Study on the Effect of LEARNS Model in Self-Management of Patients with Maintenance Hemodialysis and Volume Overload

Zhenzhen Hao[1,3], Yang Xu[2,3*], Jing Li[1,3], Li Guo[2,3], Jiao Yao[2,3]

[1]Hemopurification Center, Affiliated Hospital of Hebei University, Baoding 071000, Hebei Province, China
[2]Department of Nephrology, Affiliated Hospital of Hebei University, Baoding 071000, Hebei Province, China
[3]Key Laboratory of Bone Metabolism and Physiology in Chronic Kidney Disease of Heber Province, Baoding 071000, Hebei Province, China

*Corresponding author: Yang Xu, cdmedicalxy@163.com

Abstract: *Objective:* To investigate the effect of the LEARNS model in the self-management of patients with maintenance hemodialysis and volume overload. *Methods:* Eighty patients with maintenance hemodialysis and volume overload admitted from September 2022 to May 2024 were selected as the main subjects of this experiment. They were divided into two groups based on the odd or even days of their admission, with 40 patients in each group. Patients admitted on odd days were included in the new group and received LEARNS model education, while patients admitted on even days were included in the traditional group and received traditional education. The self-care ability, treatment adherence, and quality of life were compared between the new group and the traditional group. *Results:* The self-care ability, treatment adherence, and quality of life of patients with maintenance hemodialysis and volume overload in the new group were significantly higher than those in the traditional group, with statistically significant differences between the groups ($P < 0.05$). *Conclusion:* The LEARNS model is more effective in the self-management of patients with maintenance hemodialysis and volume overload, and it is worthy of widespread clinical application.

Keywords: LEARNS model; Maintenance hemodialysis; Self-management; Treatment adherence; Quality of life

1. Introduction

Maintenance hemodialysis is the primary clinical treatment for end-stage renal disease. It involves the use of a hemodialysis machine to remove toxins, excess water, and metabolic waste from the body, thereby extending patients' survival and reducing mortality rates [1]. However, long-term hemodialysis often leads to a series of complications, resulting in strong negative emotions and a significant reduction in patients' quality of life. Among these, volume overload is a common complication for hemodialysis patients and a significant contributor to cardiovascular events. Therefore, effective interventions are necessary, including health education to improve patients' disease awareness, compliance, and cooperation. Currently, reports are indicating the significant

effectiveness of the LEARNS model in self-management for patients with volume overload undergoing maintenance hemodialysis [2]. To verify this, the study selected 80 patients with volume overload undergoing maintenance hemodialysis admitted between September 2022 and May 2024 as the main subjects for this study. They were divided into two groups based on their admission dates: 40 patients admitted on odd-numbered days were included in the novel group and received LEARNS model education, while 40 patients admitted on even-numbered days were included in the traditional group and received traditional education. The study compared the self-care ability, treatment compliance, and quality of life between the two groups.

2. Materials and methods

2.1. Basic information

80 patients with maintenance hemodialysis and volume overload, admitted between September 2022 and May 2024, were selected as the primary subjects for this experiment. They were divided into two groups based on whether they were admitted on an odd or even day of the month, with 40 patients in each group. Patients admitted on odd days were included in the novel group and underwent LEARNS mode education, while those admitted on even days were included in the traditional group and received traditional education. The traditional group consisted of 22 male patients and 18 female patients, with ages ranging from 27 to 65 years old, and an average age of (43.66 ± 2.17) years old. The novel group comprised 23 male patients and 17 female patients, aged between 28 and 63 years old, with a mean age of (43.88 ± 2.63) years old. The basic characteristics of the study subjects were comparable (P > 0.05).

Inclusion criteria: The experimental content was approved by the ethics committee. The subjects met the criteria for maintenance hemodialysis [3], were confirmed by pathological examination, were aware of the experimental procedures, and agreed to the experimental content.

Exclusion criteria: Pregnant or breastfeeding patients; patients with organ dysfunction; patients with comorbidities such as malignant tumors, immune diseases, infectious diseases, or mental illnesses [4].

