



A Study of Correlation of TOPS Score with Outcome of Referred Neonates

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INTRODUCTION

In India, NMR contributes to 2/3rd of all infant deaths. Amongst these, 2/3rd of deaths occur during 1st week of life.¹Preterm, Birth asphyxia, hypothermia, respiratory distress are main causes of neonatal mortality.² As the Healthcare system in India is divided into primary, secondary and tertiary care centers and many of times high risk neonates need to be transferred when in-utero transport is not possible. Adequate neonatal transport is a key component of care for neonates who require referral to tertiary care centre³. Neonatal transport is an act of moving a neonate from one facility centre to another to provide a better level of care which is not available at former centre.⁴⁻⁵ Principal neonatal transport includes: (a) Indication for transfer; (b)

ABSTRACT

Introduction: Neonatal transport is a key component of care for neonates who require referral to tertiary care. The aim of the study is to find out correlation of TOPS score with outcome of referred neonates.

Method: A prospective observational study was conducted of 200 extra mural neonates for period of 1 year from August 2012 to September 2013 at general hospital, Ahmadabad. They were assessed for pattern of referral and categorized as critical or stable & TOPS scoring was done by standard statistical method.

Result: Prematurity and its complication (32%), Septicemia (15.5%) and respiratory distress (14%) were commonest morbidity among 200 neonates. Highest referred from private hospital 97(%) and 48(%) neonate were come directly. Ambulance was used only by 38 (19%) and rest by other transport system. Among them 15 were critical. Only 39 (19.5%) newborn referred after prior intimation. Commonest affected parameter of TOPS score was temperature. Among 59 neonate expired, 42 (71.18%) were critical on admission.

Conclusion: Sick newborns should be transferred in equipped vehicles and skilled personnel with pre transport stabilization. Proper implementation of referral sheet and TOPS score will definitely improve outcome of newborns.

Keywords: neonatal transport, TOPS score, neonatal mortality, hypothermia

Communication with referring hospital; (c) Stabilization before and during transport; (d) Follow up.⁶ Non availability of transport and transport by their parents and/or caregivers in private vehicles or poorly equipped ambulances may result in greater morbidity and mortality in these vulnerable newborn. There are only a few dedicated neonatal transport services available in India. Various scoring systems are there to assess the transport outcome of referred neonates like Transport Risk Index of Physiological Stability Score (TRIPS), Mortality Index for Neonatal Transportation Score (MINI) and TOPS Score (Temperature; Oxygenation; Perfusion; Sugar)⁶⁻⁷. TOPS Score is simplified assessment of neonatal acute physiology gives a good predictor of mortality in this neonate.⁸ Due to

ample references from home, PHC, CHC, private sectors to our tertiary care neonatal institute affiliated to medical college, the study was undertaken to know pattern of referral and condition of neonate at time of arrival and was intended to find strengths and lacunae of the referral system by using TOPS Score.

MATERIAL AND METHODOLOGY

This was a prospective observational study of admitted extramural neonates in NICU of Tertiary Care General Hospital, affiliated to a Medical College. Total 200 extramural neonates admitted in NICU from August 2012 to September 2013 were included in this study. All the neonates who were referred from outside to NICU and got admitted were included. After informed consent from the informant, neonates were enrolled for the study and asked for questions like-which mode of transport(vehicle) used, from where they were referred (referring center),who is accompanying person, approximate travelling distance, details of if any pre-transport intervention and stabilization was done or not. The documents sent from the referring centre were reviewed and categorized as: (a) No documents available; (b)Inadequate documents; and (c)Adequate documents; according to National Neonatology Forum guidelines.⁸ Demographic profile, detailed history and clinical parameters were noted on admission. Neonates were categorized as critical or stable on first examination. Criteria for critical neonates included were extreme preterm (<28 weeks), ELBW, severe respiratory distress, central cyanosis, bleeding, shock, acute convulsion or encephalopathy.⁹ Rest of the babies were labeled as stable babies. Probable diagnosis was made at 24hrs and recorded as morbidity in referred neonate. TOPS scoring was done on arrival at NICU.⁹ It includes: Temperature (36-37.5 C) by digital thermometer in left axilla; Oxygenation by Spo2 (<88%) monitoring (by BPL pulse oxymeter). Perfusion (>3sec) by capillary refilling time on midsternum; Sugar (<45mg/dl) by reagent strip .Any alteration parameter was recorded and given score of 1.(lowest score-0,highest score-4). All patients were managed according to standard NICU protocol and outcome was recorded only in the form of mortality and classified as death within 24 hour, 24-72 hour, >72 hour after admission. Data analysis was done by using standard statistical method.

