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ORIGINAL RESEARCH

Factors Associated with Self-Management of Peritoneal Dialysis Patients in Urumqi of Xinjiang of China: A Cross-Sectional Survey

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Purpose: To explore the factors associated with self-management of Peritoneal Dialysis (PD) patients and methods of acquiring PD knowledge.

Design: Cross-sectional survey design.

Setting: Urumqi, Xinjiang, China.

Patients: 131 Chinese maintenance Peritoneal Dialysis (PD) patients.

Methods: This cross-sectional study was conducted from October 2019 to March 2020 in the First Affiliated Hospital of Xinjiang Medical University of China. 131 PD patients were recruited. Data were collected, including demographic characteristics, clinical dialysis data, self-management ability scale, and methods to obtain PD knowledge. A self-management questionnaire was used for the evaluation of self-management ability.

Results: The score of the self-management ability of PD patients in Xinjiang, China, was (57.6±13.7) points, which was at the middle level in China. There was no statistically significant difference in the self-management ability scores of patients with different ages, sex, ethnicity, marital status, pre-dialysis status, PD time, PD procedures, self-care ability, PD satisfaction, and 24-hour average urine output ($P>0.05$). There were significant differences in the self-management ability scores of patients with different education levels, occupations, and medical insurance forms ($P<0.05$). The self-management ability of PD patients was positively correlated with the disease course of uremia and attending lectures on PD knowledge ($P<0.05$). The main factor affecting self-management ability was education level. There 73.28% of patients considered that it was necessary to establish a WeChat group for PD patients, and 65.7% believed that establishing a WeChat group for PD patients could facilitate communication between patients and enhance treatment confidence.

Conclusion: The study surveyed PD patients who have certain self-management ability. For patients with different education levels, different health education methods should be adopted to promote the improvement of patients' self-management ability. Furthermore, WeChat is essential for Chinese PD patients to obtain disease-related information.

Keywords: peritoneal dialysis, self-management, education level, influencing factors

Introduction

Chronic kidney disease (CKD) is a significant public health problem and is attracting increased attention.[1] In 2019, about 390,000 people with kidney failure were treated with peritoneal dialysis (PD), comprising 11% of the dialysis patient population worldwide.[2–4] the number of patients on peritoneal dialysis is increasing by 8% annually globally.[5] By 2030, the number of patients receiving kidney replacement therapy is expected to reach 5.4 million globally, of which Asia has the fastest growth rate.[5] At the end of 2013, the number of dialysis patients reached 326,000 in mainland China, which has brought an enormous burden to society.[6]

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PD is one of the essential methods of kidney replacement therapy to extend the life of patients with kidney failure. Patients at home can perform PD without the supervision of medical staff, and its procedure includes PD catheter care, monitoring of weight, blood pressure, diet, medication, fluid intake, etc. PD has excellent flexibility, and patients can continue to engage in routine work and social activities after PD. During the COVID-19 pandemic, PD can help patients to complete dialysis at home, stay isolated, and avoid the risk of exposure to coronavirus.[7] In remote areas where hemodialysis (HD) cannot be provided, PD can also be used in patients with acute kidney injury induced by COVID-19.[8] Usually, PD is performed at home 2–4 times a day. Over time, the patient's awareness of aseptic operations, diet and drug management, and patients' compliance may decrease, further resulting in various complications and increased hospitalization frequency.[9]

Moreover, PD patients are prone to physical, psychological, and social problems, which lead to a decline in their quality of life and increase the financial burden on patients and their families.[10] Therefore, the self-management of PD patients is critical. Self-management is the ability to manage symptoms, treatments, physical and mental complications, and lifestyles related to chronic disease.[11,12] In 1979, Greer et al[13] introduced the concept of self-management, describing it as the patient's active participation in his or her treatment or care. Self-management is an essential and indispensable part of treating patients with chronic diseases. Patients with self-management solid ability have significant clinical effects, a better quality of life, fewer hospitalizations, and longer survival time.[14,15]

Patients need to reduce complications and slow their disease progression through self-management. Strengthening the training of PD patients and improving their self-management ability can reduce the incidence of PD-related peritonitis,[16] achieve better nutritional status,[17] improve the quality of life,[15] and enhance self-efficacy.[18] Training patients may improve knowledge, self-management, and patient outcomes.[19] Therefore, it is necessary to understand the needs and access of PD patients related to the disease so that we provide a basis for subsequent targeted interventions.

