

Original Article

The effects of continuous home nursing visits on patients with chronic renal failure and peritoneal dialysis

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Abstract: Objective: To explore the effect of continuous home nursing visits on patients with chronic renal failure and peritoneal dialysis. Methods: Seventy-two patients with chronic renal failure and peritoneal dialysis were selected. According to a random number table, they were divided into an observation group and a control group, with 36 cases in each group. The patients in the control group received telephone follow-up, and the patients in the observation group underwent continuous home nursing visits. The dialysis adequacy, mental states of anxiety and depression, quality of life, nutritional status, and complications were compared between the two groups. Results: The serum creatinine (SCr) and blood urea nitrogen (BUN) levels in the observation group were lower than those of control group after nursing (both $P < 0.05$). The residual glomerular filtration rate (rGFR) in the observation group showed no statistical significance before and after nursing ($P < 0.05$). The anxiety and depression scores in the observation group were lower than those of control group after the nursing ($P < 0.001$). The physical function, emotional function, role function, cognitive function, social function, and overall quality of life scores increased in the observation group after the nursing, and they were higher than those of the control group (all $P < 0.001$). The prealbumin (PA), hemoglobin (Hb), and albumin (ALB) levels increased in the observation group after the nursing ($P < 0.05$), but the corresponding values in the control group showed no obvious changes ($P < 0.05$). The nutritional indexes in the observation group were higher than those of the control group ($P < 0.01$). The overall complication rate in the observation group (16.67%) was lower than it was in the control group (38.89%) ($P < 0.05$). Conclusion: The application of continuous home nursing visits for patients with chronic renal failure and peritoneal dialysis can improve the dialysis adequacy, the patient's psychological state, quality of life and nutritional status, and reduce complications. It is worthy of clinical promotion.

Keywords: Continuous home nursing visits, chronic renal failure, peritoneal dialysis, dialysis adequacy, nutritional status

Introduction

Peritoneal dialysis is an important renal replacement therapy for chronic renal failure. It has the advantages of home dialysis and ease of operation which is gradually spread and applied. It was reported that peritoneal dialysis currently accounts for 15% of all renal replacement therapy for acute and chronic renal injury in the world [1, 2]. Peritoneal dialysis can delay the progression of chronic renal failure, protect residual renal function and prolong patients' survival times [3]. However, due to the lack of supervision and guidance from medical staff and the long clinical course of the disease,

patients with chronic renal failure who are on home peritoneal dialysis may easily have big physical and psychological burdens, anxiety, depression, and other negative emotions. These burdens can affect the patients' treatment compliance and nursing, which in turn affects the dialysis adequacy [4, 5]. Moreover, dialysis adequacy is closely related to the patients' nutritional status. If either of them is in a bad condition, it is easy to get into a vicious circle, which leads to various complications and affects the prognosis [6]. Continuous home nursing visits are equal to home bed or home care, namely, providing health management and direct nursing for patients treated at home

[7]. This nursing mode is conducive to the smooth treatment of the patients [8]. With the increasing prevalence of chronic renal failure and the further promotion of home peritoneal dialysis, patients have an urgent requirement for continuous home nursing visits. Currently, there are few published studies on continuous home nursing visits for patients with chronic renal failure and peritoneal dialysis. Therefore, this study discussed the effect of continuous home nursing visits on peritoneal dialysis patients with chronic renal failure, and it is reported as follows.

Materials and methods

General information

Seventy-two patients with chronic renal failure and peritoneal dialysis who were admitted to the Second Affiliated Hospital of Hainan Medical University from January 2018 to January 2019 were enrolled in this study. Inclusion criteria: Patients met the diagnostic criteria for renal failure established by the American National Kidney Foundation Kidney Disease Outcome Quality Initiative (K/DOQI) [9]. Patients were between 30-80 years old, underwent peritoneal dialysis for over 3 months, underwent peritoneal dialysis at home, had a clear awareness to cooperate with treatment and nursing positively, volunteered to participate in the study, and signed the informed consent form. Exclusion criteria: Patients who underwent bedridden peritoneal dialysis. Patients who had heart failure, hepatic or pulmonary insufficiency, diseases of the immune system, gastrointestinal ulcers and gastrointestinal bleeding, combined peritonitis, historical or a recent history of kidney transplantation, a malignant tumor, systemic inflammation or acute and chronic infection, severe malnutrition, a serious disease in the hospital, a previous history of mental illnesses, or communication disorders. This study was approved by the Medical Ethics Committee of the Second Affiliated Hospital of Hainan Medical University. The patients were randomized into the observation group or the control group according to a random number table, with 36 cases in each group.

