ORIGINAL ARTICLE

CLINCAL AUDIT OF ADMISSION PATTERN AND ITS OUTCOME IN A NEONATAL ICU

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ABSTRACT

Background: Neonatal period is the most susceptible period of life due to different diseases, which in most cases are preventable. The objective of this study was to assess frequency and pattern of neonatal mortality and morbidity.

Material & Methods: A retrospective clinical audit was conducted at a grade IIIA NICU, Rehman Medical Institute, Peshawar. The data of all neonates was analyzed retrospectically from June, 2006 to June, 2012.

Results: A total of 4900 patients were admitted in the study period. Among them males were 3104 (63.3%) and females were 1796 (36.71%). Sepsis neonatorum (NNS) accounted for 2027 (41.36%), Neonatal Jaundice (NNJ) 1777 (36.2%), intrauterine growth retardation (IUGR) 941 (19.2%), prematurity 515 (10.5%), birth asphyxia (BA) 446 (9.1%) and meconium aspiration syndrome (MAS) 362 (7.3%) accounted of total admissions. Among total admissions 4331 (88.4%) were sent home after complete recovery, 407 (8.3%) expired, while 162 (3.3%) left against medical advice.

Conclusions: There is a need for timely referral to a tertiary care hospital from peripheral and non-tertiary setups to prevent and control neonatal mortality and morbidity.

KEY WORDS: Neonatal, mortality, Intrauterine growth retardation, Low birth weight.

This article may be cited as: Jan AZ, Ahmad S, Zahid SB. Clinical audit of admission pattern and its outcome in a Neonatal ICU. Gomal J Med Sci 2013; 11: 31-6.

INTRODUCTION

Neonatal period (0-28 days of life) is the most susceptible period of life due to different diseases, which in most cases are preventable.[1] Almost 50% of deaths in our country occur in neonatal period.[2] Though considerable improvement in the survival of newborn in advanced countries has been made but the mortality rate is still very high in the developing countries.[3] One of the Millennium Development Goals is to reduce the number of under 5 years child death by two third by the year 2015 and to achieve this goal a substantial reduction in early neonatal deaths will be required especially in the developing countries.[4] In the developed countries, the main cause of mortality and morbidity in the neonatal period are non-preventable causes such as congenital abnormalities, but in the developing countries the preventable causes such as Infections, Jaundice, Birth Asphyxia and Pneumonia predominate.[5] The neonatal disease pattern is a sensitive indicator of availability, utilization and effectiveness of mother and child health services in the community.

Of the estimated 130 million infants born each year worldwide,[6] four million die in the first 28 days of life. Three quarters of neonatal deaths occur in the first week, and more than ¼ deaths occur in the first 24 hours.[6-8] Of the total neonatal deaths, 2/3rd of the deaths occur in just 10 countries, mostly in Asia. Pakistan ranks as 3rd among the list of these countries and an estimated number of 298,000 neonatal deaths annually and a mortality rate of 49/ 1000 live birth is reported. Pakistan contributes for 7% of the global neonatal deaths.[9] In most instances neonatal deaths result from poor hygienic conditions during delivery, unskilled management of complications, harmful traditional practices, inadequate newborn care and lack of access to emergency care. The prognosis of neonates depends upon underlying condition, its severity and management. The neonatal mortality is increasing day by day.

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The objective of this study was to assess frequency and pattern of neonatal mortality and morbidity.

MATERIAL AND METHODS

A retrospective study conducted at the Neonatal Intensive Care Unit (NICU), Department of Pediatrics, Rehman Medical Institute, Peshawar, Pakistan from June, 2006 to June, 2012. A total of 4900 neonates admitted to the neonatology unit were included in the study. The RMI is a tertiary care private hospital and is the teaching hospital of Rehman Medical College. The neonatal unit of RMI is grade IIIA neonatology and admits all neonates including those requiring mechanical ventilator and surgical intervention.

