Diagnosis and Management of Deliberate self-poisoning in the Emergency Department

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Abstract: In recent years, stress and depression have led to the elevated suicide rate in China; the most common way of committing suicide is self-poisoning. However, we lack detailed, authoritative, uniform procedures for the diagnosis and management of self-poisoning in the emergency department (ED). To provide a description of the diagnosis and management of patients presenting to the ED with deliberate self-poisoning, and to evaluate the outcomes and medical costs associated with deliberate self-poisoning. Descriptive analysis of data collected by reviewing the medical records of all patients who presented to the ED during the period of study (1 January-31 December 2010) with a history of deliberate self-poisoning. A total of 3886 patients admitted to the ED during the study period were due to deliberate self-poisoning. The most common substance used in deliberate self-poisoning was pesticides (58%). Approximately 33% of patients were brought into the EICU for further therapy, approximately 30% were admitted to other wards in the hospital, and approximately 36% sought evaluation the ED. Twenty-two patients died. We should strengthen the management of pesticides to reduce the incidence of self-poisoning, especially in rural areas. Psychological intervention should be used in the future because it may be a valuable treatment after people have deliberately tried to poison themselves. Repeated questioning to obtain a detailed history is still very helpful in the ED. A significant number of new compounds have appeared as new poisonous substances, which have led to an increase in the number of poisoning cases. Additional research should be conducted to identify novel approaches of detoxification.
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1. Introduction

Suicide is the 5th most important cause of death in China. Among young adults 15-34 years of age, suicide is the leading cause of death (Phillips et al. 2002). In recent years, China has undergone rapid development; however, stress and depression have increased as well, leading to an elevated suicide rate in both urban and rural areas (Yip Paul et al, 2005). According to a survey, the most common way of committing suicide is self-poisoning (Doshi et al, 2005). Such patients are generally admitted to the emergency departments (EDs) of comprehensive hospitals by Emergency Medical Services (EMSs) or family members.

We sum up some characteristics of self-poisoning based on experience in an ED over many years as follows:

1. Patients may ingest all types of poisons, including pesticides, medications, household products, corrosives, industrial chemicals, and plants. Few of these poisons have specific antidotes.

2. It is usually difficult for physicians to obtain a detailed medical history in cases of self-poisoning because most patients take poisons without witnesses and are often unconsciousness when they arrive in the ED. Family members also do not know what time the poisons were taken, or the type and dosage of poisons.

3. Such patients, mostly young adults 15-34 years of age, are often healthy before self-poisoning, therefore their relatives and friends are quite nervous in the ED. Such poisoning may cause great harm to society.

4. Due to psychological reasons, many patients, while awake, do not cooperate with emergency medicine physicians in the diagnosis and treatment of the illness.

These characteristics of poisoning may delay an opportune moment for diagnosis and treatment, resulting in poor outcomes (Hendrix et al, 2013). Research on acute suicide poisoning is limited. We also lack detailed, authoritative, uniform procedures for the diagnosis and management of self-poisoning in the ED. This paper aims to describe the diagnosis and treatment of deliberate self-poisoning in China to explore a standard guideline for reference.

2. Patients and Methods

The study protocol was approved by the Human Rights Committee of the Hunan Health Systems. The study was carried out in the EDs of two large

comprehensive hospitals. The subjects studied were adolescent and adult patients who had self-poisoned and reached the hospital alive between 1 January and 31 December 2010 by EMS or family members. We selected patients who had been given a verdict of self-harm on the basis of the circumstances of the attempt, the antecedents, the history of the individual, and any other available information. In addition, all pediatric cases were excluded.

All patients with acute poisoning who presented to the ED were treated according to the following principles: 1. separated from the origin of toxicants to prevent toxicants from reabsorption; 2. remove poisons absorbed or not in the body, for example oral activated carbon, gastric lavage, and hemoperfusion; 3. make use of special antidotes; and 4. supportive treatment and prevention of complications, including endotracheal intubation and mechanical ventilation.