Methods

The two groups were treated with the Tianjin Baxter dual system and peritoneal dialysate.

The total daily dialysis dose for the male patients was 8 L, which was divided into 4 administration times. The total daily dialysis dose for the female patients was 6 L, which was divided into administration 3 times. Telephone follow-up in the control group: The patients were followed up by telephone at 1 month, 3 months, and 6 months after discharge. They were advised to pay attention to their diet, get adequate rest, focus on work and rest, take their medications as prescribed, and go to the hospital for a periodic follow-up. They were asked about problems they encountered with home peritoneal dialysis and given detailed solutions. Continuous home nursing visits in the observation group: (1) Build a home visit team: the team consisted of one doctor and five nurses. Prepare the visiting items, including general physical examinations, disinfection, injection equipment, health education materials, etc. (2) Create an information card: create a home visit card for the patients, including the patient's name, gender, discharge date, responsible staff, phone number, home address, visit time, etc. The card is created in duplicate, and the patient holds one and the responsible staff member holds the other one. After discharge, the responsible staff conduct home visits and record the specific content of the visit every month. (3) Visiting content: evaluate the patient's physiological and psychological states. Ask about and record details of the patient's diet, exercise, sleep, urine and stool, etc. Master the nursing status of the patient's family members. Patiently answer the patient's questions, learn about their problems and difficulties, and try to help them. Instruct the patient's family members to assist and care for them. Observe the patient's self-protection ability, strengthen the operation guidance for the peritoneal dialysis, and check the patient's home peritoneal dialysis record, including the frequency, dose, color of the drainage fluid, and urine volume. Observe the patient's edema and skin condition, etc. Measure the patient's blood pressure. Hand out health education sheets, brochures, cards, etc. (4) Psychological intervention: as for the patient's psychological problems, give counseling, comfort and encourage patients, and enhance their confidence in the treatment. (5) Dietary intervention: guide patients to manage their diet, teach them to distinguish the source and nature of food, list foods containing 7 g of protein, guide patients in calculating the

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Table 1. General information ($\bar{x} \pm sd, n$)

Group	Observation group	Control group	χ^2/t	P
n	36	36		
Gender			0.056	0.813
Male	20	19		
Female	16	17		
Average age (year)	55.8±6.2	56.4±6.3	0.407	0.685
Primary disease			0.787	0.853
Diabetic nephropathy	15	13		
Chronic glomerulonephritis	17	19		
Hypertensive nephropathy	3	2		
Polycystic kidney	1	2		
Duration of dialysis (month)	22.68±10.25	23.42±11.37	0.290	0.773
Education			0.261	0.878
Elementary school	6	7		
Middle school	14	12		
College degree and above	16	17		

Table 2. Comparison of the dialysis adequacy ($\bar{x} \pm sd$)

Group	Observation group	Control group	t	P
n	36	36		
SCr ($\mu\text{mol/L}$)				
Before nursing	995.27±326.79	990.14±335.63	0.066	0.948
After nursing	842.79±301.14	1001.48±341.62	2.091	0.04
t	2.059	0.142		
P	0.043	0.887		
BUN (mmol/L)				
Before nursing	19.18±4.56	19.09±4.63	0.083	0.934
After nursing	17.15±3.78	19.71±3.84	2.851	0.006
t	2.056	0.618		
P	0.043	0.538		
rGFR ($\text{mL}/(\text{min}\cdot 1.73 \text{ m}^2)$)				
Before nursing	2.86±1.45	2.89±1.42	0.089	0.930
After nursing	2.70±1.18	2.53±1.25	0.593	0.555
t	0.514	1.142		
P	0.609	0.257		

