

# Effect of the LEARNS Model on Self-Care Agency and Compliance in Hemodialysis Patients with Fluid Overload

Zhenzhen Hao<sup>1,2</sup>, Yang Xu<sup>1,3,\*</sup>, Jing Li<sup>1,2</sup>, Li Guo<sup>1,3</sup>, Jiao Yao<sup>1,3</sup>

<sup>1</sup>Key Laboratory of Bone Metabolism and Physiology in Chronic Kidney Disease of Hebei Province, Baoding 071000, Hebei Province, China

<sup>2</sup>Blood Purification Center, Affiliated Hospital of Hebei University, Baoding 071000, Hebei Province, China

<sup>3</sup>Department of Nephrology, Affiliated Hospital of Hebei University, Baoding 071000, Hebei Province, China

\*Corresponding author: Xu Yang, cdmedicalxy@163.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 explore an intervention strategy for patients with fluid overload undergoing maintenance hemodialysis and to evaluate the effects of the LEARNS model on improving self-care agency and patient compliance. *Methods:* A total of 76 patients with fluid overload undergoing maintenance hemodialysis at our hospital from March 2023 to March 2024 were selected for the study. Patients were randomly divided into two groups, with 38 in each group. The control group received conventional interventions, while the observation group was treated using the LEARNS model. Self-care agency, compliance, and quality of life outcomes in both groups were analyzed and compared. *Results:* Before the intervention, no statistically significant differences were observed in the self-care agency scores between the two groups ( $P > 0.05$ ). After the intervention, patients' self-care agency improved significantly, with the observation group showing notably higher scores than the control group ( $P < 0.05$ ). Patient compliance in the observation group was also significantly higher than in the control group ( $P < 0.05$ ). Quality of life, assessed using the SF-36 scale, showed no significant differences between the two groups prior to intervention ( $P > 0.05$ ). After the intervention, quality of life scores improved significantly in both groups, with the observation group exhibiting significantly higher scores than the control group ( $P < 0.05$ ). *Conclusion:* The LEARNS model is effective in improving patient compliance, enhancing self-care agency, and improving quality of life in maintenance hemodialysis patients with fluid overload, making it a promising approach for broader application.

**Keywords:** LEARNS model; Maintenance hemodialysis; Fluid overload; Self-care agency; Compliance

**Online publication:** January 7, 2025

## 1. Introduction

Fluid overload is a relatively common condition in hemodialysis patients and is a significant complication of

maintenance hemodialysis. It represents a major contributing factor to cardiovascular events in these patients, increasing the risks of hypertension and heart failure. Prolonged fluid overload significantly elevates mortality risk. Therefore, effective health interventions are critical in managing the daily care of hemodialysis patients to address non-adherent behaviors and strengthen self-care agency<sup>[1]</sup>.

The LEARNS model, a novel health education framework, adopts a patient-centered learning philosophy. It employs a variety of educational strategies to encourage patients to adopt healthier behaviors while improving their knowledge of disease and dialysis-related care. This approach enhances both self-care agency and adherence to medical regimens<sup>[2]</sup>.

This study involved 76 patients with maintenance hemodialysis and fluid overload treated at our hospital in recent years. The primary objective was to evaluate the efficacy of the LEARNS model and analyze its impact on improving self-care agency and adherence.

## **2. Materials and methods**

### **2.1. General data**

Seventy-six patients with fluid overload undergoing maintenance hemodialysis between March 2023 and March 2024 were randomly assigned to intervention groups. The control group consisted of 38 patients (19 male and 19 female), aged 23–66 years (mean age  $46.71 \pm 6.32$  years). The observation group also included 38 patients (20 male and 18 female), aged 24–68 years (mean age  $47.22 \pm 6.39$  years). Baseline data, including age and gender, showed no statistically significant differences between the two groups, ensuring comparability for the study ( $P > 0.05$ ). The hospital's ethics committee approved the study.

