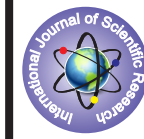


## Utility of Pediatric Risk Mortality (PRISM) Score in Predicting outcome tertiary level rural Pediatric Intensive Care Unit



### Pediatrics

**KEYWORDS:** Prognostic scores, Pediatric Critical care, PRISM 3 Mortality rate.

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### ABSTRACT

**Introduction:** To assess the severity of patients admitted in Pediatric Intensive Care units, scores are utilized which help in prognostication of outcome in terms of mortality and morbidity.

**Objective:** The purpose of this study is the utilization of the PRISM III score to predict outcome in sick children admitted in PICU in rural area.

**Methods:** Prospective cohort study, in a period of approx. 8 months, at a tertiary pediatric intensive care unit situated in rural area. The pediatric risk of mortality scores corresponding to the first 24 hours of hospitalization were recorded; additional data were collected to characterize the study population.

**Results:** 84 patients were included; twenty three (27.4%) died; mean pediatric risk of mortality score was significantly lower in patients who survived ( $P < 0.001$ ). On logistic regression analysis of the discharge status (survived / non-survived), taking PRISM score as the predictor of mortality, Odds Ratio was 17.408 with 95% confidence interval (5.11- 59.27) which was clinically significant.

**Discussion:** PRISM score was found to be effective tool to determine the overall outcome and can be an important tool to prognosticate about admitted patients. In this study pediatric risk of mortality showed satisfactory discriminatory performance in differentiating between survivors and non-survivors.

### Introduction

Pediatric critical care is about confluence of correct application of knowledge and technology to approach children suffering with variety of critical illnesses in appropriate manner to reduce the mortality and morbidity amongst them.

The capability to estimate patient's risk of death is extremely important because such estimate would be useful in achieving many different goals such as assessing patient's prognosis, ICU performance, ICU resource utilization and also evaluating therapies, controlling and matching severity of illness in clinical studies<sup>1</sup> which may help in changing in the management protocols to improve the overall outcome.

The lack of consistency, reliability, and accuracy in physician's subjective opinions concerning patient status necessitates quantitative clinical scores. Various scoring systems are currently being used in the PICU like Glasgow coma scale, Pediatric trauma score or Injury severity score, Pediatric index of mortality score, the physiologic stability index or the Pediatric risk of mortality (PRISM) score. Out of all these scoring systems, PRISM score was shown to be effective in predicting the risk of mortality and as well as in identifying the factors contributing to poor outcome.

PRISM is the Pediatric risk of mortality score which has been devised by Pollock et.al<sup>1</sup> to predict the mortality in hospitalized children. PRISM score is a revised form of physiologic stability index of mortality score. This score uses 14 physiologic variables (34 ranges) based on abnormalities observed at the bedside examination and laboratory assessment. The patient's past medical history is also taken into the account, particularly chronic illness and previous hospital admissions.

developed based on 11,000 consecutive admissions in 32 PICUs in various centers in United States.<sup>2</sup> Despite the availability of many severity predicting scoring systems, the outcome of PICUs in India has not been widely reported specially from the patient admitted in rural setup. Therefore with the above concept we have conducted this study in our PICU using PRISM-3 score.<sup>3</sup>

### Materials and Methods

A prospective study was conducted in the Pediatric Intensive Care Unit of the Dhiraj Hospital catering to the rural population of Vadodara district and adjacent states. The PICU is eight bedded with state of art facility and receives sick children with variety of diseases with age ranging from one month to 18 year. We studied all eligible patients meeting inclusion criterion admitted to the PICU from April 2016 to Sept 2016. Informed consent was taken prior from all the patients before enrollment in the study. Study was approved by the Institutional ethics Committee of Sumandeep Vidyapeeth.

**Inclusion criteria:** 1) All the patients admitted to the PICU as per the guidelines of I.A.P's PICU admission guidelines with medical conditions.<sup>3</sup>

### Exclusion criteria:

- 1) All the patients less than one month old.
- 2) Patients staying in PICU less than one Hour
- 3) Patients with history of burns
- 5) Patients who do not give consent to Participate in the study.
- 6) All those patients in whom all investigations of Prism Score were not indicated.

