



Article

Mothers Knowledge and Domain-Specific Gaps in Post-Discharge Care for Preterm Infants Following NICU Hospitalization: A Cross-Sectional Study in Karbala, Iraq

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Abstract: The transition from the neonatal intensive care unit (NICU) to home places a heavy burden on the mother of a preterm infant to deal with feeding, thermal, jaundice, infection prevention and prevention, supplementation, growth monitoring, follow-up, and danger signs. The objective of this study was to evaluate maternal knowledge about post-discharge management of preterm infants and to determine the gap in the knowledge domain. Methods: A descriptive cross-sectional study was conducted on 100 mothers who were admitted to neonatal care unit of Karbala Teaching Hospital for Children, Iraq. A researcher designed and interviewer-administered questionnaire was utilized to collect data from 12 May to 1 September 2026. Participant characteristics and knowledge responses were summarized using frequencies, percentages, means and standard deviations. Results showed that 60% of the participants living in rural areas, 65.0% said that they have a good economic status and 27.0% could not read and write. In total, 67.0% of mothers had low knowledge, 21.0% had moderate, and 12.0% had high knowledge of post-discharge care for preterm infants. Thermal care, vaccination, jaundice assessment, some breastfeeding-related items, supplementation, post-feeding positioning and monitoring of weight were found to have item-level responses that were more positive, with some items of feeding and monitoring identified as gaps in knowledge, and information received within the hospital identified as a gap in knowledge. Conclusions: Low maternal knowledge was found and differed in the various areas of care. Discharge education is warranted, particularly for nurses, and should be structured, literacy sensitive and include demonstration, teach-back, and follow-up post-discharge. Recommendations 1. Develop a uniform nurse-led discharge education program for mothers of preterm babies. 2. Employ basic Arabic and pictorial resources especially for the mothers who cannot read and write. 3. Use demonstration, return-demonstration, and teach-back to ensure skill mastery. 4. Set-up post-discharge telephone or clinic follow-up, especially for those with geographic and/or access barriers. 5. Carry out larger multicenter trials and test knowledge instrument and scoring system prior to wider generalisation.

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1. Introduction

Although almost 13.4 million babies are born prematurely in 2020 [1], [2] preterm birth is a significant newborn-health problem globally. The babies born early are particularly at risk of developing respiratory problems, feeding difficulties,

thermoregulatory problems, infections, jaundice and developmental problems [3], [4], [5], [6], [7]. These vulnerabilities do not go away after the baby is hospitalized and the move to the home setting is clinically meaningful to both the babies and families [8], [9], [10], [11].

The readiness of the mother to get home is thus an important part of nursing the newborn. At the home level, mothers might need support to maintain thermal stability, feed safely and adequately, support breastfeeding, provide supplements as prescribed, monitor for danger signs such as jaundice, prevent infection, follow up on immunisation status and developmental surveillance, and access early health care [12], [13], [14]. The literature on preparing for discharge from the NICU indicates that the most effective way to provide content and delivery of information is through skill building, parent participation, individual support and follow up post-discharge [8], [9].

There is not always a shared understanding of knowledge across all care areas. Mothers can feel good about keeping an infant warm, attending vaccinations without hesitation and not paying attention to feeding frequency, but have doubts about how to manage jaundice and/or physiologic monitoring. This is supported by previous research which has shown that in certain settings, knowledge alone may be sufficient, whilst others may find it either insufficient or not sufficient at all [12], [14], [15]. Overall and item-level patterns can therefore indicate specific areas of learning which are not clearly revealed in the total score.

Local evidence is especially relevant because literacy levels or social factors or access to post-discharge services can impact understanding and use of discharge information. The present study aimed at measuring the knowledge of mothers regarding the care after discharge of preterm infants in Karbala Teaching Hospital for Children, determining the pattern of mothers knowledge that is high and low in each care field and analyzing mothers reported relationship between their knowledge and sociodemographic factors.

1.1. Aim and Objectives

The principal aim was to evaluate the knowledge of mothers regarding post discharge care of pre term babies. Secondary goals included defining areas of more and less knowledge within each domain and defining the sociodemographic profile of the mothers who participated in this study.

2. Materials and Methods

A study design and setting are provided. A study design and setting is included.

A quantitative descriptive cross-sectional study design was used. The study was carried out in the neonatal care unit, Karbala teaching hospital for children, Karbala, Iraq.

2.1 The study period, participants and sampling

This data collection covers the period from 12th May to 1st September 2026. The study sample comprised 100 mothers who brought their preterm infants to the neonatal care unit, who were approached for the study using a convenience sampling technique.

2.2 Eligibility criteria

This involved only mothers who had an infant with a premature birth who had agreed to participate and were attending the neonatal care unit. Mothers who refused to participate and mothers with known psychological disorders were not included.