Note: SCr, serum creatinine; BUN, blood urea nitrogen; rGFR, residual glomerular filtration rate.

amount of protein intake each day, and guide them in cooking food correctly. Maintain a light diet and control salt intake. (6) Guide the family members to participate in the nursing: provide guidance and education to the family members, help patients to obtain financial and psychological support from their family members, and enable the patients to feel at ease. Provide

health education to the family members, explain the cautions about the patient's diet, encourage the family members to cooperate and provide patients with a healthy diet. Teach family members about the peritoneal dialysis operation. Help the patient if necessary, to make the treatment process smooth. The nursing effect was evaluated after 6 months in both groups.

Outcome measures

Primary outcome measures: (1) Dialysis adequacy: 3 mL of fasting venous blood was collected in the morning to measure the SCr and BUN. The urine was collected to measure the creatinine and BUN. 24-hour urine volume was recorded. $\text{rGFR} = (\text{renal urea clearance} + \text{creatinine clearance})/2$, of which $\text{creatinine clearance} = (\text{urinary creatinine}/\text{SCr}) \times 24\text{-hour urine volume}/1440$. $\text{BUN clearance} = (\text{urine urea nitrogen}/\text{serum urea nitrogen}) \times 24\text{-hour urine volume}/1440$. The correction value was applied to calculate rGFR, calculation formula = calculation result \times body surface area/ 1.73 m^2 . (2) Nutritional status: peripheral venous blood was collected. The PA, Hb and ALB levels were measured using a Hitachi Automated Biochemistry Analyzer from Japan. (3) Psychological states: before and after nursing, the anxiety and depression in both groups were evaluated using Zung's Self-Rating Depression Scale (SDS) and the Self Rating Anxiety Scale [10]. Both are 20 item Likert scales. The lower the score, the lighter the anxiety and depression.

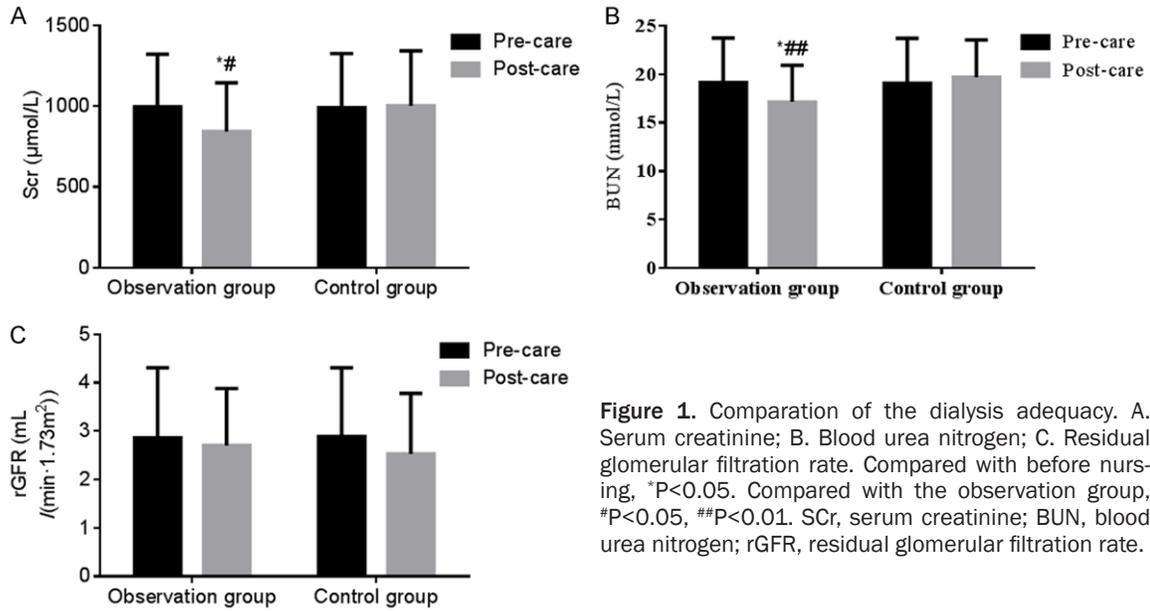


Figure 1. Comparison of the dialysis adequacy. A. Serum creatinine; B. Blood urea nitrogen; C. Residual glomerular filtration rate. Compared with before nursing, *P<0.05. Compared with the observation group, #P<0.05, ##P<0.01. SCr, serum creatinine; BUN, blood urea nitrogen; rGFR, residual glomerular filtration rate.

