Missed Care in Neonatal Intensive Care Unit: Effect of Eletronic Reminders

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Abstract

Background: Missed nursing care is a newly defined concept and refers to any aspect of required patient care that is omitted or delayed. This study aimed to determine the effectiveness of electronic reminders on missed care in NICU.

Methods: This is a two groups (before and after) quasi experimental study. A random sampling technique was employed to collect a sample of 70 nurses among two NICUs in an educational hospital in the south east of Iran. Miss care questionnaire was used to determine Missed care before, immediate, and one month after the intervention. The study intervention includes sending electronic reminders regarding nursing care of NICU hospitalized neonate. Data were analyzed using $SPSS_{20}$ software, descriptive (frequency, percentage, mean, and standard deviation), and analytical statistics. The level of significance was considered as 0.05.

Results: The results showed that the mean score of missed care was decreased after intervention in the intervention group (6.74±8.47) rather than the control group (18.57±14.59) (P=0.001). The highest and the lowest mean score of missed care before and after the intervention was in general care and oxygen therapy domains in both groups. The second time intervention was one month after did not show any significant differences in the two groups. But decreasing in missed care was shown in both groups.

Conclusion: using information technologies like whatsApp is an easy, low cost and available method which could help nurses decrease missed nursing care.

Introduction

Nurses are the largest group of health care providers and play several roles, the most important of which is to provide quality care to patients (1) including treating patients, protecting their safety, promoting health, preventing diseases and injuries, and reducing their pain and suffering.

One of the important goals of nursing care in neonatal intensive care units is to implement holistic care with the best possible outcomes. Infants are admitted to neonatal intensive care units for a variety of reasons. Currently, the infant mortality rate is one of the most important indicators in assessing community and public health. Due to the high sensitivity of infants in terms of care, the neonatal intensive care unit is one of the most sensitive units in providing professional care. Therefore, addressing neonatal care and health is an important health issue(2).

Care behaviors in intensive care units include all care services related to patient life. Nurses are the most important people affecting the health of infants admitted to neonatal intensive care units (3). According to the WHO report (2018), every year tens of millions of patients around the world suffer irreparable harm or death due to receiving unsafe health care. Approximately, one in ten hospitalized patients is harmed (4).

One of the concepts that has received a lot of attention in the health care system in recent years is the concept of missed nursing care referring to the care part of which has either been eliminated or delayed (5). The phenomenon of missed nursing care was first introduced by Kalisch (2006). In a study, he reported nine different activities that were sometimes missed by nurses including ambulation, turning, delayed or missed feedings, patient education, discharge planning, emotional support, hygiene, intake and output documentation, and surveillance (6).

Researchers believe that missed nursing care affects the quality of care and patient care outcomes. Therefore, missed care is a kind of medical malpractice that the health systems of many countries face and try to minimize and reduce the damage caused by it (7, 8).

Missed care can have consequences such as increasing the length of hospital stay, reducing patient satisfaction and safety, lowering the hospital's credibility for patients, skin problems, and medication errors (1, 9).

Numerous studies have reported the occurrence of neglected care in different countries (7). For instance, Lake et al. (2018) reported that 36% of nurses in the United States forgot one or more care activities at the end of the shift. The most common missed care included providing patient comfort, counseling, and parental education(10). Hessel et al. (2015) reported 10 to 27% of neglected care in their study, and Blackman et al. reported a rate of 34% in the same year (5, 11). Kalisch et al. (2013) found that pressure ulcers, medication errors, new infections, emptying of the serum solution container, leakage of fluid from a vein, and other problems during hospitalization were some cases of neglected care reported by patients (12).

The professional competence of nurses plays an important role in fulfilling the mission of the health system. Therefore, the level of their professional competence and care is one of the concerns of health systems and health care authorities in different countries (13). Improving the quality of service delivery leads to increased productivity, reduced costs, and, consequently, increased patient satisfaction (14). A study by Nasiripour et al. (2016) showed that paying attention to the dimensions of quality improvement and patient safety standards in hospitals can improve the level of hospital performance indicators (15). Besides, identifying neglected care provides the nursing management system with useful information for quality and safe care (16).

Missing care can be prevented in several ways. One solution is the use of technology in the health system. Accordingly, Piscotty et al. (2014, 2015) showed that the use of electronic reminders is an effective intervention for reducing missed nursing care in various wards (17, 18). It should be noted that these studies have not been performed in neonatal intensive care units. Since the care of infants, especially infants admitted to the intensive care unit is very important and no study on neonatal care was found in Iran, the present study investigates the effect of electrical reminders on reducing neglected care among nurses working in the neonatal intensive care units in a hospital in southeastern Iran.

