Original Article

DOI: 10.7860/IJNMR/2025/76723.2441

Paediatrics Section

Comparison of Different Neonatal Disease Severity Scoring Systems for Predicting Mortality Risk in Neonatal Intensive Care Unit: A Cross-sectional Study

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ABSTRACT

Introduction: To predict the risk of mortality among neonates, birth weight and gestational age have previously been used. However, a single parameter was inadequate to predict the severity of illness and outcomes for neonates. Therefore, a combination of parameters has been employed to create disease severity scoring systems aimed at predicting mortality. Consequently, various scoring systems have been developed in recent years. There is a need to assess the severity of illness in newborns, provide prognostic information to parents and formulate a new disease severity scoring system for the Neonatal Intensive Care Unit (NICU) unit.

Aim: To evaluate and compare the predictive accuracy of neonatal disease severity scoring systems {Score for Neonatal Acute Physiology-Perinatal Extension II (SNAP-PE II), Transport Risk Index of Physiologic Stability (TRIPS), Mortality Index for Neonatal Transportation (MINT), Transport Related Mortality Score (TREMS) and Sick Neonate Score (SNS)} in assessing neonatal mortality risk upon admission to the NICU.

Materials and Methods: This analytical cross-sectional study was conducted between September 2023 and August 2024 at Level II and Level III NICU of Malabar Medical College Hospital and Research Centre, Ulliyeri, Kozhikode, Kerala, India. Data on neonatal characteristics at admission, perinatal characteristics, maternal characteristics and transport information for 400 newborns who met the inclusion criteria were collected. Each parameter from the five disease severity scoring systems was obtained and recorded. The scores for SNAP-PE II, TRIPS, MINT, TREMS and SNS for all cases were then calculated. At the end of the seventh day of admission, the outcomes were measured as survivors and non survivors.

Results: Out of 390 neonates studied, 330 (84.6%) were survivors and 60 (15.4%) were non survivors. The median and interquartile range of the SNAP-PE II, TRIPS, MINT, TREMS and SNS scoring systems were higher for non survivors than for survivors. Key predictors of mortality, including admission weight, birth weight, 1-minute and 5-minute Appearance, Pulse, Grimace, Activity and Respiration (APGAR) scores, gestational age and the need for resuscitation, were identified as strong indicators of mortality, regardless of age at admission.

Conclusion: Neonatal disease severity scoring systems provide prognostic information, which assists in counselling parents. They also facilitate the evaluation of transport systems.

Keywords: Mortality prediction, Neonatal morbidity, Neonatal transport, Scoring criteria

INTRODUCTION

On an individual basis, clinicians may be able to prognosticate as accurately as any scoring system, as they can take into account the full and changing clinical picture of a child. Stevens and colleagues demonstrated that clinicians are adept at identifying high-risk infants but tend to overestimate the risk of death; in other words, they provide good discrimination but poor calibration [1]. This observation warrants further investigation, as clinical prognostications are often used in end-of-life decisions. It is possible that combining clinicians' assessments with a scoring system could improve the accuracy of risk assessment [1]. Although this may be significant in clinical practice for individuals, using clinicians' opinions for group predictions and research purposes would introduce an unacceptable level of subjectivity and potential bias.

For comparison of outcomes across different NICUs, the need to adequately adjust outcomes for differences in case mix (risk adjustment) is well recognised [2,3]. Conversely, those treating patients with poor prognoses would expect a higher rate of "poor" outcomes. As Poloniecki J stated, risk adjustment attempts to help answer the question, "Is it you, Doc, or your patients, who are below average?" [4]. This methodology is likely to be used increasingly for comparing outcomes over time and between units since the Kennedy report into Paediatric Cardiac Surgery [5].

In these circumstances, a score should quantify the morbidity of the infant when they first arrive under the care of the unit, before any interventions can influence their condition or score. Clearly, the quality of care received antenatally or during resuscitation may be important and cannot easily be accounted for by a scoring system. Even if basic birth details, such as weight and gestational age, are used on their own, differing policies on whom to resuscitate can affect comparisons between units. Although data collected shortly after admission (up to 24 hours) may produce better discriminating models than data collected solely at birth, incorporating information that is influenced by care can be problematic [6].

