

Mortality pattern among hospitalized children (29 Days to 12 years) in a tertiary care hospital, Assam

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Abstract

Introduction:

Mortality of children is the prime indicator of country's health status and its development. This study is therefore aimed at evaluating the mortality pattern in children in tertiary care hospital.

Material and method:

This retrospective study included all the children from 29 days to 12 years of age, who were hospitalized to the Paediatric Department. for a period of 18 months. Neonatal deaths (<28days) were excluded from this study since most of the time cause is multifactorial. Paediatric surgical and trauma cases, which were treated by the surgical department, were excluded.

Results:

Out of 1524 children, a total of 491 deaths were recorded. An overall mortality of 32.2% was noted in the cases admitted to the PICU. Out of total paediatric deaths, 259 children i.e., 52.7% of children were postneonatal deaths. Among these 259 children, 140 (55.1%) children were male and 119 (50.2%) children were female. Among the children of 12-23 months age group, 24-59 months age group and >60 months age group, deaths were 47 (9.5%), 80 (16.2%) and 105 (21.3%) respectively. The risk of death was found to be more in male children of 29 days -12 months age group, when compared to female children of same age group. In this study, we found that the most common causes of death among paediatric age group were AES (19.9%), sepsis (19.7%) and ARI (19.3%). Among post neonates, septicemia (30.5%), ARI (28.1%) and congenital heart disease with CCF (11.7%) were the leading causes of death while AES was the leading cause of death among 24-59 months were 35% and >60 month were 42.8.

Conclusion:

Our study found that the mortality of the PICU was 32.2 % during study period. A higher mortality was associated with more severe conditions of disease and presence of comorbidities. So better care and management should be given for those children admitted to PICU with severe comorbidities.

Keywords: Pediatric, mortality, PICU

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I. Introduction:

Understanding the causes of mortality in children is important in understanding the potential role of supportive care for these children and their families. Mortality of children is the prime indicator of country's health status and its development.¹ The application of the principles of the hospital based childhood mortality pattern can be utilized as an effective tool or analyzing the cause of death and epidemiological pattern of childhood mortality in developing countries.² This study is therefore aimed at evaluating the mortality pattern in children in Gauhati Medical College Hospital. The information obtained from this study might be useful in re-evaluating the existing health services and in improving health facilities and children care.

II. Aims and Objectives:

This retrospective study was aimed at evaluating the mortality pattern in children in Gauhati Medical College Hospital, Guwahati. The hospital serves as a tertiary center for neighboring districts. The use of the hospital based childhood mortality pattern to obtain a more complete understanding of the problem of the children, which may help in preventing the delay in the medical seeking behavior of the community, planning and implementation of the health care facilities and for re-evaluating the existing health care infrastructures.

III. Materials and methods:

This retrospective study was done with records of the expired children(29 days to 12 years of age) admitted in the department of Paediatrics, Gauhati Medical College Hospital during the period from 1st April 2017 to 30th September 2018. Gauhati Medical College Hospital, Guwahati is a tertiary careHospital. This study included all the children from 29 days to 12 years of age, who were hospitalized to the Paediatric Department, both from the out-patient and emergency department. Neonatal deaths (<28days) were excluded from this study since most of the time cause is multifactorial. Paediatric surgical and trauma cases, which were treated by the surgical department, were excluded.Data about age, gender, duration of stay, cause of death of the children werecollected and entered in MS office Excel, and analyzed using SPSS version 17.0 (SPSS Inc., Chicago, IL). The Ethical Committee of Gauhati Medical College & Hospital, Guwahati, had approved the study.

IV. Results and observation

A total of 1524 children were admitted to the Paediatric Intensive Care Unit (PICU) in the department of Pediatricsduring 1st April 2017 to 30th September 2018. A total of 491 deaths wererecorded. An overall mortality of 32.2% was notedin the cases admitted to the PICU.Among the 491 children expired,254 (16.6%) children were male and 237(15.5%)children were female. Out of total paediatricdeaths, 259 children i.e., 52.7% of children were postneonatal deaths. Among these 259 children,140(55.1%) children were male and 119 (50.2%) children were female. Among the children of 12-23 months age group, 24-59 monthsage group and >60 months age group, deathswere 47 (9.5%), 80(16.2%) and 105 (21.3%) respectively. Therisk of death was found to be more in malechildren of 29 days -12 months age group, when compared tofemale children of same age group (Table 1).

