

## A prospective epidemiological study of acute poisoning in Hong Kong

### 香港急性中毒的流行病學研究

YC Chan 陳耀祥, HT Fung 馮顯達, CK Lee 李志強, SH Tsui 徐錫漢, HK Ngan 顏孔國, MY Sy 施敏儀, ML Tse 謝萬里, CW Kam 甘澤華, GCK Wong 黃志強, HK Tong 唐漢軍, ACH Lit 列就雄, TW Wong 黃大偉, FL Lau 劉飛龍

**Objective:** To update our epidemiological knowledge of acute poisoning in Hong Kong. **Methods:** A multi-centred prospective study was conducted for six months in six major accident and emergency departments in Hong Kong. A specially designed form was used to collect demographic data, type of poison involved, cause of poisoning, management, disposal as well as final outcome of the poisoned patients. **Results:** A total of 1,467 patients (male: 588, female: 879) were included in the study. Most of them were young adults (32% were between 20 and 40 years old). Suicidal attempt (64%) was the most common cause of poisoning. Notably, 379 (26%) patients took more than one poison. Among the 2,007 counts of poison taken, sleeping pills (24%) and analgesics (18%) were the most commonly used drugs and paracetamol was the commonest single ingredient involved in poisoning. Most patients were treated with supportive measures, and about 40% and 15% of the patients were given gastrointestinal decontamination and specific antidotes respectively in their management, in which activated charcoal and N-acetylcysteine were the most common. Concerning disposal from the emergency department, 91% of the poisoned cases required in-patient management. Most patients had an uneventful recovery but 5 (0.3%) had significant disability and 21 (1.4%) died. Suicidal carbon monoxide poisoning was the leading cause of mortality in our study. **Conclusions:** Most acute poisonings in Hong Kong were suicidal in nature and paracetamol was the commonest agent. Activated charcoal was the most commonly used decontamination method and most patients had an uneventful recovery. (*Hong Kong j.emerg.med.* 2005;12:156-161)

Correspondence to:

Chan Yiu Cheung, FRCSEd, FHKCEM, FHKAM(Emergency Medicine)  
**United Christian Hospital**, Accident & Emergency Department,  
130 Hip Wo Street, Kwun Tong, Kowloon, Hong Kong  
Email: yctw0804@netvigator.com

Tse Man Li, MRCP, FRCSEd, FHKAM(Emergency Medicine)  
Lau Fei Lung, FRCP, FFAEM, FHKAM(Emergency Medicine)

**Tuen Mun Hospital**, Accident & Emergency Department, Tsing  
Chung Koon Road, Tuen Mun, N.T., Hong Kong  
Fung Hin Tat, MRCP, FRCSEd, FHKAM(Emergency Medicine)  
Kam Chak Wah, MRCP, FRCSEd, FHKAM(Emergency Medicine)

**Queen Elizabeth Hospital**, Accident & Emergency Department,  
30 Gascoigne Road, Kowloon, Hong Kong  
Lee Chi Keung, FRCSEd, FHKCEM, FHKAM(Emergency Medicine)

**Queen Mary Hospital**, Accident & Emergency Department,  
Pokfulam Road, Hong Kong  
Tsui Sik Hon, MRCP(UK), FRCSEd, FHKAM(Emergency Medicine)  
Tong Hon Kwan, FRCSEd, FHKCEM, FHKAM(Emergency Medicine)

**Yan Chai Hospital**, Accident & Emergency Department, Tsuen  
Wan, N.T., Hong Kong  
Ngan Hung Kwok, FRCSEd, FHKCEM, FHKAM(Emergency Medicine)  
Lit Chau Hung, Albert, MRCP, FRCSEd, FHKAM(Emergency Medicine)

**Pamela Youde Nethersole Eastern Hospital**, Accident &  
Emergency Department, 3 Lok Man Road, Chaiwan, Hong Kong  
Sy Man Yee, FRCSEd, FHKCEM, FHKAM(Emergency Medicine)  
Wong Tai Wai, FRCSEd, FFAEM, FHKAM(Emergency Medicine)

**North District Hospital**, Accident & Emergency Department,  
9 Po Kin Road, Sheung Shui, N.T., Hong Kong  
Wong Chi Keung, Gordon, MBBS(HK), FHKCEM, FHKAM(Emergency  
Medicine)

