ORIGINAL RESEARCH

Effectiveness of a Full Course Health Education in the Care of Patients with Chronic Kidney Disease Receiving Peritoneal Dialysis

Xiaoying Chai, MBBS; Yu Zhang, MBBS; Liying Qin, MBBS; Ping Gu, MBBS; Hua Hong, MBBS; Fujing Xiong, MBBS

ABSTRACT

Background • Chronic kidney disease (CKD) patients undergoing peritoneal dialysis face numerous challenges that can impact their health behaviors, treatment adherence, and overall quality of life. A comprehensive health education program tailored for CKD patients on peritoneal dialysis is imperative to enhance the effectiveness of treatment and address these issues.

Objective • The primary objective was to evaluate the impact of a full course health education program on health behaviors, treatment adherence, quality of life, and the occurrence of adverse events in CKD patients receiving peritoneal dialysis.

Methods • A total of 98 CKD patients on peritoneal dialysis at our hospital between October 2019 and October 2022 were selected. The patients were randomly assigned to receive either routine care (n=52) or participate in a full-course health education program (n=46). The comparative assessments included health behavior scores, treatment adherence, Kidney Disease Targeted Area (KDTA) scores, monitoring adverse events, and tracking readmissions.

Results • Patients in the observation group who underwent the full course health education program exhibited significant improvements in health behavior scores and treatment adherence ($P < .05$). Notably, the observation group demonstrated higher levels of medication compliance, timely reviews, and catheter maintenance. Moreover, full-course health education contributed to an enhanced quality of life, reflected in higher KATA scores, and led to a reduction in adverse events and readmission rates compared to routine care ($P < .05$).

Conclusions • This study concludes that a full-course health education program is effective in improving health behaviors, treatment adherence, and quality of life while reducing adverse events among CKD patients undergoing peritoneal dialysis. (*Altern Ther Health Med.* 2024;30(12):524-529).

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INTRODUCTION

The rising prevalence of chronic kidney disease (CKD) in China represents a growing health challenge in recent years.[1] CKD is characterized by the chronic impairment of kidney function and structure,[2] leading to challenges in effectively eliminating metabolic substances from the body. Furthermore, CKD can trigger water-electrolyte imbalances and endocrine disruptions, posing a threat to the overall well-being of patients.[3] Studies[4] have highlighted the significance of prompt diagnosis and interventions when urinary abnormalities are detected, considering the subtle onset and atypical symptoms associated with CKD.

Peritoneal dialysis is predominantly employed in the management of CKD, offering the advantages of simplicity in operation and low medical costs.[5] Among the various peritoneal dialysis modalities, continuous ambulatory peritoneal dialysis (CAPD) stands out as the most prevalent, enabling patients to self-administer treatment in the comfort of their homes.[6] Studies have highlighted that CAPD not only alleviates the burdens on patients but also helps in avoiding unnecessary waste of medical resources.[7]

A previous study[8] documented a variety of adverse events in patients undergoing CAPD attributed to inadequate pre-training, improper care practices, and the lack of timely follow-up monitoring. These factors compromise the effectiveness of CAPD and elevate the risks of readmission or mortality. Consequently, there is a crucial need for targeted health education to enhance CAPD efficiency, diminish adverse events, and promote both long-term survival and quality of life for patients.[9]

Therefore, this study evaluated the impact of comprehensive health education on individuals with CKD

undergoing peritoneal dialysis, with a specific focus on improving efficiency, reducing adverse events, and enhancing long-term survival and quality of life. The findings aimed to help reduce adverse events and improve the long-term survival and quality of life for CKD patients.

MATERIALS AND METHODS

Study Design

A total of 98 CKD patients undergoing peritoneal dialysis at our institution from October 2019 to October 2022 were enrolled and stratified into two groups: routine care (control group, n=52) and full-course health education (observation group, n=46). Ethical approval for the study was obtained from the Ethics Committee of the Affiliated Hospital of Jiangnan University, and all participating patients provided informed consent by signing relevant consent forms.

