

## Mortality Rate in Pediatric Intensive Care Unit (PICU): A Local Center Experience

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### **Abstract**

#### **Introduction:**

Pediatric intensive care unit (PICU) has a specific location for management of children with serious and severe diseases.

#### **Materials and Methods:**

This is a cross-sectional and analytical study was performed on all children admitted in PICU of Boali Hospital from March 2010 to March 2012.

#### **Results:**

Out of 490 patient admitted in PICU, 35 was died (7.14%), but this was 6/04 % (27/447 patients) in march 2011 to march 2012. Overall, 62 cases were died (6/6%) in two years [male =30 (3.2%), female =32 (3.4%)].

#### **Conclusion:**

Mortality rate is similar with other developed countries or higher level of medical care.

**Keywords:** Children, Mortality, PICU.

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## Introduction

Pediatric intensive care unit (PICU) has a specific location for management of children with serious and severe diseases. Often these patients need intensive care and respiration with ventilator devices. Therefore, care of these patients associated more expensive costs for family and social (1,2). Duration of admission is variable depends to underlying Disorder. Stay duration more than 13 days considered long stay admission (1,2), but it is consider very long stay when more than 30 days (3).

Mortality and morbidity probably more common in patients with more duration admission and more severe patients than they had short stay admission and less severe disorders (4). Limitation and discontinue of medial treatment in PICU cause 14 to 75% mortality (5,6). Medical treatment discontinue in developed countries is a main cause of mortality in PICU patients, despite, these ways cause many problems of legal and ethical for health care person (7). Children with different ages and weight and different diagnosis take different drugs propose at high risk. Knowledge of about different disorders, mortality rate and etiology of them could be more effective in

primary, secondary and tertiary prevention.

The aim of this study increase knowledge of different health workers and health political makers about etiology and mortality of different disorders in PICU patients in Boalisina Hospital on March 2010 to March 2012.

## Materials and Methods

This is a cross-sectional – analytical study, was performed in all children admitted in PICU of Boali Hospital from March 2010 to March 2012 (2 years). 937 patients were analyzed. We evaluated demographic characteristic such as gender, age, way of transport, diagnosis, GCS score, date of death, duration of admission and etiology of death. Data recorded in SPSS<sub>13</sub> and analyzed with T-test and Anova test. ( $P < 0.05$ ) considered significant.

## Results

Out of 490 patient admitted in PICU (March 2010 to March 2011), 35 was died (7.14%), but this was 6/04% (27/447 patients) in March 2011 to March 2012 (Table1). Overall, 62 cases were died (6/6%) in two years [male=30 (3.2%), female=32 (3.4%)].

**Table 1:** Demographic characteristics (Gender, age) in died patients in PICU at Boali Hospital from March 2010 to March 2012

Gender	March 2010- September 2010	October 2010- March 2011	Total N (%)	March 2011- September 2011	October 2011- March 2012	Total N (%)
Male	8	10	18(51)	7	5	12(44)
Female	8	9	17(49)	8	7	15(56)
Total	16	19	35(100)	15	12	27(100)
Age	Male	Female	Total	Male	Female	Total
1-6 m	5	10	15	5	7	12
7-12 m	4	3	7	4	4	8
≥ 13 m	9	4	13	3	4	7
Total	18	17	35	12	15	27

Under 6 months (n=17) more died (27.41%) for two years, but after 1 year age, male gender more died (n=12, 19.35%). The ranges of age were 1 month

to 3/5 years old in 2010-2011 and 1 month to 5 years old in 2011-2012. Our patients died more in nights than days (Table. 2).

**Table 2:** Distribution of diurnal death in our patients in PICU at Boali Hospital form March 2010 to March 2012

Year	Time of diurnal death			Total N(%)
	8Am-14 N(%)	14-20 N(%)	20-7Am N(%)	
2010-2011	11 (18)	8 (13)	16 (26)	35 (56)
2011-2012	6 (9)	8 (13)	13 (21)	27 (44)
Total	17 (27)	16 (26)	29 (47)	62 (100)

Location of life in our died patients were 13 cases (57%) from sari and other (n=6) 43% from ghaemshar were more common in 2010-2011, but were 20 cases from sari (74%) and 7 cases (26%) from other cities in 2010-2012.

The way of transport in our patients in 2010-2011; 17 cases by their family (direct) (49%) and other (18) 51% by health care centers (hospital's ambulance) by registries. In 2011-2012, 14 cases (52%) were transport by their family (direct) and others (n=13) 48% by ambulance from other hospital due to registration. Transport by intubation was 12 cases (34%) in 2010-2012 and 15 cases (55%) in 2011-2012.

Etiology of disorders in our patients was neurologic disorders were common (31%) than metabolic disorders (14%) and leukemia (11%). Hematologic disorders with malignancies (26%) then with less common anomaly disorders (20%) and gastrointestinal (GI) tract disorders (14%) was in 2010-2011. In all of patients, etiology of basal disorder includes: neurologic (n=15), Metabolic (n=8), Hematologic and oncology (n=13), heart (n=7), Pulmonary (n=5), Poisoning (n=3), GI tract (n=5), immunodeficiency (n=2), renal (n=1) and Skin (n=1).

