Original Article
Analysis on the application value of responsibility system holistic nursing in patients with renal insufficiency after hemodialysis

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Abstract: Objective: This study was set out to analyze the application value of responsibility system holistic nursing in patients with renal insufficiency after hemodialysis. Methods: Totally 123 patients with renal insufficiency admitted to our hospital were selected and assigned into group A (67 cases) and group B (56 cases). Patients in group A received responsibility system holistic nursing intervention in the treatment of hemodialysis, while those in group B were treated with conventional nursing intervention. The renal function indexes, compliance and the complication rate were observed and recorded in the two groups. In addition, Short Form of the Profile of Mood States (POMS-SF) was employed to evaluate the emotional state and hemodialysis stressor scale (HSS) was adopted to assess the pressure of patients in the two groups. Moreover, the nursing satisfaction was assessed by self-made nursing satisfaction questionnaire, and their quality of life was determined by Generic Quality of Life Inventory-74 (GQOL-74). Results: Compared with group B, patients in group A presented significantly lower renal function indexes (P < 0.05), markedly better POMS-SF score (P < 0.05), remarkable lower HSS score (P < 0.05), and notably higher compliance after nursing intervention (P < 0.05). What's more, the total incidence of nursing complications in group A was significantly lower (P < 0.05), the nursing satisfaction (P < 0.05) and quality of life score (P < 0.05) were both remarkably higher than those in group B. Conclusion: Responsibility system holistic nursing is definitely conducive to patients with renal insufficiency after hemodialysis. It can improve patients' compliance during treatment, facilitate their renal function indexes, reduce depression, fear and negative emotions, effectively alleviate psychological pressure, reduce the occurrence of complications, and enhance their quality of life.

Keywords: Responsibility system holistic nursing, renal insufficiency, hemodialysis, quality of life

Introduction

Renal insufficiency is caused by the damage of the glomerular, resulting in the disorder of the body in regulating water and electrolytes [1]. The number of patients with renal insufficiency continues to increase worldwide, in parallel with the development of society and population aging [2]. Clinically, hemodialysis is the preferred treatment for patients with renal insufficiency. However, as a long-term treatment [3, 4], it will cause many needs and problems of patients, which are not able to be handled by patients themselves [5, 6]. Therefore, effective nursing intervention is an extremely important and indispensable part for renal insufficiency patients when receiving hemodialysis treatment.

Patients receiving hemodialysis always accompany with serious physical health problems who need constant attention and care, plus the heavy workload of hemodialysis wards, nursing staff have to provide multiple services for each patient [7], which routine nursing intervention cannot meet otherwise. Therefore, it is necessary to develop a continuous nursing plan for dialysis patients [8], aiming to improve their compliance and obtain better therapeutic effects [9]. Responsibility system holistic nursing is a kind of targeted and planned holistic nursing carried out by responsible nurses for the physical and mental health of patients after admission, including accurate assessment of patients' conditions [10, 11], strengthening communication with patients and their families, and encouraging patients to actively cooperate

with nursing staff, in an attempt to optimize patients' physiological and psychological functions after nursing intervention [12, 13]. There have been extensive studies on the implementation of nursing intervention for hemodialysis patients. For example, it has been reported in the previous study [14], for hemodialysis patients, psychological nursing intervention can enormously enhance patients' psychological well-being, extend their lifecycle and elevate their quality of life.

In present study, the application value of responsibility system holistic nursing for patients with renal insufficiency after hemodialysis was analyzed, aiming to provide a feasible nursing intervention for renal insufficiency patients undergoing hemodialysis.

Materials and methods

General information

A total of 123 patients with renal insufficiency admitted to our hospital from February 2016 to March 2017 were enrolled and assigned into group A (67 cases) and group B (56 cases). There were 45 males and 22 females in group A, among whom 21 cases of chronic pyelonephritis, 19 cases of diabetic nephritis, and 27 cases of chronic glomerulonephritis. While there were 33 males, 23 females in group B, and the number of cases with chronic pyelonephritis, diabetic nephropathy and caseschronic glomerulonephritis was 20, 20 and 19 respectively.