Inclusion and Exclusion Criteria

Inclusion criteria were as follows: (1) Patients diagnosed with CKD through clinically relevant tests; (2) Patients undergoing regular peritoneal dialysis treatment for more than 90 days; (3) Patients demonstrating a willingness to participate in the follow-up survey conducted for this study actively; (4) Individuals in good mental condition, exhibiting normal cognitive function, and willing to cooperate with their prescribed treatment.

Exclusion criteria were as follows: (1) Patients with mental and cognitive dysfunction; (2) Individuals suffering from severe organ diseases; (3) Those with a life expectancy <1 year; (4) Cases with incomplete clinical data; and (5) Individuals displaying poor treatment cooperation.

Control Group Procedure: Routine Care

The control group underwent standard care procedures throughout the study period. The care protocol was as follows:

Pre-Catheter Placement Education. Before catheter placement, patients received comprehensive information from the nursing staff. This information included an introduction to the principles, contraindications, and the process of peritoneal dialysis treatment.

Post-Catheter Placement Education. After catheter placement, the nursing staff conducted educational sessions for both patients and their families. This included guidance on CAPD precautions and instructions related to dietary considerations and daily living activities.

Telephone Follow-ups. Regular telephone follow-ups were conducted once a week. These follow-ups served the dual purpose of monitoring the patients' conditions and addressing any queries they or their families might have.

Observation Group: Full Course Health Education

Establishment of Full Course Health Education Group. The observation group was facilitated by a multidisciplinary team comprising a department director, head nurse, attending physician, associate attending physician, and two clinical nurses. This team formulated a comprehensive post-discharge care protocol, providing health education tailored to different rehabilitation stages.

Medical Data Collection. A patient's self-health profile was precisely developed, encompassing vital details such as basic information, admission and discharge dates, examination results, peritoneal dialysis cannulation specifics, regular post-discharge return visits, and contact information. Peritoneal dialysis nurses performed a comprehensive assessment, addressing potential issues associated with home dialysis, including insufficient knowledge about peritoneal dialysis, poor compliance, and inadequate follow-up. Utilizing a computerized system, patient files were efficiently stored and managed. Timely updates to these files were ensured during follow-up visits, maintaining an accurate and up-to-date record of each patient's medical journey.

Full Course Health Education Guidance. (1) Basic knowledge of CKD: Patients were provided with comprehensive information on the cause, prevalence, mortality, risk factors, and typical manifestations of CKD. This education was aimed to enhance their disease awareness and knowledge, contributing to the reduction of negative emotions associated with the condition. (2) Knowledge about peritoneal dialysis: The purpose of dialysis was introduced to the patients, accompanied by guidance on preventive care measures to ensure a thorough understanding.

(3) Post-peritoneal dialysis self-care: Self-care education covered various aspects, including diet-related precautions, exercise instructions, home dialysis environment management, catheter maintenance skills, and wound infection prevention care. The health education group developed specific content for each area, delivering knowledge through text, pictures, and videos every Saturday at 15:00. Patients were encouraged to leave messages about their concerns through online communication platforms such as WeChat. Group members promptly checked and responded to these messages. Furthermore, psychological interventions were implemented to address and alleviate the negative emotions of patients, fostering enhanced treatment cooperation.

(4) Follow-up and Observation: Regular video follow-ups, each lasting approximately 20 minutes, were conducted to gain insights into the patient's rehabilitation progress, overall body condition, medication adherence, and upcoming return visits. The duration of the follow-up period spanned 3 months.

Outcome Measures

Health Behavior Scores. The patient's health behaviors were evaluated using the self-rated health measurement scale (SRAHR) both at the time of admission and during the last follow-up. This scale comprises four domains, namely diet management, exercise management, psychological pleasure, and health responsibility, featuring a total of 28 entries. Scores range from 0 to 112, with higher scores indicating more favorable health behavior.

