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The Effect of Liaison Nurse Service on Patient Outcomes after Discharging From ICU: a Randomized Controlled Trial

Zeinab Tabanejad[1], Marzieh Pazokian[2*], Abbas Ebadi[3]

[1]Department of Nursing, Nursing and Midwifery Faculty, Iran University of Medical Sciences, Tehran, Iran
[2]Department of Nursing, Nursing and Midwifery Faculty, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[3]Department of Nursing, Behavioral Sciences Research Center, Nursing and Midwifery Faculty, Baqiyatallah University of Medical Sciences, Tehran, Iran

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ABSTRACT

Introduction: Recent studies suggest that liaison nurse intervention might be effective to solve the gap between intensive care unit and wards, but little studies are known about the effect of this intervention. The aim of this study was to investigate the effect of liaison nurse service on patient outcomes after discharging from intensive care unit.

Methods: In this single blinded randomized controlled trial, a total of 80 patients were selected by convenience sampling method from two teaching hospitals located in Tehran, Iran. Patients were randomly allocated to either the experimental or the control groups. Patients in the experimental group received post-ICU care from a liaison nurse and patients in the control group received the routine care. After the intervention, patients' vital signs, level of consciousness, length of hospital stay, need for re-hospitalization in ICU, and satisfaction with care were measure. Data were analyzed by SPSS Ver.13 software.

Results: None of the participants experienced ICU re-hospitalization. According to the result and there were no significant differences between the study groups regarding heart rate, respiratory rate, systolic blood pressure, post-ICU level of consciousness, satisfaction with care, and length of hospitalization in medical-surgical wards. However, the study groups differed significantly in terms of body temperature.

Conclusion: Care services provided by an ICU liaison nurse has limited effects on patient outcomes. However, considering the contradictions among the studies, further studies are needed for providing clear evidence about the effectiveness of the liaison nurse strategy.

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Introduction

Discharging patient from intensive care unit (ICU) is a difficult and complex process because ICU nurses need to provide a lot of critical information to patients and delegate many heavy responsibilities to medical-surgical nurses.[1] Moreover, more than one third of patients who are discharged form ICU, develop serious complications and are readmitted to ICU.[2] ICU readmission and post-ICU mortality rates are 0.89–19% and 4.5–12.4%, respectively.[3,4] Studies have shown that approximately 10% of patients who are discharged from ICU are readmitted to this unit before discharging from the hospital.[5,6]

Moreover, despite great technological advances in healthcare provision, ICU readmission rate has increased during the past two decades.[7] It is noticeable that ICU hospitalizations and readmissions are very costly.[8] The Netherlands Intensive Care Evaluation Committee 2011 reported that a total of 75000 patients have been admitted to ICUs so far. Considering a mean hospital stay of patients in one day, about 1.6 million Euros can be saved yearly by decreasing the ICU readmission rate by only one percent.[4]

Moreover; ICU readmissions are associated with increased length of hospital stay (35–47 vs. 16–21 days), elevated mortality rate, and increased risk for developing nosocomial

***Corresponding Author:** Marzieh Pazokian (PhD), email: Pazokian@sbmu.ac.ir. This study was approved and funded by the deputy of research in Baqiyatallah University of Medical Sciences (Project number: P/340/166).

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infections.[9-13] On the other hand, given the growing demand for advanced medical technologies, the increasing number of elderly people with complicated health problems, and the limited number of ICU beds, prioritizing ICU hospitalizations and using ICU equipments in an optimal way are crucial.[4,14]

Accordingly, special attention has been paid in the last decade to developing strategies for improving patient outcomes once getting discharged from ICU.[2] An innovative strategy for these purposes was the introduction of a new nursing role entitled 'liaison nurse'.[2,15]

Liaison nurse strategy was originally designed in 2001 in several hospitals located in Australia.[16] The primary goal of this strategy is the facilitating of post-ICU care provision, minimizing post-ICU complications, identifying severely-ill patients who need intensive care, and reducing ICU readmission and hospital mortality rates.[2,8,17] Liaison nurses are expected to manage post-ICU care, provide scientific and educational support to other nurses, establish relationship between ICU and ward nurses, and provide intensive nursing care to patients who are in medical-surgical wards.[15,18] Accordingly, they can maintain the continuity and the quality of care which finally improve patient outcomes.[15] Given the novelty of the nurse liaison strategy, few studies have investigated its effects on patient outcomes.[9,14,16,19-23] Moreover, there are still controversies about the effectiveness of this strategy for improving patient outcomes. The aim of the study was to investigate the effect of liaison nurse on patient outcomes after ICU discharge.

