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Causes of Neonatal Re-admission in 24 hours after Cesarean Section

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ABSTRACT

Background: According to the American Academy of Pediatrics (AAP), a mother who gives birth to a healthy, term baby should stay in the hospital for as long as necessary to detect any possible issues and give caregivers time to get the child (and family) ready for release. The infant's risk of readmission may be heightened by diagnostic mistakes, or misdiagnosis, and inadequate assessment by healthcare personnel. In order to assess the frequency and cause of hospital readmissions within the first twenty-four hours of life, this study will examine the local pattern of neonatal readmissions in healthy infants.

Patients and methods: This cross-sectional study included 33 neonates who had a c-section birth, after being discharged, and readmission within 24 hours of delivery. The following newborn characteristics were examined: gestational age, birth weight, gender, duration of initial hospital stay (LOS), infant feeding method, and the type of ward from which the neonate was released following the initial evaluation. The following factors related to pregnancy and delivery were evaluated: advanced maternal age (>35 years), low socioeconomic status, low maternal education, high birth order (>2), joint family, rural area residents, primigravida, premature rupture of membranes (PROM), chorioamnionitis, preeclampsia, diabetes, psychosocial issues, thyroid disorders, and epidural/spinal anesthesia.

Results: Sixteen patients out of 33 readmitted neonates were male. the rate of neonatal readmission was 1.34%. Their average birth weight and gestational age were 2918.2 ± 619.2 gm and 36.8 ± 21.72 weeks respectively. They spent 2.62 ± 1.83 hrs. and readmitted at 7.82 ± 5.35 hrs. intervals. The main causes of readmission were vomiting and poor feeding. Regarding the maternal factors; epidural anesthesia and low education was the most significant risk factors.

Conclusions: An important component of the quality-of-care consequences of existing discharge rules and procedures may be revealed by this study. We come to the conclusion that vomiting and poor feeding are the main causes of hospital readmission in the first 24 hours of life, necessitating a proper intervention in the early hours of life. The early development of efficient lactation should be the focus of efforts to lessen digestive issues.

Keywords: Neonatal Readmission, Hospital Stay, Early Discharge.

Article Information

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INTRUDUCTION

According to the American Academy of Pediatrics (AAP), a mother who gives birth to a healthy-term baby should stay in the hospital for as long as necessary to detect any possible issues and give caregivers time to get the child (and family) ready for release. Diagnostic mistakes, or misdiagnosis, and inadequate assessment by healthcare personnel may heighten the infant's risk of readmission. [1]. Over the past 20 years, there has been a noticeable decline in the average length of hospital stay for women and babies. This decrease can be attributed to the hospital's bed capacity limitations as well as the desire of families to lower hospital stay costs.[2] Iraq's "Early Discharge" (ED) policy is primarily motivated by a shortage of hospital beds rather than budgetary limitations because the country's healthcare system is essentially free. There are 1.3 hospital beds in Iraq for every 1,000 people. Here, 2.9 beds is the worldwide mean. [3] A readmission occurs when a patient is admitted to the same hospital or another hospital within 30 days of being discharged.[4] Over the last ten years, readmission rates for term-born babies have been less than 1.3% in the US and less than 8% worldwide. The literature has examined factors that may have an effect on readmission of neonates. These include readmission-influencing variables related to mothers, newborns, institutions, and healthcare providers. [5]

Many studies examined the causes of neonatal readmission. In 2013, Young et al conducted a study in the USA and found that 5308 out of 296,114 births of health discharge neonates were readmitted to the hospital within 28 days, i.e., (1.8%). Feeding problems were the cause for the majority of readmissions (41%), followed by jaundice (35%).[6] A study by Alsulami and Al Saif [7] conducted at King Abdulaziz Medical City (KAMC), Riyadh, Saudi Arabia, between 2010 and 2011, showed that 947 out of 16,844 neonates (1.34%) were either readmitted to the hospital or had visited the emergency room (ER) within 7 days from discharge. Moreover, jaundice was the most common cause of readmission/ER visits (38%).(8). No study has assessed the etiology of neonatal readmissions in Iraq. Normal vaginal deliveries of newborns are released from most public sector hospitals as soon as the mother and child are stable, whereas cesarean deliveries usually result in the mother and child being released on the second day following birth. To assess the frequency and cause of hospital readmissions within the first 24 hours of life, the current study examined the local pattern of neonatal readmissions in healthy infants.

