

Description of Outcomes in the Neonatal Intensive Care Unit

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Abstract: Background: Neonatal intensive care units are of great importance in the care of neonatal in diagnosing them, providing the necessary services, and reducing pain, which contributes to the improvement in the quality of life of neonatal. **Objective:** This study was aimed to analyse and assess clinical outcomes associated with neonatal intensive care units. **Patients and methods:** This study recruited 50 children who were admitted to the intensive care unit and whose ages ranged from (less than 24 hours to 30 days). Clinical data for newborns was collected from different hospitals in Iraq for a period that lasted from January 5, 2022, to April 20, 2023. This study determined pain management for neonatal quality of life, which measured vital signs of respiratory rate, heart rate, systolic blood pressure, diastolic blood pressure, as well as complication rate and mortality rate. **Results:** Neonatal clinical data were recorded, which included neonates where <2% were neonates. One thousand grams includes three cases, and from 1000 to 2500 cases. g included 27 cases, g ≥ 2500 included 20 cases, neonatal age including ≥ 24 hours was 28, (2 - 8) days included 15 cases, and (9 - 30) days included 7 cases, as is the case in male newborns. 60%, and females 40%, as low birth weight newborns included 3 cases, congenital malformations included 2 cases, and a major birth defect included 1 case, Apgar, 1 minute, was 4.06 ± 1.53, Apgar, 5 minutes, was 2.63 ± 0.21. The neonatal mortality rate included 4 cases, the heart rate was 132.86 ± 8.04, the respiratory rate was 51.64 ± 2.53, the temperature was 37.12 ± 0.08, the systolic blood pressure was 83.10 ± 6.92, and the diastolic blood pressure was 44.10 ± 5.88, asphyxiation in The perinatal period included 6 cases, neonatal jaundice included 8 cases, neonatal sepsis included 3 cases, congenital malformations included 1 case, and invasive ventilation included 19 cases. , initiation of breastfeeding was 46 cases, length of stay (LOS) in the neonatal intensive care unit was 47 [35 - 60], skin-to-skin during the first week was 10 cases, swaddling included during the first week was 40 cases, overall satisfaction rates with Quality of neonatal intensive care unit management, which includes excellent with 30 cases, good with 12 cases, fair with 5 cases, and poor with 3 cases. **Conclusion:** Our cross-sectional study indicates that neonatal intensive care units play a positive role in managing neonatal in a way that enhances the improvement of their physical health, which effectively affects their survival rates. **Keywords:** Neonatal; Neonatal intensive care unit; NeQOL scale; Complications; Neonatal jaundice; Neonatal sepsis; and Length of Stay (LOS) in NICU.

INTRODUCTION

With the advances in technology and the research carried out in neonatology, it is already possible to look beyond what we can to safeguard the lives of newborns (RN), providing a quality of life [Burki, T, 2015 – Eshaq, A. M. *et al.*, 2017]. For this, we need to have a broad vision that looks beyond the individual, the environment, and the team that surrounds him. Humanization should permeate all the actions taken in the Neonatal Intensive Care Unit (NICU). [OCHA, 2019; Qirbi, N. *et al.*, 2017; Republic of Yemen Ministry of Public Health, 2015]

Pain is defined as an annoying and distressing sensation of a part of the body due to an internal or external cause. The in-depth knowledge of the physiological and hormonal response caused by pain in preterm newborns (PNPT) has allowed the improvement of its management, although the systematic use of analgesic measures in this group of patients is far from adequate. [United Nations Development Programme, 2019; Wise, P. H. *et al.*, 2015]

During their stay in the neonatal intensive care units (NICU), newborns are subjected to multiple procedures that involve painful sensations, with both short-term consequences (increased catecholamine secretion, behavioral alterations, and predisposition to intraventricular hemorrhage [HIV], and long-term (excitotoxicity or alterations in the pain response to painful procedures during childhood or adolescence. [Michel, G. *et al.*, 2012; Wuyan, L, 2014]

