

The Profile of Pediatric Patients Visit Emergency Department at Urban University Hospital in Thailand

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Background: There is an absence of data describing pediatric patients who visit Emergency Department (ED) in Thailand. Therefore, this report creates a profile of pediatric emergency room visit at a university hospital in Thailand.

Material and Method: The retrospective data of the pediatric patient aged less than 15 years that visited ED at Ramathibodi Hospital, Mahidol University, Bangkok, Thailand between fiscal year (FY) 2002 and 2011 were reviewed. The Electronic Medical Record Tracking was extracted. Demographic characteristic, acuity level, timing, and presumptive diagnosis were reviewed.

Results: During the 10 years of the data collection, 122,037 pediatric patient visited ED, thus, approximately 12,000 visits per year. Pediatric patients account for an average of 18% of hospital patients. Medical condition accounted for 95.21% of the visits followed by trauma at 4.77%, and death at 0.02%. The triage categorized patients into critical, emergency, urgency, and non-emergency, consisting of 0.6% as critical patients, 37.6% as emergency patients, 52.5% as acute illness, and 9.3% as non-emergency patients. The three most common diagnosis were upper respiratory tract infection, acute febrile illness, and acute gastroenteritis. Patient usually visited ED in the evening shift 44% (4 p.m. to midnight), followed by morning shift 40% (8 a.m. to 4 p.m.), and overnight shift 16% (midnight to 8 a.m.). There were two highest peaks of ED visit, in June, during the rainy season, and in January, during the winter.

Conclusion: Pediatric patients attending the emergency service were mostly for medical conditions. Acute illnesses were the major group of pediatric patients. A small proportion of visits in ED were true emergencies.

Keywords: Pediatric emergency, Emergency service, Emergency medicine, EMSC, EDIS

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Emergency department (ED) is the essential and important front line of medical care provided by the hospital⁽¹⁾. The ED takes care of patient of all ages, 24 hours per day, 7 days a week, in all specialties. According to characteristic, a hospital with a General ED serves all ages and types of patient, while a hospital with a pediatric ED takes care only of children. The perspectives and modalities of emergency care for children are different from adult. Understanding the epidemiological and clinical data of children emergencies will help plan for an effective emergency care for children. Furthermore, this information could help identify common illnesses likely to present at ED enabling early intervention to prevent morbidities and

mortalities among pediatric emergency services⁽²⁻⁴⁾. From current US report, children accounted for 4 to 10% of all emergency medical services at an ED⁽⁵⁾. A few reports from Asia showed that children comprise of 25 to 32% of total ED visit^(6,7). There is a large difference in number between the US and Asian reports. In Thailand, there is a lack of updated report and published epidemiological data of pediatric patient in emergency care and visits.

The objective of the present study was to report the characteristics and trend of pediatric emergency department visits over a 10-year period at an urban university hospital in Thailand.

Material and Method

Study design and population

A retrospective analysis of the Electronic Medical Record (EMR) of the ED from the Faculty of Medicine Ramathibodi Hospital, Mahidol University of the children aged 0 to 15 year between 2002 and

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2011 was done. The faculty of Medicine, Ramathibodi Hospital is a 939-bed urban teaching university hospital in Bangkok, Thailand. There are three main health services building (Main building provides general care and emergency services, Queen Sirikit Building provides general care and transplantation, and Somdech Phra Debaratana Building provides comprehensive care and advanced services).

The ED is located in the main building, providing the emergency medical services and prehospital care for both adult and pediatric patients with 24-hour service. For ED, the electronic clinical data record includes all patient data, investigations, radiographic reports, and finding. This data is entered into the in-house software system called Rama-EDIS and Patient Tracking system.

Data collection

Data was extracted from Rama-EDIS and Patient Tracking System included the demographic data as well as the clinical characteristic (medical or surgical condition), triage acuity (four levels for triage categories, triage level 1 for crisis condition, triage level 2 for urgent condition, triage level 3 for acute illness and triage level 4 for non-urgent or non-acute illness), diagnosis, time of the day, and distribution of patients by month.

Data analysis

The data was analyzed using descriptive statistics, including mean and standard deviation (SD). Numbers, percentage, and proportion were also analyzed for clinical and demographic characteristics. Comparison of demographic data and interested parameters between groups of patients were evaluated by Mann-Whitney U, Fisher's exact or Chi-square test. A *p*-value <0.05 was considered statistically significant.

The statistical analysis was performed using STATA 13.