PATIENTS AND METHODS

This cross-sectional study was carried out between December 1, 2022, and June 1, 2023. The study included 33 neonate patients

The Study Design

It is a cross-sectional study.

Exclusion criteria

1. Newborns who were deemed healthy and free of prenatal or postnatal issues at the time of discharge.
2. A c-section birth result.
3. After being discharged, readmission within 24 hours of delivery.
4. Unexpected visit to the hospital's emergency room or NICU.

Neonatal patients delivered in another hospital were an exclusion criterion. The investigation did not include mothers with a history of preterm birth, infants with intrauterine growth retardation (IUGR), congenital malformations, birth asphyxia, or respiratory distress.

Retrospective file reviews of the hospital's medical records were used to gather clinical information on both the mother and the child. Three files per readmission were examined: one from the readmission of the infant, one from the admission of the newborn's birth, and one from the admittance of the mother's The following

newborn characteristics were examined: gestational age, birth weight, gender, duration of initial hospital stay (LOS), infant feeding method, and the type of ward from which the neonate was released following the initial evaluation.

The following factors related to pregnancy and delivery were evaluated: advanced maternal age (>35 years), low socioeconomic status, low maternal education, high birth order (>2), joint family, rural area residents, primigravida, premature rupture of membranes (PROM), chorioamnionitis, preeclampsia, diabetes, psychosocial issues, thyroid disorders, and epidural/spinal anesthesia delivery.

Data collection

Using Excel from Microsoft Office 2019, all information was gathered and examined. All neonatal and maternal variables' means, standard deviations, maximums, minimums, and frequencies were computed. The scientific committee of the pediatrics division at the University of Kufa's faculty of medicine gave the study its ethical blessing.

RESULTS

During the study period, a total number of 33 neonates were enrolled in the study as their readmission criteria fit the study's inclusion criteria. The average birth weight of enrolled patients was 2918.2 ± 619.2 gm, ranging from 4800 to 2000 gm. Other neonatal criteria were listed in Table 1. Sixteen patients out of a total of 33 readmitted neonates were male, Figure 1.

The number of cesarean sections that had been done in Al Zahraa teaching hospital in the study period (i.e., between the 1st of September 2022 till the 1st of June 2023 were 3118 cesareans, of which 657 neonates had been admitted directly to NICU due to various medical problems. So, 2461 cesareans produce healthy neonates that considered for home discharge with their mothers was 2461, so the rate of neonatal readmission was 1.34%. The causes of neonatal readmission within 24 hours of birth were as the following: About half of thirty-three readmitted neonate patients were exclusively breastfed. About 90% of readmitted neonate patients were initially discharged to shared hospital wards. Many maternal risk factors had been studied that may be related to neonatal readmission. All of the thirty-three readmitted neonate mothers were delivered by spinal anesthesia. Other risk factors are stated in Figure 4. Each presumed maternal risk factor was studied in comparison with the length of initial hospital stay, Table 2.

All the thirty-three readmitted neonates were discharged well to home. Twenty-two patients out of a total number of 33 enrolled neonates were discharged initially from NICU within a period of less than 2 hours, Figure 6.

Table (1): The neonatal criteria of readmitted patients.

Variables	Mean	Std. Deviation
GA (wks.)	36.82	1.72
Birth Weight (gm)	2918.18	619.2
Length of Initial Stay (hrs.)	2.62	1.83
Interval Discharge and Readmission (hrs.)	7.82	5.35
APGAR score 1 min	6.6	1.1
APGAR score 5 min	8.7	0.8

