

## Hong Kong Poison Information Centre: Annual Report 2007

香港中毒諮詢中心年報：2007年

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**Objective:** To report the poisoning data of Hong Kong Poison Information Centre (HKPIC) in 2007. **Methods:** From 1st January 2007 to 31st December 2007, all poisoning cases received by HKPIC were retrieved from its database (DATOX) for analysis. **Results:** 2842 poisoned cases were analyzed. There were 1199 male and 1610 female patients and more than two-thirds of the cases were between 20 and 59 years old. Common causes of exposure were suicidal attempt, accident and abusive use. Non-benzodiazepine sedative-hypnotic, household products and paracetamol were common poisons exposed. The majority of the patients were managed conservatively, with 8.4% and 6.4% treated by decontamination and antidotes respectively. Most cases had uneventful recovery; less than 1% of the poison exposure resulted in death and about 5% of the exposure had major outcomes. **Conclusions:** This 2007 annual report provided updated epidemiological information on the poisoning pattern in Hong Kong and highlighted some changes in comparison to the situation in 2006. (*Hong Kong j.emerg.med.* 2010;17:85-96)

**目的：**報告2007年香港中毒諮詢中心的中毒數據。**方法：**從香港中毒諮詢中心的數據庫找出從2007年1月1日至12月31日收到的所有中毒個案作分析。**結果：**分析2842個中毒個案，1199名男及1610名女病人，三份二以上的個案在20至59歲之間。常見中毒原因為企圖自殺、意外或濫用藥物。非苯二氮草鎮靜劑／安眠藥、家居用品及撲熱息痛為常見的毒物。大多數病人以保守性方法治理，分別有8.4%及6.4%以除污及解毒劑治療。大多數個案順利復原，少於1%中毒引致死亡，大約5%中毒有嚴重後果。**結論：**這2007年報提供香港中毒模式最新的流行病學資料及突顯一些比較2006年情況的轉變。

**Keywords:** Epidemiology, poison control centers, poisoning

**關鍵詞：**流行病學、中毒控制中心、中毒

### Introduction

The Hong Kong Poison Information Centre (HKPIC) was established in July 2005.<sup>1</sup> Its main functions include provision of poison information and toxicology management advice to health care professionals in

Hong Kong. Moreover, it also serves to collect poisoning data for toxico-vigilance, training and poisoning prevention. The first report concerning the poisoning data in 2006 was published in 2008.<sup>2</sup> The annual report serves as a reference for monitoring the poisoning pattern in Hong Kong and hopefully provides valuable information for the formulation of poison control and prevention strategies in Hong Kong. In this annual report, we analysed the data in 2007.

Similar to our 2006 annual report, we included poisoning cases from both our consultation service which covered the whole Hong Kong and our reporting system which covered six major emergency departments

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(ED). These six hospitals, including Pamela Youde Nethersole Eastern Hospital, Prince of Wales Hospital, Queen Elizabeth Hospital, Queen Mary Hospital, Tuen Mun Hospital and United Christian Hospital, provided a representative sample of all poisoning cases in Hong Kong. Cases outside Hong Kong and enquiries for poisoning information without patient reference were excluded from the analysis of this report.

## Methods

From 1st January 2007 to 31st December 2007, all poisoning cases received by the HKPIC were retrieved from its database (DATOX) for analysis.

The poison information officers of HKPIC, mostly emergency medicine fellows or higher trainees, would input data of each poisoning case into the DATOX based on information obtained from the consulting health care professional, ED record, electronic patient record (ePR) of the Hospital Authority (HA) and other relevant sources. Data collected in DATOX included patient demographic data, poison data (poison type, dose, route, time, place and reason of exposure), clinical data (clinical features, investigation results), management data (decontamination, antidotes and other specific treatment), and outcome data (disposal

for ED patient, final outcome and its relationship to the exposure), as in the Annual Report 2006.

Senior staffs from the HKPIC, all emergency medicine specialists with more than one year full time training in clinical toxicology, would classify the outcome of the cases into 5 categories: no effect, mild effect, moderate effect, major effect or death with reference to the American Association of Poison Control Centers' National Poison Data System<sup>3</sup> (Table 1). Besides, the relationship between the poison exposure and clinical outcome would be graded as definite, probable, possible, not related or undetermined according to the available information. All death or major effect cases would be further reviewed by a second senior.

For this annual report, a case was defined as an incident of poisoning. HKPIC may receive multiple consultations from different specialties for the same poisoning incident. For example, an emergency physician consulted for the acute management advice on organophosphate poisoning and then the intensivist of the patient sought advice on the features of the intermediate syndrome of organophosphate poisoning days afterwards. This would generate two DATOX records. But for the analysis in this report or subsequent annual reports, the two DATOX records would be counted as one case only.

**Table 1.** Definition of clinical outcome

<b>No effect</b>	The patient did not develop any signs or symptoms.
<b>Mild effect</b>	The patient developed some signs or symptoms that were minimally bothersome and generally resolved rapidly with no residual disability or disfigurement. (Examples are self-limited gastrointestinal symptoms, drowsiness, skin irritation and sinus tachycardia without hypotension).
<b>Moderate effect</b>	The patient exhibited signs or symptoms that were more pronounced, more prolonged, or more systemic in nature than mild effect. Usually, some form of treatment is indicated. Symptoms were not life-threatening, and the patient had no residual disability or disfigurement (Examples are hypotension that is rapidly responsive to treatment, and isolated brief seizures that respond readily to treatment).
<b>Major effect</b>	The patient exhibited signs or symptoms that were life-threatening or resulted in significant residual disability or disfigurement. (Examples are repeated seizures or status epilepticus, respiratory compromise requiring intubation, unstable arrhythmias and refractory hypotension).
<b>Death</b>	The patient died.
<b>Unknown effect</b>	The clinical outcome is unknown from the available information.

