

SNAPPE II Score as a Predictor of Neonatal Mortality in NICU at a Tertiary Care Hospital in Kolar - A Prospective Observational Study

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ABSTRACT

Background: Advances In Neonatal Intensive Care Units (Nicus) Have Significantly Decreased Mortality And Morbidity While Increasing Survival Rates Among Neonates. To Aid In The Prediction Of Neonatal Outcomes, Various Scoring Systems Have Been Developed, One Of Which Is The Snappe-Ii (Score For Neonatal Acute Physiology With Perinatal Extension-Ii). This Tool Is A Modified Version Of The Original Snap (Score For Neonatal Acute Physiology) And Is Widely Used To Predict Neonatal Mortality. The Snappe-Ii Score Incorporates Both Physiological And Perinatal Factors, Offering A Comprehensive Assessment Of A Neonate's Condition. This Study Was Conducted To Evaluate The Validity Of The Snappe-Ii Score As A Predictor Of Neonatal Mortality And The Duration Of Stay In The Nicu.

Objectives: To Determine The Validity Of Snappe-Ii (Score For Neonatal Acute Physiology With Perinatal Extension-Ii) In Predicting The Outcome In Terms Of Mortality And Duration Of Nicu Stay In A Tertiary Care Hospital In Kolar.

Methodology: This Prospective Observational Study Was Conducted In Nicu Neonates Who Were Born In Rljh , Department Of Pediatrics Between February 2025 To April 2025. The Collected Data Underwent Statistical Analysis.

Results: A Total Of 131 Newborns Were Included In This Study, Out Of Which 61(46.5%) Were Female Babies And 70 (53.5%) Were Male Babies. Among The Study Population There Were 45(34.5%) Term , 22(16.5%) Late-Preterm, 64 (49%) Preterm Babies. Based On Distribution Of Snappe Ii Score 36 (27.5%) Newborns Were Classified In The Mild Category, 81 (61.5%) In The Moderate Category, And 14 (11%) In The Severe Category. The Study Found A Statistically Significant Correlation Between The Snappe-Ii Score And The Duration Of Nicu Stay, Indicating Its Utility In Predicting Mortality Outcomes.

Conclusion : The Findings Of This Study Support The Validity Of The Snappe-Ii (Score For Neonatal Acute Physiology With Perinatal Extension-Ii) As An Effective Tool For Predicting Both Neonatal Mortality And The Duration Of Nicu Stay. A Significant Correlation Was Observed Between Higher Snappe-Ii Scores And Increased Mortality Risk, As Well As Prolonged Nicu Hospitalization. These Results Indicate That Snappe-Ii Is A Reliable And Practical Scoring System That Can Aid Clinicians In Early Risk Stratification, Clinical Decision-Making, And Resource Allocation In The Neonatal Intensive Care Setting.

Keywords: Nicu, Snappe Ii Score, Predictors, Neonatal Mortality.

1. INTRODUCTION

Over the past few decades, Neonatal Intensive Care Units (NICUs) have made significant advancements, leading to improved survival rates. However, further progress is still necessary to enhance the critical care practices for neonates. Neonatal mortality continues to be a major public health issue, especially in NICUs, where critically ill newborns require specialized treatment. Illness severity scores have become a common tool used in Neonatal Intensive Care Units ¹.

Scoring systems that assess initial risk play a crucial role in promoting optimal health by predicting mortality, with some scores also predicting morbidity ².

Some of the scoring systems used are CRIB (Clinical Risk Index of Babies), CRIB II (Clinical Risk Index of Babies II), SNAP (Score for Neonatal Acute Physiology), SNAP II (Score for Neonatal Acute Physiology-II), SNAPPE (Score for Neonatal Acute Physiology-Perinatal Extension) and SNAPPE II (Score for Neonatal Acute Physiology-Perinatal Extension II) ³.

Previously, birth weight, gestational age, and the APGAR score were the only parameters used to predict mortality and morbidity. However, the relationship between these three factors and mortality prediction was not very accurate.

In 1993, Richardson et al. developed the physiology-based Neonatal Acute Physiology (SNAP) score, which included 34 parameters for neonates of all birth weights and was validated as a predictor of mortality and morbidity. They simplified this score by reducing the number of parameters to six. Additionally, three perinatal variables—birth weight, APGAR scores, and small for gestational age (SGA) status—were incorporated, and the score was renamed SNAP II with Perinatal Extension (SNAPPE-II) ⁴.

Accurate prediction of neonatal outcomes is essential for optimizing care strategies, resource allocation, and improving survival rates. The SNAPPE II (Score for Neonatal Acute Physiology with Perinatal Extension) score, a widely recognized tool, is designed to predict neonatal mortality and morbidity based on clinical and physiological parameters. This study aims to assess the impact of the SNAPPE II score on predicting neonatal mortality in a NICU setting at a tertiary care hospital, focusing on its correlation with mortality risk and the length of NICU stay. Understanding the effectiveness of the SNAPPE II score in predicting neonatal mortality can provide valuable insights into early risk stratification, allowing healthcare providers to make informed decisions on interventions and care plans. Additionally, its correlation with NICU stay duration can potentially guide discharge planning and resource management.

