Original Article
Effect of comprehensive nursing intervention on negative emotion, quality of life and renal function of hemodialysis patients

Baodan Liao[1], Linlin Zhao[2], Yiti Peng[1], Jing Chen[4], Wen Chen[3], Xiujiao Wang[1]

Departments of [1]Blood Purification Room, [2]Outpatient, [3]Nephrology, The Second Affiliated Hospital of Hainan Medical University, Haikou, Hainan Province, China; [4]Department of Nephrology, The First Affiliated Hospital of Hainan Medical College, Haikou, Hainan Province, China

Abstract: Objective: To explore the effects of comprehensive nursing intervention on negative emotion, quality of life and renal function of hemodialysis patients. Methods: A total of 128 patients with chronic renal failure or end-stage renal disease who underwent hemodialysis were randomly divided into conventional care group and comprehensive nursing group according to the nursing care methods. The comprehensive nursing group received cognitive behavioral therapy and extended care in addition to conventional care. The changes of self-rating anxiety scale (SAS) scores, self-rating depression scale (SDS) scores, quality of life (the Kidney Disease Quality of Life-36 questionnaire, KDQOL-36TM) scores at admission and three months after discharge, as well as changes in creatinine clearance rates (Ccr) and effective urea clearance volume of distribution of urea/effective dialysis time (KT/V) were recorded and compared between the two groups. Results: The differences of Ccr and KT/V before and after intervention between the comprehensive nursing group and the conventional care group were 3.96±4.78 mL/min/1.73 m^2, 2.32±2.89 mL/min/1.73 m^2 and 0.41±0.62 mL/min/1.73 m^2, 0.18±0.29 mL/min/1.73 m^2 respectively. The difference values of the comprehensive nursing group were significantly higher than those in the conventional care group (all P<0.05). In addition, the comprehensive nursing group also had significantly higher difference values in SAS, SDS and quality of life (QOL) scores compared to the conventional care group (all P<0.05). Conclusion: Comprehensive nursing interventions can effectively alleviate anxiety and depression of hemodialysis patients and improve their quality of life and renal function.

Keywords: Hemodialysis, care intervention, depression, anxiety, quality of life, renal function

Introduction

With the rapid development of economy, change of lifestyle and increasingly aging of the population, the morbidity of diabetes, hypertension, obesity and other chronic diseases are getting higher in China. Accordingly, the incidence of chronic kidney disease (CKD) is also on the rise [1]. In 2010, a multi-center cross-sectional study in China showed that taking the reduced glomerular filtration rate or proteinuria as criteria, the prevalence of chronic kidney disease in China was 10.8% and the number of affected patients was nearly 120 million [2]. As a result, some patients with CKD may develop chronic renal failure or end-stage renal disease, so they need renal replacement therapy by

means of hemodialysis or peritoneal dialysis [3]. Hemodialysis is the most common alternative therapy for chronic renal failure and end-stage renal disease, as the therapy can replace partial renal function and survive the patients. In 2015, approximately 553,000 patients in China were treated with hemodialysis, and the number was much greater than that of patients undergoing peritoneal dialysis [4]. The incidence of depression and anxiety in patients with hemodialysis is significantly higher than that in the normal people due to the long-term disease-incurred torture and treatment-induced huge economic burden. As shown in a cross-sectional study in northern China, the mobility of depression in such patients is 29.1% [5, 6]. Moreover, these ne-

gative emotions can further adversely affect prognosis and quality of life of patients [7, 8].

Multiple studies have demonstrated that nursing care interventions alleviate negative emotions (such as depression and anxiety) and improve quality of life and renal function of patients undergoing hemodialysis. However, the results of the studies are inconsistent due to the differences in study design and evaluation indicators [9-11]. Results from two meta-analyses showed that psychological intervention could effectively improve quality of life or negative emotions of patients undergoing hemodialysis [9, 10]. Nevertheless, according to the finding of a study, care interventions could not improve quality of life of patients [11]. In addition, a study also showed that continuing care interventions helped alleviate negative emotions of chronic renal failure patients who received hemodialysis, improved their self-management and treatment compliance, and reduced the incidence of complications [12]. Comprehensive nursing intervention is defined as adoption of various nursing regimens to deal with different aspects of a problem or many problems concerned [13]. Frequently used nursing care including psychological interventions and continuing care, and they can improve negative emotions, quality of life and prognosis of patients when used in the care of a variety of diseases including kidney diseases [14, 15].

