

Original Article

The Effects of Telephone-Based Telenursing on Perceived Stressors among Older Adults Receiving Hemodialysis

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ABSTRACT

Background: Older adults who receive hemodialysis face different physiological and psychosocial stressors. Management of physiological and psychosocial stressors is among their basic needs for a desirable life. **Objectives:** This study aimed to evaluate the effects of telephone-based telenursing on perceived stressors among older adults receiving hemodialysis. **Methods:** This quasi-experimental study was conducted in 2018 on sixty older adults who were receiving hemodialysis. Participants were conveniently recruited from the hemodialysis centers of Shahid Beheshti and Imam Khomeini hospitals, Babol and Behshahr, Iran, and were randomly allocated to a control and an intervention group. A 3-month telephone-based telenursing program was implemented for participants in the intervention group. Physiological and psychosocial stressors were assessed before and after the study intervention. Data were analyzed using the Chi-square, paired-samples *t*, and independent-samples *t*-tests. **Results:** The mean score of physiological stressors in the intervention group statistically significantly reduced from 17.33 ± 1.74 at pretest to 11.96 ± 3.16 at posttest ($P < 0.001$), whereas it statistically insignificantly changed in the control group from 17.30 ± 1.66 to 17.16 ± 3.03 ($P = 0.747$). Moreover, the mean score of psychosocial stressors in the intervention group statistically significantly reduced from 57.80 ± 8.17 at pretest to 32.53 ± 5.84 at posttest ($P = 0.001$), but statistically insignificantly changed in the control group from 61.2 ± 9.03 to 62.53 ± 6.04 ($P = 0.416$). Although the between-group differences respecting the pretest mean scores of physiological and psychosocial stressors were not statistically significant ($P > 0.05$), there were significant between-group differences respecting the posttest mean scores and the pretest-posttest mean differences of both physiological and psychosocial stressors ($P < 0.05$). **Conclusion:** Telenursing is effective in significantly reducing perceived stressors among older adults receiving hemodialysis. Nurses can use telenursing to reduce stressors among this patient population.

KEYWORDS: Elderly, Hemodialysis, Stress, Telenursing

INTRODUCTION

End-stage renal disease (ESRD) is among the major health problems in the world. It is most common among older adults.^[1] In most countries, 40% of patients with ESRD age more than 65.^[2]

Patients with ESRD need renal replacement therapy for life. Hemodialysis is one of the most common renal replacement therapies.^[3,4] Hemodialysis relieves ESRD symptoms and improves survival; but, it does not

treat ESRD^[5] and patients suffer from a wide range of symptoms, problems, and stressors related to both ESRD and hemodialysis.^[6]

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Stressors among patients receiving hemodialysis can be divided into two main categories, namely physiological and psychosocial stressors.^[5,7] Physiological stressors among these patients include factors such as fatigue, arteriovenous complications, nausea, loss of bodily functions, coagulopathy, and joint stiffness, whereas psychosocial stressors include factors such as frequent hospital admissions, treatment costs, limited time and place for rest and comfort, and limitations of physical and social activities.^[5,8] A study reported that patients with hemodialysis suffer from more psychosocial stressors than physiological ones.^[7] These stressors can not only affect the patients' physical and mental health, but would also interfere with their familial and social relationships, lifestyle, employment, and quality of life.^[9]

There are different strategies for stress management, the choice of which depends on patients' own personal beliefs, experiences, support systems, and available resources.^[5] Telenursing is one of these strategies.^[10,11] As an easily accessible intervention, telenursing mainly focuses on promoting health, well-being, and self-management.^[11] Telenursing interventions can be both educational and behavioral^[12] and can be used for both control and follow-up. The main positive outcomes of telenursing are easy access to health-care providers, time and resource management, self-care promotion,^[10] symptom management, family support, empowerment of family caregivers, and patient comfort and safety improvement, mainly in remote and low-income areas.^[11] Telenursing enables nurses to access patients in remote areas and manage health-care services based on their medical history.^[13] Telenursing uses technologies such as telephone, computer, tele-monitoring, and the Internet for nurse-patient communication.^[14] Telenursing through telephone is a simple, safe, and economical intervention with great popularity in different countries,^[15] which can be used for health promotion.^[16]