**目的：**更新對香港急性中毒流行病學的認識。**方法：**在香港六間大型的急症室進行為期六個月的多中心前瞻性研究。使用一張特別設計的表格，收集人口統計數據、毒物的種類、中毒的原因、中毒病者的治療、處理安排及最終的結局。**結果：**這研究共有 1,467 名病者（588 男，879 女）。大部份為年輕的成年人（32% 年齡介乎 20 至 40 歲之間）。企圖自殺（64%）為中毒最普遍的原因。值得注意的是有 379 名病者（26%）使用多於一種藥物。於 2,007 用藥次數中，安眠藥（24%）及止痛藥（18%）為兩類病者最常用的藥物，而對乙酰氨基酚為涉及中毒最多的單一成份。大多數的病者只需支持性的措施治療，40% 病者需施行腸胃道淨化及 15% 病者需接受特效解毒劑，而以活性炭及乙酰半胱氨酸的使用最為普遍。對於急症室的處理安排，91% 的中毒個案需要住院治理。大多數的病者均能平穩地復原，但 5 人（0.3%）有嚴重的傷殘及 21 人（1.4%）死亡。在這研究中，死亡原因以自殺性一氧化碳中毒為首位。**總結：**香港急性中毒多因自殺，而對乙酰氨基酚為最常用的藥物。最普遍的淨化方法為使用活性炭，而大多數的病者均能平穩地復原。

**Keywords:** Emergency Medicine, epidemiology, poisoning

**關鍵詞：**急症醫學、流行病學、中毒

## Introduction

Poisoning is an important cause of significant morbidity and mortality and "Injury and Poisoning" ranked as the fifth commonest cause of death in Hong Kong in 2000.<sup>1</sup> Different places have their own poisoning patterns which may have impact on the initial management of the acutely poisoned patient. Although there are good overseas data concerning poisoning such as the Toxic Exposure Surveillance System (TESS),<sup>2</sup> updated data of poisoning in our locality are largely unexplored. Most of our current data of acute poisoning are limited to case reports or series.<sup>3,4</sup> One of the reasons that we lack a global view of the poisoning situation in Hong Kong is that poisoning is not a mandatory reportable disease under the current medical system and we do not have a formal poison control centre to collect data. Since most acutely poisoned patients are seen initially in emergency departments, emergency physicians are in a good position to collect data of acute poisoning. Therefore we conducted this multi-centre study to gather information of the current poisoning situation locally. Hopefully, it might help the medical profession to manage the acutely poisoned patient, as well as serving as a guide for future research.

## Methods

From 1st January 2001 to 30th June 2001, six accident and emergency departments (AED) in Hong Kong

took part in this study. They included the Pamela Youde Nethersole Eastern Hospital, Queen Elizabeth Hospital, Queen Mary Hospital, Tuen Mun Hospital, United Christian Hospital and Yan Chai Hospital. Attending physicians of the involved departments recruited acutely poisoned cases basing on their clinical judgement. Data of acute poisoning were then collected in a standard data sheet. These included demographic data, cause of poisoning, type of poison involved, use of decontamination and antidotes, disposal of the poisoned patients in the AED and their final outcome. The data were then analysed.

## Results

During the study period, a total of 1,467 cases were collected. There were 588 male (40%) and 879 female (60%) patients included in the study. The age distribution of the acutely poisoned patients is shown in Figure 1, with the 21-30 years group being the commonest and 32% were between 20 and 40 years old.

The causes of poisoning are shown in Figure 2 with suicidal attempt (64%) being the most common.

For types of poison involved, the result is shown in Figure 3. Notably, 379 (26%) patients took more than one poison (Figure 4). As a result, a total of 2,007 counts of poison had been taken by the 1,467 patients. Out of the 2,007 counts, the commonest group was

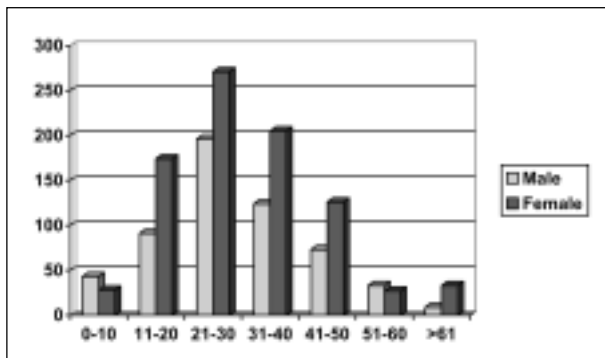


Figure 1. Age and sex distribution of the poisoned patients.