The data of all the neonatal admissions were analyzed and following were documented; Age, Gender, Place of delivery, Cause of admission, Birth Weight and Final outcome. Diagnosis was mainly clinical with specific laboratory or radiological findings. Sepsis and meningitis were diagnosed on clinical grounds along with C-reactive protein (CRP), complete blood count (CBC), positive blood culture and cerebrospinal fluid (CSF) examination. Congenital heart disease was diagnosed on ECG changes, Chest X-Ray and then confirmed by Echocardiography. Birth Asphyxia was diagnosed clinically by Sarnat Staging.[10] Diagnosis of Pre-maturity was clinical or based on WHO definition for pre-maturity (live born neonates delivered before 37 weeks from 1st day of last menstrual period) and low birth weight with birth weight less than 2500 gm.[11] Babies were labelled as intrauterine growth retardation (IUGR) when their weight was below the 10th percentile as determined through an ultrasound.[12] Neonatal jaundice was diagnosed by assessing Serum Bilirubin level along with G6PD estimation in case of males. Pneumonia was diagnosed mainly on examination and radiological findings.

RESULTS

Total number of patients admitted during the study period was 4900. Among them 3104 (63.3%) were males and 1796 (36.71%) females. Majority of the patients 4080 (83.2%) were admitted during the first week of life. Most of the neonates admitted were delivered in hospital (66%) while most of the referred patients were delivered at home (28%). Regarding the birth weight of neonates, 2 (0.04%) patients were below 1 kg, 48 (0.97%) patients were in the weight range of 1-1.5 kg, 1201 (24.5%), 2008 (40.9%) and 1641 (33.5%) patients were in the range of 1.6-2.5 kg, 2.6-3.0 kg and above 3.1 kg respectively. (Table 1)

Table 2 shows six years frequency of recovery, expiry and LAMA of 4900 neonatal admissions. Overall 88.4% of patients were recovered, while 8.3% of patients were expired and only 3.3% of patients

Table 1: Frequency and percentage of Gender, Birth Weight, Place of delivery and mortality of 4900 admitted neonates.

Variables	Attributes	Frequency (number)	Relative frequency (%)	Relative frequency (%) of Mortality
Gender	**Males**	3104	63.3	11.66
	Females	1796	36.71	4.5
Birth Weight	**<1 kg**	2	0.04	50
	1-1.5 kg	48	0.97	35
	1.6-2.5 kg	1201	24.5	11
	2.6-3.0 kg	2008	40.9	6
	>3 kg	1641	33.5	4
Place of Delivery	**Hospital**	3234	66	18
	Home	1372	28	13
	Others	294	6	22

Table 2: Six years frequency of recovery, expiry and LAMA of 4900 neonatal admissions.

	Outcome			
Year	**Discharged**	**Expired**	**LAMA**	**Total**
2006	529 (88.4%)	50 (8.3%)	19 (3.1%)	598
2007	737 (88.4%)	69 (8.2%)	27 (3.2%)	833
2008	535 (88.1%)	51 (8.4%)	21 (3.4%)	607
2009	793 (88.4%)	74 (8.2%)	30 (3.3%)	897
2010	855 (88.3%)	81 (8.3%)	32 (3.3%)	968
2011	368 (88.4%)	34 (8.1%)	14 (3.3%)	416
2012	514 (88.4%)	48 (8.2%)	19 (3.2%)	581
Total	4331 (88.4%)	407 (8.3%)	162 (3.3%)	4900

Table 3: Frequency of morbidity in 4900 neonatal admissions.

MORBIDITY	PRETERM (n = 515)	TERM (n = 4385)	TOTAL (n = 4900)
LBW[1]	396 (77%)	59 (1.2%)	455 (9.2%)
IUGR[2]	21 (4.07%)	920 (20.9%)	941 (19.2%)
NNJ[3]	98 (19%)	1679 (38.2%)	1777 (36.2%)
RDS[4]	80 (15.5%)	31 (0.7%)	111 (2.2%)
NNS[5]	54 (10.4%)	1973 (45%)	2027 (41.36%)
CONGENITAL ANOMALIES[6]	10 (2%)	122 (2.8%)	132 (2.6%)
MAS[7]	12 (2.3%)	350 (8%)	362 (7.3%)
BA[8]	51 (9.9%)	395 (9%)	446 (9.1%)
PNEUMONIA[9]	9 (1.7%)	52 (1.2%)	61 (1.2%)
SURGICAL CAUSES[10]	11 (2.1%)	219 (5%)	230 (4.7%)
TOTAL	742 (11.34%)	5800 (88.66%)	6542 (100%)

left against medical advice (LAMA). Table 3 shows the frequency of morbidity in 4900 neonatal admissions.