## Results

In 2007, there were 2990 DATOX records in which 59.5% were reporting, 36.8% were consultation and 3.8% were information enquiry. From the reasons mentioned above, the DATOX generated 2842 valid cases for subsequent analysis.

The age and gender distributions of our cases are outlined in Figure 1. There were 1199 male patients (42.2%), 1610 female patients (56.6%) and 33 sex-

unspecified patients (1.2%). A male predominance was found among cases involving children younger than 13 years, but this gender distribution was reversed in teenagers and adults, with women comprising the majority of cases. With increasing age to 50 years onwards, similar numbers of men and women were involved. Concerning age distribution, the 30-39 years group were the commonest (21.2%) and more than two-thirds (68.4%) of the cases were between 20 and 59 years old. Children younger than 6 years were involved in 6.9% of the cases.

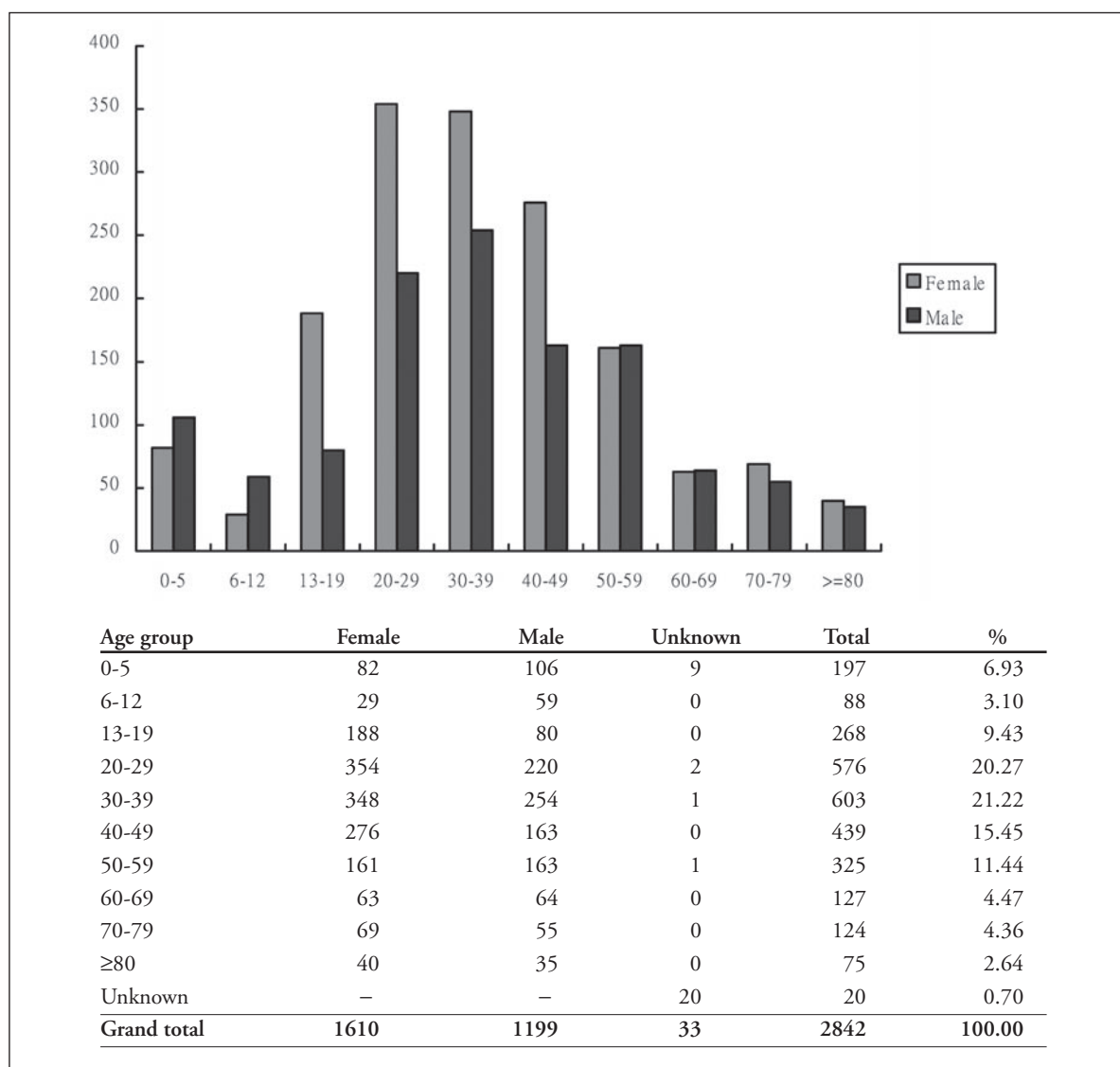


Figure 1. Age and gender distribution.

