Effect of Nutritional Nursing on the Quality of Life, Nutritional Status, and Complications in Elderly Uremic Patients Receiving Peritoneal Dialysis

Heng Yin
Cui Xia
Pengfei Xiao
Huili Ni

Objective: The aim of this study is to explore the role of nutritional nursing in the quality of life, nutritional status, and complications in elderly uremic patients receiving peritoneal dialysis (PD). Methods: We enrolled 205 uremic patients who were treated with PD in our hospital from March 2018 to April 2019 as the research subjects. Then we grouped them according to different nursing methods: 116 cases receiving nutritional nursing were assigned to the research group (RG) while the other 89 cases receiving routine nursing to the control group (CG). Clinical biochemical markers were detected by the biochemistry analyzer, the nutritional status determined by the Modified Quantitative Subjective Global Assessment (MQSGA), the anxiety and depression intensity assessed by Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS), the sleep quality assessed by the Pittsburgh Sleep Quality Index(PSQI), the nursing satisfaction level assessed by the hospital's self-made nursing satisfaction questionnaire, and the quality of life evaluated by the Quality of Life Questionnaire (QLQ-C30). The complication rate in patients was monitored. Results: The improvement of clinical biochemical markers after nursing was better in RG than in CG. The decrease in the MQSGA score, SAS score, SDS score, and PSQI score after nursing was sharper in RG than in CG. Compared with CG, RG had a remarkably lower complication rate, a notably higher nursing satisfaction level, and a remarkably better quality of life. Conclusion: Nursing intervention for elderly uremic patients receiving PD can enhance the quality of life of patients, improve the nutritional status, promote the recovery from the disease, and reduce the complication rate.

Keywords: nutritional nursing, uremia in elderly patients, peritoneal dialysis, quality of life, nutritional status, complications

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INTRODUCTION

Chronic kidney disease, a public health concern with an increasingly higher incidence around the world that can easily trigger cardiovascular and all-cause deaths [1], can finally progress into uremia [2]. Uremia affects almost all body systems, leading to decreased renal function, neuromuscular dysfunction, and cognitive impairments in patients [3], as well as severe diseases such as psychiatric illness, heart failure, or other life-threatening complications [4]. Due to the clinical insufficiency in kidneys for transplantation,

dialysis is employed to stimulate renal function to treat uremia [5, 6]. Clinical

*Heng Yin# Department of Cardiology, Brain Hospital of Hunan Province, Changsha 410017, Hunan Province, China, Cui Xia# Department of Endocrinology, Brain Hospital of Hunan Province, Changsha 410017, Hunan Province, China, Pengfei Xiao Department of scientific research, Brain Hospital of Hunan Province, Changsha 410017, Hunan Province, China, Huili Ni Department of Spinal surgery, Brain Hospital of Hunan Province, Changsha 410017, Hunan Province, China, Heng Yin# and Cui Xia# contributed equally to this work as co-first author, *Corresponding author:Huili Ni , Department of Spinal surgery, Brain Hospital of Hunan Province, 427th Section 3, Furong Middle Road, Yuhua District, Changsha 410017, Hunan Province, China(E-mail: 584276810qq.com)*

studies revealed that the severity of depression in patients after dialysis can predict patient survival independently, and that depression can worsen the illness of patients with chronic kidney disease, leading to an increase in patient mortality and hospitalization rates and a decrease in the patient's treatment compliance and quality of life [7]. One former study suggested that nursing interventions during the dialysis can improve treatment compliance [8].

Malnutrition is very common in patients on dialysis, responsible for the poor prognosis [9]. The diet designed for patients on dialysis is of high calorie and high fat, which leads to insufficient dietary intake and even malnutrition in elderly patients, but the nutritional status can be enhanced by a modified diet [10]. Patients requiring dialysis are generally with serious physical health problems, in need of nursing interventions [11]. By performing nutritional nursing, the staff will analyze risk factors of malnutrition before the treatment, establish a communication platform between nurses and patients, and teach patients health education, disease knowledge, and advantages of the treatment method to strengthen patients' confidence in medical staff, help patients foster a correct understanding of nutritional nursing, and motivate patients to actively cooperate with the nursing staff [12, 13]. In a previous study, the nutritional nursing intervention improved the nutritional status of elderly hip fracture patients and was superior to routine nursing in enhancing the independence and cognitive function of patients [14]. The study by Ebrahimi H et al. [15] revealed that nutritional nursing can greatly enhance the nutrition and quality of life of patients receiving dialysis.