**Inclusion criteria:** Patients met the criteria for maintenance hemodialysis, had indications for fluid overload, were aged  $\geq 18$  years, and had been undergoing hemodialysis for more than six months. All participants and their families provided informed consent.

**Exclusion criteria:** Patients were excluded if they had severe cognitive impairment or mental illness, physical activity dysfunction, complications such as pruritus or disequilibrium syndrome that could affect results, hematologic diseases, concurrent malignant tumors, severe organ dysfunction, or were pregnant or breastfeeding.

### **2.2. Methods**

#### **2.2.1. Control group**

The control group received routine interventions. Nurses provided oral health education to patients and their families, addressing dietary guidelines, medication usage, precautions during hemodialysis, and answering questions<sup>[3]</sup>.

#### **2.2.2. Observation group**

The observation group received interventions based on the LEARNS model:

- (1) Establishment of the LEARNS team: The team comprised a chief physician, head nurse, nurse manager, and nurses from the hemodialysis department. A nurse practitioner acted as the team leader, while the chief physician developed and adjusted plans. The team leader coordinated the work of team members, the nurse manager supervised processes, and team members implemented the LEARNS plan<sup>[4]</sup>.
- (2) Listen (L): Paramedics assessed patients to understand their knowledge of the disease and informational

needs and provided comfort for anxiety and restlessness. Active listening and attention to patients' emotional and physical states were emphasized during communication.

- (3) Establish (E): Based on patient interactions, paramedics developed targeted health education plans, which were reviewed and approved by all team members. Education sessions were conducted in accordance with the plans, with detailed records maintained. Patient questions and concerns were thoroughly addressed.
- (4) Adopt (A) and Reinforce (R): Paramedics provided hemodialysis-related knowledge, including precautions, prevention of complications, weight management, and dietary and exercise guidance. Educational tools such as videos and manuals were employed to reinforce understanding. A WeChat group was created to share knowledge, including managing potassium and phosphorus levels, fluid restriction, and arteriovenous fistula care. Public WeChat accounts were also utilized for real-time interactions and health lectures <sup>[5,6]</sup>.
- (5) Name (N): At the end of each session, paramedics used questions to evaluate patient understanding, such as: "How do you control dry weight?" or "Can you demonstrate arteriovenous fistula arm exercises?" Corrections and additional explanations were provided as needed to improve comprehension.
- (6) Strengthen (S): To address content retention issues, paramedics conducted regular group education sessions and provided one-on-one guidance based on individual assessments of knowledge retention <sup>[7]</sup>.

## **2.3. Observation indicators**

### **2.3.1. Self-care agency**

The Exercise of Self-Care Agency (ESCA) scale <sup>[8]</sup> was used to assess self-care agency in both groups before and after the intervention. The scale evaluated four aspects: self-care concept, sense of responsibility, self-care skills, and health knowledge, comprising 43 items. A 5-point Likert scale (0–4 points) was utilized, with higher scores indicating stronger self-care agency.

### **2.3.2. Compliance**

Compliance was assessed using a hospital-developed questionnaire focusing on dietary habits, medication adherence, and dialysis behaviors. The total score was 100 points and categorized as follows:

- (1)  $\geq 90$  points: Fully compliant
- (2) 60–89 points: Partially compliant
- (3) 0–59 points: Non-compliant

Compliance was calculated as the sum of fully compliant and partially compliant rates.

### **2.3.3. Quality of life**

The SF-36 questionnaire was used to evaluate the quality of life of patients before and after the intervention.

## **2.4. Statistical analysis**

Data were analyzed using SPSS 23.0 software. Measurement data were expressed as mean  $\pm$  standard deviation (SD) and analyzed using *t*-tests. Categorical variables were presented as frequencies [*n* (%)] and analyzed using  $\chi^2$  tests. A *P*-value of  $< 0.05$  was considered statistically significant.

### 3. Results

#### 3.1. Comparison of self-care agency between the two groups

**Table 1** illustrates the self-care agency scores for both groups before and after the intervention. Prior to the intervention, there were no statistically significant differences in self-care agency between the groups ( $P > 0.05$ ). After the intervention, the self-care agency scores improved significantly in both groups, with the observation group demonstrating significantly higher scores than the control group ( $P < 0.05$ ).