In addition to comparing mortality-for example, in Scotland and Australia [7]-disease severity scores have also been used to investigate other outcomes, such as narcotic administration [8], blood transfusion rates [9], and retinopathy of prematurity [10]. Although some scores may perform well in such contexts, caution is

warranted when using a score to investigate an outcome for which it was not designed. For instance, the risk factors influencing mortality may differ significantly from those impacting the need for blood transfusion, highlighting the distinct nature of risk factors for various outcomes. By assessing the infant upon admission, one can quantify the severity of illness of neonates. This study allows us to implement one of the validated neonatal disease severity scoring systems.

There are many scales available in the literature, but few of the most commonly used scales to predict mortality include: SNAP-PE II, TRIPS, MINT, TREMS and SNS [11-16]. However, until now, no previous study has evaluated which scale is superior among these.

Hence, the present study was conducted to compare the neonatal disease severity scoring systems (SNAP-PE II, TRIPS, MINT, TREMS, and SNS) for predicting neonatal mortality risk.

MATERIALS AND METHODS

This was an analytical cross-sectional study conducted at the Level II and Level III NICUs of Malabar Medical College Hospital and Research Centre, Ulliyeri, Kozhikode, Kerala, India, between September 2023 and August 2024. The study commenced after obtaining ethical clearance from the Institutional Ethical Committee (IEC) of Malabar Medical College Hospital and Research Centre (MMCH&RC/IEC/08/2023/21).

Inclusion criteria: All neonates admitted to the NICU during the study duration were included in the study.

Exclusion criteria: Neonates who died within 12 hours of admission, those Discharged Against Medical Advice (DAMA), or those discharged at the request of their parents within seven days of admission were excluded from the study.

Sample size calculation: The sample size was calculated based on a previous study conducted by Malhotra RK and Indrayan A [17]. The parameters included sensitivity: 81%, specificity: 71%, absolute precision: 0.07, and prevalence: 0.2. Consequently, the resulting sample size was 400.

Data collection: Written informed consent was obtained from the parents of eligible neonates. Variables were collected prospectively from medical records, clinical examinations and laboratory investigations. Data were recorded by paediatric residents upon arrival at the newborn emergency department. The proforma used for standardised data collection included demographic data (date and time of arrival, age, sex, admission weight), birth history (mode of delivery, date and time of birth, place of delivery, birth weight, resuscitation details, Apgar scores), maternal details (age, consanguinity, obstetric history, gestational age, blood group, HIV/HBsAg/VDRL status, maternal illnesses, obstetric ultrasound findings, Premature Rupture of Membranes (PROM), antenatal steroids), transport data (referral hospital, mode of transport, reason for referral, prior hospitalisation, treatment received, transport duration, distance travelled, transport team composition, and interventions during transport), clinical findings (congenital anomalies, admission diagnosis categorised into nine headings), and specific variables for each scoring system (SNAP-PE II, TRIPS, MINT, TREMS, SNS) documented in the proforma [Table/Fig-1] [11-15].

Scoring Systems

- **SNAP-PE II:** Variables were collected from medical records within 12 hours of hospitalisation. Multiple seizures is one of the parameters in SNAP-PE II, and the observation period is typically 12 hours, as per unit protocol.