Here we performed the nutritional nursing intervention on elderly uremic patients receiving peritoneal dialysis (PD) to discuss the role of nutritional nursing in elderly uremic patients, hoping to provide a feasible nursing intervention for elderly uremic patients on PD.

MATERIALS AND METHODS

Basic Information

We enrolled 205 uremic patients who were treated with PD in our hospital from March 2018 to April 2019 as the research subjects. Then we grouped them according to different nursing methods: 116 patients receiving nutritional nursing were assigned to the research group (RG) while 89 patients receiving routine nursing to the control group (CG). Inclusion criteria: Patients diagnosed with uremia [16]; patients with stable vital signs, independent thinking ability, and complete clinical data; patients capable of understanding the relevant content of the scales and giving responses. This study has got ethical approval from the ethics committee of our hospital and obtained informed consent from all research participants and their families. Exclusion criteria: Patients who did not actively cooperate with this study or withdrew from the study midway; patients with mental illness or family history of mental illness; patients with a comorbid malignant tumor, severe organ dysfunction, or infectious diseases; patients lost to the follow-up.

Nursing Interventions

Patients in CG were given routine nursing. First, the nursing staff made routine nursing preparation for PD. Next, they taught patients uremia-related knowledge, health education, the principle and efficacy of PD treatment, and matters needing attention during and after the dialysis. Finally, they regularly checked the vital signs of patients, took measures to prevent complications, and arranged a good ward environment.

Patients in RG were given are given nutritional nursing. We assigned a nursing team with members from multiple disciplines to provide a nutritional nursing intervention and targeted services from the hospital admission to the discharge. (1) Psychological intervention: First, nursing staff assessed the condition of each patient and recorded the doubts and negative psychological status of patients facing economic pressure. Then, they communicated with patients in a targeted way and explained in detail the necessity, advantages, and safety of PD to enhance patients' confidence in the treatment, eliminate patients' anxiety and fear of disease, and make patients actively cooperate with the treatment in good mental status. (2) PD care: Nursing staff carefully checked the concentration, color, turbidity, and package of the dialysate regularly. In the case of a large amount of fluid replacement or rescue, the nursing staff should block the dialysis tube to avoid clogging of the catheter. (3) Nutritional care: Nursing staff calculated the required volume of various nutrients and water

according to the actual condition of each patient and designed a targeted diet for each patient to ensure scientific food intake (foods containing sodium or potassium needed additional attention). The dietary intake of patients was mainly high-quality protein, requiring lean meat, low protein, high vitamins, low fat, and sufficient water to facilitate smooth defecation and prevent anemia or disorders of calcium and phosphorus metabolism. (4) Care for complications: Nursing staff monitored the patient's condition just in case of colds and diarrhea. If colds and diarrhea occur, staff should inform the doctor to take active and effective measures to prevent the occurrence of peritonitis caused by gastrointestinal infection. Besides, the nursing staff kept the patient's wounds dry, guided the body cleaning, and regularly helped patients change their body positions to prevent pressure ulcers or deep vein thrombosis.

Outcome Measures

(1): We collected 5mL of venous blood from the elbow of patients before and after the nursing and centrifuged the blood sample at 1500Xg, 4℃, for 10min. Then the sample was stored in a -70℃ refrigerator. An automatic biochemistry analyzer was used to detect urea nitrogen, serum creatinine, serum albumin, and prealbumin according to kit instructions. Human urea nitrogen was from Shanghai Yiji Industries Co., Ltd. (Shanghai, China, DA6474113), serum creatinine from Shanghai Xiyuan Biotechnology Co., Ltd. (Shanghai, China, XY-033-04591), serum albumin from Shanghai Hengdu Biotechnology Co., Ltd. (Shanghai, China, A9511), and prealbumin from Wuhan Chundu Biotechnology Co., Ltd. (Wuhan, China, CD-1155-LIN). Enzyme-linked immunosorbent assay (ELISA) [17] was carried out to measure the concentrations of interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α), and high-sensitivity C-reactive protein (hs-CRP) according to kit instructions. Human hs-CRP was from Wuhan Weike Saisi Technology Co., Ltd. (Wuhan, China, ELA-E0821r), TNF-α from Shanghai Hengfei Biotechnology Co., Ltd. (Shanghai, China, 130-110-100), and IL-6 from Multisciences (Lianke) Biotech Co., Ltd. (Hangzhou, China, 70-EK106/2).

