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ORIGINAL RESEARCH

A STUDY OF MORBIDITY AND MORTALITY PATTERN IN A PICU AT TERITATRY CARE HOSPITAL

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ABSTRACT

Background: The care of seriously ill children continues to be one of the most demanding and challenging aspects of practising paediatrics, Numerous factors, such as demographics, clinical characteristics, co-morbidities, infrastructure, and the availability of qualified staff, have an impact on patient mortality.

Methods: A hospital based Observational study From March 2021-February 2022 All acutely ill children of age (1 month to 12 years) admitted in Paediatric Intensive Care Unit attached to Department of Paediatrics, SVRRGGH, Tirupathi. Parents of children who gave consent. The data collected in Microsoft excel was analysed. are reported using frequency, percentage & continuous variables such as mean(SD) with mortality and morbidity statistics with respect to Age, Gender, transport.

Results: total of 1388 patients were admitted in PICU (mean 115.6 cases / month). Among them 32 were referred to higher centre and 14 went on LAMA. There by having study population of n= 1342. Pneumonia (n = 262 ,19.5%) was the major disease seen in this study setting PICU followed by epilepsy (n = 153, 11.4%)., patients were categorized as survivors and non- survivors.

Conclusion: The most common reason for admission to the PICU was pneumonia, which was followed by CNS, bronchiolitis, dengue, and other infectious diseases. Septicaemia had the highest case fatality rate, followed by pneumonia and CCF. In the current study, co-morbidities affect 8.84% of the patients. The current study's findings support the notion that the mortality rate was associated with co-morbidities, LOS, and younger age in a positive manner.

Keywords: survivor, Non-survivor. pneumonia, sepsis

INTRODUCTION

The care of seriously ill children continues to be one of the most demanding and challenging aspects of practising paediatrics. The paediatric intensive care unit (PICU) seeks to promote high standards of care and early intervention in order to yield favourable results and enhance prognoses. Intensive care units with enough staffing and equipment can help with this.[1,2]

Improvements to intensive care facilities have led to critically ill children living longer.[5] In critical care medicine, the effectiveness of intensive care units (ICUs) can be assessed using metrics like survival or mortality rate. The outcomes of medical procedures can be used to assess the efficacy

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of a treatment. This makes it easier to make better decisions, raises the level of care, and, if necessary, modifies management going forward. Numerous factors, such as demographics, clinical characteristics, co-morbidities, infrastructure, and the availability of qualified staff, have an impact on patient mortality.

Aim And Objectives of The Study

AIM: To study mortality & morbidity patterns in a Paediatric Intensive Care Unit at a tertiary care hospital.

Objectives

To determine the cause & disease pattern of morbidity & mortality in Paediatric Intensive Care Unit at a tertiary care hospital.

MATERIALS & METHOD

Study Design: A hospital based Observational study.

Study Setting: Tertiary care hospital, Tirupathi.

Study Period: From March 2021-February 2022.

Sample Size: All children admitted in paediatric intensive care unit during one year period of study.

Inclusion Criteria: All acutely ill children of age (1 month to 12 years) admitted in Paediatric Intensive Care Unit attached to department of paediatrics, SVRRGGH , Tirupathi. Parents of children who gave consent.

Exclusion Criteria: Children who left PICU before completion of ICU care.

Study Method: This is an observational study reviewing the admissions into the PICU of a tertiary care center in Tirupathi for a period of 1 year from march 2021-february 2022.The hospital has a well equipped 12 bedded PICU with an attached 12 bedded High dependency unit with all the necessary equipment & infrastructure requiring as per PICU protocols which admits paediatric patients up to 12 years of age from medical specialities.

Patients were admitted in PICU according to the PICU protocols and necessary details are documented like, sociodemographic profile, Age, Sex, Type of emergency pattern presentation, Mode of presentation, Etiology whenever possible, Organ dysfunction involved (single/multi organ involved). All children were stabilized, emergency management was provided as per standard ICU protocols & children were investigated with necessary investigations as per standard protocol. If needed life support was provided (respiratory, Haemodynamic). Specific diagnosis depending on etiological, clinical, laboratory results were documented. Mortality were documented and with respect to various parameters like age, gender, duration of PICU stay, Organ dysfunction involved (single/multi organ involved).

Morbidity was noted by Age, Specific etiology, Various organs involved and comorbidities.

PICU records of all admissions, transfers out, discharges & deaths were analysed. Data collected on patients included age, gender, diagnosis, weight, duration of stay in the unit & outcome. The outcome were classified as transfers to the main Paediatric wards, discharges, discharges against medical advice (DAMA), Left against medical advice(LAMA) & death ,referral discharge. All patients in the unit were treated according to the written standard protocol.