2.2. Methods

The traditional group underwent routine education, where patients were guided on a scientific diet and correct medication usage through oral instruction. Detailed explanations were provided on the precautions and complications during hemodialysis. Each session lasted for 40 minutes, twice a week, for a total of 6 weeks.

The novel group implemented the LEARNS model. Firstly, an education team was formed, consisting of 1 physician responsible for developing and improving nursing content, 1 nurse practitioner as the team leader in charge of overall management, 2 head nurses responsible for supervising the implementation of the program, and 6 nurses tasked with executing the LEARNS model.

In addition, the implementation of the LEARNS model began with:

(1) Listening (L): Questions were posed to patients based on a prepared interview outline, including inquiries about the meaning of hemodialysis, possible complications after hemodialysis, and methods to control dry weight. This allowed for a comprehensive understanding of the patient's disease cognition, assessment and organization of their information needs, and attention to ease their negative emotions. During this period, the focus was primarily on listening and observing the patient's emotional and physical changes to ensure their comfort.

(2) Establishment (E): Based on interview information, develop an educational plan. After the plan is approved, schedule an education session with the patient, implement the health education according to the plan, patiently answer the patient's questions, and pay attention to communication skills.

(3) Application and Improvement (A and R): Conduct centralized oral education by explaining hemodialysis knowledge based on the patient's needs and preferences, such as dry weight management methods, exercise and diet management, and hypotension prevention techniques. Focus on two key topics per session, with each session lasting one hour for a total of four weeks. Additionally, utilize video education by creating health knowledge promotional videos tailored to patients' needs and sending them via WeChat for easy learning and understanding. This includes topics like internal fistula care methods and skin itching treatment techniques.

(4) Feedback Teaching (N): After the education session, ask patients questions based on the previous health education content, such as dry weight control methods and internal fistula arm exercise techniques. Identify any areas of confusion or misunderstanding and improve based on the patient's knowledge mastery to enhance their understanding of the disease.

(5) Reinforcement (S): Reinforce education on easily confused topics by utilizing patients' fragmented time for face-to-face guidance, achieving one-on-one education.

2.3. Evaluation criteria

(1) The ESEA rating scale is used to evaluate patients' self-care abilities, including four dimensions and 43 items: Health knowledge level, self-concept, self-responsibility, and self-care skills. Each item is rated from 0 to 4, with a total score ranging from 0 to 172. A higher score indicates stronger self-care abilities [6].

(2) A self-made questionnaire is used to analyze patients' treatment adherence, with independent scoring by the patients themselves. The total score is 10, where a score greater than 7 indicates adherence, a score between 3 and 7 indicates partial adherence and a score less than 3 indicates non-adherence. The total adherence rate is calculated as (total number of adherent cases) × 100% [7].

(3) The sf-36 rating scale is used to evaluate patients' quality of life, including eight dimensions. The score for each dimension is calculated as (actual score for the dimension / theoretical total score) × 100. A higher score indicates a better quality of life for the patient [8].

(4) A self-made questionnaire is used to analyze patients' satisfaction with nursing care, with independent scoring by the patients themselves. The total score is 10, where a score greater than 7 indicates satisfaction, a score between 3 and 7 indicates partial satisfaction and a score less than 3 indicates dissatisfaction. The total satisfaction rate is calculated as (total number of satisfied cases) × 100% [9].

2.4. Statistical methods

Using the SPSS 26.0 system, enumeration data was represented by (n, %), and the chi-squared test was conducted; measurement data was represented by mean ± standard deviation (SD), and the t-test was conducted. The test level was set at $P < 0.05$.

3. Results

3.1. Comparison of self-care abilities between the traditional group and the new group

Comparing self-care abilities between the traditional group and the new group, the total self-care score of the new group was significantly higher than that of the traditional group, and the difference between the groups was statistically significant ($P < 0.05$) (**Table 1**).