Scale	Parameters	Cut-off range	Reference
SNAP-PE II	• Mean blood pressure • Lowest temperature • PO_2/FiO_2 ratio • Lowest serum pH • Multiple seizures • Urine output (mL/kg/hour) • APGAR score • Birth weight (gm) • Small for gestational age	Min-max: 0-162 Cut-off: 37	[11,12]
TRIPS	• Systolic blood pressure • Temperature • Respiratory status • Response to painful stimuli	Min-max: 0-65 Cut-off: 20	[12]
MINT	• Birth weight (grams) • Age • PaO_2 • pH • APGAR at 1 minute • Congenital abnormality • Heart rate at time of call	Min-max: 0-40 Cut-off: 10	[13]
TREMS	• Hypoglycaemia • Hypoxia • Hypercarbia • Hypotension • Hypothermia	Min-max: 0-5 Cut-off: 3	[14]
SNS	• Respiratory effort • Heart rate • Mean blood pressure (mm Hg) • Axillary temperature (°C) • Capillary filling time (seconds) • Random blood sugar (mg/dL) • SpO_2 in room air	Min-max: 0-14 Cut-off: 8	[15]

[Table/Fig-1]: Parameters of five neonatal severity scoring systems.

- **TRIPS, MINT, TREMS, SNS:** Data were collected immediately (within 15 minutes) upon arrival at the emergency department.

Variables for the SNAP-PE II scoring were extracted from the patient medical records and documented in a form specifically created for this purpose within 12 hours of hospitalisation. Mean blood pressure was recorded using a non invasive blood pressure monitoring technique [18]. To measure the lowest temperature (°F), axillary temperature is taken with an electronic probe thermometer. The probe is held perpendicular to the patient, and the arm is securely pressed against the side of the chest. Temperature is recorded after a peep sound is heard [19]. PaO_2 is calculated through arterial blood gas analysis. The FiO_2 requirement is determined by measuring the oxygen requirement of the infant to maintain haemoglobin saturation between 90-95% during the first 12 hours. This is done by taking readings from the air-oxygen (O_2) blender in ventilated neonates or by using a Miniox-3 meter to test oxygen concentration in infants receiving head box oxygen. The PaO_2/FiO_2 ratio is measured based on the above values. The lowest serum pH is calculated by obtaining an arterial blood sample and measuring the lowest pH in the first 12 hours of admission. Multiple seizures are defined as more than two episodes of convulsions during the 12-hour observation period. Urine output is documented during the first 12 hours of admission via bladder catheterisation [20]. The APGAR score at one minute and the birth weight are taken from birth records. The Small for Gestational Age (SGA) classification is based on the birth weight/gestational age curve used by Kramer MS et al., which defines SGA as infants with birth weights below the third percentile [21]. Newborns who died within 12 hours of admission were excluded from the study. To determine the SNAP-PE II score, newborns who did not receive immediate care at a healthcare institution (home childbirth) were also excluded due to the absence of birth weight figures and APGAR status.

The TRIPS score was calculated using data collected immediately (within 15 minutes) upon arrival at the neonatal emergency department. Seven variables were used to calculate MINT score at the time of arrival (within 15 minutes) at the neonatal emergency department.

TREMS consists of five variables, as shown in [Table/Fig-1]. Hypoglycaemia was defined as a blood sugar level below 45 mg/dL, hypoxia as a pulse oximetry measurement of oxygen saturation below 85%, hypercarbia as a PCO_2 value in arterial blood gas analysis greater than or equal to 55 mm Hg, hypotension as blood pressure values below the 10th percentile for gestational and postnatal age, and hypothermia as a body temperature below 36°C. The TREMS score was calculated using data collected immediately (within 15 minutes) upon arrival at the neonatal emergency department.

The SNS includes seven variables. In SNS scoring, higher scores are assigned for greater disease severity. The SNS score was calculated using data collected immediately upon arrival at the neonatal emergency department. Variables in the neonatal disease severity scoring systems (SNAP-PE II, TRIPS, MINT, TREMS, and SNS) were documented in a structured proforma. The total score was calculated from each variable. Neonates who were not observed until the seventh day of hospitalisation (due to request or DAMA discharges) were excluded from the study. At the end of the seventh day of admission, the outcome was measured as survivors and non survivors.