Therefore all the eligible patients was evaluated according to clinical & biochemical variables described in PRISM III.<sup>4</sup>

An updated version of this model, PRISM III has recently been

PRISM III scores corresponding to the first 24 hours of

hospitalization were recorded. The PRISM III score uses 14 physiologic variables (34 ranges) based on abnormalities observed at the bedside examination and laboratory assessment.<sup>4</sup> Total PRISM III score is calculated on the basis of 4 parameters cardiovascular and neurologic scoring, arterial blood gas analysis, biochemistry scoring, and hematology sub score comprising minimum score of 0 and maximum of 30,22,10,12 respectively. While overall score ranged from 0 to 74, higher the total score, the worse the prognosis. A rising score indicates deterioration poor outcome. All the eligible participants data were gathered to better characterize the study population: age, gender, underlying disease, duration of stay & final outcome. Data were tabulated and analyzed in a spreadsheet using STATA. The PRISM score values were analyzed to obtain the mean categorical variables were analyzed using the Pearson Chi-square test. Logistic regression was used to calculate the odds ratios (OR) and P values ≤ 0.05 was considered indicative of statistical significance. The discriminative power of the model (i.e., its ability to distinguish patients who would survive from those who would die) was calculated based on the ROC curve (area under the diagnostic yield curve). Mortality outcome was assessed on the basis primary system involvement.

**Results**

Out of total 128 eligible patients, 44 were excluded due to various reasons (38 left against medical advice, 3 expired within 2 hour of admission 3 refused to give consent for participation). Out of total 84 included patients (with mean age 64.9 months) were admitted due variety of diseases. Out of them most common 50% due respiratory diseases, 19.04% cardiovascular causes, 10.7% nervous system causes respectively. (Table-1), similarly the mortality was highest in respiratory disease group (39.1%) followed by CVS & gastrointestinal system, 21.7 and 13% respectively. Most of the CNS infection patient had good survival rate.

Mean age of survivors and non survivors were 59.04 and 69.6 months respectively with no statistical significance (P= 0.56) similarly outcome was not significantly affected by gender of patients (P=0.48) Study revealed that with increasing PRISM score the chance of survival decreased. Out of total 84 patient 61 survived (72.6%) & 23 (27.4%) died. The mean PRISM score was significantly lower in patients who survived than who died (Table-2)

On logistic regression analysis of the discharge status (survived / non-survived), taking PRISM score as the predictor of mortality, Odds Ratio was 17.408 with 95% confidence interval (5.112-59.279) which was clinically significant.

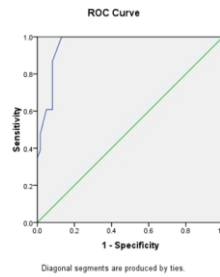
**Table - 1 Characteristic of Study Population**

| Variables              | N (%)     | Mean (Range)    |
|------------------------|-----------|-----------------|
| Number of Patients     | 84        |                 |
| Age (mths)             |           | 64.92 (2 - 192) |
| Gender                 |           |                 |
| Male                   | 49 (58.3) |                 |
| Female                 | 35 (41.7) |                 |
| Length of stay in PICU |           |                 |
| (a)Survivors           |           | 4.74±2.1        |
| (b)Non survivors       |           | 3.61±1.6        |

| CAUSE OF DISEASE       | No of patients(%) |
|------------------------|-------------------|
| Respiratory            | 42 (50)           |
| Cardiovascular         | 16 (19)           |
| Central Nervous System | 09 (10.7)         |
| Hematological          | 04 (7.1)          |
| Gastrointestinal tract | 06 (4.7)          |

**TABLE 2 – Prism score of patients in study**

|           | Results [Mean PRISM (± SD) ] | P value  |
|-----------|------------------------------|----------|
| death     | 26.91±7.337                  |          |
| survivors | 9.90±6.506                   | p <0.001 |



**Discussion**

The outcome of patients in PICU relies on various factors such as severity of illness, treatment received by the patient before seeking intensive care, time required to transfer the patient to ICU, availability of sophisticated equipment, staffing, and its rational use. The cost effectiveness of therapy and financial affordability of the parents is another important issue all this can be achieved successfully if the outcome of the patient is predicted early and managed accordingly. Various studies were carried out in past to compare PRISM with scoring system like PIM.<sup>5,6,7</sup> Present study was performed to find out the utility of PRISM III scoring in rural PICU setup.

