

# Effectiveness Evaluation of Need-Based Nursing for Hemodialysis Patients with Uremia

Jing Li\*

Jilin Second Veterans Rehabilitation Hospital, Siping 136502, Jilin Province, China

\*Corresponding author: Jing Li, 3374823545@qq.com

**Copyright:** © 2024 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

**Abstract:** *Objective:* To investigate the clinical effectiveness of need-based nursing interventions for hemodialysis patients with uremia. *Methods:* A double-blind, randomized controlled trial was conducted from January 2020 to June 2024, including a sample of 100 hemodialysis patients with uremia. The patients were randomly assigned into a test group ( $n = 50$ ) and a control group ( $n = 50$ ) using a random number table based on their medical record numbers. The control group received standard basic nursing care, while the test group received need-based nursing intervention. The two groups were compared based on self-care ability scores, resilience scores using the CD-RISC-10 scale, complication incidence rates, and nursing satisfaction. *Results:* After the nursing intervention, the test group showed significantly higher scores in self-care ability ( $P < 0.05$ ) and CD-RISC-10 resilience ( $P < 0.05$ ) than the control group. The incidence of complications was significantly lower ( $P < 0.05$ ), and nursing satisfaction was notably higher ( $P < 0.05$ ) in the test group compared to the control group. *Conclusion:* Need-based nursing for hemodialysis patients with uremia can enhance self-care abilities, improve psychological resilience, reduce complication rates, and increase nursing satisfaction, making it worthy of broader implementation.

**Keywords:** Uremia; Hemodialysis; Need-based nursing

**Online publication:** November 28, 2024

## 1. Introduction

Uremia represents the advanced stage of acute or chronic kidney failure, in which patients experience a severe decline in kidney function, disturbances in water and electrolyte balance, and retention of toxic substances and end metabolites in the body. This leads to multi-organ dysfunction, producing a range of symptoms and signs<sup>[1]</sup>. Hemodialysis is the primary clinical treatment for uremia, purifying the blood, maintaining vital signs, and controlling disease progression. However, most patients with uremia lack an understanding of hemodialysis, often have negative emotions, and exhibit low adherence to the treatment process. To ensure the safety and efficacy of hemodialysis, comprehensive nursing interventions are essential. In conventional basic nursing, nurses focus on the fundamental operations of hemodialysis but pay insufficient attention to the patient's

physical and psychological state, resulting in suboptimal outcomes [2]. In contrast, need-based nursing involves assessing patient needs, formulating targeted care measures, and standardizing nursing operations, which can improve nursing quality [3]. This study included 100 hemodialysis patients with uremia to explore the clinical effectiveness of need-based nursing.

## 2. Materials and methods

### 2.1. General information

A double-blind, randomized controlled trial was conducted from January 2020 to June 2024, enrolling 100 hemodialysis patients with uremia. Patients were randomly assigned to either the test group ( $n = 50$ ) or the control group ( $n = 50$ ) based on their medical record numbers. The test group consisted of 28 males and 22 females, aged 51–68, with an average age of  $59.72 \pm 4.68$  years and an average hemodialysis duration of  $1.42 \pm 0.38$  years (range 6 months to 2 years). Underlying conditions included chronic glomerulonephritis (21 cases), diabetic nephropathy (19 cases), and other causes (10 cases). The control group had 27 males and 23 females, aged 53–67, with an average age of  $59.66 \pm 4.71$  years and an average hemodialysis duration of  $1.38 \pm 0.45$  years. Their underlying conditions included chronic glomerulonephritis (23 cases), diabetic nephropathy (18 cases), and other causes (9 cases). Baseline characteristics between the two groups were comparable ( $P > 0.05$ ).

Inclusion criteria: (1) Diagnosed with uremia through comprehensive examination and assessment; (2) Receiving hemodialysis for over three months; (3) Signed informed consent.

Exclusion criteria: (1) Patients with hematological or infectious diseases; (2) Patients with malignant tumors; (3) Patients with incomplete clinical data or those who withdrew from the study mid-way.

