The Effect of Continuous Care Model on the Sleep Quality of Hemodialysis Patients

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Abstract

Background: One of the most prevalent problems in hemodialysis patients is sleep disturbance. Poor sleep quality has unpleasant bio-psycho-social outcomes. The positive effects of implementing the continuous care model (CCM) were verified with different variables, including sleep quality. This study was done with different populations, using two groups.

Objectives: This study aims to identify the sleep quality of hemodialysis patients in the city of Ilam and determine the effects of CCM on sleep quality.

Patients and Methods: We performed a quasi-experimental research study with 56 hemodialysis patients at the Shahid Mostafa Hospital in Ilam during 2014 and 2015. Pretests and posttests were conducted with the study groups and the control groups. Pretests were conducted over a one-month period, then repeated immediately before the study. Posttests were conducted immediately after the study and then repeated one month later. Participants were selected by census method and randomly divided into two groups. Ethical considerations were observed. Based on the continuous care model, interventions were performed through educational sessions over a three-week period. Consultations for continuous sleep monitoring, controls, and evaluations were conducted with the study group over the next nine weeks. Data were gathered from patient demographics questionnaires and PQSI, then introduced in SPSS 22 and analyzed with descriptive and analytic statistics (t-paired, ANOVA with repeated measures, follow-up tests such as S-N-K, Duncan, Sheffe and Tukey).

Results: One month prior to the study, 94.6% of the participants suffered from poor sleep quality. Immediately before and after the study, 91% complained of poor sleep quality. And one month after intervention, the figure dropped to 82%. Applying the CCM positively affected the sleep quality of hemodialysis patients in Ilam, and was statistically meaningful one month after intervention (P = 0.001).

Conclusions: Hemodialysis patients need a consistent care plan to manage poor sleep quality. This research has proven the effectiveness of implementing CCM as an intervention for improving the sleep quality of hemodialysis patients. CCM provides a comprehensive model for caring for hemodialysis patients, and its executive stages are congruent with the many stages of the nursing process. Practitioners in different domains of nursing care, education, and management can derive great benefit from this valuable care model

Keywords: Continuous Care Model, Sleep Quality, Hemodialysis Patients

1. Background

One symptom of chronic disease is the co-occurrence of end stage renal disease (ESRD), in which kidney function is not sufficient for maintaining life, and the need for replacement therapy, including hemodialysis, becomes urgent (1). The growth rate of ESRD in Iran, at approximately 12% a year, is the highest in the world (2). And, according to the research center at the University of Medical Sciences in Ilam, Iran has a corresponding growth rate of kidney disease and transplantation (2). Currently, between 16 thousand and 17 thousand people go under hemodialysis in Iran (3). In the present-day medical community, hemodialysis patients are a specifically classified group of patients subject to specific, chronic, treatment-related problems that will last until the end of life (4). However, hemodialysis leads to increased life expectancy in spite of the numerous problems caused by the treatment (5). And one of the most prevalent problems found in these patients is sleep disturbances (6-17).

Many studies throughout the world have been done concerning sleep quality problems of hemodialysis patients. What follows is an international list of sleep disordered communities: in Turkey, Tel et al. found that in one study of 150 hemodialysis participating patients, 78.8%

complained of sleep problems (7) and in the study by Bastos et al. 75% of 100 Brazilian hemodialysis patients were determined to have poor sleep quality (8). Zhang et al. reported that of 427 Chinese pre-dialysis patients with CRF and cardiovascular damage, 77.8% were poor sleepers (14), and in a study done by Chang and Yang on 278 Chinese hemodialysis patients, 60.5% presented with poor sleep quality (10). In Serbia, Trbojevic-Stankovic et al. found that in their study on 222 hemodialysis patients, 64.2% were determined to be poor sleepers, with depressed patients having the worst sleep quality (13) and in Masoumi et al. 86.6% of 90 Iranian hemodialysis patients appeared to experience poor sleep quality (12).