2. MATERIALS AND METHODS

This is a prospective Observational study conducted on NICU neonates who were admitted in department of pediatrics at RLJH.

The study was proceeded after taking the institutional ethical clearance.

Study was done from February 2025 to April 2025 to determine the validity of SNAPPE-II (Score for Neonatal Acute Physiology with Perinatal extension-II) in predicting the outcome in terms of mortality and duration of NICU stay in a tertiary Care Hospital in Kolar .

Exclusion criteria:

- ✧ Neonates discharged against medical advise / referred to higher centres during the NICU stay.
- ✧ Neonates with major congenital malformations.
- ✧ Neonates with incomplete or missing clinical data.
- ✧ Newborns who were admitted for observation (first 4 hours of admission), and postnatal transfer IN babies.

Study was started after obtaining consent from the parents. Data was collected from records of NICU (SNAPPE II register, NICU admission register)in department of pediatrics, RLJH from February 2025 to April 2025.

The data collected from the neonates includes: mean blood pressure, PO₂/FiO₂, lowest temperature (°C), serum-pH (lowest serum pH within 24 hours of admission), multiple seizures (>1 seizure within 12 hours of admission), urinary output, weight at the time of birth, Apgar score ,gestational age .

The correlation between SNAPPE-II scores in the first 48 hours after birth and the mortality rate in babies admitted to NICU was assessed.

Duration of the NICU stay was collected from NICU admission and shift out registers.

3. RESULTS

A total of 164 newborns admitted to NICU between February 2025 to April 2025 at RLJH , Kolar. Among them, 33 neonates

were excluded based on exclusion criteria and 131 neonates were enrolled in the study

DISTRIBUTION BASED ON GENDER (n=131)

MALE	FEMALE
70 (53.5%)	61 (46.5%)

DISTRIBUTION BASED ON GESTATIONAL AGE (n=131)

TERM	LATE PRETERM	PRETERM
45 (34.5%)	22 (16.5%)	64 (49%)

DISTRIBUTION BASED ON SNAPPE II SCORE (n=131)

MILD (0-20)	MODERATE (20-40)	SEVERE (>40)
36 (27.5%)	81 (61.5%)	14 (11%)

SNAPPE -II SCORE AMONG EXPIRED AND SURVIVED

SCORE	SURVIVED	EXPIRED
MILD(0-20) n=36	36 (100%)	-
MODERATE(20-40) n=81	79 (97.5%)	2 (2.5%)
SEVERE(>40) n=14	10 (71.5%)	4 (28.5%)

The above table shows p value as 0.037 which is statistically significant .

CORRELATION BETWEEN DURATION OF NICU STAY AND SNAPPE SCORE II

SNAPPE II SCORE	MEAN SCORE	< 5 DAYS	5-10 DAYS	> 10 DAYS
MILD(0-20) n=36	12.36 $\pm$ 1.29	21 BABIES (58.5%)	13 BABIES (36%)	2 BABIES (5.5%)

MODERATE (20-40) n=81	33.48 $\pm$ 3.36	4 BABIES (5%)	51 BABIES (63%)	26 BABIES (32%)
SEVERE(>40) n=14	58.63 $\pm$ 2.92		2 BABIES (14%)	12 BABIES (86%)

P value for above table is 0.033 which is statistically significant

VARIABLES USED IN CALCULATING SNAP II AND SNAPPE II SCORES AND THEIR RELATIONSHIP WITH PATIENTS' SURVIVAL (N=131)

Variable		Total (n=131)	Survived	Expired	P value
Mean blood pressure (mm Hg)	>30	118 (90%)	116 (98.5%)	2 (2%)	0.043
	20-29	10 (7.5%)	8 (98.5%)	2 (20%)	
	<20	3 (2.5%)	1 (33%)	2 (67%)	
Po2/Fio2 ratio	>2.5	62 (47.5%)	61 (98%)	1 (2%)	0.019
	1-2.4	49 (37.5%)	48 (98%)	1 (2%)	
	0.33-0.999	16 (12%)	14 (87.5%)	2 (12.5%)	
	<0.33	4 (3%)	2 (50%)	2 (50%)	
Lowest temperature	> 35.6	123 (94%)	120 (97.5%)	3 (2.5%)	0.026
	35-35.5	6 (4.5%)	4 (66.5%)	2 (33%)	
	< 35	2 (1.5%)	1 (50%)	1 (50%)	
Lowest serum pH	>7.2	42 (32%)	41 (97.5%)	1 (97%)	0.032
	7.1-7.19	73 (56%)	71 (97%)	2 (3%)	
	<7.1	16 (12%)	13 (81%)	3 (18%)	
Multiple seizures	NO	127 (97%)	123 (97%)	4 (3%)	0.049
	YES	4 (3%)	2 (50%)	2 (50%)	
Urine output (mL/kg/h)	>1	105 (80%)	103 (98%)	2 (2%)	0.038
	0.1-0.9	18 (14%)	16 (88%)	2 (10%)	
	<0.1	8 (6%)	6 (75%)	2 (25%)	
Birth weight (gms)	>1000	127	123 (94%)	4 (31.5%)	0.027
	750-999	4	2 (50%)	2 (50%)	
	<750	0	-	-	
Small for gestational age	NO	83 (63.5%)	79 (95%)	4 (5%)	0.045
	YES	48 (36.5%)	46 (96%)	2 (4%)	
Apgar at 5 min after birth	>7	127 (97%)	123 (97%)	4 (3%)	0.026
	<7	4 (3%)	2 (50%)	2 (50%)	

