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ORIGINAL ARTICLE

ADMISSION AND OUTCOME PATTERNS AMONG NEONATES ADMITTED TO THE FEDERAL POLICE REFERRAL HOSPITAL'S NEONATAL INTENSIVE CARE UNIT IN ADDIS ABABA, ETHIOPIA

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ABSTRACT

Background: *The rate of morbidity and mortality in the neonatal period remains high in Ethiopia. Assessing the Neonatal intensive care unit cases regularly is vital as the disease pattern and mortality are not known in the police population.*

Objective*: The aim of this study was to identify the number, types, clinical features of sick neonates admitted and their discharge outcome at the neonatal intensive care unit of Federal police hospital, Ethiopia since the time of its establishment two years ago.*

Methods: *A hospital-based cross-sectional retrospective review of medical records of sick neonates 0-1 month of age admitted to the neonatal unit at the Federal police Hospital, Addis Ababa Ethiopia from September 01, 2019 to October 30, 2021.*

Results: *The medical records of all 155 sick neonates during the study period were included in this study. Among the estimated 3600 deliveries at federal police hospitals during the study period, the neonatal admission rate was 155/3600 (4.3 %). The majority of neonates, 130 (83.9%), were admitted with the age less than 48 hours. Ninety-one (58.7 %) were male and 64(41.3 %) were female neonates making the male to female ratio 1.4:1. Prematurity accounts for 54 (34.8%) of admissions. Sepsis was the main reason for admissions 58 (37.4%), followed by birth asphyxia 12 (7.7%), and neonatal jaundice 10(6.4 %). On discharge, 133 (85.8%) were improved and discharged, 2(1.29%) left against medical advice, and 3(1.9%) were referred while 17(10.9%) of the admitted patients died.*

Conclusion: *Prematurity related causes, neonatal infection and birth asphyxia were the main reasons for neonatal admissions and neonatal mortality was high in the first 24 hours of age. Neonatal admissions at Federal Police Hospital NICU mirror the national profile of Ethiopian Neonatal Intensive Care Units. Due attention should be given to address these issues and to reduce mortality.*

Keywords: Federal Police Hospital, Prematurity, Neonatal sepsis, Perinatal Asphyxia

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INTRODUCTION

Neonatal Intensive care unit (NICU) is a place for the care of neonates below 28 days. NICU care is an essential component of hospital care; hence, critically ill neonates are admitted to different levels of units with the aim of reducing morbidity and mortality. NICU is also one of the implemented neonatal care interventions that are imperative for the survival of neonates in developing countries (1).

The pattern and outcome of neonates admitted to the NICU varies across the world depending on the NICU setup, staff type, training level, causes and severity of admitted cases. In high income countries, the main causes of mortality and morbidity in the neonatal period include prematurity and congenital abnormalities (2), while in the developing countries, preventable causes such as birth asphyxia, severe infection including tetanus, and premature birth predominate (3).

Although not uniform, many of the previous studies reported in Ethiopia, prematurity, sepsis, and perinatal asphyxia (PNA) as the major reasons for neonatal morbidity and mortality (4-8). Regular assessment of the illness patterns in hospital NICU settings is an indicator to show the availability, utilization and effectiveness of mother and child health services (9). Therefore, the aim of this study was to assess the pattern of admission and outcome of neonates that were admitted to the newly established NICU of Federal police hospital (FPH) from September 1, 2019 to October 30 2021.

PATIENTS AND METHODS

Study area: This study was conducted at the FPH, Addis Ababa Ethiopia, which is one of the largest hospitals and located at the heart of Addis Ababa. The hospital was established in 1961. The major services provided by the FPH include internal medicine, orthopedics, surgical, OBGYN, Pediatrics, Ophthalmology, Pathology, ENT, physiotherapy, Radiology etc. FPH is also a primary referral center for all police health facilities in the country. The Pediatrics department offers services for police members and their families from Addis Ababa and the regions and includes an emergency department, outpatient clinics, pediatric wards, and the neonatal intensive care units (NICU). The NICU was established two years ago and serves as a level II referral unit. Annually, approximately 1800 births take place at the FPH in Addis Ababa. The police NICU accepts sick and high risk children delivered within the institution, referrals from other health facilities, and home deliveries. The NICU is staffed with one General practitioner, one Health officer, three pediatricians, and eight nurses. The NICU has a 20-bed capacity and has five rooms; one for preterm babies, one for term babies, one isolation room for communicable diseases, and one transition room for mothers where comparatively stable neonates and one for those who need kangaroo mother care. It has an infant warmer and four radiant warmers to keep the room warm and three incubators for premature neonates. The unit does not have a mechanical ventilator

continuous positive airway pressure (CPAP) machine but uses bubble CPAP locally developed for neonates with respiratory distress. The babies receive oxygen through nasal prongs or nasal catheter from oxygen cylinders. The NICU has two phototherapy machines but no oxygen concentrators.