This retrospective study was based on an analysis of medical records of patients admitted during 1 year. The information regarding name, age, gender, region, type of poison consumed, time of taking the poison, time of arrival to the ED, main symptoms and vital signs on arrival at the ED, history, detailed treatment, prognosis, and medical cost were noted from the records in a separate form for each case. The data collected were subjected to descriptive statistical analysis by SPSS 12.0 for Windows. Tables are quoted as numbers and percentages.

3. Results

A total of 3886 patients were recruited that fulfilled the study guidelines. The female-to-male ratio was 1.2: 1 (Table 1). The age of patients varied from 14-75 years (Table 2). The distribution of cases according to age revealed that there was an increasing trend in the age group between 21 and 30 years. The rural-to-urban ratio was 1.5: 1 (Table 3).

Table 1. Gender distribution of poisoning cases

Gender	No. of cases (n=3886)	Percentage
Male	1749	45
Female	2137	55

Table 2. Age distribution of poisoning cases

Age in years	No. of cases (n=3886)	Percentage
14-20	661	17
21-30	1555	40
31-40	466	12
41-50	350	9
>50	854	22

Table 3. Regional distribution of poisoning cases

Region	No. of cases (n=3886)	Percentage
Rural	2332	60
Urban	1554	40

Only 1166 patients (approximately 30%) could provide detailed toxic information when they arrived to the ED. The method of poisoning was oral ingestion. The mean time between taking poisons and arriving to the ED was 3.5±0.5 hours. The patients were brought into the ED by EMS (51%) or others (49%). The substance most commonly used for self-poisoning was pesticides (58%). Drugs frequently taken alone or in combination with other drugs accounted for 24% of the poisoning cases. Chemicals, such as phenol, naphthalene balls, and detergents, accounted for 6% of the poisons (Table 4). Nearly 30% of the patients (n=1156) had consumed alcohol along with the substance or the drug used for suicide. Only 194 patients (approximately 5%) had a history of mental illness. Three hundred fifty patients (9%) who were > 50 years of age had a history of advanced cancer. Thirty-eight patients (2%) had a history of a suicidal attempt. The most common symptom of 1826 patients (47%) was coma when they presented to the ED.

Table 4. Distribution of poisoning cases according to the type of poison

Drug/substance	No. of cases (n=3886)	Percentage
Pesticides	2254	58
Medicines	933	24
Chemicals	233	6
Others	466	12

One hundred ninety-four patients (5%) underwent cardiopulmonary resuscitation, 1011 patients (26%) were intubated and mechanically ventilated, 544 patients (14%) received hemoperfusion, and all patients received gastric lavage at least once, active carbon adsorption treatment, and oral mannitol or magnesium sulfate for catharsis. A total of 1904 patients (49%) used an antidote (pralidoxime for organophosphorus poisoning and naloxone for opioid poisoning; Table 5). A total of 1282 patients (33%) were brought to the EICU for further therapy, 1156 patients (approximately 30%) were admitted to other wards in the hospital, and 1399 patients (36%) were evaluated in the ED; the mean visit time was 32±9 hours (Table 6). There were 22 deaths, including 16 patients who died due to acute severe organophosphate poisoning; a patient with encephalopathy and multiple organ failure arrived to the ED too late, and the remaining patients were due to mixed drug poisoning in which the patients and their partners could not provide detailed histories in time when they arrived to the ED. The mean medical costs of the patients who were successfully treated and survived were 9563 Yuan (RMB).

Table 5. Main treatments in poisoning cases

Treatment	No. of cases (n=3886)	Percentage
Cardiopulmonary resuscitation	194	5
Tracheal intubation and mechanical ventilation	1011	26
Hemoperfusion	544	14
Gastric lavage	3886	100
Active carbon adsorption	3886	100
Catharsis	3886	100
Special antidote	1904	49

Table 6. Outcomes of poisoning cases

Outcome	No. of cases (n=3886)	Percentage
EICU	1282	33
Other wards	1156	30
Emergency Department Visits	1399	36
Death	22	0.6

4. Discussion

Acute suicide poisoning has gradually become the most common disease in the ED in China. According to a survey, patients between 21 and 30 years of age represent the greatest proportion. Deliberate self-poisoning poses great harm to society, thus the state government is highly concerned.