Most primary telenursing-related studies were conducted in developed countries, though telenursing is currently a main research priority in different countries.^[12] Different studies reported the positive effects of telenursing among different patient populations.^[12,14,17,18] However, there is limited information about the effects of telenursing on the stressors of patients receiving hemodialysis. Therefore, further studies, particularly in developing countries and on elderly population, are needed to determine the challenges and outcomes of telenursing. The present study was conducted to address these gaps.

Objectives

This study aimed to evaluate the effects of telephone-based telenursing on perceived stressors among older adults receiving hemodialysis.

METHODS

Design, setting, and participants

This single-blind, quasi-experimental study was conducted in 2018 on sixty older adults who were receiving hemodialysis. Participants were conveniently recruited from the hemodialysis centers of Shahid Beheshti and Imam Khomeini Hospitals, Babol and Behshahr, Iran. Inclusion criteria were agreement and consent for participation, access to home telephone, age more than 60, no hearing or speech impairment, hemodialysis for at least 3 months, no history of kidney transplantation or stressful life events (such as significant losses) in the past 6 months, no affliction by psychological disorders (determined by a score of 8 or more for the Abbreviated Mental Test),^[19] ability to perform daily activities (determined by a score of 12 or more for the Activities of Daily Living Scale),^[20] and a score of <71.6 for a hemodialysis need assessment questionnaire. The participants were randomly allocated to a control and an intervention group through block randomization with ten-person blocks. They were excluded if they were reluctant to stay in the study, experienced death, faced serious physical or psychological crises, were hospitalized, had more than one absence from the sessions of the study intervention, received kidney transplant, migrated to remote areas, and were not accessible by telephone for 2 weeks during the 1st month or for 3 weeks during the 2nd and the 3rd month of the study intervention. All participants were blind to the study groups.

The sample size was estimated based on the findings of a former study,^[21] in which the mean and standard deviation of overweight (as a stressor) in the intervention group has been changed from 2.94 ± 1.0 to 2.33 ± 0.64 . Then, with a Type I error of 0.05, a Type II error of 0.20, a σ_1 of 1.0, a σ_2 of 0.64, a μ_1 of 2.94, and a μ_2 of 2.33, the sample size was estimated to be 30 per group.

Data collection instruments

Data collection instruments were a demographic questionnaire, a hemodialysis need assessment questionnaire, and the Hemodialysis Stressor Scale. The items of the demographic questionnaire were on participants' age, gender, income adequacy, employment status, marital status, second marriage, place of residence, and insurance coverage. The Hemodialysis Stressor Scale was developed based on Baldree and colleagues' studies in 1982 and includes 6 items on physiological stressors and 22 items on psychosocial stressors. The items are responded on a 5-point scale from 0 (no stress) to 4 (severe stress). Accordingly, the total scores of physiological and psychosocial stressors can be in the range of 0–24 and 0–88, respectively. Higher scores are

interpreted as greater levels of stress.^[22] This scale has a Cronbach's alpha value of 0.89, and its Farsi versions has been used in a former study in Iran.^[23] The hemodialysis need assessment questionnaire was developed based on an existing educational need assessment questionnaire for patients with hemodialysis.^[24] It includes 29 items on patients' educational needs. The items were scored on a Likert-type scale from 0 to 4, resulting in a total score of 0–112. The total score was interpreted as follows: 0–37.3: dependent; 37.3–74.6: semi-dependent; and 74.6–112: independent. Participants with scores <74.6 were included in the study. In the present study, the content validity of the Hemodialysis Stressor Scale and the hemodialysis need assessment questionnaire was assessed by ten faculty members of Fatemeh Zahra School of Nursing and Midwifery, Ramsar, Iran. The Cronbach's alpha values of these questionnaires were 0.88 and 0.62, respectively.