The reasons for poisoning are shown in Figure 2, with the commonest cause (41.1%) being suicidal attempt. Another 16.9% of the cases were secondary to accidents and 12.3% of the cases were related to the use of abusive drugs. Adverse drug reaction and therapeutic error contributed 9.4% and 4.5% of the cases respectively. As shown in Figures 3 & 4, the commonest place of exposure was in the patient's home (67%). The commonest route of exposure was ingestion (76.1%), followed by inhalation (5.4%) and dermal exposure (2.5%).

About 68% of the cases were exposed to a single poison while the remaining 32% were exposed to multiple poisons. The types of poison exposed are shown in Figure 5. The three main categories of pharmaceuticals,

non-pharmaceuticals and Chinese & alternative medicine contributed to 67.2%, 25.2% and 7.5% of the poisons exposed respectively. Apart from "others" or undifferentiated pharmaceuticals, the three commonest types of poison exposed were non-benzodiazepine sedative-hypnotics (11.0%), household products (7.2%) and paracetamol (7.1%)

Only 240 (8.4%) and 182 (6.4%) cases were treated by decontamination and antidotes respectively. For those 240 patients who underwent decontamination, the commonest method was oral administration of a single dose of activated charcoal (84.4%). Gastric lavage (6.9%) and other methods of decontamination including multiple doses of activated charcoal, whole bowel irrigation and the use of cathartic without

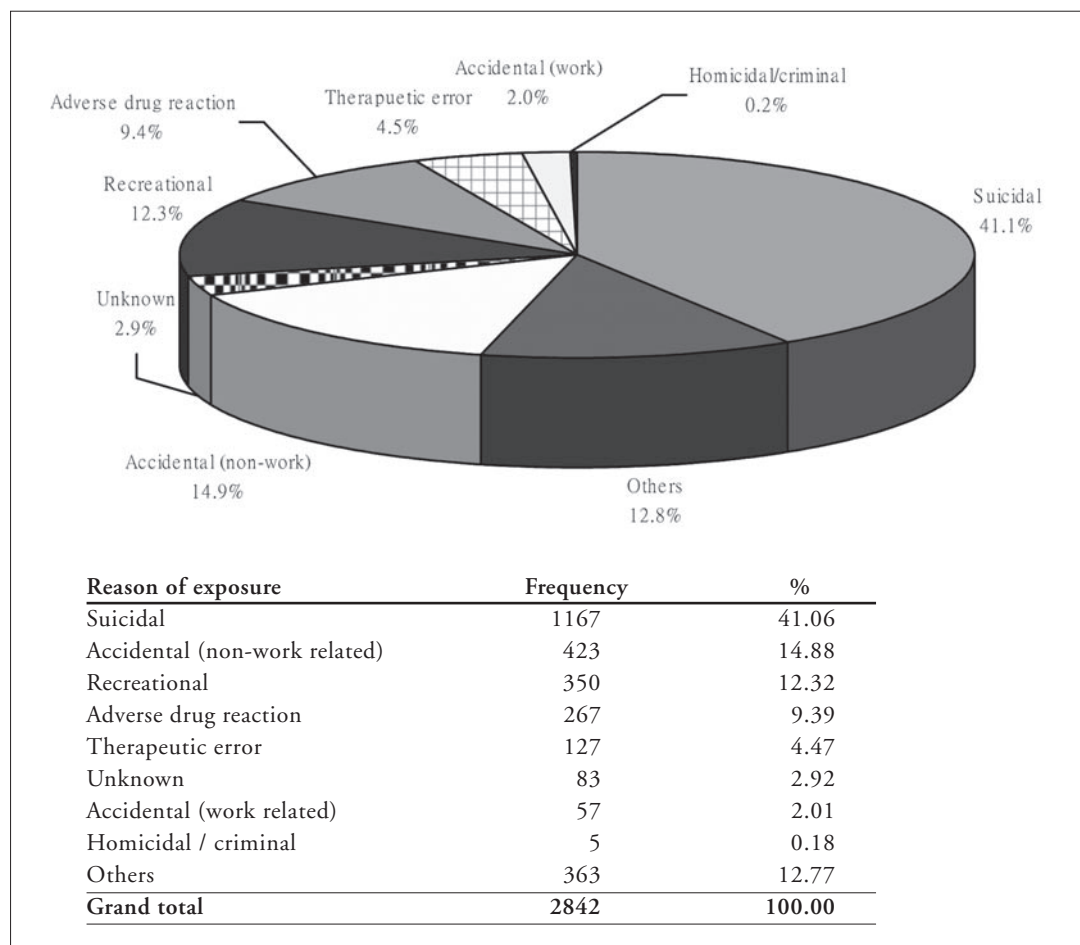


Figure 2. Reason of exposure.

charcoal were performed infrequently, as shown in Figure 6. For those 182 patients who were given antidotes, the three commonest were N-acetylcysteine (27.7%), sodium bicarbonate (19.6%) and naloxone (18.8%), as listed in Table 2.

Table 3 shows the clinical outcome of the cases, with 2815 out of the 2842 cases (99%) available for analysis, and 228 out of the total 2815 cases were graded as not related to the poison exposure and were not listed in the figures. For the remaining 2587 cases, there were 20 deaths (0.8%), 134 cases of major effects (5.2%), 378 cases of moderate effects (14.6%), 1620 cases of mild effects (62.6%), and 417 cases of no effect (16.1%);

and 46.3 %, 32.5% and 19.8% of the outcomes were graded as definitely, probably and possibly related to the poison exposure respectively while the remaining 1.4% were undetermined from the available information.