Treatment Compliance. During the final follow-up, the nursing staff evaluated the treatment compliance of both patient groups across three domains: medication adherence, timely reviews, and catheter maintenance. A patient score of ≥90 out of 100 indicated compliance, while a score of <90 signified non-compliance.

Kidney Disease Targeted Area (KDTA) Score. The KDTA was employed to evaluate the quality of life of patients at admission and during the last follow-up. This scale comprises various domains, including patient satisfaction, dialysis staff support, discomfort, nephropathy impact, nephropathy burden, work status, cognitive function, sexual function, social status, and sleep quality. A higher score for a patient is indicative of a better quality of life.

Adverse Reactions and Readmissions. Adverse reactions in the current study encompassed wound infection, peritoneal inflammation, catheter displacement, catheter dislodgement, and catheter blockage. Readmission was operationally defined as the necessity for patients to revisit the hospital for treatment during home peritoneal dialysis.

Statistical Analysis

Statistical computations were performed using SPSS 25.0 (IBM, Armonk, NY, USA), and GraphPad Prism 8 (GraphPad Software, San Diego, CA, USA) was utilized for graphical representations. Descriptive statistics for measurement data are presented as mean ± standard deviation ($\bar{x} \pm s$) and were subjected to analysis using the independent samples t test. Count data are expressed as n(%) and were compared using the chi-square (χ^2) test. The threshold for statistical significance was set at $P < .05$. Including these additional details enhances transparency regarding the statistical methods employed in this study.

RESULTS

Patient Characteristics

The control group comprised 33 males and 19 females, with ages ranging from 22 to 64 years (42.39±5.65). The duration of the disease ranged from 1 to 8 years (3.47±1.05), and the dialysis duration varied from 8 to 54 months (31.51±4.82). The distribution across CKD stages included 5 cases of stage 2, 19 cases of stage 3, 21 cases of stage 4, 7 cases of stage 5, 8 cases of diabetic nephropathy, 20 cases of hypertensive nephropathy, 15 cases of primary glomerulonephritis, and 9 cases of tubulointerstitial lesions. Regarding education, 37 cases had a high school education or below, while 15 cases had a college-level education or above.

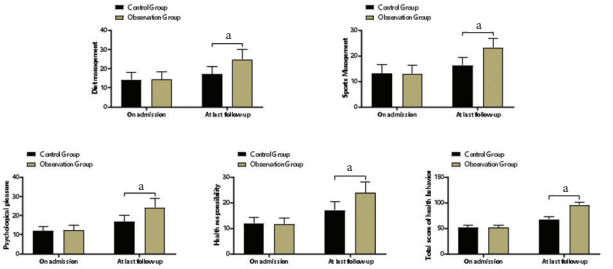
The observation group consisted of 29 males and 17 females aged 21 to 65 years (42.45±5.69). The duration of the disease ranged from 1 to 8 years (3.51±1.03), and the dialysis duration ranged from 6 to 58 months (31.71±4.59). The distribution across CKD stages included 7 cases of stage 2, 19 cases of stage 3, 16 cases of stage 4, 4 cases of stage 5, 6 cases of diabetic nephropathy, 17 cases of hypertensive nephropathy, 12 cases of primary glomerulonephritis, and 11 cases of tubulointerstitial lesions. Regarding education, 33 cases had a high school education or below, while 13 cases had a college-level education or above. Importantly, patient characteristics between the two groups were comparable ($P > .05$), as detailed in Table 1.