Intervention

The study intervention was implemented in the following two steps:

Step 1: Depending on participants' learning capacity, two to three educational sessions on ESRD and hemodialysis were held for all of them in both groups. The participants attended the sessions in ten-person groups. The participants in each session were equally and randomly selected from both control ($n = 5$) and intervention ($n = 5$) groups in order to reduce potential biases. The date and the length of each session were determined according to participants' preferences, age, and conditions. Table 1 shows the content of the sessions. Education to each group of participants was provided in two 50-min lecture sessions with a 15-min interval and using an educational booklet prepared based on leading textbooks and resources. Sessions were held in the conference rooms of the study setting. Besides education, several hemodialysis-related scenarios were provided to the participants and they were asked to discuss them based on the provided educations. At the end of the last session, an educational pamphlet was given to each participant.

Step 2: In the second step, follow-up telephone contacts were made with participants in the intervention group for 12 successive weeks. Contacts were made twice weekly in the first 6 weeks and once weekly in the second 6 weeks. The length of the contacts varied between 15 and 20 min according to the participants' needs. The time of the contacts was arranged between 09:00 and 21:00 according to participants' preferences. All contacts were made using a single telephone number. Contacts were related to patients' general health status and their educational needs and were

Table 1: The content of the educational sessions

Sessions	Topic
First	ESRD definition; risk factors; clinical manifestations; diagnostic procedures; and treatments; hemodialysis; vascular access for hemodialysis; complications of vascular access; nursing care for vascular access
Second	Hemodialysis complications; nursing care for each complication; dietary regimen; fluid and electrolytes; physical activity; stress management; hemodialysis-related medications; and their side effects

ESRD: End-stage renal disease

guided using a checklist of their educational needs. During each contact, the participants were encouraged to adhere to medical and nursing recommendations and at the end, an appointment was made for the next contact. Participants could also contact us to ask their questions. The content of each contact was documented to arrange the content of the next contacts. Participants in the control group solely received face-to-face education without any follow-up telephone contact.

Before the first step and 3 days after the 3-month follow-up period, the Hemodialysis Stressor Scale was completed for each participant in the conference room of the study setting while he/she was not under hemodialysis.

Ethical considerations

This study was approved by the Ethics Committee of Babol University of Medical Sciences, Babol, Iran (code: MUBABOL.HRI.REC.1396.124). Necessary permissions for the study were obtained from the authorities of Fatemeh Zahra School of Nursing and Midwifery, Ramsar, Iran, and provided to the authorities of the study setting. The aims of the study were explained for participants, and their written informed consents for participation were secured. All the participants were free to stay in or voluntarily withdraw from the study, and they were ensured that their data would remain confidential.

Data analysis

The study data were analyzed using the SPSS software version 16.0 (SPSS Inc., Chicago, IL, USA). The measures of descriptive statistics (including frequency, mean, and standard deviation) were used for data summarization. Between-group comparisons respecting categorical and numerical characteristics of participants were made using the Chi-square and the independent-samples *t*-tests, respectively. Moreover, within- and between-group comparisons respecting their mean scores of stressors were made using the paired and the independent-samples *t*-tests. $P < 0.05$ was considered statistically significant.

RESULTS

Sixty older adults receiving hemodialysis participated in this study in a control and an intervention group [Figure 1]. The age means in these groups were 74.20 ± 8.01 and 72.67 ± 7.73 , respectively. There were no statistically significant differences between the groups respecting participants' age, gender, income adequacy, education level, marital status, employment status, and educational needs [$P > 0.05$; Table 2].

