

Original Research Article

Correlation of TOPS scoring with immediate outcome among neonates transported to special newborn care unit: a prospective study

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ABSTRACT

Background: Several sick neonates require transfer to tertiary level care neonatal unit for treatment. The facilities of neonatal transport in India are not optimal and the newborn thus transported can become hypothermic, hypoxic and/or hypoglycemic which can affect the neonatal outcome. These parameters can be maintained during transport by adopting simple measures. The aim and objective of this study is to study impact of acute physiological parameters during transfer of neonates on their immediate outcome by using TOPS score. TOPS score - Temperature, Oxygenation, Perfusion (Assessed by capillary refill time), Blood sugar.

Methods: This prospective observational study was conducted at the special newborn care unit, Civil Hospital, Ahmedabad enrolling 460 transported neonates. TOPS scoring for each neonate was done at admission, and then the parameters of the TOPS score were correlated with the outcome at 48 h of admission.

Results: A total of 460 transported newborns were assessed, 47.8% newborns were hypothermic, 33.9% had poor perfusion, 27.8% were hypoxemic, and 22% were hypoglycemic. On correlating with the outcome, Hypoxemia and hypo perfusion had the highest sensitivity (92.2% and 57.3%, respectively) while hypoglycemia had the highest specificity (88%), for an adverse outcome.

Conclusions: TOPS score is a useful and easy to use the method to assess the physiological status and predict early mortality in transported neonates.

Keywords: Mortality neonatal transport, Outcome, Oxygenation, Perfusion and Blood sugar, TOPS score, Temperature

INTRODUCTION

India continues to have highest number of neonatal deaths in world despite of fall in the national neonatal mortality rate over past 2 decades. There is interplay of different demographic, educational, socioeconomic, biological, and care seeking factors, which are responsible for the disparities and the high burden of neonatal mortality.¹ The non-institutional and institutional births where baby cannot be managed are required to be transferred to a higher center.² Facilities of

such neonatal transport in India are very limited and concentrated to larger cities. Many of neonatal transports are self-transport without any pre-treatment stabilization or care during transport.³ The newborn thus transported can become hypothermic, hypoxic, and/or hypoglycemic which can have serious clinical implications.⁴ with the availability of limited resources, stabilization and monitoring of newborns during their transport is a challenge.⁵ A tool for monitoring the acute physiological parameters of such a babies can be very useful.⁶ The desirable properties of such a score are easy to use,

applicability early during transport and hospitalization and ability to predict mortality.⁷ I conducted this study to evaluate the predictability of acute physiological parameters during transfer of neonates in on their immediate outcomes by using TOPS score. TOPS score consist of Temperature, Oxygen, Perfusion as assessed by capillary refill time(CRT),and blood Sugar.

METHODS

This is the prospective observational type study. Study population of this prospective observational study was carried out among newborns transferred to the special newborn care unit of Civil Hospital, Ahmedabad over period of 6 months from August 2018 to January 2019 in the department of Pediatrics.

Inclusion criteria

All neonates who were transported to our SNCU from outside, fulfilling the criteria of age less than 7 days and birth weight more than 1 kg were included in my study.

Exclusion criteria

Extremely low birth weight babies, babies with lethal congenital malformations, and acute surgical emergency and parents/care givers left against medical advice were excluded.

TOPS: It included 4 parameters.

- T-Temperature was assessed by using digital thermometer kept in the axilla of the baby for 2 minutes.
- O-Oxygenation was assessed by measuring oxygen saturation (SpO2) by pulse oximeter.
- P-Perfusion was assessed by capillary refilling time on the sternum of the baby.
- S- Blood sugar obtained by glucometer.

A detailed clinical examination was done.

Hypothermia, Hypoxia, prolonged CRT and hypoglycemia were defined as temperature <36.5°C, oxygen saturation <90%, CRT >3 Second and blood sugar <45 mg/dl, respectively. Each parameter was assigned a score of 1 if abnormal and 0 if normal.⁸ Total TOPS score (an aggregate score of all 4 parameters) for each baby was calculated at the time of admission. Individual and aggregate TOP score were correlated with the outcome within 48 hours of admission. i.e. Expired or survived.

RESULTS

Total of 460 newborns, 250(54.3%) males and 210(45.7%) females who fulfilled the inclusion criteria were enrolled in the study (Table 1). The incidence of hypothermia, hypo perfusion, hypoxemia and hypoglycemia was found to be 47.8%, 33.9%, 27.8% and 22%, respectively.

Table 1: Pathophysiological characteristics of studied newborns on admission (with reference to TOPS scoring system).