## Discussion

With the establishment of the HKPIC in July 2005, one of its functions is to facilitate the collection and analysis of poisoning data. This annual report of HKPIC presented the data of more than 2800 poisoned cases in 2007 which represented the updated poisoning pattern in Hong Kong.

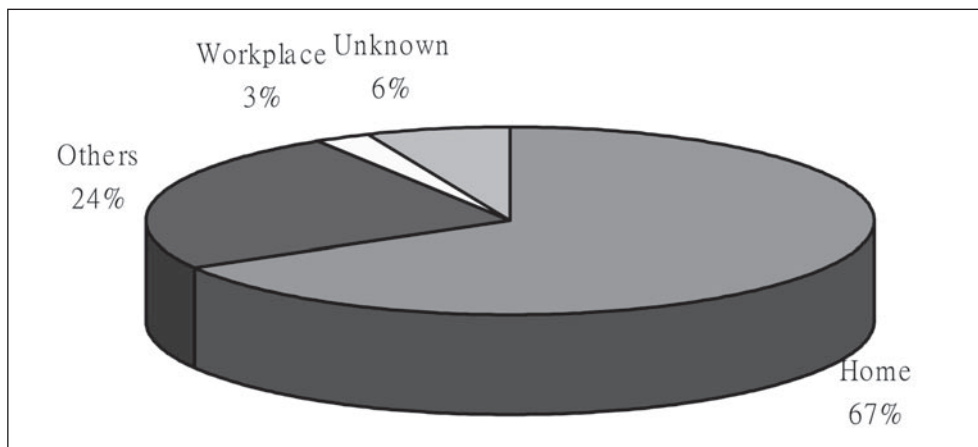


Figure 3. Place of exposure.

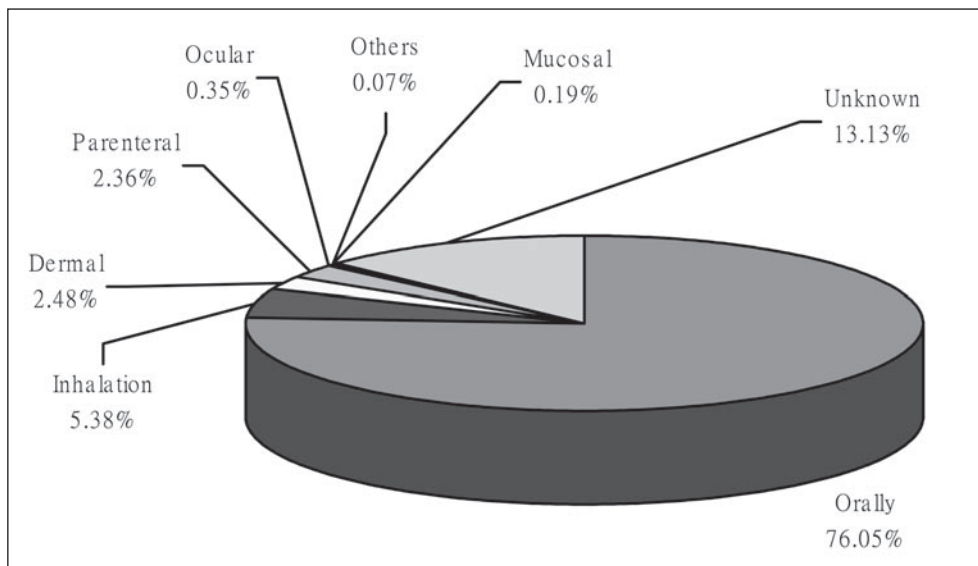


Figure 4. Route of exposure.

