Journal of Clinical and Nursing Research, 2025, Volume 9, Issue 10
http://ojs.bbwpublisher.com/index.php/JCNR
Online ISSN: 2208-3693
Print ISSN: 2208-3685

The Impact of Digital-Intelligent Health Education on Dry Weight Management in Patients Undergoing Maintenance Hemodialysis

Yujuan Dai

Donghai County Traditional Chinese Medicine Hospital, Lianyungang 222300, Jiangsu, China

Copyright: © 2025 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 evaluate the effectiveness of digital-intelligent health education for patients undergoing maintenance hemodialysis. *Methods*: From December 2023 to December 2024, 82 patients undergoing maintenance hemodialysis in our hospital were selected and randomly divided into an observation group (n = 41, receiving routine health education) and a control group (n = 41, receiving digital health education). The levels of knowledge, belief, and behavior related to dry weight control, as well as changes in dry weight and complications, were compared before and after intervention. *Results*: After intervention, the observation group had higher scores for knowledge (40.96 ± 6.43), belief (39.11 ± 6.39), behavior (39.66 ± 5.78), and total score (119.04 ± 13.11) compared to the control group ($p < 0.05$). The observation group also showed better dry weight control than the control group ($p < 0.05$). The total incidence of complications in the observation group (4.88%, 2/41) was lower than that in the control group (21.95%, 9/41) ($p < 0.05$). *Conclusion*: The rational application of digital-intelligent health education can effectively maintain dry weight in patients undergoing maintenance hemodialysis, reduce complications, and improve patients' knowledge, belief, and behavior levels. This approach is worthy of promotion.

Keywords: Digital-intelligent; Health education; Maintenance hemodialysis; Dry weight

Online publication: Oct 30, 2025

1. Introduction

The so-called "dry weight" refers to the lowest tolerable body weight during hemodialysis treatment, where the patient does not exhibit physical symptoms and hypotension does not occur without the assistance of antihypertensive drugs [1]. During dialysis for such patients, an increase in dry weight is often due to the volume load generated after water and sodium intake. If the load remains excessively heavy, the risk of adverse events such as cardiovascular and cerebrovascular diseases and hypertension also increases, directly affecting the patient's survival rate [2].

Therefore, it is necessary to implement necessary dry weight management and control for patients. Currently,

health education for patients is usually carried out in traditional forms, which are often lacking in specificity and have limited effectiveness. Digital-intelligent health education, on the other hand, can integrate multiple perspectives and utilize digital-intelligent methods to improve educational effectiveness [3].

To this end, the following will focus on a comparative analysis of the differences in effects of different health education models used in the treatment of patients undergoing maintenance hemodialysis for reference.

2. Materials and methods

2.1. Baseline information

Eighty-two patients undergoing maintenance hemodialysis in our hospital from December 2023 to December 2024 were selected. Forty-one patients were randomly chosen for the control group, while the remaining patients were assigned to the observation group. The control group consisted of 22 males and 19 females, with ages ranging from 31 to 65 years old, averaging (52.07 ± 3.25) years old. In the observation group, there were 24 males and 17 females, with ages between 33 and 68 years old, and a median age of (52.04 ± 3.30) years old. The basic information of the two groups showed no significant difference ($p > 0.05$), indicating comparability.

2.2. Methods

The health education team for this study consisted of one attending physician and three hemodialysis specialist nurses. Team members were responsible for reviewing literature, discussing within the group, and clarifying the content and specific application paths of digital intelligent health education. All team members underwent professional training before participating in the intervention process for both patient groups.

The control group received conventional health education. Education sessions were fixed on Mondays, Wednesdays, and Fridays. Team members focused on the importance of controlling dry weight, factors affecting dry weight gain, and specific control techniques. Educational flyers were distributed to patients, and team members provided timely and detailed answers to questions from patients and their families.

The observation group of patients received digital intelligent health education, which was conducted both inside and outside the hospital, with sessions scheduled for every Tuesday, Thursday, and Saturday. The details are as follows.

2.2.1. Inside the hospital

(1) Measurement of patients' dry weight

Group members were responsible for measuring patients' dry weight, understanding their diet and medication status, and providing feedback-based guidance. The entire process was controlled to 8–10 minutes.

