Scale; 50 (32.1%) arrived by ambulance; and 25 (16.0%) arrived with police. The mean time spent in the ED was 6 h (range, 0.5–24 h). Fifty patients (32.1%) required sedation, and the likelihood of requiring sedation increased almost threefold if the heart rate was over 100 beats/min on presentation. Sixty-two patients (39.7%) were admitted and 58 (37.2%) required psychiatric evaluation. Repeat attendance was common, with 71 patients (45.5%) having previous amphetamine-related presentations to the RPH ED.

Conclusions: Amphetamine-related presentations comprise 1.2% of all ED attendances and have a major impact on hospital EDs. Patients are often agitated and aggressive, require extensive resources, and frequently re-attend. The burden of amphetamine-related illnesses on EDs is likely to increase in the future.

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The illicit use of amphetamines in the community as recreational drugs and drugs of addiction is increasing.[1] Amphetamine intoxication appears to be a common reason for presentation to emergency departments (EDs), but, to our knowledge, there are no published data describing the prevalence and characteristics of amphetamine-related presentations to EDs. Our aim was to describe these features in the setting of the ED at the Royal Perth Hospital (RPH), Western Australia.

METHODS

A prospective observational cohort study was undertaken over a 3-month period from 3 August to 2 November 2005 at the RPH, an adult, inner-city, tertiary referral hospital. The ED has an annual census of about 53 000, with an admission rate of 42%.

A mandatory diagnostic prompt in the ED computerised data information system (inserted for the purpose of our study) ensured that each presenting patient was assessed for amphetamine use. Doctors were asked, "Is this presentation related to amphetamines?" The possible responses were "yes", "no" or "unsure". Amphetamine-related problems were considered to be any presenting complaint directly related to recent amphetamine use. This included symptoms of acute intoxication, withdrawal, psychiatric illness, and complications of intravenous drug use (such as infection). Amphetamine use was elicited from the history recorded at triage or during medical assessment. Urinary amphetamine drug screens were not performed, as this did not comply with normal clinical practice at the RPH. Moreover, patients with delayed sequelae of amphetamine use would not have been detected with urinary screening.

Medical staff prospectively completed a preformatted data sheet for patients identified clinically as having presentations related to amphetamine use. Medical records for patients for whom doctors were unsure about amphetamine use were recalled and examined by a single unblinded investigator (SDG). The data recorded included demographic data, drug use history, physiological data, management and disposition.

Statistical analysis

Statistical analysis was performed with SPSS version 12 software (SPSS Inc, Chicago, Ill, USA). Standard statistics were derived, including means, medians, SDs, and percentages for frequency counts. Comparisons of proportions of patients in different groups were made using odds ratios (ORs).

Ethics approval

Our study was registered as a quality improvement study with the Clinical Safety and Quality Unit and was granted an exemption by the ethics committee.

RESULTS

Over the 3-month period, there were 13 125 presentations to the ED, of which 156 (1.2%) were judged clinically to be causally related to amphetamine use (mean, 12 presentations a week; annual estimate, 624). Fifteen patients presented twice during the study period for amphetamine-related problems, and one patient presented three times. There were no deaths.

Statistics on demographic features, ED presentations, amphetamine use and associated conditions are presented in Box 1. Presentations occurred on every day of the week with relatively similar frequency. Presentations were of high acuity, with 104 (66.7%) being rated 1, 2 or 3 on the Australasian Triage Scale (meaning that the patient should be seen by a doctor within 0, 10 or 30 minutes, respectively).[2]

The most common reasons for presentation are outlined in Box 2. Many patients had associated psychiatric illness (Box 1), and 56 (35.9%) reported a drug dependence. Eighty-nine (57.1%) said they used amphetamines at least weekly, and 53 (34.0%) used marijuana on a weekly basis.

1 Characteristics of patients presenting to the Emergency Department (ED), Royal Perth Hospital, with amphetamine-related conditions, Aug–Nov 2005 ($n = 156$)

Demographic characteristics	Number (%) of patients
*Age in years**	
< 20	15 (9.6%)
20–29	81 (51.9%)
⩾30	60 (38.5%)
Male	111 (71.2%)
White	134 (85.9%)
Marital status single	113 (72.4%)
Presentations, admissions and discharges	
Time of presentation†	
00:00–06:00	38 (24.4%)
06:00–12:00	31 (19.9%)
12:00–18:00	37 (23.7%)
18:00–24:00	50 (32.1%)
Referral/mode of arrival	
Self-referred	57 (36.5%)
Arrived by ambulance	50 (32.1%)
Arrived with police	25 (16.0%)
Unspecified, or arrived with family or friends	24 (15.4%)
Admissions	
Total number of patients admitted	62 (39.7%)
To ED observation ward	31 (50.0%‡)
To psychiatric ward	12 (19.4%‡)
To general ward	15 (24.2%‡)
To intensive care unit	3 (4.8%‡)
Discharges from the ED	
Discharged home by hospital staff	76 (48.7%)
Self-discharged against medical advice	11 (7.1%)
Taken into police custody after medical clearance	7 (4.5%)