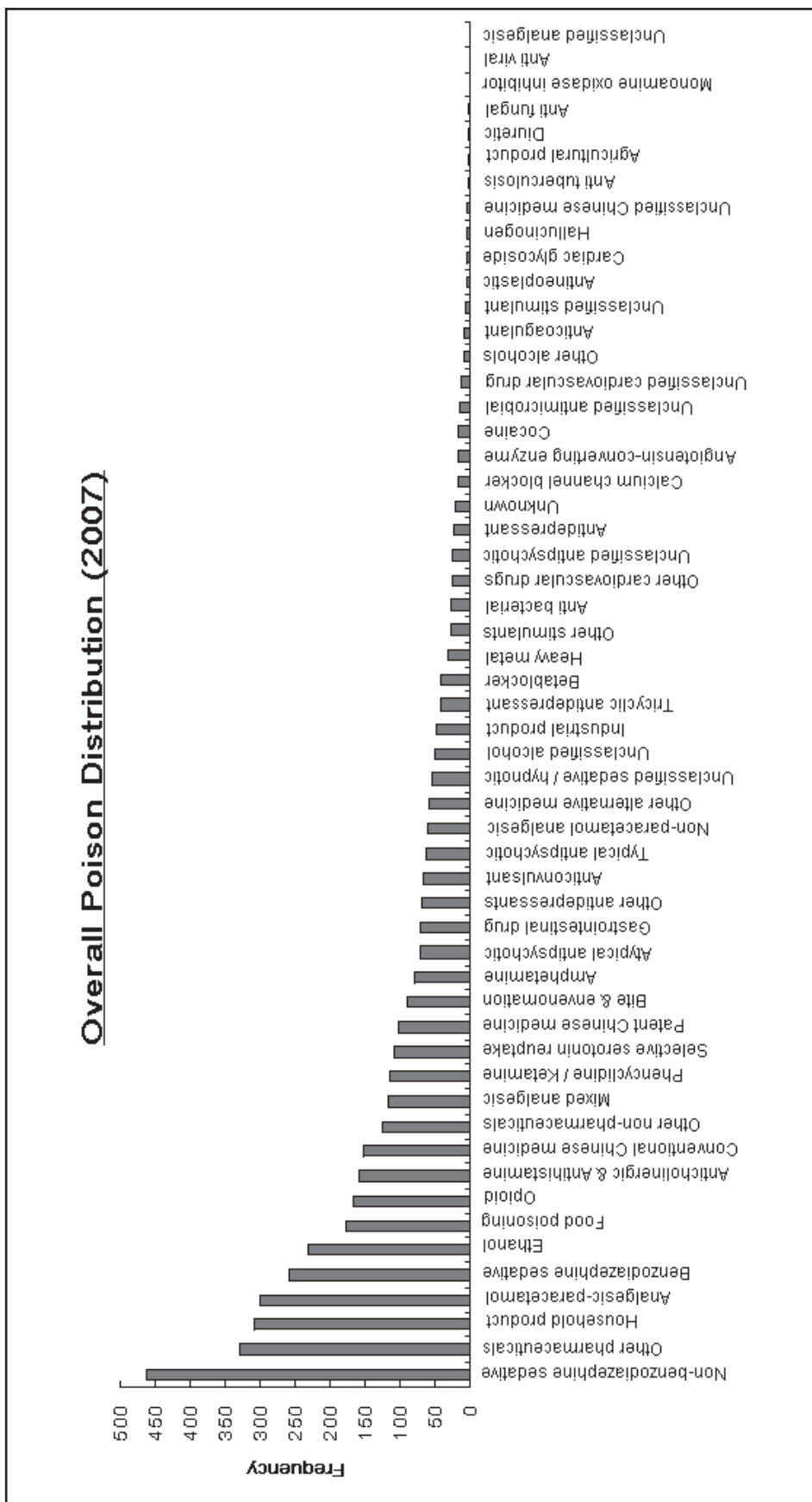


Figure 5. Type of poison exposed.

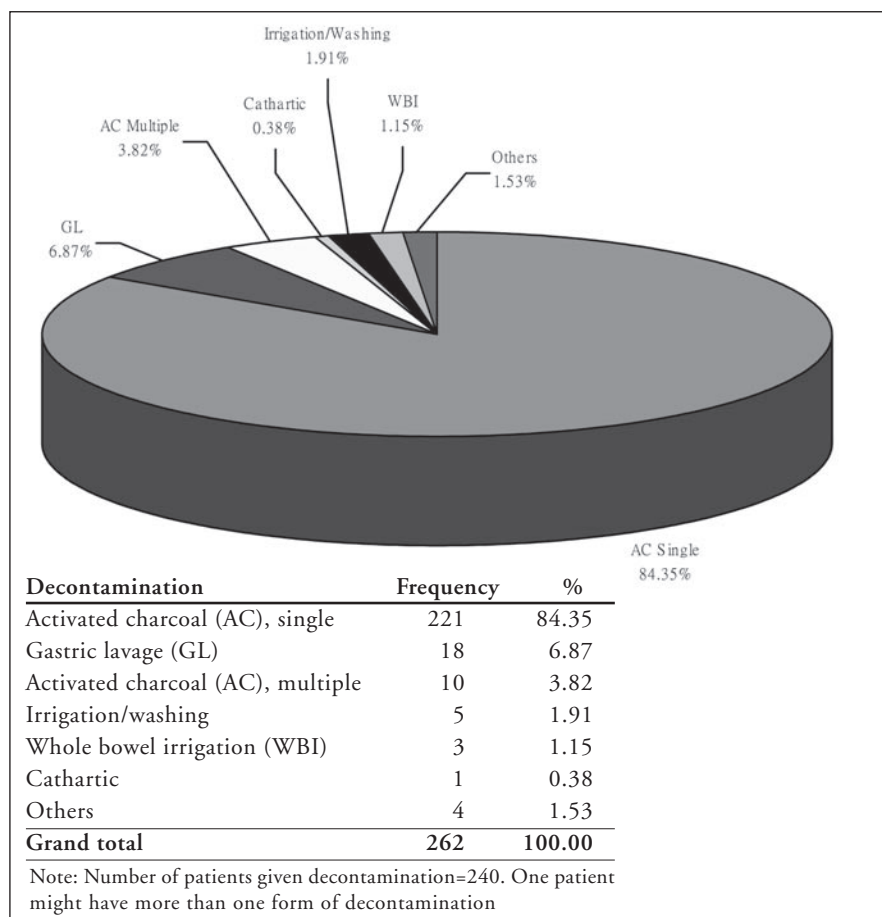


Figure 6. Decontamination.