Treatment was started as per the protocol.

The data collected in Microsoft excel was analysed. The summary statistics for categorical variables are reported using frequency, percentage & continuous variables such as mean(SD) with mortality and morbidity statistics with respect to Age, Gender, transport.

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Ethical Consideration

Before collection of data, all parents of children were briefed about the purpose of the study , written & informed consent was obtained. No financial burden was imposed on the parents of children.

RESULTS

During one year of study period, a total of 1388 patients were admitted in PICU (mean 115.6 cases / month). Among them 32 were referred to higher centre and 14 went on LAMA. There by having study population of n= 1342.

The bed occupancy rate was 94.22% per year with the turnover rate of 115.6 (n=1388) and the bed occupancy rate was 90.91% per year with the turnover rate of 111.83 after exclusion criteria (n=1342). Among the study population n= 1342, 673 (56.4%) were males and 519 (43.5%) were females, with a M:F ratio of 1.27:1. Age on admission ranged from one month to 12 years with a mean of 4.27 years and median of 3 years. The following tables(3, 4) shows demographic distribution of the study population.

Table-1: Demographic Distribution of Patients by Age

Gender	Total
Male	751(55.9%)
Female	591(44%)
Total	1342

Table 2: Demographic Distribution of Patients according to Gender

Age Group	Total (%)
<1 year	401(29.8%)
1-5 years	478(35.6%)
6-12 years	463(34.5%)
Total	1342

Pneumonia (n = 262 ,19.5%) was the major disease seen in this study setting PICU followed by epilepsy (n = 153 , 11.4%) and bronchiolitis (n= 143 ,
10.65%). Various diseases encountered in PICU are listed below.

Table-3. Common Diseases in PICU

S.No.	Name of Diseases	No of Patients	Percent
1.	Acute exacerbation of asthma	13	0.9%
2.	Acute GE with Severe dehydration	84	6.25%
3.	Acute liver failure	2	0.14%

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4.	Acute Pancreatitis	2	0.14%
5.	AES	50	3.72%
6.	AKI	3	0.22%
7.	Bronchiolitis	143	10.65%
8.	CCF	50	3.72%
9.	Croup	8	0.59%
10.	Dengue with warning signs	100	7.45%
11.	DKA	25	1.86%
12.	Drowning	3	0.22%
13.	Dysentery	1	0.07%
14.	Encephalopathy	14	1.04%
15.	Epilepsy	153	11.4%
16.	Haemophilia A	8	0.59%
17.	Hypertensive emergency	11	0.8%
18.	Hypertensive encephalopathy	1	0.07%
19.	Hypertensive urgency	2	0.14%
20.	IEM	23	1.7%
21.	Meningitis	117	8.7%
22.	Meningoencephalitis	5	0.37%
23.	Pneumonia	262	19.52%
24.	Poisoning	27	2.0%
25.	Rabies encephalitis	1	0.07%
26.	Rickettsia	17	1.2%
27.	Scorpion bite	8	0.59%
28.	Snake bite	30	2.2%
29.	Septicaemia	88	6.55%
30.	Stroke	2	0.1%
31.	Viral myocarditis	47	3.5%
32.	Miscellaneous	42	3.1%
33.	Total	1342	100

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Analysis of outcome showed that out of 1388 patients LAMA and higher centre referred patients were excluded from analysis making n= 1342 , 1192 (n= 1342 ,88.82%) patients improved and discharged. 32 (n=1388 , 2.3%) cases were referred to higher centre , 14 (n= 1388 , 1.0%) cases were left against medical advice (LAMA) , 150 (n= 1342 , 11.17%) cases were expired.

Table-4: Ventilation statistics

S.NO.	VARIABLE	VALUE:	PERCENTAGE
1.	INTUBATION (n= 1342)	246	18.33%
2.	EXTUBATION (n= 246)	96	39.02%

For the purpose of analysing final out-come, patients were categorized as survivors and non-survivors. Survivors (n= 1192, 88.8%) included as discharged patients .Those who expired were considered as non-survivors (n = 150, 11.17%). Final outcome (survivor vs non-survivor) of the patients admitted in PICU is shown in Tables below.

