Intensive care unit (ICU) is special unit primarily concerned with the care of patients with critical illness and demand a broad-based knowledge to cater for all aspect of management of their patients to achieve good outcomes\(^1\)–3. Pediatric intensive care unit (PICU) is an important component of any tertiary care center. Approximately 4 million ICU admissions per year occur in the United States with mortality rate reported ranging from 8\% to 19\%. ICU is one of the sites where medical errors are most likely to occur because of the complexity of the diseases, and patients are vulnerable to experience adverse outcomes due to multiple interventions\(^4\).

According to the World Health Organization, the major causes of death in under 5-year-old children in developing countries are preventable and curable. Improving outcome is possible by well-equipped and well-staffed ICUs\(^5\). Caring of critically ill children remains one of the most demanding and challenging aspects of the field of pediatrics. Patients are admitted to an PICU because they require a very high level of monitoring of vital signs and other body functions\(^6\). The cause of admission in PICU particularly in early age group is a sensitive indicator of the availability, utilization, and effectiveness of mother and child health services in the community. Admission pattern changes between different places and time to time even at the same place. Therefore, regular review of the disease pattern in any particular setting is important for providing better services to the patients\(^7\).

The care of critically ill children remains one of the most demanding and challenging aspects of the field of pediatrics. The main purpose of the PICU is to prevent mortality by intensively monitoring and treating critically ill children who are considered at high risk of mortality. This, however, comes at a huge cost to all the parties involved; the hospital, the personnel, and the care givers of patients\(^8\).

In sub-Saharan Africa, ICUs have varying qualities and quantities of infrastructure necessary for the provision of proper critical care services. The reported disease characteristics and mortality rates of patients admitted to ICUs in sub-Saharan Africa vary widely from one population to another. The regional hospitals send their critical patients to these referral hospitals for ICU care\(^9\).
There was a study conducted in Jimma, Ethiopia, mortality was 40% with the most common cause of admission and death being trauma in the PICU\[5\]. Another study done in Ethiopia stated that the common cause of PICU admission and death was meningitis in the study area and highlights the importance of focusing on the preventable methods in the public such as vaccine, creating awareness about hygiene, and expanding ICU for early detection and for treatment acutely ill children\[9\]. Therefore, it is clear that determining admission patterns and outcome in the PICU will help to identify the gap and improve care provision for the institution even for the country.

**Methods**

**Study design and period**

A 2 years institutional based retrospective observational study was conducted for patients who were admitted to PICU from September 2017 to September 2018.

**Study area**

The study was conducted in the University of Gondar Comprehensive Specialized Hospital (UOGCHS) PICU. This hospital is one of specialized hospital in Amhara region which had been given service for 7 million peoples per year and having around 3 ICU centers which are pediatrics, medical, and surgical ICUs.

**Source and study population**

**Source population**

All patients who had admitted to ICU in the UOGCSH from January September 2017 to September 2018 were source population.

**Study population**

All pediatrics patients who had admitted to pediatrics ICU in the UOGCSH were source population.

**Inclusion and exclusion**

**Inclusion criteria**

Pediatric patients who had admitted to PICU from September 2017 to September 2018 were included.

**Exclusion criteria**

Missed charts and charts with incomplete details were excluded.

**Dependent variables**

Admission patterns and outcome was the interest variable of this study.

**Independent variables**

Sociodemographic variables (age, sex) and length of hospital stay.

**Sample size and sampling procedure**

**Sample size determination**

All pediatrics patients who had admitted to PICU during the study period were included.

**Sampling procedure**

All consecutive pediatrics patients who had admitted to PICU during the study period were included.

The work has been reported in line with the STROCSS criteria\[10\].

**Data collection procedure**

Data was collected by using semistructured questioner prepared with English language. It included all items that will address the variables of the study. Therefore the data collectors collected all information from extensive chart review.

There were 2 data collectors (1 BSC nurse and 1 BSC anesthetist) one of them collect all pediatrics patients who had admitted to PICU between the study period from the registration book and the other collected information from extensive chart review. Charts with missed details were excluded. Important variables on demographic characteristics, causes of admission and outcomes were retrieved from the chart and logbook.

**Data quality management**

Training was given for the data collector by principal investigator. During data collection, all data were collected and properly filled on the prepared format. The principal investigator had supervised the data collector and checked for the completeness daily after data collection.