RESULTS

Among 200 neonates, 99 (49.5%) were male, 101 (50.5%) female, 136 (68%) were full term, 64 (32%) preterm babies, 183 (91.5%) hospital delivery &

Table 1: Demographic details of referred neonates

Profile of baby	Cases (%)
Mode of delivery	
Hospital delivered	183(91.5)
Home delivered	17(8.5)
Gestational age	
Preterm	64(32)
Term	136(68)
Gender	
Male	99(49.5)
Female	101(50.5)
Birth Weight	
Normal	86(43)
LBW	80(40)
VLBW	25(12.50)
ELBW	9(4.5)
Delivery attended by	
Paramedic	2(1)
Relative	6(3)
Gynecologist	172(86)
Medical Officer	10(5)
Dai	10(5)

Table 2: Morbidity in referred neonates

Morbidity	Cases (%)
Preterm	38(19.0)
Sepsis	31(15.5)
Respiratory Distress	28(14)
Hyperbilirubinemia	25(12.5)
Birth Asphyxia	21(10.5)
Convulsion	11(5.5)
Fever	8(4)
MSL &MAS(MSL+RDS)	15(7.5)
Others	23(11.5)

17(8.5%) were home delivered. Commonest cause of referral was prematurity 64(32%) followed by sepsis 31(15.5%) and respiratory distress (14%). The highest reference were made from private hospitals 97(48.5%) followed by tertiary care hospital 45(22.5%).Among critically ill newborns, 44(22%) were from private hospital and institutions. Among the referred neonate, only 39 cases had given prior intimation or inquiry. Ambulance was used as a mode of transport only in 38(19%) neonates, among them 20(52.6%) were critically ill. While other mode of transport included auto rickshaw 62(31%), bus 23 (11.5%) and private vehicles 77(38.5%). Out of 152 referred neonate from other hospital, 73(48%) had inadequate written documents. Only 10 (6.55%) referred neonates has adequate details that was from tertiary care hospital. On admission, TOPS score was 4 in 41 neonates (20.5%), out of them high mortality was observed. score was 0 in 37(18.5%) neonate, from that 2(5.4%) were expired. According to TOPS score, only 14 neonates had hypoglycemia, out of them 12 (6%) had symptomatic hypoglycemia. In our study 128(64%) had cold stress and moderate hypothermia. Among 200 neonates 59(29.5%) expired, out of

Table 3: Referring vehicle with accompanied person

Vehicles	Critical		Stable		Total
	Doctor/Paramedic	Relative	Doctor/Paramedic	Relative	
108	10 (83.3)	1 (2.1)	3 (75)	6 (4.4)	20 (10)
Private ambulance	2 (16.7)	7 (14.9)	1 (25)	8 (5.8)	18 (9)
Rickshaw	0	11 (23.4)	0	51 (37.2)	62 (31)
Bus	0	5 (10.6)	0	18 (13.1)	23 (11.5)
Two wheeler	0	6 (12.8)	0	22 (16.1)	28 (14)
Other	0	17 (36.2)	0	32 (23.4)	49 (24.5)
Total	12 (100)	47 (100)	4 (100)	137 (100)	200 (100)

Table 4: Temperature at time of admission

Temperature	Critical Newborns				Stable Newborns			
	PT	FT	Total	Expired	PT	FT	Total	Expired
>100 F	0	1	1	0(0)	4	9	13	1(7.6)
Normal	5	4	9	5(55.5)	14	49	63	3(4.7)
Cold Stress	8	8	16	10(62.5)	19	11	30	3(10)
Moderate Hypothermia	28	5	33	27(81.8)	28	7	35	10(28.5)
Severe Hypothermia	0	0	0	0(0)	0	0	0	0
Total			59	42(71.1)			141	17(12)

Table 5: Referring Unit

Referring unit	Critical	Stable	Total
Private	27(27.8)	70(72.1)	97(48.5)
Tertiary care	17(37.7)	28(62.2)	45(22.5)
Community Health Centre	2(25)	6(75)	8(4)
Primary Health Centre	1(50)	1(50)	2(1)
Self	12(25)	36(75)	48(24)
Total	59(29.5)	141(70.5)	200

Table 6: TOPS Score

Tops score	Total patient Percentages(%) (n=200)	Total expired Percentages (%)
0	37(18.5)	2(5.40)
1	52(26)	2(3.84)
2	38(19)	6(15.78)
3	32(16)	16(50.00)
4	41(20.5)	33(80.48)
Total	200(100)	59(29.5)

them 42(71.18%) were critical on admission, from that 29 were pre term and 30 were full term. There were 24 newborn (40%) were expired in 24 hour of admission. Commonest cause of death was prematurity and its associated complications 28(47.4%) followed by septicemia 15 (25.4%).

