





## The efficacy of telenursing on caregiver burden among Iranian patients with heart failure: A randomized clinical trial

Mohaddeseh Namjoo MSc<sup>(1)</sup>, Monirsadat Nematollahi PhD<sup>(2)</sup>, Mozghan Taebi PhD<sup>(3)</sup>,  
Masoumeh Kahnooji PhD<sup>(4)</sup>, Roghayeh Mehdipour-Rabori PhD<sup>(5)</sup>

### Original Article

#### Abstract

**BACKGROUND:** Heart failure is one of the most common syndromes in the world and Iran. Caring for heart failure patients can cause a burden on their caregivers. Traditional and modern treatment techniques are often used for patients with heart failure. This study was conducted with the aim to "determine the impact of telenursing on short-term caregiver burden of patients with heart failure discharged from hospitals in Iran."

**METHODS:** This randomized clinical trial (RCT) was undertaken in Kerman, Iran, in 2018-2019. From among caregivers of patients with minimal grade 2 heart failure, 100 patients were randomly selected to participate in the study. The intervention group, in addition to routine discharge training, received training and care files with videos and related photos via social media every other day for 1 month. The control group received only routine discharge training. The Caregiver Burden Scale (CBS) was completed before and after the intervention in both groups. This scale includes 22 items scored on a Likert scale ranging from 0 (never) to 4 (almost always). The data were analyzed using SPSS software.

**RESULTS:** The mean age of the participants was  $56.44 \pm 13.09$  years. The mean caregiver burden score in the control and intervention groups at baseline was 37.26 and 35.58, respectively, and after the intervention, it was 34.56 and 24.28, respectively. A significant difference was found in the 2 groups after the study; the mean caregiver burden score in the intervention group was significantly reduced compared to the control group after the study.

**CONCLUSION:** Telenursing reduces the caregiver burden in caregivers of patients with heart failure. Telenursing can be considered as an auxiliary method to control the symptoms associated with heart failure.

**Keywords:** Heart Failure; Telemedicine; Care; Telenursing

*Date of submission:* 15 Jan. 2020, *Date of acceptance:* 01 May 2021

#### Introduction

Heart failure is considered a life-threatening syndrome with high mortality and morbidity rates. In addition to its burden on the patient and his/her caregiver, heart failure imposes high health costs.<sup>1</sup> In developed countries, approximately 2% of the population has heart failure.<sup>2</sup> This syndrome spreads rapidly with age; over 10% of people over the age of 70 years in developed countries suffer from heart failure.<sup>3</sup>

Heart failure is the most common cause of hospitalization in people over 65 years of age, and

**How to cite this article:** Namjoo M, Nematollahi M, Taebi M, Kahnooji M, Mehdipour-Rabori R. **The efficacy of telenursing on caregiver burden among Iranian patients with heart failure: A randomized clinical trial.** ARYA Atheroscler 2021; 17: 2102.

1- MSc of Nursing, Nursing Research Center, Kerman University of Medical Sciences, Kerman, Iran

2- Assistant Professor, Department of Pediatrics and Neonatal Intensive Nursing, Razi School of Nursing and Midwifery AND Nursing Research Center, Kerman University of Medical Sciences, Kerman, Iran

3- Assistant Professor, Department of Anesthesia, School of Allied Medicine, Kerman University of Medical Sciences, Kerman, Iran

4- Assistant Professor, Cardiovascular Research Center, Kerman University of Medical Sciences, Kerman, Iran

5- Assistant Professor, Department of Medical-Surgical Nursing, Razi School of Nursing and Midwifery AND Nursing Research Center, Kerman University of Medical Sciences, Kerman, Iran

Address for correspondence: Roghayeh Mehdipour-Rabori; Assistant Professor, Department of Medical-Surgical Nursing, Razi School of Nursing and Midwifery AND Nursing Research Center, Kerman University of Medical Sciences, Kerman, Iran; Email: [r\\_mehdipour@kmu.ac.ir](mailto:r_mehdipour@kmu.ac.ir)

the second most common cause of referral to physicians' offices.<sup>1,4</sup> It is a clinical syndrome with many primary causes; the main causes of this disorder are ischemic heart disease (IHD) and hypertension (HTN).<sup>3,5</sup>