Due to differences in the self-management ability of PD patients, there are differences in their PD outcomes. It has been reported that the rate of PD patients who had poor medication compliance was as high as 85%, the rate of inability to comply with restricted diet and fluids was as high as 67%, and the rate of inability to adhere to dialysis exchange was as high as 53%[20] and the dropout rate of peritoneal dialysis was 41.38%.[21] Thus, it is necessary to understand the influencing factors of PD patients' self-management ability. Meanwhile, in China, the studies on the self-management ability of PD patients primarily focused on the developed areas of eastern China.[22,23] However, the self-management of PD patients in Xinjiang Northwest China is rarely reported. Xinjiang covers about one-sixth of China's total land area. Xinjiang is a multi-ethnic region with a total of 13 ethnic components.

Herein, we aim to evaluate the status and influencing factors of PD patients' self-management ability in Xinjiang, China. The methods by which patients acquire knowledge about PD were also assessed. Our data may provide a basis for subsequent targeted interventions to improve the self-management ability of PD patients in Xinjiang, China.

Materials and Methods

Study Design and Subjects

This was a cross-sectional study. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology Checklist for cross-sectional studies (STROBE 2007) guidelines to ensure the quality and specification of study reporting.

According to the sample size calculation method,[24] the sample size of this study was determined to be at least 121 subjects. The convenience sampling method was used to recruit 143 patients who received routine PD treatment for more than 3 months in the Department of Nephrology of the First Affiliated Hospital of Xinjiang Medical University (a comprehensive Grade3A hospital in Urumqi, Xinjiang Province, China) from October 1, 2019, to March 1, 2020.

We conducted a questionnaire survey of PD patients who came to the hospital's outpatient nephrology department for follow-up and to the ward for inpatient review. Before the survey, we clarified the purpose and significance of this study to the participants to obtain informed consent. However, 12 people dropped out of the questionnaire because COVID-19 outbreak was encountered during the survey (3 of the inpatient participants were transferred to other unit because of tumors, 5 were temporary receiving hemodialysis at the same time, and 4 of the outpatient participants had only half of the questionnaire filled out). Finally, 131 eligible participants were included in the analysis. Each participant took approximately 8–10 minutes to complete the

questionnaire. Inclusion criteria: ① Age ≥18 years; ② Patients receiving regular PD for ≥3 months; ③ being conscious, being literate and having communication abilities; ④ being informed and agreeing to participate in this study.

The exclusion criteria: ① with a place of usual residence not in Xinjiang Uygur Autonomous Region; ② patients with mental illness; ③, malignant tumors,; ④ Acute infection, history of severe cardiovascular and cerebrovascular events, surgery or trauma occurred within 1 month before data collection; ⑤ Patients are treated with hemodialysis at the same time.

All enrolled patients received the same pre-dialysis patient education and post-dialysis management in our center. All enrolled patients were treated with continuous ambulatory PD with a double-bag system and glucose as the dialysate. All participants signed the informed consent form. The study was approved by the Human Experiment Ethics Committee of the First Affiliated Hospital of Xinjiang Medical University, China. It was conducted in accordance with the principles expressed in the Declaration of Helsinki.

Data Collection

Demographic characteristics, including age, sex, ethnicity, marital status, education level, occupation, payment method, primary disease, disease course, dialysis time, 24-hour average urine output, number of dialysis bags per day, and some hospitalizations in the past six months, etc. were collected. The causes of chronic kidney failure and the disease course of kidney disease were obtained from hospital records.

