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ORIGINAL ARTICLE

Pharmaceutical Poisoning Exposure and Outcome Analysis in Children Admitted to the Pediatric Emergency Department

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Key Words
accidental poisoning;
duration of hospitalization;
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Background: Pharmaceuticals involved in childhood poisoning vary, and treatment of poison exposure can be a challenge for primary physicians when children are unconscious or histories are lacking. Knowledge of the clinical manifestations and prognosis of poisoning will help primary physicians perform appropriate clinical assessments. In this study, we aim to report on patient characteristics, outcomes, and clinical features of pediatric poisoning in the emergency department.

Methods: We retrospectively evaluated the medical records of 87 children younger than 18 years of age and presented to the emergency department with pharmaceutical poisoning (2001—2008). The detailed categories of pharmaceutical were reported, and their associations with patient outcomes were analyzed. Furthermore, children were divided into two groups, based on the reasons for poison exposure (accidental or intentional poisoning). Clinical features and outcomes between accidental or intentional poisoning were analyzed, and the cut-off age for high risk of intentional poisoning was also calculated.

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Results: Age groups of adolescents (48.3%) and preschool age (32.2%) children were the major representation. Neurologic system agents (48.3%) and analgesics (18.4%) were the most common causes of poisoning. Among the two major agents above, anxiolytic/hypnotic drugs (lorazepam) and acetaminophen were the most frequent causes. Of all children, 70.1% had duration of major symptoms for $\leq$1 day, and intentional poisoning caused significantly longer duration of hospital stay than accidental poisoning did ($p = 0.008$). Moreover, female gender ($p < 0.001$), older age ($p < 0.001$), and analgesics ($p = 0.008$) were more predominantly associated with intentional poisoning in children, and the cut-off age for high risk of intentional poisoning was over 10.5 years.
Conclusion: Neurologic system agents and analgesics were responsible for the majority of cases. Intentional poisoning caused longer hospital length of stay than accidental poisoning, and the factors associated with intentional poisoning were older age, female, and neurologic system agents.

1. Introduction

Pharmaceuticals involved in childhood poisoning vary, and treatment of poison exposure can be a challenge for the emergency department (ED) physicians when children are unconscious or past histories are lacking. Epidemiological studies on pediatric poisoning have demonstrated that the most common risk factors for poison exposure are young age, female gender, low education level of patients and family members, and low socioeconomic status.[1–9] Moreover, the outcome of poison exposure in children is dependent on the category and the dosage of pharmaceutical.[10,11] Previous studies reported that the most common categories of poison in children were different in various global locations. For example, neurologic drugs were the most common in France and analgesics were the most common in Turkey.[1,2] Previous study in Taiwan also reported that male exposures were more prevalent than females, and accidental exposures accounted for 77.7% of the cases, and most were exposed by the oral route.[12] However, the clinical features and prognosis, including the duration of major symptoms and the hospital length of stay between the different categories of pharmaceutical in children, have not been well addressed. In this study, we have analyzed the patient characteristics, outcomes, and clinical features of pediatric pharmaceutical poisoning in central Taiwan.

2. Materials and Methods

2.1. Study design

Children aged <18 years, who presented to the ED of Changhua Christian Hospital with pharmaceutical poison exposure during the period January 2001 to January 2008, were included in this study. Patient characteristics and categories of pharmaceutical that might be associated with the outcomes of children were analyzed.

2.2. Study setting and population

We retrospectively reviewed the medical records of 87 children aged $\leq$18 years with pharmaceutical poison exposure, who presented to the ED at Changhua Christian Hospital in central Taiwan (2000-bed medical center). ICD-9 codes 960.0—979.9 were used for data search. Pharmaceutical poison exposure was defined as the ingestion, either accidentally or intentionally, of pharmaceutical substances at doses that elicited a toxic response. Children in whom poisoning was because of nonpharmaceutical substances (foods or envenomations) and pharmaceuticals which could not be identified were not included in this study. Children treated for pharmaceutical poison exposure were required to remain in the pediatric ED for observation or were hospitalized until vital signs stabilized and major symptoms subsided. Patients in this study were divided into six major groups based on the categories of pharmaceutical: (1) neurologic system agents (anxiolytic/hypnotic agents, antidepressant agents, antiepileptic drugs, and narcotics); (2) analgesics (acetaminophen and nonsteroid anti-inflammatory drugs); (3) respiratory system agents (bronchodilators and dextromethorphan); (4) cardiovascular system agents (antihypertensive drugs and anticoagulants); (5) metabolic and nutrient agents (vitamins and iron); and (6) others.