Study design: Hospital based retrospective study with medical records review.

Inclusion and exclusion criteria: All admitted sick neonates since the establishment of FPH NICU were included. Cases that were referred from the delivery or operation room with suspected illnesses but later did not fulfill admission criteria and returned as normal following evaluation by an attending Senior in the NICU were excluded.

Ethical consideration: Letter of permission was obtained from the police hospital CEO and directors (management) committee before conducting the research.

Data collection and analysis: Data were collected retrospectively from admission/ discharge registration books, as well as death certificates, using a pretested, structured questionnaire prepared for this study. Important variables were extracted by the pediatricians practicing in the neonatal ward. The investigated variables included sex of the patient, age at admission, gestational age, birth weight, and place of birth, antenatal care follow-up, maternal age, and parity, duration of hospital stay, address, and mode of delivery, causes of admissions, treatment given and causes of death etc. Data were entered, cleaned, checked for completeness, compiled, and analyzed using SPSS version 20 (IBM Corporation, Armonk, NY, USA). Descriptive statistics were computed and percentage and frequencies were determined

RESULTS

3.1. Socio-demographic status of neonates admitted: As seen in figure 1, the majority of the newborns, 130 (83.9 %), were admitted in less than 24 hours of age, while the rest were admitted in 24hr to 7days, 18(11.6 %), and 7 to 28 days, 7(4.5%), of age.

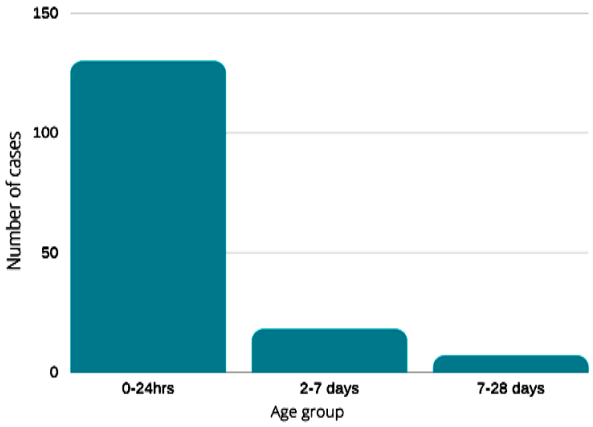


Figure 1: Number of neonates according to their age at admission, Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30, 2021

As seen in table 1, Out of the 155 neonates who were eligible for the study, 91(58.7%) were male and 64 (41.3%) were female making the male to female ratio 1.4: 1. Among all the neonates, 151 (97.4%); were born at FPH while the rest were born at home 4 (2.6%). Around two thirds 104 (67.1%) were term and 46(29.6 %) were preterm. Concerning birth weight of neonates, 101(65.1 %) were NBW/ normal birth weight (2.5- 4kg), 37(23,8 %) were LBW/low birth weight between (1.5-2.5 kg) and 8 (5.1 %) were VLBW(< 1.5 kg) and 9 (5.8%) were macrosomic (>4000 kg). With regards to anthropometry, 139(89.8 %) neonates were appropriate for their gestational age, 8 (5.1 %) were small for gestational age and 8(5.1 %) were LGA.

Table 1: Demographic characteristic of neonates admitted to The Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30, 2021

Variables	Frequency	Percentage
Gender		
Male	91	58.7
Female	64	41.3
Place of Birth		
Hospital	151	97.4
Home	4	2.6
Gestational age		
< 34 weeks	21	13.5
34–36^{+6} weeks	25	16.1
37–41^{+6} weeks	104	67.1
>42 weeks	5	3.2
Birth weight		
<1500	8	5.2
1500-2,499g	37	23.8
2,500–3,999 g	101	65.2
>4,000 g	9	5.8
Anthropometry		
Appropriate for gestational age	139	89.8
Large for gestational age	8	5.1
Small for gestational age	8	5.1
Hospital stay		
0–24 hours	135	87.1
24hrs–7 days	11	7.1
>7 days	9	5,8