The results of the paired-sample *t*-test showed that in the intervention group, the mean scores of the following psychosocial stressors statistically significantly reduced after the intervention: limitations of food and fluids, length of treatment, ineffective role performance, reversal of family roles with spouse, frequent hospitalizations, dependence on health-care providers, limitations in the styles of clothing, treatment costs, changes in family responsibilities, uncertainty over future, reduced social activities, dependence on others, occupational problems, limitation of physical activities, and limitation of recreational activities ($P < 0.05$). Similarly, the mean scores of the following psychosocial stressors statistically significantly reduced in the control group: length of treatment, changes in body appearance, occupational problems, limitation of physical activities, and limitation of recreational activities ($P < 0.05$). Moreover, respecting physiological stressors, the mean scores of the following stressors statistically significantly reduced in the intervention group: muscular pain or cramp, joint stiffness, arterial and venous punctures, nausea and vomiting, and fatigue ($P < 0.05$).

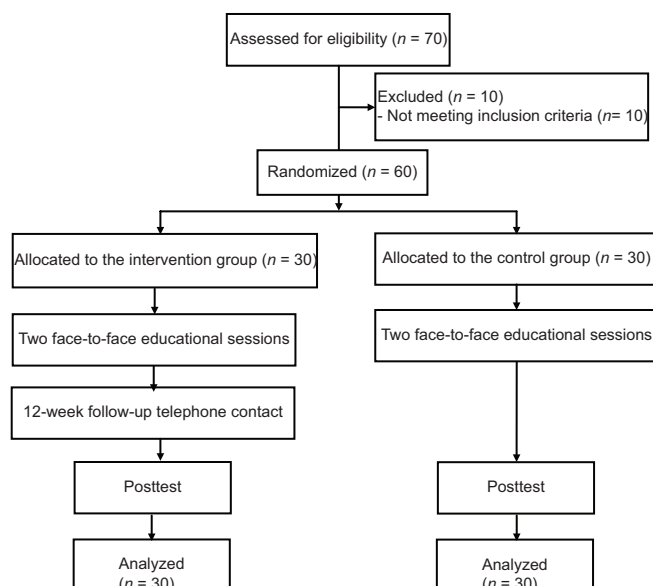


Figure 1: The flow of participants in the study

The results of the paired-sample *t*-test illustrated that while the total mean scores of physiological and psychosocial stressors did not significantly change in the control group ($P > 0.05$), both scores significantly reduced in the intervention group [$P < 0.05$; Table 3]. Consequently, the independent-sample *t*-test showed that although the between-group differences respecting the pretest total mean scores of physiological and psychosocial stressors were not statistically significant ($P > 0.05$), the posttest mean scores of physiological and psychosocial stressors in the intervention group were significantly less than that of the control group ($P < 0.05$). Moreover, there were statistically significant between-group differences respecting the pretest-posttest mean differences of both physiological and psychosocial stressors [$P = 0.001$; Table 3].

DISCUSSION

The findings showed that need-based education and follow-up through telenursing significantly reduced the

Table 2: Between-group comparisons respecting participants' characteristics

Characteristics	Group		P
	Intervention	Control	
Age (years)	72.67 ± 7.73	74.20 ± 8.01	0.454
Need assessment scores	69.90 ± 12.52	69.23 ± 14.03	0.847
Gender			
Male	17 (56.7)	19 (63.3)	0.598
Female	13 (43.3)	11 (36.7)	
Income adequacy			
No	4 (13.3)	6 (20.0)	0.375
Yes	20 (66.7)	15 (50.0)	
Somewhat	6 (20.0)	9 (30.0)	
Educational level			
Illiterate	17 (56.7)	23 (76.7)	0.26
Elementary	7 (23.3)	2 (6.7)	
Guidance or high school	4 (13.3)	4 (13.3)	
Diploma	2 (6.7)	1 (3.3)	
Marital status			
Single	4 (13.3)	3 (10.0)	0.88
Married	22 (73.3)	22 (73.3)	
Widowed	4 (13.3)	5 (16.1)	
Employment status			
Employee	6 (20.0)	1 (3.3)	0.121
Farmer	4 (13.3)	12 (40.0)	
Laborer	1 (3.3)	1 (3.3)	
Homemaker	6 (20.0)	6 (20.0)	
Self-employed	1 (3.3)	2 (6.7)	
Retired	12 (40.0)	8 (26.7)	
Educational need			
Dependent	23 (76.7)	25 (83.3)	0.519
Semi-dependent	7 (23.3)	5 (16.7)	