2.3. Study protocol

Information relating to the poison exposure was obtained from medical records and witness statements. All data were identified and abstracted by ED physicians. Demographic data gathered from ED patient charts included gender, age at onset, category of pharmaceutical, clinical presentations, the duration of major symptoms, place of poison exposure, route of exposure, past history of pharmaceutical poison, reason for poison exposure (accidental or intentional), treatments, outcomes, period from poison exposure to arrival at hospital, duration of observation at the ED, and duration of hospitalization. The reason for and the place of poison exposure were selfreported by family members, patients, or witnesses. The duration of major symptoms, as evaluated by physicians, comprised the period from the onset of symptoms to subsidence of symptoms.

The clinical presentations were categorized into seven major groups of constitutional symptoms: (1) asymptomatic

(without any uncomfortable symptoms or chief complaints, and there was no specific finding after physical examinations in the ED); (2) gastrointestinal symptoms (nausea, vomiting, diarrhea, constipation, abdominal pain); (3) neurological symptoms (dizziness, vertigo, convulsion, headache, consciousness change); (4) respiratory tract symptoms (cough, dyspnea); (5) cardiovascular symptoms (brady/tachycardia, cardiac dysrhythmia, hypo/hypertension); (6) multiple symptoms (two or more symptoms); and (7) others.

Among these six major categories of substances, patient characteristics, clinical managements, and the total hospital length of stay were analyzed for individual differences. The clinical managements associated with the severity of symptoms were divided into two major groups: (1) only ED course [discharge from hospital directly and pediatric observation unit (POU) observation]; and (2) hospital admission [ward admission and pediatric intensive care unit (PICU) admission]. Patients who were asymptomatic or suffering from mild clinical presentation could be discharged from hospital directly or observed in the POU. The POU was designed for children who do not require an inpatient admission, but need to stay in the hospital for further observation and short-term treatment. Once in the POU, these patients were evaluated, orders were reviewed by physicians, and they could be discharged home from POU if they were clinically stable. Sometimes, the patients required inpatient admission if they were not clinically stable during observation. Otherwise, patients with severe clinical presentation required hospital admission, and those with unstable vital signs (i.e., respiratory failure, persistent unconsciousness, and cardiac arrhythmia) were admitted to the PICU.

The reasons for poison exposure were classified as intentional (abuse or suicidal behavior) and accidental. The variables between intentional and accidental poison exposure were analyzed for significant differences included patient characteristics, location of poison exposure, clinical presentations, categories of pharmaceutical, period from exposure to arrival at hospital, and outcomes. In this study, patients were also divided into four age groups: (1) an infant group (1 month to 1 year); (2) a preschool age group (2−6 years); (3) a school-age group (7−12 years); and (4) an adolescent group (13−18 years). Both the reason for poison exposure and the gender of patients were also analyzed across different age groups.

2.4. Data analysis

Descriptive analyses of independent variables (gender, age, categories of pharmaceutical, clinical presentation, duration of symptoms, treatments, and outcomes) are reported as number, percentages, and mean ± standard deviation. One-way analysis of variance was used to compare the mean age of children and the mean total hospital length of stay for different categories of pharmaceutical. Factors that might be associated with accidental and intentional poison exposure were analyzed by the Pearson χ^2 test and t test. Multiple logistic regression analysis was used to analyze the predictors for risk of intentional poisoning. In addition, the reason for poison exposure and the sex of patients were both analyzed across different age groups by Pearson χ^2 test. In addition, a receiver-operating characteristic (ROC) curve was drawn and used to pinpoint the cut-off value of age for high risk of intentional poison exposure. A p value <0.05 was regarded as significant. All statistical analyses were performed on a personal computer with the statistical package SPSS for Windows (Version 15.0, SPSS).

3. Results

3.1. Patient characteristics and clinical presentations

Childhood poisoning accounted for 0.13% ($n = 198$) of all pediatric emergency visits ($n = 148{,}652$) during the study period. Among them, 87 children with pharmaceutical poison exposure were analyzed in our study. Their demographics were presented in Table 1. There were 39 boys (44.8%) and 48 girls (55.2%). The age group of adolescents was the greatest representation (48.3%), and mean age was 11.26 ± 6.82 years. The most common location of poison exposure was at home (89.7%), the major reason for poison exposure was intentional (60.9%), and all children were exposed by oral route. The mean period from poison exposure to arrival at hospital was 3.68 ± 7.29 hours, and the mean duration of ED observation was 7.83 ± 7.02 hours ($n = 60$).