Ethical approval

The present study was conducted in accordance with the principles of the 1975 Declaration of Helsinki and was approved by the Ethical Clearance Committee on Human Rights Related to Researches Involving Human Subjects, Faculty of Medicine, Ramathibodi Hospital, Mahidol University (Protocol ID 04-56-16, MURA2013/296).

Results

During 10 years of the present review, 122,037 pediatric patients visited the ED, averaging 12,204 visits per year. Most patients were male (M:F = 1.25:1). The trend of ED visit was decreasing from 13,689 visits (FY 2002) to 9,234 visits (FY 2011), see Table 1. The proportion of pediatric patient ranged from 13.54% to 19.63% with average 17.76% of total patient visiting ED.

Medical and surgical conditions: Medical condition was attributed to 116,192 cases (95.21%) and trauma was 5,823 cases (4.77%), see Fig. 1.

Triage and acuity: The ED, Ramathibodi Hospital has been using Triage and acuity Software (Maleewan V, et al) for more than 15 years, customized to four levels according to the emergency level. The triage categories level 1 was assigned to real crisis condition, triage level 2 for urgent condition, triage level 3 for acute illness, and triage level 4 for non-urgent or non-acute illness. The most frequent was triage level 3 (52.5%), followed by triage level 2 (37.6%), triage level 4 (9.3%), and level 1 (0.6%), see Table 2.

Diagnosis: The most common diagnosis of ED visits were acute nasopharyngitis (ICD10; J02),

Table 1. Characteristic of pediatric patient visit emergency department (ED)

Year (n)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Total medical cases	13,038	12,717	12,945	12,950	12,580	11,543	11,587	10,459	9,840	8,533	116,192
Critical	161	113	72	52	45	55	44	51	36	21	650
Emergency	5,936	5,369	5,179	4,712	4,261	4,009	4,023	3,554	3,611	3,024	43,678
Urgency	6,372	6,032	6,435	6,775	6,841	6,089	6,316	5,842	5,320	5,007	61,029
Non-emergency	569	1,203	1,259	1,411	1,433	1,390	1,204	1,012	873	481	10,835
Total trauma cases	644	570	620	535	597	525	593	521	518	700	5,823
Total death	7	2	2	1	2	2	1	3	1	1	22
Total pediatric cases	13,689	13,289	13,567	13,486	13,179	12,070	12,181	10,983	10,359	9,234	122,037
Total ED cases (percent)	69,729 (19.63)	71,170 (18.67)	71,608 (18.95)	71,717 (18.80)	70,564 (18.68)	66,260 (18.22)	66,857 (18.22)	65,612 (16.74)	65,586 (15.79)	68,198 (13.54)	687,301 (17.76)

followed by unspecified fever (ICD10; XX) and gastroenteritis (ICD10; A09), see Fig. 2.

Timing: The working hours of emergency physicians and nurses in ED were divided into eight hours per shift, three rotated shifts a day. The morning shift was from 8 a.m. to 4 p.m., evening shift was from 4 p.m. to midnight, and the night shift was from midnight to 8 a.m. of the next day. Most pediatric patients significantly visited ED at evening shift 44%, then morning shift 40%, and night shift 16% respectively (p -value <0.05).

Seasonal variation: Distributed by the month, there were two peak months of ED visit, in June, during rainy season, and in January, during winter, see Fig. 3.

Discussion

There are not many reports on the characteristics or epidemiologic data of pediatric emergency service at ED in both developed and developing countries⁽⁵⁻⁷⁾. Types of ED responsible to take care of children are ED of children hospital or pediatric emergency section within general ED. In Thailand, there is only one children hospital, Queen Sirikit National Institute of Child Health. Because of this, most of the pediatric emergency cares take place within the general emergency department as in our hospital. To date, there is no report about profile or characteristics of pediatric ED visit among emergency services in Thailand. The present study is the first reported profile of pediatric emergency visit in Thailand, in the setting of pediatric ED in the general emergency department.

