SPECTRUM OF NEONATAL ADMISSIONS AND THEIR OUTCOME IN A TERTIARY CARE HOSPITAL

Sadia Yasmeen, Khawaja Ahmad Irfan Waheed, Rafia Gul

Children Hospital and Institute of Child Health Lahore Pakistan

ABSTRACT

Objective: To study the spectrum of neonatal admissions and their outcome in a tertiary care hospital.
Study Design: A descriptive observational study.
Place and Duration of Study: The study was conducted in Neonatal Unit of The Children's Hospital & Institute of Child Health, Lahore for a period of one year from 1st Jan 2015 to 31st Dec 2015.
Material and Methods: Data of all admitted patients during the study period were reviewed and analysed in terms of gender, gestational age, age at presentation, weight, cause of admission and their outcome. Neonates with incomplete data were excluded subsequently. Diagnosis were made on clinical examination, radiological findings and laboratory investigations. Data were analysed using SPSS version 20.
Results: Out of 11427 neonates admitted during the study period, 397 were excluded because of deficient record. Of the 11030 neonates males were 7673 (69.6%) and females were 3353 (30.4%). Full-term neonates were 8123 (73.64%) while preterm were 2907 (26.35%). Low birth weight (LBW) babies were 5636 (51.1%). Newborns presented within first 24 hours of life were 1478 (13.4%). Birth asphyxia 3518 (31.89%) was the most common cause of hospital admissions followed by prematurity 2907 (26.36%) and neonatal sepsis 1865 (16.91%). Out of 11030 babies, 7055 (64%) were discharged, 2805 (25.4%) left against medical advice and 1170 (10.6%) neonates expired. Highest number of deaths was because of prematurity 469 (39.32%) followed by asphyxia neonatorum 359 (30.68%) and neonatal sepsis 180 (15.38%).
Conclusion: Birth asphyxia, prematurity and sepsis constitute three fourths of hospital admissions in our neonatal unit. Most common cause of mortality was prematurity followed by birth asphyxia and neonatal sepsis.

Keywords: Birth asphyxia, Neonatal intensive care, Prematurity, Sepsis, Tertiary care hospital.

INTRODUCTION

Neonatal morbidity and mortality rates reflect efficiency of health services of a country[1-3]. The first 28 days of life, the neonatal period, are the most vulnerable time for child's survival[4]. Of the estimated 140 million infants born each year, 2.7 million die in the neonatal period which accounts for 45% of under-five deaths worldwide[2,3].

Since the Millennium Development Goals were formed, progress towards reducing child mortality accelerated but remained insufficient to achieve MDG-4[4,5]. Globally, an estimated 12.6 million children under five years died in 1990 declining to 5.9 million in 2015[2,3]. However share of neonatal deaths increased from 40% in 1990 to 45% in 2015[2]. With the end of MDGs era in 2015, international community has agreed on a new framework, the Sustainable Development Goals (SDGs)[2,3]. World has recognized the fact that without substantial reduction in neonatal deaths, SDGs cannot be met for reducing under five mortality. The proposed SDG target for neonatal mortality represents a renewed commitment to the world's newborn: by 2030, end preventable deaths of newborns to ≤12 deaths per 1,000 live births[3].

Infections (24%), preterm births (35%), and birth asphyxia (24%) account for 83% of neonatal deaths worldwide[3]. Pakistan is among the countries with highest neonatal deaths with an estimated 245,000 neonatal deaths annually and reported neonatal mortality rate of 46 per 1000 live births[1]. Share of neonatal death in under-five

Correspondence: Dr Sadia Yasmeen, The Children Hospital & Institute of Child Health Lahore Pakistan
Email: dr.sadiakhalil@yahoo.com
Received: 26 Sep 2017; revised received: 05 Oct 2017; accepted: 02 Nov 2017

mortality rate in Pakistan was 47% in 1990 which has increased to 57% in 2016, contributing to alarmingly slow progress towards reducing under-five mortality[2,3]. Three major causes i.e. prematurity (39%), asphyxia (21%) and infection (27%) are responsible for 87% of neonatal deaths in Pakistan[3].

