Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Pattern of Mortality in Pediatric Intensive Care Unit from a Tertiary Care Hospital in South India

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Abstract

Background: Management of critically ill children poses a great challenge to the treating physician. With the advances in the management of critically ill children, there is an increased survival of critically ill children. Profile of mortality in the pediatric intensive care unit (PICU) varies between different age groups and between different studies. Childhood mortality is an important indicator of health status of a country.

Objective: The objective of the study was to study the pattern of mortality in a PICU.

Materials and Methods: It is a retrospective study done at a tertiary care hospital. PICU records of all deaths were analyzed from January 2018 to December 2018.

Results: Of 1993 admissions, there were 209 deaths. The mortality rate was 10.52%. One-hundred and nine children died due to infections and 100 children died due to non-infectious causes.

Conclusion: Overall infections were the major cause of death in children which are higher than the developed countries. Infections were the major cause of death in children under 5 years of age. In children older than 5 years, non-infectious causes were the major cause of death. Mortality can be further reduced by improving infrastructure.

Key words: Children, Infections, Mortality, Non-infectious causes

INTRODUCTION

Pediatric critical care remains one of the challenging aspects in the field of pediatrics. The pediatric intensive care unit (PICU), where critically ill pediatric patients who require advanced airway, respiratory, and hemodynamic supports are usually admitted with the aim of achieving a better outcome. With the advancement in intensive care facilities, there is a dramatic increase in survival of critically ill children. Childhood mortality is one of the good indicators of a country's health status of the population. The infant mortality rate in our country is 37/1000 live births and maximum being reported from Madhya Pradesh.[1] Under-five mortality according to data provided by UNICEF is 39.4 deaths/1000 live births in 2018.[2] Diarrheal diseases, pneumonia, and other infectious diseases are leading causes of death among the children below 5 years of age in developing countries like India.[3,4] However, little is known about the causes of death in children after 5 years of age. Profile of mortality in PICU varies between different age groups. Evaluation of the mortality pattern can help in better decision-making, improving quality of care, and modifying future management.

Access this article online

www.ijss-sn.com

Month of Submission : 12-2019
Month of Peer Review : 01-2020
Month of Acceptance : 01-2020
Month of Publishing : 02-2020

Aim of the Study

The aim of the study was to find the mortality pattern in PICU of a tertiary care hospital.

MATERIALS AND METHODS

Study Center

This study was conducted at PICU of a tertiary care hospital in South Tamil Nadu.

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Sampling

It is a retrospective analytical study which analyzed records from PICU of a tertiary referral center, from January 2018 to December 2018. This hospital has a well-equipped 8-bedded PICU with 16-bedded step down with eight high-end ventilators. We admit pediatric patients 1 month–12 years of age. Patients who are critically ill and those who require airway/respiratory support and hemodynamic support were admitted. PICU records of all the death cases were analyzed. The data collected on patients included age, gender, diagnosis, any comorbid conditions, and duration of unit stay. All patients were treated according to standard protocol. Relevant investigations, including hemoglobin, total and differential blood counts, blood glucose, urea, creatinine, electrolytes, blood culture, and arterial blood gas, were done whenever required. Other relevant investigations such as computed tomography and magnetic resonance imaging were done to arrive at the diagnosis. Expert opinion obtained whenever required.

RESULTS

During the study, there were 1993 admissions in PICU, of which 1157 were boys and 836 girls. There were 209 deaths (mortality rate 10.52%). Of 209 deaths, 120 (57.4%) were boys and 89 (42.6%) were girls. Table 1 shows the distribution of death among different age groups. A number of deaths were maximum in 1–12 months age group (n = 84; 40.2%).

Of 209 deaths, approximately one-third of the death (n = 58; 27.8%) occurred within 24 h of admission. Eighty-seven (41.6%) died within 5 days and the remaining 64 (30.6%) died after 5 days of admission [Table 2].

One-hundred and nine (52.1%) cases succumbed to infections and 100 (47.8%) deaths were due to non-infectious causes [Figure 1]. Among the infections, sepsis (n = 39; 18.7%) and pneumonia (n = 37; 17.7%) were the leading cause of death [Table 3].Comorbid conditions were found in 14% of children and malnutrition was the most common comorbidity. In non-infectious causes, neurological diseases (n = 18; 8.1%) were the major cause of death followed by cardiovascular diseases (n = 15; 7.2%). Other causes include accidental injuries and surgical causes [Table 4]. In children under 5 years of age, infections were responsible for 89 (58.9%) deaths and 62 (41%) children died of non-infectious causes. In children more than 5 years of age, 20 (34.5%) died due to infections and the remaining 38 (65.5%) died of non-infectious causes. [Figure 2].

