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The Effect of Phone Counseling for Mothers of Premature Infants Discharged from the Hospital on Infants' Readmission

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Abstract

Background

Despite the progress made in the care transition program from the hospital to home with an emphasis on telephone counseling, an effective and safe care transition process has not been provided to patients and their families. The aim of this study was to investigate The Effect of Phone Counseling for Mothers of Premature Infants Discharged from the Hospital on Infants' Readmission**.**

Materials and Methods

In this quasi experimental study, 100 mothers of premature infants were selected using convenient sampling and randomly assigned to two intervention and control groups. A demographic data questionnaire and the check list of the causes and readmission rate of premature infants were used for data collection. In the intervention group, after the discharge of premature infants, three phone calls in a week in the first four weeks, and two phone calls a week in weeks five to six were made via the landline and mobile phone for providing necessary education to mothers regarding the provision of care to infants. The communication time varied between 10 and 15 minutes in each phone call. Lastly, the rate of hospital readmission of the infants 4 weeks, 6 weeks, and 12 weeks after the intervention were assessed by phone. Telephone communication to the mothers in the control group was performed for raising their awareness of the causes and rate of hospital readmission in the neonatal intensive care unit (NICU).

Results: Each group (case and control groups) was consisted of 50 Mothers of Premature Infants and no statistically significant difference was reported between the two groups in terms of the mean age mothers, infant age, and birth weight when discharging from the hospital and hospitalization time. The rate of hospital readmission in the intervention group 4 weeks (P=0.004), six weeks (P=0.005) and 12 weeks (P=0.006) after the intervention was significantly lower than the control group.

Conclusion

Telephone consultations are an affordable way for engaging and supporting the mothers of premature infants. More study is warranted to determine if these results can be applied to multiple sites and in more diverse populations, as well as if this intervention can reduce infants' Readmission.

Key Words: Children, Phone counseling, Pre-mature infant, Readmission.

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1- INTRODUCTION

Premature and low birth weight infants are at the high risk for health-related problems. They may experience social, emotional and psychological problems due to their physiological problems. They require appropriate care for survival and natural growth and development (1). The World Health Organization (WHO) defined preterm birth as infant's birth before the 37th week after the first day of the last menstrual period (2). Despite the improvement of our knowledge of the causes for premature birth and appropriate medical interventions to prevent preterm birth, the incidence of preterm birth is increasing across the globe (3).

According to statistics published in 2010, more than one out of every ten births worldwide is preterm birth. It is estimated that 15 million cases of preterm birth occur each year in the world. It has been reported that 5 to 12 percent of total pregnancies in Western countries are preterm birth (4). Studies conducted in Iran showed that the reason for 31-50 percent of mortality among Iranian infants is prematurity (5, 6).

Premature infants are more susceptible to the problems and complications of prematurity including chronic lung diseases, respiratory distress syndrome, intraventricular cerebral hemorrhage (7), neurological disorders and defects such as seizures, low blood sugar and calcium, fibroplasia in the back of the eyeball, retinal damage, jaundice and brain damage caused by the deposition of bilirubin, neonatal infections and diarrhea associated with intestinal cell death. These are the main causes for the hospitalization of premature infants (8). Readmission to the hospital is a main indicator of morbidity among premature infants. The reduction of gestational age at birth has increased the rate of re-hospitalization of premature infants in the first year of life. Therefore, the rate of infants' re-hospitalization who is born at the 35th week of gestational age is 13 percent. It is also 31 percent among infants who are born in the 25th week of gestational age or less (9). Over 50 percent of preterm infants are hospitalized or re-hospitalized due to chronic lung diseases in the first or second year of life (10). Also, premature infants due to the nature of birth and repeated hospitalizations are at the risk for impairment and disability including sensory and motor impairment, learning difficulties and behavioral and social problems in long-term (3). In a study by Escobar et al., 1,250 premature infants who were born between 30 and 34 weeks were studied. The readmission of infants three months after discharge was 11.3 per 1,000 live births, which was much higher than full-term infants (11). Frequent hospitalizations impose economic, mental and physical pressures to the family and healthcare system. It has been reported that the cost of caring for a premature infant was 51,600 $ in the USA (12).

Following the hospitalization of premature infants in the neonatal intensive care unit (NICU), parents experience severe stress particularly due to the separation from the baby and inability to provide appropriate care to the infant. Such stress can have a significant impact on the infant-mother attachment (13). On the other hand, a longer duration of infant hospitalization in the hospital limits the number of available hospital beds for new admissions and requires the early discharge of other infants (14). The early discharge of infants who are not yet ready to leave the hospital imposes more pressures for post-discharge care on the family and society, which also may increase the rate of readmissions (15).