The complications of heart failure may prevent the patient from performing daily tasks and disrupt his social relationships, which can lead to repeated fatigue, energy reduction, and dependence on family and friends. This situation can impose a burden on the family of the patient.<sup>6</sup> Having heart disease reduces the quality of life (QOL) of these patients because they are faced with many physical limitations which drive them into social isolation, and consequently, mental problems. This increases the dependency of heart failure patients on their family and friends, which may increase the caregiver burden of heart failure patients.<sup>7</sup> Providing care for heart failure patients results in many complications in patients' family life, including disruption of routine activities, disruption of relationships, and possible reduction in attention to family health.<sup>8</sup>

Telenursing is defined as the use of technology in the provision of nursing services when there is physical distance between the nurse and the client. The communication technologies used include telephone, computer, remote monitoring tools, and the Internet.<sup>9</sup> The use of this technology leads to faster access of patients to better services, lower costs, easier access to the most appropriate specialized professionals and a significant increase in the quality of patient care delivery.<sup>10</sup> Of the applications of telenursing, we can mention home care, case management, and telephone triage.<sup>11</sup>

Although several studies have been conducted on the use of telenursing,<sup>1,12,13</sup> modern methods such as telenursing are far less frequently used in developing countries than in developed countries. According to the experience of the research team, patients with heart failure require continued care after discharge. Unfortunately, in Iran, these patients are forgotten after discharge, and the burden of disease is on their family, which can reduce the QOL of their family members. Thus, it is necessary to improve their QOL and enhance post-discharge services for heart failure patients so that these patients can get in touch with one of the health care personnel. Nurses with a complete understanding of the disease and the status of the discharged patients can best follow up with the patients. Moreover, given that these patients' families have a significant role in care, interventions should be taken to guide families in providing care

correctly. Therefore, the nurse should be in contact with the patients and his caregiver during the day so that necessary information can be provided to patients and their families. According to the abovementioned facts and due to the importance of telenursing methods and the need for patients with heart disease to seek nursing care as well as the need for comprehensive utilization of all available facilities and treatments to reduce patient suffering, the research team decided to conduct this study. Therefore, the present study was conducted with the aim to determine the effect of telenursing on the caregiver burden of patients with heart failure discharged from hospitals in Iran.

## Materials and Methods

This study was a randomized clinical trial (RCT) designed to determine the effect of telenursing on the caregiver burden of patients with heart failure discharged from hospitals in Kerman, Iran, during 2018-2019.

The inclusion criteria were age of over 16 years, the ability to communicate in Persian, living with the patient for at least 6 months and they are not as servants<sup>1</sup> have a smartphone, and be able to use social media.<sup>1</sup>

The study exclusion criteria included anxiety and depression disorders diagnosed by a specialist physician, lack of use of the care plan for any reason after the primary training, and not seeing the training content posted on social media.

In total, 55 individuals were assigned to each of the experimental and control groups ( $\mu_1 = 16.60$ ;  $\mu_2 = 8.96$ ;  $\sigma_1 = 1.50$ ;  $\sigma_2 = 1.17$ ).

The researcher referred to the hospitals affiliated to Kerman University of Medical Sciences, Iran, and received a list of all patients in cardiac wards. The caregivers of patients admitted to cardiac wards and CCUs with minimal grade II heart failure could enter the study. The caregivers of patients who had the study inclusion criteria were randomly sampled at the time of discharge. The researchers wrote the names of all patients discharged daily, placed them in a container, and randomly choose half of the patients to enter the study each day; sample selection for the intervention group was performed for a week and for the control group on the next week to prevent data exchange by patients.

