

Profile of Patients Visiting the Pediatric Emergency Service in an Egyptian University Hospital

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Background: The emergency department (ED) is an essential component of the medical service offered in any hospital. Yet, the published information about patients' profile and utilization of emergency services in both developing and developed countries is scarce.

Aim: This study aimed to characterize the presentation and outcome of patients visiting the ED of a university-based tertiary pediatric hospital.

Methods: This is a descriptive study reporting the profile of patients visiting the ED for 1 year.

Results: The total number of patients visiting the hospital was 249,552, with a monthly average of 20,046 patients, including 3639 monthly ED visits. "Treat-and-release" cases represented 46.7% and infants represented the largest age group (44.4%). The main presentation was respiratory distress (24.4%) and wheezy chest (17.3%), followed by convulsions (15%) and then pallor (10.7%). Long-term illnesses were predominantly congenital heart diseases, cerebral palsy, chronic hemolytic anemia, and asthma. The overall mortality rate was 0.8%.

Conclusions: Appropriate and ongoing data collection and analysis could guide more efficient utilization of pediatric emergency services to achieve better outcomes.

Key Words: acute respiratory infections, emergency medical services, epidemiology

(*Pediatr Emer Care* 2012;28: 148–152)

The emergency department (ED) is an essential component of the medical services offered in any hospital.¹ The available literature suggests that children account for approximately 4% to 10% of all emergency medical services (EMSs) offered in the United States.² Visits caused by nonserious diseases remain a burden on the ED,³ preventing efficient and effective use of health services and compromising quality.⁴

There is not much published information about the utilization of emergency services in both developing and developed countries. The availability of data will help to initiate guidelines for comparison with practices of others,⁵ to identify failures,³ to bring forward solutions, and to elaborate a strategy for promoting first-line emergency services.^{5,6} Despite continued calls for additional research in the area of pediatric EMS, there remain significant limitations in the available demographic characteristics, utilization rates, and outcomes of pediatric patients using the ED.²

The aim of this study was to establish a profile of patients visiting the ED of a university-based tertiary pediatric hospital, describing the epidemiology of patient presentations and outcome in the ED.

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Disclosure: The authors have no conflict of interest to declare.

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ISSN: 0749-5161

METHODS

Study Design

This is a descriptive study of the registered visits to the pediatric ED of Cairo University Mounira Children Hospital from November 2008 to October 2009.

Study Setting

This hospital's capacity is 284 beds. Its ED serves children up to the age of 15 years for 24 h/d, 3 d/wk, with alternate days being served at Cairo University Specialized Pediatric Hospital located across the street.

Patients are first examined by a junior consultant in the morning hours or by a senior resident in the afternoon. The ED offers diagnostic services in the form of basic laboratory tests and imaging, as well as brief therapeutic measures such as nebulizer, suction, blood components transfusion, and various emergency intramuscular or intravenous medications. In addition, those requiring more significant short-term (anticipated <24 hours) periods of observation and/or hospital management normally receive required services at the 8-bed emergency short-stay ward in the unit. By the end of the 24 hours, they would have been either discharged with home treatment or admitted to general ward or special departments. Patients with critical illnesses are stabilized at the unit before being referred to the appropriate location for definitive care such as neonatal intensive care unit (ICU) or pediatric ICU. Patients who need follow-up are referred to special clinics accordingly. Patients experiencing gastroenteritis are managed in a special unit and therefore were not included.

Data Collection

Data were extracted from the ED sheet initiated by the first examiner and completed by the ED resident. Forms were first checked for adequacy and completeness. Extracted data included the following:

- Demographic characteristics: age, sex, and season.
- Clinical characteristics: symptoms, diagnosis, and outcome within the first 24 hours of presentation.
- Patients with previously diagnosed chronic conditions were noted. Diagnoses made at the ED were also recorded.
- The outcome including discharge from the ED (whether discharge on treatment or follow-up, referral, or unauthorized/against medical advice discharge), hospital admission, or mortality was also noted.

