



Admission Patterns and Outcome in a Pediatric Intensive Care Unit at Tobruk Hospital

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Abstract: This study aims to describe the admission pattern and outcome of patients in the pediatric intensive care unit (PICU) at Tobruk medical center. We have retrospectively reviewed medical files of PICU over the period from January to December of 2016 for children aged from 1month-15 years. A total of 1026 children were admitted to PICU at Tobruk medical center. Of the total, 55% were males and 44.9% were females with male to female ratio of 1.2: 1. Age distribution showed that 64% were infants (1month -1 year). Majority of admission during cold months (December, January, and February) had the highest admission rate. Central nervous system and respiratory system diseases (23%, 12%) respectively were the most diseases requiring PICU admission. Congenital heart diseases 10/26 (38.4%) was the most common cause of total death. 668(65%) patients improved and were discharged from ICU, and 201 (19.5%) were transferred to pediatric ward for further management and discharged in satisfactory condition. 99 (9.6%) patients left against medical advice, and 32 (3%) patients transferred to more specified hospital and 26 patient died (2.5%). The observed difference in the mortality was with the respect to age, length of stay, and the involved systems. Neurological system remains a major cause for admission in ICU mainly for febrile convulsion and was associated with considerable morbidity and mortality. Respiratory system was the second cause mainly for pneumonia, and CHD was the major cause of death. The results concluded that epidemiologic analysis of the pattern of patients admitted to our PICU showed different etiologies for admission.

Key words: Pediatric intensive care unit (PICU), children and mortality, Tobruk- Libya

INTRODUCTION

Intensive care is predominantly concerned with the management of patients with acute life-threatening conditions in a specialized unit. Caring for critically ill children remain one of the most demanding and challenging aspects of the field of pediatrics (Carpenter, Dobyns, & Lane, 2003).

Patients are admitted to a pediatric intensive care unit because they require a very high level of monitoring of vital signs and other body functions. These patients may need mechanical ventilation invasive intravascular procedures and frequent attention by both the nursing and medical staffs (Frankel, 2004). Children having

acute neurological deterioration, respiratory distress, cardiovascular compromise, severe infections, and accidental poisoning constitute the major admission to a pediatric intensive care unit (Jaimovich, 2004). Patients may be discharged or ambulated from pediatric intensive care unit once the disease process has reversed itself and care can be provided in less intense environment (Frankel, 2004).

Disease pattern in a pediatric intensive care unit, particularly in the early age group, is a sensitive indicator of the availability, utilization, and effectiveness of mother and child health services in the community. Disease pattern changes between different places and from

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time to time even at the same place (Parkash & Das, 2005). Therefore, regular review of the disease pattern in any particular setting is important for providing better services to the patients. In the past two decades, improvement in life-sustaining technologies resulted in an increase in the number of ICUs. Care of the critically ill patients is a resource-intensive, and 15-20% of hospital budgets are spent on the ICUs. The focus on the quality and safety of medical care is increasing because of the high cost of healthcare and the potential for harm. There are many evaluations of mortality and incidence of complications, such as nosocomial infection in the ICUs, with an increased emphasis on the quality improvement efforts and the evaluation of outcome (Curtis et al., 2006; Luce & Rubenfeld, 2002; Mehta et al., 2007). This retrospective study was undertaken in order to document the most common type of diseases with which the children are admitted in the intensive care unit, and the outcome of this admission.

MATERIALS AND METHODS

Study design: This retrospective descriptive cross-sectional study was conducted from January to December of 2016.

Study sitting: The PICU is a part of the pediatric department (34 beds capacity), it contains 14 beds and equipped with central oxygen supply, suction lines, infusion pumps, and conventional mechanical ventilator. PICU is staffed by a consultant, 2seniors, and 2 resident doctors on duty supported by 2 trained nurses.

Data were extracted from the patient's files filled by resident doctors. Extracted data included the following:

- 2- Age, sex, residency, nationality, address, date of admission, and date of discharge.

2-Clinical characteristic: provisional diagnosis, any interventions, and the treatments received.

3-Relevant investigations including CBC and differential blood count, CSF analysis for cell counts and culture, blood sugar, serum calcium,

CRP, ESR, X-ray, CT scan, and MRI..

