

Original Research Article

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TOPRSS: a simple clinical score to predict outcome and mortality in paediatric emergency department

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ABSTRACT

Background: To validate the clinical scoring system TOPRSS for the severity of the illness to prioritize care and predict outcomes in the emergency department.

Methods: This prospective hospital-based observational study in 100 children for three months carried out. Cases <1-month age or >14 years excluded. Demographics data, provisional diagnosis, hemodynamics, seizures, and other clinical parameters were recorded on predesigned proforma at the time of admission. Final outcome of the patient, either discharge or death, was considered as the primary variable.

Results: Out of 100 children, 92 were discharged and 8 deaths were recorded. Of the six variables, oxygen saturation and sensorium were found to be significantly associated with mortality. Logistic regression found that variables such as oxygen saturation and sensorium were strongly associated with mortality with a highly significant p value of 1% and variables such as pulse rate and seizures were also associated with mortality with a significant P value of 5%.

Conclusions: For triage in pediatric emergency, a patient with two or more abnormal variables should be evaluated to facilitate admission as they have a potential risk of death. TOPRSS score being a simple clinical scoring system which does not require any expertise can be applied at all levels of health care to identify critically ill patient referral to higher centre especially in regions of resource poor environment.

Keywords: Mortality, Oxygen saturation, Sensorium, TOPRSS score

INTRODUCTION

Paediatric critical care has been well developed, thus lowering mortality rates. But in developing countries, the golden hour for management is lost due to lack of knowledge in identifying a critically ill child.

Most of the existing scoring systems such as therapeutic intervention scoring system (TISS), physiologic stability index (PSI), paediatric risk of mortality (PRISM), PRISM acute physiology score (PRISM III- APS), score for neonatal acute physiology (SNAP II), other scoring systems in paediatrics are exhaustive and include multiple physical and laboratory parameters making them

uneconomical and labor-intensive and challenging to implement in the emergency department.¹⁻¹¹

Measurement of vital signs is the routine practice for children attending an emergency.¹² Hence, early identification and predicting outcome by simple clinical evaluation is the need of the hour. TOPRSS score has thus been evolved which stands for temperature, oxygen saturation, Pulse rate, Respiratory rate, Sensorium and Seizures to calculate the TOPRSS score for each patient. In our present study, TOPRSS a simple scoring system has been evolved using physical variables at the time of presentation to predict severity of illness and outcome in emergency department in a tertiary care hospital.

METHODS

Study setting

Data was collected from 100 cases who presented to Paediatric Emergency department and were subsequently admitted in Narayana Medical College and Hospital, Nellore, Andhra Pradesh over a period of 6 months (July -December 2019). This study is a hospital based observational study and data was collected with the permission of the Head of Department. Hence, the study did not require Ethical committee clearance. Informed consent from the parent/guardian of the child was obtained before collecting the data.

Inclusion criteria

Patients who presented to paediatric ER and were subsequently admitted to PICU or ward were included in the study.

Exclusion criteria

Patients <1 month or >14 years were excluded. Patients leaving the hospital against medical advice were excluded from the study.

Table 1: Scoring of abnormal clinical variables.

Variables	Normal range
Temperature	96.8 to 101.3°F
Oxygen saturation	>94%
Pulse rate(beats/min)	Infant: 100-180
	Toddler: 98-140
	Pre-schooler: 80-120
	School age child: 75-118
	Adolescent: 60-100
Respiratory rate (beats/min)	Infant: 30-53
	Toddler: 22-37
	Pre-schooler: 20-28
	School age child: 18-25
	Adolescent: 12-20
Sensorium	Alert in AVPU scale
Seizures	Absent

With the help of a predesigned proforma, date regarding patients' name, age, gender, registration number, provisional diagnosis, temperature, oxygen saturation, pulse rate, respiratory rate, sensorium and seizures were noted at the time of admission and final outcome was followed up till discharge or death. Axillary temperature is measured by thermometer.

Pulse oximeter was used to measure the oxygen saturation. Pulse rate and respiratory rate were counted manually. Sensorium level was assessed based on AVPU scale and the presence or absence of seizures was noted.

In order to calculate the 'TOPRSS' score for each patient, all 6 variables were categorized as normal (score:0) or abnormal (score:1) based on SIRS criteria for temperature, PALS criteria for oxygen saturation, pulse rate and respiratory rate and AVPU scale for sensorium where only 'alert' was considered to be normal (Table 1). The outcome was correlated with the variables and their total score.

The data was analyzed using SPSS- 22 software. The odds ratio with 95% confidence interval was calculated for each variable. Chi square test was used when more than two ordered two ordered groups were present. Logistic regression analysis was done to assess the magnitude of association.

RESULTS

Children between the age group of >1 month up to 14 years were included. Age wise distribution showed 10 patients in the age group >1 month up to 1 year, 60 patients in the age group >1 year up to 5 years and 30 patients in the age group >5 years up to 14 years. Out of 100 children enrolled, 92 were discharged while 8 children died in the hospital Table 2 (Figure 1).

Table 2: Demographics and outcome.