Methods

The study design and setting

This interventional study was conducted on two groups of nurses working in the neonatal intensive care units I and II of Afzalipour Hospital in southeastern Iran. Afzalipour Hospital in Kerman has the first and largest NICU in southeastern Iran, with a hospitalization capacity of 60 infants. The NICUs were selected as the study setting and the nurses working in these NICUs as the participants in the study.

Sample size and sampling

This study was performed on 70 nurses who were working in two neonatal intensive care units. The nurses were selected using the census method and divided into two intervention and control groups through coin flipping and 35 nurses were placed in each group. The inclusion criteria were having at least one month of clinical experience in the neonatal intensive care unit, willingness to participate in the study, and having a bachelor's degree or higher. The exclusion criteria were not receiving feedback from the nurse in the intervention group in more than three reminders, not completing the intervention, or non-completion of the questionnaire by the nurse at each stage of distribution.

Measurement

The data were collected through the demographic and professional information form and the Missed Nursing Care Survey.

The demographic and professional data included the participants’ age, sex, marital status, education, service records, clinical experience in the NICU, shift working, position, type of employment, infant stay in the NICU, and the history of one of the family members' infants being admitted to the NICU.

The Missed Nursing Care Survey (neonatal version) was developed based on previous studies (Tubbs et al., 2015; Gathara et al., 2019) (17, 18). This scale contains 55 items in 5 subscales (general nursing care, intravenous fluid evaluation and intravenous therapies, oxygen therapy care, phototherapy care, and documentation). The items are scored using a 4-point Likert scale (1 = I rarely forget, 2 = Sometimes I forget, 3 = I often forget, and 4 = I always forget). The minimum and maximum scores on the scale are 55 and 220, respectively, and the highest mean score indicates the highest frequency of missed nursing care. The validity of the scale was assessed by 10 faculty members of Kerman University of Medical Sciences, nurses working in the intensive care unit, and other specialists reporting the good validity of the scale. Furthermore, the reliability of the scale was estimated using Cronbach's alpha coefficient and the corresponding value was reported as 0.96, indicating a strong correlation between the items in the scale.

The intervention and data collection

After obtaining all the necessary permits, the researcher referred to the research setting to implement the intervention. Given the low number of members of the population, all nurses working in the two NICUs

were selected as the participants by the census method. To minimize the possibility of contact between the members of the intervention and control groups, the nurses in each unit were randomly assigned to either the intervention or control group via coin-flipping. After receiving some explanations about the objectives of the study and before attending the intervention program, the participants in the intervention group completed the questionnaires. Before starting the intervention, the participants joined an online WhatsApp group. If any participant had not already installed the application on their mobile phones, the researcher installed the application for him/her. The members of the group were the researcher and nurses in the intervention group. The researcher provided some instructions in the form of text messages posted on the WhatsApp messenger based on the items in the Missed Nursing Care Survey for 30 days (one month). Accordingly, the nurses received reminders about missed nursing care in the neonatal intensive care unit via WhatsApp daily (see Table 1). The messages were in the morning and evening shifts (two messages each shift). All the reminders were sent to the nurses within fifteen days. Then, the questionnaires were re-administered to the participants in the intervention group. The reminders were sent again from the 16th to the 30th day. One month later, the questionnaire was completed again by the members of the intervention group.

Similarly, the participants in the control group completed the questionnaires before the study, immediately after the study, and one month later but they did not receive any intervention.

