

# Study of New born Transport status from Periphery and Morbidity and Mortality among Them

Irbaz A Turk<sup>1</sup>, Sucheta Munshi<sup>2</sup>, Dipti Shah<sup>3</sup>

<sup>1</sup>3<sup>rd</sup> Yr Resident, Department of Paediatrics, Civil Hospital, Ahmedabad, Gujarat.

<sup>2</sup>HOD & Associate Professor, Department of Paediatrics, Civil Hospital, Ahmedabad, Gujarat.

<sup>3</sup>Assistant Professor, Department of Paediatrics, Civil Hospital, Ahmedabad, Gujarat.

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## ABSTRACT

**Background:** This study was aimed to find out characteristics of transport of a sick referred neonate and to measure the mortality rate. **Methods:** An observational prospective study was conducted for the period of six months from 1/9/2018 to 31/3/2019 in the department of paediatrics, civil hospital Ahmedabad Gujarat, India. Referred new-borns fulfilling inclusion criteria were enrolled in study. Data collected included referral and transport characteristics and clinical parameters at the time of admission including TOPS score. They were followed up to immediate outcome. **Results:** Sepsis (43%) Respiratory distress syndrome (30.6%), Meconium aspiration syndrome (16.4%) Prematurity (12.3%), Birth asphyxia (8.5%) and were the main causes of referral and even mortality. Most of neonatal referrals were self or improperly organized transport and associated with inadequate prereferral stabilization, incomplete advice regarding care during transport and poor communication. Overall mortality (46.7%) of referred neonates was high. Weight less than 1500 gm, prematurity <32 weeks, Hypothermia, delayed capillary filling time and significant respiratory distress were significant predictors of neonatal death. Out of 1170 neonates, TOPS score was 0 in 23%, 1 in 33%, 2 in 21%, 3 in 14% and 4 in 9% of neonates. 100% of neonates with a TOPS score of 4 on admission expired. **Conclusion:** A significant number of neonatal deaths among referred new-borns can be prevented. The development of an effective neonatal transport system is needed for proper implementation of regionalization of perinatal care and better neonatal outcome. The TOPS scoring system can serve as a guide for the paediatrician in initiating appropriate revival and/or treatment measures.

**Keywords:** Newborn, Transport.

## INTRODUCTION

A new born infant, or neonate, is a child under 28 days of age during which he or she is at the highest risk of dying. India has witnessed a significant reduction in the number of neonatal deaths from 1.35 million in 1990, to around 0.76 million in 2012.<sup>[2]</sup> The current neonatal mortality rate of India remains at 24 per 1000 live births 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. 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 new born period. Almost two third of the total neonatal deaths are within first week of life. Causes for neonatal deaths

in immediate postpartum period is different in developing countries from developed countries. Thus, causes of neonatal mortality vary across the nations and from rural to urban setups. Similarly, babies born before 32 weeks of gestation and/or with birth weight less than 1500 gm has high morbidity and mortality in resource poor settings. 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. Though institutional delivery and in-utero transport of new born is safest but unfortunately preterm delivery and perinatal illness cannot be always anticipated resulting in continued need of transfer of these babies after delivery. These babies are often critically ill and outcome is also dependent on effectiveness of transport system. Prematurity, asphyxia and sepsis are the most common causes of neonatal mortality in developing countries. Many of these are easy to manage and significant decrease in neonatal mortality can be anticipated with regionalization of perinatal care, where many sick new-born 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

### Name & Address of Corresponding Author

Dr Irbaz A Turk  
3rd Yr Resident,  
Department of Paediatrics,  
Civil Hospital, Ahmedabad,  
Gujarat.

encouraging. 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 hypoglycemic and 75% of the babies transferred this way have serious clinical implications, currently there is limited or no dedicated neonatal transport service is provided in India at the same time it is well known that transport of newborn by a skilled organised team reduces neonatal mortality and morbidity. Navjat shishu suraksha karyakram highlights the role of safe neonatal transport. so current study was undertaken to analyse the profile and outcome of referred newborns to medical college level NICU and to see for any change in neonatal transport and outcome over the years.