On the other hand, with increasing the survival rate of premature infants, they are discharged from the hospital and require follow up care. Therefore, they are often suffering from complications, which the management of these complications at home requires nurses to provide parents with appropriate knowledge and skill for

infant care (16). Therefore, comprehensive education and support for parents are needed for the provision of care to premature infants at home (17). At home, the responsibilities for the provisos of care are given to parents. If they do not have the necessary knowledge and skills, they are unable to take care of the infant (18). One of the best and most effective methods for the prevention of infant readmissions is the improvement of parents' knowledge by nurses and engaging them especially mothers in the process of care to premature infants (19).

This promotes parents' abilities to help with the growth and development of their infant during hospitalization and after discharge, and reduces the readmission rate. As a model of family-centered nursing care, the involvement of parents especially mothers in the care process as the primary caregivers of children is recommended (20). For instance, telephone counseling is used with the purpose of the provision of health care. By definition, tele nursing refers to the use of the telecommunications technology in nursing for enhancing patient care, which includes the use of electromagnetic channels to transmit voice, data and video signals (21). Also, phone tracking is one of the most appropriate means for providing education, managing signs and symptoms, early diagnosis of complications and problems, and ensuring the quality of health care services delivered after discharge from the hospital (22).

Unlike sending messages and the other means of written procedures, telephone tracking does not require the individual to read and write. Therefore, time is saved and distance learning occurs, because the patient does not need to travel long distances especially when living in rural areas. It reduces treatment costs and nurses' workload. In addition, the frequency of emergency department's visits and readmissions are reduced, and the quality of patient's lives is increased due to a possibility of access to critical healthcare information via the phone (23). Despite the progress made in the care transition program from hospital to home (such as telephone follow-up), the process of safe and efficient care transition is faced with many challenges (24). Two systematic review studies showed that telephone follow-ups in patients with chronic heart failure reduced the number of hospitalizations, duration of hospitalization and mortality rate (25, 26).

On the other hand, two prospective studies showed that the telephone follow-up and telehealth intervention follow-up did not significantly decrease all causes for mortality (27). It should be noted that nurses play an important role in maternal preparation for discharge and days after discharge. Due to a lack of telephone follow-up studies on the readmission of preterm infants and contradictory results, this study aimed to investigate the effect of phone counseling by a nurse to the mothers of premature infants discharged from the hospital on infants' readmission.

2- MATERIALS AND METHODS

2-1. Study Design and population

This was a randomized clinical trial. A convenient method was used for data collection using inclusion criteria. The samples were randomly assigned to the intervention (n=50), and control (n=50) groups. The sample size was estimated to be 50 individuals in each group using the following statistical formula:

$$n = \frac{(z1+Z2)^2[P1(1-P1)+P2(1-P2)]}{(P1-P2)^2}.$$

The criteria for the above-mentioned formula were 95% confidence level (Z_1), 80% power (Z_2) and 84% beta. P_1 and P_2 were the estimates of infants' hospital readmission in the intervention and control groups, respectively, which were reported

23% and 4%, respectively. The inclusion criteria for the selection of mothers and infants were as follow:

* Prematurity defined as gestational age between the 30th and 36th weeks of pregnancy;

* Infant hospitalization in the neonatal intensive care unit (NICU) and childcare department;

* Critical illnesses such as intraventricular hemorrhage, intestinal necrosis so on;

* The Apgar score below 7 and cardiopulmonary arrest in the birth time and not undergoing mechanical ventilator;

* Admission to the hospital for the first time;

* Absence of the mother's physical and mental that makes her inevitably dependent on the care by a third party;

* Nulliparous mothers, the ability to speak Farsi, having the ability to take care of the infant.

Exclusion criteria were infant death, a lack of access to parents especially the mother of the infant, unwillingness to continue research and infants' suffering from other diseases.

2-2. Measurement tools

Data collection tools were the demographic information questionnaire designed in two sections. First section was the demographic characteristics of premature infants discharged from the NICU and the demographic characteristics of mothers having premature infants. Second section was the questionnaire of the causes and rate of infant hospital readmission 4, 6 and 12 weeks after the intervention (discharge from the hospital). The questionnaire reliability was assessed using the test-retest method and the calculation of the Cronbach's alpha coefficient (reported as 0.085).