Among the 87 children, neurologic symptoms were the most common (56.3%), followed by asymptomatic (16.1%). The most common duration of major symptoms was ≤1 day (70.1%), followed by 2−3 days and ≥4 days. In the pediatric ED, the majority of patients received clinical observation and intravessel fluid supplement only; 11.5% ($n = 10$) of the children were treated with antidotes, and 44.8% ($n = 39$) of children underwent nasogastric tube insertion and irrigation. Among the 10 children who received antidote treatments, 9 of them had lorazepam intoxication and flumazenil used for treatment. The other one was a case of aspirin overdose with *N*-acetylcysteine administrated as antidote. In all, 21 children (24.1%) were hospitalized because of severe clinical presentations. Among the 21 children, 4 of them were admitted to PICU because of unstable vital signs. The mean duration of hospitalization was 79.71 ± 51.34 hours. All were discharged alive.

3.2. Categories of pharmaceutical and hospital length of stay

Detailed information on pharmaceutical causing the studied poisonings is presented in Table 2. Neurologic system agents (48.3%) were the most common pharmaceutical poisons. Anxiolytic and hypnotic drugs were the most common drugs of neurologic system agents (34.5%), followed by antidepressant drugs (5.7%), antiepilepsy agents (4.6%), and narcotics (3.4%). Analgesics were the second most common pharmaceutical poisons (18.4%). Among them, acetaminophen was the most predominant drug (10.3%). Cardiovascular system agents were determined to be the drug of poisoning in 8% of children, and antihypertensive drugs were the most common (6.9%) drugs among them. Other agents

Table 1 Patient characteristics and clinical presentations in children treated for pharmaceutical poison exposure

	Poison exposure in children ($n = 87$)
	n (%)
Gender	
Male	39 (44.8)
Female	48 (55.2)
Age (mean ± SD, yr old)	11.26 ± 6.82
Infant	9 (10.3)
Preschool age	28 (32.2)
School age	8 (9.2)
Adolescent	42 (48.3)
Location of poison exposure	
Home	78 (89.7)
Outside home	9 (10.3)
Reasons for poison exposure	
Accidental	34 (39.1)
Intentional	53 (60.9)
Categories of pharmaceutical	
Neurologic system agents	42 (48.3)
Analgesics	16 (18.4)
Respiratory system agents	6 (6.9)
Cardiovascular system agents	7 (8)
Metabolic and nutrient agents	6 (6.9)
Others	10 (11.5)
Clinical presentations	
Asymptomatic	14 (16.1)
Gastrointestinal symptoms	6 (6.9)
Neurologic symptoms	49 (56.3)
Respiratory symptoms	3 (3.5)
Cardiovascular symptoms	6 (6.9)
Multiple symptoms	5 (5.7)
Others	4 (4.6)
Duration of major symptoms	
≤1 d	61 (70.1)
2−3 d	17 (19.5)
≥4 d	9 (10.4)
Administration of antidote	
Yes	10 (11.5)
No	77 (88.5)
Nasogastric tube insertion	
Yes	39 (44.8)
No	48 (55.2)
Hospital admission	21 (24.1)
POU observation	60 (69)
Discharge from the ED	6 (6.9)

SD = standard deviation; POU = pediatric observation unit; ED = emergency department.

included metabolic and nutrient agents (6.9%), respiratory system agents (6.9%), and antibiotics (4.6%).