The first step in improving neonatal survival is to document the number and rate of deaths, and identify their common causes[6]. This study is aimed to identify the spectrum of admissions and their outcome in the Neonatal Unit of the Children's Hospital & the Institute of Child Health, Lahore which may facilitate dialogue with policy makers about investing in this largely neglected area of health care.

SUBJECTS AND METHODS

This descriptive observational study was conducted in the Neonatal Unit of The Children's Hospital & the Institute of Child Health, Lahore from 1st January 2015 to 31st December 2015. The study was initiated after seeking permission from Institutional Review Board. This hospital is a tertiary care hospital and neonatal unit receives only out born neonates.

All neonates who were admitted in neonatal unit were included in the study. Data of all admitted neonates from 1st January 2015 to 31st December 2015 were collected from admission register of the unit. Both quantitative data (age, gestational age and weight) and qualitative data (gender, final diagnosis and outcome i.e. neonate was discharged, left against medical advice or died) were recorded on a proforma. Neonates with incomplete data were excluded subsequently. Neonate is defined as a baby up to first 28 days of life. Birth weight less than 2.5 kg was defined as low birth weight (LBW) and live born neonate before 37 completed weeks was defined as preterm/premature. Diagnosis was mainly clinical with specific laboratory or radiological findings. Diagnosis of birth asphyxia was based on history of delayed cry at birth. Sepsis was diagnosed on basis of history and examination supported by complete blood count with platelets, C reactive proteins (CRP) and positive blood, urine or cerebrospinal fluid (CSF) culture. Congenital heart disease (CHD) was suspected on history and examination and confirmed with x-ray and echocardiography. Acute watery diarrhea (AWD) was described as loose watery stools. Meconium aspiration syndrome (MAS) was diagnosed on history of being born through meconium stained amniotic fluid, respiratory distress and chest radiograph. Diagnosis of pneumonia was made on clinical and radiological findings. Neonatal jaundice was diagnosed after assessment of serum bilirubin and found to be in pathological zone in age, weight and gestation specific range. Congenital malformations included neonates with different anomalies and syndromic features. Bleeding disorders, infant of diabetic mother, metabolic fits, pyomeningitis, respiratory distress syndrome, seizure disorder, urinary tract infections, tetanus, and acute renal failure were included in others and diagnosed clinically and confirmed with available laboratory investigations. All data were entered and analysed using computer software SPSS version 20. Qualitative and quantitative variables were presented as frequencies and percentages.

RESULTS

During the study period of one year from 1st January 2015 to 31st December 2015, a total of 11427 neonates were admitted in the unit. All of them met the inclusion criteria but 397 neonates were subsequently excluded because of deficient record. Out of 11030 neonates, males constituted 7673 (69.6%) while females were 3353 (30.4%) resulting in a ratio of 2.2:1. Full-term newborns were 8098 (73.4%) while preterm babies were 2911 (26.36%). Regarding birth weight of the babies 5636 (51.1%) were low birth weight (LBW). The newborns presented within first 24 hours of life were 1478 (13.4%) (table-I).

Birth asphyxia (ANN) 3518 (31.89%) was the most common cause of hospital admissions followed by prematurity 2907 (26.36%) and neonatal sepsis 1865 (16.91%). Other common causes of hospital admission were broncho-

pneumonia 587 (5.32%), jaundice neonatorum 527 (4.78%) and congenital heart diseases 356 (3.23%) (table-II).

Out of 11030 babies, 7055 (64%) were discharged, 2805 (25.4%) left against medical advice (LAMA) & 1170 (10.6%) expired. Highest number of deaths was because of prematurity 469 (39.32%) followed by asphyxia neonatorum 359 (30.68%) and sepsis 180 (15.38%) (Details are in fig-1 & 2).

DISCUSSION

Our study describes the characteristics and outcome of 11030 consecutive admissions to Neonatal Unit of the Children's Hospital and the Institute of Child Health, Lahore. Hussain et al, and JAN et al, found male predominance in their studies done on pattern of admissions and their outcome in their neonatal units[6,7]. Male predominance was noted in similar studies reported by Kanodia, Mmbaga and Shah GS [5,8,9].

Table-I: Demographic data.