Aragão et al. (2001)<sup>8</sup> observed that male patients had a higher risk of death. Although this trend was not observed in the present study where there was no significant difference between which was similar to other studies<sup>10</sup> while Few studies<sup>8,11</sup> showed that outcome is affected by age of the patient which was not obvious in present study. The difference may be due socioeconomic causes, type of disease pattern or time lapse between initiation of symptoms and admission in PICU.

Although some authors have shown that the PRISM score overestimated mortality<sup>5,12</sup> and that it is not appropriate in specific pediatric populations, such as post-trauma patients, patients with acute renal failure<sup>13</sup> in this study PRISM showed satisfactory discriminatory performance in differentiating survivors from non-survivors, supporting the conclusion that higher PRISM scores are correlated with increased risk of death, similar other studies.<sup>11,14,15</sup>

**Conclusion**

The PRISM score predict the outcome of patients admitted in PICU and thus constitutes a useful tool for the assessment of prognosis for pediatric patients admitted to a tertiary Pediatric Intensive Care Unit.

**References**

- Pollack MM, Ruttimann E, Getson PR. Pediatric risk of mortality (PRISM) score. Crit Care Med. 1988;16:1110-6. 10.1097/00003246-198811000-00006 [PubMed]
- Gunning K, Rowan K. ABC of intensive care: outcome data and scoring systems. BMJ. 1999;319:241-4. [PMC free article] [PubMed]
- Castello, Frank V, Cassano, Anthony, Gregory, Patrice, et al. The pediatric risk of mortality (PRISM) score and injury severity score (ISS) for predicting resource utilization and outcome of intensive care in pediatric trauma. Critical care medicine. 1999 May; 27:985-88.
- Poonam B, Amit G B. Severity scoring systems in P.I.C.U: Indian Journal of Anesthesia. 2008; 52(5):663-75.
- Slater A, Shann F. The suitability of the pediatric index of mortality (PIM), PIM2, the pediatric risk of mortality (PRISM), and PRISM III for monitoring the quality of pediatric intensive care in Australia and New Zealand. Pediatr Crit Care Med. 2004;5:447-54. 10.1097/01.PCC.0000138557.31831.65 [PubMed]
- Wolfer A, Silvani P, Musico M, Salvo I. Pediatric index of mortality 2 score in Italy: a multicenter, prospective, observational study. Intensive Care Med. 2007;33:1407-13. 10.1007/s00134-007-0694-z [PubMed]
- Ozer EA, Kizilgunesker A, Sarioglu B, Halicioglu O, Sutcuoglu S, Yaprak I. The Comparison of PRISM and PIM scoring systems for mortality risk in infantile intensive care. J Trop Ped. 2004;50:334-8. [PubMed]
- Aragão RCF, Albuquerque MFPM, Mello MJG, Ximenes RAA. Risk factors associated with death in children admitted to a paediatric intensive care unit. J Trop Pediatr. 2001;47:86-91.
- Singhal D, Kumar N, Puliye J.M, Singh S.K, Srinivas V. Prediction of mortality by application of PRISM score in Intensive care unit. Indian Paediatric journal. 2001 Jul; 38:714-19.
- Graziela de et.al. Application of Pediatric Risk of Mortality Score (PRISM) score and determination mortality risk factors in a Pediatric Intensive Care Unit. Clinics 2010;65(11):1087-92
- El-Nawawy A. Evaluation of the outcome of patients admitted to the pediatric

- intensive care unit in Alexandria using the pediatric risk of mortality (PRISM) score. *J Trop Pediatr.* 2003;49:109–14. 10.1093/tropej/49.2.109 [PubMed]
12. 16. Goddard JM. Pediatric risk of mortality scoring overestimates severity of illness in infants. *Crit Care Med.* 1992;20:1662–5. 10.1097/00003246-199212000-00010 [PubMed]
  13. 13. Fargason CA, Langman CB. Limitations of the Pediatric Risk of Mortality score in assessing children with acute renal failure. *PediatrNephrol.* 1993;7:703–7. 10.1007/BF01213327 [PubMed]
  14. 14. Bellad R, Rao S, Patil VD, Mahantshetti NS. Outcome of intensive care unit patients using pediatric risk of mortality (PRISM) score. *Indian Pediatr.* 2009;46:1091–2. [PubMed]
  15. 11. Van Brakel MJM, Vught AJ, Gemke RJB. Pediatric risk of mortality (PRISM) score in meningococcal disease. *Eur J Pediatr.* 2000;159:232–6. [PubMed]