Table 1. Comparing self-care abilities between the traditional group and the new group (mean ± SD, scores)

Group/Number of cases	Health knowledge level	Self-concept	Self-responsibility	Self-care skills	Total self-care score
New group ($n = 40$)	44.51 ± 8.53	20.06 ± 5.27	15.47 ± 3.39	27.36 ± 5.51	114.55 ± 20.11
Traditional group ($n = 40$)	40.06 ± 5.46	15.17 ± 5.74	13.65 ± 3.16	23.59 ± 6.27	96.22 ± 18.16
T value	5.382	4.066	3.046	4.163	10.472
P-value	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

3.2. Comparison of treatment compliance between the traditional group and the new group

The overall treatment compliance rate in the new group was 92.50%, which was significantly higher than the 75.00% compliance rate in the traditional group. The difference between the two groups was statistically significant ($P < 0.05$) (**Table 2**).

Table 2. Treatment compliance of patients in the traditional group and the new group [n(%)]

Group/Number of cases	Compliant	Fairly compliant	Non-compliant	Total compliance rate
New group ($n = 40$)	17	20	3	37 (92.50)
Traditional group ($n = 40$)	14	16	10	30 (75.00)
χ^2 value				5.074
P-value				< 0.05

3.3. Comparison of quality of life between traditional and new group patients

Before treatment, there was no significant difference in the quality of life between the traditional group and the new group ($P > 0.05$). After treatment, the quality of life improved in both groups, with the new group showing significantly higher scores than the traditional group. The difference was statistically significant ($P < 0.05$) (**Table 3**).

Table 3. Comparison of quality of life between traditional and new group patients (points)

Group/Number of cases	Social function (SF)		Vitality (VT)		Physiological function (PF)		Mental health (MH)	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
New group ($n = 40$)	68.27 ± 8.54	91.07 ± 9.64	71.66 ± 2.87	93.47 ± 3.82	70.16 ± 2.45	92.75 ± 3.55	70.47 ± 1.36	93.85 ± 3.16
Traditional group ($n = 40$)	67.27 ± 8.33	81.11 ± 7.33	71.47 ± 1.36	81.46 ± 2.16	67.33 ± 4.32	83.22 ± 3.14	69.48 ± 5.22	82.44 ± 4.55
T value	0.342	3.124	0.363	3.667	0.235	5.514	0.537	6.106
P-value	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05

Group/Number of cases	Bodily pain (BP)		General health (CH)		Role emotional (RE)		Role physical (RP)	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
New group ($n = 40$)	68.74 ± 3.61	94.95 ± 1.48	65.85 ± 5.73	89.59 ± 7.74	69.06 ± 6.67	88.64 ± 7.06	68.06 ± 7.59	88.45 ± 7.47
Traditional group ($n = 40$)	68.38 ± 2.48	79.37 ± 5.69	65.84 ± 4.27	81.06 ± 6.62	70.47 ± 5.18	80.57 ± 6.18	70.63 ± 5.28	81.67 ± 6.87
T value	0.473	5.234	0.352	6.327	0.584	6.097	0.259	5.286
P-value	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05

4. Discussion

Hemodialysis is one of the safer, more feasible, and widely used blood purification methods, which has certain significance in reducing patients' symptoms and prolonging their survival. To improve the self-management ability of patients with maintenance hemodialysis and volume overload, it is imperative to implement modern nursing methods [11].

The LEARNS model, as a progressive health education model, helps to enhance patients' awareness of hemodialysis knowledge, improve their self-care skills, and meet their diversified health knowledge needs. By patiently listening and establishing a cooperative partnership with patients, conducting WeChat interactions during the application and improvement stages, and launching educational activities through a combination of online and offline methods, patients' questions can be answered promptly. The feedback and reinforcement stages can effectively correct patients' misconceptions about hemodialysis knowledge, deepen their memory, strengthen their mastery of health knowledge, and increase their interest in learning [12]. The experimental results of this paper show that the total self-care score of the new group is significantly higher than that of the traditional group, and the difference between the groups is statistically significant ($P < 0.05$). The total treatment compliance rate of the new group is 92.50%, which is significantly higher than the 75.00% of the traditional group, and the difference between the groups is statistically significant ($P < 0.05$). Before the intervention, there was no significant difference in quality of life between the traditional group and the new group ($P > 0.05$); after the intervention, the quality of life of both groups improved, and the quality of life score of the new group was significantly higher than that of the traditional group, with a statistically significant difference ($P < 0.05$). These findings are almost consistent with previous research conclusions [13–15], fully demonstrating the effectiveness of the LEARNS model in the self-management of patients with maintenance hemodialysis and volume overload, and also validating the value of this experiment.