STATISTICAL ANALYSIS

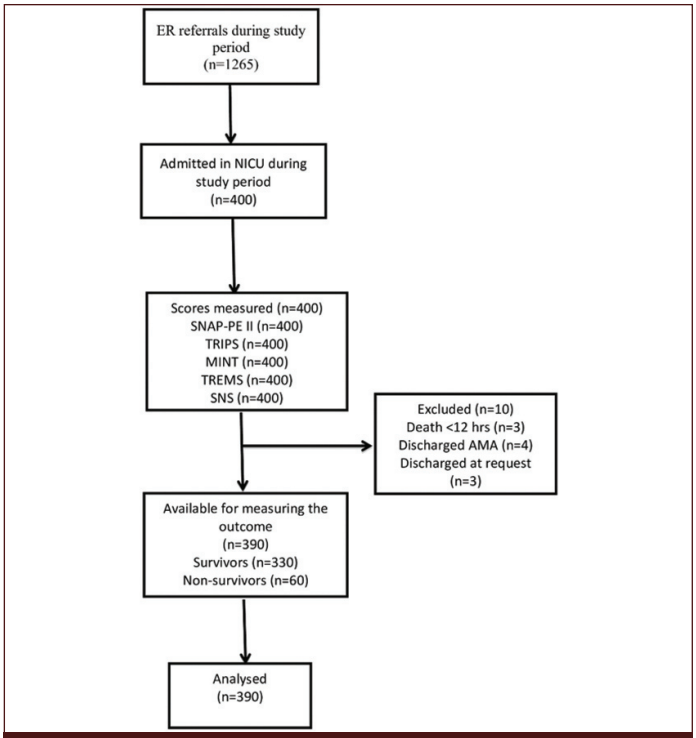
Data were analysed using Statistical Package for the Social Sciences (SPSS) software (Version 20.0). Descriptive statistics were employed to summarise the characteristics of the study population. Independent samples t-tests, Chi-square tests and Pearson correlation tests were utilised to compare the groups. Logistic regression analysis was conducted to determine the predictive ability of each scoring system for neonatal mortality. Receiver Operating Characteristic (ROC) curves were generated to compare the performance of the different scoring systems. Sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV), and likelihood ratios were calculated for each scoring system. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 1,265 newborn infants were transported to our medical newborn emergency department between 1st September 2023 and 31st August 2024, of which 400 neonates were eligible for admission to the Level II and Level III NICU units. Out of these, 390 neonates were included in the final analysis. In the cohort of 390 neonates, 330 were survivors, and 60 were non survivors. Statistical analysis were conducted for the 390 neonates [Table/Fig-2].

Among the 390 neonates, 244 (62.6%) were boys, 143 (36.7%) were girls, and 3 (0.8%) presented with disorders of sexual development (ambiguous genitalia/intersex). The admission age ranged from one day to 28 days, with a median of 4 days (IQR 1, 12). The mean admission weight of the infants was 2537.41±697.52 grams. A total of 79 (20.3%) neonates had congenital malformations, either major or minor, while 311 (79.7%) were normal [Table/Fig-3]. Various malformations were noted, including congenital heart disease, congenital diaphragmatic hernia, eventration of the diaphragm, tracheoesophageal fistula, hydrocephalus, trisomy 21, 18, and 13, neural tube defects, cystic hygroma and others.

Most neonates were delivered via labour, with 233 (59.7%) delivered naturally. Additionally, 38 (9.7%) neonates were delivered by elective Lower Segment Caesarean Section (LSCS), 113 (29%) by emergency LSCS, and 6 (1.5%) were delivered instrumentally using either forceps or vacuum. The birth weight of the study population ranged from 680 grams to 4,100 grams, with a mean birth weight of 2587.38±675.87 grams. The 1-minute APGAR scores in the study population ranged from 1 to 9, with a mean score of 6.35±1.45. The 5-minute APGAR scores ranged from 4 to 10, with a mean score of 7.76±0.99 [Table/Fig-4].



[Table/Fig-2]: Flow diagram.