At the time of discharge, first, the participants completed the demographic information checklist and the Caregiver Burden Scale (CBS). Then, the researchers trained patients and their caregivers in the intervention group; they had prepared the

educational material in 15 separate parts. These parts were training photos and videos. The researchers sent the educational material to patients and their caregivers in the intervention group through social media. The content was provided as simple, comprehensible, and loaded information for the participants in the intervention group every other day. The patients and their caregivers were asked to study the material at least once. In order to ensure content observation, the researcher sent a reminder text message to each participant of the intervention group immediately after loading of the content. The researcher reminded the participants in the intervention group to answer the questions at a convenient time. The participants in the control group received only routine care and training during hospital discharge. After 1 month of intervention, the questionnaires were completed by the participants of both groups.

The CBS was developed by Elmstahl et al. in 1996.<sup>14</sup> This scale includes 22 items scored on a Likert scale ranging from 0 (never) to 4 (almost always). Farajzadeh et al. translated the CBS into Persian.<sup>15</sup> The validity and reliability of the Persian version of this scale were studied by Farajzadeh et al. (2015), and the validity score for CBS was over 0.70 and its reliability was 0.87.<sup>15</sup> This scale has a minimum score of 0 and a maximum score of 88. A score of 0-20, 21-40, 41-60, and 61-88 indicates low or no burden on caregivers, mild to moderate burden, moderate to severe burden, and severe burden on a caregiver, respectively.<sup>14,15</sup>

Ethical considerations: This study was approved

by the Ethics Committee of Kerman University of Medical Sciences with the code IR.KMU.REC.1397.212. A written consent was obtained from every participant, and they were assured that the results would remain confidential.

This study has been registered with the code IRCT201810008041278N1 in the RCT Iran database. After the end of the study, the patients in the control group received the educational material.

**Statistical analysis:** The data were analyzed using SPSS software (version 21.0; IBM Corp., Armonk, NY, USA). First, the normality assumption was tested using the Kolmogorov-Smirnov test, and the data were normal. The researchers used descriptive statistics (frequency, percent, mean and standard deviation) for the data related to the groups. The researchers used paired t-test and independent t-test for continuous variables, and chi-square test for categorical variables. Univariate ANCOVA (adjusted for pre-intervention) was performed to test the difference between the mean caregiver burden scores of the patients in the experimental and control groups. P-value < 0.05 was considered significant for all the tests.

## Results

Of the 110 patients included in this study, 5 were excluded because they did not meet the inclusion criteria and 5 because they did not want to participate in the study. Finally, 100 patients were randomly allocated to the study groups (50 patients in the control and 50 patients in intervention group). Figure 1 shows the entry process for the participants.