Table 3: Within- and between-group comparisons respecting the mean scores of physiological and psychosocial stressors

Stressors	Groups	Time		P ^a	Mean difference
		Pretest	Posttest		
Physiological	Intervention	17.33 ± 1.74	11.96 ± 3.16	< 0.001	5.36 ± 3.37
	Control	17.30 ± 1.66	17.16 ± 3.03	0.747	2.23 ± 0.133
	P ^b	0.416	<0.001	—	<0.001
Psychosocial	Intervention	57.80 ± 8.17	32.53 ± 5.84	0.001	55.26 ± 9.88
	Control	61.2 ± 9.03	62.53 ± 6.04	0.416	8.85 ± 1.33
	P ^b	0.081	<0.001	—	<0.001

^aPaired-sample *t*-test, ^bIndependent-sample *t*-test

mean scores of both physiological and psychosocial stressors. A former study also showed that education promoted healthy behaviors among patients receiving hemodialysis.^[25] Besides behavior improvement, need-based education can also reduce health-care costs, improve care quality, reduce dependence, and thereby, reduce the effects of stressors and improve health.

The study findings also showed that telenursing significantly reduced physiological stressors such as fatigue, muscular pain, joint stiffness, nausea and vomiting, and arterial and venous punctures. We could not find any similar study into the effects of telenursing on stressors among patients receiving hemodialysis for the purpose of comparison. However, in line with our findings, several studies reported that telenursing was effective in reducing pain among cancer patients;^[26] pain and joint stiffness among patients with inflammatory rheumatic diseases;^[27] nausea and vomiting among patients with multiple sclerosis;^[28] and fatigue among patients with chronic conditions such as chronic obstructive pulmonary disease, diabetes mellitus, and amyotrophic lateral sclerosis.^[29] Telenursing provides the opportunities for continuous patient assessment, early problem detection, and effective problem management. In the present study, regular telephone contacts helped us assess participants' needs and provided need-based recommendations. Moreover, participants could contact us to ask their questions. These strategies helped reduce the effects of stressors.

Our findings also showed the insignificant effects of telenursing on itching. Contrarily, a study showed that telephone-based follow-up relieved itching among burn patients.^[30] This contradiction is attributable to the differences in the causes and the mechanisms of itching in patients with burn injuries and patients receiving hemodialysis. Itching among patients receiving hemodialysis is a multifactorial problem caused by a wide variety of factors such as diet, uremia, high level of phosphorus, low level of calcium, hyperparathyroidism, and allergic reaction to heparin and ethylene oxide

used to sterilize dialysis machine. Such complex and multifactorial mechanism of itching among patients receiving hemodialysis requires long-term telenursing interventions for effective itching management.^[29] We also found that our telenursing intervention was effective in significantly reducing psychosocial stressors such as loss of social activities, fear over loneliness, dependence on others, and financial problems. In line with our findings, previous studies also reported that telenursing significantly reduced psychosocial problems among patients receiving hemodialysis.^[31,32] Given the multiplicity of ESRD- and hemodialysis-related problems, older adults receiving hemodialysis always need such interventions for the effective management of their problems. Our findings showed that primary education complemented by follow-up telephone contacts had significant positive effects on stressors in the intervention group.

This study had some limitations. Patients' physical and psychological conditions might have affected their answers to the study questionnaires. Moreover, educations were provided based on the results of need assessment performed only before the intervention. Of course, we attempted to circumvent this limitation through assessing the participants throughout the study using checklists. Moreover, factors such as age, gender, and small sample size might have affected the study findings. Therefore, further studies with larger samples are recommended to compare the effects of telenursing among patients from different genders and age groups.

