

# Pattern of admissions to the pediatric emergency unit of Tikur Anbessa Hospital in Addis Ababa, Ethiopia (2012-2013 G.C)

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## Abstract

**Background:** Patterns of disease vary across time depending on changes in human health activities and lifestyle, environmental factors and disease epidemiology. Health facility-based studies can provide information on the burden of disease within the community. Having information on the main causes of childhood morbidity and mortality enables planners to more effectively design, implement, and evaluate prevention-focused interventions.

**Objective:** To describe the disease pattern of patients admitted in the pediatric emergency unit at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia and identify the main causes of admissions and deaths.

**Methodology:** A cross-sectional retrospective study of admissions to the pediatric emergency unit of Tikur Anbessa Specialized Hospital was made for a period of one year from April 2012 to March 2013.

**Results:** A total of 1796 patients were admitted from April 2012 to March 2013, out of which 1044 (58%) were males while 752 (42%) were females, a male to female ratio of 1.4:1. The mean age of the study subjects was 3.4 years for males and 3.7 years for females. The mean length of stay in the emergency unit was 4.7 days. Out of 1796 patients, 116 (6.5%) died. The most common cause of admission was severe pneumonia (24.7%) and also among the 116 deaths pneumonia was the leading cause of death (23.3%), followed by late onset sepsis (11.3%) and acute gastroenteritis (9.5 %).

**Conclusion:** Interventions targeting prevention of pneumonia, sepsis, acute gastroenteritis, acquired heart disease and meningitis have paramount importance in reducing childhood illnesses and deaths. Since most of the causes of death in the unit could be avoidable by improving early case detection and management. [*Ethiop. J. Health Dev.* 2016;30(2):86-91]

**Key words:** Pneumonia, Sepsis, Pediatrics Emergency, Mortality

## Introduction

Emergency care especially for children is one of the services, which would improve their chances of survival. Pediatrics Emergency Room is a key area of service in every tertiary health institution where pediatric emergencies are promptly handled on a day-to-day basis. It is a voluminous service area with a high patient turnover (1). The pediatric emergency unit of the teaching hospital is a part of the pediatrics department, which aims at providing care for children who require prompt life-saving measures before they are discharged home or sent to the ward for completion of treatment.

All acutely ill children who need hospitalization are first admitted to the Emergency Ward, excluding neonates < 7 days of age and surgical emergencies that need urgent intervention. This analysis is confined to the emergency unit and did not include patients admitted to other wards or treated in the out-patient department (OPD). As the pediatric department of the hospital serves for patients from all corners of the city, the data obtained from the emergency unit can give us good indicator on the important causes of emergency childhood problems in the pediatric age group of the population in the area under consideration.

Although reports of the pattern of childhood illnesses and deaths exist (2) few have highlighted the outcome

of pediatrics emergencies in Ethiopia. Therefore, it becomes necessary to study the pattern and outcome of admissions at pediatrics emergency unit of Tikur Anbessa specialized Hospital (TASH).

Infant and child mortality rates are basic indicators of a country's socioeconomic situation and quality of life. Preventable diseases such as pneumonia, diarrheal diseases, and malaria are major causes of childhood morbidity and mortality worldwide. Pneumonia, diarrhea and malaria account for 41% of annual deaths globally and 49% in Africa (3,4). The bulk of childhood morbidity and mortality affects mainly children under 5 years of age. These diseases can be prevented, and there are treatments that are both accessible and affordable (5). Several studies in Africa reported infectious diseases as the leading causes of childhood death (6).

Knowledge of the pattern of admissions into the pediatric emergency unit of a tertiary hospital would provide valuable information on the progress of the preventive programs already in place. There has been no such study in this tertiary health facility in the last 10 years. Therefore, this index study is timely as it will help to appraise the facility on the ground and provide baseline data for future evaluation.