DISCUSSION

This study was done to know the pattern of referral and condition of neonate at the time of presentation. This study was intended to find strength and lacunae of referral system, with solution if any. In INDIA, most sick neonates are transferred by their parents or paramedical personal in private vehicle or poorly equipped ambulance. Currently no dedicated neonatal transport service is provided by the state. Neonate must be stabilized before

the transport begins. Unstable neonates will suffer more harm than benefit from urgent transport.

In our study, total 200 referred newborn transported by ground route were studied, among them 86(43%) had normal birth weight, 80(40%) low birth weight, 25(12.5%) were very low birth weight, 9(4.5%) extremely low birth weight. Our study showed that commonest morbidities at 24 hour of admission were prematurity and its associated complication (32%), septicemia (15%), Respiratory Distress Syndrome (14%), hyperbilirubinemia (12.5%), birth asphyxia (10.5%). Highest referrals were from private hospital (48.5 %) mostly due to economic factor as this study was conducted in JSSK era. 22.5% were referred from tertiary care hospital due to unavailability of space and 24% come directly. Medical van was used only by 38 (19 %) & rest 162 (81%) used other private and public transport system including 2 wheelers (14%) with compare to study done by Buch et al¹¹ where 26.8% newborns were transported by ambulance .While in study done by Ekta et al¹² 43.7% were transported in ambulance .This may be due to, 47 (23.5%) newborn came from < 5km radius, 30 (15%) from 5-10 km radius, 36 (18%) were from 10-20 km radius and few were from > 20km area. It was observed that other modes of transport might be more convenient and time saving for referring person. Lack of awareness, unavailability, or hesitancy to utilize ambulance may be the cause. In this study, only 15(7.5%) critical neonates accompanied by medical persons, amongst them 10 (66.6%) were expired which was quite lower than the study done by Buch et al¹¹ where 11% newborn was referred by skilled person and in Sehgal et al¹³ none of referrals were accompanying by trained health personal.

Table 7: Mortality in referred neonates

Causes	Duration between death and admission			Total (%) (n=200)
	<24 hours (n=24)	24-72 hours (n=19)	>72 hours (n=16)	
Critical				
Preterm & associated complications	10 (41.7)	5 (26.3)	4 (25)	19 (9.50)
Sepsis	5 (20.8)	3 (15.8)	3 (18.8)	11 (5.50)
Respiratory failure	4 (16.7)	2 (10.5)	1 (6.3)	7 (3.50)
MAS	2 (8.3)	1 (5.3)	2 (12.5)	5 (2.50)
Stable				
Preterm & associated complications	2 (8.3)	4 (21.1)	3 (18.8)	9 (4.50)
Sepsis	0 (0)	2 (10.5)	2 (12.5)	4 (2)
Convulsion	0 (0)	1 (5.3)	1 (6.3)	2 (1)
Birth asphyxia	1 (4.2)	1 (5.3)	0 (0)	2 (1)
Total	24 (100)	19 (100)	16 (100)	59 (29.50)

From rest 44 critical neonate who came by other modes or unattended, 31 (70.45 %) expired, suggesting strong correlation ($P < 0.05$) and suggest higher fatality may be due to delay in referral, not proper stabilization prior to transport, inadequate facility while transporting or severe illness itself. In developing countries, we can manage the lacunae of skilled persons by ASHA, Anganwadi workers for pre referral stabilization and care during transport of newborn referred from peripheral health care centers.¹⁴⁻¹⁶ As per defined criteria, only 10(5%) referrals coming from tertiary care institute had adequate details. This emphasized that referring unit should be sensitized for importance of documentation. This study shows high neonatal mortality rate (71.1%) with $P < 0.05$ in critically ill, improperly transported neonates. Prior stabilization and adequate care while referring, can decrease chance of developing hypoglycemia, acidosis and mortality.^{16, 17} Our study showed high TOPS score on admission was positively correlated with high mortality. Temperature was the most commonly affected parameter in referred neonate following by hypoglycemia. Out of 200 neonates, 114 were hypothermic among them 83(72%) were preterm. From 114 hypothermic newborns, 50 (43%) newborns expired. Not a single baby had severe hypothermia on admission .. According to study done by Bhoopalam et al¹⁸ had found that hypothermia as the commonest morbidity in babies before arrival at hospital. A significant correlation between hypothermia and fatality has been observed in various study.^{18,19} High TOPS score on admission closely correlate with poor outcome in spite of highest treatment modalities .In present study ,mortality amongst referred neonates are 59(29.5%) as compared to 32.2% in study done by Buch et al and 23.7% in another study done by Ekta et al.^{11,12} Out of 59 newborns,42(71.1%) were critical on admission and from that 40% of the newborns were expired within 24 hours of their life .This shows direct correlation of mortality with TOPS score.