A neonate having more than one morbidity is counted in each category. Hence the sum may be more than the total neonates in the study.

1. Low birth weight, 2. Intrauterine growth retardation, 3. Neonatal Jaundice, 4. Respiratory distress syndrome, 5. Neonatal Sepsis, 6. Congenital anomalies, 7. Meconium aspiration syndrome, 8. Birth Asphyxia, 9. Pneumonia, 10. Surgical Causes.

DISCUSSION

This study shows that 83.2% of admissions were during the 1st week of life. Our study also showed a male predominance 63.3%, the finding of our study is consistent with other studies conducted at different places nationally and internationally.[1] Sepsis neonatorum is still one of the main cause of neonatal morbidity and mortality in the developing countries.[13] In our study neonatal sepsis accounted for 41.36% as compared to other studies done in which the incidence of sepsis was 26.03% from Khyber Teaching Hospital (KTH),

Table 4: Comparison of NICU, RMI, Peshawar data of 4900 neonatal admissions with others national and international studies.

	RMI		KTH		LHR (SH)		Gangaram Hospital		Bangladesh		SA		FSD (AH)	
	Incidence	**Mortality**	Incidence	**Mortality**	Incidence	**Mortality**	Incidence	**Mortality**	Incidence	**Mortality**	Incidence	**Mortality**	Incidence	**Mortality**
NNS[1]	2027 (41.36%)	**9.08**	441 (26.03%)	**14.51**	248 (16%)	**28.63**	309 (32.6%)	**18.7**	23 (6.4%)	**23.1**	363 (21%)	**9.8**	703 (25%)	**30**
NNJS[2]	1777 (36.2%)	**4.6**	338 (19.95%)	**3.55**	278 (17.9%)	**3.9**	157 (16.6%)	**3.8**	84 (23.3%)	**0**	49 (3.1%)	**0.9**	343 (12.2%)	**3.4**
BA[3]	446 (9.1%)	**39**	280 (16.52%)	**21**	378 (24.3%)	**23.28**	—	—	—	—	601 (38.2%)	**32.9**	844 (30%)	**32**
Cong Anomalies[4]	132(2.6%)	**4**	24 (1.71%)	**29.16**	14 (0.9%)	**0**	32 (3.3%)	**53.1**	6 (1.7%)	**50**	46 (2.9%)	**9.2**	33 (1.2%)	**0**
Pneumonia[5]	61 (1.2%)	**0.5**	—	**17.24**	42 (2.7%)	**0**	45 (4.7%)	**28.9**	3 (0.8%)	**23.1**	—	—	180 (6.4%)	**8**
Preterm[6]	515 (10.5%)	**16**	449 (26.5%)	**21.6**	256 (16.5%)	**26.17**	327 (34.6%)	**48.6**	174 (48.2%)	**15**	370 (23.5%)	**42.8**	422 (15%)	**46**
IUGR[7]	941 (19.2%)	**6**	14 (0.82%)	**0**					50 (13.9%)	**18**	—	—		
MAS[8]	362 (7.3%)	**8.9**	20 (1.18%)	**10**	94 (6%)	**0**	87 (9.21%)	**37.9**	6 (1.7%)	**16.7**	—	—	59 (2.1%)	**27**
RDS[9]	111 (2.2%)	**24.6**	10 (0.59%)	**70**	—	—	52 (5.5%)	**71.2**	23 (6.4%)	**60.9**	—	—	—	—
Surgical causes[10]	230 (4.7%)	**4.3**	60 (3.5%)	**0**	12 (1.2%)	**0**	—	—	9 (2.8%)	**0**	—	—	22 (0.8%)	**0**

Peshawar,[1] 45.21% reported from Karachi,[14] 16% from Services Hospital, Lahore.[15] In contrast to international studies done the incidence of sepsis was 21% in South Africa,[16] 6.4% in Bangladesh[17] and 10.5% in Sagamu, South Africa.[18] The highest incidence of sepsis in our study might be due to the reason that most of the referred patients were delivered with poor obstetric care and un-sterile delivery practices, while some referred patients were admitted from other setups with no proper neonatal care.