Table-6: Gender distribution and effect on mortality

Age	Admission (%)	Final outcome (%)		P value	Chisquare
		Survivors	Non survivors		
<1 year	401 (29.8%)	314 (26.34%)	87 (58%)	0.00001	70.96
1-5 years	478 (35.6%)	433 (36.32%)	45 (30%)		
6-12 years	463 (34.5%)	445 (37.33%)	18 (12%)		

Table-7: Gender distribution and effect on mortality

Gender	Admission (%)	Final Outcome (%)		P value	Chisquare
		Survivors	Non survivors		
Male	751 (55.9%)	673 (56.4%)	78 (52%)	0.29	1.07
Female	591 (44%)	519 (43.5%)	72 (48%)		

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Table-8: Length of stay and its effect on mortality

Length of stay	Admission (%)	Final outcome (%)		P value	Chisquare
		Survivors	Non Survivors		
<48 hours	665 (49.5%)	580 (48.6%)	85 (56.6%)	0.00001	56.73
3-7 days	651 (48.5%)	600 (50.3%)	51 (34%)		
>7days	26 (1.9%)	12 (1%)	14 (9.3%)		

Table-9: Disease specific statistics and its effect on mortality

Diseases	Admission (%)	Final outcome (%)		P value	Chisquare
		Survivors	Non-Survivors		
Acute GE with severe dehydration	84 (6.25%)	81(96.4%)	3 (3.5%)	0.022	5.22
AES	50 (3.72%)	36 (72%)	14(28%)	0.0001	14.8
Bronchiolitis	143 (10.65%)	142(99%)	1 (0.6%)	0.000026	17.69
CCF	50 (3.72%)	28(56%)	22 (44%)	0.00001	56.35
Dengue	100 (7.45%)	94 (94%)	6 (6%)	0.08	2.91
DKA	25 (1.86%)	24(96%)	1(4%)	0.25	1.32
Encephalopathy	14 (1.04%)	8 (57.1%)	6 (42.8%)	0.00015	14.3
Epilepsy	153 (11.4%)	152(99%)	1 (0.6%)	0.00001	19.26
Hypertensive emergency	11 (0.8%)	10(90.9%)	1 (9%)	0.82	0.04
IEM	23 (1.7%)	10(43.4%)	13(56.5%)	0.00001	48.4
Meningitis	117 (8.7%)	104 (88%)	13(11.1%)	0.98	0.0006
Meningoencephalitis	5 (0.37%)	4(80%)	1(20%)	0.53	0.39
Pneumonia	262 (19.52%)	239(91%)	23(8.7%)	0.16	1.88
Rickettsia	17 (1.2%)	16(94%)	1(5.8%)	0.48	0.486
Septicaemia	88 (6.55 %)	56(63%)	32(36.3%)	0.00001	60.17
Viral myocarditis	47 (3.5%)	46(97%)	1 (2.1%)	0.04	4.01
Miscellaneous	42 (3.1%)	35 (83%)	7 (16.6%)	0.25	1.31
Co-morbidities	119(8.84%)	97 (81 %)	22 (18.4%)	0.0047	7.96

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DISCUSSION

In this study, 1388 cases were admitted with an average of 115.6 cases per month and a bed occupancy rate of 94.22%, which was higher than that observed in Joshi P. et al.

Age at admission ranged from one month to twelve years, with a mean age of 4.2 years and a median age of three years, which is almost identical to the mean age of 3.45 years reported by Praveen Khilnani et al. in 2004 .

P value indicated significant (i.e. 0.05) when compared to the age in correspondence to survivors and non survivors in the current study as when compared to Joshi et al study. Male to female ratio was 1.27:1, which was comparable to Praveen Khilnani et al's(106) study from 2004 and Henry et al's study from 2011.

Pneumonia cases accounted for 23.2% of all cases in the 2018 Jain et al study, which is higher than the 19.5% reported in the current study, the 33.1% reported in the Joshi et al 2020 study, and the 10% reported in the Blessing et al 2014 study. Ichanal et. al revealed that 60% of PICU units within the country reported respiratory distress / failure as their primary cause of admission.

1192 (88.8%) of the patients in the entire study population showed improvement and were sent home. 32 (2.3%) cases were referred to a higher centre, and 14 (1%) patients received LAMA, which is a very low percentage compared to Joshi et al's study's 7.05% and another study's 5% by Hoque et al.

The study's mortality rate was 11.17%. Given that PICUs in other parts of the world have reported mortality rates between 12.6% and 19%, this might be regarded as acceptable. It was 18.5% in another study by Joshi et al. It was 10.3% in the Michel et al study from 2012, which was low compared to this study, and 36.1% in the Henry et al study from 2011, which was also low.