Inclusion and exclusion criteria

Patients fulfill the following criteria simultaneously were included in this study: patients diagnosed as renal insufficiency [15], without dependence on alcohol/drugs, nor allergic to drugs used in hemodialysis, who were willing to accept relevant nursing and treatment, and were able to correctly understand the relevant contents of the scale and give answers. This study was approved by the Medical Ethics Committee of our hospital, and the subjects and their families had been informed and signed the informed consent. In contrast, patients with multiple organ dysfunction, severe cardiovascular disease, heart failure, cognitive impairment, mental illness or family history of mental illness, or those who could not actively participate in this study were excluded.

Nursing methods

Patients in group B received routine nursing intervention in the course of hemodialysis treatment: patients were arranged for basic health education, with vital signs monitored regularly. Besides, they were encouraged during treatment, the balances of water-electrolyte and acid-base were maintained, and preventive care for complications and a good ward environment were provided.

Whereas, patients in group A were treated with responsibility system holistic nursing during hemodialysis treatment. The specific measures were as follows: multidisciplinary nursing teams (attending physicians, professional nurses, psychological counselors, dietitians) were set up to provide personalized care and services from admission to discharge. (1) Psychological intervention: to analyze the specific condition of each patient, and record the fear and doubts of the patients, especially those in long-term dialysis, who often give up themselves due to economic pressure and other factors. Therefore, it is necessary to take targeted customized communication for each patient and patiently answer each patient's questions, so as to clear their doubts and negative emotions. In addition, attention is paid to health education to elaborate the necessity, safety and advantages of hemodialysis, enhance patients' sense of security and confidence, eliminate patients' anxiety and fear, and keep them in the best state to actively cooperate with the treatment. (2) Dialysis nursing intervention: the nursing staff should observe and nurse the dialysis catheter regularly to avoid exudation. It is also necessary to keep the dressing dry and instruct the patient to prevent the dressing from soaking when washing, and change the dressings once a day at regular intervals. Nursing staff should pay attention to the prohibition of infusion and blood drawing in the deep venous catheter. In case of massive fluid replenishment and rescue, the catheter should be sealed to avoid catheter blockage. For patients with indwelling femoral vein catheter, it is necessary to urge them to stay in bed to avoid slipping of indwelling catheter. (3) Nursing prevention of complications: during dialysis, nursing staff should be arranged to record blood pressure, breathing, body temperature and pulse at an interval of 30-60 minutes for each patient, while for critically ill patients, a record should be made at an interval of 15-30 minutes. Keep

an eye out for dialyzer reaction, muscle spasm, arrhythmia and other complications, and take immediate measures if found. Besides, the color, blood flow and venous pressure of blood and dialysate were closely observed, and abnormalities were timely handled during dialysis. (4) Infection intervention: most patients with renal insufficiency have low immunity, so when patients are undergoing hemodialysis, nursing staff should be strictly required to carry out aseptic operation. The catheter and knife edge should be closely observed to avoid the occurrence of oozing and other conditions. In case of infection, they should report to the doctor in time and give corresponding treatment for infection. (5) Nutritional intervention: according to the patient's physical condition, different nutritional packages are formulated, and the diet, meal time and amount of food consumed by each patient are reasonably arranged. The total course of nursing intervention of the two groups was 4 weeks.

Observation indicators

(1) Before and after the nursing intervention, 5 mL venous blood on an empty stomach were taken from all the patients in the early morning, and the serum was separated by centrifugation at a speed of 670.8 (× g) for 10 min at 20-25°C for later use. The renal function indexes (creatinine, urea nitrogen, uric acid, β2-microglobulin) of patients in the two groups were determined by an automatic chemiluminescence immuno-analyzer (Wuhan Easydiagnosis Biomedicine, Co., Ltd., Article No.: CF10). Meanwhile, systolic and diastolic blood pressures were recorded before and after nursing intervention.

(2) The emotional state of patients before and after nursing intervention in the two groups was assessed by Short Form of the Profile of Mood States (POMS-SF) [16], which was divided into the following five subscales: tension-anxiety, anger-hostility, confusion-bewilderment, depression-dejection, fatigue-inertia, and vigor-activity. The higher the score of the vigor-activity scale, the better the emotional state, while things were reversed when came to the other four scales, that is, the higher the score, the worse the emotional state.