Variable	Survivors (N=330) n (%)	Non survivors (N=60) n (%)	Total (N=390) n (%)	p-value
Age at admission				
<24 hours	96 (29.1)	29 (48.3)	125 (32.1)	0.025
24-72 hours	51 (15.5)	9 (15)	60 (15.4)	
4-7 days	68 (20.6)	9 (15)	77 (19.7)	
8-28 days	115 (34.8)	13 (21.7)	128 (32.8)	
Sex				
Boys	206 (62.4)	38 (63.3)	244 (62.6)	0.759
Girls	121 (36.7)	22 (36.7)	143 (36.7)	
DSD#	3 (0.9)	0	3 (0.8)	
Admission weight (grams)				
≤1000	3 (0.9)	5 (8.3)	8 (2.1)	<0.001
1001-1500	22 (6.7)	9 (15)	31 (7.9)	
1501-2500	113 (34.2)	19 (31.7)	132 (33.8)	
2501-4000	188 (57.0)	27 (45)	215 (55.1)	
Above 4000	4 (1.2)	0	4 (1)	

[Table/Fig-3]: Neonatal characteristics at admission of study subjects.
#Disorders of sexual development (ambiguous genitalia/intersex)

Parameters§	Survivors	Non survivors	Overall	p-value¥
Age at admission (days)¶	4 (1, 13)	2 (1, 6)	4 (1, 12)	0.007#
Admission weight (grams)	2583.47± 668.66	2284.08± 798.44	2537.41± 697.52	<0.001

Birth weight (grams)	2627.47± 644.04	2366.92± 800.21	2587.38± 675.87	<0.001
APGAR at 1 minute	6.36±1.43	6.32±1.54	6.35±1.45	0.841
APGAR at 5 minutes	7.77±0.99	7.72±1.01	7.76±0.99	0.689
Duration of transport (hours)¶	60 (45, 150)	97.5 (45, 180)	60 (45, 180)	0.135#

[Table/Fig-4]: Average values of study population.
§Mean±SD; ¶Median (IQR); ¥Independent t-test; #Mann-Whitney u test

There were significant differences between survivors and non survivors concerning age at admission, admission weight, birth weight, while APGAR scores at 1 minute and 5 minutes and duration of transport showed no significant difference. [Table/Fig-4]. Maternal age, consanguinity, gravida status and maternal medical illnesses did not show any statistically significant differences between survivors and non survivors. However, maternal characteristics such as abnormal anomaly scans and PROM demonstrated significant p-values [Table/Fig-5].

Variable	Survivors (N=330) n (%)	Non survivors (N=60) n (%)	Total (N=390) n (%)	p-value
Maternal age in years				
18-20	28 (8.5)	6 (10)	34 (8.7)	0.774
21-25	174 (52.7)	30 (50)	204 (52.3)	
26-30	108 (32.7)	22 (36.7)	130 (33.3)	
Above 30	20 (6.1)	2 (3.3)	22 (5.6)	
Consanguinity				
Yes	34 (10.3)	11 (18.3)	45 (11.5)	0.063
No	296 (89.7)	49 (81.7)	345 (88.5)	
Gravida				
Primigravida	164 (49.6)	24 (40)	188 (48.2)	0.167
Multigravida	166 (50.3)	36 (60)	202 (51.7)	
Medical illnesses				
Yes	72 (21.8)	9 (15)	81 (20.8)	0.152
No	258 (78.2)	51 (85)	309 (79.2)	
Obstetrical USG				
Normal	306 (92.7)	50 (83.3)	356 (91.3)	0.022
Abnormal	24 (7.3)	10 (16.7)	34 (8.7)	
PROM				
Yes	65 (19.7)	5 (8.3)	70 (17.9)	0.021
No	265 (80.3)	55 (91.7)	320 (82.1)	

