

Validity of PRISM Score in Predicting Mortality in a Tertiary Care Hospital in North India

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ABSTRACT

Introduction: Severity of illness assessments is a critical part of ICU management. Study aimed at validating the Pediatric Risk of Mortality score (PRISM) score in predicting mortality in a tertiary care Pediatric Intensive Care Unit in North India.

Material and Methods: It was a Prospective observational study in a Pediatric Intensive Care Unit of a tertiary care hospital in North India. 411 patients were enrolled in the study. We divided patients into two categories based on PRISM-III 24 score - Patients with PRISM score >8 and those with a score of ≤8. Three hundred twenty-three (323) patients had a PRISM score ≤8, and 38 patients died in this category (11.8% mortality). In contrast, 88 patients had a PRISM score >8, and 32 patients died in this category (36.4% mortality).

Results: Prism score >8 was a significant predictor of mortality (chi-square value of 29.615 and a p-value of <0.001). The odds ratio for dying in the presence of prism score >8 was 9.28 (9 times more risk of dying compared to patients with a prism score >8) with a 95% CI of 2.47-7.43. Cox regression analysis showed that PRISM score >8 was an independent predictor of mortality.

Conclusion: PRISM score is a significant predictor of mortality.

Keywords: PRISM Score, PICU

INTRODUCTION

The severity of illness assessments is a critical part of ICU management and administration in both adult and pediatric medicine.¹ Several scoring systems have been developed in anesthesiology to predict mortality in admitted patients. By assessing the patient's mortality risk in the critical care unit and by assigning a score we aim to predict and prevent deaths in the critical care unit. However, mortality does not depend only on ICU performance but also on many other characteristics like demographic and clinical characteristic of population and infrastructure.²

Scoring systems have the aim of quantifying case mix to predict the outcome by using the resultant score.³ The PRISM score helps intensivists to predict outcome and assess the risk of mortality. The scoring provides various criteria which help in decision making in the ICU and identify patients who might benefit from timely interventions and care.^{2,4}

PRISM III 24 is a widely accepted score against which other scores are compared. There are certain limitations, however, with the use of PRISM score as a predictor of mortality. First, a lot of information is used to calculate the score. Secondly, it takes into account the worst reading within the initial 12 or 24 hours. So the score may be more of a diagnosing death rather than predicting it. Thirdly, patients in a good intensive

care unit may recover more rapidly than those in a poor unit and scores of patients in a poor intensive care unit may be high. This discrepancy can lead to an interpretation that higher mortality is due to sicker patients.⁴

We intended to study whether PRISM score can predict outcome in the form of mortality in children admitted in a Pediatric Intensive Care Unit of a tertiary care hospital in north India.

MATERIAL AND METHODS

The study was conducted at Pediatric Intensive Care Unit of Post Graduate Department of Pediatrics in Govt. G B Pant Hospital, an associated hospital of Govt. Medical College Srinagar Jammu and Kashmir India. It was a prospective observational hospital-based study conducted from 1st April 2015 to 31st March 2016. All patients admitted to the Pediatric Intensive Care Unit between the age of one year to 14 years were prospectively observed and studied and details entered in a predesigned proforma. Patients with missing data, patients who died during the first two hours of admission and patients who were admitted to intensive care unit with cardiopulmonary arrest and subsequently resuscitated were excluded from the study.

Critical illness severity was estimated with the Pediatric Risk of Mortality PRISM III 24 score and clinical and laboratory data needed to calculate PRISM III 24 score were reported as the worst value within 24 hours of admission.⁵

STATISTICAL ANALYSIS

Prism III 24 score and predicted PICU mortality rate was estimated with the free for 60 days PICUs version 3.2 software trial (PICUES v 3.2, children national medical center, Washington, USA).⁶

For the analysis of mortality risk factors, patients were allocated into two groups according to PRISM III 24 score values >8 and ≤ 8, based on previously published data showing increased mortality risk in patients with PRISM III 24 score >8.

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| Outcome | Percent |
|-------------------------|---------|
| Shifted to general ward | 83.00 |
| Died | 17.00 |
| Total | 100.00 |

Table-1: The outcome of a study population

| Score | Frequency |
|-------|-----------|
| ≤8 | 323 |
| >8 | 88 |

Table-2: PRISM score frequency

| PRISM III 24Score | | Mortality | | Total |
|-------------------|--|-----------|-------|--------|
| | | Survived | Died | |
| ≤8 | | 285 | 38 | 323 |
| | | 88.2% | 11.8% | 100.0% |
| >8 | | 56 | 32 | 88 |
| | | 63.6% | 36.4% | 100.0% |
| Total | | 341 | 70 | 411 |
| | | 83.0% | 17.0% | 100.0% |

