Implementation of a nursing rehabilitation model to improve quality of life of patients with hand burns: A randomized clinical trial

Mahnaz Seyedoshohadaee (1), Tahereh Najafi Ghezeljeh (1), Rogayeh Samimi (2), Shima Haghani (3) Mohammad Sadegh Sargolzaei (3)

(1) Department of Medical-Surgical Nursing, Nursing Care Research Center, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran; (2) Shahid Motahari Hospital, Burn Research Center, Iran University of Medical Sciences, Tehran, Iran; (3) Nursing Care Research Center, Iran University of Medical Sciences, Tehran, Iran.

Abstract

Burn is known as a life-threatening event in people's lives, causing numerous physical, psychological, and social harms and negatively affecting patients' quality of lives. This study was designed to evaluate the effectiveness of implementing a nursing rehabilitation model in improving the quality of life of people with hand burns. This was a randomized clinical trial conducted on 60 burn patients admitted to the Shahid Motahari Hospital, Burn Research Center, Iran University of Medical Sciences, Tehran, Iran in 2021. The patients were randomly allocated into two groups of intervention and control (n = 30 per group). The participants of the intervention group received a 5-week nursing rehabilitation program in two phases: at the acute phase (admission) and the recovery phase (before discharge). Data were collected using the Burns Specific Health Scale Brief (BSHS-B) questionnaire before each phase. The quality of life (Qol) - was significantly different comparing the two groups before the intervention ($p = 0.042$). Covariance analysis showed that after the intervention, the mean quality of life score was significantly higher in the intervention than the control group, indicating a better Qol in the recent group ($p < 0.001$). In the control group, the mean score of Qol was not significantly different before and after the intervention; however, this difference was statistically significant in the intervention group ($p = 0.001$). The implementation of the nursing rehabilitation model improved the Qol of patients with hand burns. So, this model seems to be an appropriate and effective strategy to accelerate the rehabilitation of patients with hand burns and their return to society.

Key Words: Rehabilitation nursing; comprehensive health care; quality of life; hand burn.

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Burns are everyday threats for people. More than 95% of burns occur in developing and underdeveloped countries.[1] According to the World Health Organization (WHO) more than 300,000 people lose their lives because of burns each year.[2] According to Iran's Ministry of Health, about 150,000 to 180,000 people are affected with burns in the country every year, of whom 30,000 are hospitalized, and 3,000 die.[3] In Iran, some studies indicated that burns due to flame and hot liquids are relatively common in the youth, women, and less educated people, and the death rate varies from 27.9 to 34.4%.[4] Burns inflict physical, psychological, social, and economic burdens even after discharge, such as skin lesions, pain, stress, low self-esteem, anxiety, depression, and post-traumatic stress disorder (PTSD), which deeply affect various dimensions of Qol.[5] The WHO defines Qol as the individual's perception of his or her living situation according to the cultural criteria of the system in which he/she lives and the relationship of these perceptions with one's goals and priorities.[6] The results of a systematic review study by Spronk et al.[7] showed that health-related Qol in burn patients was related to burn severity, and these patients had low Qol regarding the psychological and social dimensions.[7] The quality of burn treatments is not judged only by the survival of the patient but is intercalated with long-term organ function and acquiring the desired appearance. In fact, even small wounds that are not life-threatening are considered and treated,[8] such as hand burns. Due to close proximity to heat sources, and the fact that hands are usually used as a shield to protect the body, these organs account for more than 80% of severe burns.[9,10] Although the total surface area of each hand comprises less than 3% of the total body surface

area, and the fact that hand burns are generally not life-threatening, deep second- and third-degree hand burns can end up in major deformities due to the unique anatomical structure of these organ.[11] and effects on patients' performance and quality of lives, highlighting the need for effective rehabilitation treatments for patients with hand burns.[12]

Rehabilitation can comprise an active multidisciplinary program to improve the physical, mental, and social states of the patient and prepares him/her for return to society and routine life.[13] During these programs, nurses have essential roles as coordinators between the patient, his family, and other members of the rehabilitation team, as well as in the accurate assessment of the patient's condition from admission to discharge to minimize complications.[14,15] Education can provide active and informed participation of the patient to solve some of her problems.[16] Since nurses have more interaction with patients than other members of the treatment team, they are more suited to communicate with, advise and educate patients. Patient education can also promote patient awareness.[17] The nursing rehabilitation model, which is based on the medicinal biology, psychology, and sociology model, systematically considers these factors and their complex interactions in understanding health and disease and medical service provision.[12,18]

Given the important role of nurses in facilitating the return of burn patients to normal life, this study was conducted to determine the effects of implementing a nursing rehabilitation model on the Qol of patients with hand burns.