Data Analysis

Data were tabulated and analyzed using frequency and percentage. Nominal data were compared using χ^2 tests. $P < 0.05$ was considered significant. Microsoft Office Excel version 2007 (Microsoft Corp, Redmond, Wash) and Statistical Package for Social Science (SPSS, Inc, Chicago, Ill) version 17.0 were used in the process.

RESULTS

During the year of the study, the total number of patients visiting the hospital was 249,552. This number included patients

coming for outpatient consultations (medical or surgical), follow-up in special clinics (medical or surgical), operations, diagnostic investigations, and, lastly, those coming for emergency purposes (436,68 patients, 17.5%). Although ED visits averaged 3639 per month, subsequent analysis included the information of 1441 patients per month for whom complete records were available.

Regarding the demographics of patients' visits to the ED, 843 patients were males (59%) and infants (>28 days to 1 year of age) were the largest age group (574 cases, 44.4%). Neonates accounted for 9.4%, preschool children (1–4 years) accounted for 25.1%, 4- to 11-year-old children accounted for 18.2%, and older adolescents accounted for 2.9%. The children in our study experienced 31 main symptoms. The trend was toward respiratory complaints followed by convulsions and pallor as shown in Table 1. A total of 304 patients (21.1%) presented to the ED with a previously known diagnosis most commonly congenital heart disease, cerebral palsy, chronic hemolytic anemia, and bronchial asthma (Table 2). On the other hand, 438 patients (30.4%) have been diagnosed at the ED, where the most frequent diagnoses made were respiratory tract infections and anemias (Table 3).

In the neonatal period, jaundice was the most common presenting symptom (18%) followed by respiratory distress (14.7%)

TABLE 1. Presenting Symptoms of Patients Visiting the ED (n = 1441)*

Symptom	No. Patients	%
Respiratory distress	352	24.4
Wheezy chest	250	17.3
Convulsions	217	15
Pallor	154	10.7
Fever	141	9.8
Vomiting	116	8
Bleeding	90	6.2
Heart failure	80	5.6
Jaundice	79	5.5
Dehydration	72	5
Dark urine	57	4
Cyanosis	52	3.6
Generalized edema	36	2.5
Disturbed conscious level	33	2.3
Diarrhea	28	1.9
Oliguria and anuria	24	1.7
Abdominal distension	23	1.6
Hepatosplenomegaly	23	1.6
Abdominal pain	18	1.2
Arthritis, limping	16	1.1
Sore throat, oral inflammation	16	1.1
Constipation	15	1
Carpopedal spasm	14	1
Headache	14	1
Abnormality in neurological examination	14	0.9
Shock	11	0.8
Localized swelling	7	0.5
Polyuria	6	0.4
Hypertension	5	0.3
Syncope	2	0.1
Renal colic	1	0.1

*Because a patient could have more than one of these symptoms, the sum of the presented symptoms is 1966.

TABLE 2. Prior Diagnoses for Patients Presenting to the ED With a Known Diagnosis

	No. Patients	%
Congenital heart disease	70	23.3
Cerebral palsy	40	13.3
Chronic hemolytic anemia	33	11
Bronchial asthma	31	10.3
Glucose 6-phosphate dehydrogenase deficiency	23	7.7
Inhaled or ingested Foreign body	19	6.3
Epilepsy	17	5.7
Diabetes mellitus	12	4.0
Liver disease	11	3.7
Rheumatologic disease	10	3.3
Hemophilia	9	3
Nephrotic syndrome	6	2
Idiopathic thrombocytopenic purpura	5	1.7
Chronic renal failure	4	1.3
Neurogenic bladder	3	1.0
Inborn error of metabolism	3	1.0
Obstructive uropathy	3	1.0
Renal tubular acidosis	1	0.3
Total	304	100

and then bleeding tendency (13.1%). In infancy and preschool age, respiratory complaints were the commonest (37.2%) followed by convulsions (17%), whereas the dominant complaint in children older than 4 years was pallor (21.1%).