Therefore, the purpose of this study was to evaluate the role of comprehensive nursing interventions based on health education, cognitive behavioral psychology and continuing nursing in the care of patients undergoing hemodialysis, and to know its effects on negative emotions (anxiety and depression), quality of life and renal function, providing scientific evidence for improving the care effects of post-hemodialysis patients.

Materials and methods

Study subjects

A total of 128 patients undergoing maintenance hemodialysis in the Department of Nephrology of The Second Affiliated Hospital of Hainan Medical University between January 2017 and December 2017 were selected as subjects in this study. The inclusion criteria

included: patients with an age of 18 years or older; need of maintenance hemodialysis for chronic renal failure or end-stage renal disease, and the dialysis duration no less than 3 months; sober mind and normal intelligence, without cognitive impairment; signed informed consent. The exclusion criteria included: patients with other concurrent serious disease; cognitive impairment, mental illness, or inability to communicate verbally; previous other dialysis or kidney transplantation. This study was approved by the Ethics Committee of The Second Affiliated Hospital of Hainan Medical University.

Grouping and intervention

During the study, two patients who refused to participate in the study were removed, other 128 hemodialysis patients were randomly allocated to the conventional care group (n=64) and the comprehensive nursing group (n=64) in accordance with the random number table. Both groups of patients received conventional nephrological treatment, including hemodialysis, active treatment of primary diseases, control of heart failure and infection, and maintenance of electrolyte balance. In addition, the conventional care group received conventional care interventions, including post-admission education, dialysis nursing, medication and nutritional guidance, and regular follow-ups after discharge. In addition to conventional interventions, the comprehensive nursing group was also given the following nursing care: (1) Health education, during hospitalization, doctors and nurses from the Nephrology Department gave regular health education lectures on nephropathy, once or twice a week. The health education program included nephropathy treatment-related (including dialysis) knowledge and skills of mental adjustment. (2) Cognitive behavior intervention, communications with patients were made to know their psychological pressure and main problems and helped them to recognize their own unreasonable beliefs (including absolute demands, asking for subjective wishes regardless of objective reality, over-generalization and extremely terrible characteristics), negative emotions and abnormal performance caused by these problems [16]. Patients were guided according to their distinctive mental status to gradually learn to deal with the problems reasonably, make correct self-cognition, ac-

tivate their subjective initiatives, correct mistakes with reasonable cognition, reestablish cognitive structure, and challenge, debate and change their own irrational beliefs by continuous questioning. In this way, they could learn and gradually master methods of debating irrational beliefs. (3) Patients were instructed to do trainings on progressive relaxation, which included making slow and deep breathes according to the directions of the investigator and relaxing the muscles of the whole body. Efforts were also made to eliminate psychological symptoms of anxiety, depression and tension of patients. (4) Extended care, after discharge, patients continued to receive care interventions by telephone, WeChat or other means of communication on the internet, and nursing care and rehabilitation guidance, including self-management, nutritional guidance and relaxation trainings. In this study, the nursing care program started from admission and lasted until 3 months after discharge. The caregivers who provided psychological intervention had received trainings related to psychological intervention.

Observation measures

Renal function: For the two groups of patients, changes in creatinine and urea in blood, urine and dialysates were detected before and after intervention, and the ultrafiltration volume in peritoneal dialysis and urine volume were recorded. The Ccr and KT/V were calculated.

Depression and anxiety: The SDS and SAS were utilized to evaluate depression and anxiety states of patients at admission and completion of care interventions, respectively [17, 18]. The SDS scores lower than 50 indicate no depression, 50-69 are mild depression, 60-69 are moderate depression, 70 or higher are severe depression. The SAS scores lower than 50 points indicate normal state, 50-59 are mild anxiety, 60-69 are moderate anxiety, and 70 or higher are severe anxiety.

Quality of life: The quality of life of patients was assessed by the Kidney Disease Quality of Life-36 (KDQOL-36TM) questionnaire at admission and 3 months after discharge [19]. The questionnaire consists of 36 items, they were used to evaluate quality of life of patients from five dimensions, including physical activity, mental state, burden of kidney disease, symptoms of kidney disease and effects of kidney

disease. The KDQOL-SF-36TM version 1.3 was used to record data, automatically convert the score of each item and calculate the total scores of each dimension, the higher the scores, the better quality of life of patients.