The present study showed that the proportion of pediatric patient visiting ED averages 17.76% of the total ED visit. The National Hospital Ambulatory Medical Care Survey done in United States between 1997 and 2000 showed 110.9 million ED visits by children aged less than 19 years, and Pediatric patients constituted 27.3% of all ED visits during that time⁽⁵⁾. A report from the South Korean National Emergency Department Information System (NEDIS) analyzed the pediatric visits (<19 years old) between 2008 and 2010. It reported that 2,072,664 children visited

Table 2. Triage categorize for medical conditions

Medical condition: (n = 116,192 patients)	n (%)
Triage level 1: Crisis condition	650 (0.6)
Triage level 2: Urgent condition	43,678 (37.6)
Triage level 3: Acute illness	61,029 (52.5)
Triage level 4: Non-urgent or non-acute illness	10,835 (9.3)

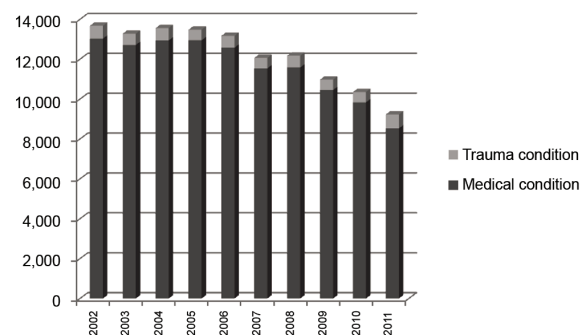


Fig. 1 Characteristic of medical and surgical condition of pediatric patient visit emergency department by year.

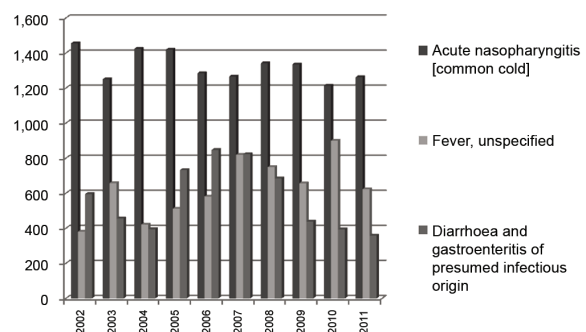


Fig. 2 The distribution of top 3rd rank of diagnosis in emergency visit during 10 years.

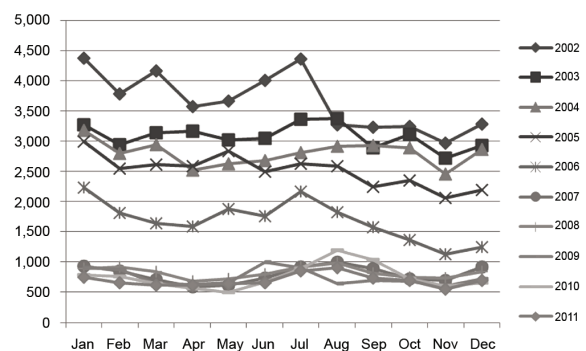


Fig. 3 Distribution of pediatric patient attended the emergency services by month.

124 EDs during the study period. It also stated that these visits were 31.2% of the total ED visits⁽⁶⁾. The report from the National Health Insurance Research Database of Taiwan stated that during the 10 years, between 2000 and 2009, children accounted for 25% of all emergency cases⁽⁷⁾.

The trend of emergency department use in the United States increased substantially, both for adult and children, from 90 to 110 million between 1992 and

2002⁽¹⁴⁾. This is in contrast to our report that the children using emergency department had decreased from 13,689 visits in 2002 to 9,234 visits in 2011. This may be explained by the fact that our hospital has opened a new pediatric ambulatory office building that serves patients with insurance coverage, thus, allowing them to choose medical care that is different from the routine universal coverages provided by the government. The choices of pediatric emergency care are increasing after successfully introducing Emergency Medicine specialist in 2006. The physicians care and expertise also extend to the private hospital sector that provides a convenient service to parents of middle to higher income. The number of pediatric emergency visits may have decreased due to the coverage area that has been assigned as Emergency Facility Care Level by the Ministry of Public Health. Some of patients may be distributed to at least two specific pediatric emergency care, Queen Sirikit National Institute of Child Health and King Mongkut Military Hospital, which were nearby.

In the four-triage categories, the most visited was acute illness (52.5%) for real emergency. The crisis condition accounted for 0.6%, the other urgent condition was 37.6%, and non-urgent/non-acute illness was 9.3%. According to the trend of pediatric emergency department utilization, most of them are non-urgent care. Compare to the report from US study epidemiology of pediatric department at urban medical center, nearly half of pediatric emergency visits were for non-urgent care (46.0%), and other 42.0% sought urgent care exclusively, 12% received both urgent and non-urgent care⁽⁸⁾. Our report showed that the medical conditions composed of more than 95% of all visits while surgical complaint was about 5%. Compared to the report from South Korea, the ED visits with medical condition were 71%, whereas surgical conditions were 39%⁽⁶⁾. This may be explained by that they included the data from some EDs that have a trauma center.