Table 4 shows the patients' outcomes in various age groups. Ten patients (1%) died within first 24 hours. Younger patients had significantly higher rates of mortality ($P = 0.01$) and referral to other hospitals ($P < 0.0001$). In addition, neonates had lower rates of admission compared with older groups ($P = 0.02$). Infants and preschool children had significantly higher rates of discharge on home treatment compared with neonates ($P = 0.006$) and older patients ($P = 0.003$). Older patients had higher rates of referral for follow-up with specialized clinics ($P = 0.0002$). Regarding ICU admissions, rates were significantly higher in infants (3.4%) compared with older children, but the difference was not significant ($P = 0.3$). There was no significant difference between age groups regarding referral to another specialty or unauthorized discharge.

Figure 1 shows that there was a tendency to higher mortality and escape and lower rates of admission among females, but this difference was not statistically significant ($P = 0.6$). Figure 2 shows the percent of each outcome relative to ED visits during the specified season. The predominance of admissions was in summer months (71/176 patients, 40.3%) followed by winter months (113/338 patients, 33.4%).

DISCUSSION

Appropriate information about the profile and outcome of ED visits is required for proper planning, evaluation and improvement of this integral aspect of health care. In addition, awareness of categorical statistics on the occurrence and outcome of key serious conditions is helpful for the pediatric emergency health care provider because one of the major goals of a sick child's visit is to identify the seriously ill child.⁷

In this study, we describe the pattern, epidemiology, and outcome of registered patients visiting the Pediatric Emergency

TABLE 3. Diagnoses Made at the ED

	No. Patients	%
Respiratory system		
Pneumonia	121	27.6
Bronchiolitis	30	6.8
Stridor	11	2.5
Cardiovascular system		
Congenital heart disease	11	2.5
Infective endocarditis	2	0.5
Central nervous system		
Fever and convulsions	15	3.4
Guillain-Barré syndrome	12	2.7
Intracranial hemorrhage	2	0.5
Nephrology system		
Nephrotic/nephritic	14	3.2
Endocrinology system		
Hypocalcemic convulsions	22	5.3
Diabetes mellitus	7	1.6
Ambiguous genitalia	3	0.7
Gastroenterology and nutrition		
Failure to thrive	11	2.5
Protein energy malnutrition	8	1.8
Liver disease	2	0.5
Hematology		
Anemia for differential diagnosis	67	15.3
Hemorrhagic disease of newborn	10	2.3
Infections		
Sepsis	23	5.3
Urinary tract infection	9	2.1
Cellulitis	3	0.7
Surgical emergencies		
Trauma	16	3.7
Intestinal obstruction	15	3.4
Renal stones	2	0.5
Surgical emphysema	1	0.2
Other surgical emergencies*	11	2.5
Miscellaneous		
Rheumatic disease	5	1.1
Allergic reaction	2	0.5
FTT and surgical emergency	1	0.2
Anemia and urinary stone	1	0.2
Chest infection and CHD	1	0.2

*Such as severe hydrocephalus, infected shunt, fractures, urethral malformation, and others.

CHD indicates congenital heart disease; FTT, failure to thrive.

Service at El Mounira hospital, one of Cairo University Pediatric Hospitals, during a period of 1 year. To our knowledge, this is the first such study in an Egyptian pediatric hospital.

The total number of ED visits during the study period was 43,668 patients; 46.7% of which were represented by “treat-and-release” cases. Similarly, a Tunisian study reported a total of 45,000 children visiting ED per year.⁶ It is likely that significant proportions of these huge numbers are not true emergencies but rather children requiring primary care services, probably due to easy access to the emergency services as a result of it being free of charges and available 24 hours. The au-

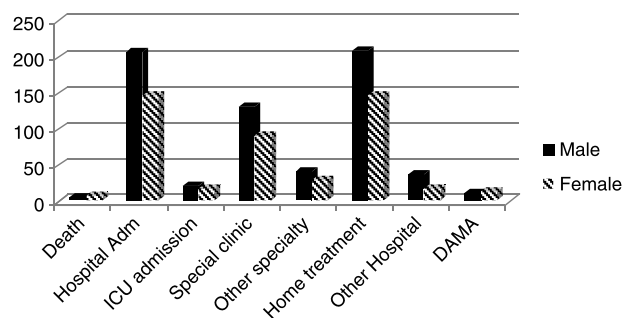


FIGURE 1. Distribution of outcome in relation to sex. DAMA indicates discharge against medical advice; Home treatment, discharge from ED with a plan for follow-up in a subspecialized pediatric clinic, referral to another specialty, or just home treatment, respectively; Hospital Adm, admission to hospital ward other than ICU; Special clinic, other specialty.