Table 1. Patient Characteristics Comparision

Characteristics	Control Group (n=52)	Observation Group (n=46)	t/χ^2	P value
Sex			0.002	.966
Male	33	29		
Female	19	17		
Age (year)	42.39±5.65	42.45±5.69	-0.052	.959
Disease Duration (year)	3.47±1.05	3.51±1.03	-0.19	.85
Duration of Dialysis (months)	31.51±4.82	31.71±4.59	-0.21	.834
CKD Stage				
Stage 2	5	7	0.713	0.399
Stage 3	19	19	0.0	1.0
Stage 4	21	16	0.326	0.568
Stage 5	7	4	0.556	0.456
Disease Types				
Diabetic Nephropathy	8	6	0.109	0.741
Hypertensive Nephropathy	20	17	0.024	0.878
Primary Glomerulonephritis	15	12	0.093	0.76
Tubulointerstitial Lesions	9	11	0.656	0.418
Education Level			0.004	0.949
High School And Below	37	33		
College And Above	15	13		

Note: t/χ^2 represents the t value for continuous variables or the chi-square value for categorical variables.

Figure 1. Health Behavior Scores



[a]indicates a statistically significant difference at $P < .05$. Error bars represent standard deviation. The scores were assessed using the Self-rated Health Measurement Scale (SRAHR) and compared between the control group and the observation group at admission and the last follow-up.

Health Behavior

The total health behavior scores at admission and during the last follow-up in the control group were (51.12±5.34, 67.14±5.59), while those in the observation group were (50.98±5.23, 95.83±5.62). Health behavior scores at admission between the two groups were comparable ($P > .05$). Notably, patients who underwent a full course of health education demonstrated significantly higher health behavior scores compared to those receiving routine care ($P < .05$), as illustrated in Figure 1.

Treatment Compliance

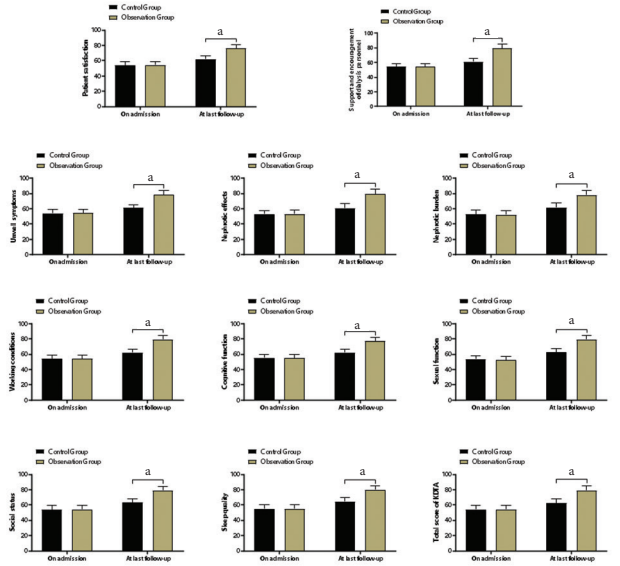
In the control group, the medication compliance rate was 69.23% (36/52), the timely review compliance rate was 63.46% (33/52), and the catheter maintenance compliance rate was 73.08% (38/52). Conversely, in the observation group, the medication compliance rate was 93.48% (43/46), the timely review compliance rate was 91.30% (42/46), and

Table 2. Comparison of Treatment Compliance

Groups	n	Medication Compliance Rate	Timely Review Compliance Rate	Catheter Maintenance Compliance Rate
Control Group	52	69.23%(36/52)	63.46%(33/52)	73.08%(38/52)
Observation Group	46	93.48%(43/46)	91.30%(42/46)	97.83%(45/46)
χ^2	-	9.182	10.535	11.533
P value	-	.002	.001	.003

Note: Compliance rates are presented as percentages with the number of compliant cases out of the total in parentheses.

Figure 2. Quality of Life



[a]indicates a statistically significant difference at $P < .05$. The quality of life scores were evaluated using the Kidney Disease Targeted Area (KDTA) scale, comparing results between the control group and the observation group at admission and the last follow-up.