		Frequency (n)	Percentage (%)
Age (days)	<1 day	1478	13.5
	1-3 days	3349	30.4
	4-7 days	2873	26.0
	8-28 days	3330	30.2
Gender	Male	7673	69.6
	Female	3353	30.4
	Undetermined	4	0.036
Gestational age (weeks)	<28	129	1.2
	28-31	971	8.8
	32-36	1807	16.4
	37-42	8098	73.4
	>42	25	0.2
Weight(kg)	<1	249	2.3
	1-1.5	1198	10.9
	1.51-2.4	4189	38.0
	2.5-4	5342	48.4
	4	52	0.5

Table-II: Spectrum of neonatal admissions and their outcome.

Diagnosis	Outcome		
	Discharge	Death	LAMA
ANN	2236 (63.6%)	359 (10.2%)	923 (26.2%)
CHD	212 (59.6%)	40 (11.2%)	104 (29.2%)
Permaturity	1554 (53.5%)	460 (15.8%)	893 (30.7%)
JNN	427 (81.0%)	22 (4.2%)	78 (14.8%)
Sepsis	1220 (65.4%)	180 (9.7%)	465 (24.9%)
AWD	291 (88.7%)	5 (1.5%)	32 (9.8%)
Pneumonia	456 (77.7%)	30 (5.1%)	101 (17.2%)
MAS	142 (62.8%)	23 (10.2%)	61 (27.0%)
Syndromic/ malformation	120 (66.7%)	17 (9.4%)	43 (23.9%)
Others	397 (74.1%)	34 (6.4%)	105 (19.6%)
Total	7055 (64.0%)	1170 (10.6%)	2805 (25.4%)

ANN: Asphyxia nonatorum, CHD: Congential heart disease, JNN: Jaundice neonatorum, AWD: Acute watery diarrhea, MAS: Meconium aspiration syndrome.

Gender bias towards male babies is a universal phenomenon and is seen in all regions and cultures. That is the reason male babies are brought in higher numbers to seek medical attention and thus have greater chance of detection of neonatal problems[5,10]. The results in our study are in conformity with above studies where males were 2.2 times more as compared to female neonates.

The first 24 hours of life is a period of crucial importance as neonate adapts to extra-uterine environment, hence suffers from most of neonatal problems during this period[11]. So, majority of neonates present to hospital during first 24 hours of life as reported by Shakya et al (62%), Kanodia et al (56%), and Begum et al (81.3%)[5,11,12]. These studies were done in neonatal units which receive inborn as well as out born babies. While admissions during this period as reported in our study was 13.7% which is significantly low as compared to above mentioned studies. The reason for this difference may be that our unit is a referral unit and receives only out born babies, half of which are from distant cities, therefore majority of neonates present later.

Global occurrence of low birth weight babies who have birth weight less than 2.5 kg is 15.5% out of which 96.5% are in developing countries[13]. The prevalence of LBW babies in some of these developing countries that includes India 30%, Bangladesh 30%, Sri Lanka 22% and Pakistan 19%[13]. LBW babies requiring admission in health facility is reported to be 60.62% in India and 55.3% in Bangladesh[14,15]. These figures are comparable with our results i.e. 51.2%. This similarity in higher number of hospital admissions may be due to hig her number of birth rates, factors that lead to birth of LBW babies e.g. socioeconomic condition, maternal health and education as well as vulnerability of LBW babies to respiratory problems, hypothermia, hypoglycemia, infections, apnea, hypocalcemia, jaundice and anaemia.

Pattern on neonatal admissions vary from place to place, however review of literature revealed that prematurity, birth asphyxia and neonatal sepsis are the common causes of newborn morbidity and mortality [3,16-18]. Begum, Kanodia and Quddusi found birth asphyxia prematurity and sepsis as common indication of hospital admissions in Bangladesh, Nepal and Multan respectively[5,12,18]. We also found birth asphyxia (ANN) 31.89%, prematurity 26.36% and neonatal sepsis 16.91% as common indication for hospital admission which are comparable with our neighboring countries and local studies (fig-2).