In response to claims of technical efficiency as well as social responsibility of its services, the assessment of health service quality started in the early decades of the twentieth century and, by the latter part of the century, became an essential tool to the transformation of health systems. [Mestrovic, J. *et al.*, 2017; Srinivas, M. *et al.*, 2007]

The best assurance that the health system's goals are being attained or are approaching completion is the regular assessment of its operations and outcomes [Raymond, S. *et al.*, 2013]. Because of

this, one of the main responsibilities of health research institutes is the assessment of health services. [Raymond, S. *et al.*, 2013]

With the advent of the notion of quality assurance in the 1980s, the assessment of the caliber of healthcare services got underway. Numerous studies have been conducted to determine the quality of healthcare provided to Americans; however, the majority of these studies have focused on hospitals and have included fewer assessments at the initial level of care, which is a crucial component of public health, particularly in areas with limited data, such as rural areas of the nation. [Rozé, J. C. *et al.*, 2017]

Neonatal intensive care units (NICU) are defined as the set of services provided to the user as well as the activities, procedures, and assistance interventions within the phases of promotion and prevention, diagnosis, treatment, and rehabilitation [Rozé, J. C. *et al.*, 2017]. According to the Unified System of Quality Assurance of Health Care in the General System of Social Security in Health, quality is understood to be the provision of affordable and equitable services, without delays which endanger life or health, to an optimal professional level that considers the available resources as well as achieves the adherence and satisfaction of the user. [von Elm, E. *et al.*, 2007]

To find the challenges and chances for development in the planning, creation, management, and delivery of these services—which are utilized annually by millions of Americans—it is critical to assess the quality of the first-level services and the contentment of their consumers. [Pierrat, V. *et al.*, 2017]

PATIENTS AND METHODS

We conducted a cross-sectional study of newborns who were admitted to the intensive care unit, which included 50 newborns whose ages ranged from (less than 24 hours to 30 days). Neonatal data was collected from different hospitals in Iraq for a period that lasted from January 5, 2022, to April 20, 2023, as clinical and demographic data in the hospital included gestational age, mother's age

(25-40) years, mother's body mass index before pregnancy, comorbidities, smoking status, mother's education level, and professional status. The methodology, data and results of this study were designed using SPSES software, version 22. Furthermore, our data distributed the clinical characteristics of the mothers, which included gestational age, method of delivery (caesarean section, vaginal delivery), place of birth since all mothers had delivered in health facilities, number of pregnancies, type of pregnancy (singleton and twin), and neonatal and delivery characteristics, which included weight at admission, grams (< 1000 g to \geq 2500 g), age of the newborn, sex (male and female), low birth weight, small size for gestational age, major birth defect, Apgar score at 1 minute, Apgar score at 5 minutes, and mortality rate.

In addition, we also measured vital signs, which consisted of heart rate, respiratory rate, temperature, systolic blood pressure, and diastolic blood pressure. This study recorded the outcomes of neonatal intensive care unit management in terms of diagnosis, treatment, and neonatal intensive care unit strategies, which included both antibiotic treatments, oxygen therapy and additional nutritional support, neonatal diagnosis on admission, and delivery room resuscitation, which included invasive ventilation and non-invasive ventilation, breastfeeding initiation, length of stay (LoS) in the NICU as well as NICU strategies which included skin-to-skin during the first week, swaddling during the first week, and direct breastfeeding during the first week.

This study recorded the clinical data of newborns admitted to the intensive care unit, which determined the rate of complications. It also evaluated the quality of life of newborns admitted to the neonatal intensive care unit (NICU) with the NeQOL scale as the NeQOL scale ranges from 0 to 100; as the score The highest (100) represents the best quality of life for newborns while 0 represents the lowest quality of life for newborns.

