





## Article

# Effects of Interdisciplinary Collaborative Nursing on Hemodialysis Compliance in Patients With Chronic Renal Failure: A Retrospective Analysis

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## Abstract

**Aims/Background:** Hemodialysis is the primary form of treatment for patients with chronic renal failure. The lengthy dialysis process and rigid treatment schedule often lead to poor patient adherence. This study aims to explore the effects of interdisciplinary collaborative nursing and routine nursing on hemodialysis compliance in patients with chronic renal failure. **Methods:** This retrospective analysis included clinical data of 136 patients with chronic renal failure who underwent hemodialysis in Zibo Central Hospital from April 2021 to January 2022. The patients were divided into a control group and an observation group according to the type of nursing care given. The control group received routine nursing, whereas the observation group received nursing intervention based on an interdisciplinary collaborative nursing model. Hemodialysis compliance, anxiety, awareness of disease, and health-related quality of life among the patients were evaluated. **Results:** Compared to the control group, the observation group exhibited significantly higher levels of hemodialysis compliance and disease knowledge ( $p < 0.05$ ). The anxiety level of the observation group was significantly lower than that of the control group ( $8.04 \pm 5.06$  vs.  $12.49 \pm 4.87$ ;  $p < 0.001$ ). In terms of quality of life, the observation group scored higher than the control group in physical, psychological, social, and environmental domains ( $p < 0.05$ ). **Conclusion:** The interdisciplinary collaborative nursing enhances hemodialysis compliance in patients with chronic renal failure, ameliorates their anxiety, and improves their health-related quality of life. This research provides a theoretical basis for the design and selection of clinical management plans in the future.

**Keywords:** kidney failure; renal dialysis; compliance; nursing care; anxiety

## 1. Introduction

Chronic kidney disease refers to the irreversible structural damage or impairment of kidney function [1]. Chronic kidney disease has a significant impact on the quality of life and health of patients, imposes huge burdens on their families, and has been listed as one of the top ten causes of death worldwide [2,3]. The global prevalence of chronic kidney disease is estimated at approximately 9–13% and continues to rise each year, with China alone accounting for more than 130 million patients [4,5]. Chronic renal failure (CRF) usually occurs in the later stages of chronic kidney disease, clinically classified as a glomerular filtration rate of less than 15 mL per minute per 1.73 m<sup>2</sup> [6], with hemodialysis, peritoneal dialysis, and kidney transplantation being the major treatments. However, due to the limited availability of organ donors, dialysis supersedes transplantation as the most common modality of treatment, and the global records show that more than 3.5 million CRF patients are recipients of dialysis treatment [6].

Dialysis works by removing solutes and excess fluid through diffusion across a semipermeable membrane and ultrafiltration. The predominant dialysis modalities are hemodialysis, peritoneal dialysis, and hemofiltration, whereas hemodiafiltration and intestinal dialysis are less

commonly used approaches [7]. Most CRF patients require lifelong dialysis, and the treatment regimen is highly rigid, marked by stringent fluid and dietary restrictions, strict medication adherence, and a time-consuming dialysis schedule of up to 3–4 hours per session, three times a week. Therefore, for CRF patients undergoing hemodialysis, strict compliance with treatment is essential. Failure in dialysis compliance would result in the accumulation of toxic substances that cannot be metabolized in the body, causing various complications and even death. Generally, patients' compliance is affected by multiple factors, such as their understanding of the disease, levels of anxiety and apathy toward their condition, family support, and the type of nursing intervention they receive [8–10].

At present, the interdisciplinary collaborative nursing mode has emerged and gradually replaced the traditional nursing mode as the primary form of nursing intervention for patients with CRF [11]. Interdisciplinary collaborative nursing entails the formation of a patient-centered nursing team comprising medical and nursing experts from different disciplines [12]. Under the traditional nursing mode, patients have poor compliance with hemodialysis due to various factors, and are prone to anxiety, depression and fear, which seriously affect their quality of life and treatment progress [13,14]. The interdisciplinary collaborative



nursing mode is expected to improve the treatment compliance of patients and their quality of life [15]. Currently, evidence on the effectiveness of interdisciplinary collaborative nursing mode in improving hemodialysis compliance and psychosocial outcomes in patients with CRF remains relatively scarce. Thus, this retrospective study aimed to analyze the impacts of different nursing modes on hemodialysis compliance, anxiety levels, disease knowledge, and health-related quality of life in patients with CRF.

## 2. Methods

### 2.1 Participants

A total of 136 patients with CRF undergoing hemodialysis at Zibo Central Hospital from April 2021 to January 2022 were included in this study. The inclusion criteria are as follows: (1) aged  $\geq 18$  years; (2) diagnosed with CRF, which is defined as an estimated glomerular filtration rate (eGFR)  $< 15$  mL/min/1.73 m<sup>2</sup> [6]; (3) undergoing hemodialysis for at least 6 months, with at least three sessions per week, each lasting a minimum of 3 hours; (4) able to communicate clearly and read. Exclusion criteria are as follows: (1) transferring to another hospital during the study; (2) incomplete medical records; (3) with malignant tumors; (4) refusing to participate in the study; (5) developing acute complications during the study period. The flow chart of patient selection is shown in Fig. 1. After filtering through the pre-defined inclusion/exclusion criteria, eligible patients were selected and divided into either the control or observation group based on the type of nursing intervention received. Ethical approval for this study was obtained from the Ethics Committee of Zibo Central Hospital (Ethics No. 202104022).