All of these studies also revealed corollary problems. In Iran, in one of the largest multicenter studies conducted, Einollahi et al. found that of 6,878 hemodialysis patients from 132 dialysis centers, 60.6% not only showed poor sleep quality, but also related difficulties of diabetes mellitus, dialysis vintage, muscle cramps, quality of life issues, and cognitive and sexual dysfunction (16). Furthermore, Chavoshi et al. found that 126 of 397 Iranian hemodialysis patients, had restless leg syndrome, in addition to experiencing poorer sleep quality and more severe insomnia than the general population (17).

Poor sleep quality has unpleasant bio-psycho-social outcomes. Sleep disturbances affect not only quality of life, but also immune function (10) and is even considered a risk factor for cardiovascular disease (14). In addition, hemodialysis patients have a high physical and psychosocial symptom burden, with the most commonly reported symptoms being fatigue, irritability, and nervousness (18). Sleep quality should be of paramount concern and be given focused attention by nurses, physicians, care givers, educators, and family members. Since these patients spend the greatest amount of time in hospital under the care of nurses, the role of nursing in addressing this issue must be emphasized in care protocols and nurse education.

The qualitative research of Borzou et al. on 24 Iranian hemodialysis patients showed that one of the most important themes in patients' perception of comfort during the hemodialysis procedure was "The presence of competent nurses"(19); and care models are used by the most competent nurses. In Iran, the continuous care model (CCM) was designed and evaluated by Ahmadi in 2001 for managing patients with chronic coronary artery disease.

This model introduces the client as an active and effective factor in the continuous care and health process (20). CCM is a regular process for effective, interactive, and consistent communication between clients and care facilitators for recognizing the needs and problems of the clients and sensitizing them toward acceptance of continuous

healthy behaviors, while helping them maintain health promotion and improvement (21). Applying this model encourages recognizing the patients' problems, as well as motivating and involving the patients and their families in problem solving (9). The main purpose of CCM is to design and provide a plan that facilitates acceptance, heightened insight, and appropriate behavior, as well as control of the underlying disease and its complications (22).

Many studies in Iran have been performed concerning CCM and its implementation in the treatment of other diseases include some of the following: Ahmadi et al. and rehospitalization and chest pain in patients with coronary artery disease (23); Ghavami et al. in diabetic patients' blood pressure (22); Ghavami et al. in diabetic patient's body mass index and weight (24); Sadeghi Sherme et al. in quality of life of cardiac patients (21); Haghdoost et al. in quality of life and prevention of complications in coronary artery bypass graft surgery patients (25); Anjomanian in quality of life in schizophrenic patients (26); Salari et al. in quality of life in chemical patients (27); Saei et al. in dialysis adequacy (28); Rahimi and Ghalyaf in depression of hemodialysis patients (29); Rahimi et al. in quality of life in hemodialysis patients (30); Azizzadeh Forouzi et al. in sleepiness in hemodialysis patients (31); Sadeghi et al. in sleep quality of hemodialysis patients (9); and Hojat et al. in sleep quality and dialysis adequacy (32).

The quasi-experimental study entitled "Effect of implementing continuous care model on sleep quality of hemodialysis patients" was done with 43 Iranian hemodialysis patients (9) and the clinical trial study entitled "Effect of continuous care model on sleep quality and dialysis adequacy of hemodialysis patients" was done on 40 Iranian hemodialysis patients (32). Neither of the studies had a control group, but they did show that the above-mentioned model was effective for improving the sleep quality of these patients. Our quasi-experimental research with control groups was conducted with the purpose of confirming the findings of the other studies. Results of this research will help develop a knowledge base of evidence concerning the care of hemodialysis patients, and facilitate more specialized care while encouraging the nurses, physicians, care givers, and family members to apply CCM to not only improve the quality of sleep, but the quality of life as well, of hemodialysis patients.

2. Objectives

This study aims to identify the sleep quality of hemodialysis patients in Ilam city and determine the effect of implementing CCM on patients' sleep quality.