(2) Game training for patients

This involved virtual diet matching. Group members guided patients to download nutrition-related software on tablets or smartphones to complete virtual pairing of diet, drinking water, and recipes, with a time limit of 8–10 minutes.

(3) Knowledge education

During the knowledge dissemination and education process, nursing staff scientifically guided patients to watch educational materials using electronic devices, further enhancing their understanding of dry weight

control. This session also lasted for 8–10 minutes.

(4) Knowledge quiz activities

Additionally, knowledge question and answer activities were organized. Relevant questions were uploaded via an online platform, and patients could participate in the competition by answering questions. Patients were rewarded with red flower stickers based on their response time and scores, which were tallied monthly. Patients could exchange their stickers for physical prizes, which helped to motivate their participation.

(5) Preparation for outside the hospital

A WeChat group for patients was established to provide assistance to patients and their families. Software for body sensation exercise was downloaded to mobile phones, and group members could add each other as friends, facilitating future monitoring and follow-up outside the hospital.

2.2.2. Outside the hospital

The focus of the intervention was on monitoring and reminders. Patients were guided to select interesting projects in the exercise software to achieve virtual exercise goals. Nursing staff in the group could remotely view patients' daily exercise status using the software. If patients did not achieve their expected exercise goals, the software's online reminder function was used to promptly notify them, ensuring timely task completion.

Data from patients' weight scales outside the hospital was effectively shared through the smart monitoring system, allowing medical staff to obtain timely updates on any fluctuations in body weight. This real-time access enabled nurses to identify abnormal trends early and provide personalized guidance or targeted interventions to prevent fluid overload or weight-related complications. The system also supported the timely issuance of reminders, ensuring that patients maintained stable dry weight and adhered to individualized health plans.

In addition, the promotion and application of the smart medicine box data-sharing function further enhanced the continuity of care. Nursing staff were able to monitor patients' medication adherence online at any time and take prompt reminder or follow-up measures in case of missed doses or irregular medication patterns. This intelligent monitoring approach effectively bridged the gap between hospital and home care, improving treatment compliance and safety.

Patients and their families were also encouraged to actively participate in disease management by providing timely feedback on daily behaviors such as physical exercise, water intake, medication use, and diet through the designated WeChat group. This interactive communication channel facilitated two-way information flow, allowing nursing staff to evaluate patients' self-management behaviors and provide individualized advice or corrections when necessary.

Furthermore, nursing staff regularly pushed educational content about dry weight management to the WeChat group, including knowledge on its importance, influencing factors, and methods for maintaining stability. Through discussions, case sharing, and experience exchanges in the group, patients were able to learn from one another, enhance their understanding of dry weight control, and improve their self-care ability. This collaborative and technology-supported model strengthened the connection between patients and healthcare providers, fostering a sense of community and shared responsibility in managing chronic conditions.

2.3. Evaluation indicators

(1) Systematic evaluation of knowledge, attitude, and practice (KAP) levels and changes in dry weight

between groups

(2) Evaluation of patients' comorbidity status

2.4. Statistical analysis

(1) Data processing:

SPSS 23.0 statistical software

(2) Data description

Count data as (n %), measurement data as ($\bar{x} \pm s$)

(3) Difference testing

Count data using χ^2, measurement data using t; $p < 0.05$ as the basis for statistical difference

3. Results

3.1. Study on changes in KAP levels of dry weight control in observation and control groups

Before intervention, there were no significant differences in relevant indicators between groups ($p > 0.05$). After intervention, there were significant differences in indicators between the two groups ($p < 0.05$) (see **Table 1**).

Table 1. Comparison of KAP levels of dry weight control before and after intervention between the two groups

Group	n	Knowledge score		Belief score		Behavior score		Total score	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Observation	41	35.23 ± 3.35	40.96 ± 6.43	31.19 ± 4.21	39.11 ± 6.39	32.25 ± 5.55	39.66 ± 5.78	110.34 ± 12.12	119.04 ± 13.11
Control	41	35.21 ± 3.33	35.47 ± 5.32	31.22 ± 4.24	34.32 ± 4.47	32.22 ± 5.51	33.21 ± 4.57	110.31 ± 12.09	113.32 ± 10.45
t-value		0.0271	4.2122	0.0321	3.9330	0.0246	5.6050	0.0112	2.1846
p-value		0.9784	< 0.001	0.9744	< 0.001	0.9805	< 0.001	0.9911	0.0318

3.2. Analysis of dry weight changes in two groups of patients

After intervention, there was a significant difference in dry weight between the observation group and the control group ($p < 0.05$) (see **Table 2**).