Materials and methods

This was a single blinded randomized controlled trial that the patients didn't know to selecting for which groups of control and intervention. The study was conducted from January to June 2014. The study population consisted of all patients who had been recently transferred from ICUs to medical-surgical wards of two teaching hospitals located in Tehran, Iran. Sample size was calculated using the Altman's nomogram and the results of a study conducted by Chaboyer et al.[19]

Accordingly, with considering α of 0.05, β of 0.1, and a power of 0.9, the sample size was determined to be 40 patients in each group.

Participants were recruited by the convenience sampling and were randomly allocated to either the control or the experimental groups regardless of the hospitals (Figure 1).

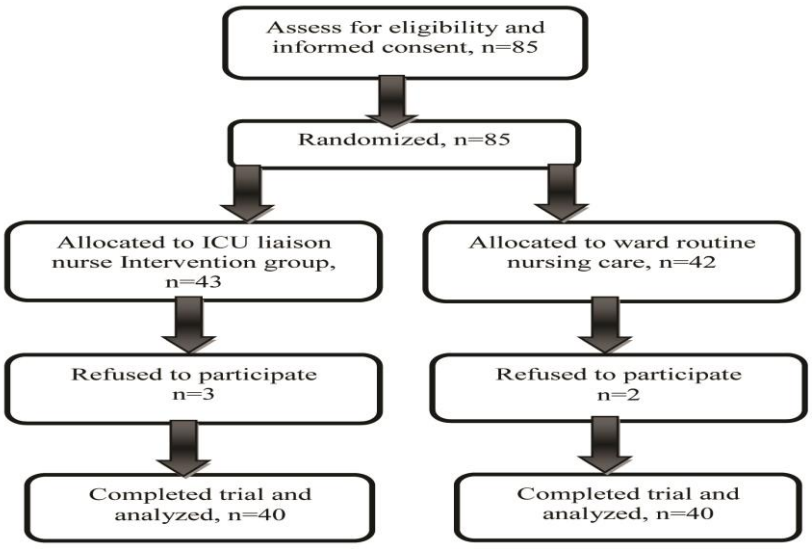

Figure 1. Flow diagram of subject progress through the phases of randomized trial

The inclusion criteria were having an age of 18–85 years, having no cardiac dysrhythmia, and having no immune disorders, leucopenia, or cancer. If patients developed conditions that the liaison nurse could not or was not privileged to manage, they were excluded from the study. Accordingly, the exclusion criteria were experiencing cardiac arrest and need for resuscitation, developing hemodynamic instability, being transferred to other clinical settings, and discharging from hospital with personal consent.

Patients in the experimental group received the study intervention by researcher for three consecutive days: When patient was transferred from ICU to medical-surgical wards, the liaison nurse of the study introduced herself to patient and his or her family members. Then, she started collecting data about patients' condition through reading their medical records.

Moreover, the liaison nurse as researcher monitored patients' baseline vital signs and informed them about the characteristics of medical-surgical wards and nurses, how to access nurses in these wards, differences between these wards and ICUs, and the reason for transferring patients from ICU to these wards. In addition, the liaison nurse taught them about the dietary regimen, the importance of daily self-care activities, and how to cope with new conditions. The liaison nurse also answered patients' questions and helped them to perform their self-care activities. Patients' vital signs and clinical conditions were monitored and documented twice a day for three days by a checklist. Medical-surgical nurses were also informed about patients' conditions, their care plan, and their educational needs. After the intervention, patients' vital signs, level of consciousness, length of hospital stay, need for re-hospitalization in ICU, and satisfaction with care were measured and documented by the checklist. Patients in the control group received the routine care of the study setting. Hence, they were not cared for by a liaison nurse.

The liaison nurse was collected Study data by using three tools; a) a checklist, b) the Early Warning Score, and c) the Patient Satisfaction Instrument. The checklist included of a demographic form and a patient assessment tool. The patient assessment tool consisted of items on the functions of:

- The cardiovascular system: heart rate, blood pressure, edema, and capillary filling time;
- The nervous system: the history of cerebrovascular accident and the level of consciousness was determined by Glasgow coma scale;
- The respiratory system: percutaneous oxygen saturation, body temperature, cough, the color and the volume of sputum;
- The digestive system: route of nutrition, appetite, pattern of elimination, and weight;
- The urinary system: the color and the volume of urine and the serum levels of electrolytes, urea, creatinine, albumin, and also fasting and postprandial glucose;
- The musculoskeletal system: mobility, joint mobility and range of motion, independence in doing daily activities, and muscular strength.