(2) The modified quantitative subjective global assessment (MQSGA) scale [18] worked to assess the food intake, gastrointestinal symptoms, and bodyweight of all patients during nursing. The score of this scale lies between 7 to 35 points. A score of ≤ 10 points represents normal nutritional status, a score from 11 to 19 points represents mild malnutrition, and a score of ≥ 20 points represents severe malnutrition. A higher score suggests a worse nutritional status.

(3) The 100-point Self-rating Anxiety Scale (SAS) [19] worked to assess the anxiety of patients. A score from 50 to 70 points represents mild anxiety, a score from 71 to 90 points represents modest anxiety, and a score over 90 points represents severe anxiety. A higher score suggests more severe anxiety.

(4) The 100-point Self-rating Depression Scale (SDS) [20] worked to evaluate the depression of patients. A score from 50 to 70 points represents mild depression, a score from 71 to 90 points represents modest depression, and a score over 90 points represents severe depression. A higher score suggests more severe depression.

(5) The 21-point Pittsburgh Sleep Quality Index (PSQI) scale [21] comprised of 7 components worked to evaluate the sleep quality of patients. A higher score suggests a worse sleep quality.

(6) Complications occurring in patients during nursing were recorded.

(7) The self-made nursing satisfaction questionnaire by our hospital worked to assess the satisfaction level of patients. It is a 100-point questionnaire with 20 items. A higher score suggests a higher nursing satisfaction level.

(8) The Quality of Life Questionnaire (QLQ-C30) [22] worked to determine the quality of life of patients. It includes 6 items: physiological function, health status, physical function, mental health, social function, and emotional function. Each item was assigned a score from 0 to 100 points. A higher score suggests a higher life quality.

Statistical Analysis

Data analysis was carried out on SPSS 25.0 (EASYBIO, Beijing, China) and data visualization was conducted on GraphPad Prism 7. The count data was represented in the form of the cases/percentage [n (%)] and its intergroup comparison was analyzed by the chi-square test. When the theoretical frequency in the chi-square test was below 5,

the continuity correction chi-square test was used. The measurement data was represented in the form of the mean ± standard deviation ($\bar{x}$ ± sd). Its comparison between before and after nursing within the group was analyzed by the paired t-test and its pairwise comparison was analyzed by the LSD-t test. A statistically significant difference was determined at when $P < 0.05$.

RESULTS

Basic Data

RG was comprised of 67 males and 49 females, 61 to 75 years of age, averagely aged (69.51 ± 5.15) years. CG was comprised of 43 males and 46 females, 58 to 72 years of age, averagely aged (68.64 ± 5.12) years. As shown in Table 1, the comparison between the two groups revealed no notable difference in age, sex, body mass index (BMI), cause of disease, place of residence, ethnicity, educational background, smoking, drinking, diabetes, and hypertension ($P > 0.05$).

Table 1
Basic information of patients in the two groups [n (%)] ($\bar{x}$ ± sd)

Factors	RG (n = 116)	CG (n = 89)	t/χ^2	P
Sex			1.806	0.178
Male	67(57.76)	43 (48.31)		
Female	49 (42.24)	46 (51.69)		
Age (year)			1.202	0.231
	69.51±5.15	68.64±5.12		
BMI (kg/m^2)			1.550	0.123
	24.54±3.45	23.78±3.52		
Causes			0.514	0.972
Diabetic nephropathy	33 (28.45)	25 (28.09)		
Chronic glomerulonephritis	23 (19.83)	19 (21.35)		
Polycystic kidney	14 (12.07)	13 (14.61)		
Obstructive nephropathy	21 (18.10)	14 (15.73)		
Hypertensive nephrosclerosis	25 (21.55)	18 (20.22)		
Place of residence			1.960	0.161
Urban area	59 (50.86)	54 (60.67)		
Rural area	57 (49.14)	35 (39.33)		
Ethnicity			0.179	0.672
Han nationality	66 (56.90)	48 (53.93)		
Minority nationality	50 (43.10)	41 (46.07)		