Statistical analysis

Measurement data were expressed as mean ± standard deviation. Comparison of the means of measurement data between the two groups were made with the use of an independent-samples t test. Categorical variables were expressed by constituent ratio, and the between-group differences were compared using two-sided x^2 test. The changes in scores of renal function, depression, anxiety and quality of life between the two groups were compared before and after intervention by paired t-test. An independent sample t test was used to compare the differences in changes of renal function, depression, anxiety and quality of life scores. The significance level was set as two-sided α=0.05. Statistical analysis was conducted on the data with the use of the SPSS software, version 20.0.

Results

Basic information of patients

A total of 128 patients were randomly allocated to the conventional care group and comprehensive nursing group, with 64 cases in each group. During the intervention period, two patients were lost to follow up and one dropped out in the conventional care group; one patient was lost to follow up and one dropped out in the comprehensive nursing group. Hence, the patients enrolled in the conventional care group and the comprehensive nursing group were 61 and 62 respectively (**Figure 1**). The baseline and clinical characteristics of both groups were presented in **Table 1**. There were no significant differences in age, sex, education, marital status, family income, ways of medical payment, dialysis time and primary disease between the two groups, so the baseline data were similar (all P>0.05).

Renal functions of patients before and after intervention

The measurements of renal function of both groups at admission and 3-month follow-up after discharge were provided in **Table 2**. The
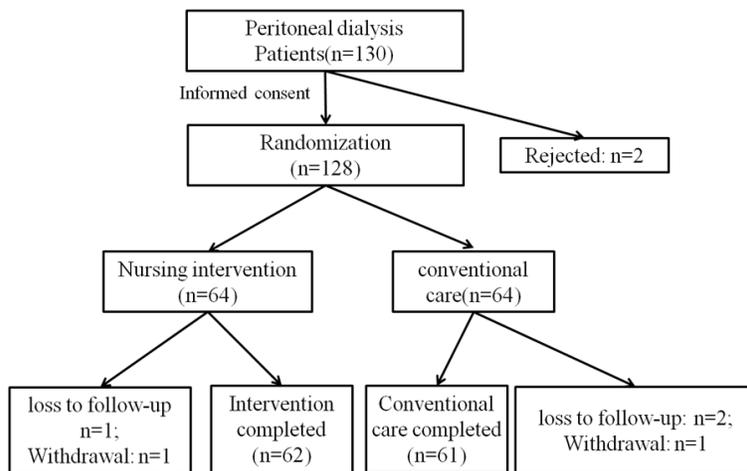
Figure 1. Inclusion flow chart of research subjects.

groups at admission (all P> 0.05), but the scores of both groups were improved at 3 months after discharge (paired t test, before and after intervention, all P<0.001). The improvements in physical activity, mental state, burden of kidney disease, symptoms of kidney disease and effects of kidney disease of the comprehensive nursing group was greater than those of the conventional care group (all P<0.05).

Discussion

CCR and KT/V scores of the comprehensive nursing group at admission were 55.67±18.46 mL/min/1.73 m² and 1.88±1.09 mL/min/1.73 m² respectively; the corresponding scores of the conventional care group were 59.25± 19.38 mL/min/1.73 m² and 2.12±1.23 mL/min/1.73 m² respectively. There were no significant differences between the two groups (all P>0.05). The CCR and KT/V of both groups improved at 3-month follow-up after discharge (paired t-test before and after intervention, all P<0.001). The differences of CCR and KT/V scores before and after intervention in the comprehensive nursing group were higher than those of the conventional care group (all P< 0.05).

Comparison of improvements in anxiety and depression before and after intervention

Before intervention, the depression scores of the comprehensive nursing group and the conventional care group were 64.02±28.58 and 64.15±30.44 respectively, with no significant difference. At completion of intervention, the scores of depression and anxiety in both groups dropped significantly (all P<0.01), but the improvements in depression and anxiety scores were significantly greater in the comprehensive nursing group than in the conventional care group, with *P* values of 0.041 and 0.029 respectively (**Table 3**).