**Table 1.** Comparison of self-care agency between the two groups (mean  $\pm$  SD, scores)

Time	Group	Self-care concept	Sense of responsibility	Self-care skills	Health knowledge
Before intervention	Observation group ( $n = 38$ )	18.88 $\pm$ 4.14	13.28 $\pm$ 3.85	25.19 $\pm$ 5.13	42.79 $\pm$ 11.13
	Control group ( $n = 38$ )	19.01 $\pm$ 3.97	13.15 $\pm$ 4.17	25.27 $\pm$ 4.96	42.18 $\pm$ 10.98
	<i>t</i> -value	0.202	0.176	0.252	0.178
	<i>P</i> -value	> 0.05	> 0.05	> 0.05	> 0.05
After intervention	Observation group ( $n = 38$ )	21.31 $\pm$ 4.65	20.59 $\pm$ 3.98	31.59 $\pm$ 5.18	49.75 $\pm$ 10.47
	Control group ( $n = 38$ )	19.84 $\pm$ 4.28	14.59 $\pm$ 3.51	27.66 $\pm$ 5.14	45.97 $\pm$ 10.36
	<i>t</i> -value	7.591	4.124	4.382	4.871
	<i>P</i> -value	< 0.05	< 0.05	< 0.05	< 0.05

#### 3.2. Comparison of compliance between the two groups

As presented in **Table 2**, the compliance rates in the observation group were significantly higher than those in the control group ( $P < 0.05$ ).

**Table 2.** Comparison of compliance between the two groups [ $n$  (%)]

Group	Fully compliant	Partially compliant	Non-compliant	Compliance rate
Observation group ( $n = 38$ )	25 (65.79)	11 (28.95)	2 (5.26)	36 (94.74)
Control group ( $n = 38$ )	20 (52.63)	10 (26.32)	8 (21.05)	30 (78.95)
<i>t</i> -value	-	-	-	9.054
<i>P</i> -value	-	-	-	< 0.05

#### 3.3. Comparison of quality of life between the two groups

**Table 3** provides an overview of quality-of-life scores in both groups before and after the intervention. Initially, there were no significant differences between the groups ( $P > 0.05$ ). After the intervention, quality-of-life scores improved significantly in both groups, with the observation group showing significantly higher scores than the control group ( $P < 0.05$ ).

**Table 3.** Comparison of quality of life scores between the two groups (mean  $\pm$  SD, scores)

Time	Group	Physical function	Psychological function	Mental health	Vitality
Before intervention	Observation group ( $n = 38$ )	43.11 $\pm$ 3.76	46.78 $\pm$ 5.05	42.26 $\pm$ 2.79	46.59 $\pm$ 2.85
	Control group ( $n = 38$ )	43.24 $\pm$ 3.97	46.51 $\pm$ 5.12	42.48 $\pm$ 3.03	46.76 $\pm$ 4.33
	<i>t</i> -value	0.158	0.272	0.391	0.209
	<i>P</i> -value	> 0.05	> 0.05	> 0.05	> 0.05
After intervention	Observation group ( $n = 38$ )	55.37 $\pm$ 4.39	61.16 $\pm$ 8.17	71.18 $\pm$ 4.36	58.05 $\pm$ 6.12
	Control group ( $n = 38$ )	45.16 $\pm$ 2.04	48.29 $\pm$ 7.24	50.09 $\pm$ 2.87	50.46 $\pm$ 5.98
	<i>t</i> -value	4.059	4.274	4.667	4.033
	<i>P</i> -value	< 0.05	< 0.05	< 0.05	< 0.05

## 4. Discussion

With the continuous advancements in hemodialysis technology, the lifespan of patients undergoing maintenance hemodialysis has significantly increased. However, the extended treatment cycles associated with this therapy often predispose patients to a range of complications, with fluid overload being one of the most prevalent. Fluid overload is a significant contributor to cardiovascular events, which can further deteriorate patients' quality of life [9]. For patients with fluid overload undergoing maintenance hemodialysis, enhancing their health knowledge is vital. Nevertheless, traditional interventions, which rely predominantly on verbal health education, are insufficient to enable patients to fully comprehend and implement the necessary health behaviors.