Table 2. Comparison of dry weight changes between the observation group and the control group

Group	n	Before intervention (kg)	After intervention (kg)
Observation group	41	66.02 ± 12.13	64.35 ± 10.54
Control group	41	66.04 ± 12.11	69.95 ± 10.77
t-value		0.0075	2.3795
p-value		0.9941	0.0197
Observation group	41	66.02 ± 12.13	64.35 ± 10.54

3.3. Comparison of comorbidity status between observation group and control group

The total incidence rate in the observation group was significantly different from that in the control group ($p < 0.05$) (see **Table 3**).

Table 3. Study on comorbidity status between the two groups of patients (n/%)

Group	n	Hypoglycemia	Muscle Cramps	Blurred Vision	Total Incidence
Observation	41	2 (4.88%)	0 (0.00%)	0 (0.00%)	2 (4.88%) *
Control	41	3 (7.32%)	3 (7.32%)	3 (7.32%)	9 (21.95%)
χ^2					5.1447
p-value					0.0233

4. Discussion

Currently, modern science and technology have achieved considerable development achievements, and the advantages of big data and artificial intelligence have gradually become prominent. Digital intelligence empowerment has also had varying degrees of impact on multiple fields [4–6]. Taking the field of nursing health education as an example, through the application of digital intelligence technology, a new health education model has been constructed with the help of AI technology, mobile terminals, and the Internet +, highlighting the central position of patients and featuring prominent characteristics of intelligence and digitization [7].

In the process of controlling dry weight for hemodialysis patients, the expansion of health education service space has been achieved through the use of mobile terminals and the Internet. Based on existing oral propaganda education or promotional brochures and other channels, it combines various forms such as virtual games, somatosensory movements, and rich media videos, enabling patients to have a more comfortable experience in receiving health education and enhancing the fun and effectiveness of education [8–11]. This model also transforms the current situation of face-to-face evaluation and monitoring, fully utilizes the characteristics of data interconnection and sharing, and achieves the goal of breaking through time constraints with the assistance of real-time feedback [12]. It provides patients with automated online monitoring and reminder services in real time, offers new ideas for the development of health education work, and significantly enhances the effectiveness of dry weight management for hemodialysis patients during both inpatient and outpatient periods [13].

In the above study, after clinical intervention, the observation group's knowledge, attitude, and practice (KAP) related to dry weight control were significantly better than those of the control group, with $p < 0.05$. The reason is that the digital and intelligent health education approach adopted in this study is highly engaging and impactful. Through this model, patients can quickly gain a deep understanding of dry weight control content using rich media educational resources, which is more conducive to forming healthy beliefs [14]. After intervention, the dry weight control status of the observation group was significantly better than that of the control group, with $p < 0.05$. This is because integrating digital and intelligent methods into health education significantly improves patients' KAP levels regarding dry weight control. Additionally, it ensures that healthcare workers have real-time knowledge of patients' conditions both inside and outside the hospital, enabling dynamic adjustments to clinical interventions and enhancing the effectiveness of dry weight maintenance [15].

The overall incidence of complications in the observation group was significantly lower than that in the control group, with $p < 0.05$. This indicates that actively conducting health education helps strengthen patients'

understanding of dry weight knowledge, leading to autonomous behavioral changes and reducing the risk of complications.

5. Conclusion

Overall, the digital and intelligent health education model combines digitalization and intelligence features, fully utilizing mobile terminals and AI technology in practice. This model demonstrates comprehensive intervention characteristics across all times and spaces. For patients undergoing maintenance hemodialysis who are controlling their dry weight, the application of this health education model enables them to further understand dry weight control-related content, achieve changes in KAP levels, and effectively avoid complications. This model has high clinical promotion and application value.

Disclosure statement

The author declares no conflict of interest.