Use of amphetamines	Number (%) of patients
Mode of amphetamine use preceding presentation	
Intravenous injection	110 (70.5%)
Ingestion	30 (19.2%)
Smoking	16 (10.3%)
Place of amphetamine use	
At home	66 (42.3%)
At a friend's place	26 (16.7%)
In a public venue	26 (16.7%)
Unspecified	38 (24.4%)
Amphetamine use alone or with friends	
Alone	85 (54.5%)
With friends	53 (34.0%)
Unspecified	18 (11.5%)
Associated psychiatric illness	
Depression	27 (17.3%)
Personality disorder	22 (14.1%)
Schizophrenia	13 (8.3%)
Previous drug-induced psychosis	25 (16.0%)
Coingestions at time of presentation	
Alcohol	57 (36.5%)
Marijuana	34 (21.8%)
Benzodiazepines	13 (8.3%)
Opioids	9 (5.8%)

* Mean age, 28 years (range, 16–55 years; SD, 7.5 years). † Median time from amphetamine use to ED presentation, 12 h (interquartile range, 4–24 h); mean time spent in ED, 6 h (range, 0.5–24 h); median time spent in ED, 4 h 40 min. ‡ Represents proportion of the number of admitted patients. ◆

2 Principal reasons for presentation to the Royal Perth Hospital Emergency Department after amphetamine use

	Number (%) of patients ($n = 156$)
Sympathomimetic agitated delirium	31 (19.9%)
Acute psychosis	19 (12.2%)
Assault	13 (8.3%)
Injury	12 (7.7%)
Suicidal thoughts or actions	10 (6.4%)
Infection at injection site	9 (5.8%)
Chest pain	7 (4.5%)
Polysubstance overdose	6 (3.8%)
Seizures	6 (3.8%)
Vomiting	6 (3.8%)
Palpitations	5 (3.2%)
Motor vehicle accident	5 (3.2%)
Miscellaneous*	27 (17.3%)

* For example, general unwellness, headache, collapse, self-harm, depression, numbness, rigors, thirst, abdominal pain. ◆

On initial observation, 66 patients (42.3%) were tachycardic (heart rate [HR] ⩾ 100 beats/min) and 10 (6.4%) were hypertensive (systolic blood pressure ⩾ 160 mmHg). Of the patients who were tachycardic on presentation, 30 (45.5%) needed benzodiazepine sedation in the ED.

Compared with patients who did not have tachycardia, the OR for patients with an initial HR ⩾ 100 beats/min requiring sedation was 2.9 (95% CI, 1.5–5.8; $P = 0.002$). The mean initial HR for patients not requiring sedation was 90 beats/min, compared with 108 beats/min for patients who received sedation (mean difference, 18 beats/min; 95% CI, 9–27 beats/min; $P < 0.001$).

In total, 50 patients (32.1%) required sedation (intravenous or oral benzodiazepines) for agitation. In the first 4 hours, the maximum parenteral dose administered to any individual patient was 65 mg diazepam intravenously or 40 mg midazolam intramuscularly.

Baseline investigations included an electrocardiogram in 78 patients (50.0%) and blood tests for urea and electrolytes in 91 (58.3%). Fifteen (9.6%) required a cranial computed tomography scan to investigate a headache or seizure. Fifty-eight patients (37.2%) received psychiatric review by the psychiatric liaison service in the ED.

Of the 31 patients admitted to the ED observation ward, 20 (64.5%) had diagnoses of amphetamine intoxication requiring ongoing sedation and observation. Three patients admitted to the ED observation ward had chest pain, and three were suffering from polysubstance overdose. Three of the 12 patients admitted to a psychiatric ward required police escort to a locked ward. Ten of the 15 patients admitted to a general ward were diagnosed with cellulitis or abscess following intravenous drug use.

Three patients, who had all used amphetamines intravenously, were admitted to the intensive care unit: a 21-year-old man had experienced a prolonged seizure; a 33-year-old woman had infective endocarditis complicated by two cerebral embolic infarcts; and a 26-year-old man with severe sympathomimetic syndrome subsequently developed aspiration pneumonia and encephalopathy. A 36-year-old man was admitted to the coronary care unit with chest pain, which was subsequently diagnosed as coronary artery spasm.