### 2.2 Intervention Protocols

The control group received routine nursing as follows:

(1) Pre-dialysis preparation: The nurses checked patients' identity, evaluated dialysis equipment and vascular access before dialysis, and measured their blood pressure, heart rate, body temperature and other vital signs to ensure that they were healthy prior to dialysis initiation.

(2) Dialysis monitoring: The nurses continuously observed the patients' blood pressure, electrocardiogram (ECG), dialysate parameters, and fluid balance during dialysis, and provided instant treatment for common complications such as hypotension, convulsions and spasms upon detection.

(3) Basic education and diet guidance: The nurses provided fundamental health education to patients during daily follow-up, including diet control (e.g., limiting potassium- and phosphate-rich foods), fluid intake control, standardized use of drugs, and the importance of maintaining dialysis compliance.

The control group received routine nursing throughout the study period, which was implemented during each

dialysis session (3 times per week, 3–4 hours per session) and continued for 6 months.

Interdisciplinary collaborative nursing intervention refers to the establishment of a multidisciplinary team consisting of an attending physician, three nurses, a nutritionist, a clinical pharmacist, and a psychologist. The observation group received interdisciplinary collaborative nursing as follows:

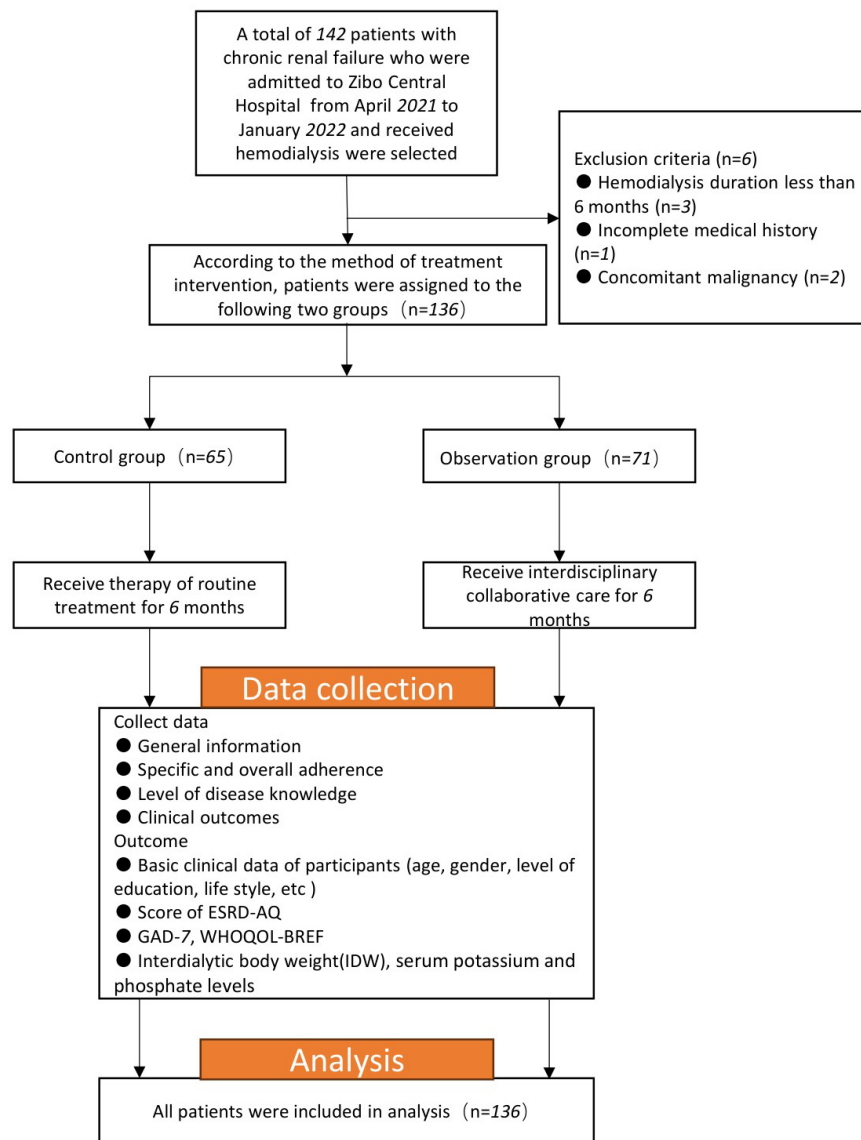
(1) Comprehensive health education: An education manual—consisting of relevant content based on themes determined by the multidisciplinary team members through regular academic meetings—is created after strict revision. Each patient will receive a copy of the manual. The manual covers a broad spectrum of relevant health education-related content, such as dialysis compliance, timely medication use, diet and fluid control, and the interrelationship among dialysis-related symptoms, such as hyperkalemia and arrhythmia, to enhance patients' understanding of the disease and strengthen their self-management ability. The nurses would explain and answer questions in stages during the interval of dialysis.

(2) Nutritional guidance: Nutritionists formulated a personalized diet plan tailored to each patient after assessing their nutritional status, taking into account the effects of dialysis on protein, potassium, phosphate, and electrolyte balance. They would also educate the patients on the recommended foods, cooking methods, and specific restrictions, and introduce adjustments to the plan throughout the follow-up.

