EFFECT OF PLACE OF BIRTH, MODE OF TRANSPORT AND MEDICAL SKILLS OF THE ACCOMPANYING PERSON ON MORTALITY OF NEONATES

Shahid Mahmud, Syed Awais Ul Hassan Shah*, Syed Qamar Zaman*, Salman Ali

Army Medical College, Rawalpindi, National University of Sciences and Technology (NUST) Islamabad, Pakistan, *Military Hospital Rawalpindi, Pakistan

ABSTRACT

Objective: To determine the effect of place of birth, mode of transport and medical skills of the accompanying person on mortality of neonates.

Study Design: A descriptive study.

Place and Duration of Study: Military Hospital (MH), Rawalpindi from October 2011 to March 2012.

Patients and Method: One thousand two hundred and ninety three neonates of either gender under the age of 28 days admitted to NICU either as indoor or outdoor were entered in the study. Data included high risk obstetric factors, gestational age, birth weight, APGAR score, gender, need for resuscitation, diagnosis, complications, place of delivery, mode of delivery and outcome. The associations between the place of delivery, mode of delivery and medical skills of the accompanying person with the neonatal mortality were associated using the Pearson Chi-Square method.

Results: A total of 1293 neonates were included in the study and their data regarding place of delivery and mode of transport was evaluated. Four hundred and two (402/1293) cases died in our NICU and the mortality rate of the neonates admitted in our setup was 31.1%. The breakup of neonatal deaths was further subdivided into the patients born in health care with NICU facility (25%), those born in health care without NICU facility (33.60%) and those born in the community setting (40.54%). The aforementioned percentages were calculated out of the total live births in that particular setup and do not represent mere breakup of total mortality. A total of 50.32 % neonates brought to hospital in an unequipped vehicle expired versus 2.28% mortality of neonates that were brought in a medically equipped vehicle. The neonatal mortality rate in patients accompanied by unskilled personnel was 40% versus skilled personnel which was 1.62%. Statistically significant associations using Pearson Chi-Square method were seen between the place of delivery, mode of transport, the skills of the person accompanying the patient in the transport and neonatal mortality (*p* value = 0.001 each).

Conclusion: Results of this study prove that the quality of birth services and patient transport mechanisms directly affect the neonatal survival and babies who are born in community setting, transported in unequipped vehicle without a skilled medical attendant are at a higher risk for mortality than the patients born in NICU facility, transported in an equipped vehicle and accompanied by skilled medical attendant.

Keywords: Mode of Transport, Neonatal Mortality, NICU, Place of Birth, Skilled Medical Attendant.

INTRODUCTION

World wide four million infants die in neonatal period, three quarters of these deaths occur in the first week of life. With regards to neonatal mortality, Pakistan ranks 3rd in the world after India and China[1]. Neonatal mortality rate as per latest statistics is 41/1000 live births[2]. Pakistan's Millennium Development Goals (MDG) aspire to decrease IMR and CMR to 40 and 45 (MDG4) and MMR to 140 (MDG5) by 2015[4,5]. There has been a significant reduction in the number of deaths of children under 5 but it is mainly due to decrease in post-neonatal mortality. No effort has been made to reduce neonatal mortality[6].

There are many risk factors for the neonatal mortality, one of them is the place of delivery and the presence of skilled attendance at the time of childbirth. Facility based newborn care has assumed an importance in developing countries owing to its potential to reduce Neonatal Mortality Rate (NMR) by 23-50% in different settings[7]. Pakistan has got an institutional delivery coverage of 34% and skilled attendant at birth coverage of 39% which is very low and thus a contributing factor for

Correspondence: Dr. Shahid Mahmud Dept of Paediatrics, MH Rawalpindi, Pakistan.
Email: shahidmahmud101@hotmail.com
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high NMR[8]. The major reason for this is poor access of the mothers to health care facilities due to social, cultural, economic, and political environment that they face, especially in rural areas[9]. Mazhar et al reported that there was no decrease in neonatal mortality during 2005 to 2008[10].

There is a limited data in our country that can offer evidence of a direct link between institutional delivery, trained attendance and neonatal survival. The role of institutional delivery system in preventing the neonatal mortality is also unclear. The present study aims to determine the association between the place of delivery, mode of transport, medical skills of the accompanying person and the neonatal mortality.

PATIENTS AND METHODS

This descriptive study was carried out at Neonatal Intensive Care Unit (NICU) of Paediatric Department at Military Hospital (MH), Rawalpindi. About 12 to 15 babies on average are admitted in NICU daily. Two consultant neonatologists, ten residents in paediatrics, fifteen registered nurses and ten midwives provide health care to neonates admitted in the unit. This NICU can accommodate ninety neonates at a time providing intensive medical and surgical care for thirty newborns, cot care for thirty newborns and mother based care for thirty newborns.