3. Patients and Methods

This quasi-experimental research designed with pretests and posttests was performed with hemodialysis patients in Shahid Mostafa hospital in Ilam during 2014 and 2015. Pretests and posttests were conducted with both the study groups and the control groups. Pretests were conducted over a one-month period, then repeated immediately before the study. Posttests were conducted immediately after the study and then repeated one month later. Fifty-nine patients with ESRD were selected by census method and randomly divided into two study and control groups. Total participants numbered 56 (28 in each group); three were lost due to attrition. Participant criteria included age of at least 18 years, the ability to read and write, as well as heightened awareness of the illness, its problems, and possible treatments. Excluding criteria included lack of desire to participate in the study and low awareness. Patients and their families were oriented to CCM and the purposes of the research, and they provided informed, written consent. The intervention was conducted based on CCM through educational sessions over a period of three weeks. The consultations for continuous sleep monitoring, control, and evaluation were conducted with the study group over the following nine weeks.

The tools for data-gathering included two parts. The first part consisted of a demographic characteristics questionnaire: age, gender, marital status, education level, monthly income, the number of dialysis treatments per week, and the duration of dialysis. Some features related to the disease were included, such as: being aware of the disease, interest in getting information, tolerance for limitations of the disease, family support, and cause of disease. The second part consisted of the Pittsburgh sleep quality index (PSQI). This self-reported scale has seven parts, including subjective quality of sleep, sleep onset latency, sleep duration, sleep efficiency, presence of sleep disturbances, use of hypnotic-sedative medication, and presence of daytime disturbances. The final score of each part totals 3, and each question has scores from 0 to 3. The sum of the questionnaire's seven-parts scores form the total score and vary from 0 to 21. The scoring is then reversed; and the higher the score, the lower the quality of sleep. Therefore, scores lower than 5 are considered good-quality sleep (23). The psychometrics of this tool were conducted both outside and inside Iran (33-35). It was applicable as a valid and reliable tool in many studies (6-8, 10, 11, 13, 16).

The CCM consists of four stages: familiarization, sensitization, control, and evaluation (20). It is implemented respectively in study groups of four, 7 – 8-person groups.

3.1. Familiarization Stage

This stage is meant to create the necessary sensitivities regarding disease, accurate recognition of the problem, creating motivation and a feeling of need, and the necessity of follow-up. A ten to fifteen-minute meeting was conducted, with the researcher, patient, and his/her family in attendance in the waiting room of the hemodialysis ward. The participants and the researcher both expressed their expectations and requests, as well as emphasized that the care-treatment connection would not be disrupted.

3.2. Sensitization

Sensitization was implemented over 4 - 6 meetings, lasting 30 - 45 minutes each based on tolerance and acceptance of the patients and their families, and with the purpose of participation in the implementation of care. In this stage, the researcher discussed with the patients and their families the following: features of kidney disease; the importance of paying attention to diet; physical activity; regular visits by the physician and following given instructions; training in the ways of creating good habits before bedtime and trying to increase useful sleep hours; and factors affecting sleep, sleep hygiene principles, and various sleep disorders. Individual sessions were held during or at the end of hemodialysis for completion of the discussions and for helping patients who did not attend the meetings. The first and second stages lasted three weeks.

3.3. Control

Consultation was continued in order to evaluate and consider new care problems (hospitalization and learned behaviors continuity) and to maintain interactive, reciprocal communication (face to face or via telephone), as well as decision-making and problem-solving. This stage lasted one week.

3.4. Evaluation

This stage consisted of investigating the sleep quality of patients during two phases, immediately after and one month following intervention.

The questionnaires were completed by the study group and the control groups four times during one month and immediately before and after, and one month after the intervention. Data was introduced in SPSS 22 and analyzed descriptively, including frequency distribution tabulations, central and dispersion measures and analytic statistics (t-paired, ANOVA with repeated measures, follow up tests such as S-N-K, Duncan, Sheffe and Tukey). One of the important assumptions of ANOVA with repeated measures is Mauchely's sphericity. It is similar to the Levin test

of equality of variances. The Mauchely test is done within-subjects analyzing (during four times in one month and immediately before and after, and one month later). Significance level was considered to be 0.05.