thors are aware that objective assessment of the proportion of nonemergency cases visiting the ER through detailed chart review, caregiver, and/or physician feedback is beyond the scope of the present study. Nevertheless, it is still plausible to believe that the provision of primary care in the emergency setting does place an additional load on facilities and manpower. More effective systems ensuring access to primary health care whenever and wherever needed at the community level, as well as efficient means for initial assessment and triage at the ED, should minimize the influence of this load on the quality of ED services for true emergencies.

Neonates and infants younger than 1 year accounted for the largest number of ED visits (53.8%). This is in accordance with rates described in Turkey (47%) and the United States (57.7%).^{8,9} Despite declining infant mortality rate in Egypt reaching 27.26 per 1000 live births in 2009 to 2010,¹⁰ infants are still a more vulnerable group and, in agreement with Claudet et al,¹¹ they were associated with higher rates of ICU admission and mortality.

The most common cause of infant morbidity and mortality worldwide has traditionally been diarrhea. However, widespread use of oral rehydration solution by mothers and improvement of hand hygiene have decreased the mortality associated with diarrhea and the most common cause is currently pneumonia.¹² Wheezy chest and respiratory distress accounted for 41.7% of ED visits in our study, and comparable results (29%–40%) have been reported by several other studies.^{3,6,12} This explains that the maximum number of patients was seen in winter months (33.9%), similar to Lindemans et al.¹³ Although acute diarrheal disease is still an important cause of emergency visits; however,

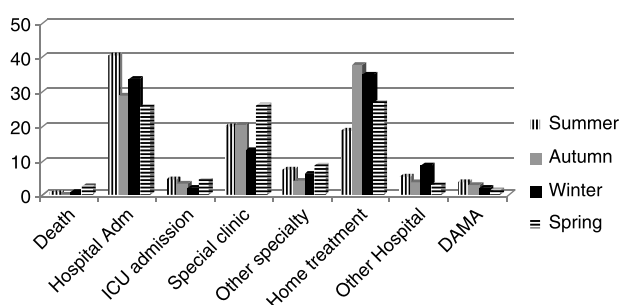


FIGURE 2. Distribution of outcome in relation to season. Of the total visits, 466 (33.9%) were in winter, 374 (27.2%) in spring, 330 (24%) in autumn, and 204 (14.8%) in summer.

TABLE 4. Distribution of Outcome (Within 24 Hours) by Age

Outcome	Neonate (n = 98)	Infancy (n = 464)	Preschool (n = 263)	4–11 y (n = 184)	12–18 y (n = 29)	Total
Mortality	4 (4%)	3 (0.6%)	3 (1.1%)	0	0	10 (0.9%)
Admission to hospital	23 (18.8%)	183 (39.4%)	79 (30%)	71 (38.6%)	7 (24.1%)	363 (35%)
ICU	0	20 (4.3%)	9 (3.4%)	5 (2.7%)	0	34 (3.2%)
NICU	23 (18.8%)	0	0	0	0	23 (2.2%)
General ward	0	163 (35.1%)	70 (26.6%)	66 (35.8%)	7 (24.1%)	306 (29.4%)
Discharged from ED	71 (72.4%)	278 (59.9%)	181 (68.9%)	113 (61.4%)	22 (75.9%)	665 (64.1%)
Discharged on treatment	20 (16.3%)	158 (34%)	95 (36.1%)	41 (22.2%)	8 (27.5%)	322 (31%)
Follow-up in special clinic	20 (16.3%)	63 (13.5%)	59 (22.4%)	53 (28.8%)	10 (34.4%)	205 (19.7%)
Referred to other specialty	12 (9.8%)	24 (5.1%)	15 (5.7%)	10 (5.4%)	2 (6.8%)	63 (6%)
Referred to other hospital	17 (13.9%)	25 (5.3%)	7 (2.6%)	4 (2.1%)	1 (3.4%)	54 (5.2%)
Unauthorized/against medical advice	2 (1.6%)	8 (1.7%)	5 (1.9%)	5 (2.7%)	1 (3.4%)	21 (2%)
Total	98	464	263	184	29	1038

ICU indicates intensive care unit; NICU, neonatal intensive care unit.

it was not included in the present study because it is treated in a special unit.