4. DISCUSSION

Estimating the severity of illness is a key factor when caring for critically ill neonates.

Our study done on 131 neonates admitted to NICU in RLJH , department of pediatrics revealed 53.5% of male and 46.5% female babies with male predominance and majorly involving preterm babies with 49% followed by term (34.5%) and late preterm babies (16.5%).

On distribution based on SNAPPE II score revealed majority of neonates are included in moderate category with 61.5%, followed by mild (27.5%) and severe categories (11%).

On distribution based on mortality 95.5% of neonates are survived with 100% survival rate in neonates belonging to mild SNAPPE II score and on statistical analysis there was significant correlation of mortality rate with SNAPPE score.

Our study also aimed on predicting the duration of NICU stay based on SNAPPE score which revealed significant correlation based on scoring criteria. Study revealed neonates belonging to severe SNAPPE II category had high mortality rates and prolonged stay in NICU.

To determine the correlation of mortality with SNAPPE II score , each parameter was compared with survived and expired neonates. On statistical analysis significant correlation was found on prediction of mortality .

The statistical significance between SNAPPE II score and prediction of mortality was similar to the study conducted by Divyashree Devaramuddinahalli Annegowda, Chandana Nanjaiah Shetty Srinivas, Prashanth Siddaiah at Department of Pediatrics, Mysore Medical College and Research Institute, Mysuru, Karnataka, India on Neonatal mortality risk assessment using SNAPPE-2 score in a neonatal intensive care unit involving 138 neonates stated that SNAPPE-II score can be used to predict neonatal mortality rates in moderate-to-late preterm babies of gestational age between 32 and 36 weeks 5.

A prospective, observational study carried out by Shivanna Sree Harsha ,Banur Raju Archana on SNAPPE-II (Score for Neonatal Acute Physiology with Perinatal Extension-II) in Predicting Mortality and Morbidity in NICU involving 248 newborns admitted to NICU of Indira Gandhi Institute of Child Health, Bangalore from January 2012 to July 2013 concluded that SNAPPE II score is a better predictor of mortality irrespective of gestational ages and it is not a good predictor of morbidity 6.

A prospective observational study carried out by Sujana Rachuri, Saritha Paul, Jaidev M. D. on SNAPPE II score: predictor of mortality in NICU involving 116 newborns admitted to NICU of Father Muller Medical College and Hospital, Kankanady, Mangalore, Karnataka, India stated that SNAPPE-II score recorded in the first 48 hours of life could be a good predictor of mortality in babies admitted to NICU 7.

Similar results were concluded by a study done by Dipak Muktan¹, Rupa R. Singh , Nisha K. Bhatta and Dheeraj Shah. This study stated that SNAPPE- II is a useful tool to predict neonatal mortality in NICU and higher mortality was observed in neonates belonging to severe score category. This stated also stated SNAPPE II score could not predict the duration of NICU stay ⁸.

5. LIMITATIONS

Limitation of this study is the relatively short duration of only three months. This limited timeframe may have restricted the sample size and the diversity of cases included, potentially affecting the generalizability of the findings.

This study was conducted in a single tertiary care center, which may limit the generalizability of the results to other healthcare settings with different patient populations, resources, or protocols.

WHAT STUDY ADDS?

This study adds to the existing literature by not only validating the SNAPPE-II score in predicting neonatal mortality but also highlighting its effectiveness in estimating the duration of NICU stay, thereby offering a more comprehensive assessment of neonatal outcomes.

6. CONCLUSION

The findings of this study affirm the clinical validity and practical utility of the SNAPPE-II (Score for Neonatal Acute Physiology with Perinatal Extension-II) as an effective tool for predicting neonatal mortality and the duration of NICU stay. A significant correlation was observed between higher SNAPPE-II scores and increased risk of mortality, as well as prolonged hospitalization, highlighting its role in early risk stratification. The score's standardized, objective nature—based on routinely available, non-invasive clinical and laboratory parameters—makes it both accessible and easy to implement across diverse healthcare settings, including resource-limited NICUs. Moreover, its affordability and lack of need for specialized equipment enhance its practicality, supporting better clinical decision-making, efficient resource allocation, and overall improvement in the quality of neonatal intensive care.

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