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Performance evaluation of pediatrics emergency unit of a hospital whether retrospectively or prospectively should be periodically carried out as information obtained from such studies could give an insight into the existing services with aims of improving them. It would also help in defining priority areas which will help policy makers in planning disease preventive and intervention programs for the Pediatric population.

The objective of this study is to analyze the characteristics of patients admitted under the emergency unit of TASH and identify important causes of admission and deaths. The study findings can also be compared with previous studies and can give sound information if there is any change in disease distribution in the past years. The findings can also be used to direct important areas of further investigation to know causes of childhood diseases.

**Methods**

The study was done in the Department of Pediatrics and Child Health Pediatric Emergency unit of Addis Ababa University’s TASH, located in the capital of Ethiopia. The pediatric emergency unit is found on the first floor of the hospital. It has 45 beds and admits on average five to ten patients per day and 300 patients per month. The admissions are all acutely ill children who need hospitalization, excluding those less than 7 days old since their admission take place in Neonatal ICU.

Retrospective records of all children admitted into the Emergency unit between 1st of April 2012 to 30<sup>th</sup> of March 2013 were retrieved.

All medical case records of eligible subjects presented at the emergency unit include documentation of the date and month of admission, age, gender, diagnosis and outcome of management (defined as discharged home, transferred to the ward, discharged against medical advice or died). Diagnosis of the diseases was done by the attending doctors and residents based on the clinical features and available laboratory results. The records whose information was incomplete and the address was not properly recorded on the patient

registry were excluded in the study. Data were collected by nurses who were trained for half day on how to collect the data. The principal investigator supervised the data collection. Ten percent of the records were cross checked against hospital medical records for validity. In cases where multiple diagnoses were recorded, only the principal reason for admission was included to calculate mortality and morbidity rates.

A total of 1796 eligible cases of admissions in the pediatric emergency unit were reviewed and analyzed. The number includes only cases of admissions in the study period. The data extracted from the records included the age, sex, diagnosis, duration of stay and outcome. The outcome was classified as discharged, died, transferred from emergency to the wards, referred out to another facility or discharged against medical advice (DAMA). The duration of stay of all the patients was also obtained from the records irrespective of their outcome.

The data were entered into a computer and analyzed, major cause of admission and outcome, duration of stay and age specific mortality using SPSS version 20 statistical software package.

Ethical approval was obtained from the Ethics Committee of Addis Ababa University, Department of Pediatrics. The eligible data was retrieved from the computer database of the unit and from the card room after permission was granted by the department. The confidentiality of the patient data was maintained by removing personal identifiers.

**Results**

Out of the total number of the study participants, 1088 (60.7 %) were from Addis Ababa while 667 (37.1 %) were from other regions and the rest addresses were unknown. Within the one-year review period, a total of 1796 children between the ages of 7 days and 15 years were admitted in pediatrics emergency unit (Table 1). There were 1044 males (58%) with the male: female ratio of 1.4:1. Majority (41.5%) of the patients are less than one year of age. (Table1).

**Table 1: Age and sex distribution of admissions, pediatrics emergency unit of TASH, Addis Ababa Ethiopia (April 2012 – March 2013)**

Age	Male	Female	Total	Percent
<1 year	431(57.8%)	315(42.2%)	746	41.5%
1- 5 years	356(61%)	224(38.6%)	580	32.3%
>5years	257(54.7%)	213(45.3%)	470	26.2%
<b>Total</b>	<b>1044</b>	<b>752</b>	<b>1796</b>	<b>100%</b>

The common cause for admission and deaths was severe pneumonia, which accounts 27.4% and 23.3% respectively of all admissions to pediatric emergency

unit, followed by heart diseases (11.9%) and sepsis (7.7%). The least cause of admissions was Tb of all forms (0.3%), (Table 2).