	Frequency	Percentage
<1 yr	10	10
1-5 yrs	60	60
6-14	30	30
Male	32	32
Female	68	68
discharge	92	92
Death	8	8
Mortality-respiratory	4	4
Mortality-neurological	2	2
Mortality-septic shock+cardiac	2	2

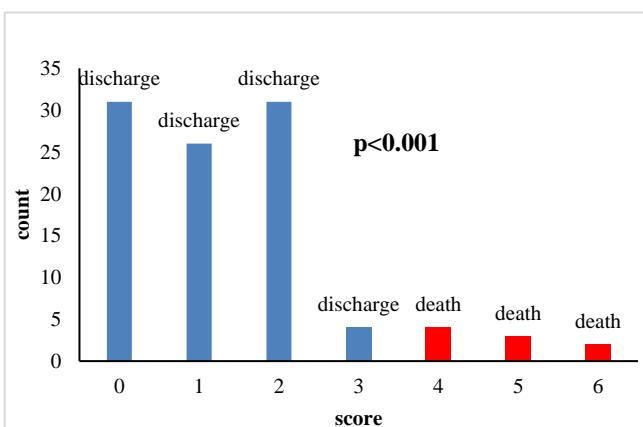


Figure 1: TOPRSS score and outcome

Infectious etiology cause without any focus followed by respiratory and neurological disorders were among the commonest causes. Mortality was highest with respiratory diseases followed by septic shock, neurological disorders and cardiac diseases.

The distribution of abnormality of temperature in age <5 years and age >5 years is equal. The distribution of seizures was equal in both <5 years & >5 years age group. The distribution of abnormality of SPO2 in age <5 years is more when compared to age >5 years. (chi square; $P=0.006$ at 5%). The distribution of heart rate abnormality is more in age <5 years compared to age >5 years. The distribution of abnormality of Respiratory Rate is more in age <3 years than age >5 years. (P value <0.001 at 1%). Abnormal sensorium is more in age <5 years than age >5 years. Mortality was higher in children aged <5 years without any gender preference.

In terms of correlation with mortality, among the 6 variables, oxygen saturation and sensorium were highly significant while pulse rate and seizures were significant. Those children with a total score >3 had 100 times risk of mortality compared to those with a score <3 . This scoring system's predictive ability showed accurate mortality prediction in 100% of subjects (Figure 2).

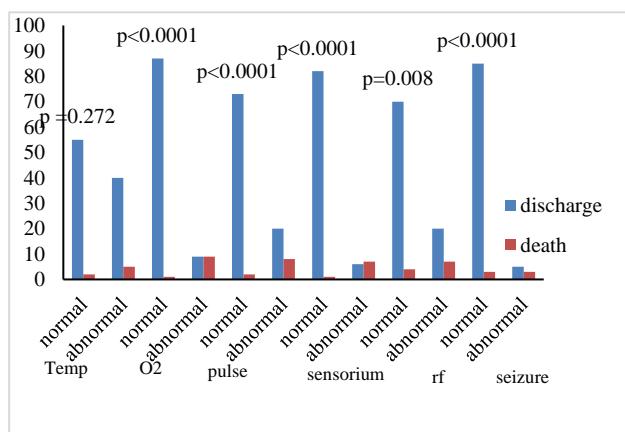


Figure 2: TOPRSS and number of abnormal variables in discharge and death patients.

DISCUSSION

Triage has a crucial role in paediatric emergency department to ensure that critically ill children are efficiently managed. Simple clinical scoring systems that can be utilised at the point of first contact with the patient are essential in early identification and outcome prediction in the critically ill. In comparison with the already available time consuming PRISM score and PIM score, which require laboratory investigations, the TOPRSS score can be easily applied at the time of admission. With regard to the simplicity of this score, it can also be applied in rural centres that lack adequate facilities, to promptly refer the critically ill to a higher

centre. In our study, mortality observed as 8%, belongs to <5 years age.

The maximum possible score for the child was found to be 6, but in our study the maximum observed score was 5. The increase in the number of abnormal variables of TOPRSS score caused a statistically significant increase in the mortality rate. TOPRSS score of 3 or more was significantly associated with the mortality. Similar observations were noted in other studies.¹³⁻¹⁷

The performance of TOPRSS score in our study was excellent in prediction of Mortality. All the scoring systems are either for ICU patients or requiring extensive laboratory variables and observation, it requires specialized training program for doctors and other health care staff for implementation. WHO formulated emergency triage, assessment and the treatment guidelines (ETAT).

In our study, the physical variables alone were helpful in predicting the outcome. No training is required for implementation of the TOPRSS score and can be applied immediately when the patient comes in emergency.¹⁶⁻¹⁸ A total of six physical variables were studied, out of which 4 variables, such as SpO₂, PR, sensorium, seizure had a significant effect on the outcome. Logistic regression found that variables such as oxygen saturation and sensorium were strongly association with mortality with a highly significant p value of 1% and variables such as PR and seizures were also associated with mortality with a significant p value of 5%. Logistic regression found that variables like SPO₂ and HR are strongly associated with Mortality with a P value highly significant at 1%. RR and Sensorium variables are strongly associated with the mortality with a p value highly significant 5%.

Limitation of the study is that it was center study with less sample size.

CONCLUSION

From the derived results and the discussion, the TOPRSS score when applied at the time of admission in paediatric emergency department aids in rapid assessment of the severity of illness; early triage of critically ill children, prompt management and mortality prediction.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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