Questionnaire Survey

The questionnaire was distributed by the investigators and 2 trained PD nurses (one of whom was of Uyghur ethnicity) at the hospital's outpatient nephrology department and the ward. The questionnaire survey was conducted face-to-face, distributed, and returned on the spot. All items in the questionnaire were filled in by the respondents independently. Uyghur nurses translated and filled out the questionnaires for ethnic minority patients with language communication impairment.

Self-Management

The Chinese version of the self-management scale of PD patients, was developed by Wang et al[25] in 2014 was used to measure PD patients' self-management behaviors in this study. It has 5 dimensions and 28 items, including solution bag replacement (7 items), troubleshooting during operation (4 items), diet management (5 items), complication monitoring (8 items), emotion management and return to social life (4 items).

The scale was scored on a 4-point Likert scoring system. The scores for "Never", "Sometimes", "Often", and "Always" are 0, 1, 2, and 3 points respectively. The scale does not include any reverse items. The total score was 0–84. The higher the score is, the higher the self-management level of PD patients. Its Cronbach's alpha coefficient was 0.926. self-management ability was classified into 3 levels, with a score of 67–84 points as "good", 50–66 points as "medium", and <50 points as "poor".

PD Patient's Health Knowledge Needs

The self-designed questionnaire was used to analyze the methods for obtaining PD knowledge. The contents included:

① Which aspects of health guidance do you want to obtain during PD (multiple choice questions); Disease knowledge; Diet; Medication; Lifestyle; Mental health aid; Exercise guidance; Others.

② Currently used methods to PD knowledge (multiple choice); Consulting the doctors in charge using WeChat groups; Consulting the doctors in charge using telephones; Consulting other PD patients using WeChat groups; Consulting the nurses using telephones; Consulting the doctors or nurses face to face; Searching on the internet; Consulting other PD patients using telephones; Television or radio; Others; Community health education; Newspapers.

③ With what methods do you want to obtain health knowledge related to PD (multiple choice); Consulting the doctors in charge using WeChat groups; Consulting the doctors in charge using telephones; Consulting other PD patients using WeChat groups; Consulting the doctors or nurses face to face; Consulting the nurses using telephone; Searching on the internet; Consulting other PD patients using telephones.

Community health education; Television or radio; Newspapers; Others.

④ Do you think it is necessary to establish a WeChat group for PD patients? (single choice). Very necessary; Necessary; Not necessary.

⑤ If a WeChat group is established for PD patients, what kind of help or significance do you think is helpful or meaningful? (single choice). Facilitating communication between patients and enhancing treatment confidence; Of great help; Of little help; No reply from doctors or nurses; Of no help.

Statistical Methods

SPSS23.0 was used for statistical analysis. Continuous variables are expressed as mean ± standard deviation, while categorical variables are expressed as percentage and frequency. Comparisons between groups were performed by a χ^2 test, an independent -sample *t*-test, Z-test and one-way analysis of variance. The self-management ability scores of PD patients with different education levels, occupations, and forms of medical insurance were statistically significant (P<0.05) Pearson correlation was used for correlation analysis. The influencing factors of self-management ability were analyzed by multivariate linear regression analysis. The self-management ability score was used as the dependent variable. The statistically significant factors in univariate and Spearman correlation analyses were used as independent variables to perform multivariate linear regression analysis. Statistical significance was indicated by P value<0.05.

Ethical Approval

Ethical approval for this study was obtained from the Ethical Review Committee of the First Affiliated Hospital of Xinjiang Medical University (K201908-06). The study complied with the guidelines in the Declaration of Helsinki.