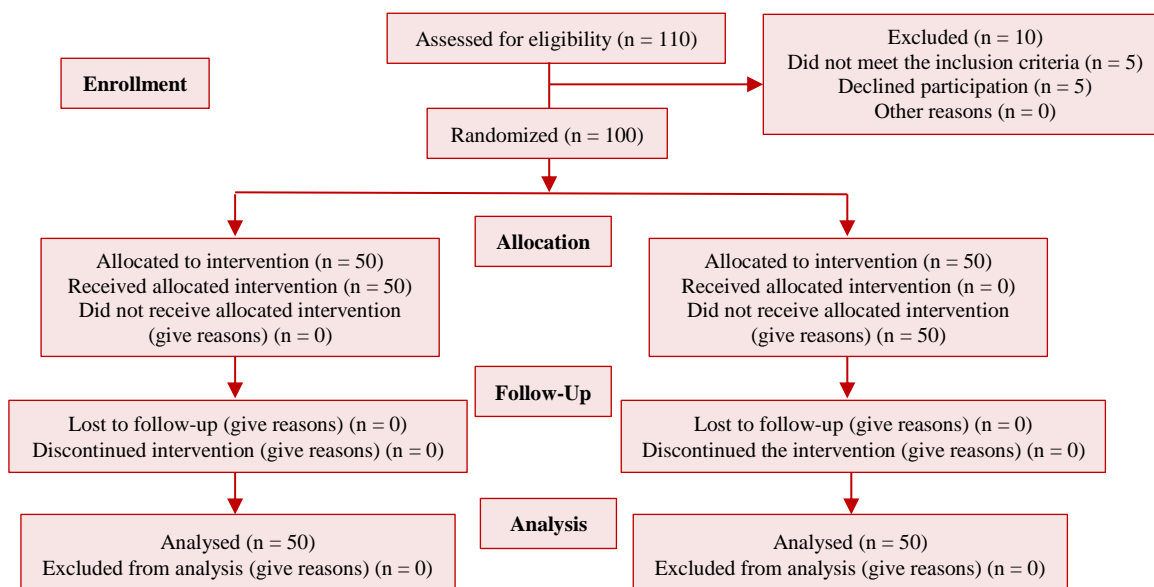


Figure 1. Standard flowchart for entry of participants

**Table 1.** Demographic characteristics and disease-related information of patients with heart failure

Variable		Control group (n = 50)	Intervention group (n = 50)	P
		n (%)	n (%)	
Age (year)	25-40	3 (6)	6(12)	0.30**
	41-55	25 (50)	16(32)	
	56-70	18(36)	19(38)	
	71-85	4(8)	9(18)	
Gender	Male	26(52)	25(50)	0.50*
	Female	24(48)	25(50)	
Marital status	Single	2(4)	2(4)	0.70**
	Married	42(84)	41(82)	
	Divorced	2(4)	2(4)	
	Widowed	4(8)	5(10)	
Education	Pre-diploma education	28(56)	32(64)	0.16**
	Diploma	10(20)	11(22)	
	Bachelor's degree	7(14)	6(12)	
	Master's degree	5(10)	1(2)	
Duration of care	6 months-1 year	13(26)	15(30)	0.80*
	1-2 years	12(24)	10(20)	
	More than 2 years	25(50)	25(50)	
Occupation	Self-employed	21(42)	18(36)	0.19**
	Employee	11(22)	7(14)	
	Retired	8(16)	5(10)	
	Housewife	10(20)	18(36)	
	Unemployed	0(0)	2(4)	
Duration since diagnosis	Less than 1 year	14(28)	12(24)	0.28*
	1-2 years	14(28)	14(28)	
	2- 3 years	6(12)	7(14)	
	More than 3 years	16(32)	17(34)	

\* $\chi^2$  test, \*\*Exact Fisher's test

Among the 100 participants in the study, 25 participants in the intervention group were men (50%) and 26 participants in the control group were men (52%). The mean age of the participants was  $56.44 \pm 13.09$  years, with a range of 28-74 years (Table 1). The study groups were homogeneous in terms of demographic and disease information.

Table 2 compares the mean caregiver burden score between the control and intervention groups. No significant difference was found between the two groups before the intervention, but after the intervention, the difference between the two groups was significant ( $P = 0.001$ ). The mean caregiver burden score in the intervention group before the intervention was  $35.56 \pm 19.84$ , but after the intervention was  $24.28 \pm 11.22$ .

Based on the analysis of covariance after adjusting for the pre-interventional score ( $R^2 = 0.774$ ), the

mean caregiver burden score in the interventional group ( $24.28 \pm 11.22$ ) was significantly lower than the control group ( $34.56 \pm 19.84$ ) ( $F = 13.55$ ;  $P < 0.001$ ), based on univariate ANCOVA results, after adjusting for the pre-intervention score.

## Discussion

This study aimed to determine the effect of telenursing on the caregiver burden of heart failure patients in Iran. We found that telenursing can significantly reduce the caregiver burden of heart failure patients. Chiang et al. assessed the effect of remote health care on caregiver burden in patients with heart failure and showed that remote health care reduced the caregiver burden in these patients.<sup>1</sup> Gitlin et al. measured the effect of home phone care on 272 patients with dementia and their caregivers.<sup>16</sup>

**Table 2.** The mean caregivers' burden score of the patients in the study groups before and after the intervention

Time	Before	After	Mean difference (Mean $\pm$ SD)	P
Control group (Mean $\pm$ SD)	37.26 $\pm$ 13.27	34.58 $\pm$ 19.84	2.32 $\pm$ 6.57	0.01**
Interventional group (Mean $\pm$ SD)	35.56 $\pm$ 19.84	24.28 $\pm$ 11.22	11.28 $\pm$ 8.62	0.001**
P	0.7*	0.001*	0.001**	