Table 3. Adverse Events and Readmission

Adverse Events	Control Group (n=52)	Observation Group (n=46)	χ^2	*P* value
Wound Infection	3	1	-	-
Peritoneal Inflammation	3	1	-	-
Catheter Dislocation	2	0	-	-
Catheter Dislodgement	1	0	-	-
Catheter Blockage	1	0	-	-
Total Incidence (%)	19.23(10/52)	4.35(2/46)	5.031	.025
Percentage of Readmission (%)	17.31(9/52)	2.17(1/46)	6.101	.014

Note: Incidence percentages are presented as proportions with the number of cases out of the total in parentheses.

the catheter maintenance compliance rate was 97.83% (45/46). This finding reflects a notable improvement in medication, timely review, and catheter maintenance compliance in the observation group compared to the control group.

Full-course health education significantly enhanced patients' treatment medication compliance compared to routine care ($P < .05$), refer to Table 2. These findings highlighted the positive impact of the intervention on increasing patients' adherence to medication, timely reviews, and catheter maintenance. It implies that the comprehensive health education program contributed to an overall improvement in adherence to the prescribed treatment regimen and related medical recommendations.

Comparison of Quality-of-Life

The total quality of life scores at admission and during the last follow-up were (54.27±5.13, 62.09±5.89) in the control group and (53.98±5.36, 79.04±6.11) in the observation group. Full-course health education demonstrated a more significant improvement in the quality of life of patients compared to routine care, as evidenced by the higher KATA scores ($P < .05$), see Figure 2. This result implies that the intervention positively impacted the overall well-being and quality of life of patients in the observation group, as reflected in their higher scores.

Comparision of Adverse Events and Readmission

The incidence of adverse reactions was 19.23% (10/52) in the control group and 4.35% (2/46) in the observation group, with readmission percentages of 17.31% (9/52) in the control group and 2.17% (1/46) in the observation group. Full-course health education resulted in a more significant reduction in adverse events and readmission compared to routine care, as indicated by the lower incidence of adverse reactions and readmission ($P < .05$), see Table 3.

DISCUSSION

CKD, being a lifelong disease, lacks a clinical cure at present, and the existing treatments predominantly aim to impede disease progression.[10] Consequently, the basics of CKD prevention and treatment lie in cultivating a sound health concept, acquiring in-depth disease knowledge, honing self-care skills, rectifying unhealthy lifestyle choices, and fostering robust behavioral habits.[11] Park et al.[12] discussed that enhancing the self-health management ability and compliance of CKD patients holds substantial significance in the efforts to delay the progression of CKD.

Peritoneal dialysis is an efficacious intervention for renal replacement in CKD patients, characterized notably by its option for home-based treatment. This modality necessitates patients to attain proficiency in understanding CKD, mastering the complexities of standardized peritoneal dialysis procedures, and acquiring knowledge of related care methods.[13] Past studies indicate a substantial correlation between the effectiveness of training and the quality of peritoneal dialysis treatment, as well as the overall quality of patient survival.[14]

Traditional nursing interventions for CKD patients typically encompass knowledge instructions and telephone follow-ups, yielding suboptimal outcomes.[15] Furthermore, inadequacies in communication and timely guidance regarding the management of adverse events can exacerbate disease progression.[16] Full-course health education, as an innovative approach, addresses the limitations of conventional nursing interventions by offering comprehensive disease knowledge education and online follow-ups. This proactive strategy aims to promptly address patient concerns, ultimately enhancing patient prognosis through heightened disease awareness knowledge and delaying disease progression.[17]

A significant number of peritoneal dialysis patients struggle to cultivate healthy habits during home peritoneal dialysis,

primarily due to the absence of professional nursing guidance post-discharge. This deficiency undermines the therapeutic efficacy of peritoneal dialysis.[18] Examining traditional nursing interventions for CKD reveals shortcomings in providing adequate knowledge instructions and timely communication, ultimately leading to less-than-optimal outcomes. Advocating for full-course health education, which addresses these shortcomings through the provision of comprehensive disease knowledge and online follow-up, can help address these challenges. This approach contributes to heightened patient awareness, knowledge, and the delayed progression of the disease, particularly in the context of home peritoneal dialysis.