Table 1: Age & Sex Distribution of Pediatric Deaths

Age group	Male deaths N(%)	Female deaths N(%)	Total deaths N(%)
29 days -12 months	140(55.1%)	119(50.2%)	259 (52.7%)
12-23 months	21(8.3%)	26(10.9%)	47(9.6%)
24-59 months	38(14.9%)	42(17.7%)	80(16.3%)
>60 months	55(21.7%)	50(21.1)	105(21.4%)
Total	254 (100%)	237(100%)	491(100%)

In this study, we found that the most common causes of death among paediatric age group were AES (19.9%), sepsis (19.7%) and ARI (19.3%).

Table 2: Causes of death in all age group

Age Group	Cause of Death	N (259)	%(52.74)
29 days -12 months	ARI	73	28.1
	AES	16	6.17
	CHD with CCF	30	11.7
	Sepsis	79	30.5
	Leigh's disease	11	4.24
	Bleeding disorder in shock	3	1.15
	Tubercular meningitis	3	1.15
	Severe acute malnutrition	2	0.77
	Bacterial Meningitis	15	5.79
	Stroke	3	1.15
	IEM	2	0.77
	Failure to thrive	2	0.77
	Aspiration pneumonia	2	0.77
	Hemorrhagic disease of newborn	6	2.31
	Cerebral palsy with refractory seizure	3	1.15
	Acute liver failure	2	0.77
	Cholestatic jaundice	1	0.38
	Congenital CMV infection	2	0.77
	Congenital anomaly	3	1.15
Acute kidney injury	1	0.38	
12-23 months	Cause of Death	N (47)	%(9.57)

	Sepsis	8	17.02
	ARI	6	12.76
	CHD with CCF	10	21.27
	AES	9	19.14
	Leigh's disease	2	4.25
	Bacterial Meningitis	3	6.38
	Cholestatic jaundice	1	2.12
	IEM	1	2.12
	Leukemia	1	2.12
	Cerebral palsy with refractory seizure	2	4.25
	Acute liver failure	2	4.25
	Bleeding disorder in shock	2	4.25
24-59 months	Causes of death	N (80)	%(16.29)
	GuilaineBarre syndrome	2	2.5
	AES	28	35
	CHD with CCF	7	8.7
	Sepsis	6	7.5
	ARI	11	13.5
	Leigh's disease	2	2.5
	Acute kidney injury	1	1.3
	Severe acute malnutrition	1	1.3
	Acute liver failure	4	5
	Stroke	1	1.3
	Bacterial Meningitis	6	7.5
	Leukemia	2	2.5
	Drowning	2	2.5
	OP poisoning	2	2.5
	Snake bite	2	2.5
	Cerebral palsy with refractory seizure	1	1.3
	ITP with intranial bleed	1	1.3
	Nephrotic syndrome	1	1.3
>60 months	Causes of death	N(105)	%(21.38)
	Acute glomerulonephritis with complication	1	0.95
	45	42.85	
	AES	1	0.95
	Tubercular meningitis	1	0.95
	GuilaineBarre syndrome	6	5.71
	Acute liver failure	5	4.76
	ARI	4	3.8
	Sepsis	1	0.95
	Bleeding disorder in shock	1	0.95
	Tubercular Meningitis	1	0.95
	Acute kidney injury	7	6.66
	Cerebral palsy with refractory seizure	10	9.52
	CHD with CCF	2	1.9
	Mushroom poisoning	2	1.9
	Nephrotic syndrome	1	0.95
	Suicidal hanging	1	0.95
	SLE with renal failure	2	1.9
	Portal Hypertension with upper GI bleeding	2	1.9
	1	0.95	
	Stroke	2	1.9
	Complicated malaria	1	0.95
	Snake bite	2	1.9
	Diabetic ketoacidosis	2	1.9
	Brain tumor	1	0.95
	OP poisoning	1	0.95
	Disseminated tuberculosis	1	0.95
	Bacterial meningitis	1	0.95
	Drowniong		
	ITP with intranial bleed		