Materials and Methods

Design, Participants, Sampling

This study used a randomized, non blinded controlled trial approach with two groups (experimental and control). This study was performed on 60 patients with hand burns referred to the Shahid Motahari Educational and Medical Center of Tehran from November 4, 2020, to April 19, 2021. To determine the sample size at 95% confidence interval and regarding a power of 80%, a moderate Cohen effect on Qol in the intervention group compared to the control group (ES = 0.5), and a sample loss of 10%, the sample size in each group was determined 30.

Ethical approval for this study was obtained from the Vice Chancellor of Ethics of Research and Technology of Iran University of Medical Sciences (reference no: IR.IUMS.REC.1399.715) and the Iranian Clinical Trial Center (reference no: IRCT20201207049634N1).

Inclusion and exclusion criteria

The burn of the dominant hand, with or without the involvement of the opposite hand, deep burns (with partial or full thickness), age over 18 years, no history of psychological disorders, having the literacy of reading and writing, and willingness to participate in the study were considered as inclusion criteria. Severe damage to the muscles of upper limbs, tendons, the skeleton, and nerves, being diagnosed with severe cardiac, pulmonary, and cerebral diseases, anesthesia before burns, unwillingness to participate or continue participation in the study, and missing any of the rehabilitation sessions were regarded as exclusion criteria. Given the nature of the intervention, there was no blinding in this study.

Data Collection

The patients were randomly divided into the control and intervention groups using the block randomization method (each block with a size of four). Each patient was assigned a unique code. The list of blocks was initially assigned with numbers 1 to 6, then a colleague who was not involved in the research randomly selected a number between 1 to 6 for 30 times to determine the order of the block numbers. Finally, the full list of assignments (from 1 to 60) in each of the intervention (n = 30) and control (n = 30) groups was prepared. The prepared assignment list was provided to a colleague who was not involved in the study each time to enlist patients' names. In this way, the patients were randomly allocated to the intervention and control groups, without the patients themselves or the researcher being aware of group assignments. Finally, the demographic and specific questionnaires, Burns Specific Health Scale Brief (BSHS-B), were delivered to the patients to complete them.

This questionnaire was initially developed and further modified and its newer and more efficient version was developed in 2001.[19-21] The questionnaire includes 40 questions on skin sensitivity to heat, body image, hand function, how to care for burnt areas, occupation-communication, the ability to perform simple tasks, and sexual and emotional performance, scored based on a 5-point Likert scale. A higher score in each item (maximum of five) indicated a good quality of life, and a lower score (minimum of one) reflected a poor quality of life. Out of 40 queries, 18, 11, and 11 are related to the physical, psychological, and social dimensions of quality of life, respectively. Pishnamazi et al., based on experts' opinions, reported a content validity of 95% and a reliability (Cronbach's alpha) of 94% for the tool.[20] In this study, Cronbach's alpha coefficient was calculated as 0.86 (Figure 1).

Intervention

Patients in both intervention and control groups received routine treatment-rehabilitation programs of the center. In the intervention group, the patients also received a 5-week nursing rehabilitation program during three phases (i.e., at admission, during recovery, and before discharge, as described below), which was delivered by a team consisting of a nurse, a physiotherapist, and a psychologist, who all were employees of the center.

At admission:

This period included one to three days after hospitalization. the nurse established the initial relationship with patients according to their physical and