(3) Hemodialysis stressor scale (HSS) was employed to evaluate the pressure of patients in the two groups before and after the nursing intervention [17]. It was divided into three dimensions: physiological stressors, psycho-logical stressors and social stressors. On a 116-point scale, the higher the score, the higher the patient's stress level.

(4) The self-made nursing satisfaction questionnaire was adopted to identify the nursing satisfaction of patients [18], mainly including attitude, personality, wearing, and operating proficiency. There were 20 questions, each of which scored 5 points. The score and corresponding satisfaction evaluation was as follows: < 70 points for unsatisfactory, 70-89 points for basic satisfaction and ≥ 90 points for satisfaction. Satisfaction rate = (satisfaction + basic satisfaction)/total number of cases × 100%.

(5) The quality of life after nursing intervention was assessed by Generic Quality of Life Inventory-74G (QOL-74) [19], which was divided into four dimensions: physical function, psychological function, social function and living status. With a total score of 100 points in each dimension, the higher the score, the better the quality of life.

(6) Compliance [20] was divided into complete compliance, partial compliance and non-compliance. Complete compliance: patients followed the doctor's advice and cooperate with the nursing staff's nursing treatment process. Partial compliance: patients completed most of the nursing care and treatment under the supervision of nursing staff. Noncompliance: patients completely disobeyed the medical advice and did not cooperate with the nursing staff.

(7) The complications occurred after nursing intervention were observed and recorded.

Statistical analysis

The collected data was statistically analyzed using SPSS22.0 (SPSS, Inc., Chicago, IL, USA) in this study. The counting data were expressed as cases/percentage [n/(%)] and analyzed by a chi-square test. Chi-Square Continuity Correction was adopted in the case that theoretical frequency in chi-square test was less than 5. The measurement data were expressed in the form of mean ± standard deviation ($\bar{x} \pm sd$), among which, intergroup comparison were analyzed by a t-test and comparison within groups was conducted by a paired t test. P < 0.05 indicated a statistically significant difference.

Table 1. General clinical data of patients in the two groups [n (%)] ($\overline{x} \pm$ sd)

Categories	Group A (n = 67)	Group B (n = 56)	t/χ^2 value	P value
Gender			0.944	0.345
Male	45 (67.16)	33 (58.93)		
Female	22 (32.84)	23 (41.07)		
Age (years)	42.51±2.17	43.21±2.16	1.785	0.077
BMI (kg/m^2)	23.5±3.6	22.7±3.5	1.243	0.216
Pathogeny			0.861	0.650
Chronic pyelonephritis	21 (31.24)	17 (30.36)		
Diabetic nephropathy	19 (28.36)	20 (35.71)		
Chronic glomerulonephritis	27 (40.30)	19 (33.93)		
Residence			0.279	0.779
Urban	34 (50.75)	27 (48.21)		
Rural	33 (49.25)	29 (51.79)		
Ethnicity			0.054	0.967
Han	41 (61.19)	34 (60.71)		
Ethnic minorities	26 (38.81)	22 (39.29)		
Education background			0.180	0.857
≥ High school	36 (53.73)	31 (55.36)		
< High school	31 (46.27)	25 (44.64)		
Smoking history			0.012	0.990
Yes	43 (64.18)	36 (64.29)		
No	24 (35.82)	20 (35.71)		
Drinking history			0.902	0.367
Yes	44 (65.67)	41 (73.21)		
No	23 (34.33)	15 (26.79)		
History of diabetes mellitus			0.128	0.898
Yes	45 (67.16)	37 (66.07)		
No	22 (32.84)	19 (33.93)		

Results

General information

No significant differences were identified in general clinical baseline data including gender, age, BMI, etiology, residence, ethnicity, education background, smoking history, drinking history and diabetes history between the two groups (P > 0.05) (**Table 1**).

Improvement of biochemical indicators in the two groups before and after nursing

Before nursing intervention, no significant differences were observed in the expression levels of creatinine, urea nitrogen, uric acid and β2-microglobulin between the two groups (P > 0.05). While after nursing intervention, all the above indicators markedly decreased (P < 0.05), with those in group A being significantly lower than group B (P < 0.05) (**Table 2**).