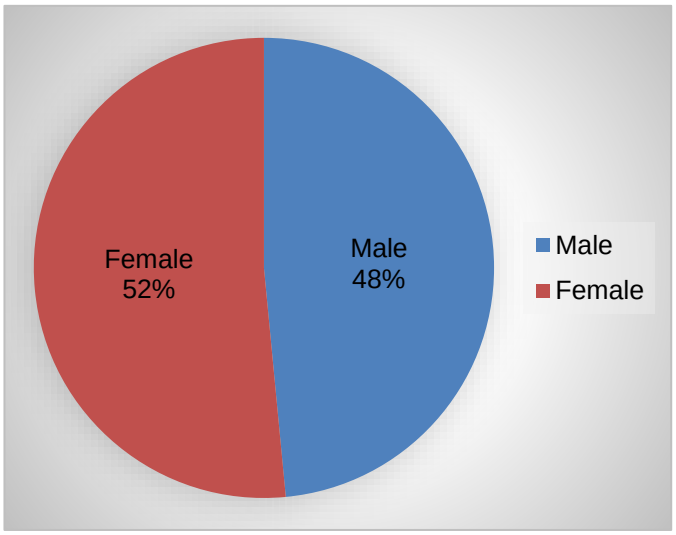

Figure 1: Sex distribution of enrolled patients.

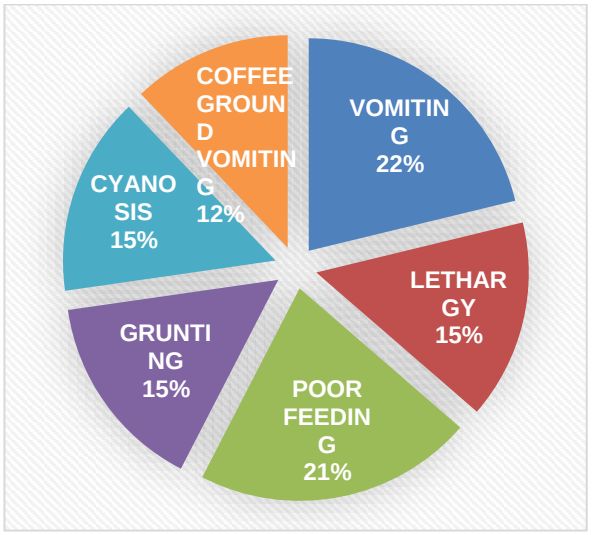

Figure 2: causes of neonatal readmission.

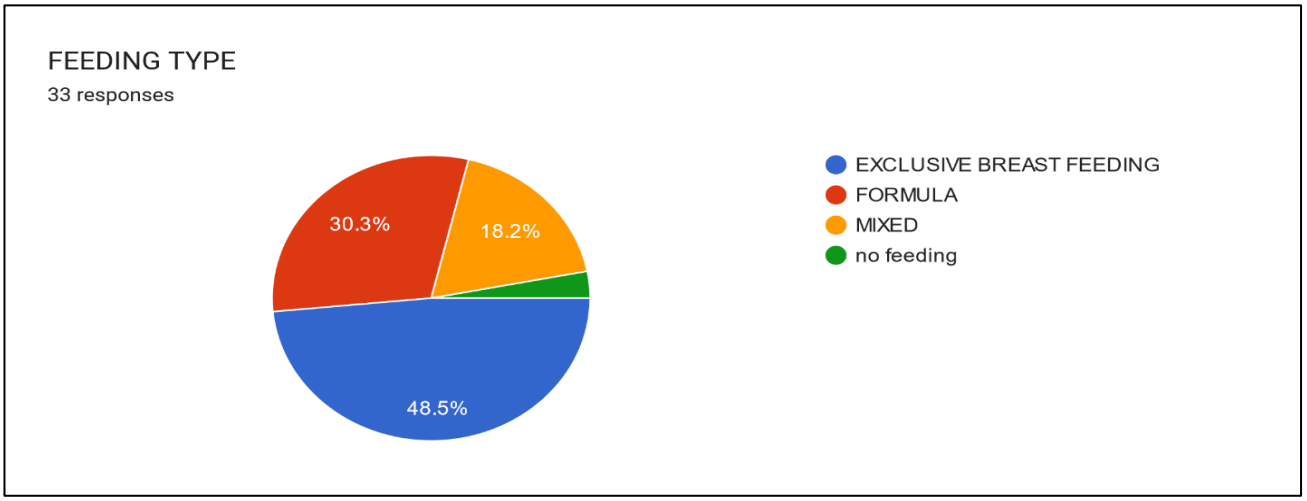

Figure 3: Type of feeding in the enrolled patients.