3.2 Demographic characteristics of mothers of neonates admitted: The majority of mothers' 149(96.1%) were in the age range from 18 to 35 years, followed by 6 (3.9 %) who were more than 35 years of age while there were no mothers below 18 years of age. There were 57 (36.8 %) primiparous mothers and 98 (63.2 %) multiparous women. All mothers 100% had an ANC follow-up. Three (1.93%) mothers were positive for hepatitis B antigen and 1(0.64 %) for human immunodeficiency virus (HIV) with HIV-exposed neonate. The mode of delivery was normal or vaginal delivery in 99 (63.9%) and cesarean section in 47 (30.3 %). There were 9 (5.8%) breech presentations and instrumental deliveries. The Majority 144(92.9%) of the study's neonate mothers delivered singleton, and the rest 11(7.1%) had twin deliveries (Tables 2).

Table 2. demographic characteristics of mothers of neonates admitted to The Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30, 2021

Variables	Frequency	Percentage
Maternal Age		
<18 years	0	0
18–35 years	149	96.1
≥35 years	6	3.9
Parity		
Para I	57	36.8
Para II–IV	98	63.2
≥Para IV	0	0
Abnormal Lab findings		
HIV positive	1	0.64
VDRL reactive	0	0
HBSag positive	3	1.93
Mode of Neonate's presentation		
Cephalic	99	63.9
Cesarean section	47	30.3
Breech	3	1.9
Instrumental	6	3.9
Number of gestations		
Singleton	144	92.9
Twins	11	7.1
Triplets	0	0

3.3. Admission diagnosis (Disease patterns) of the neonates Reviewing the diagnosis at the time of admission shows that over a quarter of the sick neonate 54(34.8%) were premature with several complications such as sepsis, RDS, hypothermia, hypoglycemia, jaundice, anemia, NEC, polycythemia, DIC, etc. Neonatal sepsis was identified in 58 (37.4%)

newborns among which 36 (62.1%) were early onset cases while EONS and 7 (12 %) were late onset cases. Other common causes of neonatal admissions were respiratory distress 39 (25.2%), perinatal asphyxia 12(7.7 %) and neonatal jaundice 10(6.4%). Congenital malformations were documented in 12(7.7%) include cleft lip, cleft palate, polydactyl, and myelomeningocele/MMC , hydrocephalus, Tracheo-esophageal fistula /TEF, and congenital heart diseases (Table 3). Neonatal admissions due to respiratory distress were due to Transient Tachypnea of the newborn/ TTN 11 (28.2%), Pneumonia 10(25.6%), Meconium Aspiration Syndrome/MAS 9 (23.1%) and Respiratory distress syndrome/ RDS 9(23.1%). Of the total cases with pathologic jaundice, 10 (6.4%) were due to ABO & RH-incompatibilities, whereas 19 cases were related to other systemic illnesses.

Table 3. Clinical diagnoses of neonates admitted to the Federal police referral Hospital, Addis Ababa Ethiopia September 1, 2019 to October 30, 2021

Characteristics	**Frequency**	**Percentage**
Prematurity	52	33.5
Term	103	66.5
Total	**155**	**100**
Neonatal infections		
Early onset neonatal sepsis (EONS)	36	62.1
Late onset neonatal sepsis (LONS)	7	12
Meningitis	4	6.9
Diarrhea	1	1.7
Other	10	17.2
Total	**58**	**100**
Respiratory distress		
Transient tachypnea of newborn(TTN)	11	28.2
Pneumonia	10	25.6
Meconium aspiration syndrome (MAS)	9	23.1
Respiratory distress syndrome (RDS)	9	23.1
Total	**39**	**100**
Neonatal Jaundice	10	6.4
Total	**155**	**100**
Hypoxic ischemic Encephalopathy	12	7.7
Total	**155**	**100**
Congenital malformations *	12	7.7
Total	155	100

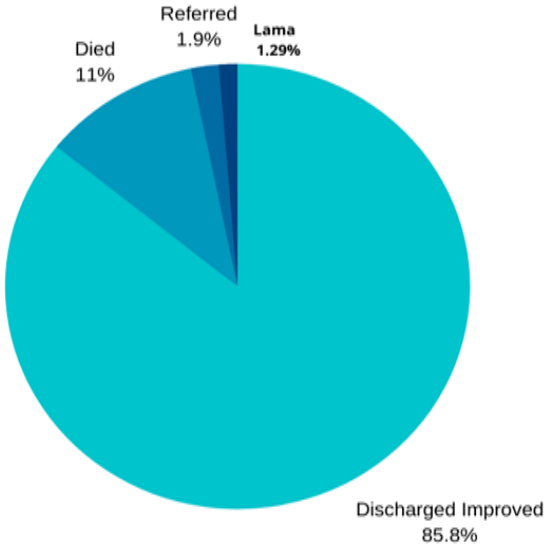
*includes cleft lip,cleft palate, polydactyly, MMC, congenital heart diseases, TEF,imperforate anus.