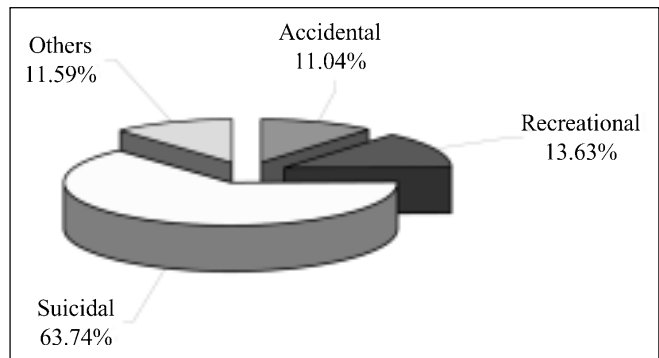


Figure 2. Nature of poisoning.

sleeping pills (24%), followed by others (23%) and analgesics (18%). From another point of view, 33% and 25% of the patients took sleeping pills and analgesics respectively. For those poisons that we could identify the ingredients, paracetamol was the commonest substance involved. There were 90 cases of carbon monoxide (CO) poisoning.

Concerning gastrointestinal (GI) decontamination (Figure 5), about 60% of our patients did not require any form of decontamination. About one third of the patients were given activated charcoal. About 8% of the patients had gastric lavage with or without other forms of decontamination.

Antidotes were given in 230 (16%) cases and the commonest one used was N-acetylcysteine in paracetamol poisoning. The next commonest antidotes used were naloxone and flumazenil. Six cases were given sodium bicarbonate as an antidote, four cases being tricyclic antidepressant (TCA) poisoning, one for alkalisation in aspirin poisoning, and another one for correcting the sodium channel blocking effect of dextropropoxyphene. Two carbon monoxide poisoning underwent hyperbaric oxygen (HBO) therapy (Figure 6).

The disposal of the poisoned patients in the emergency departments and their ultimate outcomes are shown in Table 1. More than 91% of the patients required hospitalisation, either for their medical or psychiatric problems. About 7% could be discharged after observation and treatment. Most of the poisoned patients enjoyed uneventful recovery, but 5 (0.3%) patients suffered from permanent disability and 21 (1.4%) patients died. The commonest poisons

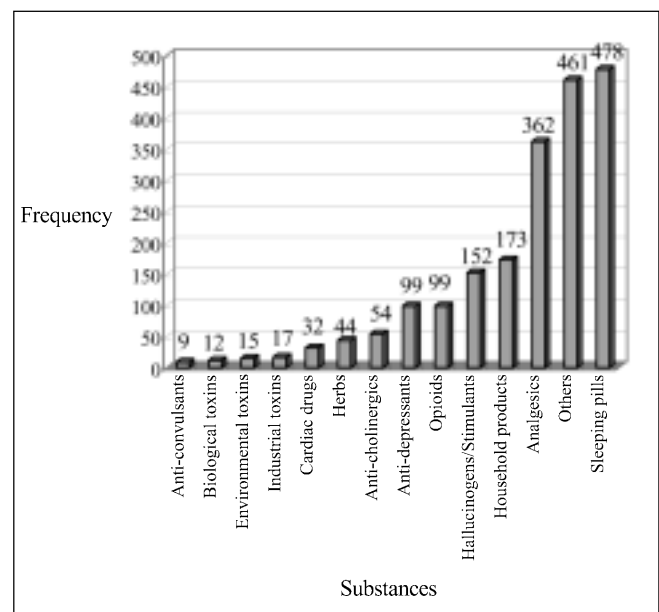


Figure 3. Poison group distribution.