\*Independent t-test, \*\* Paired t-test

They found that caregiver burden was significantly reduced in the intervention group.<sup>16</sup> Further studies have been conducted to investigate the effect of telenursing on other symptoms related to heart failure, including a study by Evangelista et al. in California.<sup>11</sup> They examined the effect of a remote health care system on activity, self-care, and QOL among patients with chronic heart failure; according to the results, all variables studied were significantly reduced in the remote health care group.<sup>11</sup> In another study conducted by Furuya et al. as a systematic review of patients undergoing vascular regenerating surgery, findings demonstrated the positive effect of remote health care on many of the outcomes in patients such as QOL, anxiety, knowledge, self-care improvement.<sup>12</sup> Kargar et al., in a study examining the effect of telenursing on depression, anxiety, and stress in hemodialysis patients, reported a significant difference between the two study groups after the intervention.<sup>17</sup>

Health care systems in Iran provide traditional services. Currently, not all the complications of using traditional methods for patients can be controlled by telenursing, but factors such as access to care, cost effective delivery of care, and distribution of limited providers are well resolved using telenursing. The emergence of telenursing methods is in fact to overcome the temporal and spatial obstacles to the provision of care services. In these methods, the spatial dimension can be well controlled, and patients are provided with the care needed as quickly as possible. Patients with heart failure constitute a large proportion of chronic patients; the chronic nature of the disease and the need to provide a more rapid care service to these patients justify the existence of telenursing systems. One of the outcomes of using this method for chronic patients with heart failure is frequent face-to-face medical visits that can result in effective and safe services, and increased speed of service delivery.

According to the results of the present study, the caregiver burden score in the control group was also significantly reduced after the intervention. This finding is in line with the results of other studies. The significant reduction in the caregiver burden score in the control group may be attributed to the hospital discharge training and how it was performed. This content was only provided at discharge for patients with heart failure in the Kerman Heart Training Center; perhaps the reason for the effectiveness of the hospital discharge training in the control group is the academic and clinical sensitivity of nurses regarding heart failure training. It should be noted that although the

difference in the mean score of caregiver burden between the control group before and after the intervention was significant, but the difference in the mean score in the intervention group was higher than the control group.

However, some studies have indicated that telenursing does not affect other variables. In a study on patients with heart failure, de Lusignan et al. (2001) evaluated the compatibility and efficacy of remote follow-up at home for 1 year.<sup>18</sup> They found no significant difference in the QOL of patients with heart failure between the remote health care group and the control group.<sup>18</sup> Evidently, variables such as QOL are influenced by several factors.<sup>19</sup> Further studies on the effect of telenursing on other variables such as anxiety and depression are necessary.

### Conclusion

This study showed the positive effect of telenursing on caregiver burden in patients with heart failure. In this regard, our results can be used for telehealth methods for different diseases. This study had several limitations including the short duration of the intervention, and the lack of blindness of participants. It is recommended that future studies be conducted with longer intervention durations and blinding. Due to the effect of telenursing on the reduction of the caregiver burden in caregivers of patients with heart failure, this method can be considered as an auxiliary method to control the symptoms in patients with heart failure. Nurses must use this method for reducing caregiver burden not only in caregivers of patients with heart failure, but also in caregivers of other patients.

### Acknowledgments

The researchers would like to thank the patients who participated in this study and the Research Department of Kerman University of Medical Sciences who made this research possible.

### Conflict of Interests

Authors have no conflict of interests.

### Authors' Contribution

This study was the result of the cooperation of all team members. Author RM designed the study and wrote the proposal, and MN led the data collection and analysis. MT conducted data collection, MK led data collection, and MN wrote the final draft of the manuscript. All authors have read and approved the manuscript.