Educational background			0.029	0.863
≥ high school	47 (40.52)	35 (39.33)		
< high school	69 (59.48)	54 (60.67)		
Smoking			1.868	0.172
Yes	62 (53.45)	39 (43.82)		
No	54 (46.55)	50 (56.18)		
Drinking			0.217	0.641
Yes	64 (55.17)	52 (58.43)		
No	52 (44.83)	37 (41.57)		
Diabetes			0.019	0.889
Yes	65 (56.03)	49 (55.06)		
No	51 (43.97)	40 (44.94)		
Hypertension			0.139	0.708
Yes	63 (54.31)	46 (51.69)		
No	53 (45.69)	43 (48.31)		

Comparison of Biochemical Markers Between the Two Groups before and after Nursing

No marked difference was detected between the two groups before nursing in the expression of urea nitrogen, serum creatinine, serum albumin, and prealbumin before nursing (P > 0.05). As shown in Table 2, after nursing, the expression of all biochemical markers was in a markedly better situation than before nursing (P < 0.05), with markedly lower urea nitrogen and serum creatinine levels and markedly higher serum albumin and prealbumin levels in RG than in CG (P < 0.05).

Table 2
Biochemical markers in the two groups before and after nursing ($\bar{x}$ ± sd)

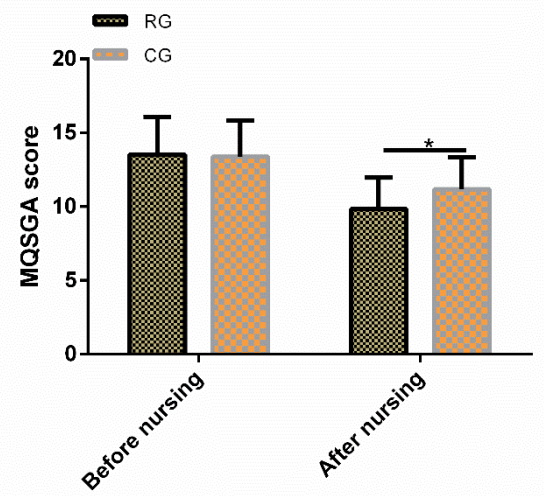
Group	n	Urea nitrogen (mmol/L)		Serum creatinine		Hemoglobin		Albumin	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
RG	116	17.19±3.23	8.95±2.11	809.13±121.03	413.76±98.45	90.36±10.21	114.67±11.23	15.53±2.56	28.85±3.32

CG	89	17.20 ±3.21	11.67± 2.15	807.25 ±122.46	653.37 ±99.38	91.04± 10.18	105.28± 11.09	15.37± 2.58	26.34± 3.29
t	-	0.022	9.073	0.109	17.200	0.473	5.966	0.442	5.386
P	-	0.982	< 0.001	0.912	< 0.001	0.636	< 0.001	0.658	< 0.001

Comparison of the Mqsga Score between the Two Groups before and after Nursing

The two groups were not markedly different in the MQSGA score before nursing (P > 0.05). After nursing, the MQSGA score markedly decreased in the two groups (P < 0.05), with a notably lower MQSGA score in RG than in CG (P < 0.05), as shown in Figure 1.

Figure 1
MQSGA scores in the two groups before and after nursing.



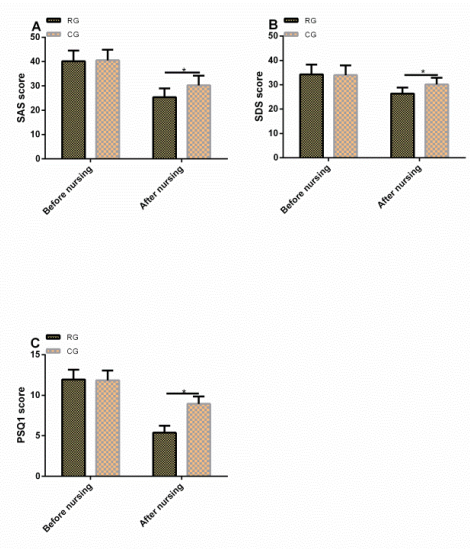
Before nursing, the MQSGA score in RG was not different from that in CG; after nursing, the MQSGA score in RG was remarkably lower than that in CG.