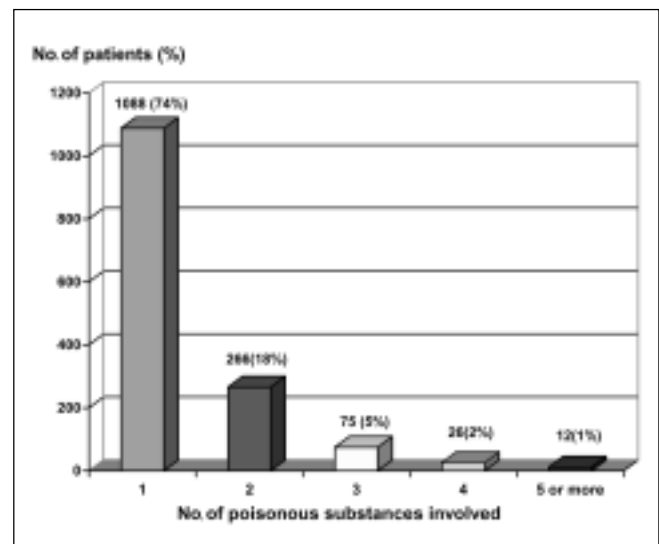


Figure 4. Number of poisons taken by patients.

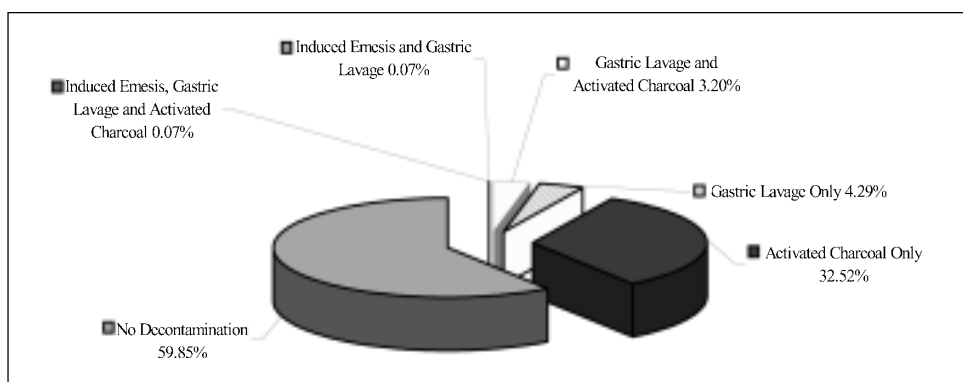


Figure 5. Decontamination used in the poisoned patients.

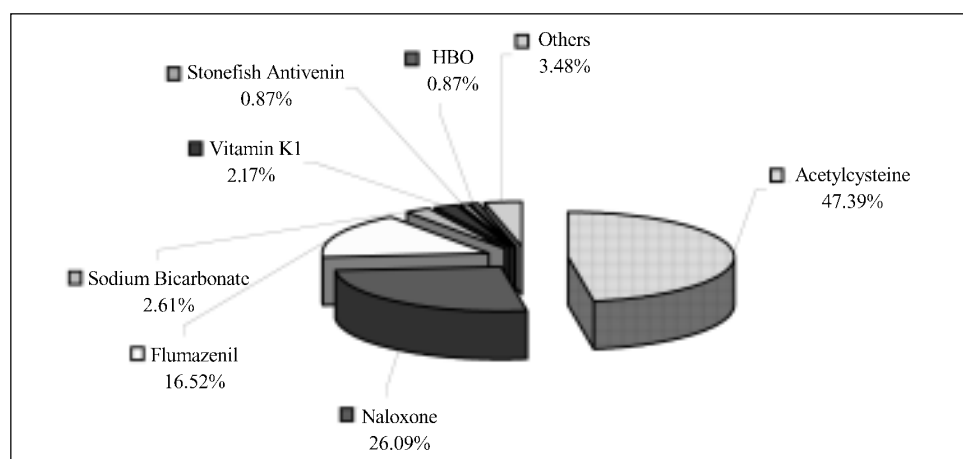


Figure 6. Antidote used in the poisoned patients.

resulting in mortality were carbon monoxide (7 cases, 8% case mortality), opioids (6 cases, 6% case mortality) and antidepressants, particular TCA (4 cases, 4% case mortality).

## Discussion

During the study period, the total attendance of the six AED was 607,843. This made acute poisoning contributing about 0.24% of the acute emergency cases in Hong Kong, and this was comparable to the 0.15%<sup>5</sup> and 0.19%<sup>6</sup> in two previous local studies. However, different studies had different methodologies and the figures might not be compared directly. The six selected AED, with high attendance ranking among the AED under the Hospital Authority, recruited a significant proportion of AED patients in Hong Kong. Since most acute poisoned

patients were managed in AED, our study population should be able to represent the acute poisoning data in Hong Kong. One of the limitations in the study was the voluntary recruitment of cases, which depended solely on the clinical judgement of the attending physicians.