Comparison of POMS-SF score between the two groups before and after nursing

The POMS-SF score calculated by tension-anxiety, anger-hostility, confusion-bewilderment, depression-dejection, fatigue-inertia, and vigor-activity scores did not differ remarkably between the two groups before nursing intervention (P > 0.05), while except the increased vigor-activity, all the rest four scales decreased markedly in the two groups after nursing intervention (P < 0.05). Patients in group A presented significant lower tension-anxiety, anger-hostility, confusionbewilderment, depression-dejection, fatigue-inertia scores, while a markedly higher vigor-activity score than those of group B (**Table 3**).

Comparison of HSS score between the two groups before and after nursing

The scores of physiological stressors, psychological stressors and social stressors did not display significant differences between the two groups before nursing intervention (P > 0.05), while after that, all these three indicators dropped significantly. The scores of physiological stressors, psychological stressors and social stressors in group A were significantly lower than those in group B (P < 0.05) (**Figure 1**).

Comparison of compliance score between the two groups after nursing

A significant difference was observed in patients' compliance scores between the two groups after nursing intervention (P < 0.05), with that of Group A being markedly higher than group B (P < 0.05) (**Table 4**).

Table 2. Improvement of biochemical indicators ($\overline{x} \pm sd$)

Groups		Creatinine (mol/L)		Urea nitrogen (mmol/L)		Uric acid (mol/L)		β2-microglobulin (g/ml)	
		Before nursing intervention	After nursing intervention	Before nursing intervention	After nursing intervention	Before nursing intervention	After nursing intervention	Before nursing intervention	After nursing intervention
Group A	67	215.66±5.82	140.76±3.95	18.44±1.23	6.48±0.88	425.07±8.69	342.56±7.05	13.51±2.89	10.73±2.67
Group B	56	215.68±5.84	187.34±4.66	18.46±1.21	12.53±1.07	424.84±8.71	407.11±7.93	13.67±2.88	12.34±2.78
t	-	0.019	60.010	0.090	34.410	0.146	47.770	0.306	3.268
P	-	0.985	< 0.001	0.928	< 0.001	0.884	< 0.001	0.759	0.001

Table 3. POMS-SF score ($\overline{x} \pm sd$)

| Groups	n	Tension-anxiety		Depression-dejection		Anger-hostility		Vigor-activity		Fatigue-inertia		Confusion-bewilderment	
		Before nursing intervention	After nursing intervention	Before nursing intervention	After nursing intervention	Before nursing intervention	After nursing intervention	Before nursing intervention	After nursing intervention	Before nursing intervention	After nursing intervention	Before nursing intervention	After nursing intervention
Group A	67	5.51±1.92	2.46±1.23	4.33±1.44	2.21±0.87	4.31±1.08	2.21±0.99	2.81±1.09	5.49±1.89	4.92±1.23	2.99±1.19	4.89±1.04	2.77±1.01
Group B	56	5.53±1.94	3.91±1.21	4.36±1.46	3.23±1.05	4.34±1.09	3.16±1.03	2.74±1.12	4.43±1.87	4.94±1.21	3.67±1.20	4.85±1.03	3.48±1.03
t		0.057	6.559	0.114	5.893	0.153	5.203	0.350	3.113	0.090	3.144	0.213	3.848
P		0.954	< 0.001	0.909	< 0.001	0.879	< 0.001	0.727	0.002	0.928	0.002	0.831	0.002
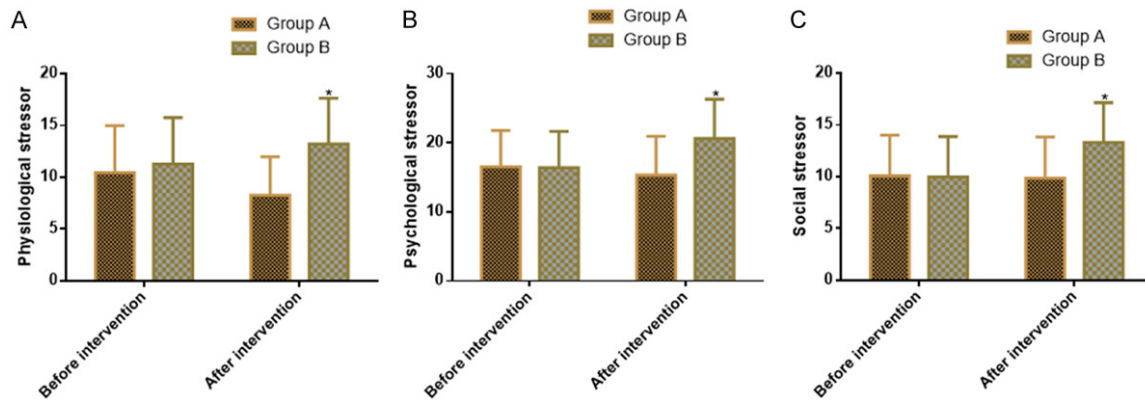
Figure 1. Comparison of HSS score between the two groups before and after nursing intervention. The scores of physiological stressors (A), psychological stressors (B) and social stressors (C) did not display any significant differences between the two groups before nursing intervention (P > 0.05), while after that, all these three indicators dropped significantly. The scores of physiological stressors, psychological stressors and social stressors in group A were significantly lower than those in group B (P < 0.05). Note: * indicates P < 0.05 when compared with group B after nursing intervention.