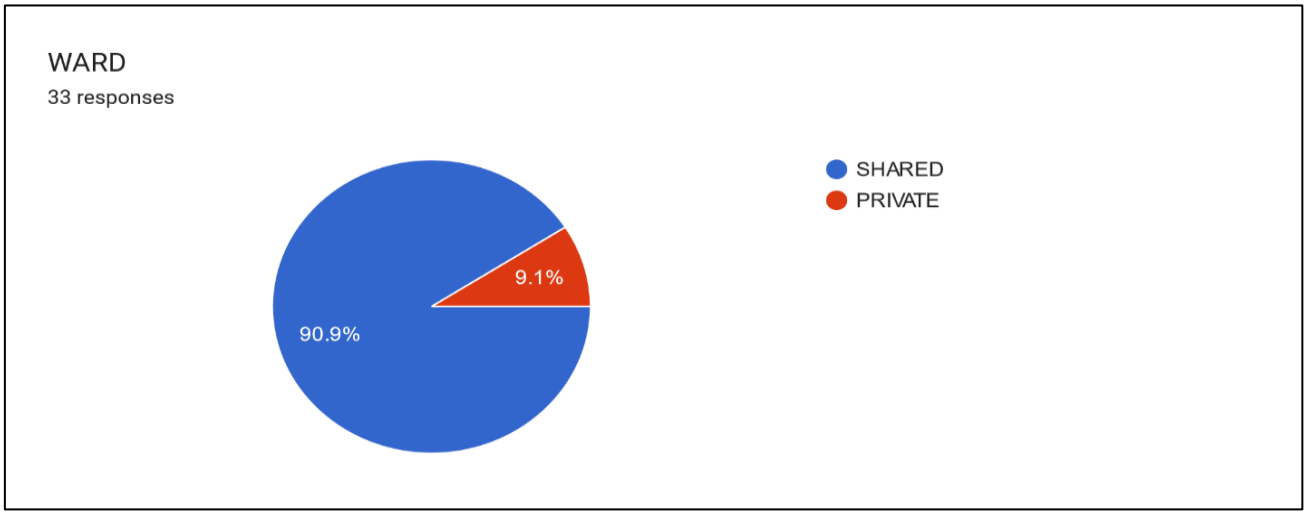

Figure 4: Type of discharged hospital ward.