Table 1: Age and sex distribution

Age group	Male	Female	Percentage
1 month–1 year	49	35	40.2
1–5 years	39	28	32.0
5–12 years	32	26	27.8

Table 2: Duration of PICU stay

Duration	Number of cases	Percentage
<1 day	58	27.8
1–5 days	87	41.6
>5 days	64	30.6

PICU: Pediatric intensive care unit

DISCUSSION

During the study, 1993 children were admitted to PICU. Majority were male children. Haque *et al.* also found that in their study, majority (60.9%) of patients were male.[5] Two-hundred and nine patients died during the study. The mortality rate was 10.52% which is comparable to the study conducted by Rashma *et al.* which was 10.56%.[6] The lower mortality rate was reported by Shah *et al.* (2.1%) and Choi *et al.* with the mortality rate (2.6%) from a general hospital in Hong Kong.[7,8] In our study, there was higher mortality among male children (57.4%) which is similar to the results of Siddiqui *et al.* and the male-to-female ratio was 1.3:1.[9] In the present study, we observed that most of the deaths (40%) were below 1 year of age which is comparable to other studies by Shashikala *et al.* and Ramnarayan *et al.* (51%,

Table 3: Spectrum of infectious diseases

Causes	Number of cases (%)
Sepsis	39 (18.7)
Pneumonia	37 (17.7)
Meningitis/encephalitis	17 (8.1)
Acute hepatitis	4 (1.9)
Tuberculosis	3 (1.4)
Other infections	9 (4.3)

Table 4: Spectrum of non-infectious causes

System involved/causes	Total number of cases (%)
Neurologic illness	17 (8.1)
Congenital heart diseases	11 (05.3)
Leukemia	10 (4.8)
Liver diseases	9 (4.3)
Poisoning/envenomation	9 (4.3)
Late HDN	8 (3.8)
Kidney diseases	6 (2.9)
Chronic lung diseases	4 (1.9)
Hematological diseases	4 (1.9)
Endocrine/metabolic	4 (1.9)
Acquired heart diseases	4 (1.9)
SLE	4 (1.9)
Solid tumors	3 (1.4)
Drowning	3 (1.4)
Others	4 (1.9)

HDN: Hemorrhagic disease of the newborn, SLE: Systemic lupus erythematosus

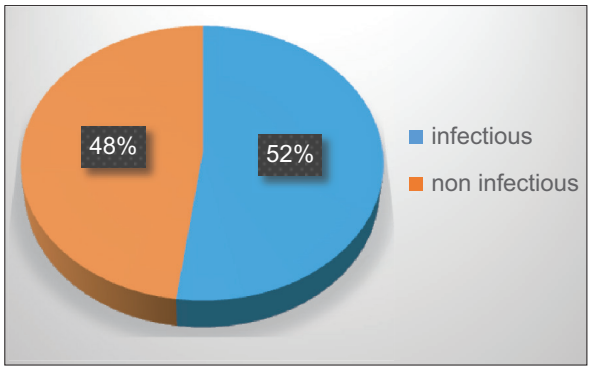

Figure 1: Distribution of death

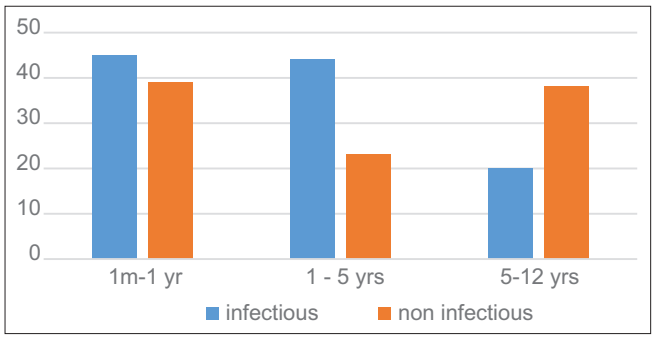

Figure 2: Distribution of death among the different age groups

57.7%), respectively.[10,11] Of 209 patients, 58 (27.8%) patients died within 24 h of admission. Shashikala *et al.* reported 16% of deaths occurring within 24 h of admission.[10] It may be due to delayed referral from peripheral health centers and lack of awareness regarding danger signs. Among the infections, sepsis (18.7%) and pneumonia (17.7%) were the leading causes of death, which are comparable to the study by Kapil and Bagga.[12] They reported that septicemia (18.6%) was the most common cause of death followed by congenital heart disease (10.6%). Shah *et al.* in their study reported that pneumonia (23.4%) was the most common cause of death.[7] In children below 5 years of age, infections were responsible for 58.9% of deaths which are similar to other studies.[13,14] In our observation, 65.5% of death in above 5 years of children is due to non-infectious causes. This is contrary to the study done by Morris *et al.* which showed about 60% of death due to infectious causes.[15] This is probably due to the fact that our center is a tertiary referral hospital, where the profile of referred children is different from the community. There are some limitations in our study. Since it is a retrospective study, it may have some recall and interpretation bias that could lead to incomplete data. Second, this study does not include the children who got discharged against medical advice then died later at home.

CONCLUSION

Our center showed a mortality rate of 10.5% which is higher than in developed countries. Mortality can be further reduced by strengthening of infrastructure and workforce. Infections were the leading cause of death which can be prevented by improving the socioeconomic status of the population and strengthening immunization coverage. Approximately one-third of children died within 24 h of admission which can be avoided by early referral and educating the community regarding danger signs. Majority of children with >5 years of age died due to non-infectious causes. Further studies are needed to confirm these observations.

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How to cite this article: Sangeeth S, Vanitha B, Rajkumar D, Balasankar S. Pattern of Mortality in Pediatric Intensive Care Unit from a Tertiary Care Hospital in South India. Int J Sci Stud 2020;8(2):24-26.

Source of Support: Nil, **Conflicts of Interest:** None declared.