Table 4. Compliance [n (%)]

Categories	Group A (n = 67)	Group B (n = 56)	χ^2 value	P value
Complete compliance	49 (73.13)	20 (35.71)	17.31	< 0.001
Partial compliance	17 (25.37)	24 (42.86)	4.196	0.041
Non-compliance	1 (1.49)	12 (21.43)	12.831	0.001

Table 5. Improvement of complications [n (%)]

Categories	Group A (n = 67)	Group B (n = 56)	χ^2 value	P value
Hypertension	1 (1.49)	2 (3.57)	-	-
Respiratory and biliary tract infections	0 (0.00)	3 (5.36)	-	-
Hyperkalemia	1 (1.49)	2 (3.57)	-	-
Electrolyte disturbance	1 (1.49)	4 (7.14)	-	-
Total incidence	3 (4.48)	11 (19.64)	6.955	0.008

Comparison of complications between the two groups after nursing

The overall incidence of complications identified a significant difference after nursing intervention between the two groups (P < 0.05). Group A presented a remarkably lower one than that of group B (P < 0.05) (**Table 5**).

Comparison of nursing satisfaction between the two groups

There was a significant difference in nursing satisfaction between the two groups after nursing intervention (P < 0.05), and the nursing satisfaction of group A was significantly higher than that of group B (P < 0.05) (**Table 6**).

Comparison of GQOL-74 score between the two groups before and after nursing

The scores of physical function, psychological function, social function and living status did not show significant differences between the two groups before nursing intervention (P > 0.05), while after that, all these four indicators improved significantly. The scores of physical function, psychological function, social function and living status in group A were significantly higher than those in group B (P < 0.05) (**Figure 2**).

Discussion

Hemodialysis is considered as one of the most commonly used renal replacement therapy clinically, which can significantly increase the survival of patients with renal insufficiency. However, hemodialysis treatment can also produce significant side effects [21], such as reducing the patient's mobility and causing a variety of complications [22], which will not only induce great physical and psychological stress [23, 24], but affect the patient's mental state and sleep quality [25]. Therefore, comfortable and effective nursing intervention during treat-

Table 6. Nursing satisfaction [n (%)]