Results

Basic Information of Study Subjects

Finally, 131 patients were enrolled in this study. The clinical data are shown in Table 1. There were 74 males and 57 females, with an average age of (56.5±14.2) years old. For disease causes, there were 25 cases of diabetic nephropathy, 44 cases of chronic nephritis, 46 cases of hypertensive kidney injury, 3 cases of IgA nephropathy, 2 cases of lupus nephritis, 2 cases of purpuric nephritis, 3 cases of gouty nephritis, and 6 cases of unknown reasons. The average duration of PD treatment, which was the time from the start of dialysis to the conduction of the self-management survey, was (31.7±24.5) months, and the most prolonged duration of PD was 122 months.

The Survey Score of Self-Management Ability

In this study, a total of 143 questionnaires were distributed. After eliminating 12 invalid questionnaires, 131 valid questionnaires were recovered, with an effective recovery rate of 93.6%. The total scores of patients' self-management ability was (57.6±13.7) points. The scores of each dimension and each item are shown in Table 2.

Descriptive Analysis of PD Patients' Self-Management Ability

For different occupations, the self-management score of PD patients of cadre occupation was the highest (64.416.0), followed by the unemployed, family members, and retired patients (58.8±12.9), and the self-management ability score of the workers and farmers was the lowest (53.5±14.1) (Table 3). For medical insurance forms, the self-financed patients had the lowest self-management score (45.5±0.7); patients with urban employee basic medical insurance had the highest score (59.1±13.8); and those with the new rural cooperative medical insurance ranked third (52.0±13.4) (Table 3). Univariate analysis showed that there was no statistical difference in the self-management ability scores between PD patients of different ages, sex, ethnicity, marital status, pre-dialysis status, PD time, PD exchanges, self-care ability, PD satisfaction, and 24-hour average urine output (P>0.05) (Table 3). However, the self-management ability scores of PD patients with different education levels, occupations, and forms of medical insurance were statistically significant (P<0.05) (Table 3).

Correlation Analysis of Self-Management Ability and Clinic-Pathological Factors

Pearson correlation analysis showed that the self-management ability of PD patients was positively correlated with the disease course of uremia (years) and attending lectures on PD (r = 0.208 and 0.182, P = 0.017 and 0.037) (Table 4). There was no significant correlation between patients' self-management ability and other clinic-pathological factors.

Table 1 Demographic Information of All Patients (n=131)

	Number of Cases	Percentage (%)
Sex		
Male	74	56.5
Female	57	43.5
Age (year)		
18–39	46	35.1
40–59	73	55.7
≥60	12	9.2
Ethnicity		
Han	95	72.5
Others	36	27.5
Education level		
Junior high school and below	61	46.6
High school / technical secondary school	20	15.3
College and above	50	38.2
Marital status		
Unmarried	19	14.5
Married	99	75.6
Divorced/Widowed	13	9.9
Occupation		
Cadre staff	8	6.1
Worker/farmer	40	30.5
Others (retired/family member/unemployed/individual/student)	83	63.4
Medical insurance form		
Basic medical insurance system for urban workers and residents	71	54.2
New Rural Cooperative Medical System	23	17.6
Urban Residents Medical Insurance	35	26.7
Self-pay	2	1.5
Pre-dialysis status		
Well	26	19.9
Good	42	32.1
General	44	33.6
Not Good	16	12.2

(*Continued*)

Table 1 (Continued).

	Number of Cases	Percentage (%)
Very Bad	3	2.3
Peritoneal dialysis time (months)		
3–11	34	26.0
12–35	43	32.8
≥36	54	41.2
Peritoneal dialysis operation		
Oneself operation	109	83.2
Family member operation	4	3.1
Operation mainly by oneself	14	10.7
Operation mainly by family member	4	3.1
Self-care ability		
Full self-care	87	66.4
Basic self-care	42	32.1
Barely self-care	2	1.5
Satisfaction with peritoneal dialysis		
Satisfied	72	55.0
Basically satisfied	55	42.0
Basically dissatisfied	4	3.1
Primary disease		
Diabetic nephropathy	25	19.1
Chronic nephritis	44	33.6
Hypertension kidney damage	46	35.1
IgA nephropathy	3	2.3
Lupus nephritis	2	1.5
Purpuric Nephritis	2	1.5
Gouty nephritis	3	2.3
Other or unknown	6	4.6
24-hour average urine output		
Urine output always stable	38	29.0
Urine output sometimes more and sometimes less	23	17.6
Urine output gradually decreases but there is still urine	35	26.7
Urine output gradually becomes less and there is now no urine	35	26.7