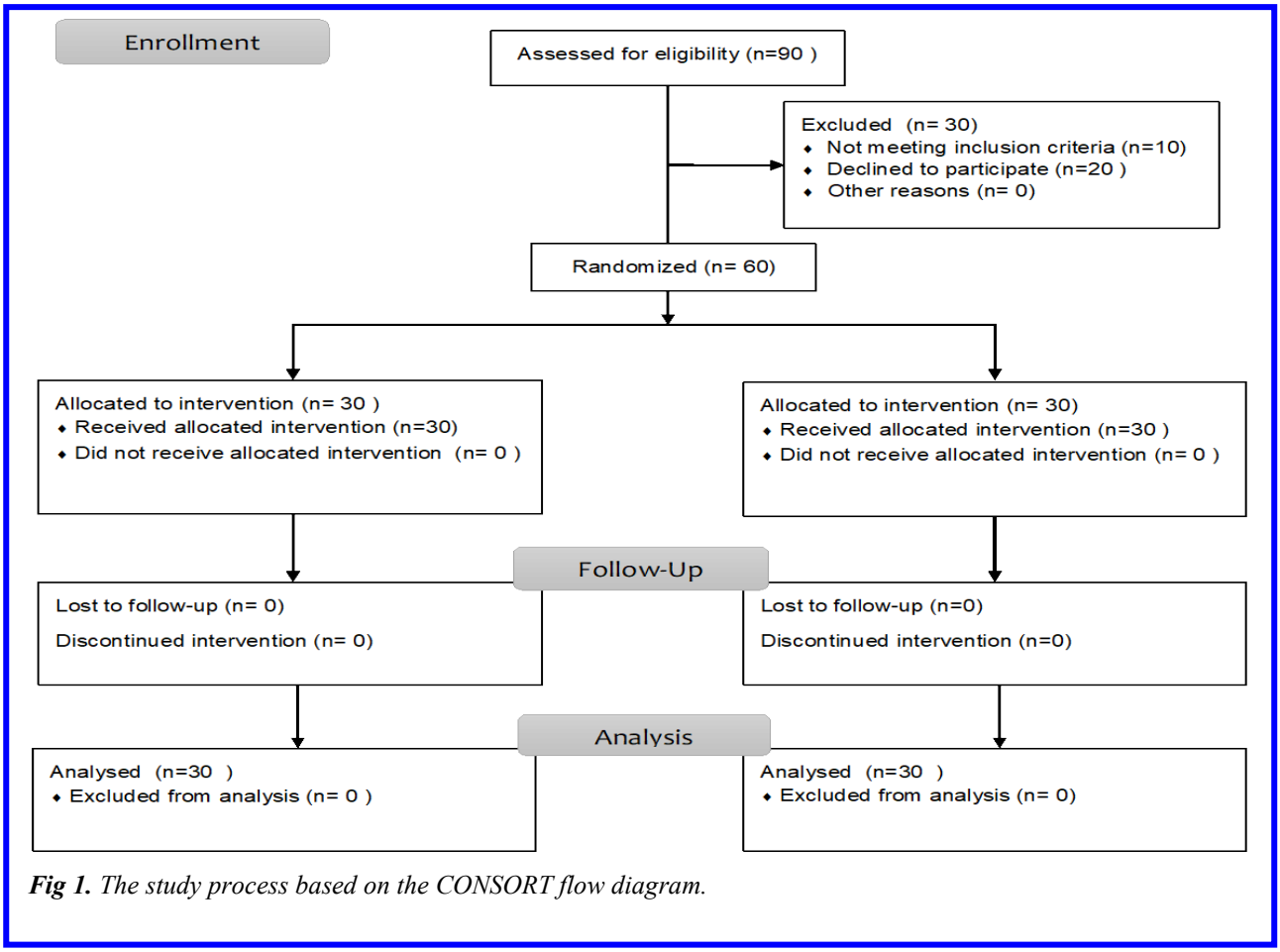

Fig 1. *The study process based on the CONSORT flow diagram.*

mental conditions and provided them with social support according to their age and level of education. Based on the acceptance of patients and their families, the nurse also purposefully imparted regular health instructions to help family members boost their confidence and understand their role in the rehabilitation process. In addition, the nurse encouraged patients to walk and communicate by informing them of successful examples of rehabilitation programs and tried to create a positive attitude towards therapeutic measures and therapists, including the physiotherapist and psychologist, as the persons involved in providing social support to patients.
At this stage, health education to the patient included: the skin's normal function and common types of burns, the size and degree of burns, wound healing time, hand surgery procedures, scar hyperplasia signs, common body ailments during burns, and body performance after burns and how to regain normal functioning through rehabilitation exercises. At this phase, two psychological counseling sessions, each for 30 to 50 minutes were delivered. the counselor established a relationship with the patient by creating a positive atmosphere so that the patients would express their thoughts, feelings, and concerns about the disease. These sessions also helped the patients understand and cope with their current situation, reducing their suffering. During this phase, our main purpose was to address the patient's emotional and psychological reactions to burns, such as depression and suicidal thoughts due to feeling useless and alone. hand rehabilitation movements were intermittently instructed by a physiotherapist (twice per day, 10-15 minutes in each session) according to the patient's tolerance, while being vigilant not to trigger bleeding.