4-Length of stay (LOS), discharge, LAMA, referral to another hospital for treatment, and comparing the outcome between patients with direct admission to ICU and patients transferred to ICU from the pediatric ward with increased emphasis on the quality improvement efforts and evaluation of outcome.

Data analysis:

Data were entered and analyzed using (SPSS) Version 18. Statistics like mean, median, and standard deviation were computed, and results were presented as frequency tables and figures.

RESULTS

A total of 5133 children were admitted to the pediatric department at Tobruk Medical Center during the study period, and 1026 were admitted to pediatric intensive care unit (PICU), 3150 admitted to pediatric ward. Males were 565 (55 %) and females were 461 (45%). Male to female ratio was 1.2:1. Out of 1026, 1005(98%) were Libyans and Non-Libyans children represented 21 (2%). Out of 1026, 930 (90%) were form Tobruk and 96 (9.3%) were from outside Tobruk, their age ranged from 1 month to 15 years. Of the total admitted children, 67.4% were between (1month -1 year), followed by > 1-5 years (20.9%), while children aged from 5 to 10 years and >10 years were (9.3%) and (2.2%) respectively. (Table 1).

Table (1). Distribution of patients according to age

Age group	No.of patients	%
1month-1 year	692	67.4%
>1 -5 years	215	20.9%
>5 – 10 years	96	9.3%
>10 years	23	2.2%
Total	1026	100%

We noticed that December, January, and February had the highest admission rates (131, 123, and 118 respectively). Central nervous system diseases (n=255, 24.8%), respiratory

illnesses (n=159, 15.4%), and gastrointestinal (n=120, 11.6%) were the most common diseases requiring ICU admissions in this analysis. Admissions also include cardiovascular (n=68, 7%), endocrine (n=23, 2.2%), hematology (n=10, 0.9%), and others (n=167, 11.9%).

Commonest central nervous system diseases requiring ICU care were febrile convulsion (n=142/255 pts), meningitis (33/255 pts), cerebral palsy (n=28/255 pts), epilepsy (n=24/255 pts), encephalitis (11/255 pts), Brain tumor (3/255 pts), hydrocephalus e shunt (9/255), facial palsy (4/255), and CVA (1/255).

Respiratory diseases required ICU admission were pneumonia (n=83/159 pts, 52.2 %), aspiration pneumonia (n=14/159 pts, 8.8%), bronchial asthma (n=30/159pts, 18.8%), acute bronchiolitis (n=17/159pts, 10.6%), whooping cough (n=11/159pts, 6.9%), choking n=2/159pts, 1.25%), and foreign body aspiration (n=2/159pts, 1.25%).

Cardiac cases admitted include: congenital heart disease (n=65 pts), myocarditis (n=2pts) and supraventricular tachycardia (n=1 pt).

Regarding children with severe dehydration (n=57 pts), 5 of them were hypernatremic dehydration, and (52pts) were isonatremic dehydration.

Endocrine diseases in this study were: diabetic ketoacidosis (n= 17pts), hypoglycemic attack (n=1 pts), and Hypocalcaemia (n=4 pts). Among hypocalcaemia, two patients had rickets and one case with hypoparathyroidism, and they were presented with carpopedal spasm.

The renal illnesses admitted were a chronic renal failure (n=4 pts), nephrotic syndrome (n=5 pts), congenital adrenal hyperplasia (n=1pt).

Others include: hematology (hemophilia, G6PD, plastic anemia, leukemia), drowning, snake bite, scorpion bite, head trauma with convulsion, and electric shock. Poisoning in-

clude: drug ingestions (n =8 pts) ,organ phosphorus, hysterical (n=1pt),

Surgical cases include (hypertrophic pyloric stenosis (n=6 pts), intestinal obstruction (n=4 pts), intussusception (n=5pt), and operating esophageal Artesia with a gastrostomy tube (n=1pt).

The outcome:

- Most of the patients, 668 (65%), improved and were discharged from ICU, and 201 (19.5%) were transferred to the ward when they were not in need of intensive care or were discharged home from ICU with a satisfactory condition.
- 32 patients (3%) were referred to another specialized hospital for further management.
- Ninety-nine patients (9.6%) were left against medical advice (LAMA).
- Twenty-six patients (2.5%) died (Figure 1).