CONCLUSION

This study suggests that simple short-term education has significant positive effects on patient outcomes among patients receiving hemodialysis. While providing patient education, nurses need to pay careful attention to patients' educational needs and perform follow-up assessment to ensure the effective fulfillment of their needs. Telephone-based telenursing is a sample strategy to maintain the continuity of patient education and care. However, further studies and efforts are still needed in

our countries in order to make telenursing practical. Nurses' active engagement in telenursing can reduce patients' stress and thereby, reduce their request for health-care services.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Gheshlagh RG, Ebadi A, Dalvandi A, Rezaei M, Tabrizi KN. A systematic study of resilience in patients with chronic physical diseases. *Nurs Midwifery Stud* 2016;6:e36401.
- Kahn LS, Vest BM, Madurai N, Singh R, York TR, Cipparone CW, *et al.* Chronic kidney disease (CKD) treatment burden among low-income primary care patients. *Chronic Illn* 2015;11:171-83.
- Iyasere OU, Brown EA, Johansson L, Huson L, Smee J, Maxwell AP, *et al.* Quality of life and physical function in older patients on dialysis: A comparison of assisted peritoneal dialysis with hemodialysis. *Clin J Am Soc Nephrol* 2016;11:423-30.
- Subramanian L, Quinn M, Zhao J, Lachance L, Zee J, Tentori F. Coping with kidney disease-Qualitative findings from the Empowering Patients on Choices for Renal Replacement Therapy (EPOCH-RRT) study. *BMC Nephrol* 2017;18:119.
- Tchape OD, Tchapoga YB, Atuhaire C, Priebe G, Cumber SN. Physiological and psychosocial stressors among hemodialysis patients in the Buea Regional Hospital, Cameroon. *Pan Afr Med J* 2018;30:49.
- Clarke AL, Yates T, Smith AC, Chilcot J. Patient's perceptions of chronic kidney disease and their association with psychosocial and clinical outcomes: A narrative review. *Clin Kidney J* 2016;9:494-502.
- Ahmad MM, Al Nazly EK. Hemodialysis: Stressors and coping strategies. *Psychol Health Med* 2015;20:477-87.
- Adib-Hajbaghery M, Molavizadeh N, Alavi NM. Quality of care of vascular access in hemodialysis patients in a hemodialysis center in Iran. *J Vasc Nurs* 2012;30:24-8.
- Reid C, Seymour J, Jones C. A thematic synthesis of the experiences of adults living with hemodialysis. *Clin J Am Soc Nephrol* 2016;11:1206-18.
- Souza-Junior VD, Mendes IA, Mazzo A, Godoy S. Application of telenursing in nursing practice: An integrative literature review. *Appl Nurs Res* 2016;29:254-60.
- Bashir A, Bastola DR. Perspectives of nurses toward telehealth efficacy and quality of health care: Pilot study. *JMIR Med Inform* 2018;6:e35.
- Yang S, Jiang Q, Li H. The role of telenursing in the management of diabetes: A systematic review and meta-analysis. *Public Health Nurs* 2019;36:575-88.
- Barbosa Ide A, Silva KC, Silva VA, Silva MJ. The communication process in Telenursing: Integrative review. *Rev Bras Enferm* 2016;69:765-72.
- Goudarzian M, Fallahi-Khoshknab M, Dalvandi A, Delbari A, Biglarian A. Effect of telenursing on levels of depression and anxiety in caregivers of patients with stroke: A randomized clinical trial. *Iran J Nurs Midwifery Res* 2018;23:248-52.
- Hinkle J, Cheever K. Brunner and Suddarth's Textbook of Medical-Surgical Nursing. 14th ed. Philadelphia: Wolters Kluwer; 2018.
- Hannan J. APN telephone follow up to low-income first time mothers. *J Clin Nurs* 2013;22:262-70.
