



## Disease Burden of Neonatal Care Unit at Al-Bayda Medical Center Al-Bayda Libya

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**Abstract:** This research was conducted to determine the number, disease pattern, and outcome of the patients admitted at the Neonatal Care Unit (NCU) at Al-Bayda medical center (AMC) in Libya. A retrospective cross-sectional descriptive study was carried out on all neonates admitted to the NCU between January 2008 and December 2008. The collected data include age, gender, mode and site of delivery, number of gestations, maturity, duration of stay, cause of admission, and outcome. Total infants delivered were 10075, 620 (6.1%) of them were admitted to NCU with a (6.15%) admission rate, 56.5% were male and 43.5% were female, of whom 613 (98.9%) were in-born and 519 (83.7%) were term neonates; 523 (84.4%) of total born were by normal vaginal delivery (NVD). 48.7% of total admissions occurred during the first 24 hours of life. The average length of hospital stay for term births was 5.6 days (SD 5.4) and for preterm 8.7 days (SD 8.55). The common causes of admission were neonatal jaundice (29.3%), followed by neonatal infections (17.6%) were prematurity accounts for (16.3%), and respiratory distress (11.1%). The majority of the admitted neonates improved and were discharged 517 (83.4%), 37(6%) left against medical advice (LAMA) and nineteen (3%) were referred to other specialized hospitals for further management. The neonatal mortality rate was 0.4%, and the overall hospital neonatal mortality rate was 7.6%. According to the cause-specific death rate analysis, prematurity was the most common cause of death (29.8%), followed by sepsis (17%) and birth asphyxia (12.8%). In conclusion, neonatal jaundice, infection, and prematurity complications were the leading causes of morbidity in neonates. The case-fatality rate was high for prematurity, sepsis, and birth asphyxia. Most of these etiologies are preventable to some extent by regular prenatal visits, healthy delivery practices, and timely referral to hospitals which can reduce NCU burden and improve outcomes.

**Keywords:** Neonatal Admission, Outcome, Al-Bayda, Libya.

### INTRODUCTION

The first 28 days of the life of a newborn infant is called the neonatal period and the term prematurity is used to describe live-born neonates delivered before completing 37 weeks of gestation. The neonatal period is the most critical period of life because adaptation from intrauterine to extra-uterine life occurs in it. This may not occur promptly in some newborns resulting in various neonatal morbidities and raising the rate of neonatal admissions and the need for NCU services in the early postnatal

period (Platt & Hey, 1992). Over the last few decades, improvements in neonatal care have greatly improved the survival rate of newborns and decreased the neonatal mortality rate (NMR) by 51%, especially premature neonates (Hug et al., 2019). Caring for the critically ill is a challenge in developing countries, where health needs often outstrip available resources (Watters, 1992). Neonatal morbidity and mortality rates are sensitive indicators for the assessment of facility services presented to mothers and infants in the community. There are many evaluations of neonatal morbidity and

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mortality across the world, but the data from our country is still not sufficient. Therefore, this study was conducted to review the number, disease pattern, and outcome of neonates who are admitted to NCU at the pediatric department at AMC.

### MATERIALS AND METHODS

**Study design:** A descriptive retrospective cross-sectional study was conducted from the 1<sup>st</sup> of January to the 31<sup>st</sup> of December 2008. (Total No.=620).

**Study sitting:** The Neonatal Care Unit (NCU) is a part of the pediatric department at AMC in Al-Bayda , Libya. It contains 18 incubator units that accommodate all inborn neonates that need specialized care, 15 baby cots, and is equipped with a central oxygen supply, suction lines, three conventional mechanical ventilators, five CPAP machines, six phototherapy machines, one cylindrical phototherapy machine, two servo-controlled warmers, and patient care monitors. The Neonatal Unit is staffed by one resident doctor on duty supported by two trained nurses. The neonatal Care Unit is attached to the obstetrics and labour department and receives admissions from these wards and the outpatient clinic.

**Statistical data and analysis:** The data was examined using the statistical package for social sciences (SPSS). The data were interpreted in Tables and Figures, and the numerical data were shown as percentages. The proportionate mortality rate (PMR) was calculated by dividing the proportion of cause-specific deaths by the number of deaths from all causes and was then multiplied by 100. The Chi-square test was used to find the significance of the observed variables, and P-value <0.05 was perceived to be statistically significant.

### RESULTS

A total of 620 neonates were admitted to NCU. Among them, 350 (56.5%) were males, and 270 (43.5%) were females. A total of 613

(98.9%) were born in the hospital, 6 (1%) were born at home, and one baby (0.1 %) was a car delivery. The mode of delivery was mostly normal vaginal delivery (NVD) 523(84.4%), caesarean section (CS) was 75(12.1%), and instrumental delivery (ID) 22(3.5%), the majority of all newborns stayed for ≤ seven days (77.6%). (Table1).