In addition to higher ED utilization and higher vulnerability, neonates and infants represent a population significantly different from adults in ED practices and required equipment and supplies. The need for specialized pediatric emergency service is thus emphasized. Given the high rates of respiratory emergencies, benefit may be expected from a community-level program for the management of acute respiratory infections (currently adopted by the ministry of health) and from studies addressing the etiological agents that should guide antimicrobial policies and explore the impact of immunizations such as pneumococcal vaccination as well as ensuring adequate facilities for dealing with respiratory emergencies and adequate ICU beds.

Forty percent of deaths were in the neonatal period, similar to the study of Salaria and Singhi.¹⁴ It is notable that the hospital does not have a delivery section and receives out-born infants born at home or clinic or referred from regional hospitals. Improved perinatal care, ensuring appropriate initial stabilization and transport, achieving a better general condition on arrival to the definitive care location, together with expanding neonatal intensive care service, is thus needed. The requirement for expanding the neonatal service is also shown by that neonates had higher rates of referral and lower admission rates.

Twenty-one percent of ED visits represented patients with various chronic disorders presenting with exacerbations and/or complications of their illnesses. The most frequent disorders were congenital heart diseases (presenting with heart failure, chest infection, or cyanotic spells), cerebral palsy (with chest infection, uncontrolled convulsions, or dehydration), and hemolytic anemias (thalassemia, glucose 6-phosphate dehydrogenase deficiency, and sickle cell disease) needing blood transfusions. Children with chronic disorders will continue to require EMSs; however, earlier definitive surgical correction of congenital heart disease and higher efficiency and compliance with scheduled follow-up would be likely to reduce the need for ED visits and improve overall care of these children.

Previously diagnosed asthma represented only 10% of known morbidities, although it is known to be an important cause of morbidity that is increasing in prevalence¹⁵ and has been found in other studies to be the most frequent illness, representing 20.3% of the pediatric emergency visits.¹⁶ Interpretation of this as reflecting good control of asthma in our patients requires caution because it is possible that larger proportions of other chronic diseases and of asthma cases that had not previously been diagnosed and hence depend largely on intermittent ED visits rather than regularly scheduled care exist.

According to our study, consultations for boys were somewhat higher (57%). Results from India showed a larger male preponderance of 73%.¹⁴ Complete registration of all data regarding each patient visiting the ED has probably been hampered by the priority sometimes given by health care providers to service provision over documentation at times of overload. Nevertheless, appropriate records are required for appropriate continuity of care for individual patients as well as for more effective planning of the service as a whole.

At the end of the consultations, 26.9% of the patients were hospitalized. This is comparable to the 24% admission rate described in Australia¹⁷ but higher than that found in a national survey in the United States (12%).¹⁸ Admission rates are influenced by the nature of ED visits whether true emergencies or not as well as by the extent of services available at the ED and possibly the availability of hospital beds to those with relative indications for hospitalization. Death within 24 hours of presentation occurred in 0.8% of cases compared with 2% in a study done in India.¹⁹

In conclusion, this report has shown that infants are the largest group coming to the ED and that respiratory emergencies are the leading cause of morbidity. The ability to provide respiratory care to infants and refer those in need of respiratory ICU services is emphasized for EMSs receiving children. Neonates have fewer admissions despite high rates of morbidity and mortality owing to the need to increase the capacity of the neonatal service at the community level. Repeated ED access by those with chronic illness should be at least partly replaced by routine care of diagnosed patients according to specific protocols. Efficient policies and procedures for triage, management, documentation, and referral would be expected to improve the overall quality of care, and further studies regarding practice guidelines, effectiveness, and quality of EMSs for children are still needed.

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