Duration of admission was variable form 1 to 90 days (Table 3).

**Table 3:** Duration of admission in died cases in PICU at Boali Hospital in 2010 -2012.

Duration of admission (days)	2010-2011	2011-2012	Total N (%)
1-2	10	9	19 (30)
3-7	8	8	16 (26)
8-14	3	2	5 (8)
15-30	3	2	7 (11)
> 30	9	6	15 (24)
Total	35	27	62 (100)

**Table 4:** Distribution of gender, age, transport, etiology, time of death and complication in PICU at Boali Hospital in 2010-2011

Number	Gender	Age (month)	Transport	Diagnose	Time of death	Complication
1	M	19	D	Cerebral Palsy	4 Am	Respiratory distress
2	F	2	D	CIC	15.45	Sepsis
3	M	1	A	Hydrocephaly RDS	22	Respiratory failure
4	F	7	D	CHS	17	Sepsis
5	F	1	A	RDS	5.45 Am	Peritonitis
6	F	2	A	Coarctation of Aorta	11	Heart failure
7	M	16	D	CHD	3.30 Am	Heart failure
8	M	5	D	Duncan syndrome	14	Sepsis
9	F	5	A	Hirsh prong	12 Am	sepsis
10	F	31	D	CHD	10 Am	Heart failure
11	M	55	D	Adrenal insufficiency	11.30	shock
12	M	29	A	Acute Meylogenic Leukemia	13.15	sepsis
13	F	8	D	Drug poisoning	14	shock
14	M	42	D	FELS	13.30	Sepsis
15	M	5	D	ALL	19.45	Sepsis
16	F	3	A	ALL	20.30	Sepsis
17	F	46	A	Verding Hoffman	1 Am	Pneumonia
18	M	3	A	ALL	5 Am	Sepsis,DIC
19	F	7.5	D	Pure red cell aplasia	16	Sepsis
20	M	11	A	CHD,metabolic	7.30	Pneumonia
21	M	56	D	ALL	2.30	DIC
22	M	3	A	Nephrotic syndrome	5	Sepsis
23	M	21	A	Viral encephalitis	11.40	Brain death
24	F	4	D	Hepatic failure	4	Respiratory failure
25	M	15	A	Metabolic	17	DIC
26	M	12	D	Esophageal Atresia	10	Pneumonia
27	F	53	D	Gushe disease	3.45	DIC
28	M	11	A	Opioid poisoning	9.35	DIC
29	F	5	A	Metabolic	5	Sepsis
30	M	6	D	ToF	17	Heart failure
31	M	2	A	CHD	15.30	DIC
32	F	23	D	Biliary atresia	14.35	Sepsis
33	F	7	D	Cardiomyopathy	21.30	DIC
34	F	54	D	Brain tumor	7.15	Brain abscesses
35	F	9	A	ALL	24	sepsis

F=Female; M=Male; A=ambulance; D= Direct; ALL=acute lymphocytic leukemia; DIC=disseminated intravascular coagulopathy; CHD=congenital heart disease; ToF=tetralogy of falot; RDS=respiratory disseminated syndrome; FELS=fetal erythrohemophagocytic syndrome.

**Table 5:** Distribution of gender, age, transport, etiology, time of death and complication in PICU at Boali Hospital in 2011-2012

Number	Gender	Age	Transport	Diagnose	Time of death	Complication
1	M	8	D	Multiple anomaly	17.20	Renal failure
2	F	60	D	Dandy walker	17.30	sepsis
3	M	30	D	Leukodystrophy	23	pneumonia
4	M	3	A	Metabolic	22.35	Sepsis
5	M	3	A	Metabolic	19.30	pneumonia
6	F	4	D	Hydrocephaly	14.30	Respiratory failure
7	M	9	D	HUS	14.20	Shock
8	F	18	D	Phagocytic syndrome	14.40	Sepsis
9	F	60	D	Neuroblastoma	5.15	DIC
10	F	7	D	Werding haffman	13.30	pneumonia
11	M	60	A	Opioid poisoning	7	Respiratory failure
12	F	11	D	Brain anomaly	15.30	Respiratory failure
13	M	6	D	Metabolic	7.30	Sepsis
14	M	39	D	HUS	4.20	Sepsis
15	M	2	A	Metabolic	21	Shock
16	F	3	A	Multiple anomaly Hirsh prong	10	Heart failure
17	F	4	D	Epidermolysis bullosa	11	Septic shock
18	F	14	D	Metabolic	5.30	Encephalitis
19	F	9	D	CHD,hydrocephaly	23	Heart failure
20	F	8	D	Meningitis	1	Shock
21	F	5	D	Down syndrome	10.30	pneumonia
22	F	3	A	Cystic Fibrosis	13.40	pneumonia
23	F	1	D	Chronic lung disease	3	pneumonia
24	F	6	A	Werding Hoffman	4	pneumonia
25	F	2	A	Metabolic disorder	11.30	sepsis
26	M	25	D	Brain anomaly	22.30	DIC
27	M	2	A	Brain anomaly	22.45	Respiratory failure

CHD=congenital heart disease; HUS=hemolytic uremic syndrome; DIC= disseminated intravascular coagulopathy; A=Ambulance; D=Direct; M=Male; F=Female.