**Table (1).** Descriptive characteristics of admitted neonates

Variable	Attributes	NO	Frequency %
Gender	Male	350	56.5
	Female	270	43.5
Place of Delivery	Hospital	613	98.9
	Home	6	1
	Car	1	0.1
Mode of delivery	NVD	523	84.4
	CS	75	12.1
	ID	22	3.5
Number of gestations	Singleton	588	94.8
	Twin	29	4.7
	Triples	3	0.5
Length of stay in hospital in days	≤7	481	77.6
	>7	139	22.4

Neonatal jaundice and infections were the main causes of admission to NCU, at 29.3 % and 17.6%, respectively. Prematurity complications were the third most common cause of admissions (16.3%) followed by respiratory distress (11.1%). The major causes of infections in both term and preterm babies were sepsis (10.2%), pneumonia (4.5%), and acute gastroenteritis (AGE) (1.6%). 3.38% of admitted neonates had feeding issues (Vomiting, Poor feeding, and choking). The rest were admitted for different causes, as shown in (Table2).

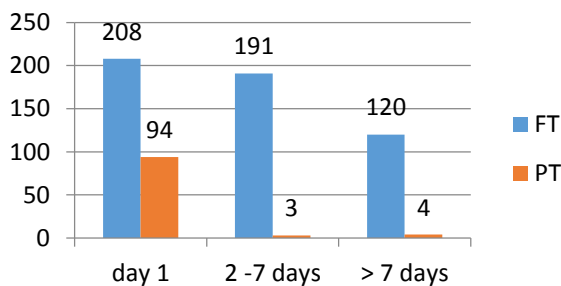
**Table (2).** Disease pattern of neonatal admissions

Diagnosis	NO	%
Neonatal jaundice	182	29.3
Neonatal infections:	109	17.6
Sepsis	50	45.9
Pneumonia	27	24.8
Acute gastroenteritis (AGE)	10	9.1
Urinary tract infection (UTI)	6	5.5
Septic arthritis	6	5.5
Other infections <sup>1</sup>	10	9.2
Prematurity complications:	101	16.3
RDS	24	23.8
Neonatal jaundice	20	19.8
Sepsis	13	12.9
Other complications <sup>2</sup>	44	43.5
Respiratory distress:	69	11.1
MAS	36	52.2
TTN	17	24.6
Others	16	23.2
Feeding issues	21	3.38
Birth asphyxia	20	3.2
Fever for evaluation	16	2.58
IDM	15	2.4
CHD	14	2.2
MCA includes syndromes	21	3.4
Birth trauma	10	1.6
Others <sup>3</sup>	42	6.77
<b>Total</b>	<b>620</b>	<b>100</b>

1: Meningitis, URTI, Mastitis, Omphalitis, skin infection 2: Apnea, hypocalcemia, hypoglycemia, hypothermia, CHD, birth asphyxia, IVH, IDM, Down syndrome

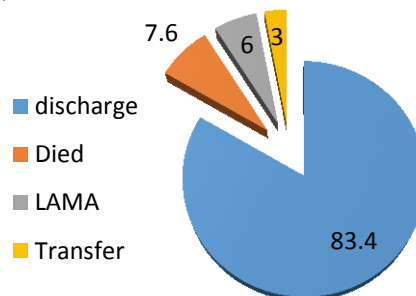
3: Convulsion, Hypothermia, Hypocalcaemia, Hypoglycemia IVH, IEM, LGA, SGA, polycythemia, anemia, Hematuria, Aneuria, post-operative cases.

The majority of the babies 519(83.7%) were full-term, 101(16.3%) were preterm. About 48.7% of total newborns were admitted during the first 24 hours of life, most of preterm babies 94(93%) were admitted during the first 24 hours of life, while 208 (40.1%) were full-term, as shown in (Figure1).



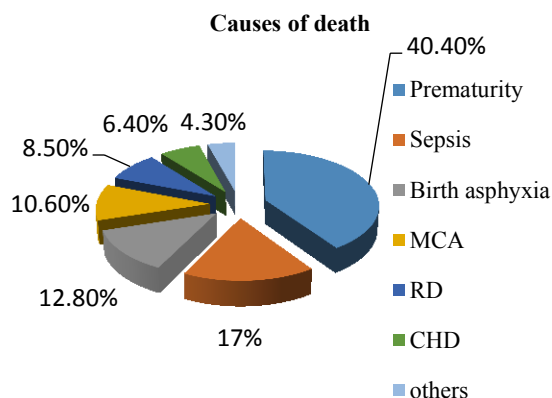
**Figure (1).** Distribution of neonates according to age at admission

Five hundred and seventeen newborns (83.4%) were discharged alive; 47(7.6%) of newborns died in the course of hospitalization; 37(6%) were leaved against medical advice (LAMA) and nineteen (3%) were referred to other specialized hospitals for further management (Figure 2).