5. Conclusion

In summary, the LEARNS model has a more prominent effect on the self-management of patients with maintenance hemodialysis and volume overload. It improves self-care ability and treatment compliance while enhancing the quality of life, making it worthy of widespread clinical application.

Funding

Disclosure statement

The authors declare no conflict of interest.

References

[1] Liu Y, 2024, Application of Mindfulness-Based Stress Reduction Therapy Combined with Teach-Back Health Education Model in Patients Undergoing Maintenance Hemodialysis. Chinese Health Care, 42(16): 100–103.

[2] Fu H, Huang Q, Chen J, 2024, Application Effect of 321 Health Education Model in Patients Undergoing Maintenance Hemodialysis with Skin Itching. Primary Medical Forum, 28(8): 7–9 + 19.

[3] Zhao J, 2024, Application of Self-Management Education Intervention Model in Patients Undergoing Maintenance Hemodialysis. Marriage, Parenthood and Health, 30(3): 187–189.

[4] Sun X, Cha X, Zhang X, et al., 2023, Impact of LEARNS Health Education Model on Self-Care Ability and Quality of Life of Patients Undergoing Maintenance Hemodialysis. Chinese Clinical Nursing, 15(12): 757–761.

[5] Liu X, Wang D, 2022, Application of Internet-Based Self-Management Oriented 5A Nursing Model in Patients Undergoing Maintenance Hemodialysis. Clinical Medical Engineering, 29(12): 1749–1750.

[6] Gao C, 2022, Application of Nursing Based on Health Behavior Interaction Model in Dry Weight Management Behavior of Patients Undergoing Maintenance Hemodialysis. Nursing Practice and Research, 19(22): 3382–3387.

[7] Xia J, Zhu W, Song D, et al., 2022, Application Effect of Tripartite Empowerment Combined with Knowledge-Attitude-Practice Health Education Model in Exercise Intervention for Patients with Maintenance Hemodialysis. Guangxi Medical Journal, 44(17): 2065–2068.

[8] Huang J, Zhao R, Weng X, 2022, Application of Micro-Lecture Combined with Workshop Health Education Model in Nursing Care of Arteriovenous Fistula for Patients with Maintenance Hemodialysis. Qilu Journal of Nursing, 2022, 28(17): 147–149.

[9] He E, Song R, Li N, 2022, Application of Hospital-Community-Family Ternary Linkage Nursing Model in Patients with Uremia Undergoing Maintenance Hemodialysis. Qingdao Medical and Health, 54(4): 307–310.

[10] Xiong Y, Tang A, Xie A, et al., 2022, Application Effect of Health Behavior Interaction Model in Dry Weight Management for Patients with Maintenance Hemodialysis. Modern Nurse (Mid-Month Edition), 29(6): 109–113.

[11] Zhang X, Wu Y, Ding P, 2022, Application Effect of Team Health Education Model in Patients Undergoing Maintenance Hemodialysis. Integrated Traditional Chinese and Western Medicine Nursing (Chinese and English), 8(5): 97–99.

[12] He Y, 2022, Application of the "123" Health Education Model in Patients with Maintenance Hemodialysis and Skin Itching. Modern Nurse (Early Edition), 29(5): 123–126.

[13] Lian M, Yang X, Wang X, 2021, Analysis of the Application Effect of the "5A" Nursing Model in Patients with Maintenance Hemodialysis. Chinese and Foreign Medical Treatment, 40(27): 171–174.

[14] Zhu Y, 2020, Application of Comprehensive Nursing Model in Hemodialysis Combined with Hemoperfusion for Patients with Maintenance Hemodialysis. Medical Equipment, 33(1): 186–187.

[15] Liang Y, Huang Y, Hu M, et al., 2019, Application of Knowledge-Attitude-Practice Model in Self-Management of Patients with Maintenance Hemodialysis. Heilongjiang Journal of Traditional Chinese Medicine, 48(6): 198–199.