

# Study on Neonatal Transport at Tertiary Care Centre

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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 impact of epidemiological factors related to transfer neonates, adverse events related to transfer neonates, role of TOPS score and outcome. Study included all neonates < 7 day of life. Total 300 neonates were randomly selected and enrolled in the study. Study was questionnaire based; the receiving clinician documented the routine clinical physiological parameters as observed on arrival of the baby on data capturing sheet developed by the researcher. TOPS scoring was done on arrival (temperature by digital thermometer in axilla, SPO2 by pulse oximeter, CRT in mid sternum region, RBS by reagent strip). Out of 300 enrolled, 47.3% were transported in ambulance, 33% in auto rickshaw, 18.3% in open vehicle; 55.7% were accompanied by un trained relatives, 15% by doctor or nurse, 28% paramedical person; pre transport stabilisation done only in 37.6%, referral hospital informed prior to transport only in 28%. Reason for transport (21.4% preterm, 16.4% birth asphyxia, 13.7% septicaemia, 11.3% meconium, 9.6% ventilator support, RDS 9.3%, LBW 6%). Altered parameters (hypothermic 55%, hypoxic 27.4%, hypoperfused 23.4%, hypoglycaemic 20.6%). TOPS score (one 40.3%, two 16%, three 12.4%, four 4.3%), 23.7% expired (septicaemia 46.4%, birth asphyxia 18.3%, meconium aspiration 15.5%). This study demonstrates current prevailing situation in the country, a significant number of neonatal deaths can be reduced by early identification and appropriate pre referral stabilisation, communication regarding care of newborn during transport and adequate equipment and man power at referral facility.*

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

## 1. Introduction

India contributes to about 20% of global births with 27 million live births each year with about 2 million under – five annual deaths, India also accounts for a quarter of global child mortality [1]. The infant mortality rate has declined over years but there are wide inter and intra state variations in infant mortality and between rural and urban areas. Around 66% of infant and over 50% of under-five mortality occurs in newborn period [2]. Almost two third of the total neonatal deaths are within first week of life. At the same time the Millenium Development goal(MDG)-4 on child mortality for India aims for a two third reduction in IMR from 1990 level of 84/1000 live births to 28/1000 live births by 2015 [3]. Non institutional births constitute a significant proportion of total births in developing country like India and still many deliveries are conducted at home specifically in rural area [5]. Though institutional delivery and in-utero transport of newborn is safest but unfortunately preterm delivery and perinatal illness cannot be always anticipated resulting in continued need of transfer of these babies after delivery [6, 7]. These babies are often critically ill and outcome is also dependent on effectiveness of transport system [8]. Prematurity, asphyxia and sepsis are the most common causes of neonatal mortality in developing countries [9]. Many of these are easy to manage and significant decrease in neonatal mortality can be anticipated with regionalization of perinatal care, where many sick newborn can be provided with better care and outcome if they are timely transported in stable condition. At the same time facility of neonatal transport in India are not encouraging [6]. Most of neonatal transports are self transport without any pre-treatment stabilization or care during transport. Many of these newborns thus transported are cold, blue and hypoglycaemic and 75% of the babies transferred this way have serious clinical implications [10] currently there is limited or no dedicated neonatal transport service is provided in India. My study conducted at a tertiary care

centre aims at analysing the adverse events related to transfer neonates, impact of epidemiological factor related to transferred neonates and the role of TOPS scoring in predicting mortality.

## 2. Material and Methods

Study design: cross sectional, descriptive study with analytic components. Neonates transported to nicu of tertiary care hospital with medical college during the study period were enrolled and clinical parameters were documented on arrival.

Study period: July 2010 to July 2012.

Inclusion criteria: all extramural babies <= 7 day of life

Exclusion criteria: lethal congenital malformation, acute surgical emergency (TOF, CDH), newborn age >7 days, expired within 1 hour of admission.

A total of 300 patients were selected randomly and enrolled in study.

The study was questionnaire based, where the receiving clinician documented the routine clinical physiological parameters as observed on arrival of the baby on a data capturing sheet.

Data collected by complete history and examination, TOPS scoring on arrival at NICU and at 1 hr of admission. It includes temperature by digital thermometer in axilla, oxygenation by Spo2 monitoring (mediad pulse oxymeter), perfusion by capillary refilling time on midsternum, sugar by reagent stripe and low reading <40mg/dl confirmed by serum samples at laboratory.

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.

### 3. Results

Out of the 300 newborn admitted. Number of hospital delivered babies 178(59.4%) and home delivered 122(40.6%). Number of term babies 141(47%) and preterm 159(53%). Maternal risk factors were present in 166(55.4%) of neonates admitted and 48(28.9%) of these neonates expired, while out of 134(44.6%) of neonates without maternal risk factors 23(17.1%) expired. In this study 236(78.7%) from slum and rural areas and rest from urban society areas. The mortality 59(83.1%) was higher in the patients from slum and rural areas compared to urban society. 71(23.4%) expired.

**Table 1:** In transport characteristics of referral new born

Characteristics	Total n=273	Survived n=209	Expired n=64
Reason for referral specified	165(55%)	112	53
Informed the referred hospital	84(28%)	49	35
Pre referral stabilisation	113(37.6%)	97	16
Accompanying trained paramedic	133(44.3%)	96	37
Clothing & Warming	120(40%)	88	32

**Table 2:** Morbidity of referred new borns

Morbidity	Total	Survived	Expired
Septicaemia	79	46	33
Severe birth asphyxia	31	18	13
Meconium aspiration	29	18	11
Hyaline membrane disease	19	10	9
Extreme preterm(<750gm)	5	-	5

**Table 3:** Altered parameter of transported newborn

Parameter	At admission	Mortality at admission	At 1 hr	Mortality at 1 hr
Temperature(36.5 c)	166(55.3%)	52(31.4%)	62(20.6%)	46(74.1%)
Oxygen (spo2<90%)	82(27.4%)	46(56%)	32(10.7%)	28(87.5%)
Perfusion(CRT >3 sec)	70(23.4%)	45(64.3%)	16(5.4%)	16(100%)
Sugar (RBS<40mg/dl)	62(20.6%)	42(67.7%)	6(2.0%)	6(100%)

Highest altered parameter at admission is hypothermia. If alteration of these parameter persist after stabilisation at 1 hr after admission mortality rate is high.