## Discussion

Our study showed PICU mortality in our setting was higher than many other countries in the world (6/6%). Of course, this center is in the capital of Mazandaran

Province in the north of Iran and it is a referral center for other cities and registries of more serious disease. We think, low mortality rate related to professional nursing, different children

subspecialists physician, and adequate devices such as ventilators.

In our study 22 cases (2.34%) were died with duration of admission more than 14 days and 35 cases (3.73%) died in first 7 days admission, but Naghib et al. showed 4.6% mortality rate in their PICU patients (8) that in 22% of patients had more than 28 days (long stay admission). The mortality rate was lower in patients with 7-14 days admission than before or after it in our study. There is not significant difference mortality rate between two genders (3/2% in male verse 3/4% in female). Therefore, both gender propose equally have mortality rate in a PICU center (7). Sands et al. showed 5.1% mortality rate in their PICU center (9). Overall, the mortality rate in PICU was 4-6 % in American (10), 7.3% in Canada and 5.8% in Europe.

Etiology of death is important for family and health care politic managers. Out of 62 cases died in our center, 31 patients had congenital anomaly (50%), is the most common causes of mortality. These anomalies including: hematologic (n=15) 14%; metabolic (n=8) 13%; heart (n=7) 11% and skin (n=1) 1.6%. Among the hematologic and oncologic disorders (the most common etiology of death) in our center leukemia and pancytopenia was more common (n=13) 21% but in Naghib`s study, congenital anomalies with 28%, and heart disease with 28% were more common (8). sands et al. showed infections and trauma each with 19.6% were more common etiology of death in PICU center and congenital anomaly (17.2%) and malignancy 16.2% were in future statues (9). However, often of these studies showed that anomalies and malignancy were more etiology of mortality in PICU. We think, one of the reasons of high incidence of congenital anomaly in our region is familial marriage. Therefore, for make lower anomalies, the

government health care managers should be take to suitable decision. Increased knowledge of general population, physicians (General practitioner, specialist and subspecialist) and health care personals. Also, prenatal diagnosis will be improved and make a good law for abortion for congenital anomaly that they have poor prognosis.

Mean of ages of died patents in our study were 15.5 months, but in Sands study was 3 years old. However, in more study this was variable between 8 months to 2.6 years old (10,11). Often of died patients in our study had age under one year (n=42) 68% higher than sands study (27.9%). However, it is expected that mortality rate is more common in infant than older children (3,10). Duration of stay is important because serious and sever disease cases rapid and more mortality. According to our study, more mortality rate was in first 7 days is similar with other studies(12,13).

Therefore, this is a clear reason that showed often of PICU patients had very severe condition when received to PICU. Drug discontinue cause 13 to 55% mortality rate in PICU patients (9,12,14). In our culture, we did not it even in one patient but this was reported 5% in Malaysia (15). The main etiology of mortality in our patients were pneumonia and sepsis (n=18) 29% and disseminated intravascular coagulation (DIC) (n=17) 27% that is similar with other study such as Bilan that showed multiorgan dysfunctions (50%), sepsis 20% and DIC 10% (16).

Bilan reported respiration disorder (30%). Neurology (28%) and cardiovascular 16% involved more common etiology of PICU admission . In this study morality rate was 60% in male and 40% in female with mean age  $33.83 \pm 0.342$  months. 50% mortally was in under one year and 50% was higher than one year age with mean duration of admission 5 days (16).

Elnawany showed 38% PICU mortality (17), but in India this was 35% (18) and in Argentina was lower (2.6%) (19). In Marcin study, 2.1 to 8.1% of PICU patient had been long stay admission. Outcome was not very well. Their age was lower and need more care (2). Pollack et al. showed children with more stay in PICU (more than 13 days), had lower ages and severe diseases. Also, chronic diseases were more common. They had more mortality rate in PICU (17.4% verse 7.3%), also, hospital mortality rate is more common (23.9% verse 8.7%) than they have short stay admission. 50% of PICU care related to these patients (20).

Gemke in a multi center study showed mean 7.1% mortality rate (range 1-10%) in PICU patients. one of the reasons of variant rate of mortality related the different severity of disorders (21).

Vander Heide et al. showed more common complication in the patients with stay more than 30 days admission than short stay admission (2.9% verse 1.2). Infection complication were more common (5%), but mortality rate was not significant between two groups (31.8 verse 26.7,  $P=0/54$ ). However, more stay accompanied with more complications (22). Campos Mino et al. in Latin American countries showed 13.29% mean mortality rate in PICU but it is 5% in Europa. Cuba with 5.2% and Honduras with 25% was lowest and highest rates. In Spain and Portugal was 4% and 6% respectively (10).

### Conclusion

Our result is similar with other developed countries or higher level of medical care. Different subspecialists, pediatrics resident associated with professional nursing could be a significant decrease in PICU mortality rate.

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