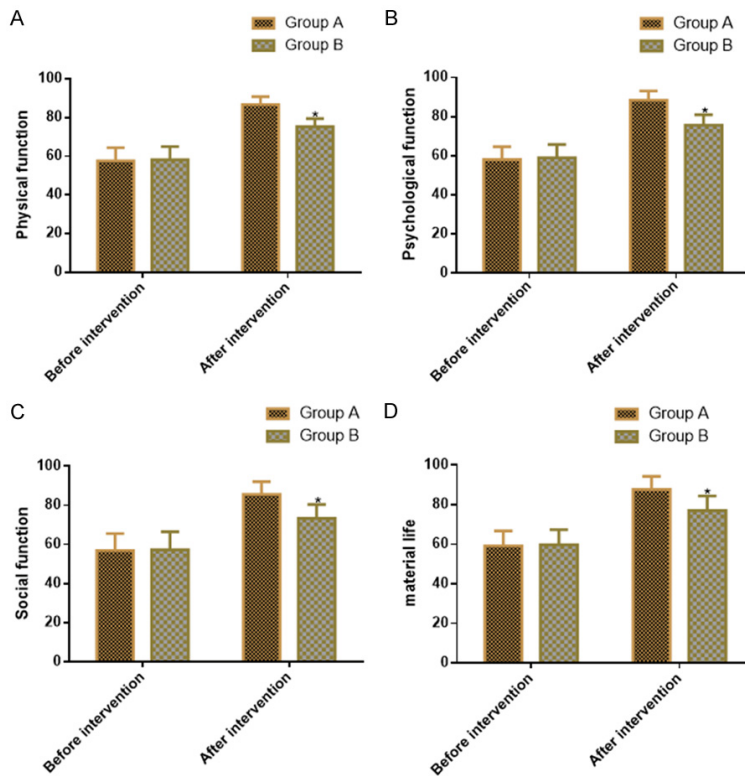| Categories	Group A (n = 67)	Group B (n = 56)	χ^2 value	P value
Very satisfied	54 (80.60)	18 (32.14)	-	-
Satisfied	12 (17.91)	24 (42.86)	-	-
Dissatisfied	1 (1.49)	14 (25.00)	-	-
Nursing satisfaction rate	66 (98.51)	42 (75.00)	15.741	< 0.001

Figure 2. Comparison of quality of life between the two groups before and after nursing intervention. The scores of physical function (A), psychological function (B), social function (C) and living status (D) did not identify any significant differences between the two groups before nursing intervention (P > 0.05), while after that, all these four indicators improved significantly (P < 0.05). The scores of physical function, psychological function, social function and living status in group A were significantly higher than those in group B (P < 0.05). Note: * indicates P < 0.05 when compared with group B after nursing intervention.

tion for patients with chronic kidney disease can reduce the comfort injury of patients, which will not only improve the physical function of patients, but also promote the recovery, increase energy, and improve the symptoms of depression and fatigue. In current study, the biochemical indicators of patients in group A were significantly better than those in group B after nursing intervention, indicating that the implementation of responsibility system holistic nursing can effectively improve the renal function of patients. What's more, patients in group A exhibited markedly better POMS-SF and HSS scores after nursing intervention than those in group B, suggesting that the application of responsibility system holistic nursing can reduce the level of depression and fear, as well as the psychological pressure and negative emotions of patients.

Some studies have pointed out that non-compliance with prescribed treatment regiments is a common problem in hemodialysis treatment, and is related to the increase of morbidity and mortality [29]. For example, in Wang's study [30], nursing intervention during dialysis treatment for patients with end-stage renal disease can improve their compliance. The present study showed that, compared with group B, the compliance of patients in group A was significantly higher, and the complications were significantly lower after nursing intervention, suggesting that responsibility system holistic nursing can improve the compliance of patients and reduce the incidence of complications during treatment. Still, studies have revealed that [31] the quality of life is a predictor for outcome evaluation of a disease. Patients in group A demonstrated markedly higher quality of life

ment is of great importance to alleviate the negative psychology of patients [26].

In this study, patients with renal insufficiency who received hemodialysis presented significantly improved condition after responsibility system holistic nursing intervention. It offers individualized, complete and sustained professional nursing services for each patient [27]. In the study of Melo GAA [28], nursing interven-

than group B after nursing intervention in this study, indicating that patients' quality of life can be improved through the application of responsibility system holistic nursing.

Taken together, the responsibility system holistic nursing is definite effective in patients with renal insufficiency after hemodialysis. On the one hand, it can improve patients' compliance during treatment, boost patients' renal function indexes, and reduce patients' depression, fear and negative emotions. On the other hand, it can effectively relieve patients' psychological pressure, reduce complications, and improve patients' quality of life.

Disclosure of conflict of interest

None.

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