

The Impact of Progressive Effect Nutritional Care on Treatment Adherence, Quality of Life, and Nutritional Status in Uremia Patients Undergoing Dialysis

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Abstract: *Objective:* To investigate the impact of progressive effect nutritional care on uremia patients undergoing dialysis. *Methods:* A total of 101 uremia patients undergoing dialysis admitted from January 2024 to March 2025 were selected as the study subjects and divided into two groups by lottery method. The control group (55 cases) received routine care, while the observation group (56 cases) received a combination of routine care and progressive effect nutritional care. *Results:* After 4 weeks of care, the observation group demonstrated higher treatment adherence ($P < 0.05$), better quality of life ($P < 0.05$), and improved nutritional status ($P < 0.05$) compared to the control group. *Conclusion:* Progressive effect nutritional care can significantly enhance treatment adherence, quality of life, and nutritional status in uremia patients undergoing dialysis.

Keywords: Nutritional status; Progressive effect nutritional care; Quality of life; Routine care; Treatment adherence; Uremia

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1. Introduction

Uremia is a clinical syndrome of advanced kidney disease, characterized by pathological phenomena such as electrolyte imbalances and metabolic acidosis due to the progression of chronic renal failure to its end stage^[1]. Patients often experience symptoms such as fatigue, edema, and poor appetite, which severely impact their quality of life^[2]. Dialysis can help eliminate excess water and medium-to-large molecular substances, but the treatment process is lengthy and imposes significant economic burdens^[3]. Furthermore, during dialysis, patients may lose certain amounts of proteins, trace elements, vitamins, amino acids, and other nutrients, leading to malnutrition and adversely affecting their health status and dialysis outcomes^[4].

Therefore, it is crucial to provide effective dialysis care for patients, regulate their nutritional status, and enhance dialysis outcomes. Progressive effect nutritional care involves tailoring nutritional interventions based

on individual nutritional status to improve the specificity of nutritional support and enhance patients' health and quality of life. This study aimed to analyze the effectiveness of progressive effect nutritional care in uremia patients undergoing dialysis.

2. Materials and methods

2.1. General information

The sample size for the study was calculated using the formula:

$$n1 = n2 = 2[(u\alpha + u\beta)/(\delta/\sigma)]^2 + 0.25u\alpha^2$$

where $n1$ and $n2$ are the sample sizes for the observation group and the control group, respectively

The initial estimated sample size was 80 cases, with $n1 = n2 = 40$ cases.

However, various issues such as sample attrition and sample exclusion arose during the study, prompting an increase in the total sample size to 101 cases within the permissible range, with $n1$ being 56 cases and $n2$ being 55 cases.

A total of 101 uremic patients undergoing dialysis from January 2024 to March 2025 were selected as the study subjects and divided into two groups using the lottery method. The control group consisted of 55 patients, including 32 males and 23 females, aged between 41 and 73 years (57.34 ± 4.38 years), with a dialysis duration of 6 to 32 months (19.25 ± 3.23 months). The observation group included 56 patients, comprising 36 males and 20 females, aged between 44 and 71 years (57.87 ± 4.52 years), with a dialysis duration of 8 to 31 months (19.92 ± 3.47 months). There were no significant differences in the data between the groups ($P > 0.05$), indicating comparability. This study was approved by the Medical Ethics Committee, and informed consent was obtained from the patients or their families.

Inclusion criteria:

- (1) Patients meeting the diagnostic criteria for uremia outlined in the “Clinical Management Guidelines for Slowing the Progression of Chronic Kidney Disease (2025 Edition)”^[5];
- (2) Patients with indications for hemodialysis who comply with clinical dialysis treatment;
- (3) Patients with normal language expression and communication abilities.

Exclusion criteria:

- (1) Patients with other major diseases;
- (2) Patients with mental illnesses;
- (3) Patients with communication barriers.

2.2. Methods

The control group received routine care, including the distribution of manuals and oral education on uremia and hemodialysis knowledge. Patients were guided to self-monitor their condition, identify and address abnormalities early, actively soothe their emotions, and examples of successful hemodialysis cases were cited to enhance treatment compliance.