The outcomes of patients are presented in Table 3. Metabolic and nutrient agents were significantly associated

Table 2 Detailed information on pharmaceuticals which caused poisoning in children

	n (%)
Neurologic system agents ($n = 42$)	
Anxiolytic and hypnotic drugs	30 (34.5)
Lorazepam	13 (14.9)
Zolpidem	7 (8)
Oxazolam	4 (4.6)
Zopiclone	2 (2.3)
Estazolam	2 (2.3)
Phenobarbital	2 (2.3)
Antidepressant drugs	5 (5.7)
Fluoxetine	3 (3.4)
Imipramine	2 (2.3)
Antiepilepsy	4 (4.6)
Carbamazepine	3 (3.4)
Lamotrigine	1 (1.1)
Narcotics	3 (3.4)
Amphetamine	2 (2.3)
MDMA	1 (1.1)
Cardiovascular system agents ($n = 7$)	
Antihypertensive drugs	6 (6.9)
Nifedipine	3 (3.4)
Verapamil	1 (1.1)
Captopril	1 (1.1)
Warfain	1 (1.1)
Respiratory system agents ($n = 6$)	
Bronchodilators	4 (4.6)
β-Adrenergic agonists	2 (2.3)
Theophylline	2 (2.3)
Dextromethorphan	2 (2.3)
Analgesics ($n = 16$)	
Acetaminophen	9 (10.3)
NSAID	7 (8)
Ibuprofen	3 (3.4)
Diclofenac	2 (2.3)
Ketorolac	1 (1.1)
Aspirin	1 (1.1)
Metabolic and nutrient agents ($n = 6$)	
Vitamins	4 (4.6)
Iron	1 (1.1)
Atrovastatin	1 (1.1)
Others ($n = 10$)	
Antibiotics	4 (4.6)
Antacids	3 (3.4)
Antihistamine	2 (2.3)
Diuretics	1 (1.1)

MDMA = 3,4-methylenedioxymethamphetamine; NSAID = non-steroidal anti-inflammatory drug.

Table 3 The outcomes of children who suffered different categories of pharmaceutical poison exposure

Categories of pharmaceutical	Poison exposure in children ($n = 87$)					
	Age* (yr/o) (95% CI)	Only ED course ($n = 66$)		Hospital admission ($n = 21$)		Total n	Total hospital length of stay† (hr) (95% CI)
		Discharge from hospital n (%)	POU observation. n (%)	Ward admission n (%)	PICU admission n (%)		
Neurologic system agents	14.75 ± 5.74 (7.26–13.98)	3 (7.1)	25 (59.5)	9 (21.4)	3 (7.1)	42	45.13 ± 44.46 (9.61–52.29)
Analgesics	11.60 ± 6.74 (7.46–16.12)	1 (6.2)	9 (56.3)	5 (31.3)	1 (6.2)	16	34.58 ± 28.76 (8.66–49.23)
Respiratory system agents	5.09 ± 2.74 (1.27–8.66)	0 (0)	5 (83.3)	1 (16.7)	0 (0)	6	20.36 ± 25.44 (−7.84 to 47.37)
Cardiovascular system agents	5.97 ± 4.39 (1.41–9.52)	1 (14.3)	6 (85.7)	0 (0)	0 (0)	7	5.93 ± 4.31 (1.3–12.72)
Metabolic and nutrient agents	2.87 ± 1.52 (1.39–6.71)	0 (0)	6 (100)	0 (0)	0 (0)	6	11.74 ± 7.54 (1.01–19.55)
Others	13.41 ± 5.92 (3.78–15.12)	1 (10)	7 (70)	2 (20)	0 (0)	10	18.69 ± 17.28 (11.42–43.57)
Total	11.26 ± 6.82 (5.65–12.74)	6 (6.9)	60 (69)	17 (19.5)	4 (4.6)	87	29.13 ± 36.54 (12.27–42.54)

* The mean age differ significantly between the categories of pharmaceuticals ($p = 0.012$);
† The total hospital length of stay included the duration of observation in POU and hospital admission.
ED = emergency department; CI = confidence interval; POU = pediatric observation unit; PICU = pediatric intensive care unit.

with younger age (2.87 ± 1.52 years) ($p = 0.012$). Neurologic system agents were associated with the longest duration of hospital length of stay (45.13 ± 44.46 hours), and cardiovascular system agents were associated with the shortest duration of hospital length of stay (5.93 ± 4.31 hours). Four children requiring intensive care were admitted to the PICU because of critical conditions after neurologic system agent and intentional analgesic abuse. Among them, the first one was caused by acetaminophen overdose which caused acute liver failure, and the other three cases were amphetamine, lorazepam, and oxazolam abuse, respectively. After critical care in the PICU, they all were discharged home, on Days 13, 7, 5, 4, respectively.