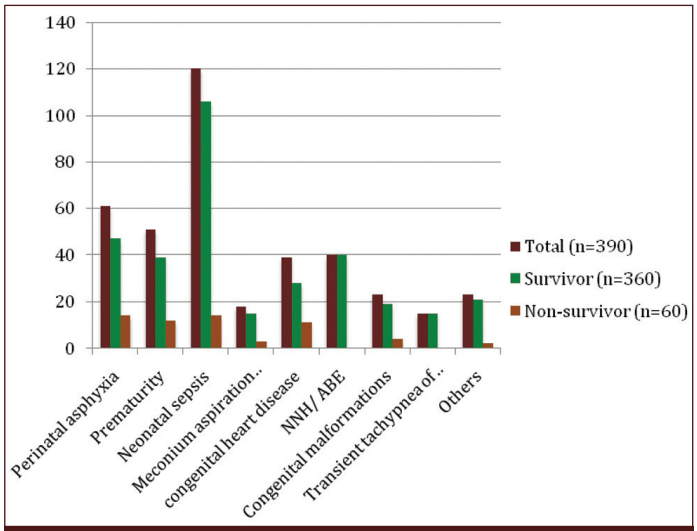
[Table/Fig-5]: Comparison of maternal characteristics between survivors and non survivors.

Clinical diagnoses, including perinatal asphyxia, prematurity, neonatal sepsis, meconium aspiration syndrome, transient tachypnoea of the newborn, and congenital malformations, did not show any statistical significance between survivors and non survivors. In contrast, clinical diagnoses involving congenital heart disease and neonatal hyperbilirubinemia-whether or not accompanied by acute bilirubin encephalopathy-showed statistical significance between survivors and non survivors [Table/Fig-6,7].

The overall median SNAP-PE II score was 12, with an interquartile range of 0 to 22. The median SNAP-PE II score for survivors was 5, with an interquartile range of 0 to 18, whereas the median SNAP-PE II score for non survivors was 33.5, with an interquartile range of 19.75 to 47 (p-value <0.001). The overall median TRIPS score was 11, with an interquartile range of 5 to 19. The median TRIPS score for survivors was 7, with an interquartile range of 4 to 13, whereas the median TRIPS score for non survivors was

Clinical diagnosis	Survivors (N=330) n (%)	Non-survivor (N=60) n (%)	Total (N=390) n (%)	p-value
Perinatal asphyxia	47 (14.2)	14 (23.3)	61 (15.6)	0.07
Prematurity	39 (11.8)	12 (20)	51 (13.1)	0.08
Neonatal sepsis	106 (32.1)	14 (23.3)	120 (30.8)	0.175
MAS	15 (4.5)	3 (5)	18 (4.6)	0.88
CHD	28 (8.5)	11 (18.3)	39 (10)	0.02
NNH/ABE	40 (12.1)	0 (0)	40 (10.3)	0.004
Congenital malformations	19 (5.8)	4 (6.7)	23 (5.9)	0.78
TTN	15 (4.5)	0 (0)	15 (3.8)	0.09
Others	21 (6.4)	2 (3.3)	23 (5.9)	0.36

[Table/Fig-6]: Comparison of clinical diagnosis at admission between survivors and non survivors.
All figures in round brackets are percentages. MAS: Meconium aspiration syndrome; CHD: Congenital heart disease; NNH/ABE: Neonatal hyperbilirubinemia with acute bilirubin encephalopathy: Congenital malformations include either major or minor malformations. Many malformations were noted, which include congenital heart disease, congenital diaphragmatic hernia, eventration of diaphragm, tracheoesophageal fistula, hydrocephalus, trisomy 21, 18 and 13, neural tube defects, cystic hygroma, etc. TTN: Transient tachypnea of newborn. Others- bronchiolitis, inborn errors of metabolism, intra uterine growth restriction, intra uterine infection, vitamin K dependent bleeding disorder of newborn, hypernatremic dehydration and hydropsfetalis



[Table/Fig-7]: Clinical diagnosis at admission and outcome.

28, with an interquartile range of 21 to 35.75 (p-value <0.001) [Table/Fig-8].

Score	Survivors median (IQR)	Non survivors median (IQR)	Overall median (IQR)	p-value
SNAP-PE II	5 (0, 18)	33.5 (19.75, 47)	12 (0, 22)	<0.001
TRIPS	7 (4, 13)	28 (21, 35.75)	11 (5, 19)	<0.001
MINT	0 (0, 1.25)	8 (6, 11)	0 (0, 5)	<0.001
TREMS	0 (0, 1)	3 (2, 3)	0 (0, 1)	<0.001
SNS	2 (1, 4)	7 (7, 9)	2 (1, 5)	<0.001

[Table/Fig-8]: Comparison of neonatal disease severity scoring systems (SNAPPE-II, TRIPS, MINT, TREMS and SNS) for predicting mortality.