In this PICU study, age-related mortality was highest for patients under one year of age (58%) and male patients died at a higher rate than female patients (78 vs 72). Age exhibited statistical significance between survivors and non-survivors, while gender showed no significant differences. Unlike Joshi et al study's which found that neither gender nor age had any statistical relevance. Contrary to this study's findings, AIIMS (32.1%) and BPKIHS (7.8%) had the greatest mortality rates among children aged one to five..

Septicaemia had the greatest case fatality rate (36.3%), which was comparable to the study in Bangladesh (33.3%). In the 2012 study by Mohammad et al., it was 24%; in the 2012 study by Hoque et al., it was 10.1%. In contrast to this study, Joshi et al's research found that acute leukaemia had the greatest case fatality rate (37.5%).

The data that showed 100% of survivors and 100% of non-survivors had the best prognosis, while those that showed hypertensive encephalopathy, hypertensive urgency, and rabies encephalitis had the worst prognosis. Comparison between this study and Joshi et. al study, regarding bronchiolitis survivors are of more percentage in this study (99% vs 97.7%) and non survivors were less compared to Joshi et. al study (0.6% vs 2.3%). Poisoning was same statistical value in both studies between survivors and non-survivors (100% vs nil). In contrast to septicaemia where this study has more percentage in non-survivors than in Joshi et al study (36.3% vs 34.15%). AES, EPILEPSY, and ACUTE GE WITH SEVERE DEHYDRATION have statistically significant differences between the two studies in the table above when compared to the Joshi et al study conducted in 2020.Co-morbidities affected 8.84% (n = 119) of the patients in this study, with the majority being neurological (70.58%) and cardiac (25.2%). Nephrology, vasculitis, hepatobiliary, and autoimmune disorders rounded out the list with 1.6%, 0.8%, 0.8%, and 0.8%, respectively.

According to this study, patients without co-morbidities had a higher survival rate (89.5%) than those who did (81%), with a significant p value of 0.0047 and chi-square value of 7.96. This pattern

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of co-morbidity association has been documented in Greece in the past, as well as most recently in the Joshi et al. study from 2020.

The average length of stay in this study was 2.97 days, with a median of 3 days and a mode of 2 days, and a standard deviation of 1.70 days, as opposed to Joshi et al. study's mean of 5.72 days and median of four days.

The average length of stay in the PICU was shorter when compared to Joshi et al's study, but when it came to mortality, this study's mortality rate was lower (11.17% vs. 18.5%), and both studies' significant P values for comparing length of stay with outcome (survivors and non-survivors) were 0.00001 and 0.001, respectively.

The mortality rate of 40.6% (n = 61) in the current study is within 24 hours which was similar to 2011 Henry et. al study which was 47.13% (n = 41)

Limitations Of the Study

The patients in the current study represented the wide range of services offered by the central PICU and had a variety of illnesses. The current study was limited by the fact that it was a single centric study, the results of which may not be generalised to the population of various areas where resources are more scarce, despite this and the large sample size.

SUMMARY

During one year of study period, a total of 1388 patients were admitted in PICU (mean 115.6 cases / month). Among them 32 were referred to higher centre and 14 went on LAMA. There by having study population of n= 1342.

The bed occupancy rate was 94.22% per year with the turnover rate of 115.6 (n=1388) and the bed occupancy rate was 90.91% per year with the turnover rate of 111.83 after exclusion criteria (n=1342). Among the study population n= 1342, 673 (56.4%) were males and 519 (43.5%) were females, with a M:F ratio of 1.27:1. Age on admission ranged from one month to 12 years with a mean of 4.27 years and median of 3 years. Pneumonia (n = 262,19.5%) was the major disease seen in this study setting PICU followed by epilepsy (n = 153, 11.4%) and bronchiolitis (n= 143, 10.65%). Analysis of outcome showed that out of 1388 patients LAMA and higher centre referred patients were excluded from analysis making n= 1342, 1192 (n= 1342, 88.82%) patients improved and discharged. 32 (n=1388, 2.3%) cases were referred to higher centre, 14 (n= 1388, 1.0%) cases were left against medical advice (LAMA) , 150 (n= 1342, 11.17%) cases were expired.

Most of the total duration of stay in PICU was 89.3% between 1-5 days.

Age, length of stay, co-morbidities had significant p value on outcome

CONCLUSION

The most common reason for admission to the PICU was pneumonia, which was followed by CNS, bronchiolitis, dengue, and other infectious diseases. Septicaemia had the highest case fatality rate, followed by pneumonia and CCF. In the current study, co-morbidities affect 8.84% of the patients. The current study's findings support the notion that the mortality rate was associated with co-morbidities, LOS, and younger age in a positive manner.

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