Table 1: The content of missed nursing care reminders

Day	The content of electronic reminders
1	1. I am present in daily rounds. 2. I do oral care for mechanically ventilated babies according to the existing protocol. 3. I bathe the baby according to the protocol or if necessary.
2	4. I start feeding when the baby shows signs of needing nutrition. 5. I do a comprehensive physical assessment of the baby according to the protocol. 6. I prescribe PRN drugs to the baby when needed according to the doctor's instructions. 7. I evaluate vital signs according to the protocol.
3	8. I do tests and take samples and submit them according to the instructions. 9. I prescribe the medication within 30 minutes according to the scheduled time. 10. I observe hand hygiene according to the protocol. 11. I take precautions to control the infection according to the protocol.
4	12. I routinely care for skin and wounds as a priority need. 13. I deliver nursing care between shifts. 14. I change the sheets.
5	15. I change diapers if needed. 16. I take care of the umbilical cord if necessary. 17. I check the condition of the endotracheal tube and nasal tube. 18. I check for emergency trolley medications at the beginning of the shift.
6	19. I communicate with parents. 20. I provide emotional support to parents/families as a moderately low priority. 21. I teach parents about the necessary care at home. 22. I involve parents in caring for the baby.
7	23. I provide supportive care for the baby's development (skin-to-skin contact and kangaroo mother care (KMC)). 24. I advise and support the mother to start and continue KMC. 25. I check the safety of bedside equipment once per shift or according to the protocol 26. I approve high-risk drugs according to the protocol.
8	27. I implement the safety protocol. 28. I respond to device alerts on time.

	29. I evaluate the pain according to the protocol.
9	30. I control pain using medication / supportive care methods. 31. I evaluate the effectiveness of the drugs within 30-60 minutes after administration or according to the existing protocol. 32. I re-evaluate the pain after taking the necessary measures. 33. I monitor and evaluate the entry point of the peripheral venous catheter according to the protocol.
10	34. I monitor and evaluate the entry point of the central venous catheter according to the protocol. 35. I control the intake/output every hour or according to the protocol. 36. I flush the catheter route before intravenous treatment. 37. I adjust oxygen.
11	38. I prescribe oxygen to the baby according to the protocol/doctor's instructions. 39. I check the condition of the endotracheal tube and nasal tube according to the protocol. 40. I clean the eyes and control them for infection 41. I change the eye pad for the baby under phototherapy.
12	42. I change the baby's position every two hours while undergoing phototherapy. 43. I evaluate the skin during phototherapy. 44. I examine the eyes for damage caused by phototherapy.
13	45. I review the clinical care performed. 46. I record other care taken. 47. I record vital signs. 48. I record the treatments performed.
14	49. I record the recommendations made in the round. 50. I record phototherapy. 51. I record a summary of the baby's nutrition. 52. I record the status of oxygen therapy.
15	53. I record the prescribed fluids. 54. I record the change of position of the baby. 55. I record the patient's safety process in the event of an error and forgetting of any care.

Since posting and reading messages by the nurses could be tracked through this social media, the researcher was able to check the messages viewed and read by the participants. Moreover, each nurse in the intervention group had to send a message to the researcher confirming that he/she had received and read the message. Furthermore, if a nurse was busy and missed any message, he/she could view and read it at a later time when he/she had the time to do so. The nurses could also read the messages several times if they wished so. The participants in the control group did not receive any electronic reminders. However, after the intervention, all instructions for missed nursing care were posted for them via a WhatsApp group.

Data analysis

The collected data were analyzed using SPSS software (version 20). Descriptive statistics (frequency, mean, percentage, and standard deviation) were used to describe the participants' demographic and professional characteristics and inferential statistics (Fisher's exact test, chi-square test, independent samples t-test, paired-samples t-test, analysis of covariance (ANCOVA), and repeated measures analysis of variance (ANOVA)) were used to analyze the missed nursing care data. All statistical procedures were performed at the significance level of 0.05.

Ethical considerations

The present study was conducted after obtaining the code IR.KMU.REC.1398.261 from the Ethics Committee of Kerman University of Medical Sciences and making arrangements with the officials of Afzalipour Hospital, Kerman. The objectives of the study were explained to the participants and informed written consent was obtained from them. The participants were told that they could leave the study at any time, and they were assured that all their data would be kept confidential.

Results

The analysis of the participants’ demographic characteristics before the intervention showed that the two groups had a statistically significant difference in terms of some variables such as marital status, service records, and the history of the hospitalization of one of the family members, and the two groups were not homogeneous (Table 2).