4. Results

There were 56 hemodialysis patients in two 28-person groups. The majority of them were female (54%), married (91%), and illiterate (87.5%), with a monthly income of less than 4 million Rials (68%), with dialysis three times per week (85.7%), and with a duration of dialysis ranging between 24 and 36 months (42.8%). The mean age was 64.34 ± 11.09, with a minimum age of 50 and a maximum age of 88 years. Other features related to the disease of the participants are summarized in Table 1.

Table 1. Frequency Distribution of Some Features Related to the Disease

Variable	No. (%)
Being aware of the disease	
High	17 (30.4)
Average	26 (46.4)
Low	13 (23.2)
Interest in getting information	
Yes	48 (85.7)
No	8 (14.3)
Tolerance for limits of the disease	
Completely	6 (10.7)
To some extent	2 (39.3)
Not in the least	28 (50.0)
Family support	
High	17 (30.4)
Medium	10 (17.9)
Low	19 (33.9)
Not in the least	10 (17.9)
Cause of disease	
Hypertension	34 (60.7)
Polycystic Kidney	3 (5.4)
Diabetes	17 (30.4)
Chronic Glomerulonephritis	2 (3.6)

Scores were categorized as desirable sleep (scores ≤ 4) and poor sleep (scores > 4). Poor sleep quality was 94.6% one month before; 91% immediately before and immediately after; and 82% one month after intervention. The

scores of sleep quality decreased in the study group immediately and one month after intervention, which means that sleep quality became more realizable. The mean scores of PQSI in study and control groups were analyzed. The internal subject-analysis mean scores of sleep quality showed the Mauchely test was significant four times in one month, and immediately before and after, and one month following intervention (P = 0.001). Therefore, Epsilon correction was used (Table 2). Correlated one- way ANOVA showed training of CCM affected sleep quality (F = 29.40, P = 0.001, η^2 = 0.35).

The follow-up tests were done to determine the significance of the compared means four times. The results of these tests showed a meaningful difference between the paired means of study and control groups just one month after intervention (P = 0.001). The results were summarized in Tables 3 and 4.

In this manner, the results of t-pairs for comparing mean scores of sleep quality in study and control groups before and after intervention showed a meaningful difference between one month before and after (t = 6.74, df = 55, P = 0.001). In general, applying CCM has a positive effect on the sleep quality of hemodialysis patients in Ilam. This effect was meaningful one month after intervention (P = 0.001).

5. Discussion

The results of this study showed a high percentage of patients on hemodialysis (94.6%) had poor sleep quality congruent with the results of many studies outside and inside Iran (7, 8, 10, 12-14, 16, 17). Prevalence of sleep disturbances in patients with chronic uremia is high, compared to the common population (36) and in hemodialysis patients, disruption of cognitive functions may appear (37). There are other factors that can affect sleep quality of these patients, too. In Einollahi et al. there was a meaningful relationship between sleep quality with diabetes mellitus, age, duration of dialysis, muscle cramps, quality of life, cognitive function and sexual function (16). In the present study, the majority of participants were female and in the range of elderly with a mean age of 64 years. In Chang and Yang, 60.5% of patients who experienced poor sleep quality were also elderly women. The mean age of these patients was 61 years (10). In Tel et al. the patients who were women and housewives had worse sleep quality compared with other patients. Also, as their age increased, their sleep quality decreased (7). Trbojevic-Stankovic et al. found that the poor sleepers were often older women as well (13). In contrast, Yang et al. found no difference in age, gender, and mode or duration of dialysis between good and poor sleepers. However, their study was done on peritoneal patients with a

Table 2. Correlated One Way ANOVA at Four Times Measures

Source of Variation	SS	df	MS	F	P	η
Scores of sleep quality	859.68	1	859.68	29.24	0.001	0.35
Residual Error	1616.82	55	29.40	NA	NA	NA

Abbreviation: NA, not available.