## References

- Chiang LC, Chen WC, Dai YT, Ho YL. The effectiveness of telehealth care on caregiver burden, mastery of stress, and family function among family caregivers of heart failure patients: A quasi-experimental study. *Int J Nurs Stud* 2012; 49(10): 1230-42.
- Zarrinkoub R, Wettermark B, Wandell P, Mejhert M, Szulkin R, Ljunggren G, et al. The epidemiology of heart failure, based on data for 2.1 million inhabitants in Sweden. *Eur J Heart Fail* 2013; 15(9): 995-1002.
- Nahlen BC, Elfstrom ML, Bjorling G, Persson H, Saboonchi F. Patterns and the mediating role of avoidant coping style and illness perception on anxiety and depression in patients with chronic heart failure. *Scand J Caring Sci* 2016; 30(4): 704-13.
- Beckerman J. Congestive Heart Failure and Heart Disease [Online]. [cited 2020 Aug 22]; Available from: URL: <https://www.webmd.com/heart-disease/guide-heart-failure#1>
- Khodabandeh-Shahraki S, Azizzadeh-Forouzi M. Effects of gradual exposure to carbon dioxide gas on the blood pressure status of workers in coal mines of Kerman province, Iran. *ARYA Atheroscler* 2012; 8(3): 149-52.
- Cimpean D, Drake RE. Treating co-morbid chronic medical conditions and anxiety/depression. *Epidemiol Psychiatr Sci* 2011; 20(2): 141-50.
- Humphrey L, Kulich K, Deschaseaux C, Blackburn S, Maguire L, Stromberg A. The Caregiver Burden Questionnaire for Heart Failure (CBQ-HF): Face and content validity. *Health Qual Life Outcomes* 2013; 11: 84.
- Balenton N, Chiappelli F. Telenursing: Bioinformation Cornerstone in healthcare for the 21<sup>st</sup> century. *Bioinformation* 2017; 13(12): 412-4.
- 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.
- Noonan MC, Wingham J, Taylor RS. 'Who Cares?' The experiences of caregivers of adults living with heart failure, chronic obstructive pulmonary disease and coronary artery disease: A mixed methods systematic review. *BMJ Open* 2018; 8(7): e020927.
- Evangelista LS, Lee JA, Moore AA, Motie M, Ghasemzadeh H, Sarrafzadeh M, et al. Examining the effects of remote monitoring systems on activation, self-care, and quality of life in older patients with chronic heart failure. *J Cardiovasc Nurs* 2015; 30(1): 51-7.
- Furuya RK, Mata LR, Veras VS, Appoloni AH, Dantas RA, Silveira RC, et al. Original research: Telephone follow-up for patients after myocardial revascularization: A systematic review. *Am J Nurs* 2013; 113(5): 28-31.
- Mohammadi H, Valiee S, Nouri B, Fallahi A, Zehni, K. The effect of self-care education through social networks on the patients' quality of life with type 1 diabetes in Sanandaj City, Iran. *Creat Educ* 2018; 9(2): 322.
- Elmstahl S, Malmberg B, Annerstedt L. Caregiver's burden of patients 3 years after stroke assessed by a novel caregiver burden scale. *Arch Phys Med Rehabil* 1996; 77(2): 177-82.
- Farajzadeh A, Akbarfahimi M, Nedjat S, Kohan A, Saberi H. Translation and validation of a caregiver burden scale (CBS) among caregivers of patients with spinal cord injury. *Journal of Rehabilitation Medicine* 2016; 5(1): 1-12.
- Gitlin LN, Winter L, Dennis MP, Hodgson N, Hauck WW. Targeting and managing behavioral symptoms in individuals with dementia: A randomized trial of a nonpharmacological intervention. *J Am Geriatr Soc* 2010; 58(8): 1465-74.
- Kargar JM, Javadpour S, Taheri L, Poorgholami F. Effect of nurse-led telephone follow ups (Tele-Nursing) on depression, anxiety and stress in hemodialysis patients. *Glob J Health Sci* 2015; 8(3): 168-73.
- de Lusignan S, Wells S, Johnson P, Meredith K, Leatham E. Compliance and effectiveness of 1 year's home telemonitoring. The report of a pilot study of patients with chronic heart failure. *Eur J Heart Fail* 2001; 3(6): 723-30.
- Babaei S, Khodabandeh-Shahraki S. Life with hypertension: A phenomenological study. *ARYA Atheroscler* 2012; 8(Spec): S187-S189.