Comparison of improvements in quality of life before and after intervention

Table 4 shows no differences in the scores of each item of the KDQOL-36TM between the two

In the past decade, CKD has become one of the major global public health concerns. The CKD inpatients accounted for 4.8% of all hospitalized patients in China in 2015, and the percentage was higher than that of patients with other chronic non- infectious diseases. The age-adjusted incidence of end-stage renal disease patients undergoing hemodialysis was 122.19 cases per million patients, and it was higher than the previous value and higher than that of peritoneal dialysis [4, 20]. Due to the irreversible disease course of hemodialysis patients, treatment constraints to their lives and economic pressure, patients are inclined to develop negative emotions including anxiety and depression, which affect their quality of life [21, 22]. Therefore, how to avoid or reduce negative emotions and improve quality of life of hemodialysis patients has become a focus for research on post-hemodialysis care [23, 24].

To improve the care effect of hemodialysis patients, many intervention regimens have been used for hemodialysis patients, such as education, psychology, and continuing care. The content of assessments includes negative emotions, quality of life and some other clinical indicators [25-27]. Cognitive behavioral intervention is a widely used psychotherapy among psychological care interventions. It can change poor cognition by changing thoughts or beliefs and behavior of patients to eliminate their bad mood and behavior. It has already been used for nursing care of hemodialysis patients [28, 29]. Some randomized controlled studies have

Table 1. Single-factor analysis of enumeration data between comprehensive intervention group and conventional care group

Characteristic	Conventional care group (n=61)	Comprehensive Intervention group (n=62)	x^2/t	P
Gender			0.654	0.419
Male	34 (55.74)	39 (62.90)		
Female	27 (44.26)	23 (37.10)		
Age (years)	52.87±10.46	55.29±12.68	1.534	0.250
Education level			0.998	0.318
High school and below	35 (57.38)	41 (66.13)		
College and above	26 (42.62)	21 (33.87)		
Marital status			0.721	0.396
Unmarried/Bereft of spouse/Divorce	5 (8.20)	8 (12.90)		
Married	56 (91.80)	54 (87.10)		
Family monthly income			0.692	0.405
Less than 6,000 yuan	24 (39.34)	29 (46.77)		
More than 6,000 yuan	37 (60.66)	33 (53.23)		
Medical Payment Method			1.217	0.270
Medical insurance/New rural cooperative medical system	56 (91.80)	53 (85.48)		
At their own expense	5 (8.20)	9 (14.52)		
Dialysis time (month)	43.56±13.95	47.26±15.36	1.398	0.165
Primary cause			1.482	0.687
Glomerulonephritis	28 (45.90)	24 (38.71)		
Hypertensive nephropathy	12 (19.67)	16 (25.81)		
Diabetic nephropathy	12 (19.67)	10 (16.13)		
Other	9 (14.75)	12 (19.35)		

Table 2. Improvement of renal functions in comprehensive intervention group and conventional care group

Measurements	Intervention condition	Conventional care group (n=61)	Comprehensive Intervention group (n=62)	t	P
CCR (mL/min/1.73 m²)	Before intervention	59.25±19.38	55.67±18.46	1.049	0.960
	After intervention	61.57±21.34	59.63±20.19	0.518	0.605
	Difference value	2.32±2.89	3.96±4.78	2.298	0.023
	t	6.270	6.523		
	p	<0.001	<0.001		
KT/V (mL/min/1.73 m²)	Before intervention	2.12±1.23	1.88±1.09	1.457	0.254
	After intervention	2.30±1.67	2.21±1.89	0.397	0.691
	Difference value	0.18±0.29	0.41±0.62	2.628	0.010
	t	4.848	5.207		
	p	<0.001	<0.001		

indicated that cognitive behavioral intervention significantly improves quality of life of end-stage renal disease patients undergoing hemodialysis, alleviate their depression and promote treatment compliance [29]. Continuing care refers to the care provided to ensure patients to receive continuing care in different health care locations (generally from the hospital to the community), including development of discharge programs, family visits and guidance [30]. A randomized controlled trial showed that continuing care intervention based on telephone follow-ups could significantly reduce depression, anxiety and stress in hemodialysis patients [31]. In the present study, after psychological care and continuing care (primary cognitive behavior) were performed, the patients in the comprehensive nursing group sh-

Table 3. Depression improvement in comprehensive intervention group and conventional care group

Measurements	Intervention condition	Comprehensive Intervention group (n=62)	Conventional care group (n=61)	t	p
SDS	Before intervention	60.83±22.67	64.02±28.58	0.686	0.494
	After intervention	51.02±20.59	60.06±28.91	2.000	0.048
	Difference value	9.81±19.32	3.96±10.79	2.069	0.041
	t	3.998	2.866		
	p	<0.001	0.006		
SAS	Before intervention	61.54±25.47	64.15±30.44	0.516	0.607
	After intervention	52.67±23.85	61.20±28.73	6.799	<0.001
	Difference value	8.87±19.11	2.95±8.49	2.214	0.029
	t	3.655	2.714		
	p	0.001	0.009		