Table 3. Comparison of the psychological states ($\bar{x} \pm sd$)

Group	Observation group	Control group	t	P
n	36	36		
Anxiety score				
Before nursing	62.42±5.73	63.28±6.04	0.620	0.537
After nursing	31.65±3.79	48.16±4.81	16.176	0.000
t	26.873	11.749		
P	0.000	0.000		
Depression score				
Before nursing	63.34±6.28	64.27±6.11	0.637	0.526
After nursing	36.48±5.06	48.80±5.27	10.118	0.000
t	19.983	11.504		
P	0.000	0.000		

Secondary outcome measures: (1) Quality of life: the patient's overall quality of life, physical function, emotional function, role function, cognitive function, and social function before and after nursing were evaluated using the quality of life questionnaire (QLQ-30). The total score was between 0-100. The higher the score, the better the quality of life. (2) Observation of the complications in the two groups.

Statistical methods

All statistical data were analyzed using SPSS 19.0 statistical software. The measurement data were expressed as the mean ± standard

deviation ($\bar{x} \pm sd$) and independent samples *t*-test were applied. A paired *t*-test was used for the intra-group comparisons before and after nursing. All count data were expressed as a % and a chi-squared (χ^2) test was applied. P<0.05 was considered statistically significant.

Results

Comparison of the general information

There were no significant differences between the two groups in terms of gender composition including age, primary disease, duration of the dialysis or education (P>0.05). See **Table 1** for details.

Comparison of the dialysis adequacy

After nursing, the BUN and SCr levels in the observation group were significantly lower than the levels before nursing. The BUN and SCr levels in the observation group were significantly lower than the levels in the control group (P<0.05). There was no statistical significance in the rGFR in the observation group before and after nursing, and there was no significant difference compared with the rGFR of the control group (P>0.05). See **Table 2** and **Figure 1**.

Comparison of the psychological states

After nursing, the anxiety and depression scores in both groups were significantly lower

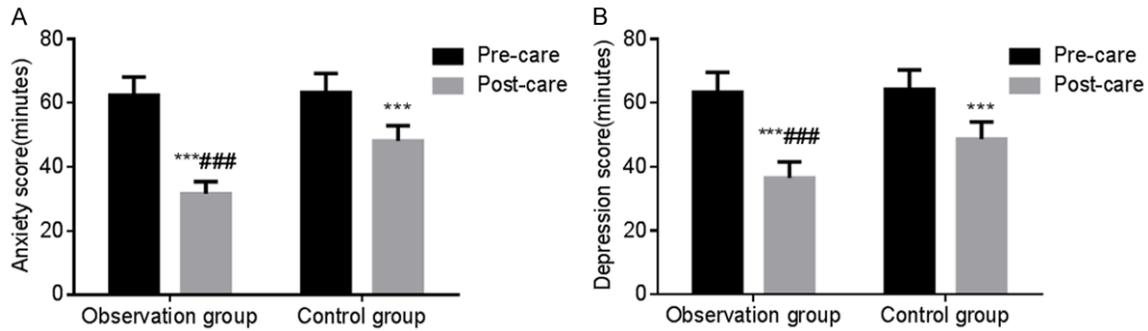


Figure 2. Comparison of the psychological states. A. Anxiety score; B. Depression score. Compared with the scores before nursing, *** $P < 0.001$. Compared with the observation group, ### $P < 0.001$.