(3) Drug intervention: Clinical pharmacists reviewed patients' medication regimens, monitored for potential drug-drug interactions, and assessed the impact of dialysis on drug clearance. During their slots, they would introduce the key drugs commonly used by the patients, such as phosphate binders, antihypertensive agents, and erythropoietin, and demonstrate the proper usage to ensure patient safety and compliance.

(4) Psychological counseling: Through individual psychological counseling and group counseling regularly, psychologists offer feedback and words of advice to the patients to help them relieve anxiety and depression, so as to improve their adaptability to long-term dialysis treatment. When necessary, the psychologists will cooperate with other team members to make customized adjustments to patient's nursing care and education plan.

The observation group received the interdisciplinary collaborative nursing intervention for 6 months. The comprehensive health education briefing was conducted weekly during dialysis session. Nutritional guidance, drug intervention and psychological intervention are carried out once a month, and these interventions can be adjusted according to the patient's condition, when necessary.



**Fig. 1. Flowchart of patient selection and grouping.** ESRD-AQ, End Stage Renal Disease-Adherence Questionnaire; GAD-7, Generalized Anxiety Disorder 7; WHOQOL-BREF, World Health Organization Quality of Life-BREF Scale.

### 2.3 Sociodemographic Data

Clinical and baseline information, including age, gender, education level, disease duration, body mass index (BMI), history of smoking, marital status, presence of chronic diseases (such as diabetes or hypertension), and family history of renal failure, was collected.

### 2.4 Evaluation of Patients' Compliance Under Different Nursing Modes

#### 2.4.1 End Stage Renal Disease-Adherence Questionnaire

The End Stage Renal Disease-Adherence Questionnaire (ESRD-AQ) was used to evaluate the adherence of patients, originally developed by Kim *et al.* [16] to capture multidimensional adherence behaviors in hemodialysis patients (attendance, medication, fluid, diet). The EDRD-AQ has been translated and validated in multiple languages and

settings [17]. The questionnaire consists of five parts, including 46 items. The first part contains the patient's relevant medical history, and the other four parts measure the patient's compliance with treatment, adherence of medication use, fluid and dietary restriction during the course of hemodialysis. Questions 14, 17, 18, 26, 31, and 46 in the ESRD-AQ, which evaluate treatment compliance behavior, were translated into Chinese, and the translations were reviewed by a multidisciplinary team to ensure preservation of the intended meaning. These questions have different score ranges, with question 14 having a score range of 0–300, questions 17, 26, 31, and 46 having a score range of 0–200, and question 18 having a score range of 0–100. The higher the score, the stronger the treatment compliance in the patients.

**Table 1. Sociodemographic data of the participants.**

Variables	Control group (n = 65)	Observation group (n = 71)	Statistic	p
Age (years)	53.98 ± 6.37	55.86 ± 6.76	t = -1.66	0.099
Disease duration (months)	25.52 ± 4.68	26.93 ± 4.80	t = -1.72	0.087
BMI (kg/m <sup>2</sup> )	23.70 ± 3.17	24.25 ± 2.27	t = -1.16	0.250
Smoking history			χ <sup>2</sup> = 0.94	0.333
No	53 (81.54)	53 (74.65)		
Yes	12 (18.46)	18 (25.35)		
Family history of kidney failure			χ <sup>2</sup> = 0.01	0.920
No	62 (95.38)	69 (97.18)		
Yes	3 (4.62)	2 (2.82)		
Gender			χ <sup>2</sup> = 0.37	0.541
Male	36 (55.38)	43 (60.56)		
Female	29 (44.62)	28 (39.44)		
Marital status			χ <sup>2</sup> = 0.04	0.981
Divorced or widowed	23 (35.38)	24 (33.80)		
Married	24 (36.92)	27 (38.03)		
Unmarried	18 (27.69)	20 (28.17)		
With chronic conditions				
Hypertension	18 (27.69)	26 (36.62)	χ <sup>2</sup> = 1.24	0.266
Hyperglycemia	6 (9.23)	5 (7.04)	χ <sup>2</sup> = 0.22	0.640
Level of education			χ <sup>2</sup> = 3.63	0.057
High school and below	46 (70.77)	39 (54.93)		
College and above	19 (29.23)	32 (45.07)		

Abbreviation: BMI, body mass index.

#### 2.4.2 Clinical Outcomes

Serum levels of phosphate and potassium, as well as body weight changes, were measured before and 6 months after dialysis to assess clinical outcomes of these patients. Serum potassium was used as a biomarker for assessing compliance of dietary restrictions, whereas serum phosphate was utilized to evaluate drug use adherence. Interdialytic weight (IDW) was calculated as the difference between patients' pre-dialysis and post-dialysis weights. IDW, together with relevant biomarkers, was used to evaluate patients' fluid management. Serum potassium levels remained below 6.0 mmol/L and showed a downward trend, while serum phosphate levels remained below 7.5 mg/dL and also decreased. An IDW of no more than 2.5 kg was considered indicative of a favorable clinical outcome.

#### 2.5 Evaluation of Patients' Anxiety Level Under Different Nursing Modes

Originally introduced by Spitzer *et al.* [18] as a quick screening tool in clinical settings, the Generalized Anxiety Disorder 7 (GAD-7) scale was used to evaluate the anxiety degree of patients in the two groups [19]. The GAD-7 has been widely validated in general and clinical populations in various languages, showing good internal consistency and diagnostic performance (in terms of sensitivity and specificity) [18]. This 7-item scale uses a 0–3 scoring range per item, resulting in a total score spanning 0–21, where higher

scores indicate increased anxiety. Anxiety severity was categorized as follows: 0–4 (slight or none), 5–9 (mild), 10–14 (moderate), and 15–21 (severe).