2-3. Intervention

In the intervention group, the nurse obtained phone numbers from the mothers of premature infants and their permissions to be contacted by the researcher (M). Three phone calls in a week in the first four weeks, and two phone calls a week in weeks five to six were made via the landline and mobile phone for providing necessary education to mothers regarding maternal and child fellow up care, massage therapy, bathing, changing nappies for the prevention of infant's foot burning), breastfeeding and supplementary feeding, removing the infant's burp, baby feeding such as adequate nutrition, giving the supplement drops (multivitamins, iron), drugging the infant, body temperature monitoring, laying the baby in the right way, awareness of infant vaccination, infant development tasks, prevention of infections, infant's jaundice care, diarrhea and vomiting care, fever care, care during respiratory infections, ear infection, drug use and awareness of warning signs.

If they had any question, they could contact the nurse. During the intervention, in each phone call to the mother, they were taught gradually. In this way, 10 educational topics were taught to them during the first 2 weeks. In the next phone calls, educational materials were reminded and answers were provided to their questions. The duration of phone calls was 10-15 minutes. Lastly, the rate of hospital readmission of the infants 4 weeks, 6 weeks, and 12 weeks after the intervention were assessed by telephone. Telephone communication to the mothers in the control group was performed for raising their awareness of the causes and rate of hospital readmission in the NICU.

2-4. Data analysis

Descriptive (mean and standard deviation) and inferential statistics (Chi-square, t-test, and Mann-Whitney test) was conducted via the SPSS version 20.0 software. Independent t-test was used to compare the mean age of the mothers, infant's age, birth weight when discharging, and hospitalization time in the groups.

Chi-square test was used to compare the frequency of sex variables, delivery method, causes of Preterm birth causes, Causes for neonatal hospitalization and the type of feeding and infant hospital readmission rate.

2-5. Ethical considerations

This study was approved by the Ethics Committee affiliated with Azad University, Khorasgan Branch (ETHIC CODE: IR.MUI.REC.1395.4.31). The aim of the study and confidentiality of the collected data were explained to the mothers. Written and informed consents were taken from those mothers who agreed to participate in the study. To ensure the anonymity of the mothers a number was given to each person for their identity.

3- RESULTS

Each group was consisted of 50 Mothers of Premature Infants in each group. No statistically significant difference was reported between the two groups in terms of the mean age mothers (P = 0.29), infant age (P = 0.62), birth weight when discharging from the hospital (P = 0.63) and hospitalization time (P = 0.96) (**Table.1**).

According to **Table.2**, the infant gender, method of childbirth and cause for preterm labor had no statistically significant differences between the groups. Before the telephone consultation, the cause for hospitalization and the type of infant feeding had no statistically significant differences between the groups (**Table.3**).

The rates of infant's hospital readmission 4 weeks (P=0.004) and 6 weeks after the intervention (P = 0.005) were significantly lower in the intervention group compared with the control group. Also, in the third month after the intervention, the rate of readmission in the intervention group was significantly lower than the control group (P = 0.006) (**Table.4**).

Table-1: The mean age of the mothers, infant's age, birth weight when discharging, and hospitalization time in the groups

Variables	Intervention		Control		Independent t-test	
	Mean	SD	Mean	SD	t-test	P- value
Mother's age (year)	28.5	5.4	29.6	5.3	1.07	0.29
Infant's age, (week)	33.8	1.3	33.7	1.8	0.50	0.62
Infant weight when discharging from the hospital, (gram)	1699.6	436.6	1654.7	488.7	0.48	0.63
Length of hospitalization, (days)	5.6	1.8	5.7	1.9	0.05	0.96

No statistically significant difference was reported between the two groups in terms of the mean age mothers, infant age, and birth weight when discharging from the hospital and hospitalization time.

Table-2: The demographic information in the intervention and control groups

Variables		Intervention		Control		Chi-square test	
		Number	Percent	Number	Percent	χ^2	P- value
Baby gender	Male	22	44	19	38	0.37	0.54
	Female	28	56	31	62		
Method of childbirth	Natural	13	26	17	34	0.76	0.38
	Caesarian section	37	74	33	66		
Preterm birth cause	Placental Avulsion	6	12	12	24	16	0.40
	Cervix failure	6	12	4	8		
	Infection	6	12	3	6		
	Rupture of fetal curtains	20	40	24	48		
	Hypertension	5	10	3	6		
	Unknown	7	14	4	8		

According to Table.2, the infant gender, method of childbirth and cause for preterm labor had no statistically significant differences between the groups.

Table-3: Causes for neonatal hospitalization and the type of feeding in the groups

Variables		Intervention		Control		Chi-square test	
		Number	Percent	Number	Percent	χ^2	P value
Cause for hospitalization	Respiratory problem	20	40	18	36	0.76	0.94
	Jaundice	12	24	10	20		
	Poor nutrition	11	22	14	28		
	Infection	4	8	5	10		
	Gastrointestinal problem	3	6	3	6		
Infant feeding	Breast milk	34	68	33	66	0.86	0.29
	Dry milk	11	22	13	26		
	Formula	5	10	4	8		

Before and after the telephone consultation, the cause for hospitalization and the type of infant feeding had no statistically significant differences between the groups.