Birth asphyxia is a global perinatal problem which significantly contributes to both neonatal morbidity and mortality. One fourth of neonatal

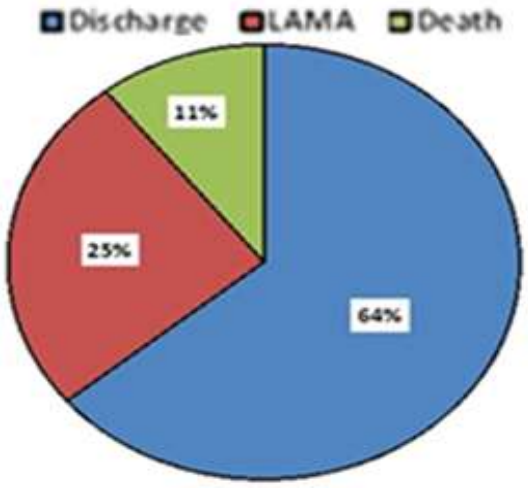


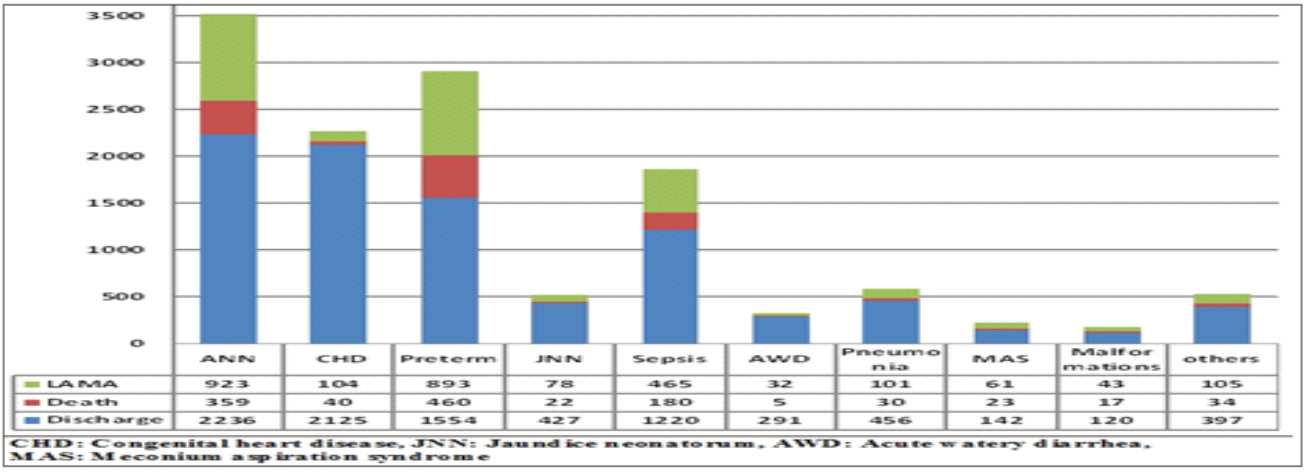
Figure-1: Outcome of neonatal admissions.

deaths are caused by birth asphyxia worldwide[3]. In Sri Lanka institutional delivery rate is 98% and 99% are conducted by skilled birth attendants resulting in birth asphyxia rate of only 12%[1,2]. Data of neonatal units at Multan (34.5%) and Rahim Yar khan (36.6%) shows higher occurrence of birth asphyxia which is comparable with our results (31.89%)[18,19]. This high number of asphyxiated babies in Pakistan is because of the fact that only 48% deliveries are conducted by traditional birth attendants while 52% are conducted outside health institutions that lack the required expertise and neonatal resuscitation facilities[1,2].

The incidence of prematurity is higher in developing countries (12%) as compared to 9% in

developed countries[17]. Among top 10 countries with highest rate of preterm birth, Pakistan ranks 8th with a rate of 15.8%[17]. Preterm newborns require care in NICUs with specialized equipment, well trained staff and higher financial support. Preterm babies constituted 20% of hospital admissions in a study by Qaddusi in Multan and 27.9% by Ali in Hyderabad as these neonatal units provide similar level of care as ours required for these preemies[18,20]. Similarly in our study, 26.36% of total admissions were preterm. However, low influx of preterm babies in neonatal units is reported by Shakya (6.5%) and Narayan (13%) in their studies conducted in included only babies with confirmed diagnosis of generalized sepsis, while babies with broncho-pneumonia, AWD, meningitis and minor infections were recorded separately.