#### 2.6 Evaluation of Patients' Awareness of Disease Under Different Nursing Modes

Questions 11, 12, 22, 23, 32, 33, 41, and 42 of the ESRD-AQ assess patients' awareness of the disease. In the original questionnaire, no explicit scoring was provided for these eight questions. After translation, each of these questions was assigned with a scoring scale of 1–5 points. A higher total score obtained indicates that the patient has a better understanding of the disease.

#### 2.7 Evaluation of Patients' Quality of Life Under Different Nursing Modes

Health-related quality of life (HRQoL) in both groups was assessed using the World Health Organization Quality of Life-BREF Scale (WHOQOL-BREF) [20], which contains a total of 26 items. WHOQOL-BREF was developed by the World Health Organization in 1998 and has been validated across many countries marked by distinct cultural features with good psychometric properties [21,22]. Two items are independent analysis items for the measurement of the overall quality of life. The remaining content of the scale comprises four domains: physical (7 items), psychological (6 items), social (3 items), and environmental do-

**Table 2. Comparisons of scores on the ESRD-AQ subscale between the two groups.**

Item	Adherence	Control group (n = 65)	Observation group (n = 71)	Statistic	p
Before nursing intervention					
14	Number of dialysis sessions	245.72 ± 28.59	250.45 ± 29.00	t = -0.96	0.341
17	Whether to shorten dialysis	152.75 ± 14.17	150.89 ± 10.45	t = 0.87	0.387
18	Reduced duration of dialysis	66.23 ± 12.22	65.86 ± 12.25	t = 0.18	0.860
26	Medication use adherence	169.06 ± 10.67	167.21 ± 12.22	t = 0.94	0.351
31	Fluid restriction compliance	122.23 ± 7.99	121.54 ± 8.02	t = 0.51	0.614
46	Dietary restriction compliance	133.20 ± 8.20	131.44 ± 11.31	t = 1.05	0.297
After nursing intervention					
14	Number of dialysis sessions	271.72 ± 15.82 <sup>#</sup>	277.17 ± 14.96 <sup>#</sup>	t = -2.06	0.041*
17	Whether to shorten dialysis	165.30 ± 11.67 <sup>#</sup>	170.58 ± 13.47 <sup>#</sup>	t = -2.44	0.016*
18	Reduced duration of dialysis	78.91 ± 3.81 <sup>#</sup>	80.80 ± 3.80 <sup>#</sup>	t = -2.90	0.004*
26	Medication use adherence	173.54 ± 6.04 <sup>#</sup>	175.76 ± 4.28 <sup>#</sup>	t = -2.46	0.016*
31	Fluid restriction compliance	134.09 ± 7.46 <sup>#</sup>	137.99 ± 5.93 <sup>#</sup>	t = -3.38	<0.001*
46	Dietary restriction compliance	144.62 ± 6.48 <sup>#</sup>	150.23 ± 5.97 <sup>#</sup>	t = -5.26	<0.001*

\*  $p < 0.05$ , statistically significant difference between types of nursing intervention; <sup>#</sup>  $p < 0.05$ , statistically significant difference within the same group.

mains (8 items). Items are rated on a 1–5 point scale, with higher scores denoting better quality of life.

### 2.8 Statistical Analysis

The data were processed and analyzed using SPSS 22.0 statistical software (IBM Corp., Armonk, NY, USA). Normality and homogeneity of variance of continuous data were evaluated. Normally distributed data are presented as mean ± standard deviation (SD), where non-normally distributed data are expressed as median and interquartile range [median (Q1, Q3)]. The Kolmogorov-Smirnov test was used to assess the normality of continuous variables. Normally distributed data underwent Levene's test to assess their homogeneity of variance. When both assumptions were satisfied, independent samples *t*-tests were used for between-group comparisons, and paired samples *t*-tests were used for within-group comparisons. For normally distributed data with unequal variances, Welch's *t*-test was utilized. Non-normally distributed data were compared using the Mann-Whitney *U* test. Categorical data, expressed as counts (*n*) and percentages (%), were analyzed using the Chi-square ( $\chi^2$ ) test and the corrected Chi-squared test. For all analyses, statistical significance was defined as  $p < 0.05$ .

## 3. Results

### 3.1 Sociodemographic Data

A total of 136 patients with CRF undergoing hemodialysis in Zibo Central Hospital from April 2021 to January 2022 were included in this study and divided into two groups according to the nursing mode applied. Among them, 65 patients in the control group received routine nursing care, and 71 patients in the observation group received interdisciplinary collaborative nursing care. No statistically significant intergroup differences were observed in sociodemographic variables ( $p > 0.05$ ; Table 1).

### 3.2 Patients' Compliance

In this study, the ESRD-AQ scale was used as a tool to evaluate patients' compliance. There was no significant difference in individual scores between the two groups before implementation of the nursing intervention ( $p > 0.05$ ). After nursing intervention was carried out, the observation group demonstrated significantly higher compliance scores across all individual items compared to the control group ( $p < 0.05$ ; Table 2).

### 3.3 Clinical Outcomes of Patients

Serum potassium, phosphate and IDW were measured before and 6 months after dialysis as clinical outcomes.