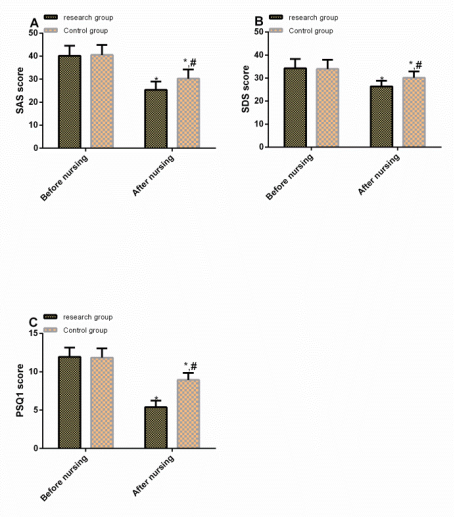
Note: *P < 0.05 when the two groups are compared

Comparison of the SAS Score, SDS Score, and PSQI Score between the Two Groups before and after Nursing

The two groups were not markedly different in the SAS score, SDS score, and PSQI score before nursing (P > 0.05). As shown in Figure 2, the SAS score, SDS score, and PSQI score markedly decreased after nursing in the two groups, with a markedly lower SAS score, SDS score, and PSQI score in RG than in CG (P < 0.05).

Figure 2. The SAS score, SDS score, and PSQI score in the two groups before and after nursing.





A. Before nursing, the SAS score in RG was not different from that in CG; after nursing, the SAS score in RG was remarkably lower than that in CG.

B. Before nursing, the SDS score in RG was not different from that in CG; after nursing, the SDS score in RG was remarkably lower than that in CG.

C. Before nursing, the PSQI score in RG was not different from that in CG; after nursing, the PSQI score in RG was remarkably lower than that in CG.

Note: * $P < 0.05$ when the two groups are compared

Comparison of Inflammatory Factors between the Two Groups

The two groups were not markedly different in concentrations of IL-6, TNF-α and hs-CRP before nursing ($P > 0.05$). As shown in Table 3, after nursing, concentrations of inflammatory factors markedly decreased in the two groups, with markedly lower levels of IL-6, TNF-α and hs-CRP in RG than in CG ($P < 0.05$).

Table 3
Inflammatory factors in the two groups before and after nursing ($\bar{x}$ ± sd)

Group	n	hs-CRP (mg/ml)		TNF-α (pg/ml)		IL-6 (ng/ml)	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
RG	116	20.09±5.21	9.36±2.21	17.38±2.78	10.38±2.28	89.34±7.45	13.34±2.45
CG	89	19.94±5.28	12.47±2.78	17.36±2.56	13.76±2.32	88.45±7.32	15.89±2.67
t	-	0.203	8.923	0.052	10.440	0.854	7.103
P	-	0.839	< 0.001	0.957	< 0.001	0.394	< 0.001

Comparison of Complications During Nursing between the Two Groups

Complications occurred in both groups during nursing. As shown in Table 4, the complication rate in RG was remarkably lower than that in CG (4.31% vs. 14.61%, $P < 0.05$).

Table 4
Complications during nursing in the two groups [n (%)]

Factors	RG (n = 116)	CG (n = 89)	χ^2	P
Clogging of the catheter	1 (0.86)	3 (3.37)	1.657	0.198
Peritonitis	0 (0.00)	3 (3.37)	3.968	0.046

Leakage of peritoneal dialysis solution	2 (1.72)	4 (4.49)	1.360	0.244
Anemia	2 (1.72)	3 (3.37)	0.574	0.449
Incidence of complications	5 (4.31)	13 (14.61)	6.666	0.009

Comparison of the Quality of Life after Nursing between the Two Groups

As shown in Table 5, after nursing, the scores of all items of the QLQ-C30 scale (physiological function, health status, physical function, mental health, social function, and emotional function) in RG were remarkably higher than those in CG ($P < 0.05$).