The cut-off points were taken from the literature, which includes 37, 20, 10, 3, and 8 for SNAP-PE II, TRIPS, MINT, TREMS, and SNS, respectively, for predicting mortality. Sensitivity, specificity, PPV, NPV, and likelihood ratios for neonatal disease severity scoring systems in the prediction of mortality based on the above cut-off points are described in [Table/Fig-9,10].

SNS had the highest Area Under Curve (AUC) (0.966), followed by TREMS (0.939), TRIPS (0.935), MINT (0.918), and SNAP-PE II (0.844) [Table/Fig-11,12].

Score	Cut-off point	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)
SNAP-PE II	37	41.7 (29.1-55.1)	92.7 (89.4-95.3)	51 (36.3-65.6)	89.7 (86-92.7)
TRIPS	20	88.3 (77.4-95.2)	90 (86.2-93)	61.6 (50.5-71.9)	97.7 (95.3-99.1)
MINT	10	36.7 (24.6-50.1)	98.2 (96.1-99.3)	78.6 (59-91.7)	89.5 (85.9-92.5)
TREMS	3	51.7 (38.4-64.8)	97.9 (95.7-99.1)	81.6 (65.7-92.3)	91.8 (88.4-94.4)
SNS	8	48.3 (35.2-61.6)	97.6 (95.3-98.9)	78.4 (61.8-90.2)	91.2 (87.8-94)

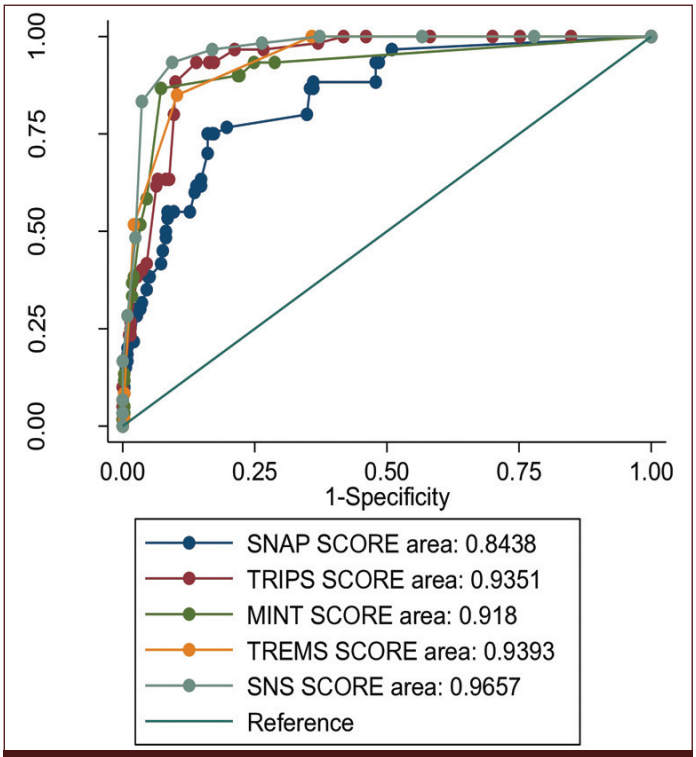
[Table/Fig-9]: Sensitivity, specificity, PPV and NPV for prediction of mortality by scoring systems.

Score	Cut-off point	Likelihood ratio	
		(+)(95% CI)	(-)(95% CI)
SNAP-PE II	37	5.73 (3.52-9.33)	0.63 (0.51-0.78)
TRIPS	20	8.33 (6.31-12.37)	0.13 (0.06-0.26)
MINT	10	20.17 (8.54-47.65)	0.65 (0.53-0.78)
TREMS	3	24.36 (11.25-52.75)	0.49 (0.38-0.64)
SNS	8	19.94 (9.58-41.49)	0.53 (0.41-0.68)

[Table/Fig-10]: Likelihood ratio prediction of mortality by scoring systems (cut-off points from literature).