Acute organophosphate pesticide poisoning (AOPP) is the most common type of self-poisoning, especially patients from rural areas (Eddleston, 2000). This observation may be associated with relaxed management of pesticides in China at present (Eddleston and Phillips, et al). Although AOPP has a specific antidote, for very severe cases, AOPP can lead to multiple organ failure, and even death (Gunnell and Eddleston, 2004). Most cases which are brought to the EICU are AOPP, which will lead to higher medical costs. Therefore, we suggest that the Department of Agriculture strengthen the management of organophosphate pesticides to reduce the incidence of pesticide poisoning. Once AOPP occurs, the patient should be immediately sent to the hospital for emergent treatment, such as gastric lavage, catharsis, and atropinization.

In this study 38 cases had a history of suicide, which may reflect a lack of follow-up and psychological intervention for these patients in China. Many prospective studies have confirmed that psychological intervention can reduce the recurrence of suicide attempts (Hickey et al, 2001; Guthrie et al, 2001). In the future we should strengthen cooperation amongst psychologists and improve psychological intervention treatment.

A detailed history provided by bystanders about acute poisoning is vital to diagnosis and treatment of disease. However, of 2720 patients in this study, 147 failed to provide a detailed history when they arrived at the ED, such as types and dose of poisons, and time of taking poisons. The possible reasons for this observation are as follows: 1826 patients were unconscious when they arrived at the ED and not able to provide a history; some conscious patients were reluctant to tell physicians and nurses due to some psychological reasons; and most patients take oral poisons without witnesses. Thus, it is very difficult for physicians to promptly select a suitable diagnosis and management strategy in the ED. Fortunately, the death rate is not high if we save the patients in the ED

according to the principle of treatment with acute poisoning because most drugs have low toxicity or the principle of treatment with acute poisoning is the best management strategy. However, management without pertinence can lead to an escalation in medical costs. We may perform some treatments which are unnecessary, such as head CT scanning for all coma patients and blood cholinesterase determinations for patients without confirmed AOPP.

Mixed toxicant poisoning is a new subject, with an increasing trend in recent years (Kapur et al, 2005). Mixed toxicant poisoning has several common forms of presentation, as follows: 1. Organophosphorus pesticides are increasingly rare on the market. To improve the effect of pesticides, more hybrids are blended with pesticides. 2. Alcohol is often taken together with other poisons; alcohol is accessible and has an anesthetic effect. and 3. all types of drugs are taken together, commonly among patients with a larger motivation for death. There is a case in which a female patient, 24 years of age, has taken 12 drugs, including benzodiazepines, antipyretics, analgesics, vitamins, and some Chinese patent medicines, in this study. She was successfully treated after arrival to the ED within 30 minutes of taking poisons; gastric lavage and catharsis were performed in time and a detailed toxic history was provided by the family members. However, mixed drugs poisoning led to six deaths in this study, which were attributed to excessive doses of drugs without an accurate history provided in time.

5. Limitations

This research was a retrospective study. The clinical significance of the conclusions of this study is limited. In the future, we will conduct cohort studies of self-poisoning and increase the sample size.

6. Conclusions

We should strengthen the management of the pesticides to reduce the incidence of self-poisoning especially in rural areas. Psychological intervention should be used in the future because it may be a valuable treatment after people have deliberately attempted to poison themselves. Repeated questioning to obtain a detailed history is still very helpful in the ED. Now a significant number of new compounds have appeared as new poisonous substances, which have led to an increase in the number of poisoning cases. Additional research should be conducted to identify novel approaches for detoxification.

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