Table 5
Quality of life after nursing ($\bar{x} \pm sd$)

Group	Physiological function	Health status	Physical function	Mental health	Social function	Emotional function
RG (n = 116)	59.45±8.22	62.56±7.44	64.68±8.33	58.23±8.11	57.12±7.12	63.02±8.12
CG (n = 89)	54.67±7.67	58.38±7.42	61.08±6.45	51.34±7.21	51.65±7.09	59.44±8.15
t	4.248	3.992	3.374	6.323	5.462	3.124
P	< 0.001	< 0.001	0.001	< 0.001	0.001	0.002

Comparison of the Nursing Satisfaction between the Two Groups

As shown in Table 6, the nursing satisfaction rate in RG was remarkably higher than that in CG (93.97% vs. 79.78%, $P < 0.05$).

Table 6
Nursing satisfaction level in the two groups [n (%)]

Factors	RG (n = 116)	CG (n = 89)	χ^2	P
Great satisfaction	64 (55.17)	32 (35.96)	-	-
Moderate satisfaction	45 (38.79)	39 (43.82)	-	-
Dissatisfaction	7 (6.03)	18 (20.22)	-	-
Satisfaction rate	109 (93.97)	71 (79.78)	9.470	0.002

DISCUSSION

Uremia in senior people marks the end stage of many life-threatening chronic kidney diseases [23]. It is mainly induced by the decline of glomerular filtration and disordered water-electrolytes, accompanied by the production and retention of toxic metabolites, which affects the nerves, digestive tract, and

blood of patients [24]. Clinically, blood purification technology is prevalent in treating uremia [25, 26].

Here we performed the nutritional nursing on elderly uremic patients on PD and found that the condition of patients was markedly improved after the nursing intervention. Nutritional nursing is nursing and nutrition interventions tailored to the patient's physical condition and disease condition [27]. The study by Wang J et al. [28] showed that nursing interventions (including interventions of education, cognition, and behavior) could effectively improve treatment compliance of patients on dialysis for treating end-stage renal diseases. The study by Hernandez Morante JJ et al. [29] revealed that the fatality and disease prevalence in patients with chronic renal failure receiving dialysis were reduced by enhancing the nutritional status of patients. In the present study, the improvement in urea nitrogen, blood creatinine, serum albumin, and prealbumin after nursing was more obvious in RG than in CG, indicating that the nutritional nursing can enhance the health condition of patients and boost the recovery of renal function. Here, patients from RG had remarkably lower MQSGA scores which reflect the nutritional status than patients from CG, indicating that nutritional nursing can significantly enhance the physical condition of patients, promote nutritional absorption, and accelerate the recovery of physical function. Anxiety and depression are common in patients on dialysis, accompanied by markedly decreased sleep quality and poor mental health, which impair the quality of life and lead to poor clinical outcomes [30, 31]. Here the decrease in the SAS score, SDS score, and PSQI score of patients after nursing was markedly sharper in RG than in CG, indicating that the psychological intervention in nutritional nursing can effectively relieve the negative emotions of patients, encourage patients to fight the disease positively to eliminate fear, depression, and anxiety, thereby improving the sleep quality of patients.

Inflammation is considered as the main cause of disease prevalence and fatality in uremic patients on dialysis, and reducing the inflammatory response can improve the treatment efficacy of patients [32]. Here the decrease in concentrations of serum IL-6, TNF-α, and hs-CRP of patients was markedly sharper in RG than in CG, indicating that the nutritional nursing intervention is superior in inhibiting the inflammation in elderly patients with uremia and relieving the micro-inflammatory. The complication rate in RG after nursing was remarkably lower than that in CG, indicating that nutritional intervention can effectively reduce the risk of complications during PD treatment. Patients on dialysis generally have poor quality of life [33]. A study [34] suggests that medical staff should analyze the physical condition of patients and take corresponding interventions to enhance the nutrition and quality of life of patients. Here, quality of life scores of patients in RG were remarkably higher than those in CG, which indicates that nutritional nursing is efficient in enhancing the quality of life of patients after dialysis[35]. We noted a higher satisfaction level with nursing in RG than in CG, suggesting that nutritional nursing is preferred by patients.

This study confirmed the benefits of nutritional nursing for elderly uremic patients receiving PD, but there are some limitations. For example, we did not assess the treatment compliance, nor did we analyze the risk factors of poor prognosis in elderly uremic patients. We should address such problems in the future to perfect this study.

In summary, nursing intervention for elderly uremic patients receiving PD can enhance the quality of life of patients, improve the nutrition, promote the recovery from the disease, and reduce the incidence of complications.

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