- Shahrokhi A, Azimian J, Amouzegar A, Oveisi S. Effect of telenursing on outcomes of provided care by caregivers of patients with head trauma after discharge. *J Trauma Nurs* 2018;25:21-5.
- Kotsani K, Antonopoulou V, Kountouri A, Grammatiki M, Rapti E, Karras S, *et al.* The role of telenursing in the management of diabetes type 1: A randomized controlled trial. *Int J Nurs Stud* 2018;80:29-35.
- Bakhtiyari F, Foroughan M, Fakhrzadeh H, Najafi B, Alizade HM, *et al.* Validation of the Persian version of abbreviated mental test (AMT) in elderly residents of Kahrizak charity foundation. *Iran J Diabetes Metab* 2014;13:487-94.
- Doroszkiewicz H, Sierakowska M, Muszalik M. Utility of the Care Dependency Scale in predicting care needs and health risks of elderly patients admitted to a geriatric unit: A cross-sectional study of 200 consecutive patients. *Clin Interv Aging* 2018;13:887-94.
- Estaji Z, Hejazi S, Tabarraie Y, Saedi M. The effects of training through text messaging via cell phones on the compliance of patients undergoing hemodialysis. *J North Khorasan Univ Med Sci* 2016;8:203-13.
- Baldree KS, Murphy SP, Powers MJ. Stress identification and coping patterns in patients on hemodialysis. *Nurs Res* 1982;31:107-12.
- Ahangar R, Parvan K, Hosseini FS, Abdollahzadeh F, Seyedrasooli E, Ghojzadeh M. Stressors and coping methods of patients on hemodialysis in Tabriz Imam Reza teaching hospital in 2009 Razi J Med Sci 2013;20:1-11.
- Habibzadeh H, Khalkhali HR, Davarpanah M. The study of the effect of Orem self care model on self efficacy in hemodialysis patients in Urmia medical science hospitals during. *J Urmia Nurs Midwifery Fac* 2012;10:190-9.
- Rostami F, Ramezani BF, Amini K, Pezeshki A. Effect of a self-care educational program based on Orem's model on stress in patients undergoing hemodialysis. *Prev Care in Nurs Midwifery J* 2015;5:13-22.
- Chakeri A, Salehi S, Ab Gharebagh Z, Haghani S. Evaluating effect of Tele-nursing on the quality of life of cancer patients admitted to selected hospitals of Tehran University of Medical Sciences, 2014-2015. *Int J Ayurvedic Med* 2018;9:83-7.
- Ramelet AS, Fonjallaz B, Rio L, Zoni S, Ballabeni P, Rapin J, *et al.* Impact of a nurse led telephone intervention on satisfaction and health outcomes of children with inflammatory rheumatic diseases and their families: A crossover randomized clinical trial. *BMC Pediatr* 2017;17:168.
- Strupp J, Groebe B, Knies A, Mai M, Voltz R, Golla H.

- Evaluation of a palliative and hospice care telephone hotline for patients severely affected by multiple sclerosis and their caregivers. *Eur J Neurol* 2017;24:1518-24.
29. Kamei T, Yamamoto Y, Kanamori T, Nakayama Y, Porter SE. Detection of early-stage changes in people with chronic diseases: A telehome monitoring-based telenursing feasibility study. *Nurs Health Sci* 2018;20:313-22.
 30. Gonçalves N, Ciol MA, Dantas RA, Farina Junior JA, Rossi LA. A randomized controlled trial of an educational programme with telephone reinforcement to improve perceived health status of Brazilian burn victims at 6-month post discharge. *J Adv Nurs* 2016;72:2508-23.
 31. Kind AJ, Jensen L, Barczi S, Bridges A, Kordahl R, Smith MA. Low-cost transitional care with nurse managers making mostly phone contact with patients cut rehospitalization at a VA hospital. *Health Aff* 2012;31:2659-68.
 32. Pettitte TM, Narsavage GL, Chen YJ, Coole C, Forth T, Frick KD. Feasibility study: Home telemonitoring for patients with lung cancer in a mountainous rural area. *Oncol Nurs Forum* 2014;41:153-61.