3.3. Differences between accidental and intentional poisoning exposure

In this study, the reasons for poison exposure in children were classified as accidental and intentional causes. The differences between the two causes are presented in Table 4. The total hospital length of stay differed significantly between the two causes of poisoning exposure ($p = 0.008$). Children with intentional poison required longer length of hospital stay (37.74 ± 46.52 hours) than those with accidental poisoning (20.79 ± 27.52 hours). Male gender was significantly associated with accidental poisoning, but female sex was significantly associated with intentional poisoning ($p < 0.001$). Multiple logistic regression analysis revealed that the age of children was the most important factor associated with intentional poisoning (odds ratio: 1.99, 95% confidence interval: 1.24–3.21, $p = 0.005$). Of the 53 children with intentional poisoning, 2 (3.8%) had past history of intentional pharmaceutical poison exposure. Furthermore, female ($n = 34$; 81%) sex was more predominant among adolescents ($n = 42$) and male ($n = 21$; 75%) gender was more predominant in preschool age group ($n = 28$), respectively ($p < 0.001$). There was also a significant difference in the mean age of children between the two groups ($p < 0.001$). The mean age of children treated for accidental poisoning was greater than that of children treated for intentional poisoning (4.59 ± 3.32 years *vs.* 13.84 ± 5.02 years). Moreover, the data revealed that the proportion of intentional poison exposure increased with age (infant group, 0/9 = 0%; preschool age group, 8/28 = 28.6%; school-age group, 5/8 = 62.5%; and adolescent group, 40/42 = 95.2%) ($p < 0.001$). We also found that the ages of patients with intentional poisoning were quite varied and ranged from 5.1 years to 18 years. The mean age of patients was analyzed by ROC curve to pinpoint the cut-off age for high risk of intentional poisoning in the ED. The area under the ROC curve (AUC) was greater than 0.5, and the cut-off age for high risk of intentional poison was 10.5 years (AUC = 0.909 [95% confidence interval 0.843–0.976], sensitivity = 78%, specificity = 88.5%, likelihood ratio+: 14.19, likelihood ratio−: 0.32, odds ratio: 43.87).

4. Discussion

In central Taiwan, pharmaceutical poisoning exposure in children is an uncommon reason for visiting the pediatric

Table 4 Significant differences between accidental and intentional poison exposure

	Poison exposure in children ($n = 87$)		p
	Accidental ($n = 34$)	Intentional ($n = 53$)	
	n (%)	n (%)	
Total hospital length of stay (hr)*	20.79 ± 27.52	37.74 ± 46.52	0.008
Mean age (yr)*	4.59 ± 3.32	13.84 ± 5.02	<0.001
Gender*			
Male	25 (73.5)	14 (26.8)	<0.001
Female	9 (26.5)	39 (73.2)	
Location of poison exposure			
Home	30 (88.2)	48 (90.6)	0.560
Outside home	4 (11.8)	5 (9.4)	
Clinical presentations			
Asymptomatic	8 (23.5)	6 (11.3)	0.218
Gastrointestinal symptoms	2 (5.9)	4 (7.4)	
Neurologic symptoms	16 (47.1)	33 (62.3)	
Respiratory symptoms	1 (3)	2 (3.8)	
Cardiovascular symptoms	4 (11.7)	2 (3.8)	
Multiple symptoms	2 (5.8)	3 (5.7)	
Other	1 (3)	3 (5.7)	
Categories of pharmaceutical*			
Neurologic system agents	21 (61.7)	21 (39.7)	0.007
Analgesics	2 (5.8)	14 (26.5)	
Respiratory system agents	1 (3)	5 (9.5)	
Cardiovascular system agents	4 (11.8)	3 (5.7)	
Metabolic and nutrient agents	5 (14.7)	1 (1.9)	
Others	1 (3)	9 (16.7)	
Hospitalization			
Yes	27 (79.4)	37 (69.8)	0.266
No	7 (20.6)	16 (30.2)	
Mean period from poison exposure to arrival at hospital	2.37 ± 3.49	4.49 ± 8.80	0.262

* Significant differences between accidental and intentional poison exposure.

ED, accounting for less than 0.1% of all admissions. This percentage was much lower than 0.15% and 0.14% of total pediatric emergency admissions, which were reported in Spain and France, respectively.[1,5] The difference could be because of less frequent poison exposure in central Taiwan, or the introduction of child-resistant containers for medicines has been effective in terms of primary prevention.