## MATERIALS AND METHODS

This observational prospective study was conducted at the NICU of department of paediatrics at civil hospital Ahmedabad, Gujarat, India from 1/9/2018 to 31/3/2019. During this period data was collected for referred extramural neonates with following criteria.

### Inclusion criteria:

- All neonate referred to civil hospital Ahmedabad

### Exclusion criteria:

- Neonates having Major congenital anomaly or surgical condition
- Refusal to give informed written consent
- New born who left against medical advice (LAMA) were excluded

The subjects were assessed in terms of maternal antenatal visits, place of birth (home, PHC, CHC, District level hospital, Private hospital), persons conducting delivery (doctor, Nurse, Female Health worker, Trained birth assistant, or other) birth events (need for resuscitation and its details) and complication (at the time of delivery) if any, reason for referral (verbal or written), prereferral treatment (as per referral note whenever available), Mode (Ambulance, own vehicle, Public transport, Auto rickshaw etc), duration of transport, Person accompanying (skilled/ unskilled attendants or relatives), and treatment if any during transport. Referred neonates were also assessed for advice regarding care during transport like temperature, feeding and airway management. Condition of baby at arrival in NICU was assessed for temperature, airway, breathing, circulation and hypoglycaemia and need for immediate resuscitation on admission. After initial stabilization new-borns were assessed for maturity, clinical condition, individual morbidity and their outcome was assessed in terms of discharge, death and duration of stay. New-borns that left against medical advice were not included in

outcome analysis TOPS scoring on arrival at NICU within 1 hr of admission. It includes Temperature by digital thermometer in axilla, Oxygenation by Spo2 monitoring by pulse oximeter; Perfusion by capillary refilling time (CRT) on midsternum; and, Sugar by reagent strip with Glucometer parameters as observed on arrival of the baby.

## RESULTS

**Table 1: Demographic and Clinical profile of admitted Babies**

Babies	
<b>Profile of babies Cases (n=1170)</b>	
Referring Hospitals	
Private hospitals	27%
Municipal	14.1%
Community health centre	26.8%
G.M.E.R.S.	32.1%
Accompanied by doctor/paramedical worker	
Yes	35%
Not	65%
Morbidity of referred newborns	
Sepsis	43%
RDS	30.6%
Meconium Aspiration	16.4%
Birth asphyxia	8.5%
Pre term/low birth weight	12.3%
RDS with sepsis	15%
Mas with birth asphyxia	5.5%

**Table 2: Transport from Govt. peripheral centres**

Transport used Cases (n=1170) (%)	
Mode of transports	
108 Ambulance	49%
Government ambulance	10%
Private ambulances	21%
Auto rickshaws	12%
Private vehicles	8%

**Table 3: Distribution of LBW neonates**

Distribution of LBW babes Cases (n=144) (%)	
LBW (<2499 gms)	95(65.9%)
VLBW (<1499gms)	30(20.8%)
ELBW (< 999 gms)	19(13.1%)

**Table 4: TOPS Scores and Its Outcome**

Top scoring	Referred newborn(n=1170)	Expired = (n=545)
TOPS 0	234	0
TOPS 1	421	155 36.8%
TOPS 2	249	165 66.2%
TOPS 3	163	148 90.7%
TOPS 4	77	77 100%

**Table 5: Mortality causes amongst babies with TOPS score=4**

Mortality causes Cases (n=545) (%)	
Preterm with Sepsis	327(60%)
RDS	81(15%)
Birth asphyxia	109(20%)
Meconium aspiration	81(15%)
10% patient have mixed cause	

A total of 1170 referred neonates were included in the study based on inclusion criteria .out of them 1050(89.8%) new-born were institutional birth whereas 120(9.2%) were born at home. Among

referred 315(27%) were referred from private set up, 375(32.1%) from gmrs college, 165(14.1%) from municipal hospital, 313 (26.8%) from chc/phc. Majority of mother (75.5%).