In 2007, HKPIC received more than 1000 cases of consultation in comparison to less than 500 cases in 2006. The increase was reflected by the fact that 36.8% of the cases in 2007 were from our consultation services comparing to 18% in 2006. This suggested more and more health care professionals were aware of and used our service.

The age and gender distribution, as well as the reasons and routes of exposure were expected and compatible with previous local and overseas data.<sup>2-5</sup> Apart from "others" or undifferentiated pharmaceuticals, the three commonest types of poison exposed were non-benzodiazepine sedative-hypnotics (11.0%), household products (7.2%) and paracetamol (7.1%). The non-benzodiazepine sedative-hypnotics included mainly the Z-hypnotics (zopiclone and zolpidem), melatonin and other over-the-counter sleeping pills with herbal ingredients. One of the reasons for sleeping pills exposure was the easy availability of this group of drugs

Table 2. Antidote use

Antidote	Frequency	%
N-acetylcysteine	62	27.7
Sodium bicarbonate	44	19.6
Naloxone	42	18.8
Benzodiazepines	12	5.4
Atropine	10	4.5
Calcium	9	4.0
Flumazenil	8	3.6
Antivenin/antitoxin	7	3.1
Thiamine	7	3.1
Dextrose	6	2.7
Vitamin K	4	1.8
Physostigmine	4	1.8
Glucagon	4	1.8
Insulin	3	1.3
Methylene blue	2	0.9
Pralidoxime	0	0
Digoxin Fab	0	0
<b>Total</b>	<b>224</b>	<b>100.00</b>

Note: Number of patients given antidote=182. One patient might have used more than one antidote.

Table 3. Clinical outcome

Outcome	Definite	Probable	Possible	Undetermined	Total
	Frequency (%)				
Death	6 (0.2)	6 (0.2)	8 (0.3)	0 (0)	20 (0.8)
Major effect	105 (4.1)	21 (0.8)	8 (0.3)	0 (0)	134 (5.2)
Moderate effect	176 (6.8)	133 (5.1)	69 (2.7)	0 (0)	378 (14.6)
Mild effect	684 (26.4)	620 (24.0)	306 (11.8)	10 (0.4)	1620 (62.6)
No effect	225 (8.7)	60 (2.3)	120 (4.6)	12 (0.5)	417 (16.1)
Unknown	2 (0.1)	0 (0)	1 (0.0)	15 (0.6)	18 (0.7)
<b>Total</b>	<b>1198 (46.3)</b>	<b>840 (32.5)</b>	<b>512 (19.8)</b>	<b>37 (1.4)</b>	<b>2587 (100)</b>

with or without prescription and the belief that it was an effective method of committing suicide. In recent years, there is a trend in using zopiclone for abusive purpose. Zopiclone is a non-dangerous drug which contributes to its popularity among the abusers in contrast to other abusive hypnotics such as benzodiazepines which are classified as dangerous drugs in Hong Kong. With the increasing use of zopiclone, cases of new clinical presentations such as methemoglobinemia and renal impairment have been encountered in massive overdose (usually more than 100 tablets).<sup>6,7</sup> Household products, again, is readily available for poisoning by suicidal attempt as well as accidental exposure. A household product database was established in HKPIC in 2007 in collaboration with the Consumer Council, with its first phase focussed on household cleaner. At the end of 2007, we had more than 350 products information in the database, rapidly accessible for our consultation service. Paracetamol was the next commonest poison involved, as expected from its extreme popularity and easy availability.

Only 8.4% of our patients were treated with decontamination which is less than the reported figure of 18.7% in the 2006 report<sup>2</sup> and the 40% of an epidemiologic study of ED patients in 2001.<sup>4</sup> There may be several reasons to explain the dramatic drop. Firstly, there is a growing consensus among clinical toxicologists that decontamination is not routinely performed for all patients with poison exposure and this concept has been effectively conveyed to emergency physicians in recent years. Secondly, with

the increasing use of the HKPIC consultation service, some unnecessary use of decontamination has been prevented after the HKPIC recommendation. The reduction in decontamination observed is compatible with the situation in the United States as reflected by their figures of decreasing use of activated charcoal administration from 7.1% in 1997 to 4.3% in 2007.<sup>3</sup>

For the use of antidotes, the pattern remained similar and the three commonest used antidotes were N-acetylcysteine (27.7%), sodium bicarbonate (19.6%) and naloxone (18.8%).

Concerning the clinical outcome, the majority of cases (78.7%) were classified as no effect or mild effect. On the other hand, 20 (0.8%) patients died at least possibly related to the poison exposure. The death rate is compatible with the previous figure of 0.9%.<sup>2</sup>

There are several limitations of this report. First of all, the majority of our cases were voluntary reporting from six major EDs only. This may not totally reflect the whole poisoning pattern in Hong Kong although significant inter-district difference in poisoning pattern is not expected in such a small city and the six EDs were already selected from different regions of Hong Kong. In order to improve the surveillance, we have already extended the reporting to all EDs in the Hospital Authority since July 2008. Secondly, the classification of poison type in DATOX was less than perfect: not uncommonly we found difficulty and discrepancy in classifying the type of poison. Finally,

the judgement on clinical outcome and its relationship to the poison exposure might be suboptimal in some cases especially if the available information provided was limited or unreliable. However, we had taken appropriate measures to be objective and consistent in the analysis.