**Data processing and analysis procedure**

Data were checked for completeness, inconsistencies, and then coded, entered using EPI data version 4.6. Then the data cleaned and analyzed using SPSS version 20. Descriptive statistics were computed to determine frequencies and summary statistics. Data were presented using tables.

**Ethical considerations**

Ethical clearance was obtained from ethical committee board of the institution. Permission was obtained from head of PICU ward and Head of medical records to access the registration book of patients and their medical record. All the collected data were kept confidential and no one except the members of the research team had access to the collected information. All papers of the study were kept in a secured place under lock and computer records kept locked with passwords and the name or other personal information were not notified in any report.

**Results**

**Sociodemographic characteristics of patients**

A total of 305 patients were admitted in the study period with the age range of 1 month to 14 years and most of them are under 5 years but the majority of patients 85 (27.9%) were found in the age range of 10–14 years. Most of patients 175 (57.4%) were males and 130 (42.6%) were females, giving a male to female ratio of 1.3:1 (Table 1).

The length of ICU stay was ranged from 1 to 28 days and above with a majority 135 (44.3%) of them stayed for 2–7 days (Table 1).
General causes of ICU admission

Majority of patients were admitted due to neurological 72 (23.6%), respiratory 58 (19%), cardiac 36 (11.8%), malnutrition 25 (8.2%), shock 23 (7.5%), and endocrine 20 (6.6%) causes (Table 2).

The 5 most common reasons for admission were neurological 23.6%, respiratory 19%, cardiac 11.8%, malnutrition 8.2%, and shock 7.5%. Among these disorders; meningitis (12.8%), pneumonia (7.5%), congestive heart failure (8.4%), severe acute malnutrition (6.56%), and septic shock (5.6%) are the commonest diseases, respectively (Table 3).

General outcome of admitted patients

Out of all patients, 13 (4.3%) were discharged, 167 (54.8%) patients were transferred to the pediatric wards for further management, 72 (23.6%) patients were died and 54 (17.3%) were left against medical advice. Generally, 72 (23.6%) patients were died during the study period, consisting of neurological 16 (5.2%), malnutrition 9 (2.95%), shock 12 (3.9%), cardiac 8 (2.6%), respiratory 6 (2.0%), renal 7 (2.3%), poisoning 4 (1.3%), trauma 2 (0.7%), hepatic 2 (0.7%), gastrointestinal tract 1 (0.3%), and others were 5 (1.6%). From exitus patients, 27 (42.6%) were females.

The overall mortality rate of patients admitted to PICU was 23.6% and males have higher mortality rate than females. Out of 305 patients, 37 (12.1%) were mechanically ventilated and majority of patients were stayed on mechanical ventilator for <6 days. Among patients on mechanical ventilation 10 (27.0%) of patients were died (Table 4).

Discussion

Caring for the critically ill children is a challenge in developing countries, where health needs often outstrip available resources. Necessary equipment is scarce and often malfunctions, and trained manpower is limited. Management of critically ill patients requires significant human, infrastructural, and financial resources. These resources are typically limited in low-income countries[6].

In the current study, the analysis showed that majority 175 (57.4%) of children admitted to the PICU were males and under 5 years of age contributing more than half of the admission. This finding is comparable with a study done in Ethiopia and
Strength of the study

The strength of this study was that subjects were homogeneous (only pediatrics with the age range of 1 mo to 14 y) which can provide representative results.

Limitations of the study

The study design and being only descriptive may be the source of bias.

Conclusion

The leading cause of admission and death was neurologic causes. Respiratory and cardiac causes were also significant. The mortality rate was very high (23.6%) and further interventions are recommended to reduce mortality and increase quality of care. We also recommended, for researchers, to perform another study by avoiding the current limitations.

Ethics approval and consent to participate

This study was approved by the ethical review board of University of Gondar, School of Medicine, College of Medicine and Health Sciences and this local ethics committee ruled that no formal ethics approval was required in this particular case and consent was taken verbally.

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Author contribution

This work was carried out by Seid A. Ahmed.

Conflicts of interest disclosure

The author declares that there is no financial conflict of interest with regard to the content of this report.

Research registration unique identifying number (UIN)

NA.

Guarantor

Seid A. Ahmed.

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