Had minimum three antenatal visits. 1041(89%) newborn births were attended by doctor, whereas 129(11%) birth were attended by trained birth attendant or others. Majority of referred newborns were delivered vaginally (72%) where as 28% of newborn were delivered by Caesarean section.

Reason for referral included sepsis 43%, respiratory distress syndrome 30.6%, meconium aspiration syndrome 16.4%, preterm 12.3%, birth asphyxia 8.5%. Some patient had multiple cause 35% patient accompanied with doctor. 20% patient referred for no vacancy. 28% patient referred with bag and tube ventilation. 38% patient referred without oxygen support.

Pre-referral treatment given in 74% patient in form of oxygen, IV fluid, antibiotic, vitamin k.

Most common cause of mortality in our study was sepsis with prematurity

Account for 60% then rds 15%, mas 15% birth asphyxia 20%

Most patient expired within 1 day account for 42%.

Mode of transport most common was 108 ambulance.

100% of neonates with a TOPS score of 4 on admission expired.

No proper documentation or refer sheet available in 33% patient.

Advice regarding care during transport provided in 30% of patient

Patient left against medical advice were 65(0.05%)

**Table 6:**

Duration Between Time Of admission And Death		
<1 DAY	230	42.2%
1-3 DAYS	188	34.4%
4-7 DAYS	90	16.5%
>7 DAYS	37	0.6%

## DISCUSSION

This study attempts to identify common issues related to neonatal health and transport system for newborn. The findings might represent the status at peripheral part or district level NICU in many parts of country and also in other developing countries. About 85% of deliveries were conducted at health care facility and 75.5% of mother had minimum three antenatal visits. There is significant increase in institutional deliveries over the years. Unbooked status of mother heightens the risk of neonatal mortality as opportunity of nutritional and health consultation and early detection of complication is not available. Deliveries taking place outside health facilities, those conducted by untrained birth attendants also contribute to higher perinatal mortality.

Prematurity and sepsis 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 and sepsis at the time of admission were strongly observed among expired new-borns compared to survive. So this finding reaffirms that safe neonatal transport system and whenever feasible In utero transfer needs to be strengthened in peripheral part of the country. Some of the new-borns were referred without proper documentation, pre referral stabilization, communication, skilled attendant accompanying new-born. Advice regarding care during transport was provided in few of referred new-borns. However there is improvement in transport system compared to earlier studies. In a study by Sehgal et al. 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. This further stresses the need to develop perinatal regionalization with special care new-born units at smaller centres. As already known the key component of a neonatal transport system are human resource, vehicles and equipment's, 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. Mortality of 46.5% of referred newborn in present study is comparable with other studies published from the same region and other developing countries. Percentage of patients left against medical advise in present study was quite low, at least 10% of them stayed for minimum 7 days in NICU and most of them (60%) were preterm babies kept for weight gain who opted for LAMA for their social and economical reasons. This finding stresses upon the need of social worker and counsellor in NICU so relatives can be provided optimum information and counseling during stay as well as at home. Present study had demonstrated that admission weight less than 1500 gm, Hypoglycaemia, Hypothermia, Blocked airway, cyanosis, delayed CFT(capillary filling time) and significant respiratory distress are independently associated with mortality. In the current study 54.9% of the neonates were referred directly (i.e. no intermediate referral points), either from the health

facility or their homes and represent timely referral. In our study pre referral treatment at any point was given to 74% neonates contributing to safer transport. As hypoglycemia, hypothermia, poor perfusion and oxygenation have shown to be associated with high mortality in transported neonates. TOPS, a simplified assessment of neonatal acute physiology gives a good prediction of mortality in these neonates. Prior stabilization and adequate care during transport results in decreased of hypoglycaemia, acidosis and mortality.

## CONCLUSION

It was concluded that Prematurity, Respiratory distress syndrome, Birth asphyxia and sepsis were the main causes of referral and even mortality. Overall mortality of referred neonates is high. Weight less than 1500 gm, prematurity <32 weeks, Hypothermia, delayed capillary filling time and significant respiratory distress were significant predictors of neonatal death. The study had demonstrated current prevailing situation in peripheral parts of country and need for proper regionalization of perinatal 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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