Previous study demonstrated that analgesics, cardiovascular medications, theophylline preparations and antidepressants, and other psychotropic medications were more common in adult and elder pharmaceutical poisonings.[13] In central Taiwan, we found neurologic system agents were also the most common drug and analgesics were the second most common drug associated with pediatric pharmaceutical poisoning. Among them, anxiolytic/hypnotic drugs and acetaminophen were more predominant in these two categories, respectively. Furthermore, the mean length of hospital stay was longer in patients with neurologic system agents and analgesic poisoning than that in patients with other drugs. Therefore, this finding may indicate that it is important to determine what kind of drugs patients have ingested, and detecting the drug levels (i.e., the level of benzodiazepine, barbiturate, and acetaminophen) should be seriously considered for early diagnosis if children are unconscious or history is difficult to be obtain. We found that neurologic system agents were the most common agents in both the intentional and accidental pediatric poisonings in Taiwan. Therefore, further educating the parents to store these agents well to prevent mistakes by young children is very important. Moreover, the validity of obtaining neurologic system agents should be paid more attention with regard to school-age and adolescent children to avoid them being the tool of suicide or substance abuse.

In this study, the causes for poisoning may also play an important role related to the outcomes of the patients. We found that children with intentional poisoning had significantly indicated longer length of hospital stay than those with accidental poisonings, and children who were admitted to the PICU for critical care were all intentional

issues. Therefore, understanding the differences between intentional and accidental poisonings is quite important. Also, identifying the definite issue may help primary physicians for performing appropriate assessments.

The first factor associated with the reason for poison was the age of the poisoned children. The mean age was greater in children with intentional poisoning than that in children with accidental poisoning. This finding was similar with those of some previous studies which addressed a bimodal age distribution of poisoning in children with toddlers comprising the majority (mainly accidental poisonings, with a male preponderance) and a second peak in adolescence (with an increase in intentional poisonings, and a female preponderance).[1,2,7,8] However, we divided children into four age groups and found that adolescents were the major age group (48.3%), and a second peak was the preschool age group (32.2%). Goto et al[14] reported that the percentage of pediatric poisonings was 37.5% in the infant group in Japan. However, this number was much smaller in central Taiwan (only 10.3%) and in American (12.1%). Moreover, the causes for poison exposure differed significantly between these two age groups. Intentional poisoning was the most common reason (93.6%) for poison exposure in adolescents, whereas accidental poisoning was the majority (71.4%) of poison exposure in children of preschool age. In our study, the ROC analysis showed that 10.5 years old was the cut-off age for high risk of intentional poison in the ED, and the sensitivity and the specificity were both maximized at this point. According to our results, of this cut-off age, 78% sensitivity means that 78% of intentional poisoning could be found in the ED, and 88.5% specificity means that 88.5% of accidental poisonings could be sure that they did not suffer intentional poisoning. Therefore, the cut-off point at 10.5 years old was taken as the best age point for judgment indicating the highest possibility of intentional poison in the ED. Therefore, on the basis of this finding, we suggest that children older than 10.5 years of age with suspected of suffering from pharmaceutical poison exposure should be surveyed for the risk of suicide or drug overdose-related poisoning in the pediatric ED.

In addition, there was also a significant correlation between the causes of poison exposure and the gender. The incidence of intentional poisoning was significantly higher in girls than that in boys, and it was predominant in adolescence of girls. Therefore, intentional poisoning needs to be considered regularly in female adolescents with poison exposure in the pediatric ED, especially when female patients suffer from altered unconscious status.

There were five most common categories of pharmaceutical poisons identified in this study. The categories of pharmaceutical differed significantly between accidental and intentional poisonings in children. Antihistamines and acetaminophen had ever been reported as the most common agents causing accidental poisoning in children, respectively,[9,15] but in this study, we noted that neurologic system agents were more common in accidental poisoning than other agents. Although accidentally poisoning by analgesics was not common in central Taiwan, there were still 26.5% of children with intentional poisons treated for analgesics. So, surveying the risk of analgesics intoxication in children with intentional poisoning should be noticed by primary care physicians in the pediatric ED.

5. Conclusions

The detailed categories of pharmaceutical causing pediatric poisoning in central Taiwan were analyzed in our study. Neurologic system agents and analgesics were responsible for the majority of cases. Intentional poisoning caused longer hospital length of stay than accidental poisoning, and the factors associated with intentional poisoning were older age, female gender, and the neurologic system agents.

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