IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 3 Ser. 10 (March. 2019), PP 11-15
www.iosrjournals.org

Application of Tops Score in Sick Neonates Received At Level 3 Nicu and Its Impact on the Outcome of the Neonate

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Abstract: *Transporting of neonates is the greatest challenge faced today in the outcome of neonates in our country. We have scarce and inaccessible facilities, no any accomplice for enroute and underdeveloped communication system. Many babies thus transported are cold, blue and hypoglycaemic. This study aims to study the applicationof TOPS score and its effect on outcome. Illness severity scores have been used as predictors of neonatal mortality, to give prognostic information to parents about their baby,to identify high risk babies for prompt action (triage) and for standardized comparisons between neonatal units for quality assessment. To evaluatethe TOPS (Temperature,Oxygenation,Perfusion and blood Sugar) score predictive value for hospital death so as to institute an easy tool for assessing mortality index in transported neonates.*

A prospective study was conducted in a tertiary teaching hospital enrolling 500 transported neonates. TOPS scoring was done at admission (temperature by digital thermometer in axilla, saturation by pulse oximeter, capillary refill time in mid sternum region, blood sugar by reagentstrip) and babies were followed for outcome.A mortality of 29.4% was observed. Derangements in TOPS variables had significant correlation with neonatal mortality. Hypothermia was commonly observed in transported neonates (29.8%).The sensitivity, specificity, positive and negative predictive values of derangements of two or more TOPS parameters in predicting mortality were 67.4%,80.6%,62.2% and 85.4% respectively. Besides being useful to predict hospital death, TOPS was a simple score that can be easily applied in neonatal units.Based on these results, we recommend TOPS score to be done routinely for all the babies at admission.

Keywords: *Neonatal transport, TOPS score, Morbidity & Mortality*

Date of Submission: 28-02-2019 Date of acceptance: 18-03-2019

I. Introduction

Institutional delivery and in utero transport of newborn is the safest way to transport a sick neonate. But unfortunately preterm delivery and many other perinatal illnesses cannot be always anticipated. This makes the transport of an ailing neonate inevitable[1, 2]. These babies are often critically ill and the outcome is also dependant on the effectiveness of transport system[3]. In most of these newborn babies the ineffective transport system results in hypoglycemia, hypothermia, cyanosis and other complications. These complications further increase the morbidity and mortality among these sick neonates[4].A further fall in IMR can only be achieved by improving the Neonatal Transport Facilities[5].The introduction of Neonatal 108 ambulance services in has revolutionised the transport of sick neonates to the SNCU. It is well known that the transport of newborn baby by a skilled organised team reduces neonatal mortality and morbidity.Hence we undertook this study to analysethe profile of newborn babies referred to our level III NICU, to evaluate TOPS score in assessing the clinical status of newborn and the outcome and finally to stress upon the need of a better, well equipped and well managed neonatal transport system[6].

II. Materials And Methods

This prospective observational study was conducted for the period of four months from September to December 2017 in the SNCU KT CHILDREN HOSPITAL, PDU Medical College, Rajkot,enrolling extramural (out born) newborns.

Inclusion criteria: All the extramural neonates (<28 days) requiring admission.

Exclusion criteria: Refusal to give informed written. Neonates having life threatening congenital anomalies consent.

Procedure methodology: A total of 700 babies were screenedand enrolled in the study as per the above criteria. A pre-designed proforma was used to record information at the time of admission. Ethical Committee approval

was taken for the study. Written consent was taken from the attendants after explaining them the purpose of study in their own language.

The study was questionnaire based, where the receiving resident shall document the complete history, examination and clinical physiological parameters (TOPS) as observed on arrival of the baby on a data capturing sheet.

It includes:

i. Temperature by digital thermometer in axilla
ii. Oxygenation by Spo2 monitoring (radical 7 pulse oxymeter)
iii. Perfusion by capillary refilling time(CRT) on mid-sternum
iv. Sugar by reagent strip and low reading[7].

Hypothermia, hypoxia, prolonged CRT and hypoglycemia were defined as <36.5 Celcius[8], <90%[6] , >3 seconds[9] and < 45mg/dl[10] respectively.