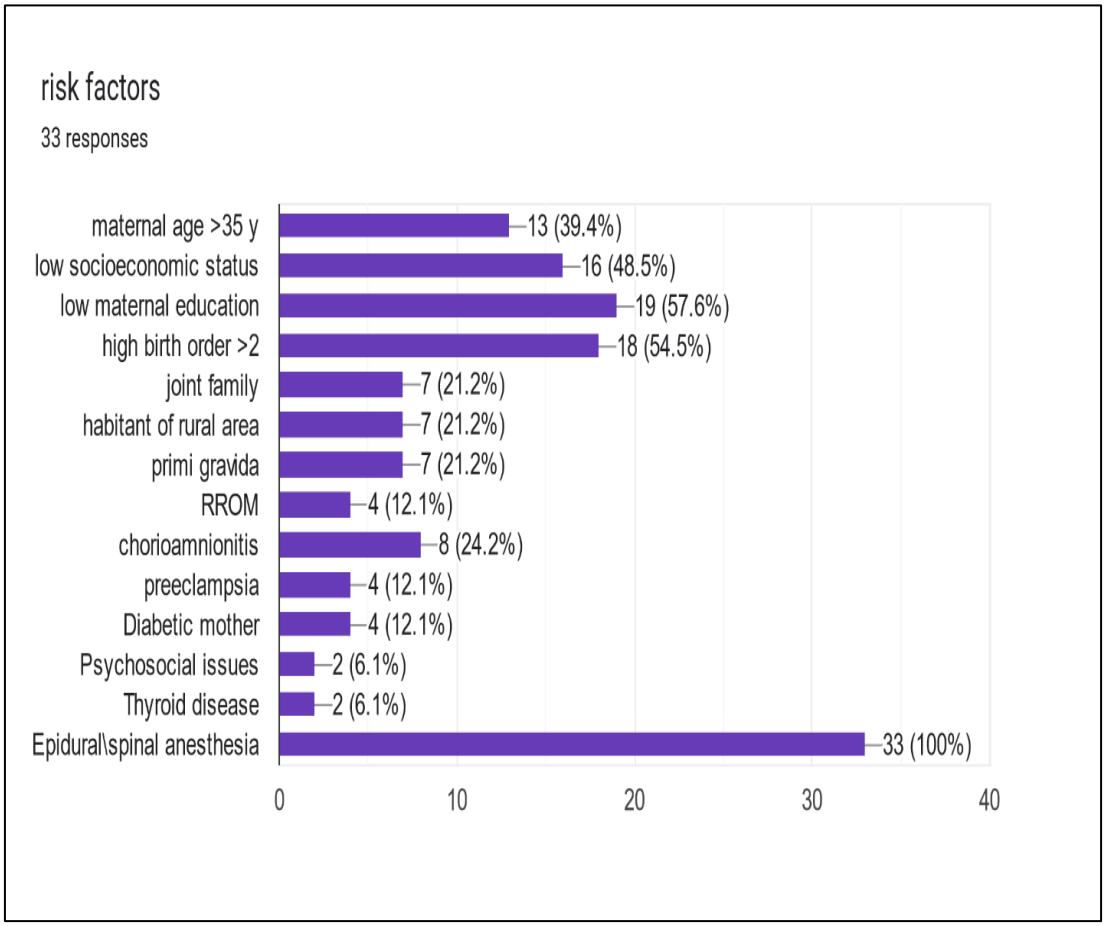

Figure 5: Maternal risk factors that may be associated with neonatal readmission.

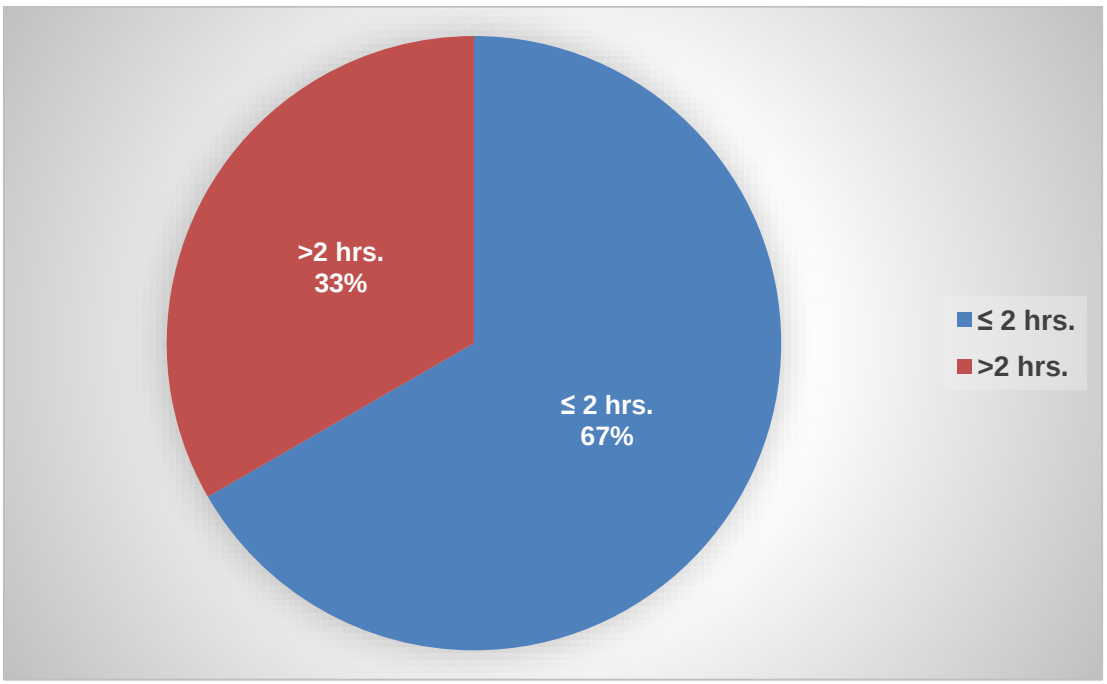

Figure 6: the percent of early vs late initial NICU discharge.