3.4. Treatment given to sick neonates: In addition to general NICU supportive care, Antibiotics 124(80%), Intranasal oxygen/INO2 or water bubble CPAP/Continuous airway pressure 81 (52.2%), Iv fluids/10%DW 68 (43.8%), incubator care 68(43.8%), phototherapy 34 (21.9%), Kangaroo Mother care/KMC 16 (%) and other 28(%) i.e calcium gluconate, aminophylline, blood transfusion, Fresh Frozen Plasma. FFP etc. , were the treatments offered to the sick neonates. Antibiotics, IV fluid and oxygen were the common interventions used for the management.(Table 4).

Table 4. Treatment of neonates admitted to the Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30, 2021

Treatment	Frequency	Percentage
Antibiotic	124	80
INo2, CPAP	81	52
10%DW	86	55.45
Incubator care	68	43.8
Phototherapy	34	21.9
KMC	16	10.3
Other	28	18

3.5. Outcome and major causes of death* of neonates As seen in Figure 2 , out of 155 neonates studied 133 (85.8%) were improved and discharged, 3(1.9%) were referred and 2 (1.3%) were left against medical advice and 17(11%) of the admitted patients died. The main causes of death were prematurity 52 (33.5%), Sepsis 58(37.4%), 39(24.5%) by birth asphyxia 10(6.5%) and sepsis 22(10%) (Table 3).



*Major causes of death include: Prematurity with its Complication, Perinatal asphyxia, Neonatal infections

Figure 2: Outcome and major causes of death of neonates admitted at Federal police referral Hospital, Addis Ababa Ethiopia. September 1, 2019 to October 30

The neonatal mortality rates of NICUS ranged from 4 to 46% in developed countries and 0.2 to 64.4% in developing countries (20).The overall neonatal mortality rate in our study was 17(10.9%) which is significantly lower than the rates reported from some developing countries, such as South Africa (13.8%), Nigeria (14.2%) Bangladesh (20.6%) and St. Paul's Hospital (23.2%) and higher than in Pakistan 6.2% and Nepal, 4.6 %(4,12,13,16).

There is a great variation in neonatal death statistics between NICUs from different parts of the world. This variation in mortality can be explained by several reasons such as severity of neonate's illness, the level of care in the studied NICU, skill of the staff, and doctor-patient ratio. The three major causes of death in the present study were prematurity, birth asphyxia and sepsis. These findings are consistent with previous studies in Ethiopia and other developing countries (12, 16). Mortality rates were even higher among the preterm and low birth weight neonates. Provisions of quality neonatal care, including quality resuscitation, thermal care, and appropriate feeding, are important to avert some of these factors (16).

LIMITATION OF THE STUDY As this is a retrospective cross-sectional study, cause–effect relation could not be analyzed and it could be also subjected to study design-related bias. Charts may not be complete for some of the cases. Blood cultures and chest X-ray were not done consistently for the diagnosis of sepsis and respiratory distress syndrome (RDS) respectively.

CONCLUSIONS AND RECOMMENDATIONS: The outputs of the research had identified the main reasons for NICU admission and the major cause of death in neonates (Prematurity, neonatal infection and birth asphyxia) and neonatal mortality was high in the first 24 hours of age. The research recommends further follow up audits to further improve the quality of care of the NICU through prioritizing, planning and allocating resources and better referral linkage between police health facilities in the country.

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ABBREVIATIONS

EONS : Early onset neonatal sepsis; FPH : Federal police hospital ; LONS : Late onset neonatal sepsis ; LBW: Low birth weightl; MMC: Meningiomyelocele . NMR: neonatal mortality rate; NICU : Neonatal intensive care unit; PNA: Perinatal asphyxia ; RDS: Respiratory distress syndrome ; TTN: Transient tachypnea of the newborn.

Competing interests

The authors declare that they have no competing interest

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