Computerised analysis of data was done with the help of graph pad version 5 demo. The study variables were analysed for their association with immediate outcome by applying chi square test or Fisher's exact test as applicable. All p values were too tallied and $p<0.05$ was considered statistically significant. Variables that were found significant on chi square test were further analysed using logistic regression analysis for their possible independent association with mortality

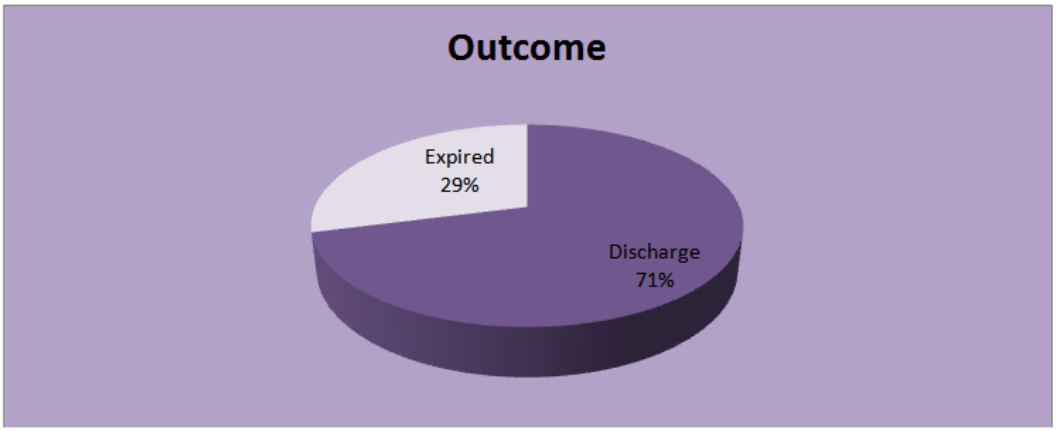
III. Results

A total of 700 babies were enrolled in the study, out of which 390 (55.7%) were males and 310(44.3%) were females. Mean age of neonate was 53 hrs, weight at admission was 2127g and gestational age was 34.75wk at admission. Only 276 (39.4%) were accompanied by a doctor/paramedical worker, and remaining 424 (60.5%) were brought only with relatives. Appropriate pre-transport stabilisation was done in only 245 (35%) patients.

TABLE 1: Demographic profile

S No	Character	Frequency
1	**Total referred cases**	**700**
2	**Sex distribution**	
	Males	390
	Females	310
3	**Outcome**	
	Expired	206 (29%)
	Discharge	494 (71%)
4	**Mode of transport**	
	Govt provided transport(108 ambulance)	238 (34.0%)
	Private ambulance	188 (26.8%)
	Auto rickshaw	162 (23.1%)
	Private vehicles	112 (16.0%)
5	**Referral slip**	
	Ref slip available	533
	Ref slip not available	167
6	**Accompanying staff**	
	Yes	276 (39.4%)
	No	424 (60.5%)
7	**Pre referral stabilisation**	
	Pre referral stabilisation	245 (35%)
	No pre referral stabilisation	455 (65%)
8	**Gestation**	
	Term	391
	Preterm	309
	Mean gestational age	34.75
	Median gestational age	36.5
9	**Birth weight**	
	Mean birth weight	2.12
	Median birth weight	2.09
	Mode birth weight	2.5

FIGURE 1: Outcome of study population



Out of 700 babies, 494 (71%) were discharged, 206 (29%) had expired.

TABLE 2: Time taken for referral

TIME TAKEN FOR TRANSPORT	FREQUENCY
<30 min	205 (28.2%)
< 1 hour	385 (55.0%)
> 1 hour	110 (15.7%)