Table 2: Comparison of maternal risk factors with the initial hospital stay.

		Length of stay groups		Total	Odd ratio	P value	95% CI
		≤2 hrs.	>2 hrs.				
Sex	Male	11	5	16	1.2	1.000	0.281 – 5.124
	female	11	6	17			
Ward	Private	3	0	3	1.579	0.534	1.2 – 2.07
	Shared	19	11	30			
Advanced maternal age	No	13	7	20	0.825	1.000	0.185 – 3.676
	yes	9	4	13			
Low socioeconomic status	No	12	6	18	1.000	1.000	0.234 – 4.278
	yes	10	5	15			
low maternal education	No	11	3	14	2.667	0.278	0.55 – 12.79
	yes	11	8	19			
high birth order	No	10	5	15	1.000	1.000	0.234 – 4.278
	Yes	12	6	18			
joint Family	No	18	7	25	2.571	0.391	0.5 – 13.22
	Yes	4	4	8			
Habitants of rural area	No	16	9	25	0.593	0.687	0.098 – 3.57
	Yes	6	2	8			
Primi gravida	No	18	9	27	1.000	1.000	1.53 – 6.53
	Yes	4	2	6			
PROM	No	19	10	29	0.633	1.000	0.058 – 6.9
	Yes	3	1	4			
Chorioamnionitis	No	18	7	25	2.57	0.391	0.5 – 13.22
	Yes	4	4	8			
Preeclampsia	No	19	10	29	0.633	1.000	0.058 – 6.9
	Yes	3	1	4			
Diabetes	No	19	10	29	0.633	1.000	0.058 – 6.9
	Yes	3	1	4			
Psychosocial issues	No	20	11	31	0.645	0.542	0.497 – 0.83
	Yes	2	0	2			
Thyroid Diseases	No	21	10	31	2.1	1.000	0.12 – 37.1
	Yes	1	1	2			
Feeding Type	No feed	1	0	1		0.665	
	EBF	10	6	16			
	BF	6	4	10			
	MF	5	1	6			

DISCUSSION

The healthcare institution is greatly impacted by readmissions or rehospitalizations, which result in a strain on staff, resources, expertise, tools, and procedures. The first hospital stay after delivery offers a chance to learn how to nurse, become a better parent, and spot any early newborn health issues. Many of these abilities, nevertheless, take time to develop; for example,

well-established breastmilk, which is linked to a lower risk of jaundice, often takes three or four days to build and is less likely to occur in situations where early discharge occurs. [9] The ever-growing demands on hospital resources and patient turnover are in competition with this time-sensitive service. [10, 11] The goal of the current study was to evaluate the outcomes, causes, risk factors, and readmission rate of neonates who were released from tertiary care institutions in Najaf City, Iraq.

The rate of neonatal readmission in Al Zahraa Teaching Hospital in our study was 1.34%, this rate is lower than that found by Bawazeer, et al [12], 2.1%. however, Bawazeer, et al studied neonatal readmission during 28 days (neonatal period) which is not the situation in our study (first 24 hours of life). Habib H. S. [13], give a neonatal readmission rate close to our findings, 1.3%. Bayoumi et al [10] found a higher neonatal readmission rate (10.1%). This controversy may be justified by different assessments of discharge readiness following childbirth in these study centers.

The period of time from the time of birth till the patient is released to go home is referred to as the initial hospital stay. In our study, this equated to 2.62±1.83 hours. When compared to US standards, which generally recommend regular newborn discharge 24 hours after vaginal delivery and 72 hours following cesarean delivery, this is a fairly short period of time. Nonetheless, during the past ten years, the average duration of stay in the hospital following birth for healthy, full-term infants in the US has decreased significantly. Many managed care companies are trying to speed up this trend by enacting policies that demand an earlier release for full-term newborns without evident health issues, all in an effort to control the cost of medical treatment. [14–16]