Table 2: The participants’ demographic characteristics

Variable		Groups				Test	P-value
		Control		Intervention			
		Frequency	%	Frequency	%		
Marital status	Single	6	17.1	14	40	Chi-square	0.03
	Married	29	82.9	21	60		
Work shift	Morning	0	0	1	2.9	Fisher	1
	Evening	1	2.9	1	2.9		
	Night	1	2.9	0	0		
	Rotating	33	94.3	33	94.3		
Employment	Project-based	3	8.6	9	25.7	Chi-square	0.145
	Corporate	8	22.9	8	22.9		
	Official	24	68.6	18	51.4		
The history of the participant's baby admitted to NICU	Yes	6	17.1	4	11.4	Chi-square	0.49
	No	29	82.9	31	88.6		
The history of the family members' baby admitted to NICU	Yes	6	17.1	16	45.7	Chi-square	0.01
	No	29	82.9	19	54.3		
Variable		SD	Mean	SD	Mean	Test	P-value
Age		89/6	06/33	7.51	33.09	Fisher	0.08
Nursing service records		82.78	113.83	89.57	91.74	Chi-square	0.02
NICU service records		37/82	87.37	76.99	67.66	Chi-square	0.15

The findings of the study concerning missed nursing care showed the highest scores for the subscales of missed nursing care before intervention for the participants in the intervention (9.69 ± 9.48) and the control group (16.77 ±13.32) were related to the general nursing care. Moreover, the lowest scores for the subscales of missed nursing care before intervention for the participants in the intervention (0.6 ± 1.3) and the control group (1.14 ±1.45) were related to oxygen therapy. The results of the independent samples t-test showed that there was a significant difference between the mean scores of all subscales of missed nursing care except oxygen therapy (P = 0.077) in the two groups before the intervention (P

<0.05) (Table 3). To control the effects of the pre-test scores, analysis of covariance (ANCOVA) was used for the pre-test scores that showed significant differences between the two groups.

Table 3: The descriptive statistics for pre-intervention missed nursing care among the NICU nurses in the two groups

Missed nursing care and its subscale (0-165)	Groups				Independent samples t-test
	Intervention		Control		
Subscales	Mean	SD	Mean	SD	
General nursing care	9.69	9.48	16.77	13.32	t = 2.56, df = 68, p = 0.013
Evaluation of intravenous fluids and intravenous therapies	0.80	1.05	2.25	2.44	t = 3.24, df = 68, p = 0.002
Oxygen therapy care	0.60	1.03	1.14	1.45	t = 1.79, df = 68, p = 0.07
Phototherapy care	71/1	2.10	3.68	3.13	t = 3.08, df = 68, p = 0.003
Documentation	02/2	2.75	3.71	3.51	t = 2.23, df = 68, p = 0.02
Missed nursing care score	82/14	14.73	27.51	22.16	t = 2.82, df = 68, p = 0.006

The results showed that the mean scores of missed nursing care for the participants in intervention and control groups were 6.47±8.47 and 18.57 ±14.59, showing a significant intergroup difference. Accordingly, the participants in the intervention group reported missed nursing care less frequently compared to the participants in the control group. The results also showed that sending messages for one month after the intervention had no significant impact on missed nursing care between the two groups. However, the frequency of missed nursing care in the control group was higher than that of the intervention group (Table 4).

Table 4: The descriptive statistics for post-intervention missed nursing care among the NICU nurses in the two groups

Missed nursing care and its subscale (0-165)	Groups						Test results
	Control		Intervention				
Subscales	Mean	SD	Mean	SD	Mean	SD	
General nursing care**	11.60	9.10	11/5	6.74	6.17	6.71	12.51, p = 0.001
Evaluation of intravenous fluids and intravenous therapies**	1.40	1.55	25/0	0.50	0.34	0.63	23.32, p = 0.001
Oxygen therapy care*	0.54	0.98	0.08	0.28	0.22	0.59	2.64, df = 68, p = 0.010
Phototherapy care**	2.20	0.39	0.71	1.22	0.71	1.40	8.64, p = 0.004
Documentation**	2.97	3.54	0.54	0.85	1.60	2.31	14.80, p = 0.001
Missed nursing care score**	18.57	14.59	6.74	8.47	9.05	10.09	18.91, p = 0.001

*: Independent samples t-test; **: ANCOVA

Discussion

Providing care in neonatal intensive care units is one of the most important and challenging tasks for nursing staff working in these units. Missing any care can have very bad consequences for the infant, family, and caregiver. Taking interventions to reduce missed nursing care can be a great help in reducing these consequences.