**Figure (2).** Distribution according to outcome

Forty-seven infants died in the neonatal period accounting for a neonatal mortality rate of 0.4% (4.7/1000 live births) and the hospital mortality rate was 7.6%. The causes of neonatal hospital mortality were dominated by prematurity with its complications (40.4%), followed by neonatal sepsis (17%) and birth asphyxia (12.8%), as shown in (Fig3).



**Figure (3).** Case fatality rates among studied patients MCA: (multiple congenital anomalies includes chromosomal abnormalities) – RD: (respiratory distress) – CHD: (congenital heart disease)

The average length of hospital stay for term babies was 5.6 days (SD 5.4 days) and for those delivered preterm 8.7 days (SD8.55 days).

There was very strong evidence of a relation between the maturity of neonates in relation to their outcome and duration of admission (P value <0.001) (Table 3).

**Table (3).** Outcome and duration of stay in NCU in relation to maturity of neonates

Variables	Maturity		Chi-square P value
	Term 519(83.7%)	P.T 101(16.3%)	
Outcome	Died	23	24
	Discharge	442	75
	LAMA	37	0
	Transfer	17	2
Duration	Mean 5.6 (SD5.4)	Mean 8.7 (SD8.55)	(84.677) <0.001

### DISCUSSION

This study was undertaken in order to document the most common causes of morbidity and mortality of newborns how are admitted to NCU. to some extent, from other data available from abroad, because of inadequate data from inside Libya. However, there were notable differences. The highest percentage of babies were born in the hospital 98.9%, which indicates improved awareness of parents regarding delivery in the hospital. 48.7% of total admissions occurred during the first 24 hours of life (Shakya et al., 2014). Another study done in Nepal found 62% of admissions were during the first 24 hours, this supports the fact that the majority of the newborn problems are present within the first hours of life.

Thus early diagnosis and intervention are crucial. Males babies were predominant in the current study 56.5%, it is consistent with other studies by (Chapagain et al., 2017; Thammanna et al., 2015), suggesting that the male gender is more susceptible to illness during the neonatal period. Furthermore, social and cultural factors might contribute to male babies getting more attention from parents than females. Delivery at term is considered low risk, and despite of this, term babies can develop illnesses that necessitate their admission to NCU and require a

higher level of care. Here term infants accounted for 83.7% of the total NCU admissions, which was the same finding was reported by (Shakya et al., 2014). Moreover, most of the neonates admitted 84.4% were delivered by NVD. Overall, the main indications of admission into NCU at the center was neonatal jaundice 29.3%, which was higher than other studies in Nigeria and Karachi, which were 11% and 9.44% respectively (Aijaz et al., 2012; Toma et al., 2013), this result may due to awareness of parents about the complications of neonatal jaundice.

Neonatal jaundice is the most common problem amongst neonates. Between 25-50% of term newborns and a higher percentage of premature infants develop jaundice (Hinkes & Cloherty, 1998). However, early detection, bilirubin monitoring, and effective phototherapy are important to prevent serious complications. Secondly, neonatal infections were found to be the next common cause for admission 17.6%, which was less than the observed in other studies in Misurata, Nepal, and Cameron 23.8%, 45.9%, and 31%, respectively (Ashour et al., 2014; Ndombo et al., 2017; Shakya et al., 2014). However, in a study conducted in Bangladesh by (Nahar et al., 2007), sepsis was found to be as low as 4% lower than the rate shown in the current study (which was 10.2% of total cases), this difference may be due to the different diagnostic approach (diagnosed clinically or by lab culture test).

Prematurity tends to reduce the distinctiveness but increases the severity of the clinical signs and symptoms of most disorders due to immature organ function. Thus preterm neonates usually need very close observation and advanced care because of their complications. About 16.3% of total admissions were due to prematurity complications which accounted for the third most common cause of admissions to the NCU. This incidence is higher than that of (Shakya et al., 2014), which was 6.5%, and this finding was different from other centers where the percentages of premature babies were higher (35% to above 50%) (Demisse et al., 2017;

Tajkia et al., 2019), which suggests good antenatal care in Al-Bayda. On the other hand, the rate of birth asphyxia 3.2% was much lower than others from Misurata and Bangladesh by (Ashour et al., 2014; Hoque et al., 2013). A possible reason is that urgent intervention by caesarean section; was done as soon as fetal distress was observed, thus lowering the occurrence of asphyxia.