From the present study, the most common diagnoses were acute respiratory tract infection (common cold), fever, and gastroenteritis. Most of them were non-emergency visit. Compared to reports from US, common non-emergent visits included mild asthma, viral syndromes, otitis media, allergy, or minor injury⁽¹⁵⁾. In Asia, the report from South Korea showed that the most important complaint was fever (37.4%), whereas many older children presented with abdominal pain (15.4%)⁽⁶⁾. The report from India showed that the highest complaints were gastrointestinal and respiratory

illnesses (23% each), neurological emergencies (16%), and neonatal problems (15.6%)⁽⁹⁻¹¹⁾. Recently, the report from Taiwan showed acute upper airway infection, fever, and acute gastrointestinal illness as the most common diagnoses among all non-hospitalized children, similar to our study. Of these 4.5% required subsequent hospitalization, and their most common diagnosis was fluid/electrolyte disorder, upper/lower airway infection, and acute gastrointestinal illness⁽⁷⁾.

About work hour shifts, our study showed that pediatric patient visited ED during evening time, more than morning and nighttime. These finding may be explained by the location of our hospital, which is located at the urban center and most parents work during daytime and brought their children to ED after working hour. The second reason was the parent perceived attitude that they received faster service than in the morning shifts due to crowding patients. This has been reflected from survey reports.

There are strong seasonal variations in clinical presentation at ED. There are two peak periods, which are the winter and the rainy season. January and June are the most active months at the ED. Compared to the study from India⁽⁹⁻¹¹⁾, the maximum number of patients were seen in the monsoon months of July and August. The awareness of seasonal variation in the number and incidence of common pediatric emergencies is important for planning as well as preventive action of common illness.

There were few reported death at ED. Our report indicated 0.02% (22 cases from 122,037 patients in 10 years) mortality rate. A study from Egypt⁽¹²⁾ reported overall mortality rate was 0.8%. Study from India⁽¹⁰⁾ reported about 2% of patients died within 24 hours of hospitalization from ED. The study from Turkey⁽¹⁶⁾ reported the net mortality rate was 2.9%, infectious diseases being the most common cause of mortality. Both studies reported the death after admission to the hospital but do not report death at ED.

Preparation and improvement of the quality of care in ED is based on the characteristic of patients who visit ED⁽¹⁷⁾. The epidemiologic and clinical data will help to initiate guideline for practice and strategy to promote first-line emergency service for children at ED^(18,19). The epidemiological result from the present study will help towards pediatric emergency plan as well as initiate guideline of common pediatric emergency problem and quality improvement of pediatric emergency care in the future.

Conclusion

We reported the profile of pediatric emergency room visit, most were acute illness. Real emergency, critical conditions were making up a small proportion. The clinical data will help in setting up pediatric emergency's strategy plan to improve the pediatric emergency care, both in academic and service prioritized on teaching and training both undergraduate medical students and postgraduate physicians.

Limitations

The present study had some limitations. First, our study was reported from a single institute at the university hospital. The data may not represent the other ED settings. Other limitation was due to extracting data from EMR where some data such as cause of death could not be explored in-depth.

What is already known on this topic?

The overall picture of EMSC (Emergency Medical Services of Children) in Thailand has not been established despite that the Emergency Medicine training has been initiated for more than five years already. We still lack a database of children who visited to emergency services in the aspect of descriptive characteristics of diseases that lead these patients to Emergency visit. Baseline characteristic and amount of patients in each shift is useful to anticipate the resource requirement for emergency management, based on time of the day and the season. We need to know the factors that are used to prepare and improve the quality of care in ED.

What this study adds?

The present study described EMSC in Thailand, which is one small part of the general emergency service. The amount of EMSC in this urban area is nearly one fourth of the overall emergency services, which is less than in rural area. The reason could be due to the well-developed ambulatory pediatric care in urban area and the density of medical care and services. The services provided to patients differ because of the number of patients, the rate of arrival and the staff available. Furthermore, seasonal variations, epidemic, school academic calendar, and holidays affects the demand for the service. By using this database, the mortality and quality of emergency service in different areas can be anticipated along with labor, facility of healthcare equipment, and professionalism. The results of this 10 years study may show a big picture of EMSC may

help improve the direction and policies of services in the future.

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Potential conflicts of interest

None.