As per our study, there is lacuna in case of adequate documentation as only 10 referred newborns had adequate documentation.

CONCLUSION

Neonates needing special or intensive care should be transported by skilled transport team with organized teamwork in an equipped vehicle customized for neonatal transport. Hypothermia, hypoglycemia, poor perfusion and oxygenation are strongly associated with high mortality in transported newborns. Pre-transport stabilization is the most vital step before transport along with care during transport and post transport management. Adequate and timely communication with the family, referring hospital and support groups is essential. Ideally, transport of a newborn should be in orderly manner, i.e. by a health worker to PHC, then to FRU and thereafter to medical college. In spite of availability of 108, FRU and CHC, the neonatal mortality of India (29%) is still the major cause of mortality due to prematurity, septicemia and birth asphyxia. This reflects improper implementation and utilization of Government Program. Neonatal transport is a formidable task, in fact a challenge, for the family as well as the healthcare provider. The TOPS score is a reliable indicator of morbidity and mortality. There must be implementation and awareness about kangaroo mother care along with breast feeding, proper transport system with skilled attendance in stable or critical newborn among periphery and public level like other government programmers for better outcome.

BIBLIOGRAPHY

1. SRS Bulletin. Available at: http://www.censusindia.gov.in/vital_statistics/Vital_Rates/Vital_rates.asp. Accessed February 13th, 2012.
2. John P. Cloherty, Manual of Neonatal Care, Neonatal Transport. 7th ed. Philadelphia: Wolters Kluwer/Lippincott Williams And Wilkins; 2012. p-192-202.
3. Meharban Singh. Care of Newborn, Transport of sick in-

- fants.7th ed.New Delhi:Sagar Publications;2010. p29-31.
4. Britto J,Nadel S,Maconochie I,Levin M,Habibi P.Morbidity and severity of illness during interhospital transfer:impact of specialised paediatric retrieval team.BMJ 1995 Sep 30;311(7009):836-9.
 5. Kumar PP,Kumar CD,Venkatalakshmi A.Long Distance Neonatal Transport-The Need of the Hour.Indian Pediatrics.2008 Nov 1;45(11):920.
 6. Anjali Kulkarni.Handbook OF Neonatology,Neonatal Transport,the neonatology chapter of Indian Academy Of Paediatrics.1st ed.Banglore:Arrow medical Information Services Publishers;2013.p-14-19.
 7. O.P.Ghai.Essential Pediatrics,Transport of neonates.8th ed.New Delhi:CBS Publications;2017.p-178.
 8. Mathur NB,Arora D.Role of TOPS(a simplified assessment of neonatal acute physiology) in predicting mortality in transported neonates.Acta Paediatr.2007 Feb;96(2):172-5.
 9. NNFclinicalpracticeguidelines.Available at http://nnfi.org/images/pdf/nmf_cpg_consolidated_file-january102011.pdf. Accessed on February 13th,2011.
 10. Community-based interventions for improving perinatal health outcomes in developing countries;a review of the evidence.pediatrics.2005 Feb;115:519-617.
 11. Buch Pankaj M et al. Status of Newborn Transport in Periphery and Risk Factors of Neonatal Mortality among Referred Newborns JPBMS,2012,16(09).
 12. Ekta Dalal,Gaurav Vishal,Devang Solanki. Study of Neonatal Transport at Tertiary Care Centre. International Journal of Science and Research ISSN(Online):2319-7064.2013 December;2(12):289-292.
 13. Sehgal Arvind,M.S.Roy,N.K.Dubey,M.C.Jyothi. Factors contributing to outcome in newborns delivered out of Hospital and referred to a teaching Institution. Indian pediatr 2001;38:1289-94.
 14. Facility Based (F-IMNCI),Ministry of health & Family Welfare 2009,pg no-79-83.
 15. Janani Suraksha Yojana: Guidelines for implementation,Ministry of Health and Family Welfare, Government of India. Available at: http://www.mohfw.nic.in/NRHM/RCH/guidelines/JSY_guidelines_09_06.pdf.
 16. George A,Woodward,Roxanne Krisch.Avery's Disease of Newborn,Stabilization and transport of the high risk infant.9th ed.Philadelphia:Elsevier Saunders Publisher;2005.p-341-357.
 17. Hood J .Cross A ,Hulka B. Effectiveness of neonatal transport team. Critical Care Medicine1983;11(6):419-2-3.
 18. Karan S,Rao MN,Urmila S,Rajaji S.The incidence,clinical profile,morbidity and mortality of hypothermia in newborn.Indian Paediatrics;1975;42:1205-10.
 19. Santosh KB,Surendra Shah K,Hair MKS,Shyamal KS,Shant G.Primary cold injury of newborn.Indian Pediatr 1971;8:827-30.