The majority of admitted cases improved and were discharged 83.4%, and 19(3%) patients were transferred to more specialized hospitals, the most common causes of transfer were CHD, MCA, IEM, and IVH, and those cases referred for neurosurgery, cardiac surgery, and metabolic and genetic screening. In this study, the overall neonatal mortality rate was 0.4%, and hospital neonatal death rate was 7.6% this is close to research conducted by (Al-Momani, 2020) in Jordan which was 8.1%, and was lower in a study carried out by (Ali et al., 2013). Prematurity complications, sepsis, and birth asphyxia were the three most common causes of mortality that may result from poor antenatal care, high-risk pregnancies, and failure to attend hospital for early intervention.

### CONCLUSION

In conclusion, this comprehensive analysis of neonatal admission and outcomes represents the first study from an academic institution in Al-Bayda city. This is a single hospital base study that may not reflect the exact mortality and morbidity of the community and nation as a whole.

Neonatal jaundice, neonatal infection, and prematurity complications are the main causes of admission. Unlike other studies, perinatal asphyxia was not a significant cause of admission. The case fatality was high for prematurity, sepsis, and birth asphyxia, most of these etiologies are preventable to some extent by regular prenatal visits, healthy delivery practices, and timely referral to hospital can reduce NCU burden and improve outcomes. Creating a national database for all newborns and NCU ad-

missions to report and compare mortality and morbidities is encouraged considering the difference in healthcare quality and availability of resources.

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## العبء المرضي لوحدة رعاية حديثي الولادة في مركز البيضاء الطبي، ليبيا

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المستخلص : دراسة مقطعية بأثر رجعي لجميع حديثي الولادة تهدف إلى تحديد العبء المرضي، وأنماطه، والنتائج لحديثي الولادة المرقدين في وحدة رعاية حديثي الولادة بمركز البيضاء الطبي في خلال الفترة من يناير إلى ديسمبر 2008. البيانات التي تم جمعها تشمل (العمر، الجنس، سبب الترقيد، مدة الترقيد، التشخيص، عدد مرات الحمل، طريقة ومكان الولادة، النضج، النتيجة النهائية للعلاج)، حيث بلغ عدد المواليد 10075 طفلاً، وبلغ عدد حالات المرقدين في وحدة حديثي الولادة 620 (6.1%) حالة منهم 350 من الذكور (56.5%) و270 من الإناث (43.5%). تمت ولادة 613 حالة في المستشفى (98.9%)، و519 (83.7%) كانوا أطفال كامل المدة. تم ترقيد معظم الحالات خلال الأربع و العشرين ساعة الأولى بعد الولادة (48.7%)، 523 (84.4%) من إجمالي المواليد كانوا عن طريق الولادة المهبلية الطبيعية، كان متوسط مدة الإقامة في المستشفى للأطفال كامل المدة 5.6 يوماً (SD 5.4) وللخدج 8.7 يوماً (SD 8.55). كانت الأسباب الشائعة للإرقاد اليرقان الوليدي في (29.3%)، تليها عدوي الولدان في (17.6%) من الحالات، والابتسار في (16.3%)، وضيق في التنفس (11.1%) من الحالات، تم السماح لعدد 517 (83.4%) بمغادرة المستشفى، بينما تركت 37 حالة (6%) المستشفى ضد المشورة الطبية، وتمت إحالة تسع عشرة حالة (3%) إلى مستشفى متخصص آخر لمزيد من التدابير الطبية، كان معدل وفيات للولدان 0.4%، ومعدل وفيات حديثي الولادة داخل المركز الطبي 7.6%، كان الخداج هو السبب الأكثر شيوعاً لمعدل الوفيات (29.8%)، يليه الإنتان (17%)، والاختناق عند الولادة (12.8%)، نستنتج من هذه الدراسة أن اليرقان، والعدوى، ومضاعفات الخداج هي الأسباب الرئيسية للمرض عند الولدان، وكانت حالات الوفاة مرتفعة عند الخداج، والإنتان، والاختناق عند الولادة، ويمكن الوقاية من معظم هذه المسببات إلى حد ما عن طريق الزيارات المنتظمة قبل الولادة، وممارسات الولادة الصحية، والإحالة في الوقت المناسب إلى المستشفيات يمكن أن تقلل من العبء، وتحسن النتائج.

الكلمات المفتاحية: ترقيد حديثي الولادة، البيضاء، ليبيا.