### 2.2. Methods

The control group received standard basic nursing care. The nursing staff completed the routine setup of dialysis equipment parameters, observed the arteriovenous fistula, and performed standardized puncture operations. During hemodialysis, they closely monitored vital signs, assessed discomforts such as pain, and addressed abnormalities promptly. Following hemodialysis, staff provided brief explanations on daily care and answered patient questions.

The test group received need-based nursing intervention, outlined as follows:

- (1) Needs analysis: A hemodialysis care team was formed to review clinical data, communicate with patients and their families, and assess their knowledge, physical and mental state, and lifestyle. Care needs were determined, including health education, psychological support, and specialized dialysis care, with targeted nursing interventions developed accordingly [1-3].
- (2) Health education: Educational materials on uremia and hemodialysis were distributed to patients and families. Hemodialysis health videos were played in the ward, and the hospital's WeChat account was promoted for regular health knowledge updates. Staff provided in-person explanations about hemodialysis principles, its role in substituting renal function, balancing electrolytes, and the procedure for hemodialysis. They also answered patients' questions to foster an accurate understanding of hemodialysis.
- (3) Psychological nursing interventions: For patients exhibiting pessimism or depression, staff emphasized that hemodialysis minimally impacts daily life and effectively controls disease progression. Positive

outcomes from other cases were shared to reinforce hope for recovery. For anxious patients, calming techniques such as gentle touch, music, and breathing exercises were used, with reassurances on the low pain and high safety of hemodialysis procedures.

- (4) Vascular access care: For patients with arteriovenous fistulas, staff instructed them to elevate the affected limb post-surgery and advised against using that limb for blood draws, blood pressure monitoring, or carrying heavy objects. Patients were cautioned to avoid scratching the fistula area and to apply heat after dialysis, with fist exercises to improve blood circulation. For patients with venous catheters, antiseptic treatment of the catheter and surrounding skin was performed. If redness or oozing was observed around the catheter, iodine compression was applied or the catheter was removed. After dialysis, staff flushed the catheter with heparin and advised patients to avoid compressing the catheter area to maintain cleanliness and prevent dislodgement.
- (5) Puncture care: Before hemodialysis, nurses assessed fistula maturity, disinfected the skin and catheter, and chose a puncture site at least 5 cm from the anastomosis point. Dialysis parameters were set appropriately, and vital signs were monitored throughout the procedure. After dialysis, puncture sites were carefully compressed to control bleeding.
- (6) Dietary guidance: Patients were advised to eat small, frequent meals, reduce sugar, fat, and phosphorus intake, and supplement protein based on urine output to regulate food and water intake. Patients with less than 500 mL of daily urine were advised to limit potassium-rich foods (such as oranges, dates, and mushrooms). Those with hypoglycemia were encouraged to supplement with candies, while those with hypertension were advised to limit salt intake.
- (7) Complication management: Nurses closely monitored blood pressure, blood glucose, and sodium and water intake to ensure adequate and effective dialysis. Patients were encouraged to consume candy before dialysis, and hypoglycemic medication was reduced accordingly. Patients with hypertension followed prescribed medication routines to manage their blood pressure.

### **2.3. Evaluation indicators**

- (1) Before and after nursing intervention, the Self-Care Ability Evaluation Scale was used to assess both groups. Evaluation items included self-concept, self-responsibility, self-care skills, and health knowledge level, with a positive scoring system.
- (2) The CD-RISC-10 Resilience Scale was used to assess psychological resilience in both groups before and after nursing intervention, evaluating optimism, self-strength, and resilience, with a positive scoring method.
- (3) Complication incidence rates were recorded for both groups.
- (4) Nursing satisfaction was assessed in both groups using a self-administered questionnaire.

### **2.4. Statistical analysis**

Data analysis was performed using SPSS 23.0 software. Quantitative data (mean  $\pm$  standard deviation) were evaluated using *t*-tests, while categorical data [*n* (%)] were evaluated using  $\chi^2$  tests. A *P*-value of  $< 0.05$  was considered statistically significant.

### 3. Results

#### 3.1. Comparison of self-care ability scores

As shown in **Table 1**, post-intervention self-care ability scores were significantly higher in the test group compared to the control group ( $P < 0.05$ ).