The main causes of neonatal readmission during the first 24 hours in our study were: poor feeding (22%), vomiting (21%) cyanosis, grunting, lethargy (15% for each), and coffee ground vomiting, (12%). According to Farahat [17], the main cause of neonatal readmission was hyperbilirubinemia followed by suspected neonatal sepsis (84.2% and 10.5% respectively. This is quite logical and highly anticipated because this study considered readmission during the first 28 days of life which is not the situation in our study. Bawazeer, et al [12] studied early neonatal readmission (less than 7 days) and found that the main causes of readmission were: jaundice (54.8%), suspected sepsis (11.5%), and gastrointestinal tract disorders (6.4%). Brown et al [18] had correlate the length of the Initial Hospital Stay with the causes of neonatal readmission and found that apnea was the most common cause of neonatal readmission in correlation with a shorter period of Initial Hospital Stay, followed by birth defects and feeding and gastrointestinal problems.

Neonatal and maternal risk factors have been studied to anticipate the probability of them as potential risk factors for readmission. Regarding neonatal risk factors, our study found that 52% of readmitted neonates were female versus 48% male. This variable was statistically insignificant to be regarded as a potential risk factor for neonatal readmission. This is against Bawazeer, et al [12], who found that the readmitted neonates were mainly male (54.7%) in comparison to (45.3%) females with a statistically significant P value (0.01). This difference could be attributed to big differences in the population sample size (33 neonates in our study versus 570 in Bawazeer, et al study). The mean Birth Weight of readmitted neonates was 2918.18±619.2 gm. That is so close to Bawazeer, et al [12] findings (3000±50) gm and lower than that for Jarrett et al, [19] (3387±575 gm). Again, different sample sizes may attribute this variance. Sixteen out of a total of 33 readmitted neonates (48.5%) had started exclusive breastfeeding, 10 (30%) neonates fed by the bottle, 6 (18.2%) by mixed feeding and lastly, one neonate (3%) did not commence

feeding at all. This variable was insignificant as a potential neonatal readmission risk factor (P value 0.665). Jarrett et al, [19] reported that breasts 69%, artificial (bottle, syringe) 10%, breast and artificial 20%, and No documentation 1%. The lower percentage of exclusive breastfeeding in our center notifies poor counseling skills about the importance of exclusive breastfeeding.

Many maternal variables had been evaluated in our study searching for their significance as neonatal readmission risk factors; these variables were: advanced maternal age (>35 years), low socioeconomic status, low maternal education, high birth order (>2), joint family, rural area residents, primigravida, premature rupture of membranes (PROM), chorioamnionitis, preeclampsia, diabetes, psychosocial issues, thyroid disorders, and epidural/spinal anesthesia. No one of these maternal variables was statistically significant as a risk factor for neonatal readmission during the first 24 hours of life. This is the same in Jarrett et al, [51] study, however; he studies only preeclampsia and maternal diabetes mellitus. Bawazeer, et al [44] studied more maternal diseases such as anemia, obesity, and asthma but they also did not record a statistically significant odd ratio. Farahat [49], gets a significant odd ratio regarding maternal variables (odd ratio 1.985, 95% CI 0.962 -0.097, P value 0.05) but he studies all the maternal risk factors in one scope i.e., obstetric complications.

Another variable that was neither neonatal nor maternal was the ward type to which the neonate with his mother had been discharged for. About 90% of neonates were discharged to shared wards in comparison to only 10% to private ones. The odd ratio points toward the possible contribution of this variable as a risk factor for neonatal readmission.

CONCLUSIONS

An important component of the quality-of-care consequences of existing discharge rules and procedures may be revealed by this study. We come to the conclusion that vomiting and poor feeding are the main causes of hospital readmission in the first 24 hours of life, necessitating a proper intervention in the early hours of life. The early development of efficient lactation should be the focus of efforts to lessen digestive issues.

RECOMMENDATIONS

1) To support and inform nursing mothers through medical professionals.
2) To design a systematic strategic plan for the infants who were released within two hours; this includes altering the post-discharge care routines, such as early follow-up or home visits from medical personnel.
3) Future prospective studies on the factors that influence newborn readmission are urged as they may aid in the early detection and evaluation of these factors prior to discharge.
4) As a final point, we propose that by adhering to the proper national guidelines, the morbidity and mortality caused by early neonatal discharge can be significantly reduced and managed.

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