Before dialysis, the serum potassium levels and the number of patients meeting the serum potassium criteria were comparable between the two groups ( $p > 0.05$ ). After dialysis, the serum potassium level of the observation group was significantly lower than that of the control group, and a significantly higher proportion of subjects in the observation group satisfied the serum potassium qualification criteria compared to the control group ( $p < 0.05$ ; Table 3).

Before dialysis, there were no significant differences in serum phosphate levels and the number of patients meeting the serum phosphate standard between the two groups ( $p > 0.05$ ). After dialysis, the serum phosphate level of the observation group was significantly lower than that of the control group, and a significantly higher proportion of subjects in the observation group satisfied the serum phosphate qualification criteria compared to the control group ( $p < 0.05$ ). A significantly higher proportion of subjects in the observation group satisfied the IDW qualification criteria compared to the control group ( $p < 0.001$ ; Table 4).

**Table 3. Comparison of serum potassium levels between the two groups.**

Variables	Control group (n = 65)	Observation group (n = 71)	Statistic	p
Pre-dialysis level (mmol/L)	5.22 (4.93, 5.80)	5.26 (5.07, 5.83)	Z = 0.75	0.455
Post-dialysis level (mmol/L)	4.61 (4.30, 4.99) <sup>#</sup>	4.00 (3.57, 4.38) <sup>#</sup>	Z = 6.82	<0.001*
Number of eligible people before dialysis, n (%)			$\chi^2 = 0.00$	0.982
Not qualified	12 (18.46)	13 (18.31)		
Qualified	53 (81.54)	58 (81.69)		
Number of eligible people after dialysis, n (%)			$\chi^2 = 5.55$	0.018*
Not qualified	9 (13.85)	2 (2.82)		
Qualified	56 (86.15)	69 (97.18)		

\*  $p < 0.05$ , statistically significant difference between types of nursing intervention; <sup>#</sup>  $p < 0.05$ , statistically significant difference within the same group.

**Table 4. Comparison of serum phosphate and IDW levels between the two groups.**

Variables	Control group (n = 65)	Observation group (n = 71)	Statistic	p
Pre-dialysis level (mg/dL)	6.65 (6.00, 7.33)	6.77 (6.03, 7.26)	Z = 0.31	0.757
Post-dialysis level (mg/dL)	5.88 (5.50, 6.09) <sup>#</sup>	4.50 (3.99, 4.90) <sup>#</sup>	Z = 8.69	<0.001*
Qualified before dialysis, n (%)			$\chi^2 = 0.15$	0.697
Not qualified	12 (18.46)	15 (21.13)		
Qualified	53 (81.54)	56 (78.87)		
Qualified after dialysis, n (%)			$\chi^2 = 3.90$	0.048*
Not qualified	9 (13.85)	3 (4.23)		
Qualified	56 (86.15)	68 (95.77)		
IDW, n (%)			$\chi^2 = 21.22$	<0.001*
Not qualified	42 (64.62)	18 (25.35)		
Qualified	23 (35.38)	53 (74.65)		

\*  $p < 0.05$ , statistically significant difference between types of nursing intervention; <sup>#</sup>  $p < 0.05$ , statistically significant difference within the same group. IDW, interdialytic weight.

### 3.4 Anxiety Level of Patients

Individual scores did not differ significantly between the two groups prior to the nursing intervention ( $p > 0.05$ ). After nursing intervention based on the interdisciplinary collaborative mode, anxiety levels were significantly reduced in the observation group relative to the control group ( $p < 0.001$ ; Table 5). Further analysis of anxiety severity categories revealed that the proportion of patients with severe anxiety decreased more substantially in the observation group compared to the control group, suggesting that the interdisciplinary collaborative mode not only lowers mean anxiety scores but also shifts the distribution toward milder anxiety levels. These findings indicate that the intervention has clinically meaningful benefits beyond statistical significance.

### 3.5 Levels of Disease Understanding Among the Patients

Both control and observation groups showed comparable levels in disease understanding prior to the implementation of nursing intervention ( $p > 0.05$ ). Post-intervention disease knowledge achieved significant improvements in both cohorts, with the observation group demonstrating superior gains over the controls ( $p < 0.05$ ; Table 6).

### 3.6 Health-Related Quality of Life of the Two Groups

Before nursing interventions were implemented, the individual domain scores of the health-related quality of life were not significantly different between the control and observation groups ( $p > 0.05$ ). At 6-month follow-up, WHOQOL-BREF assessment revealed significantly higher scores across all domains (physical, psychological, social, environmental) in the observation group than in the control group ( $p < 0.05$ ; Table 7).

## 4. Discussion

According to global epidemiological studies, chronic kidney disease (CKD) is a major contributor to mortality worldwide, with approximately 1.48 million deaths in 2023, making it one of the top ten causes of death globally and underscoring the expanding health burden of CKD and its related complications [23], highlighting CRF as a life-threatening condition. Hemodialysis is the primary treatment modality for patients with CRF [24], but the lengthy dialysis process and frequent schedules are among its notable drawbacks [25,26].