The study population consisted of newborns of military personnel and civilians of either gender under the age of 28 days. Data of clinical diagnoses of the admitted neonates during this period along with disease wise outcome, place of delivery and mode of transport was also taken. Infants born before 24 weeks of gestation, and those weighing less than 500 grams we excluded from the study. Children who left against medical advice, children with incomplete record and babies who were detained and were handed over to parents after initial checkup were also excluded from the study.

Neonatal death is defined as termination of life of a live-born child within 28 days of birth. Place of delivery was classified as "healthcare with NICU facility", "healthcare without NICU facility "or"in the community". Healthcare facility included dispensaries, health centers and hospitals. Deliveries at home, TBA's homes or anywhere else besides healthcare facilities were classified here as "in the community".

Mode of transport was classified as "Medically Equipped Road Vehicle" or "Non-equipped Road vehicle". Medically equipped road vehicle contained facilities of oxygen, cardiac monitor, neonatal resuscitation equipment and may or may not be manned by a skilled health professional which further classifies this category into "Medically Equipped Road Vehicle Accompanied by Skilled health worker" and "Medically Equipped Road Vehicle With Unskilled Personnel". Non Equipped Road Vehicle may be any vehicle which did not contain medical equipment and was unmanned by skilled health worker. There was no reported case of referral in which a newborn was transported on unequipped vehicle accompanied by a skilled health worker. Mode of transport was recorded only for outdoor admissions because in case of indoor admissions, the NICU facility of MH Rawalpindi is located at the same floor of Labour Room and Operation Theatre and babies are transported in transport incubators.

The data of total admissions, mortalities and causes of deaths was recorded and entered on a set proforma. Information on mode of delivery, risk factors and medical history were collected from the children's parents by means of an interview conducted by the researcher and as recorded on a data form.

The study was approved by the MH Research and Ethics Committee. Written informed consent was obtained from the parents of all the participants. The sample size was calculated by taking anticipated probability of mortality among admitted children as 0.07 and anticipated probability of mortality of children in general population as 0.06, level of precision was 50% and confidence interval was 95%. The minimum sample required was 272[11].

Sample size was calculated using World Health Organization (WHO) calculators. All data was analyzed using Statistical Package for

Social Sciences (SPSS) version 18.0. Frequencies and percentages were taken out for the qualitative data; mean and standard deviation were taken out for the numerical variable. Associations between the qualitative variables were taken out using Pearson Chi-Square method and Fisher's Exact Test. At 95% confidence level, *p*-value less than 0.05 was taken as significant.

RESULTS

A total of 1293 patients fulfilling the inclusion criteria, were admitted to NICU, MH Rawalpindi over 6 months. The mean age was 3.78 days (SD ± 3.60) days with a range from 1 to 28 days. There were a total of 750 (58%) males and 543 (42%) females with a male to female ratio of 1.38:1. Six hundred and seventy six neonates (52.3%) were delivered in a health care setup with NICU facility. Two hundred and forty seven neonates (19.1%) were delivered in a health care setup without NICU facility. Three hundred and seventy neonates (28.6%) were delivered in community. The mortality was 169/676 (25 %) in neonates delivered at healthcare with NICU facility, 83/247 (33.6%) in neonates delivered at healthcare without NICU facility and 150/370 (40.5%) in neonates delivered in community. Total deaths were 402/1293 (31.1%). Table-1.

Six hundred and thirty neonates from transported to NICU at MH Rawalpindi. Out of these 175 were transported in medically equipped vehicle and 455 in medically unequipped vehicle. Associations between place of birth, mode of transport, medical skills of the accompanying person and neonatal mortality were significant at *p* value=0.001 using Pearson Chi-Square method.

DISCUSSION

Regionalized neonatal/perinatal care with a good system of amenities at different levels has turned up as a major approach to undertake neonatal disease burden. Evidence reveals that places where nursery facilities are not present, there is a high risk of neonatal mortality[12]. The present study showed that patients who were born in a institution with NICU facility had a lower mortality rate (25%) as compared to the patients who were born in an institution without NICU facility (33.60%) and those born in a community setting (40.54%) depicting a significant association between place of birth and neonatal mortality *p* value = 0.001). Controversies regarding the safety of hospital birth as compared to the unsupervised births have been an intense topic of discussion in both developed and developing countries. There have been convincing opinions in both favors of

Table-1: Place of delivery and neonatal mortality.