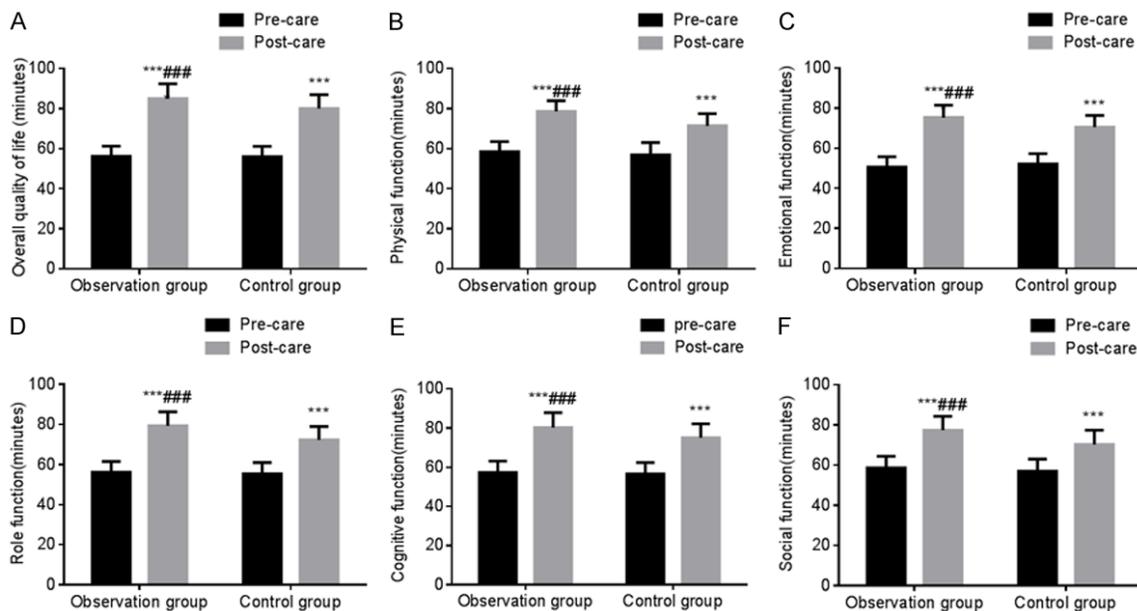


Figure 3. Changes in the quality of life before and after nursing. A. Scores of the overall quality of life; B. Physical function; C. Emotional function; D. Role function; E. Cognitive function; F. Social function. Compared with the scores before nursing, *** $P < 0.001$. Compared with the control group, ### $P < 0.001$.

than they were before the nursing ($P < 0.001$), and the scores in the observation group were significantly lower than those of the control group ($P < 0.001$). See **Table 3** and **Figure 2**.

Comparison of the quality of life

After nursing, the physical function, emotional function, role function, cognitive function, social function, and overall quality of life scores in both groups were significantly higher than they were before the nursing ($P < 0.001$), and the scores in the observation group were significantly higher than those of the control group ($P < 0.001$). See **Figure 3**.

Comparison of the nutritional status

After nursing, the PA, Hb and ALB levels in the observation group were significantly higher than they were before the nursing ($P < 0.05$). There was no significant change in the control group. The nutritional indexes in the observation group were significantly higher than those of the control group ($P < 0.01$). See **Table 4** and **Figure 4**.

Comparison of complications

The overall incidence of complications in the observation group was 16.67%, which was sig-

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Table 4. Comparison of the nutritional status ($\bar{x} \pm sd$)

Group	Observation group	Control group	t	P
n	36	36		
PA (mg/L)				
Before nursing	0.29±0.06	0.30±0.07	0.651	0.517
After nursing	0.35±0.08	0.28±0.09	0.488	0.001
t	3.6	1.052		
P	0.001	0.296		
Hb (g/L)				
Before nursing	10.35±0.96	10.37±0.93	0.09	0.929
After nursing	11.02±0.99	10.33±0.91	3.079	0.003
t	2.915	0.184		
P	0.005	0.854		
ALB (g/L)				
Before nursing	34.52±5.03	34.13±5.65	0.309	0.758
After nursing	37.21±4.25	33.96±5.17	2.914	0.005
t	2.451	0.133		
P	0.017	0.894		

nificantly lower than the incidence in the control group (38.89%) ($P < 0.05$). See **Table 5**.