In this study, we investigated the effects of different nursing modes on patients' compliance, anxiety, disease understanding, and health-related quality of life. Both the

**Table 5. Comparison of anxiety levels between the two groups.**

Variables	Control group (n = 65)	Observation group (n = 71)	Statistic	p
Pre-intervention scores	16.55 ± 1.90	16.66 ± 1.93	t = -0.33	0.743
Post-intervention scores	12.49 ± 4.87 <sup>#</sup>	8.04 ± 5.06 <sup>#</sup>	t = 5.22	<0.001*
Pre-intervention anxiety level, n (%)			χ <sup>2</sup> = 0.50	0.479
Moderate	10 (15.38)	8 (11.27)		
Severe	55 (84.62)	63 (88.73)		
Post-intervention anxiety level, n (%)			χ <sup>2</sup> = 20.86	<0.001
Severe	24 (36.92)	11 (15.49)		
Moderate	20 (30.77)	15 (21.13)		
Mild	19 (29.23)	25 (35.21)		
Slight or none	2 (3.08)	20 (28.17)		

\* p < 0.05, statistically significant difference between types of nursing intervention; # p < 0.05, statistically significant difference within the same group.

**Table 6. Comparison of levels of disease understanding between the two groups.**

Variables	Control group (n = 65)	Observation group (n = 71)	Statistic	p
Pre-intervention	20.94 ± 2.69	22.10 ± 4.51	t = -1.84	0.068
Post-intervention	30.15 ± 5.22	32.04 ± 3.86	t = -2.41	0.019*
Statistic	t = -12.65	t = -14.11		
p	<0.001*	<0.001*		

\* p < 0.05, statistically significant difference.

**Table 7. Comparison of health-related quality of life scores between the two groups.**

Variables	Control group (n = 65)	Observation group (n = 71)	Statistic	p
Before nursing intervention				
Physical domain	19.48 ± 5.39	19.38 ± 5.91	t = 0.10	0.921
Psychological domain	18.98 ± 2.54	18.58 ± 2.46	t = 0.95	0.344
Social domain	5.68 ± 2.27	5.54 ± 2.22	t = 0.37	0.713
Environmental domain	23.06 ± 2.57	23.06 ± 2.76	t = 0.01	0.991
After nursing intervention				
Physical domain	24.68 ± 2.26 <sup>#</sup>	29.39 ± 2.45 <sup>#</sup>	t = -8.09	<0.001*
Psychological domain	22.52 ± 2.66 <sup>#</sup>	24.23 ± 1.99 <sup>#</sup>	t = -4.19	<0.001*
Social domain	8.42 ± 2.26 <sup>#</sup>	10.03 ± 2.31 <sup>#</sup>	t = -4.12	<0.001*
Environmental domain	29.46 ± 4.38 <sup>#</sup>	31.37 ± 4.47 <sup>#</sup>	t = -2.51	0.013*

\* p < 0.05, statistically significant difference between types of nursing intervention; # p < 0.05, statistically significant difference within the same group.

control and observation groups tested exhibited comparable baseline demographics. Patients receiving interdisciplinary care demonstrated significantly superior adherence to treatment regimens, medication protocols, fluid control, and dietary restrictions, compared to the controls. Due to the subjectiveness of the questionnaire used, we also adopted IDW, serum levels of potassium and phosphate of the patients as clinical indicators to evaluate their degree of treatment compliance. The observation group achieved significantly improved IDW compliance, serum levels of potassium and phosphate, relative to the controls. High overall adherence correlated with enhanced treatment efficacy. The observation results validate the effectiveness of the interdisciplinary collaboration nursing mode, demonstrating a higher degree of treatment compliance among the patients using this nursing mode.

Subjects in the observation group had significantly greater understanding of the disease than those in the control group (32.04 ± 3.86 vs. 30.15 ± 5.22), reflecting the favorable effectiveness of the interdisciplinary collaborative mode in disease education. Compared to the controls, patients of the observation group also had lower anxiety scores (8.04 ± 5.06 vs. 12.49 ± 4.87) and fewer incidences of severe anxiety cases (15.49% vs. 36.92%). Ye *et al.* [27] showed that the degree of disease understanding could influence the anxiety level of patients; therefore, it is reasonable to speculate that involving a psychologist in this multidisciplinary nursing intervention can achieve anxiety relief and expansion of disease understanding among the patients. The observation group outperformed the control group in every domain of the health-related quality of life instrument: physical domain (29.39 ± 2.45 vs. 24.68 ±

2.26), psychological domain ( $24.23 \pm 1.99$  vs.  $22.52 \pm 2.66$ ), social domain ( $10.03 \pm 2.31$  vs.  $8.42 \pm 2.26$ ), and environmental domain ( $31.37 \pm 4.47$  vs.  $29.46 \pm 4.38$ ). This highlights that interdisciplinary care significantly enhances patients' quality of life. This improvement may stem from optimized patient education, which expands disease understanding, reduces anxiety, boosts treatment compliance, and ultimately improves clinical outcomes. In other studies, a reduction in the anxiety level of patients has been shown to improve their treatment compliance and quality of life [28–30]. These results are consistent with our findings of the current study.

Several limitations of this study need to be acknowledged. First, the adoption of a single-center, retrospective study design and a relatively small sample size in this research may affect the generalizability of the results. Second, although there were no statistically significant differences in baseline sociodemographic and clinical characteristics between the two groups of patients, the lack of randomization, which is inherent in the retrospective study design, may impact the results, probably due to the presence of unmeasured or unrecorded confounding factors. Furthermore, key indicators, including anxiety levels and quality of life, were primarily assessed via questionnaires, which are inherently subjective. Future research should expand the sample size, adopt a multicenter prospective design, and introduce more objective physiological or behavioral parameters to control for potential confounding factors and further validate the conclusions of this study.