Among post neonates, septicemia (30.5%), ARI (28.1%) and congenital heart disease with CCF (11.7%) were the leading causes of death while AES was the leading cause of death among 24-59 months were 35% and >60 months were 42.8%. (Table 2). Among the 91 deaths, 53 (58.3%) were occurred within the first 48 hours of admission to the hospital. (Table 3)

Table 3: Mortality according to duration of stay

Number of death	(N=)	N	%
Duration of stay	<1 day	205	41.75
	1-3 days	155	31.56
	4-7 days	88	17.92

	>7 days	43	8.75
Total		491	100%

The seasonal pattern of mortality showed a bimodal distribution with twin peaks in a year, once in summer (March to May) and again during rainy seasons (July to September) with 34.06% and 30.76% mortality respectively.

V. Discussion:

Most of the study investigated the PICU outcome using mortality (the Incidence proportion of death). Generally, the PICUs in developed countries have lower mortality than those in the developing countries, and mortality decreased with years. Our study had a mortality rate of 32.21% , which is in higher than with several studies published from low and middle-income countries³⁻⁵. Our study results regarding the spectrum of co morbidities were consistent with that of Pollack MM et al.⁶. A study by Epstein reported a higher risk for death for children less than 1 month and older than 12 years in PICU⁷. A study done in a Brazilian PICU found that mortality increased significantly with increasing age⁸. The dead cases in the study conducted by Ala S et al. had a 60% proportion of male⁹. Our study also showed a male preponderance (Male 51.73%) Some studies showed that Socio-economic status (SES) was associated with health outcomes in monotonic pattern, i.e. each decrease of SES level was related to a decrease of health status^{10,11}. SES could affect the health from various aspects in all age groups¹² Shukla et al. reported that the infectious disease was still one of the commonest causes of PICU admission and mortality¹³. Our study also had the same results. A study in the United States divided admission sources into emergency department, operating rooms, wards, and inter-hospital transfer from non-PICU and PICU settings, and found that patients from the wards and inter-PICU transfer had higher odds ratio of fall¹⁴. In our study emergency department shifted maximum PICU patients and their mortality rate was high. Goh et al. reported that PICU with 24h intensivist care had lower mortality odds ratio than PICU without 24h specialist care¹⁵. A study conducted in the United States by Goldstein et al collected 63,285 consecutive PICU admissions from January 2004 to December 2005 in the Virtual Paediatric Intensive Care Unit Performance System database and found that patients with day 1 MODS had higher risk to die (10.0% vs 1.2%), longer length of stay in PICU (3.6 vs 1.3 days) and worse performance at discharge¹⁶. Our study also had the similar results. Odetola et al did a survey about co morbid illnesses among critically ill children in 2006 in the United States, and found that 41% of the patients had co morbidity and patients with co morbid illnesses had significantly higher mortality, longer hospital stay and higher cost¹⁷. The same results were seen in our study also. A study by Epstein D in the United States reported that infectious disease or oncologic disease had higher risk for death¹⁸ Our study also had the same pattern of risk for death.

Current study shows that AES (19.9%) is the leading cause of death followed by Sepsis (19.7%) and ARI (19.34%) in post neonatal age group. Children of 29 days -12 months age group experience higher mortality (52.7%) when compared to older children, which may be due to the fact that they are more prone for infection. This study shows that, AES as the major infection among 1-5 year children. Mortality among 5-12 years children were mainly due to AES (29.4%) followed by CHD with CCF (9.5%). High Mortality occurred within 24hrs and 24 - 48hrs of the hospital stay, which is 39.6% and 18.7% respectively. This finding is probably due to delayed referral and poor health seeking behavior of the community¹⁹ In this study, three major causes of paediatric deaths are AES(19.9%), sepsis (19.7%) and ARI(19.3%) which is similar to the findings found in various studies.²⁰

VI. Conclusion:

Our study had comprehensively investigated the mortality profile in PICU of a tertiary hospital in North East India. Our study found that the mortality of the PICU was 32.2% during study period. A higher mortality was associated with more severe conditions of disease and presence of comorbidities. So better care and management should be given for those children admitted to PICU with severe comorbidities. Infections have a higher predilection for higher mortality rate in PICU. So the source of infection either hospital acquired or community acquired should be identified and managed aggressively.

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