Parameters	No. of Neonates (%) (n=460)
Hypothermia(<36.5)	220 (47.8%)
Hypo perfusion (CRT>3 Seconds)	156 (33.9%)
Hypoxemia (Spo2<90%)	128 (27.8%)
Hypoglycemia (RBS<45 mg/dl)	101 (22%)

Out of 460 babies 115 died, mortality rate being 25% among the transported babies. Among the expired patients, Hypoxemia was found to be the most prevalent abnormal parameter (n=106,68%), followed by prolonged CRT (n=94,60%), hypoglycemia (n=60,59%) and hypothermia (n=35,16%) in the babies died within 48 h post admission (Table 2).

Table 2: Distribution of outcome according to individual parameters of TOPS score.

Parameters	Newborns survived during first 48 h of admission	Newborns died during first 48 h of admission
Hypothermia(n=220)	185	35(16%)
Hypoxemia (n=128)	50	106(68%)
Hypo perfusion (n=156)	62	94(60%)
Hypoglycemia (n=101)	41	60(59%)
Total (460)	345	115

When composite TOPS score was considered, 200 babies (43.5%) were found to have normal score, i.e. “0”, followed by scores of 3(n=87,18.9%), 2(n=60,13%), 1(n=58,12.6%), and 4(n=55,12%).

All the babies with a normal score of “0” were alive at 48 h post admission, while those with worst scores of 4 showed a maximum proportion of deaths (45/55=82%) (Table 3).

Table 3: Outcome with reference to TOPS scores.

TOPS score	Total number of neonates (%)	Number of neonates survived during first 48 h of admission (%)	Number of neonates died during first 48 h of admission(%)
0	200(43.5%)	200(100%)	0
1	58(12.6%)	54(93%)	4(7%)
2	60(13%)	41(68%)	19(32%)
3	87(18.9%)	40(46%)	47(54%)
4	55(12%)	10(18%)	45(82%)
Total	460	345(75%)	115(25%)

When an individual parameter of the TOPS score was considered, it was found that for prediction of mortality at 48 h admission, hypoxemia and hypo perfusion found to be most sensitive parameters for predicting the mortality

at 48 h in our study, with a sensitivity of 92.2% and 81.7% respectively and negative predictive value of 97%

and 93%. Hypoglycemia had the highest specificity (88%) (table 4).

Table 4: Test characteristics of individual parameters.

Parameter	Hypothermia (%)	Hypoxemia (%)	Hypo perfusion(%)	Hypoglycemia (%)
Sensitivity	30.4	92.2	81.7	52.17
Specificity	46.3	85.5	82	88
Positive predictive value	15.9	68	60	59.4
Negative predictive value	66.7	97	93	85

DISCUSSION

The study was conducted among 460 transported newborn babies who fulfilled the inclusion criteria. Mortality rate was high among the newborns who were transported without stabilization and proper monitoring during the transport.⁹ With the primary aim of assessing the status of acute physiological parameters during the transport and their effect on immediate outcome. TOPS scoring was done at the time of admission to assess their acute physiological parameters, namely temperature, oxygenation, perfusion and blood sugar, and their effect was assessed on the mortality rate within 48 h of admission. Babies with better TOPS score had less mortality at 48 h post admission. TOPS score can not only be used to predict mortality, but it can also be used as a monitoring tool for neonatal assessment during the transportation.¹⁰ In my study, the babies who had all the parameters as normal at admission survive at 48 h post admission. hypothermia followed by hypo perfusion was most common event among transported babies. These parameters can be managed easily during transport without requiring any sophisticated equipment.¹¹ Even if no facility is available than at least kangaroo parent care can be practice.

The most common mode of neonatal transport was 108 Ambulance followed by private ambulance and rickshaws. Probably an effect of Janani-Shishu Suraksha karyakram, an incentive based scheme launched by government of India on 1st June 2011, and an effect of 108 Ambulance service launched in 2008, a large percentage of referred neonate were transported by ambulance.

Respiratory distress, prematurity, sepsis, perinatal asphyxia, meconium stained liquor, congenital malformation and jaundice continue to be the most common causes for neonatal referral, most common being respiratory distress, low birth weight and birth asphyxia.

CONCLUSION

Mortality rate among out-born babies is higher than inborn neonatal mortality rate in our institute. Mortality due to respiratory distress syndrome, meconium aspiration

syndrome, perinatal asphyxia and sepsis have been found to be more among out-born neonates in comparison to inborn. Most of the referred neonates are already very sick at the time of referral, carrying the high mortality and some of them deteriorate during transport also.

Though, Intra uterine transfer considered the safest mode of transport but every time it is not possible to predict the high risk during antenatal period. India has got a wide network of peripheral health centers in rural areas where most of our population resides. Perinatal care facilities at these setups need up-gradation. Reduction in referrals will decrease the loads on tertiary care centers and will improve their functioning also. A neonates should be referred only when it is absolutely necessary, and safe neonatal transport would act as a bridge between referring and receiving centers. Distance travelled by the neonates and condition at arrival emphasize the need of further improvement of transport service and care during transport. TOPS score is a useful and easy to use method to assess the physiological status and predict early mortality in transported (Out-born) neonates.

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