Test result variable (s)	AUC	Std. Error	95% Confidence interval	
			Lower limit	Upper limit
SNAP - Total score	0.844	0.026	0.792	0.895
TRIPS - Total score	0.935	0.013	0.908	0.960
MINT - Total score	0.918	0.023	0.873	0.963
TREMS - Total score	0.939	0.013	0.914	0.965
SNS - Total score	0.966	0.009	0.948	0.984

[Table/Fig-11]: Area Under Curve (AUC) values for SNAPPE-II, TRIPS, MINT, TREMS and SNS scoring systems for predicting mortality.



[Table/Fig-12]: Receiver operating characteristics curves for SNAPPE-II, TRIPS, MINT, TREMS and SNS scoring systems for predicting morality.

DISCUSSION

Present study compared five neonatal disease severity scoring systems (SNAP-PE II, TRIPS, MINT, TREMS and SNS) in neonates who were transported to our unit. This study is one of the few that has compared these five neonatal disease severity scoring systems [11-16].

The median scores and interquartile ranges for non survivors were 33.5 (19.75, 47), 28 (21, 35.75), 8 (6, 11), 3 (2, 3), and 7 (7, 9) for SNAP-PE II, TRIPS, MINT, TREMS and SNS, respectively. In the study by Sutcuoglu S et al., the mean scores of MINT, SNAP-PE II and TREMS were reported as 6.4±6.3, 8.8±12, and 1.3±1.1, respectively [15]. Harsha SS and Archana BA reported that the mean SNAP-PE II score among expired infants was 45.72±18.68 [12]. In the study by Rathod D et al., the average SNS for all neonates was 10, while it was 6 for those who expired [16].

In present study, the SNS score had the highest sensitivity, whereas the SNAP-PE II score had the lowest sensitivity in predicting mortality. The specificity of the SNS score was higher than that of the other scoring systems, while the SNAP-PE II score demonstrated the lowest specificity. The PPV was highest in the TREMS score, whereas the SNAP-PE II score had the lowest PPV. The NPV of the TRIPS score was higher than that of the other scoring systems in predicting mortality, whereas the MINT score had the lowest NPV.

This study is among the few that compared five neonatal disease severity scoring systems [22-25]. Present study measured the severity of illness in neonates in the emergency room and identified high-risk infants; this helped us to deliver suitable interventions for specific neonates. The mortality rate was low during the study period. Neonatal disease severity scoring systems provide prognostic information, which helped us to offer counselling and prognostic insights for parents. Present study evaluated transport systems in our setup; this study will assist us in improving our neonatal transport system. This study was an initiative aimed at deriving and validating a new neonatal disease severity scoring system to assess the severity of illness in our neonatal unit in the future.

Limitation(s)

Present study evaluated these neonatal disease severity scoring systems in Level II and III units, rather than exclusively in a Level III unit. The sample size was small and authors were unable to generate a new neonatal disease severity scoring system for our unit using logistic regression analysis.

CONCLUSION(S)

Neonatal disease severity scoring systems assist in assessing the severity of illness. They provide prognostic information, which helps in counselling parents. Additionally, these systems aid in evaluating the transport system for newborns. All five neonatal disease severity scoring systems assessed are useful predictors of mortality in an extramural emergency setting. SNS is a simple, non invasive scoring system that achieves the maximum area under the curve for predicting mortality. In the future, this study will be helpful in generating a new neonatal disease severity scoring system that is simple, non invasive and can be used in our unit to predict outcomes.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Nov 09, 2024
- Manual Googling: Apr 07, 2025
- iThenticate Software: Apr 16, 2025 (14%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Nov 08, 2024**
Date of Peer Review: **Dec 18, 2024**
Date of Acceptance: **Apr 18, 2025**
Date of Publishing: **Jun 30, 2025**