In the current study, patients who underwent a full course of health education demonstrated significantly elevated health behavior scores compared to those receiving routine care ($P < .05$). This improvement may be attributed to the comprehensive health education offering patients guidance on home peritoneal dialysis precautions and regular video follow-ups. Earlier research[19] highlighted the lack of effective nursing guidance during home treatment for many CKD peritoneal dialysis patients, leading to irregular dialysis operations and decreased compliance. Consequently, it increases the risk of adverse reactions and readmission.

Comprehensive health education significantly improved patients' treatment medication compared to routine care ($P < .05$). Additionally, it resulted in a notable reduction in adverse events and readmission compared to routine care, as evidenced by the lower incidence of adverse reactions and readmission ($P < .05$). These findings align with the research outcomes reported by Modi et al.[20] The consistent results affirm that comprehensive health education proves effective in enhancing compliance and refining self-care skills in patients with chronic diseases, ultimately mitigating the occurrence of adverse events.

Quality of life serves as a crucial indicator of the physical and mental well-being of CKD patients undergoing home peritoneal dialysis. The outcomes of the present study revealed that comprehensive health education significantly enhanced the quality of life for patients compared to routine care, as evidenced by the higher KATA scores ($P < .05$). These results align with the research outcomes of Legrand et al.,[21] who conducted a comprehensive health education guidance intervention involving 49 patients with cardiovascular and cerebrovascular diseases. Their research indicated that the improvement in quality of life was notably superior in patients who underwent comprehensive health education compared to those who received routine guidance.

Our results reveal a significant positive impact of a full course of health education on health behavior, treatment compliance, and quality of life in CKD patients undergoing peritoneal dialysis. These findings affirm the efficacy of the intervention and underscore its potential to address critical aspects of patient care. The integration of these results reveals how targeted health education can play a pivotal role in improving outcomes and fostering a holistic approach to managing chronic kidney disease.

Building on the insights garnered from this study, several promising avenues for future research emerge. Firstly, there is a need for in-depth exploration and customization of comprehensive health education programs to cater to the unique needs of diverse CKD populations. Innovative approaches to enhance online follow-up and foster patient engagement could significantly improve the delivery of health education. Additionally, the incorporation of community health care as a flexible care strategy in chronic disease management may serve as a supplementary element in future care practices.[22] Future studies can focus on identifying and overcoming barriers hindering the development of healthy habits during home peritoneal dialysis, ultimately aiming to optimize therapeutic outcomes.

Our findings suggest that targeted research is essential to address the specific limitations acknowledged in this approach. Exploring strategies to rectify irregular dialysis operations and enhance compliance during home treatment could effectively mitigate adverse reactions and readmissions. Comparative studies assessing the long-term impact of various health education interventions on patient outcomes hold the potential to provide invaluable insights, aiding in the refinement of clinical practices.

Study Limitations

While illustrating the effectiveness of full-course health education, this study acknowledges certain limitations. These limitations encompass factors such as sample size, potential selection bias, and the specific demographic characteristics of the study participants. Additionally, the study's duration and the homogeneous nature of the CKD population may restrict the broader applicability of the results to more diverse patient groups. Understanding these limitations is crucial for interpreting the study's outcomes accurately and for guiding future research efforts. Future research should prioritize addressing these limitations and delving deeper into the potential advantages of comprehensive health education across diverse CKD populations.

CONCLUSION

In conclusion, this study demonstrates the significant effectiveness of full course health education in improving health behaviors, treatment compliance, and quality of life among CKD patients undergoing peritoneal dialysis. The positive outcomes underscore the clinical impact of comprehensive health education, supporting its integration into tailored programs for CKD patients. Addressing identified limitations can refine interventions, enhancing patient care. Future research should focus on customizing health education strategies for diverse CKD populations and exploring innovative online engagement methods. Targeted investigations into overcoming barriers related to irregular dialysis operations and improving compliance at home will inform clinical practices. Overall, this study provides a foundation for advancing health education interventions in CKD and peritoneal dialysis.

CONFLICTS OF INTEREST

The authors report no conflict of interest.

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None

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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