## 5. Conclusion

This study demonstrates that the interdisciplinary collaborative nursing intervention significantly improves hemodialysis compliance, expands disease understanding, reduces anxiety levels, and enhances clinical outcomes as well as health-related quality of life in patients with CRF. These multidimensional improvements may elevate survival rates and reduce complications in hemodialysis-dependent CRF patients, aligning with the core nursing principles for this patient population. Future research should assess intervention sustainability, monitor complication incidence, and optimize therapeutic efficacy in this population.

## Key Points

- This study examines the effects of interdisciplinary collaborative nursing versus traditional nursing on hemodialysis compliance in patients with CRF.
- Interdisciplinary collaborative nursing mode significantly enhances patients' hemodialysis compliance, improves clinical indicators such as serum potassium and phosphate, and reduces interdialytic weight.
- Compared with the traditional nursing mode, the interdisciplinary approach effectively reduces patients' anx-

ety, expands their disease understanding, and strengthens their self-management ability.

- Regarding health-related quality of life, patients in the observation group experienced significant improvements across four domains: physical, psychological, social, and environmental.

- Therefore, the interdisciplinary collaborative nursing mode demonstrates significant clinical value in the management of patients with CRF undergoing hemodialysis, offering a solid foundation for the development and implementation of subsequent care strategies.

## Availability of Data and Materials

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

## Author Contributions

HW and JFL designed the research study. YHZ and ZZ performed the research. HW and ZZ analyzed the data. ZZ drafted the manuscript. All authors contributed to the important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

## Ethics Approval and Consent to Participate

This study has been approved by the Ethics Committee of Zibo Central Hospital (Ethics No. 202104022). The study protocol was designed in accordance with the Declaration of Helsinki, and the enrolled patients signed a written informed consent.

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## Conflicts of Interest

The authors declare no conflicts of interest.

## References

- [1] Romagnani P, Agarwal R, Chan JCN, Levin A, Kalyesubula R, Karam S, *et al.* Chronic kidney disease. *Nature Reviews. Disease Primers.* 2025; 11: 8. <https://doi.org/10.1038/s41572-024-00589-9>.
- [2] Kovesdy CP. Epidemiology of chronic kidney disease: an update 2022. *Kidney International Supplements.* 2022; 12: 7–11. <https://doi.org/10.1016/j.kisu.2021.11.003>.
- [3] Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. *Kidney International.* 2024; 105: S117–S314. <https://doi.org/10.1016/j.kint.2023.10.018>.