Table-4: The infant hospital readmission rate after the intervention in the groups

Time after the intervention	Intervention		Control		Statistical test	
	Number	Percent	Number	Percent	χ^2	P- value
4 weeks after the intervention	12	24	26	52	8.32	0.004
6 weeks after the intervention	4	8	14	30	7.86	0.005
12 weeks after the intervention	0	0	7	14	-	0.006

The rates of infant's hospital readmission 4 weeks (P = 0.004) and 6 weeks after the intervention (P = 0.005) were significantly lower in the intervention group compared with the control group. Also, in the third month after the intervention, the rate of readmission in the intervention group was significantly lower than the control group (P = 0.006).

Table-5: Causes for readmission in after the intervention in the groups

Time after the intervention	Causes	Intervention		Control	
		Number	Percent	Number	Percent
4 weeks after the intervention	Respiratory distress	6	50	16	61.5
	Hypoxia	2	16.7	2	7.7
	Infection	2	16.7	5	19.3
	Jaundice	2	16.7	3	11.5
6 weeks after the intervention	Diarrhea	2	50	7	50
	Infection	2	50	7	50
12 weeks after the intervention	Infection	0	0	7	100

4- DISCUSSION

The results of this study indicated that phone counseling to the mothers with premature infants by the nurse reduced infants' readmission. Therefore, readmission 4 and 6 weeks after telephone counseling in the intervention group were 24 and 8 percent, respectively. It showed the positive effects of telephone counseling on the reduction of readmission. Also, the readmission rate at the end of the third month was zero percent. However, the readmission rate in the control group at the end of the fourth and sixth week was 52 and 30 percent, respectively. Also, this rate was 14 percent at the end of the third month.

The results also showed that the readmission rate 4 and 6 weeks after the intervention was decreased significantly compared to the control group. In line with our results, Erdeve et al., found that telephone counseling to mothers and their involvement in infant care reduced infants' readmission and visits to doctors in the intervention group (28). Also, Dehkordi et al. (2013) showed that telephone counseling significantly correlated with the higher duration of mothers' exclusive breastfeeding in the intervention group (29). Also, Miller and Bapr's study (2015) study on effect of the telephone follow-up process in patients at the risk for readmission showed that the readmission rate in the first 7 days after discharge was significantly lower ($P \leq 0.05$). Also, the readmission rate 30 days after discharge was lower (24). Dwinngr et al. (2013) conducted a study in Hamburg with the aim of promoting health through phone conversations among patients with chronic diseases. They showed that the patients' readmission rate and depression were decreased and the quality of life was enhanced (30). Black et al. (2014) in California studied telephone interventions by nurses and patients for remote monitoring that reduced the readmission of 1,500 patients for heart failure.

It showed that the rate of readmission following a phone call was dropped (31). In addition, the results of Biese et al. (2014) with the aim of studying the effects of telephone follow-up on the acceptation of the care plan among older people over 65 years discharged from hospital emergency departments in the USA showed that the intervention group was more likely to have outpatient visits with medical healthcare providers five days after emergency department visits compared to other groups (32). The study of Ortenstrand et al. (2010) also measured the effect of parental involvement in the preterm infant care on the duration of hospitalization and morbidity. They observed that parental involvement and

presence had a strong influence on the hospitalization length in the majority of preterm infants. Therefore, the readmission rate of these infants was reduced by an average of five days. It was also found that parental involvement could have a direct impact on infants' stability and morbidity (33). This study also found that the mothers often had questions regarding how to care for premature infants requiring rapid interventions after discharge from the hospital.

Lastly, it should be noted that due to a lack of consultant nurses in the hospital this new role for nurses in hospitals is described as nurses can apply their education role in follow-up care after discharge. On the other hand, a telephone consultation can be done even to replace the traditional methods of patient counseling. Patients can communicate and solve their problems without stress, and too much cost and time due to far distance.

4-1. Limitations of the study

As the limitation of this study, it was conducted only in one hospital. Therefore, the generalizability of the findings needs caution and more studies. Another limitation was the small sample size. Therefore a larger sample sizes should be considered in future studies.

5- CONCLUSION

The care transitions program using telephone consultations is an affordable way for engaging and supporting the mothers of premature infants. Telephone consultations improve mothers' understandings of follow-up care after discharge from the hospital. More study is warranted to determine if these results can be applied to multiple sites and in more diverse populations, as well as if this intervention can reduce return visits to the hospital and/or infants' readmission.

6- CONFLICT OF INTEREST: None.

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