Table 2 The Total Score and the Score of Each Dimension and Each Item of PD Patients' Self-Management Ability (n=131)

Dimensions	Items	Score (Points)
Solution bag replacement	Total	15.3±2.9
	Checking the status of peritoneal dialysis fluid	2.3±0.8
	Correctly connecting and draining the filtrate	2.7±0.5
	Properly exhausting and flushing tubes	2.61±0.61
	Correctly infusing peritoneal dialysis fluid and separating tubes	2.7±0.5
	Preventing the contamination caused by the replacement of the iodophor cap	2.6±0.7
	Maintenance of the tube outlet	2.3±0.9
	Using peritoneal dialysate following the doctor's advice	2.3±0.9
Troubleshooting during operation	Total	7.4±4.1
	Seeking help from doctors in time to replace PD catheter	1.8±1.2
	Poor drainage	2.0±1.0
	Contacting the peritoneal dialysis nurse when the spiral port of PD catheter is contaminated	1.8±1.1
	Contacting the peritoneal dialysis nurse when the tube falls off during the infusion	1.8±1.2
Diet management	Total	10.2±3.3
	Less intake of plant protein and moderate intake of high-quality protein	2.1±0.7
	Less intake of high-phosphorus foods; and, intake of high-potassium or low-potassium foods based on electrolytes	2.1±0.8
	Moderate intake of foods containing salt and sodium	2.1±0.8
	Accurately recording ultrafiltration volume and urine volume	2.0±0.9
	Less intake of high-fat diet	2.0±0.9
Complication monitoring	Total	17.1±5.1
	Regular blood pressure measurement	2.2±0.7
	Monitoring edema of lower extremities and eyelids	2.2±0.8
	Performing peritoneal assessment and replacing the short tube regularly	2.4±0.6
	Paying attention to whether there is weakness of limbs and numbness of hands, feet, mouth, etc.	2.2±0.8
	Paying attention to chest pain, chest tightness, shortness of breath, palpitations, and increased fatigue, etc.	2.0±0.9
	Monitoring skin itching	2.1±0.9
	Monitoring abnormal protrusions at abdomen or the base of thighs	1.9±1.0
	Monitoring sleep	2.1±0.8
Emotional management and return to social life	Total	7.6±2.5

(*Continued*)

Table 2 (Continued).

Dimensions	Items	Score (Points)
	Negative emotion management	1.5±0.9
	Emotional anxiety and self-regulation	2.2±0.8
	Be able to accomplish and be willing to do what can be done	2.3±0.7
	Contacting friends to meet and chat, and participating in entertainment activities	1.7±0.9
Total score of self-management ability		57.6±13.7

Table 3 Influencing Factors of Self-Management Ability of Peritoneal Dialysis Patients (n=131)

Factors	n	Score of Self-Management Ability (Mean ± SD)	t/F/Z/χ^2 value	P value
Gender				
Male	74	56.757±14.4619	t=−0.754*	0.452
Female	57	58.579±12.6561		
Age (years)				
18–39	46	59.44±11.53	χ^2=2.619†	0.270
40–59	73	57.12±14.39		
≥60	12	52.92±16.53		
Ethnicity				
Han	95	57.07±14.04	Z=−0.691$	0.489
Other	36	58.81±12.79		
Education level				
Junior high school and below	61	53.95±13.76	χ^2=9.136†	**0.01****
High school / technical secondary school	20	62.15±15.18		
College and above	50	60.10±12.01		
Marital status				
Unmarried	19	60.05±11.07	χ^2=4.213†	0.122
Married	99	58.00±13.96		
Divorced/Widowed	13	50.46±13.73		
Occupation				
Cadre staff	8	64.38±16.01	F=3.193#	**0.044****
Worker/farmer	40	53.53±14.10		
Others (retired/family member/unemployed/individual/student)	83	58.83±12.90		
Medical insurance form				

(*Continued*)

Table 3 (Continued).