The LEARNS model, a patient-centered educational framework, addresses these limitations by focusing on six core components: Listen (L), Establish (E), Adopt (A), Reinforce (R), Name (N), and Strengthen (S). In the Listen phase, paramedics establish effective communication with patients to thoroughly understand their concerns and needs, thereby enabling the development of tailored health education plans. The Reinforce and Strengthen phases emphasize evaluating patients' understanding and addressing gaps through targeted explanations and continuous support. This structured approach enhances patients' health knowledge and fosters behavioral changes, ultimately improving their self-care skills and supporting better prognoses [10].

The results of this study affirm the efficacy of the LEARNS model. Patients in the observation group demonstrated significantly higher self-care agency scores, better compliance, and improved quality-of-life functional scores compared to those in the control group. These differences were statistically significant ( $P < 0.05$ ), underscoring the model's effectiveness in addressing the limitations of conventional educational methods.

## 5. Conclusion

In conclusion, the LEARNS model is a highly effective intervention for maintenance hemodialysis patients with fluid overload. By significantly improving self-care agency, compliance, and quality of life, it offers a valuable strategy for clinical application and broader promotion in healthcare settings.

## Disclosure statement

The authors declare no conflict of interest.

## References

- [1] Liu Y, 2024, Study on the Application of Mindfulness-Based Stress Reduction Therapy Combined with the Teach-Back Health Education Model in Maintenance Hemodialysis Patients. *Chinese Health Care*, 42(16): 100–103.
- [2] Fu H, Huang Q, Chen J, 2024, Application Effects of the 321 Health Education Model in Maintenance Hemodialysis Patients with Pruritus. *Primary Medical Forum*, 28(8): 7–9 + 19.
- [3] Sun X, Zha X, Zhang X, et al., 2023, Effects of the LEARNS Health Education Model on Self-Care Agency and Quality of Life in Maintenance Hemodialysis Patients. *Chinese Clinical Nursing*, 15(12): 757–761.
- [4] Ma C, Gao H, Shang C, et al., 2023, Application of Board Games in Volume Management Health Education for Elderly Maintenance Hemodialysis Patients. *Chinese Nursing Education*, 20(8): 901–908.
- [5] Xia J, Zhu W, Song D, et al., 2022, Application Effects of Tripartite Empowerment Combined with the Knowledge-Attitude-Practice Health Education Model in Exercise Intervention for Maintenance Hemodialysis Patients. *Guangxi Medical Journal*, 44(17): 2065–2068.
- [6] Huang J, Zhao R, Weng X, 2022, Application of Micro-Lectures Combined with Workshops in the Health Education of Arteriovenous Fistula Care in Maintenance Hemodialysis Patients. *Qilu Nursing Journal*, 28(17): 147–149.
- [7] Li Q, Zhang Y, 2022, Analysis of the Application Value of the 321 Health Education Model in Maintenance Hemodialysis for Uremia Patients. *Smart Healthcare*, 8(20): 182–185.
- [8] He Y, 2022, Application of the “123” Health Education Model in Maintenance Hemodialysis Patients with Pruritus. *Contemp Nurse (First Issue)*, 29(5): 123–126.
- [9] Lin M, Xu B, 2021, Observing the Effects of the Knowledge-Attitude-Practice Health Education Model on Maintenance Hemodialysis Patients with Hypertension. *China Medical Guidelines*, 19(25): 44–45.
- [10] Liu C, Guan F, Lu S, et al., 2020, Effects of Peer Health Education on Dry Weight, Self-Management Ability, and Quality of Life in Maintenance Hemodialysis Patients. *General Nursing*, 18(29): 4010–4013.

### Publisher's note

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