	Healthcare with NICU facility		Healthcare without NICU facility		In the community		Total	
Month	Adm-issions	Neonatal Deaths	Admissins	Neonatal Deaths	Admissins	Neonaal Death	Admi-ssions	Neonatal Deaths
Oct 2011	102	17	42	10	59	23	203	50
Nov 2011	87	30	46	12	50	20	183	62
Decr 2011	108	33	32	32	73	14	213	79
Jan 2012	105	28	49	08	64	34	218	70
Feb 2012	154	32	40	11	79	30	273	73
Mar 2012	120	29	38	10	45	29	203	68
Total	676 (52.3%)	169 (25%)	247 (19.1%)	83 (33.60%)	370 (28.6%)	150 (40.5%)	1293	402 (31.1%)

and against the unsupervised births. Newman supports the fact that unplanned and unsupervised deliveries carry a risk of unforeseen situations for which appropriate management is easily available at hospitals[13]. People who advocate home deliveries argue that such situations are exceptional, and are disproportionate to the frequency of childbirth interventions that have their own risks in most obstetric departments[13-14]. The latest statistics by National Institute of Population Studies in Pakistan reveal that only 34% of the deliveries occur inside health care delivery systems while rest 66% deliveries are conducted at home. Also, during 39% of the births, skilled attendant is present at birth. Further more, almost 80% of these home births are assisted by Trained Birth Attendants (TBAs) or dais and 11% assisted by family or friends. Home deliveries by TBAs/dais are a custom in majority of the rural and peri-urban areas of Pakistan due to their easy availability, cost effectiveness and cultural norms[15]. Delivery conducted by a TBA or a dai can improve maternal and neonatal outcome but at the same time they are unable to deal with the potential complications as either they are not trained in dealing with them or they do not have adequate facilities to treat them[16]. Study by Lawn et al shows that countries with 98% institutional delivery coverage and 99% presence of skilled attendance had a very low Neonatal Mortality Rate (<15)[1]. Similarly another study done in China showed that hospital births with skilled staff were associated with 62% reduction in neonatal mortality[17]. The present study shows higher mortality in community settings because most likely the trained birth attendants are just trained to conduct the delivery and not skilled enough to deal with potential complications.

The present study also showed that the neonatal mortality was 2.2% in patients transported in medically equipped ambulance as compared to 50.3% in patients transported in unequipped vehicle. This study showed significant association between the mode of transport and neonatal mortality (p value = 0.001). Generally speaking, a higher mortality has been reported by Mitchell et al in cases of road transport[18]. In the present study, all the patients from outdoor were transported by a road vehicle. Study by Johnson show that properly equipped ambulance may actually help in safe transportation of the patients[19].

Table-2: Mode of transport, skill of accompanying person and neonatal mortality.

Patients	Mode of Transport						
	Medically equipped Vehicle			Medically un-equipped Vehicle			Total
	Skilled Personnel	Unskilled Personnel	Total	Skilled Personnel	Unskilled Personnel	Total	
Admission	52	123	175	0	455	455	630
Neonatal Deaths	2 (3.8%)	2 (1.6%)	4 (2.2%)	0	229 (50.3%)	229 (50.3%)	233 (37%)

The present study showed that the neonatal mortality rate in patients accompanied by unskilled personnel was high (40%) versus skilled personnel (3.8%). Our study showed significant association between the skills of the accompanying person in transport of the patient and neonatal mortality (p value = 0.001). The importance of the skills of the accompanying persons has been highlighted in different studies worldwide. Strategies proposed in the different studies and from international organizations (SCCM, ESICM, SIAARTI) propose that critical care patients must be accompanied by at least 2 escorts during transport[20]. One of these escorts should be a critical care nurse with Advanced Cardiac Life Support certification and experience with emergency situations[21].

CONCLUSION

The neonatal mortality is drastically reduced in those healthcare centers that have a NICU facility. Also, the provision of a medically

equipped ambulance and transport of the babies with a medically skilled assistant significantly reduced the number of neonatal deaths. We also conclude that birth in community settings is one of the major factors contributing to the high neonatal mortality in Pakistan. The most likely reason for high mortality rate amongst community births is the lack of training of dais and TBAs to deal with the potential complications that may arise during and after birth.

Recommendations

We recommend that Neonatal Intensive Care facilities should be improved by providing specialized training to doctors as well as other health care providers. Adequate transport facilities in the shape of equipped ambulances both with medical equipments and skilled staff should be provided for the patients. The TBAs and dais should be trained to deal with the common complications.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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