During Recovery (i.e., four weeks from the start of wound healing and skin grafting)

At this stage, the BSHS-B questionnaire was completed again, and two more 30-50-minute psychological counseling sessions were held. Therapeutic measures included guiding patients to tolerate the existing situation, evoking strong emotional reactions in the patient, allowing the patient to express thoughts and feelings, and changing inappropriate emotional reactions. At this stage, more attention was paid to the patient's psychological problems such as anxiety, distorted mental self-image, low self-esteem, confusion and helplessness towards the future, unbearable pain, and abnormal body image. In addition, hand rehabilitation exercises were performed either actively or passively. During the first week, using tools for upper extremity joint repair (i.e., the finger joint), hand exercises (e.g., palm pressure and finger pressure) were performed thrice a day (15 to 30

minutes) with giving priority to passive hand movements. Active and passive movements were combined during the second week, and the practicing of daily activity projects began, including activities of daily living (ADL), such as grabbing a bed bar or a rubber ball, feeding, dressing, and doing laundry. The patients practiced for at least two hours per day in the ward. Active and inactive movements continued until the third week when finger muscle strength training was performed. The fourth week included practicing active movements and continuing the training of ADL, as well as a set of hand combined-functional rehabilitation exercises (three sessions per day, 30 minutes per session).

Started 1-2 days before discharge

According to the results and the patient's attitude to life and work in the future, psychological therapies were offered to those who still had problems in some dimensions. During this phase, the patient was encouraged about acquiring a job in the future, and his/her attitude towards this issue was discussed. Samples were checked for quality of life for up to two weeks after discharge.

Statistical Analysis

In this study, SPSS 16 software was used for data analysis. First, the data were presented using descriptive statistics such as frequency and mean, and then inferential statistics, such as the Chi-square test, independent and paired t-test, and ANCOVA were performed. A p value of < 0.05 was considered statistically significant.

Results

In this clinical trial, gender distribution was similar between the intervention and control groups (15 males and 15 females in each group). The mean age was 36.53 ± 14.65 years in the control group and 34.1 ± 13.23 in the intervention group. Overall, demographic features of the participants showed no statistically significant difference between the two study groups (Table 1).

Table 1. *Demographic characteristics of control and intervention groups.*

Variables		Control N=30 n (%)	Intervention N=30 n (%)	p value
Gender	Female	15 (50)	15 (50)	-
	Male	15 (50)	15 (50)	
Marital status	Single	9 (30)	14 (46.7)	0.184
	Married	21 (70)	16 (53.3)	
Education	Illiterate	2 (6.7)	0 (0)	0.146**
	Reading and writing literacy	12 (40)	6 (20)	
	Diploma	6 (20)	9 (30)	
	Higher than diploma	10 (33.3)	15 (50)	
Occupation	Employed	15 (50)	15 (50)	0.703**
	Unemployed	8 (26.7)	5 (16.7)	
	Retired	5 (16.7)	8 (26.7)	
	Student	2 (6.7)	2 (6.7)	
Income	Poor	2 (6.7)	0 (0)	0.59**
	Average	25 (83.3)	27 (90)	
	Adequate	3 (10)	3 (10)	
Hand burn	Dominant hand	20 (66.7)	22 (73.3)	0.573
	Both hands	10 (33.3)	8 (26.7)	
Surgery duration	0-1 h	22 (73.3)	25 (83.3)	0.297**
	1-2 h	5 (16.7)	5 (16.7)	
	>2 h	3 (10)	0 (0)	
Degree of burn	I	5 (16.7)	8 (26.7)	0.358
	II	17 (56.7)	18 (60)	
	III	8 (26.7)	4 (13.3)	
Age (mean ± SD), years Min-Max		36.53 ± 14.65 18-84	34.1 ± 13.23 18-83	0.502***

; The Chi-square test, **; The Fisher exact test, *; Independent t-test*

Table 2. *Quality-of life and total life quality score of control and intervention groups before and after intervention.*