Table-3: PRISM score and mortality

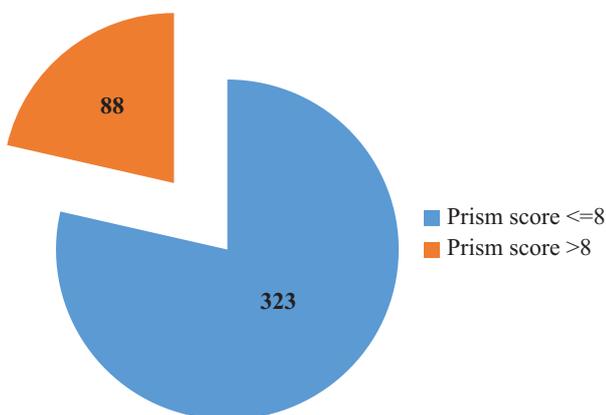


Figure-1: Pie chart showing PRISM score frequency

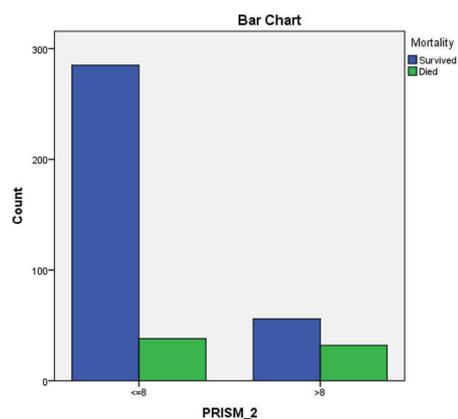


Figure-2: Shows the relation between PRISM score and mortality

Univariate analysis was performed through chi-square test and relative risk estimation with 95% confidence intervals. Cox proportional hazards were used for survival analysis. Statistical significance was set at a p-value of < 0.05.

RESULTS

We enrolled a total of 411 patients in our study of which

227 patients were males, and 184 patients were females. The outcome was assessed regarding death or discharge from the Pediatric Intensive Care Unit.

In the calculation of PRISM score of our study population, we allocated patients into two categories by PRISM score and found that 88 patients had a PRISM score >8 at admission (table-1). We concluded that PRISM score was a significant predictor of mortality. Mean total PRISM III-24 score was 4.99±4.93. Patients with a PRISM score >8 at admission had a significantly higher mortality than those with a PRISM score ≤8 (figure-1, table-2). Chi-square value was 29.615 and p-value was <0.001. The odds ratio of dying in the presence of PRISM score ≥8 was 9.28 with a 95% CI of 2.47 to 7.43.

Figure-2 shows the relation between PRISM score and mortality

Cox regression analysis of PRISM III 24 score as a predictor of mortality showed that it is an independent predictor with a p-value of 0.019 and 95% CI between 1.112 and 3.262 making it statistically significant (figure-2, table-3).

DISCUSSION

It is difficult to predict outcome in response to an insult because of differing potentials of individuals to recover in response to an insult. Outcome of a patient in an intensive care unit predicts policy formulation and optimum and maximal usage of limited resources especially in a country like India where tertiary care hospital facilities are meager.^{8,9} Therapeutic intervention scoring system (TISS) was the first score to be used in a pediatric intensive care unit. In this system score is decided by the severity of illness. Out of 70 nursing and medical procedures, a score of 1 to 4 is awarded based on complexity and invasiveness of intervention. TISS was found to be a useful score for obtaining comparable data which is used for administrative, management and clinical purposes. However, it is affected by diagnosis, indication that the TISS score depends on monitoring and therapeutic philosophies of the physicians and institutions using it.¹⁰

After that, physiology based scores were used to assess severity of acute illness. The most important among these scores was physiology stability index (PSI). It has a total of 34 measured variables from seven systems. The very existence of PRISM score has been derived from the physiologic stability index.¹¹

The PRISM score was validated and developed by Pollack et al. in an intensive care setting. Standard laboratory tests and clinical examination describe the severity of illness.¹¹ PRISM score allows for mortality assessment in the Pediatric Intensive Care Unit. It was developed from Physiologic Stability Index to reduce the number of variables from 34 to 14 and the number of ranges from 75 to 23 without losing the predictive power.¹² PRISM III 24 score helps us in predicting institutional performance. Models like PRISM III 24 score provide one of the best ways to organize an intensive care unit.¹³

PRISM III 24 score takes 24 hours to complete and can't be used in regulating admissions to the PICU but only to assess

illness severity and length of stay.¹⁴⁻¹⁷

Our study showed that increased PRISM score in admitted patients in the PICU is associated with increased mortality. Comparable studies also showed similar results.¹⁴⁻¹⁷

CONCLUSION

To conclude PRISM III 24 score is a good indicator of the initial severity of illness because a higher PRISM score is associated with higher mortality. In a country with limited resources like India there are few tertiary care referral centers for pediatric admission. In such cases PRISM III 24 score can serve as a useful guide as to which patients need intensive care. In addition to this the PRISM score has a role in the prediction of illness severity initially. In clinical epidemiology, PRISM score can serve as a useful marker to include or exclude patients from a particular study in clinical trials.

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