From our study, the commonest cause of poisoning was attempted suicide (64%), which was comparable to an epidemiological study in 1996 that found 57% of the poisoning was suicidal in nature.<sup>5</sup> In the TESS data, intentional suicidal poisoning contributed less than 8% of the poison exposure. The large difference might be due to the different methodologies in data collection. All suspected poison exposures were entered in the TESS database, some of which were direct calls from home to obtain advice for the management of suspected poison exposure, mostly accidental. This differed from our study in which the data was hospital-

**Table 1.** Disposal and outcome of the poisoned patients

	Frequency	Percentage
<b>Disposal from AED</b>		
Admitted for inpatient treatment	1339	91.3
Discharged after observation in AED	98	6.7
Discharged directly	7	0.5
Discharged against medical advice	13	0.9
Dead	8	0.5
Disappeared	2	0.1
<b>Final outcome</b>		
Well	1374	93.7
Dead	21	1.4
Discharged against medical advice	55	3.7
Disabled	5	0.3
Unknown	12	0.8

based and the patients required medical attention. The fact that most of our cases were suicidal attempts might partly explain the observation that most of our cases required inpatient management. Although we do not have exact data on this, we speculate that a significant percentage of hospitalisation were for psychiatric consultation rather than medical concern on the toxic effect of the poisons.

For the types of poison involved, the two commonest groups were sleeping pills and analgesics, which contributed about 24% and 18% of the poison exposure respectively. Previous local<sup>5,6</sup> and overseas<sup>7</sup> data also found sleeping pills or hypnotics as the commonest drug groups involved in acute self-poisoning. This is expected, as the public generally perceives sleeping pill overdose as an effective method of committing suicide. Another reason for the high percentage of sleeping pills use was the easy availability of this group of drugs with or without prescription both in Hong Kong and Mainland China. The explanation for analgesic poisoning is similar as it was extremely common and readily available in every household. To make it worst, many people did not consider it to be dangerous or even a medication. Out of the analgesic group, the most common ingredient involved was paracetamol. As paracetamol-poisoned patients may be completely asymptomatic in the first 24 hours, it is important for clinicians to screen for the paracetamol level in all non-accidental poisoning.<sup>8</sup>

Overall, about 40% of our patients received GI decontamination, and most of them were given activated charcoal alone. There was only a small percentage of gastric lavage, alone or in combination with other methods. The current recommendation from the positional statement of the American Academy of Clinical Toxicology<sup>9</sup> is to consider gastric lavage in patients with potentially lethal ingestion within one hour. As reflected by our study, most poisoned patients can be managed by simple GI decontamination such as activated charcoal or even no decontamination. However, the use of aggressive decontamination should be considered in severely poisoned patients, especially if they present early.<sup>10</sup>

For the disposal of the poisoned patients, most of the cases (91%) were admitted for in-patient management either for their medical or psychiatric concern. The opposite was true in a multi-centre study in which 80% of the acute poisoned cases could be managed as outpatients.<sup>11</sup> As mentioned above, a certain percentage of our patients was admitted for psychiatric assessment of their suicidal risk even when they were medically cleared from the toxic effect of the poison taken. In order to reduce the admission rate of poisoned cases, better psychiatric cover in AED as well as faster turnover time for essential laboratory tests such as paracetamol level are necessary. As seen in this study, only about 7% of our cases could be discharged from the AED either directly or after a period of

observation. Hence there is great potential to reduce admission if our AED care of poisoned patients can adopt the overseas model.<sup>11</sup>