**Table 1.** Comparison of self-care ability scores before and after intervention (mean  $\pm$  SD)

Group	Self-concept		Self-responsibility		Self-care skills		Health knowledge level	
	Before	After	Before	After	Before	After	Before	After
Test ( $n = 50$ )	24.18 $\pm$ 2.65	37.12 $\pm$ 4.98	11.24 $\pm$ 1.51	18.36 $\pm$ 1.85	17.25 $\pm$ 1.61	25.18 $\pm$ 2.76	35.94 $\pm$ 3.18	46.27 $\pm$ 3.98
Control ( $n = 50$ )	24.26 $\pm$ 2.59	32.45 $\pm$ 2.79	11.18 $\pm$ 1.47	14.22 $\pm$ 1.17	17.19 $\pm$ 1.65	20.12 $\pm$ 1.29	36.02 $\pm$ 3.25	42.75 $\pm$ 1.84
<i>t</i> -value	0.153	5.785	0.201	13.374	0.184	11.744	0.124	5.677
<i>P</i> -value	0.879	0.000	0.841	0.000	0.854	0.000	0.901	0.000

#### 3.2. Comparison of CD-RISC-10 scores

**Table 2** shows that post-intervention CD-RISC-10 resilience scores were significantly higher in the test group compared to the control group ( $P < 0.05$ ).

**Table 2.** Comparison of CD-RISC-10 scores before and after intervention (mean  $\pm$  SD)

Group	Resilience		Self-strength		Optimism	
	Before	After	Before	After	Before	After
Test ( $n = 50$ )	35.26 $\pm$ 5.75	43.94 $\pm$ 5.53	22.36 $\pm$ 1.85	27.96 $\pm$ 3.19	12.65 $\pm$ 1.58	15.29 $\pm$ 2.83
Control ( $n = 50$ )	35.18 $\pm$ 5.82	38.75 $\pm$ 2.64	22.41 $\pm$ 1.92	23.81 $\pm$ 2.08	12.71 $\pm$ 1.64	13.72 $\pm$ 1.77
<i>t</i> -value	0.069	5.989	0.133	7.706	0.186	3.326
<i>P</i> -value	0.945	0.000	0.895	0.000	0.853	0.001

#### 3.3. Comparison of complication incidence rates

As shown in **Table 3**, the incidence of complications was significantly lower in the test group compared to the control group ( $P < 0.05$ ).

**Table 3.** Comparison of complication incidence rates [ $n$  (%)]

Group	Hypertension	Hypotension	Hypoglycemia	Complication rate
Test ( $n = 50$ )	1	0	1	2 (4.0)
Control ( $n = 50$ )	3	3	2	8 (16.0)
$\chi^2$ -value				4.000
<i>P</i> -value				0.045

#### 3.4. Comparison of nursing satisfaction

Evaluation results indicated that nursing satisfaction in the test group (49/50) was 98.0%, significantly higher than that in the control group (41/50), which was 82.0% ( $P < 0.05$ ).

## 4. Discussion

Uremia represents stages 4 and 5 of chronic kidney disease, during which patients experience endocrine dysfunction within the kidneys, electrolyte imbalances, and an inability to excrete toxic substances and metabolic by-products, leading to various symptoms and signs. Hemodialysis is the standard treatment for uremia; however, to reduce treatment risks and improve therapeutic outcomes, appropriate nursing interventions are required<sup>[4,5]</sup>.

In standard basic hemodialysis nursing, fixed procedures such as observation and basic dialysis operations are employed, but there is insufficient focus on patients' cognitive levels and psychological issues, resulting in lower adherence to hemodialysis treatment and suboptimal physical and mental states during therapy<sup>[6]</sup>. The demand-driven nursing model, however, centers on the patient by analyzing and summarizing their specific nursing needs and subsequently formulating targeted nursing measures. This approach can enhance patients' awareness, improve their mental states, and ensure the safety and effectiveness of hemodialysis<sup>[7]</sup>.