Discussion

Chronic renal failure is the result of the development of various chronic renal diseases advancing to a certain stage rather than an independent disease [10]. Studies have indicated that the prevalence of stages 3-5 chronic renal disease in China was up to 11% and the incidence was increased by about 3% every year, which seriously endangers the residents' physical and mental health [11]. Chronic renal failure can lead to renal parenchymal damage, resulting in varying degrees of renal atrophy and impaired renal function. Furthermore, it can lead to water-electrolyte imbalance, acid-base imbalance, metabolite retention and other syndromes [12, 13]. There is no cure for chronic renal failure. Renal replacement therapy is the chief method of delaying the deterioration of the disease [14]. Peritoneal dialysis is a renal replacement therapy. Peritoneal dialysis utilizes the peritoneum as a semi-permeable membrane to clear metabolites and toxicants accumulated in the body, to promote the water-electrolyte and acid-base balances, thereby improving the conditions of patients with chronic renal failure [15]. Peritoneal dialysis can be performed at home,

which is conducive to the treatment and recuperation of patients and can mitigate the patients' burdens. It is being accepted by more and more patients [16]. However, home treatment for peritoneal dialysis patients requires self-operation and self-care. It has some effects on patient compliance due to the lack of supervision and timely guidance from medical staff.

Continuous home nursing visits are a nursing service aiming to maintain and improve patient health [17]. During home treatment for peritoneal dialysis, the thoughtfulness and support of family members have great effects on the patients. Through continuous home nursing visits, medical staff will provide patients with face-to-face communications. They can not only master the patient's recent situations, learn about their physical conditions and psychological changes, but they can also understand their family environment, structure, family members, and the health status of the family members', etc. And then, they can carry out nursing activities and provide effective assistance according to the actual demand and available resources [18, 19]. During the progress of continuous home nursing visits, the medical staff not only check the patient's health status, but they also learn about their living environment, psychological state, etc., and provide assistance and guidance to the patient. Meanwhile, the patient's family members are instructed to participate in the patient's nursing progress to mitigate their burden.

This study showed that after nursing, both the BUN and SCr levels in the observation group were lower than they were before nursing. The BUN and SCr levels in the observation group were lower than those of the control group. There was no statistical significance in the rGFR in the observation group before and after nursing, and there was no significant difference compared with the rGFR of the control group. The results are consistent with previous studies [20]. It was indicated that the BUN and SCr levels in the observation group could be better cleared than they could in the control group, which showed better dialysis adequacy in the observation group. Although the descent of

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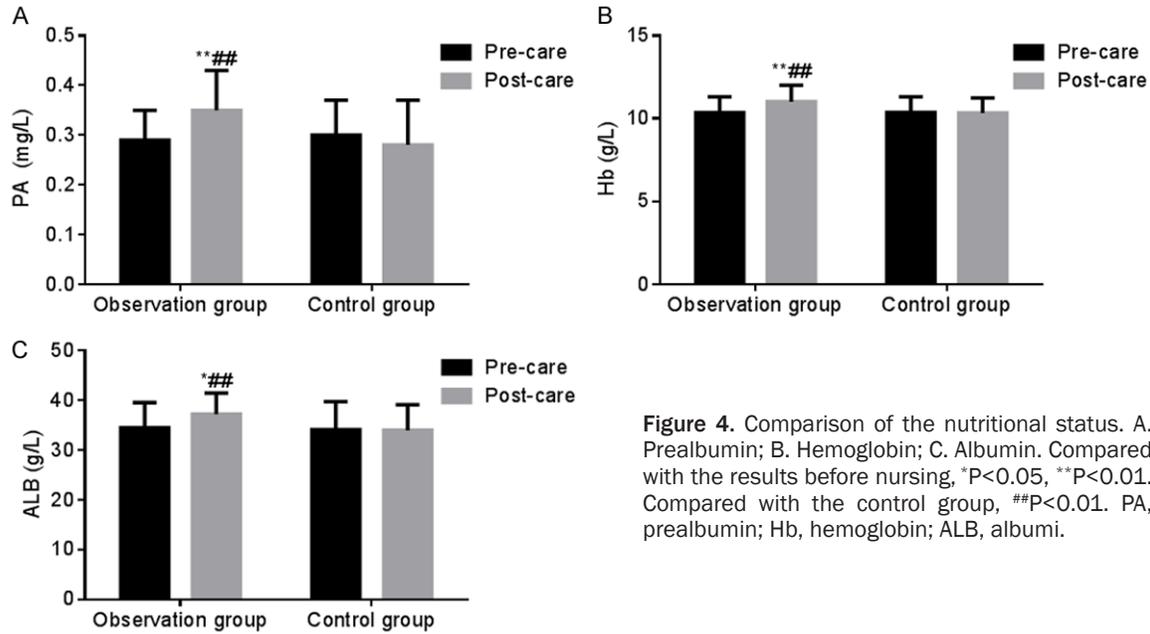