Most of our patients had an uneventful recovery, similar to both local<sup>6</sup> and overseas<sup>2</sup> data. In our study, less than 2% suffered from significant disability or death. CO poisoning by burning charcoal, which is a popular method of committing suicide in recent years, was the cause of the highest mortality. It seems to be a unique method of deliberate self-harm in Hong Kong since 1998 when the first case was reported. Burning charcoal was the second most commonly used method of committing suicide after jumping from height in 2001 and it contributed about 25% of all suicidal death which was nearly 5 times greater than that caused by all toxic ingestion.<sup>12</sup> The use of HBO in CO poisoning to reduce the morbidity and long term neurological effect is still controversial<sup>13,14</sup> and is not commonly utilised as shown in our study (2 cases of HBO therapy in 90 cases of CO poisoning). In fact, a study found only 6% of the treatment sessions of HBO therapy in Hong Kong was for CO poisoning.<sup>15</sup> Some other reasons of not referring CO poisoned patients for HBO therapy include the risk of transferring the patient to the HBO centre which is located on the Stonecutter Island and the potential health hazard to the accompanying medical personnel. Opioids ranked as the second commonest cause of mortality and antidepressant poisoning, in particular TCA, was the third commonest cause of death in our study. Compared to a study in London which found that amitriptyline and dothiepin contributed 80% of antidepressant overdose mortality,<sup>16</sup> our sample was too small to draw any conclusion on which particular antidepressant is more dangerous than others.

## Conclusion

This study provides updated information on the epidemiology of acute poisoning in Hong Kong. Most of them were suicidal in nature and could make an uneventful recovery. Sleeping pills were commonly involved and CO poisoning was the commonest cause of mortality in our study.

## References

1. Department of Health, Hong Kong. Vital statistics. [cited 2003 Dec]. Available from: [www.info.gov.hk/dh/useful/index.htm](http://www.info.gov.hk/dh/useful/index.htm)
2. Watson WA, Litovitz TL, Rodgers GC Jr, Klein-Schwartz W, Youniss J, Rose SR, et al. 2002 annual report of the American Association of Poison Control Centers Toxic Exposure Surveillance System. *Am J Emerg Med* 2003;21(5):353-421.
3. Lam KK, Lau FL. An incident of hydrogen cyanide poisoning. *Am J Emerg Med* 2000;18(2):172-5.
4. Lau FL, Wong CK, Yip SH. Puffer fish poisoning. *J Accid Emerg Med* 1995;12(3):214-5.
5. Lau FL, Liu R, Yip SH. The changing pattern of self-poisoning in Hong Kong over nine years. *Emerg Med* 1996;8:119-122.
6. Yeung KC, Wong TW. Poisoning - an epidemiological study. *J Hong Kong Med Assoc* 1990;42(4):220-1.
7. Caballero Valles PJ, Dorado Pombo S, Brusint Olivares B, Jerez Basurco B, Medina Sampedro M. The epidemiological surveillance of acute poisoning in 1997 (a study of 1140 cases from the area south of the Madrid Community). *Rev Clin Esp* 1999;199(7):424-30.
8. Ashbourne JF, Olson KR, Khayam-Bashi H. Value of rapid screening for acetaminophen in all patients with intentional drug overdose. *Ann Emerg Med* 1989;18(10):1035-8.
9. Vale JA. Position statement: gastric lavage. American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. *J Toxicol Clin Toxicol* 1997;35(7):711-9.
10. Lau FL. Emergency management of poisoning in Hong Kong. *Hong Kong Med J* 2000;6(3):288-92.
11. Burillo-Putze G, Munne P, Duenas A, Pinillos MA, Naveiro JM, Cobo J, et al. National multicentre study of acute intoxication in emergency departments of Spain. *Eur J Emerg Med* 2003;10(2):101-4.
12. Yip PS, Law CK, Law YW. Suicide in Hong Kong: epidemiological profile and burden analysis, 1981 to 2001. *Hong Kong Med J* 2003;9(6):419-26.
13. Scheinkestel CD, Bailey M, Myles PS, Jones K, Cooper DJ, Millar IL, et al. Hyperbaric or normobaric oxygen for acute carbon monoxide poisoning: a randomised controlled clinical trial. *Med J Aust* 1999;170(5):203-10.
14. Weaver LK, Hopkins RO, Chan KJ, Churchill S, Elliott CG, Clemmer TP, et al. Hyperbaric oxygen for acute carbon monoxide poisoning. *N Engl J Med* 2002;347(14):1057-67.
15. Ramaswami RA, Lo WK. Use of hyperbaric oxygen therapy in Hong Kong. *Hong Kong Med J* 2000;6(1):108-12.
16. Henry JA. Epidemiology and relative toxicity of antidepressant drugs in overdose. *Drug Saf* 1997;16(6):374-90.