## Conclusion

This annual report provides updated epidemiological information on poisoning in Hong Kong and highlights some changes in comparison with the situation in 2006. Non-benzodiazepine sedative-hypnotics, household products and paracetamol remained the commonest poisons exposed. The majority of patients were managed conservatively, with decreasing figures of 8.4% and 6.4% of them being treated specifically by decontamination and antidotes respectively. Most cases had an uneventful recovery; less than 1% of the poison exposure resulted in death and about 5% of the exposure had major outcomes. HKPIC shall continue to monitor the poisoning pattern in Hong Kong in order to guide the formulation of strategies in poison control and prevention.

## Interesting cases

### Case 1

A 68-year-old woman was found in cardiac arrest at home with a history of consuming self-prepared herbal decoction. She did not respond to resuscitation by pre-hospital crew. Her son who had consumed the same herbal broth also developed dizziness, nausea, vomiting and generalised weakness requiring in-patient care. Laboratory analysis of the herbal broth remains as well as the forensic blood samples of the deceased patient found gelsemine. Gelsemine is one of the major toxins found in the toxic plant *Gelsemium elegans* (斷腸草、鉤吻、大茶藥). In the year of 2007, three clusters of *Gelsemium elegans* poisoning were recorded with 8 patients affected totally. In one cluster, a patient misidentified it with a benign herb in the countryside during collection and drank its broth. In another

cluster, the toxic herb was dispensed from an herb shop in Shenzhen when the patient intended to buy another benign herb. The cause of poisoning in the remaining cluster that resulted in the only fatality was unknown. *Gelsemium*, apart from causing gastrointestinal upset, can cause rapid-onset muscle paralysis and respiratory failure. No antidote is available, timely airway protection and respiratory support is the recommended management.

### Case 2

A 29-year-old woman, who worked in a dentist's clinic, poisoned herself by taking 3 grams of lignocaine powder. She developed mental confusion in about 30 minutes and was sent to the hospital for further management. On presentation to the ED, apart from confusion, she had a blood pressure of 141/69 mmHg and sinus tachycardia at a rate of 144 beats per minute. She was admitted into the intensive care unit for management where she developed two episodes of convulsion and coma. The convulsion subsided after benzodiazepine bolus and propofol infusion. She was put on mechanical ventilation, recovered rapidly and was discharged with no neurological sequela. Dentists are familiar with powder-form lignocaine but not medical doctors. Taking a few grams of it can result in potentially lethal neurological and cardiac toxicity and unluckily no specific antidote exists. Recent studies did show that intravenous intralipid might be a promising treatment in case of life-threatening local anaesthetic overdose, including lignocaine. It is stored in many operation theatres for emergency treatment of inadvertent overdose where local anaesthetic procedures are performed.

### Case 3

A 70-year-old man developed diarrhoea for two days requiring intravenous fluid treatment in hospital. He consumed oil-fish shortly before the onset of his symptoms. Oil-fish was found being sold in Hong Kong under the name of cod or mackerel in early 2007 and had resulted in outbreaks of more than 70 notifications to the Food and Environmental Hygiene Department<sup>8</sup> involving about 100 patients. The actual species should be either *Ruvettus pretiosus* or *Lepidocybium flavobrunneum*. They had been sold

previously under different confusing names including butterfish, gemfish, rudderfish and even sea bass in different countries. Both species are known to cause gastrointestinal symptoms like abdominal pain, bloating and oily diarrhoea with attack rates of 45% to 67% due to gempylotoxin, an indigestible wax-ester contained in the fish-meat.<sup>9</sup> The illness is usually self-limiting.

#### *Case 4*

A 67-year-old lady presented to an ED two hours after taking a grass carp gallbladder cooked with honey with the intention to improve her general well-being. She complained of severe right upper quadrant abdominal pain, vomiting and diarrhoea. Blood tests results revealed an acute hepatitis and worsening acute renal failure within 48 hours. The ALT peaked at 7340 IU/L measured at 13 hours after ingestion with a delayed rise in total bilirubin up to 111  $\mu\text{mol/L}$  on day 3. She developed oliguria and her blood creatinine rose to 639  $\mu\text{mol/L}$  on day 4. Haemodialysis was performed on day 5 for fluid retention. Her urine output started to improve on day 9 and she was subsequently discharged on day 17. Creatinine clearance measured at about 4 weeks after the poisoning was 31 ml/min.

Consumption of the gall bladders of grass carp and other related cyprinoid fish species has been reported to cause acute renal failure and death in South China region and Southeast Asia for decades. Folk remedies wrongly advocate them for eye complaints, upper and lower respiratory tract illness. The bile juice of these fish species contains potent toxic substances resistant to cooking that can cause severe liver and kidney damage. Other reported complications included myocardial damage, haemolysis and central nervous system toxicity. Haemodialysis was reported to improve the clinical outcome in recent case series which reported a range of 0 to 5.9% short-term mortality.<sup>10</sup>

#### *Cases 5 and 6*

An 11-month-old boy presented to a hospital for irritability, failure to thrive, retrograde development and desquamating erythematous rash over his extremities for a few months. He was found to have hypertension and proteinuria and subsequent

investigation found a whole blood mercury level of 69 nmol/L (reference <77 nmol/L), but a markedly elevated urine mercury per creatinine ratio at 30 times the upper limit of normal. The diagnosis of acrodynia was made by the caring paediatricians and chelation with dimercaptosuccinic acid (DMSA) was promptly started.<sup>11</sup> A locally manufactured Proprietary Chinese Medicine [陳標記小兒疳積散] was confirmed to be the cause. The product was found to contain 1228 ppm, almost 2500 times of the legal limit, in the form of mercuric chloride.