**Table 2: Major cause of admission death to pediatrics emergency unit of TASH, Addis**

**Ababa Ethiopia (April 2012 –March 2013)**

<b>Diagnosis</b>	<b>N=1796</b>	<b>%</b>	<b>Death (n=116)</b>	<b>%</b>
Severe-pneumonia	493	27.4	27	23.3
Heart-diseases*	237	13.2	9	7.6
Late onset sepsis	153	8	12	11.3
Acute gastroenteritis	143	4.7	11	9.5
Head injury	84	4	6	5.2
Malignancies**	73	4	7	6
Meningitis***	72	3.1	10	8.6
Seizure disorder	55	2.9	5	4.3
Anemia (of all causes)	52	2.6	0	0
Croup	46	2.3	0	0
DKA	42	1.7	0	0
Bronchial asthma	29	1.5	0	0
Acute Kidney injury	27	1.7	0	0
TB (all forms)	5	0.3	5	4.3
Others	284	15.8	11	8.7
<b>Total</b>	<b>1796</b>	<b>100</b>	<b>116</b>	<b>100</b>

\***Heart diseases** include congenital and acquired heart diseases with and without congestive heart failure.

\*\***Malignancies**-include leukemia, Wilms tumor, neuroblastoma, lymphoma, rhabdomyosarcoma, osteosarcoma, brain tumor

\*\*\***meningitis** except Tb meningitis

With regards to duration of stay in the emergency unit, the minimum and maximum days of stay were 1 and 36 days respectively while the mean duration of stay was 4.67 days (SE 0.100). The highest number of patients 676 (44.6%) who stayed in the hospital for more than

five days had good outcome, being discharged improved. Among the deaths 57 (49.2%) were patients who stayed in the emergency less than 24 hours ( $X^2 = 59.1$ , p value <0.000) (Table 3)

Table 3: **Duration of stay and outcome of patients admitted to pediatrics emergency unit of TASH, Addis Ababa, Ethiopia (April 2012 –March2013)**

<b>Duration of stay</b>	<b>Improved</b>	<b>Transferred</b>	<b>Died</b>	<b>Others</b>	<b>Total</b>
< 24 hours	230 (69.1%)	41(12.3)	57(17.1%)	5(1.5%)	333(100%)
24-48 hours	262(89.1%)	19(6.5%)	12(4.1%)	1(0.3%)	294(100%)
48-72 hours	242(91.3%)	13(4.9%)	9(3.4%)	1(0.4%)	265(100%)
3-5 days	189(88.3%)	12(5.6%)	12(5.6%)	1(0.5%)	214(100%)
> 5 days	593(86.1%)	67(9.7%)	26(3.8%)	3(0.4%)	689(100%)
<b>Total</b>	<b>1516(84.5%)</b>	<b>152(8.5%)</b>	<b>116(6.5%)</b>	<b>11(0.6%)</b>	<b>1795(100%)</b>

Sever pneumonia is the most common disease for admitted pediatrics emergency patients which accounts 28.7% from the total admission and also the common cause of death in pediatrics emergency 23.3%. ( $X^2 = 7.96$ , P=0.005),

Out of the total admissions 1516 (84.5%) were discharged improved, 152 (8.5%) were transferred to the ward, and a total of 116 (6.5%) died. Six patients (0.3%) were discharged against medical advice and 5 (0.3%) were referred to other facility (Table 4).

Table 4: **Outcome of major causes of admission to the pediatric emergency unit of TASH, Addis Ababa Ethiopia (April 2012 – March 2013)**