The findings of the present study showed that posting electronic reminders was effective in missed nursing care and all its subscales. After receiving electronic reminders via mobile and WhatsApp messenger during the intervention, the nurses' average missed nursing care score was lower compared to their pre-intervention scores. Similarly, Piscotty et al. (2014) showed that sending text messages was effective in reducing missed nursing care in the internal surgery ward and adult intensive care unit (17). Although the study was conducted in different wards, this finding was in line with the observations made in the present study. Studies by Piscotty et al. (2015) in the emergency department and intensive care unit

showed that the use of nursing care reminders as an effective intervention can reduce the frequency of missed nursing care (18, 19). All these three studies highlighted the positive effects of reminder messages on missed nursing care, as evident in the present study. The only difference was that none of the studies were conducted in the NICU. Other studies have examined the effect of electronic reminders in cases such as drug use and disease management. For instance, Kaunda et al. (2018) showed that texting was effective in the adherence of medical staff to case management strategies for malaria (20). Likewise, Ahmadi et al. (2019) found that sending reminder messages increased patient medication compliance (21).

Currently, using a mobile phone and receiving and sending text messages is an important part of people's lives, so that receiving a text message encourages the recipient to read or respond to it. Probably the nurses participating in the present study also read the text message and viewed the notes that were sent to them as reminders, and this decreased the frequency of reported missed nursing care after the intervention.

As indicated in the present study and other studies in the literature, the use of electronic reminders was effective in reducing missed nursing care. Given the ease of use of technology and the importance of performing all the necessary care for patients especially infants admitted to the intensive care unit, missed nursing care can be reduced by sending SMS reminders. Reducing the frequency of missed nursing care can lead to an increase in the quality of care for health care providers, manage care over time, and impose lower costs on the care system.

The findings of the present study showed that sending electronic reminders one month after the intervention did not show a significant decrease in the frequency of missed nursing care compared to before the study and immediately after the intervention. However, missed nursing care started to follow a downward trend. However, a review of the literature showed that no study assessed the effect of electronic reminders one month after the intervention. Nevertheless, Ravari et al. (2020) found that sending text messages to follow the medication regimen in patients with hypertension one, two, and three months after the intervention showed a significant difference (22). Besides, Varleta et al. (2017) found that adherence to taking medications six months after the intervention showed a significant difference in the intervention group compared to the control group (23). Contrary to the present study, these two studies indicated that sending messages were effective in taking medication after one month and six months. The reason for this discrepancy can be attributed to differences in the variables under study, different tools used, and different populations surveyed. Furthermore, the frequency of missed nursing care was undergoing a decline in the present study and the nurses were likely to be tired of receiving messages after a while, and work pressure and a large number of patients could affect the nurses' tendency to view and follow up reminder text messages. Making changes in the type and manner of sending text messages may attract the attention of nurses and encourage them to continue the declining trend of missed nursing care.

It should be noted that there is no much information available about the use of electronic reminders and their impact on missed nursing care in neonatal intensive care units. The insights from this study can add to the body of the literature in this field. Moreover, nursing managers in neonatal intensive care units can reduce the frequency of missed nursing care by spending less money and using electronic reminders.

One of the most important limitations of this study was the nurses' huge workload and lack of time to complete the questionnaire, which could lower their accuracy in completing the questionnaire. Besides, only a self-report questionnaire was used in this study to collect the data, while observations or qualitative methods of data collection could provide more accurate results.

Conclusion

Care is an important issue in neonatal intensive care units and missed nursing care can reduce the health of infants and their families. The present study showed that sending electronic reminders had a significant effect on reducing missed nursing care. Therefore, reminder messages can be used as an easy, low-cost, and accessible method to increase patient safety and also help nurses to provide neonatal care more effectively since care is the core and main goal of the nursing profession.

Declarations

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Ethics approval and consent to participate

The present study was conducted after obtaining the code IR.KMU.REC.1398.261 from the Ethics Committee of Kerman University of Medical Sciences”. All experimental protocols were approved by the Ethics Committee of Kerman University of Medical Sciences. **The study was conducted in accordance with relevant guidelines from** Ethics Committee of Kerman University of Medical Sciences

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

The author FB wrote the study proposal, performed the intervention, and wrote the study discussion. The author BB supervised all steps of the study and intervention, and wrote the article. The author MAF Collaborated in writing the initial proposal, supervised all stages of the study, and provided advice at each stage. The author MN and BK provided advice at different stages of the study and read the final version of the article and commented on it.