RESULTS

Table 1: Demographic and clinical data of NICU

Characteristics	Number of patients [50]	Percentage [%]
Gestational age, weeks		
< 26	5	10%
27 – 29	21	42%
30 - 32	24	48%
Maternal age, years		
25 – 30	8	16%
31 – 35	30	60%
36 – 40	12	24%
Maternal BMI before pregnancy, [Kg/m2]		
Underweight	3	6%
Normal weight	30	60%
Overweight	10	20%
Obese	7	14%
Comorbidities		
Yes	20	40%
No	30	60%
Hypertension	8	16%
Diabetes	4	8%
Kidney diseases	3	6%
Asthma	3	6%
Heart disease	2	4%
Smoking status		
Yes	5	10%
No	45	90%
Maternal level of education		
Elementary school	4	8%
Secondary school	14	28%
College/university	32	64%
Occupation Status		
Employed	35	70%
Unemployed	15	30%

Table 2: Neonatal and maternal characteristics

Variables	Number of patients [50]	Percentage [%]
Maternal characteristics		
Gestational age, weeks		
< 26	5	10%
27 – 29	21	42%
30 - 32	24	48%
Mode of delivery		
Cesarean section	33	66%
Vaginal delivery	17	34%
Place of birth		
Health facility	50	100%
Number of pregnancies		
0	18	36%
1	20	40%
2	7	14%
3	3	6%
≥ 4	2	4%
Type of pregnancy		

Singleton	48	96%
Twin	2	4%
Neonatal characteristics		
Weight on Admission, gram		
< 1000 g	3	6%
1000 to 2500 g	27	54%
≥ 2500 g	20	40%
Age of newborn		
≤ 24 h	28	56%
(2 – 8) days	15	30%
(9 – 30) days	7	14%
Sex		
Male	30	60%
Female	20	40%
Adverse factors		
Low birth weight	3	6%
Small for gestational age	2	4%
Major birth defect	1	2%
Apgar score		
Apgar, 1 minute, (Mean ± SD)	4.06 ± 1.53	
Apgar, 5 minutes, (Mean ± SD)	2.63 ± 0.21	
Neonatal death cases		
Yes	4	8%
No	46	92%

Table 3: Determine vital signs outcomes of neonatal

Vital signs	Measures
Heart rate (Mean ± SD), BPM	132.86 ± 8.04
Respiratory rate (Mean ± SD), breaths per minute	51.64 ± 2.53
Temperature (Mean ± SD), Celsius	37.12 ± 0.08
Systolic blood pressure (Mean ± SD)	83.10 ± 6.92
Diastolic blood pressure (Mean ± SD)	44.10 ± 5.88

Table 4: NICU management outcomes in terms of diagnosis, treatments, and NICU strategies

Clinical outcomes	Number of patients [50]	Percentage [%]
Therapies received		
Antibiotics	48	96%
Oxygen therapy	18	36%
Extra feeding support	22	44%
Stabilised and referred	4	8%
Diagnosis of neonatal at admission		
Perinatal asphyxia	6	12%
Neonatal jaundice	8	16%
Neonatal sepsis	3	6%
Congenital anomalies	1	2%
Delivery room resuscitation		
Continuous positive airway pressure	6	12%
Postnatal corticosteroids	4	8%
Invasive ventilation	19	38%
Non-invasive ventilation	40	80%
Breastfeeding initiation	46	92%
Length of Stay (LOS) in NICU [days], median	47 [35 – 60]	
NICU's strategies		

Sedation during the first week	34	68%
Duration of primary ant biotherapy	19	38%
Duration of secondary ant biotherapy	23	46%
Skin-to-skin during the first week	10	20%
Swaddling during the first week	40	80%
Direct breastfeeding during the first week	45	90%

Table 5: Complications surrounding neonatal admitted to the neonatal intensive care unit

Complications	Number of patients [50]	Percentage [%]
Infection	3	6%
Difficulty breathing	0	0%
Feeding problems	2	4%
Developmental delays	0	0%
Vision impairment	1	2%
Total	6	12%

Table 6: Assessment of quality of life for neonatal admitted in NICU by NeQOL scale

Items	NeQOL scale
Physical health	74.89 ± 6.57
Emotional well-being	80.12 ± 5.85
Social interactions	72.18 ± 4.36
Overall health	78.46 ± 5.75