Factors	n	Score of Self-Management Ability (Mean ± SD)	t/F/Z/χ^2 value	P value
Basic medical insurance system for urban workers and residents	71	59.09±13.74	χ^2=7.984†	**0.046****
New Rural Cooperative Medical System	23	52.00±13.44		
Urban Residents Medical Insurance	35	58.77±13.22		
Self pay	2	45.50±0.71		
Pre-dialysis status (Good status in terms of appetite, sleep, physical strength, etc)				
Well	26	61.58±13.48	F=1.287#	0.279
Good	42	57.31±13.65		
General	44	54.52±14.16		
Not Good	16	58.88±11.89		
Very Bad	3	63.33±15.31		
Peritoneal dialysis time (months)				
3–11	34	59.71±16.23	χ^2=1.360†	0.507
12–35	43	55.98±11.39		
≥36	54	57.44±13.70		
Peritoneal dialysis operation				
Oneself operation	109	57.62±14.09	χ^2=0.345†	0.841
Family member operation	4	58.75±16.66		
Operation mainly by oneself	14	55.43±11.41		
Operation mainly by family member	4	61.75±9.03		
Self-care ability (Ability to take care of oneself in life on an individual basis)				
Full self-care	87	58.39±13.83	χ^2=1.732†	0.421
Basic self-care	42	56.19±13.63		
Barely self-care	2	49.50±3.54		
Satisfaction with peritoneal dialysis treatment				
Satisfied	72	58.49±13.81	F=0.424#	0.655
Basically satisfied	55	56.56±13.58		
Basically dissatisfied	4	54.25±14.98		
24-hour average urine output (Compared to before peritoneal dialysis)				
Urine output always stable	38	60.92±13.66	χ^2=3.011†	0.390
Urine output sometimes more and sometimes less	23	56.74±13.24		

(*Continued*)

Table 3 (Continued).

Factors	n	Score of Self-Management Ability (Mean ± SD)	t/F/Z/χ^2 value	P value
Urine output gradually decreases but there is still urine	35	55.26±12.00		
Urine output gradually becomes less and there is now no urine	35	56.71±15.37		

Notes: P value is a probability value calculated from the sample data when conducting a hypothesis test. **P < 0.05. *Independent samples *t*-test. #One-way analysis of variance, namely, F-test. †χ^2 test. $Rank-sum test namely, Z-test. Bold indicates significant differences in the self-management ability scores of patients with different education levels, occupations, and medical insurance forms (P<0.05).

Table 4 Correlation Analysis of Patients' Self-Management Ability and Clinic-Pathological Factors (n=131)

Clinic-Pathological Factors	Self-Management Ability	
	r	P
Course of primary disease (years)	0.145	0.099
Disease course of uremia (years)	0.208	**0.017****
Current body weight (kg)	−0.086	0.331
Number of peritoneal infections	−0.088	0.320
Attending lecture on peritoneal dialysis knowledge (times)	0.182	**0.037****
Number of hospitalizations in six months	−0.01	0.911
Peritoneal dialysis time	−0.098	0.267

Notes: r represents the correlation coefficient, a statistical method that indicates the linear relationship between two variables with each other and determines their closeness. In the present study, that is correlation analysis of PD patients' self-management ability and clinic-pathological factors. Namely, the self-management ability of PD patients was positively correlated with the disease course of uremia and attending lectures on PD knowledge (P<0.05), shown in bold. P value is a probability value calculated from the sample data when conducting a hypothesis test. **P < 0.05.