The observation group received a progressive nutritional nursing approach combined with other measures as outlined:

- (1) Nutritional assessment: Upon admission, nutritional risk was evaluated using the Subjective Global Assessment (SGA) method, which took into account gastrointestinal symptoms, appetite status, and changes in body weight. The total score was 7 points, with nutritional status classified according to the score: 6–7 points indicated Grade A (good nutrition); 3–5 points indicated Grade B (suspected

malnutrition); and 1–2 points indicated Grade C (severe malnutrition). Nutritional nursing plans were adjusted based on these classifications to determine nutritional doses and implement nursing interventions:

- (i) Grade C nursing: To prevent and improve common complications such as gastrointestinal dysfunction and malnutrition, full-nutrient enteral support with a nutrient-configured solution was administered as early as possible. The heat-to-nitrogen ratio was 145:1, with a total intake of 25–30 kcal/kg/day. The composition included 20% protein, 30% fat, and 50% carbohydrates. The enteral pumping rate was 20–30 mL/hour, with each infusion consisting of 300–500 mL. There should be a 3–4 hour interval between two enteral nutrition infusions;
- (ii) Grade B nursing: Patients in this group had a certain tolerance capacity and stronger enteral nutrition tolerance compared to Grade C. The infusion solution was the same as that used in Grade C, with a total intake of 40–45 kcal/kg/day. The composition included 20%–25% protein, 30%–35% fat, and 35%–40% carbohydrates. The enteral pumping rate was 30–50 mL/hour, with a 4-hour interval between two enteral nutrition infusions. After each infusion, 20–30 mL of warm water was injected to flush the catheter;
- (iii) Grade A nursing: If patients did not require enteral feeding, a dietary management plan was formulated based on their dietary preferences and habits. The daily intake included 30–35 g of meat, 55–60 g of high-quality protein, 350–400 g of legume products, 100 g of regular staple foods, and 300–350 g of fruits. Dietary management adhered strictly to a three-meals-and-two-snacks schedule, following a low-oil, low-salt, and light diet principle. Calcium and sodium intake were controlled to reduce cardiac load. Urine output was recorded, and water intake was adjusted accordingly, with an additional 500 mL of drinking water added to the urine volume.

Both groups received nursing care for 4 weeks.

2.3. Observation indicators

Treatment adherence was evaluated based on patients' dialysis performance. Complete adherence meant that patients fully complied with medical advice without reminders, including timely admission for dialysis, proper preparation for dialysis, and cooperation during dialysis procedures; partial adherence indicated that patients occasionally needed reminders, with fewer than 2 reminders per week, to fully comply with medical advice for dialysis; non-adherence referred to patients who frequently required reminders, needing 2 or more reminders to cooperate with dialysis or still unable to follow medical advice after reminders. Treatment adherence was calculated as 1 minus non-adherence.

Quality of life was assessed using the Kidney Disease Quality of Life Scale Questionnaire ^[6]. The questionnaire consisted of 36 questions, with 12 general questions covering physical and mental health, each with a total score of 100. Additionally, there were 24 specific questions addressing symptoms and discomfort, the impact of kidney disease, and kidney burden, each also with a total score of 100. Higher scores indicated better quality of life.

Nutritional status was evaluated by collecting 5 mL of fasting venous blood samples, which were then centrifuged under standard conditions (3000 r/min, radius of 10 cm, duration of 15 minutes). Hemoglobin, transferrin, and albumin levels were measured using an automated blood cell analyzer.

2.4. Statistical methods

Data were analyzed using SPSS 27.0 software. Categorical data were presented as percentages (%) and compared

using the χ^2 test. Continuous data conforming to a normal distribution were expressed as mean $\pm$ standard deviation (SD), and comparisons within and between groups were performed using the t-test (or F-test). A *P*-value less than 0.05 was considered statistically significant.

3. Results

3.1. Comparison of treatment adherence between the two groups

As shown in **Table 1**, the treatment adherence in the observation group was higher than that in the control group (*P* < 0.05).

Table 1. Treatment adherence in the two groups (n/%)

Group	n	Full compliance	Partial compliance	Non-compliance	Treatment compliance rate
Observation group	56	34 (60.71)	20 (35.71)	2 (3.57)	54 (96.43)
Control group	55	20 (36.36)	25 (45.45)	10 (18.18)	45 (81.82)
χ^2 value					6.143
<i>P</i> -value					0.013

3.2. Comparison of quality of life between the two groups

As shown in **Table 2**, after 4 weeks of nursing, the quality of life in the observation group was higher than that in the control group (*P* < 0.05).

Table 2. Quality of life in the two groups (mean $\pm$ SD, points)