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ข้อมูลพื้นฐานการรับบริการด้านการแพทย์ฉุกเฉินของกลุ่มผู้ป่วยเด็กที่เข้ารับบริการในโรงพยาบาลระดับมหาวิทยาลัยในประเทศไทย

อุเทน ปานดี, ตักดา อาจงค์ วัลลิภากร, อติศักดิ์ ผลิตผลการพิมพ์

วัตถุประสงค์: เพื่อทบทวนและวิเคราะห์ข้อมูลย้อนหลังข้อมูลพื้นฐานของกลุ่มผู้ป่วยเด็ก อายุน้อยกว่า 15 ปี ที่เข้ารับบริการด้านการแพทย์ฉุกเฉิน ระดับโรงพยาบาลมหาวิทยาลัย ตั้งแต่ พ.ศ. 2545 ถึง พ.ศ. 2555 (10 ปี)

วัสดุและวิธีการ: การศึกษาวิจัยแบบทบทวนย้อนหลังข้อมูลการเข้ารับบริการการแพทย์ฉุกเฉินของผู้ป่วยเด็ก 122,037 ราย ที่แผนกเวชศาสตร์ฉุกเฉิน คณะแพทยศาสตร์ โรงพยาบาลรามธิบดี มหาวิทยาลัยมหิดล โดยใช้ข้อมูลที่บันทึกจากเวชระเบียนอิเล็กทรอนิกส์ฉุกเฉินจากระบบที่ออกแบบไว้โดยเฉพาะสำหรับผู้ป่วยเด็ก ทั้งในด้านข้อมูลทั่วไป ระดับความรุนแรงของการรักษา ระยะเวลาและช่วงของการเข้ารับบริการ และข้อมูลการวินิจฉัย

ผลการศึกษา: อัตราการเข้ารับบริการโดยเฉลี่ยเท่ากับ 12,000 ครั้งต่อปี จากจำนวนผู้ป่วยเด็กฉุกเฉินทั้งสิ้น 122,037 ราย โดยคิดเป็นสัดส่วนเฉลี่ยร้อยละ 18 ของผู้ป่วยทั้งหมดที่เข้ารับการรักษาที่ห้องฉุกเฉินทั้งหมด พบผู้ป่วยส่วนใหญ่หรือร้อยละ 95.21 เป็นการเข้ารับบริการการแพทย์ฉุกเฉินจากการเจ็บป่วยด้วยโรคต่างๆ ส่วนน้อยร้อยละ 4.77 เข้ารับบริการจากอุบัติเหตุ พบอัตราการเสียชีวิตรวมร้อยละ 0.02 จากข้อมูลระดับการคัดกรองพบว่า ระดับวิกฤติพบร้อยละ 0.6 ระดับฉุกเฉินพบร้อยละ 37.6 เจ็บป่วยเฉียบพลันพบร้อยละ 52.5 และระดับไม่ฉุกเฉินพบร้อยละ 9.3 ตามลำดับ สาเหตุการหลักของเข้ารับบริการฉุกเฉิน 3 อันดับแรกในเด็กได้แก่ การติดเชื้อของระบบทางเดินหายใจส่วนบน ภาวะไข้ และการติดเชื้อของกระเพาะอาหารและลำไส้เฉียบพลัน สถิติพบว่า การเข้ารับบริการของผู้ป่วยเด็กฉุกเฉินส่วนใหญ่ในเวลาระหว่างเย็น (16:00 ถึง 24:00 น.) มากถึงร้อยละ 44 เวลาระหว่างเช้า (8:00 ถึง 16:00 น.) ร้อยละ 40 และส่วนน้อยร้อยละ 16 ในเวลาระหว่างกลางวัน (24:00 ถึง 8:00 น.) ตามลำดับ ซึ่งพบความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ (p -value < 0.05) พบอัตราการกระตุกตัวของผู้ป่วยเด็กเข้ารับบริการสูงสุดในสองช่วงเดือนคือ ในเดือนมิถุนายนหรือระหว่างฤดูฝน และเดือนมกราคม ซึ่งเป็นช่วงปลายฤดูหนาว

สรุป: ข้อมูลพื้นฐานของการรับบริการการแพทย์ฉุกเฉินในเด็กส่วนใหญ่ สาเหตุมาจากการเจ็บป่วยฉุกเฉินจากโรคต่างๆ โดยพบว่าระดับการเข้ารับบริการส่วนใหญ่อยู่ในระดับเจ็บป่วยแบบเฉียบพลัน มากกว่าการเจ็บป่วยแบบวิกฤติและฉุกเฉินจริงซึ่งพบเป็นกลุ่มน้อยที่เข้ารับบริการที่ห้องฉุกเฉิน