Table 7: Determine the satisfaction level of neonatal after NICU

Items	Number of patients [50]	Percentage [%]
Excellent	30	60%
Good	12	24%
Fair	5	10%
Poor	3	6%

DISCUSSION

Regarding demographic and clinical results, these data recorded the demographic results of gestational age, which included < 26 weeks, which included five women, 27-29, which included 21 women, and 30-32, which included 24 women, and the results of body mass index, which included underweight, which included three cases, and normal weight, which included 30 cases, and over. Weight included 10 cases, and obesity included 7 cases. Data on comorbidities included high blood pressure (16%), diabetes 8%, kidney disease 6%, asthma 6%, and heart disease 4%; the percentage of women who smoked was 10%, and non-smokers was 90%. For maternal and neonatal characteristics, data on characteristics of the delivery method were recorded, which included a caesarean section (33 cases), vaginal delivery (17 cases), where singletons were 96%, twins were 4%, weight on admission, where newborns with < 1000 g included three cases and 1000 to 2500 cases. g included 27 cases, g ≥ 2500 included 20 cases, age of the newborn, which included ≤ 24 h, was 28, (2 – 8) days included 15 cases, and (9 – 30) days included 7 cases, as the male newborns

were 60%, while Females: 40%, as newborns with low birth weight included 3 cases, small for gestational age included 2 cases, and a major birth defect included 1 case, Apgar, 1 minute, was 4.06 ± 1.53, Apgar, 5 minutes, was 2.63 ± 0.21, and neonatal mortality rate included 4 cases.

Our vital signs data recorded heart rate was 132.86±8.04; respiratory rate was 51.64±2.53, temperature was 37.12±0.08, systolic blood pressure was 83.10±6.92 and diastolic blood pressure was 44.10±5.88. Our results showed discrepancies in central care unit data: antibiotics included 48 cases, oxygen therapy included 18 cases, perinatal asphyxia included 6 cases, neonatal jaundice included 8 cases, neonatal sepsis included 3 cases, congenital malformations included 1 case, invasive ventilation included 19 cases, and initiation of breastfeeding was There were 46 cases, the length of stay (LOS) in the NICU was 47 [35 – 60], skin to skin during the first week was 10 cases, and swaddling during the first week included 40 cases.

The complication rates were 6 cases, the most prominent of which were infection and feeding

problems. The quality-of-life results for newborns admitted to the intensive care unit, which included physical health, were 74.89 ± 6.57 , emotional well-being was 80.12 ± 5.85 , social interactions were 72.18 ± 4.36 , and general health were 78.46 ± 5.75 . General satisfaction rates were found with the quality of the intensive care unit's management of newborns, which include excellent with 30 cases, good with 12 cases, fair with 5, and poor with 3 cases.

Last studies agreed that neonatal intensive care units (NICUs) are crucial since they offer specialized medical care to preterm babies or babies in major health issues; where it comes to pain management, when NICUs have the capacity and expertise to maintain an eye on a newborn's discomfort as well as take appropriate action to guarantee their comfort and wellbeing. [Flamant, C. et al., 2011; Frondas-Chauty, A. et al., 2014]

Some studies found NICUs improve the quality of life of newborns by responding for their particular medical requirements in a safe and encouraging setting, which entails giving preterm newborns specific care, maintaining an eye on their development and growth, and delivering medical treatments as needed, where NICUs work to enhance neonates' long-term outcomes through optimizing their health and well-being through comprehensive care programs. [Butel, M. J. et al., 2007; Tognini, P. et al., 2017]

NICUs are essential for giving needy babies thorough care, managing pain, enhancing the quality of life, as well as generating successful clinical outcomes that support these patients' long-term health and wellbeing. [Cowan, C. S. M. et al., 2019]

CONCLUSION

The current study shows that neonatal intensive care units have an essential and effective role in achieving positive clinical outcomes that contribute significantly to ensuring the health and well-being of neonatal in terms of treating pain and improving quality of life in the long term.

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