Aspects	Observation group (n=56)	Control group (n=55)	t-value	<i>P</i> -value
Physical health				
Before care	46.23 $\pm$ 4.15	47.08 $\pm$ 4.38	1.050	0.296
After care	56.98 $\pm$ 4.87 ^a	52.07 $\pm$ 4.65 ^a	5.431	< 0.001
Mental health				
Before care	48.72 $\pm$ 4.35	49.65 $\pm$ 4.49	1.108	0.270
After care	59.01 $\pm$ 4.87 ^a	54.06 $\pm$ 4.65 ^a	5.475	< 0.001
Symptoms/discomfort				
Before care	45.17 $\pm$ 4.12	45.98 $\pm$ 4.36	1.006	0.317
After care	55.67 $\pm$ 4.56 ^a	51.21 $\pm$ 4.43 ^a	5.225	< 0.001
Effects of kidney disease				
Before care	47.27 $\pm$ 4.31	48.24 $\pm$ 4.49	1.161	0.248
After care	58.73 $\pm$ 4.69 ^a	54.01 $\pm$ 4.48 ^a	5.420	< 0.001
Burden of kidney disease				
Before care	44.62 $\pm$ 4.32	45.58 $\pm$ 4.59	1.135	0.259
After care	55.96 $\pm$ 4.85 ^a	52.32 $\pm$ 4.69 ^a	4.019	< 0.001

Note: Compared with the same group before nursing, ^a*P* < 0.05.

3.3. Comparison of nutritional status between the two groups

As shown in **Table 3**, after 4 weeks of nursing, the nutritional status of the observation group was higher than that of the control group ($P < 0.05$).

Table 3. Nutritional status of the two groups (mean $\pm$ SD, g/L)

Aspects	Observation group (n=56)	Control group (n=55)	t-value	P-value
Hemoglobin (g/L)				
Before care	74.12 $\pm$ 9.13	75.76 $\pm$ 9.45	0.930	0.355
After care	118.75 $\pm$ 9.85 ^a	102.12 $\pm$ 9.67 ^a	8.974	< 0.001
Transferrin (g/L)				
Before care	0.82 $\pm$ 0.24	0.85 $\pm$ 0.26	0.632	0.529
After care	3.08 $\pm$ 0.37 ^a	2.38 $\pm$ 0.34 ^a	10.374	< 0.001
Albumin (g/L)				
Before care	23.51 $\pm$ 3.52	24.34 $\pm$ 3.67	1.216	0.227
After care	39.86 $\pm$ 3.99 ^a	34.64 $\pm$ 3.85 ^a	7.012	< 0.001

Note: Compared with the same group before nursing, ^a $P < 0.05$.

4. Discussion

Studies have indicated that nutritional status is a major factor affecting the safety of dialysis treatment for uremia patients, with higher complication rates and mortality in malnourished patients ^[7]. Patients undergoing dialysis for uremia require a long-term low-protein diet to slow the progression of the disease. If adequate nutrients are not supplemented in a timely manner, malnutrition may result ^[8]. Uremia patients completely lose or lose most of their renal function, making it impossible for them to undergo normal metabolism and eliminate toxins from the body. Accumulated toxins can induce gastrointestinal reactions such as poor appetite, nausea, and vomiting, reducing food intake and increasing the risk of adverse nutritional reactions ^[9].

To ensure the effectiveness and safety of dialysis, proper dialysis nursing is essential. Nutritional nursing is a major component of dialysis nursing and a key factor affecting dialysis outcomes and nursing quality. Therefore, it is necessary to find an ideal nursing plan.

In this study, the treatment compliance of the observation group was higher than that of the control group, suggesting that progressive nutritional nursing can effectively improve patients' treatment compliance. The reason is that during conventional nursing, patients' physical and mental comfort and quality of life are adversely affected by uremia and dialysis treatment, which in turn affects their treatment compliance ^[10]. Progressive nutritional nursing is characterized by its humanity and scientific approach, allowing for targeted nursing based on patients' nutritional status. It determines the nutrient intake and precautions for patients at each stage, alleviating the problem of low compliance caused by insufficient knowledge and lack of emphasis on nutritional supplementation.

In this study, the quality of life and nutritional status of the observation group were higher than those of the control group, suggesting that progressive effect nutritional care can effectively improve patients' quality of life and nutritional status. The reason is that conventional nursing lacks specificity and fails to take into account the individual characteristics and nutritional status of each patient, resulting in generally moderate nursing outcomes

and a decline in patients' quality of life^[11]. Progressive effect nutritional care can adjust nursing intervention plans based on individual nutritional status and dynamic changes.

The core of this nursing approach is the stepwise escalation of nutritional support measures, which can meet the nutritional management needs of patients at different stages and of different types. It can gradually, scientifically, and effectively improve nutritional status, enhance patients' health conditions, improve the efficacy of dialysis treatment, and progressively enhance the quality of life^[12].

5. Conclusion

In summary, progressive effect nutritional care can improve the quality of life and nutritional status of uremic dialysis patients and enhance their treatment compliance. However, this study has limitations, including a lack of indicators such as complications and dietary management capabilities, as well as a relatively short observation period, which did not allow for verification of the impact of this nursing approach on patients' prognosis and long-term outcomes. Therefore, further in-depth clinical research and analysis are needed.

Disclosure statement

The authors declare no conflict of interest.

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