Out of 11030 babies, 7055 (64%) were discharged after improvement, 2805 (25.4%), left against medical advice and 1170 (10.6%) died. Mortality noted in our study is comparable with local data reported from Multan (8.14%) and Peshawar (8.3%) but is low as compared to Karachi 25.85% & Larkana (38%)[7,18,24]. This variation may be due to difference in study population and facilities available in neonatal unit. In our study prematurity (39.32%), asphyxia



	ANN	CHD	Preterm	JNN	Sepsis	AWD	Pneumonia	MAS	Malformations	others
LAMA	923	104	893	78	465	32	101	61	43	105
Death	359	40	460	22	180	5	30	23	17	34
Discharge	2236	2125	1554	427	1220	291	456	142	120	397

CHD: Congenital heart disease, JNN: Jaundice neonatorum, AWD: Acute watery diarrhea, MAS: Meconium aspiration syndrome

Figure-2: Spectrum of neonatal admissions and their outcome.

Nepal and Sri Lanka respectively which is lower than ours[11,21]. The difference may be because their units are level II nurseries having lower level facilities, so most of these babies are referred to higher centers.

Neonatal sepsis has always been a major management challenge for care givers especially in developing countries[22]. Occurrence of infection is reported to be 34.5% in Nepal, 38% in India and 22.5% in Egypt[5,10,23]. This higher percentage of infection as compared to ours in these studies is because infection includes neonatal sepsis along with bronchopneumonia, meningitis and other infections. In our study sepsis accounts for 16.9% of hospital admissions comparable with similar study from Karachi (17%)[24]. One possible explanation of this low percentage is that we neonatorum (30.88%) and sepsis (15.38%) were the leading causes of mortality, which are consistent with both health facility and community based studies from low resource countries[3,10,21]. All babies which we receive are usually referred without stabilization, temperature maintenance, oxygenation and ventilation which contribute to high mortality in sick neonates.

The prevalence of leaving against medical advice (LAMA) in hospitals varies widely in literature, from less than 1% up to 30% or even more[16]. In a review of current publications and online medical database sources, only few articles were discovered that had studied LAMA among neonates. The number of babies who LAMA in study from Saudi Arabia (1.6%) was quite low

as compared to India (25.4%) and Multan (20.2%)[16,18,25]. This wide difference in LAMA rate appears to be related to factors like study setting, sociocultural factors and regional government health policy. However, our reported incidence of LAMA is 25% and comparable to regional studies. These studies revealed that parents leave hospital against medical advice for many reasons like family, personal or financial problems, dissatisfaction with medical care, preference for another hospital, false perception that the condition was terminal, dislike of the hospital environment and communication gap between health care providers and parents [16,18,25].

CONCLUSION

Major causes of hospital admission include birth asphyxia, preterm births and sepsis. These three constitute three fourths of hospital admissions in neonatal unit. Preterm births constitute major chunk of neonatal mortality followed by birth asphyxia and sepsis. One fourth of neonates left against medical advice.

Limitations of the study

Our hospital is a tertiary care hospital which receives only out-born neonates, so the results may not be generalized to all hospitals or to the general population.