Table 4. Quality of life in comprehensive intervention group and conventional care group

Quality of life	Intervention condition	Comprehensive Intervention group (n=62)	Conventional care group (n=61)	t	P
Physical activity	Before intervention	35.82±9.47	37.29±10.61	0.811	0.419
	After intervention	42.18±11.73	40.86±12.35	0.608	0.544
	Difference value	6.36±7.21	3.57±5.71	2.377	0.019
	t	6.946	4.883		
	P	<0.001	<0.001		
Mental state	Before intervention	40.36±11.27	42.81±13.65	1.086	0.300
	After intervention	51.63±13.56	45.78±14.19	2.338	0.021
	Difference value	10.37±22.05	2.97±10.91	2.353	0.020
	t	3.703	2.126		
	P	<0.001	0.038		
Nephrotic burden	Before intervention	16.07±6.26	18.03±8.74	1.432	0.155
	After intervention	26.19±10.53	21.27±9.35	2.738	0.007
	Difference value	10.12±22.65	3.24±9.64	2.186	0.031
	t	3.518	2.625		
	P	0.001	0.005		
Nephrotic symptoms	Before intervention	65.91±15.06	68.35±17.52	0.829	0.409
	After intervention	77.93±19.52	72.16±19.78	1.628	0.106
	Difference value	12.02±29.57	3.81±9.79		
	t	3.201	3.040	2.060	0.042
	P	0.002	0.002		
Nephropathy effect	Before intervention	48.61±16.76	52.49±19.23	1.193	0.235
	After intervention	62.49±20.58	56.18±21.68	1.656	0.100
	Difference value	13.88±28.83	3.69±10.56	2.594	0.011
	t	3.791	2.730		
	P	<0.001	0.008		

owed significantly greater improvements in depression, anxiety and quality of life than those in the conventional care group during hospitalization and after discharge, similar to the findings of other studies [27, 32]. However, the effects of care interventions in hemodialy- sis patients are not completely consistent. For example, in a meta-analysis evaluating the impacts of care interventions on quality of life of patients with CKD, the comprehensive nurs- ing intervention regimen including multiple activities had substantial impacts on only the

dimensions of quality of life which covered symptoms, sleep, dialysis and encouragement, but it had no significant impacts on the dimensions of effects of kidney disease and burden of kidney disease. The results were consistent in subgroup analysis of hemodialysis patients [25]. However, the author also pointed out that the results of this meta-analysis were highly heterogeneous and should be explained with caution. The effect of care interventions on negative emotions and quality of life of hemodialysis patient needs further evaluation due to the different intervention methods, patient characteristics and evaluation indicators.

Lower quality of life score is often associated with poor outcomes in hemodialysis patients [33]. Results of two randomized controlled studies indicate that compared with conventional care, cognitive behavioral care intervention improved the hemodialysis compliance rate of chronic renal failure patients undergoing hemodialysis, and significantly reduced the level of renal function indicators [34, 35]. In the current study, the renal function indicators of patients in both groups were significantly improved after intervention, but the comprehensive nursing group got significantly greater improvements than the conventional care group. This may be attributable to the fact that care interventions are helpful to enhance patients' confidence in treatment and increase their treatment compliance, leading to better efficacy.

An advantage of the present study is adoption of randomization; because of that, the two groups were well-balanced and comparable in baseline characteristics. However, there are still some limitations, such as lack of blind design and failure to avoid the impacts of some biases. In future research, intervention randomized controlled trials with large sample size and definite evaluation indicators are needed to evaluate the effects of comprehensive nursing interventions on improving negative emotions, quality of life and renal function of hemodialysis patients. In this way, more powerful evidence can be obtained for effectiveness of comprehensive nursing interventions in hemodialysis patients.

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Disclosure of conflict of interest

None.

Address correspondence to: Xiujiao Wang, Department of Blood Purification Room, The Second Affiliated Hospital of Hainan Medical University, No.48 Baishuitang Road, Haikou 570311, Hainan Province, China. Tel: +86-0898-66808115; Fax: +86-0898-66808115; E-mail: wangxiujiaortfg55@163.com

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