2.3 Data-collection instrument

Data collection was done on site using researcher designed and administered questionnaire. Sociodemographic, maternal and obstetric, infant-related and knowledge of premature infants' care were included in the instrument. The knowledge items were presented with the response options of "agree," "do not agree," and "not sure." Ten mothers were mentioned in a pilot study and it was estimated that the time needed to complete the questionnaires was 15–25 minutes. Item mean scores were classified as low (1.00–1.66), moderate (1.67–2.33), or high (2.34–3.00).

Pilot study: A pilot study was conducted with 10 mothers who fulfilled the study eligibility criteria in order to check the clarity, feasibility and estimated completion time of the questionnaire. The pilot participants were not included in the final sample of the

study. The questionnaire took around 15-25 minutes for participants to fill out. Validity and Reliability

A panel of seven experts in various nursing and healthcare related fields reviewed the questionnaire to determine the appropriateness, comprehensiveness, clarity and relevance of the items in the questionnaire with respect to the assessment of mothers' knowledge about post-discharge care of preterm infants. The opinions and suggestions given in their comments were taken into account in the finalization of the questionnaire before the data collection.

Also, Cronbach's alpha coefficient was used to measure the internal consistency of the questionnaire. The internal consistency of the knowledge domain was good as per the Cronbach's alpha coefficient, which was 0.82.

2.4 Statistical analysis

Frequencies, percentages, means and standard deviations were used to summarize the participant characteristics and knowledge responses. The overall knowledge categories were reported as per the study classification table and the item-level responses were analyzed descriptively to see if there were stronger and weaker care domains.

3. Results

3.1 Participant characteristics

100 mothers took part in this study. The largest age group was 26–32 years (32.0%). Majority of the participants resided in rural areas (60.0%), 65.0% had a good economic status, 27.0% were illiterate and 56.0% were self-employed/free work. The sociodemographic characteristics are summarized in Table 1.

Table 1.

Characteristic	Category	n	%
Age	19–25 years	12	12.0
	26–32 years	32	32.0
	33–39 years	26	26.0
	40–46 years	16	16.0
	≥47 years	14	14.0
Economic status	Sufficient	65	65.0
	Semi-sufficient	29	29.0
	Insufficient	6	6.0
Residence	Urban	40	40.0
	Rural	60	60.0
Education	Unable to read and write	27	27.0
	Able to read and write	23	23.0
	Primary school	19	19.0
	Secondary school	23	23.0
	Bachelor's degree or higher	8	8.0
Occupation	Employee	44	44.0
	Free work	56	56.0

3.2 Infant and family characteristics

The infant and family data available showed that 47.0% of mothers had 4–6 children and second birth order among the mothers had the highest proportion (30.0%). The other characteristics are given in Table 2.

Table 2. Infant and family characteristics selected were those reported in the source data set

Variable	Category	n	%
Number of children	1–3	23	23.0
	4–6	47	47.0
	7–9	30	30.0
Source variable labelled “premature”*	No find	39	39.0
	1–3	20	20.0
	4–5	41	41.0
Reported gestational duration	9 months	81	81.0
	<9 months	13	13.0
	>9 months	6	6.0
NICU admission duration	1–6 days	10	10.0
	7–12 days	15	15.0
	13–18 days	50	50.0
	19–24 days	18	18.0
	Source row labelled 1–6 days	7	7.0
Birth order	First	27	27.0
	Second	30	30.0
	Third	22	22.0
	Fourth	12	12.0
	Fifth	6	6.0
	Sixth	2	2.0
	Seventh	1	1.0

3.3 Overall maternal knowledge

Overall maternal knowledge was predominantly low. Of the 100 mothers, 67 (67.0%) were classified as having low knowledge, 21 (21.0%) as moderate, and 12 (12.0%) as high knowledge of post-discharge care for preterm infants (Table 3).

Table 3. Overall maternal knowledge classification for preterm-infant discharge care (N=100)

Knowledge level	n	%
Low	67	67.0
Moderate	21	21.0

Knowledge level	n	%
High	12	12.0
Total	100	100.0

3.4 Item-level knowledge

A significant heterogeneity was found in the item level responses. High mean scores were observed for maintaining warmth, vaccination, clinical assessment of the consequences of severe jaundice, feeding-time routines, various statements relating to breastfeeding, iron/vitamin supplementation, positioning after feeding and regular monitoring of weight, and for the purpose of nasogastric feeding. Moderate scores were obtained for the following: information for mothers during hospital stay; statement regarding feeding intervals; physiologic measurement when the newborn was crying; and continued breastfeeding during jaundice. These results highlight strengths and gaps in the knowledge of these discharge-care areas and not necessarily overall high levels of knowledge.