CONFLICT OF INTEREST

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

REFERENCES

1. World Health Organization. World Health Statistics 2017; Monitoring health for SDGs (sustainable development goals).
2. UNICEF. The state of the world children 2016: A fair chance of survival for every child. 2016.
3. UNICEF. Committing to child survival: A Promise Renewed-Progress Report 2015.
4. Jehan I, Harris H, Salat S, Zeb A, Mobeen N, Pasha O et al. Neonatal mortality, risk factors and causes: A Prospective population- based cohort study in urban Pakistan. Bull World Health Organ 2009; 87(2): 130-8.
5. Kanodia P, Yadav SK, Bhatta NK, Singh RR. Disease profile and outcome of newborn admitted to neonatology unit of BPKIHS. J Col Med Sci Nepal 2015; 11(3): 20-4.
6. Hussain S. Neonatal Morbidity and Mortality Pattern in a Tertiary care Neonatal Unit of a Teaching Hospital. Ann Pak Inst Med Sci 2014; 10(1): 7-11.
7. Jan AZ, Ahmad S, Zahid S. Clinical audit of admission pattern and its outcome in a neonatal ICU. Gomel J Med Sci 2013; 11(1): 31-3.
8. Shah GS, Yadav S, Thapa A, Shah L. Clinical profile and outcome of neonates admitted to neonatal intensive care (NICU) at tertiary care center in eastern nepal. J Paediatr Soc 2013; 33(3): 177-81.
9. Mmbaga BT, Lie RT, Olimi R, Mahande MJ, Kvale G, Daltveit AK. Cause-specific neonatal mortality in a neonatal care unit in Northern Tanzania: a registry based cohort study. J BMC Pediatrics 2012; 12: 116.
10. Bucens IK, Reid A, Barrreto AC, Dwivedi V, Counahan M. Three years of neonatal morbidity and mortality at national hospital in Dili, East Timor. J Paediatr Child Health 2013; 49(12): 1004-9.
11. Shakya A, Shrestha D, Shakya H, Shah SC, Dhakal AK. Clinical profile and outcome of neonates admitted to the Neonatal Care Unit at teaching hospital in Lalitpur, Nepal. J khatmandu Med Col 2014; 3(10): 144-48.
12. Begum NN, Begum M. Neonatal morbidity and outcome in a medical college hospital. Dinajpur Med Col J 2016; 9(1): 38-44.
13. World Health Organization & UNICEF. Low birth weight, country regional & global estimates 2004.
14. Rakholia R, Rawat V, Mehar B, Singh G. Neonatal morbidity and mortality of sick newborns admitted in a teaching hospital of Uttarkhand. Chrismed J Health Research 2014; 1(4): 228-34.
15. .Klemm RD, Merrill RD, Wu L, Shamim AA, Ali H, LabriqueA et al. Low-birthweight rates higher among Bangladeshi neonates measured during active birth surveillance compared to national survey data. Matern Child Nutr 2015; 11(4): 583–94.
16. .Al-Turkistani HK. Discharge against medical advice from Neonatal Intensive Care Unit: 10 years' experience at a University Hospital. J FamComm Med 2013; 20(2): 113-15.
17. World Health Organization. Preterm Birth.
18. Quddusi A, Razzaq A, Hussain S, Hussain A. Pattern of neonatal admission at the children hospital and the institute of child health, multan. J Ayub Med CollAbbttabad 2012; 24(2): 108-10.
19. Saleem M, Iqbal R, Bokhari S, Ali M, Khan Z. Pattern of Neonatal Admissions & their outcome in tertiary care hospital of Southern Punjab (A 5 year study). Pak J Med health Sci 2014; 8(4): 917-21.
20. Ali SR, Ahmed S, Lohana H. Disease patterns and outcomes of neonatal admissions at a secondary care hospital in Pakistan. Sultan Qaboos Uni Med J 2013; 13(3): 424-8.
21. Narayan R. A study of pattern of admission and outcome in neonatal intensive care unit at high altitude. Sri Lanka J child health 2012; 41(2): 79-81
22. UIke E, Oyetunde MO. Pattern of disease and care outcomes of neonates admitted in special care baby unit of university college hospital, Ibadan, Nigeria from 2007 & 2011. IOSR J Nursing Health Sci 2015; 4(3): 62-71.
23. Seoud I, Rasha M, El-Din G, Said RN, Hessin HA. Predictors of neonatal mortality in intensive care unit in children's hospital, cairo university. Alexandria J Paediatr 2005; 19(1): 93-7.
24. Aijaz N, Huda N, Kauser A. Disease Burden of NICU at tertiary Care Hospital, Karachi. J Dow University health Sci Karachi 2012; 6(11): 32-5.
25. Devpura B, Bhadesia P, Nimbalkar S, Desai S, Phatak A. Discharged against medical advice in neonatal intensive care unit gujrat, India. Int J Paediatr 2016.