The Early Warning Score instrument (EWS) was developed by Stenhouse et al., for the early diagnosis of life-threatening conditions and significant alterations in patients' state of health.[24] EWS assesses patient's clinical condition based on items such as respiratory rate, heart rate, level of consciousness, body temperature, and systolic blood pressure. Each item is scored on a four-point scale from zero to three (Figure 2). The total score of the instrument is interpreted as follows:

- Scores 0–2: the nurse continues providing routine care and monitors vital signs every twelve hours;
- Score 3: the nurse immediately modifies the vital sign monitoring schedule from every twelve hours to every two hours. If the problem persists after three rounds of vital signs monitoring, the nurse needs to monitor patient and provide intensive care;
- Score 4: the nurse reports patient's condition to physician performs the continues monitoring of vital signs, and measures intake and output (I/O) every two hours;

- Score 5: the nurse monitors patient's vital signs and blood oxygen saturation hourly and reports patient's condition to the resuscitation team. If the patient acquires a score of 5 at three subsequent rounds of monitoring, the nurse reports the condition to physician to decide on transferring patient to ICU;
- Score 6: the nurse reports patient's condition to both physician and resuscitation team when the patient is transferred to ICU.

The researcher used the 25-item Patient Satisfaction Instrument (PSI) for measuring patient satisfaction with care. Hajinezhad et al. in their researcher point that PSI was developed by Wolf et al.,[25] this instrument consists of three domains including nurses' professional practice (seven items), patients' confidence in nurses (eleven items), and nurses' patient education services (seven items). Items are scored on a five-point likert scale ranging from 1 (Completely disagree) to 5 (Completely agree). Higher scores of PSI show greater satisfaction.

We invited ten ICU nurses who had the work experience of more than fifteen years to evaluate the content validity of the checklist. The reliability of the EWS had been previously determined using the Guttman split-half method which yielded a correlation coefficient of 0.868.[26] The sensitivity of the instrument has been reported to be 80%.[27] Hajinezhad et al., evaluated the reliability of the PSI and reported a Coronbach's alpha of 0.90 for the instrument.[25]

The Statistical Package for Social Sciences software SPSS Ver. 13 was employed for data analysis by Statistician. The normality of the variables were assessed by using the Kolmogrov-Smirnov test. The Chi-square, the independent-samples t-test, and the repeated measures analysis of variance (ANOVA) tests were used for comparing the study groups in terms of the demographic characteristics, the length of hospital stay, EWS, and patient satisfaction. The P- values less than 0.05 were considered as significant.

This study was approved by the ethics committee of Baqiyatallah University of Medical Sciences, Tehran, Iran. Patients and their families were informed about the aim of the study. Participation in the study was completely voluntary. A number was allocated to each participant to protect their personal privacy.

Results

The age of participants ranged from 22 to 82 years with a mean of 59.5 (14.24) years. None of the participants experienced re-admission to ICU. The results of the Chi-square test revealed that the intervention and control groups did not differ significantly in terms of demographic characteristics such as gender, education, employment, reason for hospitalization, and history of previous hospitalization in ICU (P> 0.05) (Table 1).

The results of the independent-samples t-test showed that there were no significant differences between the two groups regarding heart rate, respiratory rate, systolic blood pressure, post-ICU level of consciousness, satisfaction with care, and the length of hospitalization in medical-surgical wards (P>0.05). Results of variables associated with hospitalization of patients are shows in Table2.

Moreover, the results of the independent-samples t and the repeated measures ANOVA tests indicated that the study groups did not differ significantly regarding the post-ICU EWS scores (P>0.05)(Table 3). However, the results of the independent-samples t-test showed that the difference between control and intervention groups in terms of body temperature was statistically significant (P<0.05).

Discussion

This study was conducted to investigate the effect of liaison nurse on post-ICU patient outcomes. The findings revealed that liaison nurse had no significant effect on ICU re-hospitalization rate and the length of post-ICU hospital stay. In line with this study, Doric et al., reported that liaison nurse's services did not significantly affect the rate of ICU re-hospitalization and the length of hospitalization stay.[14] Williams et al., also reported the similar finding.[22]

Figure 2. This table shows early warning score

Variable	3	2	1	0	1	2	3
Respiratory rate		<8		9-14	15-20	21-29	>30
Heart rate		<40	40-50	51-100	101-111	112-129	>130
Systolic blood pressure	<70	71-80	81-100	101-199		>200	
Level of conscious	No response	Response to pain	Response to voice	Conscious			
Temperature		<35	35.1-36	36.1-38	38.1-5	38.6<	

Table 1. Baseline demographic and clinical characteristics of participants (N=40)