Table 4. Item-level maternal knowledge responses across discharge-care areas

Knowledge item	Agree (%)	Mean	SD	Evaluation
Received information on preterm-infant care in hospital	40.4	2.101	0.839	Moderate
Maintaining body temperature contributes to weight gain	72.7	2.687	0.547	High
Feeding interval is 2–3 hours daily	11.1	1.828	0.607	Moderate
Vaccinations are essential for protection from disease	82.8	2.747	0.595	High
Jaundice requires clinical assessment and may require blood tests	91.9	2.879	0.435	High
Severe untreated jaundice can cause brain damage	82.8	2.788	0.500	High
Home warmth and appropriate clothing are essential	87.9	2.798	0.571	High
Wake the baby at feeding time	91.9	2.889	0.401	High
Breast milk is digested faster than formula	87.9	2.828	0.496	High
Avoid measuring pulse/respiratory rate while newborn is crying	40.4	2.101	0.839	Moderate
Colostrum helps reduce infections and jaundice	72.7	2.687	0.547	High
Most newborns with jaundice can continue breastfeeding	11.1	1.828	0.607	Moderate
Breastfed preterm infants may need iron/vitamin supplements	82.8	2.747	0.595	High
Breastfeeding helps protect against infections and other conditions	91.9	2.879	0.435	High

Knowledge item	Agree (%)	Mean	SD	Evaluation
Keep newborn upright 20–30 minutes after feeding	82.8	2.788	0.500	High
Most newborn breastfeeding sessions last 20–45 minutes	87.9	2.798	0.571	High
Regular weight measurement is necessary	91.9	2.889	0.401	High
Primary purpose of nasogastric tube is feeding	87.9	2.828	0.496	High

4. Discussion

The key finding was that 67.0% of mothers had low overall knowledge of post-discharge care for preterm babies while only 12.0% had high knowledge. This pattern is indicative of an important learning need in the hospital to home transition process. In previous studies, inadequate maternal knowledge of the care of preterm infants at discharge was also found and the importance of planned transfer of health information before and after discharge was highlighted [12]. Literature also shows that preparing for discharge from the NICU is a continuous process that includes information, care skills, psychosocial support and continuity of services [8], [9].

The findings itemized were additional details to the classification. Thermal care, vaccination, jaundice assessment, feeding time routines, some feeding items, supplementation, post-feeding positioning, and weight monitoring were the areas where mothers had relatively higher scores. There were a few gaps in selected feeding and monitoring items and reported information received in hospital. Consistent with this, previous studies indicate that there is a multi-dimensional nature of post-discharge preparedness, which can be different across home-care tasks [8], [9], [12], [14], [15]. A single overall knowledge score may thus not be the most appropriate way to support discharge education; rather, it could be domain-specific assessment.

Importance of clinical implications because safe preterm infant discharge depends on both knowledge and skills of the caregiver. A recent systematic review of parenting education programmes in the NICU revealed that educational content, programme structure and delivery, and parental needs were identified as important elements of discharge preparation [8]. A subsequent systematic review and meta-synthesis also identified psychological and social support, information and skills support, and continuity of services and resources as significant parental needs for 2025 [9], [16]. The findings are consistent with the use of structured, individualized discharge education, as opposed to verbal instruction only, that incorporates demonstration, supervised practice, and follow-up.

The educational approach should be based on literacy and social context. Here 27.0% of mothers could not read and write, whilst 60.0% resided in rural areas. These don't necessarily mean that one has poor knowledge, but they may impact on access to and use of discharge information. Therefore, pictorial materials, simple spoken language, teach-back, demonstration and return-demonstration, and telephone or clinic follow-up can be considered as appropriate strategies [8], [9].

5. Conclusion

To conclude, the overall knowledge of maternal care after delivery of the preterm infant was mostly low (67.0 %), moderate (21.0 %) and high (12.0 %). Not all knowledge was equally distributed in areas of care. Mothers showed greater responses towards thermal care, vaccination, jaundice assessment, some breastfeeding-related items,

supplementation, post feeding positioning and weight monitoring, gaps of which occurred in some feeding and monitoring items and in reported receipt of hospital information.

These findings provide the rationale for structured nurse-led, literacy-informed discharge education with demonstration, teach back, and post-discharge follow up.

5.1 Recommendations

- a. Develop a uniform nurse-led discharge education program for mothers of preterm babies.
- b. Employ basic Arabic and pictorial resources especially for the mothers who cannot read and write.
- c. Use demonstration, return-demonstration, and teach-back to ensure skill mastery.
- d. Set up post-discharge telephone or clinic follow-up, especially for those with geographic and/or access barriers.
- e. Carry out larger multicenter trials and test knowledge instrument and scoring system prior to wider generalisation.

5.2 Nursing implications

- a. Use a standardised checklist to assess preterm infant discharge which addresses feeding, breastfeeding, thermoregulation, hygiene, jaundice, supplements/medications, safe sleep, danger signs, immunisation, growth monitoring and follow up.
- b. Verify comprehension and skill by teach-back, demonstration, rather than verbal instructions.
- c. Ensure mothers who don't read or write in Arabic are given pictorial discharge materials and the important messages are reinforced in simple spoken Arabic.
- d. Start discharge education as early as during hospital stay and provide it through a range of interactions, adjusting to the gaps in knowledge that are identified for each mother.
- e. Have a follow-up plan for telephone or clinic after discharge especially for families with access or geographic barriers.

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