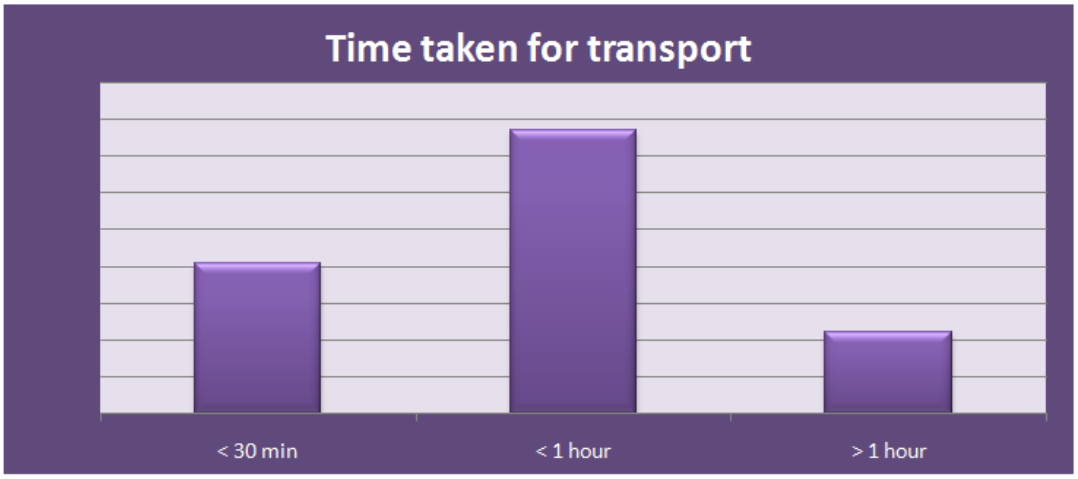


Table 3: Reason for referral/morbidity profile and mortality profile.

DIAGNOSIS	TOTAL	EXPIRED
Low birth weight	326	105(32.2%)
Perinatal asphyxia	148	44 (29.7%)
Prematurity	145	55 (37.9%)
Respiratory distress	79	20 (25.3%)
Jaundice	67	05 (07.4%)
Meconium aspiration syndrome	29	08 (27.9%)
Convulsion	12	05 (41.6%)
CHD	20	14 (70.0%)

Low birth weight is the most common cause of referral followed by birth asphyxia and prematurity. Low birth weight is the most common cause of mortality followed by birth asphyxia.

Table 4 : Sensitivity of individual parameter in predicting mortality

ALTERED PARAMETER	IN CASES	EXPIRED
TEMP	378(54%)	113 (29.8%)
SPO2	301(43%)	165 (54.8%)
CRT	112(16%)	100 (89.2%)
RBS	140(20%)	92 (65.7%)

The p value is <0.001. Means the variables are significantly associated. Altered perfusion is the most significant parameter in predicting mortality followed by hypoglycemia, low saturation and hypothermia.

Table 5: TOPS score and outcome

TOPS SCORE	REFERRED NEONATES N= 700	EXPIRED N=207
0	173 (24.7%)	0
1	209 (29.8%)	35 (16.9%)
2	139 (19.8%)	46 (33.0%)
3	107 (15.2%)	54 (50.4%)
4	72 (10.0%)	72 (100%)

The p value is <0.0001.Means the varibles are significantly associated. High TOPS Scoring is associated with high mortality.

IV. Discussion

The present study revealed that derangements of two or more TOPS variables had good sensitivity, specificity, positive and negative predictive values comparable to Mathur NB et al study[6].

Table 6: Comparison of tops significance

Parameters	Present study	Mathur et al study[6]
Sensitivity	**67.4%**	81.6%
Specificity	**80.6%**	**77.4%**
Positive predictive value	**62.2%**	**72.3%**
Negative predictive value	**85.4%**	**89.0%**
Total correct classification rate	**80.8%**	**81.7%**

During this study, we verified that TOPS score was easily applied. This score is practical, since it uses variables that are part of the routine care of newborns, and also because they are quickly obtained. TOPS score can be easily reproduced, avoiding interpretation errors due to individual subjectivity.

Highest altered parameter found in the study was hypothermia (54%), as shown in other related studies[6][7]. We found that there was 100% mortality in babies with all the four deranged parameters at admission, a similar association was found in studies conducted by Mathur N B et al [6] and Dalal Ekta et al[7].

It reinforces the fact that once the irreversible cellular injury sets in, any extent of heroic efforts taken to revive the baby becomes futile. Hence a meticulous neonatal transport is of utmost importance and need of the hour in neonatal care to reduce neonatal mortality. Because of the obvious ethical issues involved, we want to emphasize that the present scoring system is not sufficiently accurate to identify those patients who cannot be saved.

V. Conclusion

Illness severity scores for newborns are complex, cumbersome and require expensive equipment. Most of the referral cards do not have proper history like APGAR score and resuscitation done to newborn hence the scores in which this information is required cannot be applied. TOPS score comprises following features that are necessary for an efficient predictive score of mortality: (1) reliability, (2) easy application, (3) applicability early in the course of hospitalization and (4) usefulness for all groups of neonates to be described. Because of these features, TOPS seems to be the score of choice for the assessment of neonatal units, especially in countries where advanced diagnostic and therapeutic resources are limited.

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