Quality of life dimensions		Control group		Intervention group		p (independent t-test)
		Mean	SD	Mean	SD	
Simple abilities	Pre-test	7.8	3.57	7.6	2.2	0.795
	Post-test	7.76	3.53	8.53	4.21	0.089
	p (paired t-test)	0.924		0.245		
Hand function	Pre-test	13.1	6.8	112.03	6.17	0.527
	Post-test	12.33	5.97	14.39	7.39	0.133
	p (paired t-test)	0.465		0.170		
Emotions	Pre-test	18.43	7.93	22.5	7.06	**0.04**
	Post-test	15.8	6.65	28.16	6.68	**<0.001**
	p (paired t-test)	0.076		**<0.001**		
Interpersonal relationships	Pre-test	10.35	4.59	15.7	5.71	**<0.001**
	Post-test	9.24	3.94	17	5.41	**<0.001**
	p (paired t-test)	0.175		0.121		
Sexual performance	Pre-test	7.55	4.29	10.81	4.54	**<0.006**
	Post-test	7.23	3.82	12.61	3.39	**<0.001**
	p (paired t-test)	0.638		**0.036**		
Mental image	Pre-test	12.64	4.53	12.33	4.67	0.795
	Post-test	11.42	4.46	15.17	4.48	**<0.001**
	p (paired t-test)	0.007		0.058		
Skin sensitivity to heat	Pre-test	12.86	5.15	16.13	4.96	**<0.015**
	Post-test	12.07	5.09	18.89	5.95	**<0.001**
	p (paired t-test)	0.443		0.072		
Therapeutic regimens	Pre-test	14.96	5.83	15.6	5.96	0.679
	Post-test	13.3	5.29	19.57	5.86	**<0.001**
	p (paired t-test)	0.164		**0.013**		
Occupation	Pre-test	11.36	3.68	10.73	5.15	0.586
	Post-test	10.16	3.65	15.28	2.97	**<0.001**
	p (paired t-test)	0.169		**<0.001**		
Quality of life	Pre-test	108.79	27.91	123.42	26.45	**0.042**
	Post-test	99.13	20.77	149.64	34.58	**<0.001**
	p (paired t-test)	0.114		**0.001**		

**; For post-intervention comparisons, ANCOVA was used to control the effect of baseline scores. The partial eta squared value was used to investigate the effect size according to Cohen's categorization (0.01 = small effect size, 0.06 = moderate effect size, 0.14 = large effect size).*

Regarding different dimensions of health-related Qol, there was no significant difference between the two study groups at the baseline comparing the scores of the simple abilities, hand function, mental image, therapeutic regimens, and occupation dimensions. On the other hand, the participants of the intervention group had significantly higher scores regarding the emotion (p=0.04), interpersonal relationships (p<0.001), sexual performance (p=0.006), and skin sensitivity to heat (p=0.01) dimensions, as well as the total score of Qol (p

= 0.042) at the baseline. After the intervention, the participants receiving the nursing rehabilitation program showed significantly higher scores in the emotion ($p<0.001$), interpersonal relationships ($p<0.001$), sexual performance ($p<0.001$), mental image ($p<0.001$), skin sensitivity to heat ($p<0.001$), therapeutic regimens ($p<0.001$), and occupation ($p<0.001$) dimensions, as well as total quality of life ($p<0.001$) compared to the participants of the control group.

Regarding within-group comparisons, no significant change was observed in the Qol dimensions and the total score of Qol in the control group before and after the study period. Compared to the baseline; however, there were significant increases in the scores of the emotion ($p<0.001$), sexual performance ($p=0.036$), mental image ($p=0.007$), therapeutic regimens ($p=0.013$), and occupation ($p<0.001$) dimensions, as well as the total score of quality of life ($p=0.001$) in the intervention group at post-test (Table 2).

Discussion

The results of the present study are in line with the observations of Elsherbiny et al. in Egypt, showing that burn rehabilitation education improved the Qol of patients with hand burns.[19] In another study in China, Li et al. assessed the effects of a nursing rehabilitation model on improving the overall health of patients with hand burns and showed that the patients receiving the intervention had significantly higher scores regarding the general health, physical functioning, psychological functioning, and social functioning dimensions compared to control subjects.[12] The participants of a recent study showed comparable demographic features compared to our participants. In a study by Mohaddes Ardebili et al. in Iran, the researchers assessed the effectiveness of a multimedia-based self-care education program in boosting the life quality of burn patients and reported improvements in overall Qol, as well as in the physical, psychological, and social dimensions.[5] Likewise, Azami et al. in Iran reported that a psycho-social-based therapeutic program improved the social skills of women with post-traumatic stress disorder caused by burn injuries.[21]