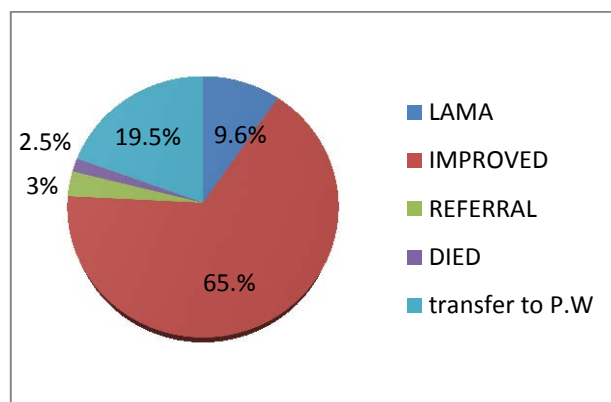


Figure (1). Distribution of patients according to the outcome

The commonest diseases requiring PICU admission were central nervous system diseases, mainly febrile convulsion disease, followed by respiratory system diseases

DISCUSSION

In various studies, it has been shown that intensive care had a positive outcome for the vast majority of critically ill children. However, caring for critically ill children is a challenge in

developing countries, where health needs often outstrip available resources. Necessary equipment is scarce and often is malfunctioned, and trained manpower is limited. Management of critically ill patients requires significant human, infrastructural, and financial resources and these resources are typically limited in low-income countries (Butt et al., 1990; Gemke, Bonsel, & van Vught, 1995; Isamade, Yiltok, Uba, Isamade, & Daru, 2007; Oke, 2001; Watters, 1993).

We noticed that infants (1 month-1 year) and children up to 5 years were the most vulnerable age groups representing the majority of admitted patients to PICU, this is in consonance with a study documented in Cairo by (Rady, 2014). In a study in Bangladesh, 93.3% were below 5 years of age (Hoque, Masud, & Ahmed, 2012). Another study in India found that 72.7% were below 5 years of age (Abhulimhen-Iyoha, Pooboni, & Vuppali, 2014). Male babies outnumbered their female counterparts with a ratio of 1.2:1 (568 vs 465), this reflects a gender bias in parental health seeking behavior regarding their children, or alternatively there may be an epidemiological reason for male susceptibility to infection or other conditions requiring admission. The male predominance at admission is consistent with an Indian study where infants represent 31%, and 63% of them were males (Shah, Shah, Thapa, Shah, & Mishra, 2014). Similarly, in study done in Ethiopia, where they observed that admission of male children was more than that for females children (93 vs. 77) with a male to female ratio of 1.2:1 (Abebe & Girmay, 2015), As well as other studies, We found that December, January, and February had the highest admission rates which is similar to a study in Egypt where they found that November and December had the highest admission rate (Rady, 2014), which reflects a possibility of droplet infection (respiratory manifestation) in winter season.

Neurological system was the most common involved system (24.6%) in total admission.

Diseases like febrile convulsion, meningitis, encephalitis, and cerebral palsy were the commonest indications for admission in our set, followed by respiratory illness, which represent (15.5%) of the total admission, like pneumonia, aspiration pneumonia whooping cough, and acute bronchiolitis. This could be a reflection of disease prevalence under five years of age; this may be decreased by incorporating pneumococcal vaccine in the national immunization program. The predominance of neurological diseases and respiratory illness at admission in our study is similar to studies from Egypt and Bangladesh (Hoque et al., 2012; Rady, 2014), and another study also showed that respiratory diseases 40%, followed by neurological illness 27% were the common cause of illness in their PICU (Singhal, Kumar, Puliyeel, Singh, & Srinivas, 2001). In the current study, cardiovascular diseases represent 4% of the total admission, and 92.5% of them had congenital heart disease, the most common cause of deaths in PICU, where in studies in India, they represents 41.1% and 6.5% respectively (Abhulimhen-Iyoha et al., 2014; Shah et al., 2014) While in a study in Pakistan, they found that post cardiac surgery 34% to be the most common condition (Haque & Bano, 2009).