Figure 4. Comparison of the nutritional status. A. Prealbumin; B. Hemoglobin; C. Albumin. Compared with the results before nursing, * $P < 0.05$, ** $P < 0.01$. Compared with the control group, ## $P < 0.01$. PA, prealbumin; Hb, hemoglobin; ALB, albumin.

Table 5. Comparison of the complications (n, %)

Group	Observation group	Control group	χ^2	P
n	36	36		
Hypotension	1 (2.78)	3 (8.33)	1.059	0.303
Cardiovascular events	2 (5.56)	3 (8.33)	0.215	0.643
Infections	3 (8.33)	7 (19.44)	1.858	0.173
Bleeding	0 (0.00)	1 (2.78)	1.014	0.314
Overall incidence	6 (16.67)	14 (38.89)	4.431	0.035

rGFR was inevitable, the descent can be delayed and the residual renal function can be protected. This study also suggested that after the nursing, the improvement of anxiety and depression in the observation group was better than it was in the control group, and the quality of life was higher than it was in the control group, which is basically consistent with previous studies [21, 22]. It showed that continuous home nursing visits could improve the psychological state and quality of life of peritoneal dialysis patients with chronic renal failure. At the same time, this study showed that after nursing, the nutritional indexes, namely the PA and Hb and ALB levels, in the observation group were increased, but the control group showed no significant change. The overall incidence of complications in the observation group was 16.67%, which was significantly lower than of the incidence in the control group. It is basically consistent with previous studies

[23]. It was shown that continuous home nursing visits could improve the nutritional status of patients with chronic renal failure and reduce complications. The reasons for the results are: it might be that compared with telephone follow-up, medical staff can directly contact patients through continuous home nursing visits. They can perform a simple physical examination to master their physical conditions, which is beneficial to finding and solving problems for peritoneal dialysis patients; medical staff can communicate with patients directly and build a good relationship with them. Patients are more likely to confide when they have any difficulties or problems with peritoneal dialysis. Nursing services provided by medical staff were much more targeted, which is conducive to promoting the smooth treatment of patients; medical staff could learn about the patient's family directly through continuous home nursing visits, then make full use of the family resources to maintain the patient's health. The patient's family members could better participate in the progress of nursing through guidance and communication; the patient's psychological state, treatment and nursing compliance, and peritoneal dialysis progress could be effectively improved through various nursing services. Consequently, the dialysis adequacy and quality of life could be improved and the complica-

tions of peritoneal dialysis could be reduced. However, due to the short observation time of this preliminary study, the long-term prognosis effect of continuous home nursing visits on patients with chronic renal failure and peritoneal dialysis was not discussed. It will be further explored in a future study.

In summary, the application of continuous home nursing visits for patients with chronic renal failure and peritoneal dialysis can improve the dialysis adequacy, the patient's psychological state, quality of life and nutritional status, and reduce complications. It is worthy of clinical promotion.

Disclosure of conflict of interest

None.

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