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References

1. Lake ET, Germack HD, Viscardi MK. Missed nursing care is linked to patient satisfaction: a cross-sectional study of US hospitals. BMJ Qual Saf. 2016;25(7):535-43.
2. Babaei H, Dehghan M. Study of Causes of Neonatal Mortality and its Related Factors in the Neonatal Intensive Care Unit of Imam Reza Hospital in Kermanshah, Iran during (2014-2016). International Journal of Pediatrics. 2018;6(5):7641-9.
3. Lam J, Spence K, Halliday R. Parents' perception of nursing support in the neonatal intensive care unit (NICU). Neonatal Paediatric and Child Health Nursing. 2007;10(3):19.
4. Organization WH. WHO medicines strategy 2004-2007: countries at the core. World Health Organization; 2004.
5. Hessels AJ, Flynn L, Cimiotti JP, Cadmus E, Gershon RR. The impact of the nursing practice environment on missed nursing care. Clinical nursing studies. 2015;3(4):60.
6. Kalisch BJ. Missed nursing care: a qualitative study. Journal of nursing care quality. 2006;21(4):306-13.
7. John ME, Mgbekem MA, Nsemo AD, Maxwell GI. Missed Nursing Care, Patient Outcomes and Care Outcomes in Selected Hospitals in Southern Nigeria. Nuring and Healthcare. 2016;1(2):1-5.

8. Güneş ÜY, Gürlek Ö, Sönmez M. A survey of the patient safety culture of hospital nurses in Turkey. Collegian. 2016;23(2):225-32.
9. Ball J, Griffiths P, Target S. Missed nursing care: a key measure for patient safety. Agency for Healthcare Research and Quality, PSNet. 2018:1-5.
10. Lake ET, Staiger DO, Cramer E, Hatfield LA, Smith JG, Kalisch BJ, et al. Association of Patient Acuity and Missed Nursing Care in U.S. Neonatal Intensive Care Units. Medical Care Research and Review. 2018;77(5):451-60.
11. Blackman I, Henderson J, Willis E, Hamilton P, Toffoli L, Verrall C, et al. Factors influencing why nursing care is missed. Journal of clinical nursing. 2015;24(1-2):47-56.
12. Kalisch BJ, Xie B, Dabney BW. Patient-reported missed nursing care correlated with adverse events. American Journal of Medical Quality. 2014;29(5):415-22.
13. Organization WH. Strengthening nursing and midwifery in the Eastern Mediterranean Region: a framework for action 2016-2025. World Health Organization. Regional Office for the Eastern Mediterranean; 2016.
14. Wang KY, Chou CC, Lai JCY. A structural model of total quality management, work values, job satisfaction and patient-safety-culture attitude among nurses. Journal of nursing management. 2019;27(2):225-32.
15. Nasiripour AA, Jafari S. The relationship of quality improvement and patient safety with performance indicators in Shahid Beheshti University of Medical Science teaching hospitals. 2016.
16. Hernández-Cruz R, Moreno-Monsiváis MG, Cheverría-Rivera S, Díaz-Oviedo A. Factors influencing the missed nursing care in patients from a private hospital. Revista latino-americana de enfermagem. 2017;25.
17. Ronald J Piscotty J, Kalisch B. The relationship between electronic nursing care reminders and missed nursing care. CIN: Computers, Informatics, Nursing. 2014;32(10):475-81.
18. Piscotty RJ, Kalisch B, Gracey-Thomas A, Yarandi H. Electronic nursing care reminders: implications for nursing leaders. JONA: The Journal of Nursing Administration. 2015;45(5):239-42.
19. Piscotty Jr RJ, Kalisch B, Gracey-Thomas A. Impact of healthcare information technology on nursing practice. Journal of Nursing Scholarship. 2015;47(4):287-93.
20. Kaunda-Khangamwa BN, Steinhardt LC, Rowe AK, Gumbo A, Moyo D, Nsona H, et al. The effect of mobile phone text message reminders on health workers' adherence to case management guidelines for malaria and other diseases in Malawi: lessons from qualitative data from a cluster-randomized trial. Malaria journal. 2018;17(1):481.
21. Ahmadi H, Mahdian sz, Sheikhtaheri A. The Effect of Short Message Service Reminders on Medication Adherence in Patients with Chronic Hyperlipidemia. Journal of Health Administration. 2019;22(4):12-21.
22. Ravari A, Irani M, Mirzaei T, Raeisi M, Askari Majdabadi H. Effects of drug use reminder SMS on controlling hypertension in elderlies: A clinical trial study. Koomesh. 2020;22(3):437-45.

23. Varleta P, Acevedo M, Akel C, Salinas C, Navarrete C, García A, et al. Mobile phone text messaging improves antihypertensive drug adherence in the community. Journal of clinical hypertension (Greenwich, Conn). 2017;19(12):1276-84.