Neonatal jaundice in our study was 36.2%, as compared to study done in Bangladesh,[17] where the incidence of sepsis was 23.3%. Similarly incidence of jaundice in other studies were; 19.95% in KTH,[1] 17.9% in Services Hospital, Lahore,[15] 16.6% in Sir Gangaram Hospital, Lahore,[19] 12.2% in Allied Hospital, Faisalabad,[20] 3.1% in South Africa[16] and 54% in India[21] respectively. The changing pattern of neonatal jaundice may be due to environmental variations.

The incidence of BA in our study was 9.1%, which in contrast to other studies done is, 16.52% in KTH,[1] 24.3% in Services Hospital Lahore,[15] 38.2% in South Africa[16] and 30% in Allied Hospital Faisalabad.[20] The incidence of BA in our study is quite less as compared to other studies which may be due to advanced care at our unit.

Prematurity in our study was 10.5%. This is comparatively low in comparison to other studies in which the incidence was quite high, 26.9% from Peshawar,[1] 16.5% from services hospital Lahore,[15] 34.6% from Sir Gangaram Hospital,[19] 15% from Allied Hospital, Faisalabad.[20] International study done also shows a higher incidence of prematurity reporting, 48.2% from Bangladesh[17] and 23.5% from South Africa.[16]

Neonatal mortality was 8.3% in our study. It was reported to be 14.87% from KTH,[1] 25.85% from Karachi,[14] 34% from Lahore[22] and 38% from Larkana.[23] The commonest causes of deaths in our study were Birth Asphyxia 39%, Respiratory distress syndrome 24.6%, prematurity 16%, Neonatal sepsis 9.08% and Meconium aspiration syndrome 8.9%. Birth asphyxia was the major cause of death (39%) which is a bit high as compared to 21% from KTH,[1] 23.28% from Services Hospital, Lahore,[15] 32.9% from South Africa[16] and 32% from Allied Hospital, Faisalabad.[20] The highest neonatal mortality due to BA might be due to the reason that most of the referred patients are either delivered at home or at setup which don't have any well trained staff and often present late, mostly with full blown complications. The neonatal deaths due to prematurity in our study accounts for 16% of the total neonatal deaths which in comparison to other study is much less; this can be attributed to the availability of a well-trained in-house neonatologist attending all high risk deliveries and with back up of ventilator facility. Neonatal mortality due to prematurity reported is 21.6% from KTH,[1] 26.17% from Services Hospital Lahore,[15] 48.6% from Sir Gangaram Hospital,[19] 46% from Allied Hospital, Faisalabad[20] and 42.8% from South Africa.[16] Table 4 shows comparison of our study with other studies.

1. Neonatal Jaundice, 2. Neonatal Sepsis, 3. Birth Asphyxia, 4. Congenital Anomalies (CHD, Syndromes etc.), 5. Pneumonia, 6. Prematurity, 7. Intrauterine growth retardation, 8. Meconium aspiration syndrome, 9. Respiratory Distress Syndrome, 10. Surgical Problems (Spina Bifida, Imperforate anus, NEC etc.)

CONCLUSION

There is a need for timely referral to a tertiary care hospital from peripheral and non-tertiary setups to prevent and control neonatal mortality and morbidity.

Acknowledgment: The authors gratefully acknowledge Professor Dr. Mehr Taj Roghani, Head of Pediatrics Department, RMI, Peshawar for her kind permission and assistance and Dr. Fahad Liaqat and Dr. Zahid Gul for their valuable help in conducting the study.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.