Table 3. Correlated One-Way ANOVA Measured Four Times After Follow Up Tests

Source of Variation	SS	df	MS	F	P
Sleep quality, One month Before	20.643	1	20.643	0.617	0.435
Sleep quality, Immediately Before	44.64	1	44.643	1.024	0.316
Sleep quality, Immediately After	1.446	1	1.446	0.37	0.847
Sleep quality, One month After	693.018	1	693.018	31.769	0.001

Table 4. Analysis of Mean Scores of Sleep Quality in Study and Control Groups Measured Four Times

Time	Mean (SD)	F, df	P
Before Intervention			
One month			
Experiment	14.64 (5.16)	0.617, 1	0.435
Control	13.43 (6.33)	NA	NA
Immediately			
Experiment	14.04 (6.46)	1.024, 1	0.316
Control	12.25 (6.74)	NA	NA
After Intervention			
Immediately			
Experiment	13.07 (6.24)	0.037, 1	0.847
Control	13.39 (6.19)	NA	NA
One month			
Experiment	5.50 (2.31)	31.769, 1	0.001
Control	NA	NA	NA

Abbreviation: NA, not available.

mean age of 47 years ([6]). In this manner, it should be said that a high level of blood urea, being female, and elderly have been significant factors affecting the sleep quality of these patients.

In our study, 50% of the participants did not tolerate the disease in the least. One of the explanatory factors for their intolerance is the negative outcomes of poor sleep quality. Based on some studies, sleep disorders affect not only quality of life, but also immune functions ([10]) and are even considered a risk factor of cardiovascular diseases

([14]). Hemodialysis patients have a high physical and psychosocial symptom burden and the most commonly reported symptoms are fatigue, irritability, and nervousness ([18]). Factors such as being aware of the disease process and ways of controlling and managing it, as well as family support, can play a valuable role in modifying patients' capacities to tolerate disease limitations. In the present study, only 30 percent of the patients reported a high awareness of disease and high support by their family.

Applying CCM as a nursing intervention increases awareness of the patients and improves the ability to control and manage the disease. The findings of this study indicate the need for promotion of sleep quality in hemodialysis patients by applying CCM. Many studies confirmed the positive effect of this model on variables such as chest pain in coronary artery patients, diabetic hypertension, BMI and weight in diabetic patients, quality of life in patients with cardiac, coronary artery, schizophrenia diseases, and chemical patients. Positive effects were also seen with stress, anxiety, depression, quality of life, sleepiness and sleep quality, and hemodialysis adequacy in hemodialysis patients ([23]-[32]). In this study, sleep quality didn't vary immediately after applying the model, but had a significant difference one month following intervention. This is congruent with the results of the study of Hojat et al. ([32]) but incongruent with the results of Sadeghi et al. ([9]). It can be explained by the effect of two factors: nature of the model itself and characteristics of the participants in these studies. It seems CCM is a dynamic model; and it is necessary for patients and their families to exercise and perform the instructions of this model continuously and repeatedly to profit from its benefits. Thus, presenting the effect of the model on sleep quality in hemodialysis patients requires the passage of time, patience, and the continuous efforts

of care givers, patients themselves, and their families in applying the model. In other words, demographic characteristics of the participants and the features related to their disease in this study and two mentioned studies were relatively different. Therefore, different responses are to be expected (9, 32).

The results of this research will develop a knowledge base of evidence concerning the care of hemodialysis patients, facilitate a more specialized care, and encourage the nurses, physicians, care givers, and family members to apply CCM in order to improve the sleep quality of hemodialysis patients. This research reconfirms the effectiveness of CCM and indicates its desirable effect on the sleep quality of hemodialysis patients. CCM provides a complete and comprehensive model for the care of hemodialysis patients, and its executive stages are congruent with the stages of the nursing process. It is necessary that all benefit from this valuable care model throughout the different domains of nursing education, practice, and management.

Acknowledgments

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