Another 18-month-old girl who had taken the product for a month was admitted into another hospital for detailed assessment. She appeared asymptomatic and her physical examination, baseline blood and urine tests were all normal, however her whole blood mercury level climbed up to 183 nmol/L (reference <77 nmol/L) and her urine mercury to creatinine ratio was sixty times the upper limit of normal. DMSA chelation was given judging on the heavy mercury burden in her developing body.

These cases illustrated the poor sensitivity of blood mercury level in diagnosing inorganic mercury poisoning in Hong Kong, and paired blood and urine mercury quantification is recommended in the workup of suspected mercury poisoning. They also illustrated the difference in susceptibility among individuals to the toxicity of inorganic mercury. Such phenomenon may be explained by the inter-individual variation of immune response to a protein-adducting toxin.

#### *Case 7*

A 48-year-old woman attempted suicide by overdosing herself with 100 tablets of 7.5 mg zopiclone and presented to a hospital with drowsiness (Glasgow Coma Scale score 12/15). She was warded for continuation of observation and supportive treatment. Two hours after admission, she was found to have increased drowsiness, central cyanosis and a pulse-oximetry reading of 86% despite oxygen supplement and non-invasive positive pressure ventilation. Arterial blood gas analysis and co-oximetry revealed a  $\text{PaO}_2$  of 26.5 kPa and a methaemoglobin level of 12%.

She received endotracheal intubation, respiratory support and was transferred to the intensive care unit for further management. Methylene blue was given intravenously which reduced her methaemoglobin level to 6.7% (~10 hours post-ingestion); however it rebounded to 20.5% eight hours later. A second dose of methylene blue was given which successfully lowered the methaemoglobin level to 10% (~22 hours post-ingestion) which then fell slowly to 3% and persisted till 90 hours post-ingestion.

Massive zopiclone overdose-induced methaemoglobinaemia was first reported by Fung et al in Hong Kong.<sup>6</sup> Further case series showed that it was also associated with renal impairment and haemolytic anaemia.<sup>7</sup>

### Case 8

A 65-year-old lady with history of metastatic carcinoma of the rectum presented for repeated syncope within 24 hours together with a 4-week history of persistent watery diarrhoea. Baseline blood test revealed mild hypokalemia of 2.8 mmol/L. The electrocardiogram (ECG) showed a prolonged corrected QT interval up to 620 msec and continuous ECG monitoring recorded transient torsades de pointes causing a 10-second interval of unconsciousness. Magnesium sulphate and potassium supplement were given with no recurrence of the arrhythmia. Subsequent direct questioning revealed her taking of complementary medicine from a "naturopathy doctor" in Hong Kong for three months. She started to have diarrhoea after commencing on a "step-up" treatment for her cancer six weeks ago. Clinical suspicion of cesium chloride poisoning was made because of similar case reports from overseas. Special analysis of her blood showed a cesium concentration of more than 27,000 times of the upper limit of reference. One tablet-form medication was confirmed to be almost pure cesium chloride. Prussian blue, a metal chelator, was given to hasten the elimination of cesium in the patient's body. Cesium chloride is advocated by some naturopathic practitioners for anti-cancer treatment in recent years. Including this, at least six similar cases of life-threatening arrhythmias have been reported

since 2001<sup>12</sup> as a result of cesium poisoning from naturopathic medicine use in cancer treatment.

### Case 9

Six children felt dizzy with abdominal discomfort a few hours after sharing some cakes in a Christian Fellowship. The gift was brought there by a woman. Three of the victims presented to a hospital within 24 hours for postural hypotension or dystonic reactions. All of them recovered after treatment. Urine toxicology screening found the presence of risperidone and the Government Laboratory also detected risperidone from samples of the cakes and powder on the cake container. Malicious poisoning was confirmed and the police swiftly hunted down the suspect who probably committed the crime because of her psychotic illness.

### Case 10

A 54-year-old woman borrowed a Chinese soup-recipe book from a public library, and prepared a fish soup with several Chinese herbal ingredients according to one recipe. She developed nausea, vomiting, diaphoresis and persistent muscle cramps affecting both lower limbs. She improved with supportive treatment. Surprisingly, review of the recipe found on it a highly toxic ingredient: Maqianzi (馬錢子), the fruit of *Strychnos nux-vomica* at a dose ten times higher than the recommended dose in Chinese Medicine. Maqianzi overdose may cause muscle spasms, spinal seizures, respiratory failure and death. The toxic effect is due to the presence of strychnine and brucine which are antagonists of the inhibitory neuro-receptors in the spinal cord.

The chief librarian was alerted of the incident, and all 14 copies of the cookbook were immediately removed from the shelves of all public libraries in Hong Kong. The Department of Health also warned the public about the toxic recipe. Subsequent investigation suggested that publication error had led to the wrong listing of Maqianzi instead of water chestnut. The dispensing of such a high dose of toxic herb without a proper prescription had also contributed to the event.

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