References

[1] Zhang L, Yu C, Xu C, et al., 2024, Evaluation of the Effectiveness of 321 Health Education Guided by the Transtheoretical Model in the Treatment of Patients Undergoing Maintenance Hemodialysis. Chinese Journal of Health Education, 40(10): 942–946.

[2] Wang Y, Zhao H, Su C, et al., 2021, Intervention of Health Education under the Focusing Solution Mode on Self-Management Ability of Non-Knowledge-Based Elderly Patients Undergoing Maintenance Hemodialysis. Chinese Journal of Gerontology, 41(20): 4590–4592.

[3] Li Y, Guo Y, 2020, The Effect of Peer Support Health Education on the Quality of Life of Patients Undergoing Maintenance Hemodialysis. Chinese Journal of Health Education, 36(1): 82–85.

[4] Luo Z, Ouyang Y, Su H, et al., 2024, Study on the Correlation Between Abnormal Thalamic Functional Connectivity and Memory Decline in Patients with End-Stage Renal Disease Undergoing Maintenance Hemodialysis. Journal of Xi'an Jiaotong University (Medical Edition), 45(2): 292–297.

[5] Yang Y, Zheng N, 2022, Application of Health Education Based on Timeliness Incentive Theory in Weight Management of Patients Undergoing Maintenance Hemodialysis. Chinese Journal of Health Education, 38(4): 367–370.

[6] Yao J, Xu L, Wu C, et al., 2020, Effects of Dietary Health Education on Dietary Management Behavior, Calcium and Phosphorus Metabolism, and Nutritional Status of Patients Undergoing Maintenance Hemodialysis. Chinese Journal of Health Education, 36(12): 1141–1144.

[7] Jin M, 2021, The Influence of Social Support Based on Peer Support on Self-Management Behavior and Quality of Life of Patients Undergoing Maintenance Hemodialysis. Chinese General Practice, 2021(S1): 29–32.

[8] Ren Q, Yang J, Yang L, 2025, The Influence of Health Education Work Based on the Teach-Back Method on the Psychological Level and Complications of Patients with Chronic Kidney Disease Undergoing Maintenance Hemodialysis. Chinese Journal for Clinicians, 53(4): 437–440.

[9] Wang K, Hu M, Jiang X, 2024, The Influence of Neuman Nursing Based on the Concept of Structured Health Education on Self-Care Ability, Mindfulness, and Compliance with Water and Sodium Control in Patients Undergoing Maintenance Hemodialysis. Journal of North Sichuan Medical College, 39(8): 1138–1142.

[10] Li B, Zhang J, Liang X, 2024, The Influence of Incremental Health Education Method Based on Dominant Content on Bad Emotions and Quality of Life of Patients Undergoing Maintenance Hemodialysis. Internal Medicine, 19(1): 109–112.

[11] Yang X, Li S, 2024, The Influence of LEARNS Health Education Combined with Group-Based Mindfulness Decompression Intervention on Subjective Well-Being and Quality of Life of Patients Undergoing Maintenance Hemodialysis. Primary Medical Forum, 28(34): 130–133.

[12] Zhang L, Xiao H, Zhang Z, 2024, Research on the Effects of Case-Problem-Driven Health Education on Self-Management, Self-Efficacy, and Complication Prevention in Patients Undergoing Maintenance Hemodialysis. International Journal of Nursing, 43(7): 1209–1212.

[13] Liu Y, Sun Q, Chang J, et al., 2024, The Influence of a Nurse-Led Family Support Model Combined with Knowledge, Attitude, and Practice Health Education on the Self-Care Ability of Patients Undergoing Maintenance Hemodialysis. Clinical Medical Research and Practice, 9(17): 157–160.

[14] Zhang Y, 2024, The Influence of Visual Graphic Health Education on Post-Dialysis Fatigue, Sleep Self-Management Ability, and Compliance in Patients Undergoing Maintenance Hemodialysis. Primary Medical Forum, 28(25): 129–132 + 149.

[15] Gong H, Zhou Y, Wang W, et al., 2024, Application Effect of Intensive Health Education Combined with Psychological Nursing in Patients Undergoing Maintenance Hemodialysis. Integrated Traditional Chinese and Western Medicine Nursing (Chinese and English), 10(4): 17–20.

Publisher's note

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