3 Chemical and street names for amphetamines[1,3-7]

Chemical name	Street name
Amphetamine	Browns, hearts, amp, dexies
Methamphetamine	Ice, speed, crystal, crank
3,4-Methylenedioxymethamphetamine (MDMA)	Ecstasy, E, Adam, M&M
3,4-Methylenedioxyethamphetamine (MDEA)	Eve
3,4-Methylenedioxyamphetamine (MDA)	Love drug

Review of the patients' medical records revealed that 71 (45.5%) had had previous amphetamine-related presentations to the RPH ED. Seventeen (10.9%) stated that they had attended the ED with a heroin overdose.

DISCUSSION

Amphetamines are a group of central nervous system stimulants that include amphetamine and amphetamine-related derivatives known as "designer" amphetamines. These designer drugs are produced, with varying purities, in clandestine laboratories.[3] Common street names for the drugs are listed in Box 3.[7] Amphetamines may be injected, ingested, insufflated (snorted) or smoked. They enhance release and block reuptake of catecholamines, resulting in central nervous system stimulation and peripheral sympathomimetic effects. The clinical effects of acute intoxication are summarised in Box 4.[8,9] Deaths have occurred as the result of sympathomimetic syndrome (hyperpyrexia, tachycardia and hypertension), seizures, intracerebral haemorrhage, myocardial infarction, cardiac arrhythmias and aortic dissection.

Our results highlight the impact of amphetamines on the health system, especially EDs. A small number of retrospective studies from Hawaii,[10] California[11] and London[12] suggest amphetamine use is associated with increased use of hospital resources, but to date there have been no Australian studies in this area.

We found that amphetamine-related presentations are of high acuity, result in prolonged length of stay in the ED and consume considerable resources. A third of patients required sedation, which correlates with a high prehospital, nursing, medical and security load to manage these patients safely. Further contributing to the impact are the high rates of repeat attendance and the large proportion of patients with underlying psychiatric illness and a history of drug dependence. Amphetamine use is associated with violence, antisocial behaviour and risk-taking.[5] Twenty per cent of all amphetamine-related presentations to our ED involved the police at some stage. Also of great concern is emerging evidence of serious long-term effects, including depression, anxiety, psychosis and memory disturbance.[13-16]

4 Acute intoxication and associated clinical effects of amphetamines[7,8]

System/nature of problem	Symptoms
Central nervous system	Anorexia, headache, bruxism, agitation, aggression, tremor, ataxia, seizures, coma, intracerebral haemorrhage, subarachnoid haemorrhage, hypertensive encephalopathy
Cardiovascular	Hypertension, tachycardia, arrhythmias, acute coronary syndrome, aortic dissection
Pulmonary	Cardiogenic and non-cardiogenic pulmonary oedema, pulmonary hypertension
Gastrointestinal	Nausea, vomiting, mesenteric ischaemia
Musculoskeletal	Hyperthermia, rhabdomyolysis
Adrenergic crisis	Sympathomimetic syndrome, hepatorenal failure, disseminated intravascular coagulation
Electrolyte disturbances	Hyponatraemia, hypernatraemia, hypoglycaemia
Psychiatric	Euphoria, "rush", increased energy, paranoia, anxiety, hallucinations, acute psychosis

There were limitations to our study. The main issue was the difficulty of capturing all patients with amphetamine-related presentations. As routine drug screens were not performed, we relied on clinical assessment. Some patients (such as multi-trauma patients) who were unable to give an adequate history or who were not questioned on their drug use history may have been missed. Although medical staff were required to complete a preformatted data sheet and were prompted to consider amphetamine use, there was variable compliance with this. If patients had missing information, their charts were recalled for review and data were retrospectively obtained.

Another limitation of our study was its relatively short duration. Over the 3-month period, the full spectrum of amphetamine-related illnesses was not observed. It is well recognised that amphetamine use can be associated with acute myocardial infarction, subarachnoid haemorrhage, aortic dissection and acute rhabdomyolysis.[8,13] Although there are about six documented cases of this type at the RPH each year, there were no presentations as a result of these severe complications during the study period.

In summary, we found that amphetamine-related presentations comprised 1.2% of all ED attendances and had a major impact on the ED. Patients with acute amphetamine intoxication are often agitated and aggressive, require extensive resources such as sedation, and frequently re-attend. With increasing availability and use of amphetamines, the burden on emergency services will continue to grow.

COMPETING INTERESTS

None identified.

AUTHOR DETAILS

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