In our study acute gastroenteritis represent 5.5% of the total admission, this may be due to incorporating ROTA viral vaccine in the national vaccination program whereas in a study done in India diarrheal diseases were the commonest cause of admission 26.8% (Sharma et al., 2012). Out of 1026 child admitted, 668(65%) child were improved and transferred to the ward or discharged home in satisfactory condition, and 32 (3%) child were referred to other specialized hospitals. The referred patients include: children with surgical problems, patients for cardiac surgery, some patients need special investigation like bone marrow aspiration and MRI, and some patients were referred to based on a family request in spite of the unnecessary referral because of the lack of confidence in the care provided to their children. 99

out of 1026 patients (9.6%) left against medical advice (LAMA), mainly for domestic reasons including the lack of caring for children, and the lack of confidence on the level of care provided to these children whereas in a study in Bangladesh they found that 6 out of 119 (5%) left against medical advice for the same reasons (Hoque et al., 2012).

Twenty-six patients died during the course of admission, giving an ICU mortality rate of 2.5%. This mortality rate was underestimated because some of the referred children were very sick, and some cases were received dead but not registered for medico-legal causes. This value is near to the result documented in reported in India 2.6% and less than Hong Kong 6.7%, (Choi et al., 2005; Khilnani et al., 2004). It is, however, less than the overall mortality of 16.7% recorded in other parts of India, and 15% mortality rate documented in Brazil in 2010, and also less than that shown in Greece 9.7% (Costa, Delgado, Ferraro, & Okay, 2010; Klem, Pollack, & Getson, 1990). ICU mortality rate varies depending on the case age, gender, length of stay and organizational aspects of the unit (El - Nawawy, 2003). This study is a little effort to determine the pattern of admission and the outcome of critically ill children, and to help these angles by making the critical care more feasible.

CONCLUSION

Epidemiologic analysis of the pattern of patients admitted to our PICU shows different etiologies for admission. On the top, there were neurological and respiratory systems; and congenital heart disease was the major cause of death. The absence of a high-dependency unit at our hospital led to the admission of some patients who were not ill enough to require ICU admission. The high referral rate to special units like pediatric surgery and ENT unit for bronchoscopy may provide an argument for establishing pediatric surgical and ENT department. Death rate was underestimated be-

cause some patients were brought in a serious condition and we do not know their fate and some cases were received dead but not registered for medico-legal causes.

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أنماط الدخول والنتائج في وحدة العناية المركزة للأطفال في مركز طبيرق الطبي، ليبيا

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المستخلص: استهدفت الدراسة توصيف معدل دخول الاطفال من عمر (شهر إلى 15 سنة) الذين تعرضوا لأمراض حرجة والمحولين إلى وحدة العناية المركزة في قسم طب الأطفال بمركز طبيرق الطبي، وذلك من خلال دراسة ملفات المرضى بأثر رجعي من الفترة من يناير 2016 إلى ديسمبر 2016. حيث بلغ عدد الأطفال المقبولين في وحدة العناية المركزة في مركز طبيرق الطبي 1026 طفلاً، 55% من الذكور و44.9% من الإناث وبنسبة الذكور إلى الإناث: 1.2 :1. وأظهر التوزيع العمري أن 64% من العدد الكلي هم من الرضع من (1 شهر -1 سنة). بينت الدراسة أن نسبة امراض الجهاز العصبي المركزي والجهاز التنفسي (23%، 12%) على التوالي وتعتبر هذه الامراض من الأمراض الأكثر شيوعاً والتي تتطلب دخول وحدة العناية المركزة، من الدراسة تبين أيضاً أن معظم حالات الدخول كانت في فصل الشتاء شهر (يناير، فبراير وديسمبر) معدل الوفيات الإجمالي (26) 2.5% وكانت نسبة الوفاة أعلى في الذكور 17 \ 26 مقارنة بالإناث 9 \ 26 وكانت هذه الإحصائيات مختلفة معنوياً. كان امراض الخلفية بالقلب السبب الأكثر شيوعاً للوفاة حيث كان 10 / 26 مريضاً (39%). 668 مريضاً من العدد الكلي (65%) تحسنت حالتهم، 99 مريضاً (9.6%) غادروا بدون المشورة الطبية، وأحيل 32 مريضاً (3%) إلى مستشفى أكثر تحديداً، وتوفي 26 مريضاً بمعدل نسبة الوفيات (2.5%). كان الالتهاب الرئوي امراض القلب الخلقية، التشوهات الخلقية، التهاب الجهاز العصبي والرئوي أكثر الأسباب شيوعاً للوفاة.

الكلمات المفتاحية: وحدة العناية المركزة، مركز طبيرق الطبي- ليبيا.