- [4] Li Y, Ning Y, Shen B, Shi Y, Song N, Fang Y, *et al.* Temporal trends in prevalence and mortality for chronic kidney disease in China from 1990 to 2019: an analysis of the Global Burden of Disease Study 2019. *Clinical Kidney Journal*. 2023; 16: 312–321. <https://doi.org/10.1093/ckj/sfac218>.
- [5] Liyanage T, Toyama T, Hockham C, Ninomiya T, Perkovic V, Woodward M, *et al.* Prevalence of chronic kidney disease in Asia: a systematic review and analysis. *BMJ Global Health*. 2022; 7: e007525. <https://doi.org/10.1136/bmjgh-2021-007525>.
- [6] Flythe JE, Watnick S. Dialysis for Chronic Kidney Failure: A Review. *JAMA*. 2024; 332: 1559–1573. <https://doi.org/10.1001/jama.2024.16338>.
- [7] Said N, Lau WJ, Ho YC, Lim SK, Zainol Abidin MN, Ismail AF. A Review of Commercial Developments and Recent Laboratory Research of Dialyzers and Membranes for Hemodialysis Application. *Membranes*. 2021; 11: 767. <https://doi.org/10.3390/membranes11100767>.
- [8] Jin J, Sklar GE, Min Sen Oh V, Chuen Li S. Factors affecting therapeutic compliance: A review from the patient's perspective. *Therapeutics and Clinical Risk Management*. 2008; 4: 269–286. <https://doi.org/10.2147/tcrm.s1458>.
- [9] Fan Q, Ong ASE, Shankari G, Koh MS, Silva DAD, Doshi K. Impact of anxiety and depression on medication adherence among patients diagnosed with asthma and stroke. *Current Psychology*. 2024; 43: 29587–29596. <https://doi.org/10.1007/s12144-024-06610-4>.
- [10] Mechta Nielsen T, Frøjk Juhl M, Feldt-Rasmussen B, Thomsen T. Adherence to medication in patients with chronic kidney disease: a systematic review of qualitative research. *Clinical Kidney Journal*. 2018; 11: 513–527. <https://doi.org/10.1093/ckj/sfx140>.
- [11] Johns TS, Prudhvi K, Motechin RA, Sedaliu K, Estrella MM, Stark A, *et al.* Interdisciplinary Care and Preparedness for Kidney Failure Management in a High-Risk Population. *Kidney Medicine*. 2022; 4: 100450. <https://doi.org/10.1016/j.xkme.2022.100450>.
- [12] Hsu HT, Chiang YC, Lai YH, Lin LY, Hsieh HF, Chen JL. Effectiveness of Multidisciplinary Care for Chronic Kidney Disease: A Systematic Review. *Worldviews on Evidence-Based Nursing*. 2021; 18: 33–41. <https://doi.org/10.1111/wvn.12483>.
- [13] Garcia-Llana H, Remor E, Selgas R. Adherence to treatment, emotional state and quality of life in patients with end-stage renal disease undergoing dialysis. *Psicothema*. 2013; 25: 79–86. <https://doi.org/10.7334/psicothema2012.96>.
- [14] Al-Nashri F, Almutary H. Impact of anxiety and depression on the quality of life of haemodialysis patients. *Journal of Clinical Nursing*. 2022; 31: 220–230. <https://doi.org/10.1111/jocn.15900>.
- [15] Tang Z, Shi Y, Pan A, Yu W, Yu M, Chen Y, *et al.* Effect of new nurse-led healthcare collaborative model on self-efficacy, compliance and quality of life in patients with chronic diseases. *American Journal of Translational Research*. 2023; 15: 2957–2969.
- [16] Kim Y, Evangelista LS, Phillips LR, Pavlish C, Kopple JD. The End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ): testing the psychometric properties in patients receiving in-center hemodialysis. *Nephrology Nursing Journal*. 2010; 37: 377–393.
- [17] Poveda V, Amado L, Filgueiras M, Teixeira L, Miranda V, Santos-Silva A, *et al.* End-stage renal disease adherence questionnaire: translation and validation to the portuguese language. *Renal Failure*. 2016; 38: 1633–1638. <https://doi.org/10.1080/0886022X.2016.1209063>.
- [18] Spitzer RL, Kroenke K, Williams JBW, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*. 2006; 166: 1092–1097. <https://doi.org/10.1001/archinte.166.10.1092>.
- [19] Wang F, Ma D, Salerno S, Chen Y, Liu M, Luo Y, *et al.* Reproductive concerns and associated factors among female chronic kidney diseases patients: a Multi-Center Cross-Sectional Study. *Nursing Open*. 2021; 8: 2743–2749. <https://doi.org/10.1002/nop.2850>.
- [20] Yu CH, Lin CC, Wu ZZ, Wu AB, Chang YT, Lin CY, *et al.* Validating psychometric properties of generic quality-of-life instruments (WHOQOL-BREF (TW) and EQ-5D) among non-dialysis chronic kidney disease: Rasch and confirmatory factor analyses. *Journal of the Formosan Medical Association*. 2025; 124: 514–522. <https://doi.org/10.1016/j.jfma.2024.12.030>.
- [21] Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. *Psychological Medicine*. 1998; 28: 551–558. <https://doi.org/10.1017/s0033291798006667>.
- [22] Vahedi S. World Health Organization Quality-of-Life Scale (WHOQOL-BREF): Analyses of Their Item Response Theory Properties Based on the Graded Responses Model. *Iranian Journal of Psychiatry*. 2010; 5: 140–153.
- [23] Mark PB, Stafford LK, Grams ME, Aalruz H, Abd ElHafeez S, Abdelgalil AA, *et al.* Global, regional, and national burden of chronic kidney disease in adults, 1990–2023, and its attributable risk factors: a systematic analysis for the Global Burden of Disease Study 2023. *Lancet*. 2025; 406: 2461–2482. [https://doi.org/10.1016/S0140-6736\(25\)01853-7](https://doi.org/10.1016/S0140-6736(25)01853-7).
- [24] Thurlow JS, Joshi M, Yan G, Norris KC, Agodoa LY, Yuan CM, *et al.* Global Epidemiology of End-Stage Kidney Disease and Disparities in Kidney Replacement Therapy. *American Journal of Nephrology*. 2021; 52: 98–107. <https://doi.org/10.1159/000514550>.
- [25] Lalo R, Kamberi F, Stasa E, Lalo K. Burden of hemodialysis on health-related quality of life: insights from a multi-center cross-sectional analysis in Southern Albania. *Frontiers in Medicine*. 2025; 12: 1557063. <https://doi.org/10.3389/fmed.2025.1557063>.
- [26] Butt MD, Ong SC, Butt FZ, Sajjad A, Rasool MF, Imran I, *et al.* Assessment of Health-Related Quality of Life, Medication Adherence, and Prevalence of Depression in Kidney Failure Patients. *International Journal of Environmental Research and Public Health*. 2022; 19: 15266. <https://doi.org/10.3390/ijerph192215266>.
- [27] Ye M, Chen SH, Li XT, Huang J, Mei RR, Qiu TY, *et al.* Effects of Disease-Related Knowledge on Illness Perception and Psychological Status of Patients With COVID-19 in Hunan, China. *Disaster Medicine and Public Health Preparedness*. 2022; 16: 1415–1422. <https://doi.org/10.1017/dmp.2021.33>.
- [28] Alshelleh S, Alhourri A, Taifour A, Abu-Hussein B, Alwreikat F, Abdelghani M, *et al.* Prevalence of depression and anxiety with their effect on quality of life in chronic kidney disease patients. *Scientific Reports*. 2022; 12: 17627. <https://doi.org/10.1038/s41598-022-21873-2>.
- [29] Huang P, Huang HT, Ma J, Pang J, Zhang YY, Ma CH, *et al.* Impact of anxiety symptoms on dialysis adherence and complication rates: A longitudinal observational study. *World Journal of Psychiatry*. 2024; 14: 1918–1924. <https://doi.org/10.5498/wjg.v14.i12.1918>.
- [30] Hao J, Wang Y, Wang Y, Zhang J, Gao J, Kang L, *et al.* Analysis of influencing factors on quality of life in patients with chronic kidney disease undergoing maintenance haemodialysis. *Heliyon*. 2024; 10: e25817. <https://doi.org/10.1016/j.heliyon.2024.e25817>.