Results from this study indicate that the self-care ability scores in the experimental group were higher than those in the control group after nursing intervention, suggesting that demand-driven nursing can enhance patients' self-care abilities. Compared to the standard nursing protocol, the demand-driven model involves understanding patients' needs for hemodialysis-related health knowledge, formulating comprehensive health education plans, explaining the principles of hemodialysis, demonstrating methods for protecting vascular access, and highlighting lifestyle considerations. This enables patients to better understand the therapeutic effects of hemodialysis and increases their willingness and ability to engage in self-care<sup>[8]</sup>. In this study, CD-RISC-10 scores were also higher in the experimental group compared to the control group after nursing intervention, indicating that demand-driven nursing improves patients' emotional well-being. Through this model, caregivers embrace a humanistic approach, addressing patients' psychological issues, soothing negative emotions, and guiding family members to provide support, thereby reducing patients' negative emotional states<sup>[9]</sup>. Moreover, the experimental group had a lower incidence of complications than the control group, confirming that demand-driven nursing can reduce the occurrence of complications. By analyzing the causes of complications and implementing targeted preventive measures, caregivers can effectively lower complication rates. Lastly, nursing satisfaction in the experimental group was higher than that in the control group, as demand-driven nursing met the patients' specific care needs, significantly improving the standard and effectiveness of nursing operations, and thereby enhancing patient satisfaction<sup>[10]</sup>.

## 5. Conclusion

In conclusion, demand-driven nursing in patients undergoing hemodialysis for uremia can improve self-care abilities, enhance psychological well-being, reduce complication rates, and increase nursing satisfaction, making it a valuable model for wider application.

## Disclosure statement

The author declares no conflict of interest.

## References

- [1] Li YP, Meng X, Hu JK, et al., 2024, Establishing and Applying A Quality-Sensitive Indicator System for Nutrition Screening and Assessment in Maintenance Hemodialysis Patients. *Nursing Research*, 38(14): 2582–2586.
- [2] Lin P, Wu XL, Chen SS, 2024, Observing the Effects of Micro-Video-Based Education and Specialized Workshops in Vascular Access Care for Maintenance Hemodialysis Patients. *Chinese Journal of Practical Nursing*, 40(8): 612–618.
- [3] Huang X, Yu XP, Liu YC, 2024, Application of Standardized Care Process Management Combined with A Humanistic Care Model in Hemodialysis for Uremic Patients. *Qilu Journal of Nursing*, 30(14): 115–117.
- [4] Gao LL, Wang JF, 2024, Application of An Incremental Exercise Intervention Program Based on Evidence-Based Nursing in Maintenance Hemodialysis Patients. *Evidence-Based Nursing*, 10(8): 1355–1359.
- [5] Shang YR, Hu XY, Guo JD, 2024, Effect of Continuous Nursing Intervention Based on A WeChat Platform on Maintenance Hemodialysis Patients. *Qilu Journal of Nursing*, 30(1): 62–65.
- [6] Wang WW, Wang HP, Zhang J, 2024, Application Effect of Individualized Exercise Therapy in Maintenance Hemodialysis Patients. *Chinese and Western Nursing (Bilingual)*, 10(5): 177–179.
- [7] Liu LX, Zhang J, Liu JX, et al., 2024, Constructing An Early Recognition and Care Process Management Plan for Catheter-Related Bloodstream Infections in Hemodialysis Based on Evidence. *Evidence-Based Nursing*, 10(3): 421–426.
- [8] Yu Y, Du AY, Zhao CM, et al., 2024, Application of Evidence-Based Supervision Nursing in Improving Management Levels of Diabetic Nephropathy Hemodialysis Patients. *International Journal of Nursing*, 43(8): 1401–1404.
- [9] Zhu DH, Ping MH, 2024, Impact of Progressive Target Nursing on Negative Emotions, Nutritional Status, and Self-Efficacy in Uremic Hemodialysis Patients. *International Journal of Nursing*, 43(17): 3125–3129.
- [10] Sun LM, Xu HL, Wang ZH, 2024, Effect of A High-Quality Targeted Nursing Model in Hypertensive Nephropathy Hemodialysis Patients. *International Journal of Nursing*, 43(10): 1784–1787.

### Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.