Diagnosis	Improved No (%)	Transferred to ward No (%)	Died No (%)	DAMA No (%)	Referred No (%)	Total No (%)
Severe pneumonia	453 (91.9)	12 (2.4)	27 (5.5)	1 (0.2)	0	493 (100)
Heart diseases	211 (89)	17 (7.2)	9 (3.8)	0	0	237 (100)
late onset sepsis	133 (86.9)	8 (5.2)	12 (7.2)	0	0	153 (100)
Acute Gastro Enteritis	127 (89.4)	4 (2.8)	11 (7.7)	0	0	142 (100)
Head injury	63 (75)	10 (11.9)	7 (8.3)	4 (4.8)	0	84 (100)
Malignancies	48 (65.8)	17 (23.3)	7 (9.6)	1 (1.4)	0	73 (100)
Meningitis	53 (73.6)	9 (12.5)	10 (13.9)	0	0	72 (100)
Seizure disorder	48 (87.3)	(1.8)	6 (10.9)	0	0	55 (100)
Anemia (of all causes)	45 (86.5)	4 (7.7)	3 (5.8)	0	0	52 (100)
Others	301 (74.1)	76 (18.7)	20 (5.7)	1	5	403 (100)
<b>Total</b>	<b>1517 (84.5)</b>	<b>152 (8.5)</b>	<b>116 (6.5)</b>	<b>6 (0.3)</b>	<b>5 (0.2)</b>	<b>1796 (100)</b>

The highest mortality was among infants (8.3%) ( $X^2 = 4.8, P < .028$ ) following by patients between the age of 1-5years (5.5%). The mortality decreases as age increases. The mortality rate for males is 5.5% while

for females being 7.8%. The pattern of admission for each age group was found different ( $X^2=4.9, P 0.027$ ) (Table 5).

**Table 5: Age specific mortality of all admissions to the pediatric emergency unit (April 2012 – March 2013)**

Age group	Admission	Deaths	Mortality
<1year	746	62	8.3%
1-5 years	580	32	5.5%
>5 years	470	22	4.6%
<b>Total</b>	<b>1976</b>	<b>116</b>	<b>6.5%</b>

**Discussions**

This study has shown the common causes of morbidity and mortality amongst children receiving pediatrics emergency admission care in TASH. The numbers of admissions during the study period were 1796, decreased by one third from that reported decade ago (7). This may be explained by the fact that health centers as well as the private hospitals have increased in number over the last decade in addition to provision of effective prevention and treatment of the common childhood diseases at lower levels of the health care system.

The findings from this study showed male: female ratio of 1.4:1 consistent with a study done in the same hospital 10 years back and also a study done in Bangladesh (7, 8). The four leading causes of admissions to the pediatric emergency unit in this study were severe pneumonia (27.5%), heart diseases (13.4%), late onset neonatal sepsis (8.5%) and acute gastroenteritis (7.9%), while in the study conducted at TASH ten years ago (7), the four leading causes of admission were severe pneumonia (38.6%), meningitis (7.2%), sepsis (5.6%) and heart diseases (4.6%). Severe pneumonia is still the leading cause of admissions to the emergency unit while meningitis is the seventh leading cause of admission. The explanation for the decrease of meningitis cases can potentially be explained by the introduction of the vaccination against H. influenza and pneumococcal infection. This review has similar findings as studies done in Bangladesh and Gondar (8, 9)

In most of African studies malaria is among the leading causes of morbidity and mortality since malaria ranked highest (1, 10) while in Addis Ababa the rank of malaria is lowest. In the current study, we found only 8 cases of malaria with a frequency of 0.4% and there was no death report which is unlike with other studies conducted in African countries. The study conducted at TASH ten years ago also showed a pediatric malaria prevalence of 1.4% (7, 11). This could be due to the fact that most of the patients were from Addis Ababa, which is not malaria endemic area compared to other African cites and effective national prevention strategies were implemented to combat malaria at the community level.

Heart disease is the second most common cause of admission and the fifth cause of death in this study. In the previous study done in the same setting, heart disease was the fourth cause of admission and the seventh cause of death. The frequency of heart disease is higher (11.9%) than the previous study (4.6 %) (7) As this is the only specialized hospital with cardiac center in the country, cardiac patients' referral to the hospital seems to be increasing in number. Frequency of head injury has increased from the study conducted in the same setting 10 years ago from 2.3% to 4.2%. This can be explained in that TASH is the largest public hospital providing neurosurgery service. Malignancies ranked sixth as cause of admissions in this study is higher than the previous study, from 1.7% to 3.7%. This increase can be explained by the fact that TASH is the only hospital which provides treatment for pediatrics hematology and oncology patients. This figure, however, may not reflect the true picture of the

burden of malignancy seen at TASH as there are other patients admitted to the oncology ward without passing through the emergency unit.