**Table 4:** TOPS score as mortality predictor

No. of altered parameter	One	Two	Three	Four
At admission	121(40.3%)	48(16%)	37(12.4%)	13(4.3%)
At 1 hrs	30(10%)	16(5.3%)	10(3.4%)	6(2.0%)
Mortality at admission	12(9.9%)	17(35.4%)	29(78.3%)	13(100%)
Mortality at 1 hrs	18(60%)	12(75%)	10(100%)	6(100%)

Significant P value =0.0001 of TOPS scoring in predicting mortality of newborn, also failure of improvement of TOPS score after 1 hr suggests poor outcome.

Regarding the transport mode 142(47.3%) were transported in ambulance, 99(33.0%) in auto rickshaw, 55(18.3%) in open vehicle and 4(1.4%) in bus.

### 4. Discussion

This study attempts to identify common issues related to neonatal health and transport system for newborn. About 60% of deliveries were conducted at health care facility [19]. Deliveries taking place outside health facilities, those conducted by untrained birth attendants also contribute to higher perinatal mortality. However, in a very large country still considerable deliveries take place at home especially in rural area. Promotion of institutional deliveries would go a long way to bring down NMR. Prematurity and low birth weight continues to be major public health problems in present study and same has been consistently observed in many other developing countries. Low Admission weight, prematurity and hypothermia at the time of admission were strongly observed among expired newborns compared to survive.

Same has been earlier shown by others [5, 19-21]. So this finding reaffirms that safe neonatal transport system and when ever feasible *In utero* transfer needs to be strengthened in peripheral part of the country. Most of the newborns were referred in present study without proper prereferral stabilization, documentation or communication and use of Ambulance (33%), skilled attendant accompanying newborn (44.3%) and advice regarding care (40%) during transport was provided in few of referred newborns. However there is improvement in transport system compared to earlier studies. In a study by Sehgal et al [5]. None of referrals had been preinformed and none of referrals were accompanying by trained health personnel and none of babies had been fed during transport. In a study from Nigeria, suboptimal condition of neonatal resuscitation, thermoregulation and transfer were associated with poor immediate outcome. [20] This further stresses the need to develop perinatal regionalization with special care newborn units at smaller centres. As already known the key component of a neonatal transport system are human resource, vehicles and equipments, communication and family support, documentation and consent as well as feedback from referring unit and all of them need to be strengthened to have better neonatal survival. Individual morbidity and cause for mortality

have not changed in developing countries though many of them can be managed properly. Birth asphyxia, Hyaline membrane disease, sepsis and Meconium aspiration syndrome were most common morbidity among multiple co morbidities. Incidence of sepsis and HMD among preterm and LBW babies are major cause for immediate adverse outcome in other studies from developing countries of Asia and Africa [5, 19-22].

Improving survival of low birth weight neonates is a particular challenge among resource poor countries. As efforts to lower preterm labour are not always very successful, emphasis must be placed on best possible care of small infants, antenatal steroids for HMD and transport in stable condition to an equipped centre in time. Findings of present study are same for these simple danger signs in newborn which reflects physiological derangements and disease process with other studies done in past from other developing countries [4, 19-20]. It is preferable to have organised transport than self transport. Once the decision of transporting a newborn has been taken then assessment of newborn, stabilization and care during transport becomes important so a newborn can reach a referral facility in stable condition to improve intact survival. Body temperature, airway and breathing (Oxygenation), perfusion and sugar (hypoglycaemia) need to be addressed adequately before and during transport. TOPS, a simplified assessment of neonatal acute physiology gives a good prediction of mortality in these neonates [23]. Prior stabilization and adequate care during transport results in decreased of hypoglycaemia, acidosis and mortality [22]. Premature, LBW and even sick referred full term babies are at risk for developing these complications. In developing countries most of transport is not by a vehicle equipped for neonatal transport although guidelines of neonatal transport are available, they are not being fulfilled at peripheral parts of country and rural areas which account for majority of neonatal transport. In present study only one out of all transported newborn was referred with Kangaroo mother care on the way though majority of newborns were covered with more than one layer of clothes hypothermia was significantly seen in transported newborns. As temperature maintenance by transport incubator is not available at majority of places in resource limited setup kangaroo mother care used by attendant or mother is a useful way to maintain temperature along with other local alternative methods like thermocol boxes, plastic wrap etc.[6] Community based interventions, Prereferral stabilization and appropriate care during transport by a trained person may even be ASHA worker or Aanganwadi worker might go a long way for better outcome of referred neonates in developing country [6]. As following the implementation of outreach programme, Shenai *et al.* [25] Had demonstrated that frequency of stabilization measures performed before and during transport increased significantly, incidence of complication decreased significantly and transport related mortality also decreased to 2.9% from 8.0%.

## 5. Conclusion

This study has demonstrated current prevailing situation in peripheral parts of country and need for proper regionalisation of peripheral care for better outcome. A

significant number of these deaths can be avoided by promotion of institutional deliveries, proper regionalization of newborn care, early identification and appropriate pre referral stabilization, communication regarding care of newborn during transport and adequate equipments and manpower at the referral facility.

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