Group	Control group N (%)	Intervention group N (%)	Statistical indicators
Gender			
Male	15 (37/5)	22 (55)	χ^2=2.46
Female	25 (62/5)	18 (45)	P=0.11
Education			
Illiterate	14 (35)	7(18.4)	χ^2=2.86
Elementary	8 (20)	11(28.9)	P=0.41
High school	8 (20)	9 (23.7)	
Academics	10 (25)	11 (28.9)	
Job			
Retired	14 (35)	15 (38.5)	χ^2=4.70
Housewife	23 (57.5)	15 (38.5)	P=0.09
Occupation	2 (5)	3 (7.7)	
Employee	1 (2.5)	6 (15.4)	
Respiratory	9 (22.5)	6 (15)	χ^2=3.13
Cardiac	0 (0)	3 (7.5)	P=0.37
Causes of ICU admission			
Kidney	0 (0)	1 (2.5)	χ^2=3.13
Brain and nervous	15 (37.5)	19 (47.5)	P=0.37
Immunology	1 (2.5)	0 (0)	
Gastrointestinal	15 (37.5)	11 (27.5)	
History of hospitalized in the ICU			
yes	28 (70)	31 (77.3)	χ^2=0.58
No	12 (30)	9 (22.5)	P=0.45

Table 2. Variables associated with hospitalization of patients in selected hospitals of Tehran in 2014 (N=40)

Variables	Control group[a]	Intervention group[a]	95%CI Lower	95%CI Upper	df	Statistical indicator
Length of stay in the ICU	14.1 (7.6)	8.7 (19.4)	-6.51104	8.61104	78	t=2.76
			-6.52225	8.62225	56.972	P=0.7
Length of stay in the ward	6.8 (5.6)	5.2 (3.4)	-2.82173	2.02173	78	t=0.32
			-2.83589	2.03589	71.297	P=0.7
Duration of intubation(day)	14.7 (12.3)	13 (23.6)	-19.47441	-8.07646	17	t=0.06
			20.72441	19.32646	16.724	P=0.9

[a] Mean (SD)

Table 3. Early warning score variation in intervention and control group

Group / Time[a]	1[£]	2[£]	3[£]	4[£]	5[£]	6[£]	Statistical indicator
Control	1.4 (0.8)	1.2 (0.5)	1.3 (0.6)	1.3 (0.6)	1.3 (0.7)	1.2 (0.5)	F=1.19
Intervention	1.3 (0.6)	1.3 (0.6)	1.3 (0.6)	1.3 (0.6)	1.3 (0.6)	1.3 (0.6)	P=0.31
Statistical indicator	t=0.28	t=-07	t=-0.3	t=-0.5	t=-0.3	t=0.3	
	P=0.7	P=0.4	P=0.7	P=0.6	P=0.7	P=0.6	

[£]Mean (SD), F=Repeated Measures ANOVA

However, Green and Edmonds found that a five-year care plan provided by liaison nurses significantly reduced the rate of ICU re-hospitalization—from 2.3% to 0.5%.[16] Coffin et al., also reported that liaison nurse strategy reduced the rate of pediatric ICU re-hospitalization from 5.4% to 4.8%.[9] According to Chaboyer et al., contradictions in terms of the effect of liaison nurse strategy on patient outcomes can be attributed to factors such as differences in patients' clinical conditions, complexity and diversity of post-ICU care, differences in the length and the types of liaison nurses' interventions, and differences in the types, scale, and the management systems of the settings of the studies.[28] However, Eliott et al., noted that liaison nurses can produce more significant effects on patient outcomes in large-scale hospitals that have several ICUs and higher ICU admission and discharge rates.[18]

The findings of our study revealed that liaison nurse strategy had no significant effect on patient satisfaction. Chaboyer et al., also reported the similar findings.[1] However, Coffin et al., found that 99% of their participants were satisfied with liaison nurses' care services.[9] This contradiction is probably related to the differences in liaison nurses' clinical competence and communication skills. We also found that the care services provided by liaison nurse only decreased patients' body temperature and had no significant effects on heart rate, respiratory rate, blood pressure, and level of consciousness. Doric et al., noted that liaison nurses can positively affect patients' survival and empowerment.[1] To the best of our knowledge, none of the previous studies investigated the effects of liaison nurse strategy on patients' vital signs and level of consciousness.

This study had several limitations. We only included patients who seemed to be more collaborative. Therefore, the findings may have limited generalizability. Moreover, this study had also limited budget and also was required to be completed in a short period of time. Accordingly, designing and conducting long-term and large-scale studies may produce different results and more persuasive evidence.

Conclusion

Study findings suggest that care services provided by an ICU liaison nurse has limited effects on patient outcomes.

However, according the contradiction among the studies, further studies are needed for exploring factors that improve care quality and patient outcomes as well as for providing clear evidence about the effectiveness of liaison nurses.

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Ethical issues

None to be declared.

Conflict of interest

The authors declare no conflict of interest in this study.

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