The frequency of moderate and severe wasting combined together was 13.5%, which is higher than the result from a study done in Eastern part of Ethiopia, prevalence estimate 10.7% (12). The rate of stunting in our study was 41.2% and that of underweight was 31.8% similar to a study done in Southern Ethiopia, while stunting is lower than the same study... (13)

The mean duration of stay in the emergency unit in the current study was 4.7 days. This is relatively consistent with the rate found in the previous study of 5 days (11) but higher than a similar study reporting 24-48 hours (14). The four top causes of death in this study are severe pneumonia, late onset sepsis, acute gastroenteritis and meningitis, and this is consistent with a study done in Nigerian (10, 14). This reflects the global and national picture of under-five mortality. It is also consistent with the previous study in the same setting (7).

The previous report put pediatric AIDS with the highest case fatality rate, whereas in our study it is not found in the leading cause of death (7).

In this study, high Pneumonia morbidity and mortality 27.3% and 23.3% respectively is comparable finding with the earlier studies (7, 9, 15) which indicates to improve on the disease prevention and intervention strategies and the related health seeking behavior in accordance with national strategies which are in place.

The overall mortality rate in the emergency unit in our study was 6.5% of which children under-five years constituted 81.0 % of all deaths. This is much less than the 1970-1971 report with a mortality rate of 28.3% and the study conducted ten years back in the same setting, where the mortality rate was 14.3%. (7,16). In a recent study in Nigeria, the rate is higher 9.6% (10). The decrease in the mortality rate over time may be due to overall improvements of emergency care provided by the unit. In this study, infant mortality was (8.3%) which is higher than the study in Nigeria of 7%. (10). The highest mortality was seen with infants similar in other studies. (10, 14, 17).

Infections of various types are the leading cause of morbidity and mortality, which is similar to previous reports on the leading cause of childhood illnesses and mortalities (7, 9, 14). WHO (18) recognizes diarrheal diseases, and acute lower respiratory infections as the leading cause of childhood morbidities and mortalities, especially with the age group of under-5 and this finding is similar with the current study. These infections, however, are preventable and/or are curable with minimal cost if they are recognized early or if presentations to hospital are made earlier.

The outcome with respect to discharge against medical advice is 0.3% which is comparable with the study conducted in Nigeria (17)

The outcome with regard to discharge home and transfers to the ward is encouraging and justifies the presence of the unit for prompt management of acute life-threatening pediatric illnesses. However, adequate resources in the form of increased manpower and equipment should be put in place to improve the outcome of admissions.

Preventive measures and improvement of health delivery have been shown to improve outcomes using the basic health tools such as integrated management of childhood illnesses (IMCI) in Tanzania and Uganda (19). Furthermore, in India and Bangladesh, the introduction of early detection and treatment of childhood illnesses through the use of IMCI have significantly reduced the morbidity and mortality of these childhood illnesses (20). Ethiopia's implementation of IMCI had a great role on the current decrease of under-five mortality (20).

### **Conclusion and Recommendations**

As the major causes of hospital admission and deaths are pneumonia, sepsis and gastroenteritis which are preventable and treatable with available medical technology, there is a room to reduce childhood deaths and illnesses by improving early case detection and management. The death rate decreases significantly as the age of children increases. Parents should be informed of the importance of early treatment seeking for any health problem seen in their young children. Health professionals should make timely case detection, appropriate management and follow up of young children.

Although the findings of this review show similarity with other studies in some of the basic indicators, and still share the limitation associated with hospital-based studies which are the restrictions in the extrapolation of the outcome to the general population. Furthermore, the lack of pathological confirmation of causes of death may affect some of the probable causes of death. However, further study is needed to verify the findings.

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### **Competing interests**

There are no financial or non-financial competing interests.

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