As confirmed in the present study, it seems that treatment programs can improve social skills in people with burns. In addition, continuing these programs during follow up visits can establish their effects, resulting in prolonged improvements in patients' social skills. Overall, our results were consistent with the findings of the above-mentioned studies. Rouzfarakh et al., assessed the effectiveness of social media-based rehabilitation education in improving burn patients' quality of lives. They reported significant improvements in the mean scores of the simple abilities, hand function, emotion, body image, interpersonal relationships, skin sensitivity to heat, therapeutic regimens, and occupation dimensions in the intervention group one- and three-month after the intervention, which was consistent with the results of the present study.[15] In the present study, we observed that neither age nor gender was significantly associated with the quality-of-life score, which was in line with the results of Lotfi et al.[22] However, Palmu et al. stated in their study that men had better life quality compared to women.[23,24] Our results highlighted the essential role of nurses as those who have the most contact with patients and can mitigate disease complications by implementing rehabilitation principles. Due to the high prevalence of hand burn deformities and resultant declines in the physical, psychological, and social performance of patients, nurses can deliver effective roles in the education of rehabilitation exercises. Nevertheless, the results of studies show that nurses pay little attention to this issue in burn patients.[19] Therefore, it is necessary that in parallel with routine care activities, nurses also pay attention to continuous training and implementation of rehabilitation programs from the admission to the discharge of burn patients.

The use of a nursing rehabilitation model in the present study improved the Qol of patients with hand burns through establishing a relationship between patients and the rehabilitation team, consisting of a nurse, a physiotherapist, and a psychologist. Imparting necessary information and supporting victims by the rehabilitation team during the acute phase of the traumatic event, as well as during recovery accelerated the return of patients to pre-event functioning levels and motivated and prepared them to continue rehabilitation programs after discharge. Regarding the disabilities associated with burns, especially in developing countries, it is essential to use the capacity of rehabilitation interventions to improve the Qol of burn patients and to design a comprehensive rehabilitation plan to fulfil patients' needs, alleviate their physical, psychological, and social complications, and finally upgrade their quality of lives.

The limitations of study include the lack of possibility to blind the participants, lack of follow-up visits, and the lack of obtaining patient information between classes and during the time interval from the admission to recovery. acquiring information about hand burns from other sources such as social media and misconceptions about burns in society could have affected the patients' responses to the questionnaire's items. Therefore, in this study, we considered a time for asking questions at the end of each training session to identify these beliefs and correct them by appropriate education and training. Moreover, the patient's feeling about his/her condition at the time of filling the questionnaire, and the fact that how much the events of that specific day had bothered him/her could also have affected patient responses. These items were beyond the control of the researcher. It is recommended that researchers include patients with burns in other parts of the body as well and consider longer follow-up periods to more precisely assess the effects of rehabilitation programs on the Qol of burn patients.

Taken together, our data suggested that the nursing rehabilitation model significantly increased the physical and psychological functions of patients with hand burns improving their social relationships and general health. In conclusion our results highlight the importance of developing a comprehensive educational rehabilitation program for burn patients, including as major actors the nursing system.

List of acronyms

BSHS-B - Burns Specific Health Scale Brief
PTSD - post-traumatic stress disorder
Qol - quality of life
WHO - World Health Organization

Contributions of Authors

MS, TN: Study conception and design. RS, MS: Data collection. MS: Data analysis and interpretation. MS, TN: Drafting of the article. MS, TN, RS, MSS, SHH: Critical revision of the article. All authors approved the fina editedl typescript.

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Conflict of Interest

The authors declare no conflict of interests.

Ethical Publication Statement

We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Corresponding Author

Mahnaz Seyedoshohadaee, Department of Medical-Surgical Nursing, Nursing Care Research Center, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran.
ORCIDciD: 0000-0001-5719-7674
E-mail: Seyedoshohadaee.m@iums.ac.ir

E-mails and ORCID iD of co-authors

Tahereh Najafi Ghezeljeh: najafi.t@iums.ac.ir
ORCID iD: 0000-0002-2779-2525
Rogayeh Samimi: rogayehs@yahoo.com
ORCID iD: 0000-0001-7416-9835
Shima Haghani: shima_haghani@yahoo.com
ORCID iD: 0000-0002-1334-975X
Mohammad Sadegh Sargolzaei: ms.sargolzaei@gmail.com
ORCID iD: 0000-0002-4251-9199

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