Multivariable Analyses of Factors Associated with Self-Management Ability of PD Patients

The self-management ability score was used as the dependent variable. The statistically significant factors in univariate and Spearman correlation analyses were used as independent variables to perform multivariate linear regression analysis. The results indicated that education level was the main factor affecting the self-management ability of ambulatory PD patients (Table 5).

Table 5 Multivariate Linear Regression Analysis of Factors Influencing the Self-Management Ability of Ambulatory Peritoneal Dialysis Patients (n=131)

	B	SE	β	t	P
Constant	46.067	6.559		7.024	<0.0001
Education level	2.801	1.342	0.188	2.087	**0.039****
Attending lecture on peritoneal dialysis knowledge (times)	1.405	0.802	0.161	1.752	0.082
Occupation	0.905	2.055	0.04	0.441	0.66
Medical insurance form	−0.111	1.309	−0.008	−0.084	0.933
Disease course of uremia (years)	0.109	0.314	0.032	0.346	0.73

Notes: B, regression coefficient. SE, standard errors of regression coefficient. β, represents the standard regression coefficient. t, represents the process value of the test. P, represents the p-value obtained from the *t*-test, and a p-value less than 0.05 means that its corresponding independent variable has a significant effect relationship on the dependent variable. Namely, the main factor affecting self-management ability was education level, shown in bold. **P < 0.05.

Patient's Health Knowledge Needs

Multiple response analysis of multiple choice questions found that during PD treatment, patients mostly expected to obtain health guidance on disease knowledge, diet, and medication (Table 6). Currently, the majority of

Table 6 The Patients' Needs for Health Knowledge Related to Peritoneal Dialysis (n=131)

Item		Frequency (N)	Percentage (%)	Percentage of Each Case (%)	Rank
Which aspects of health guidance do you want to obtain during PD	Disease knowledge	102	21.7	71.3	1
	Diet	96	20.4	67.1	2
	Medication	91	19.3	63.6	3
	Lifestyle	58	12.3	40.6	4
	Mental health aid	56	11.9	39.2	5
	Exercise guidance	55	11.7	38.5	6
	Others	13	2.8	9.1	7
Total		471	100.0	329.4	
Currently used methods to PD knowledge	Consulting the doctors in charge using WeChat groups	75	16.1	52.4	1
	Consulting the doctors in charge using telephones	70	15.1	49.0	2
	Consulting other PD patients using WeChat groups	69	14.8	48.3	3
	Consulting the nurses using telephones	63	13.5	44.1	4
	Consulting the doctors or nurses face to face	57	12.3	39.9	5
	Searching on the internet	54	11.6	37.8	6
	Consulting other PD patients using telephones	36	7.7	25.2	7
	Television or radio	19	4.1	13.3	8
	Others	10	2.2	7.0	9
	Community health education	9	1.9	6.3	10
	Newspapers	3	0.6	2.1	11
Total		465	100.0	325.2	
With what methods do you want to obtain health knowledge related to PD	Consulting the doctors in charge using WeChat groups	88	20.0	61.5	1
	Consulting the doctors in charge using telephones	67	15.2	46.9	2
	Consulting other PD patients using WeChat groups	59	13.4	41.3	3

(*Continued*)

Table 6 (Continued).

	Consulting the doctors or nurses face to face	56	12.7	39.2	4
	Consulting the nurses using telephones	51	11.6	35.7	5
	Searching on the internet	37	8.4	25.9	6
	Consulting other PD patients using telephones	25	5.7	17.5	7
	Community health education	23	5.2	16.1	8
	Television or radio	18	4.1	12.6	9
	Newspapers	9	2.0	6.3	10
	Others	8	1.8	5.6	11
Total		441	100.0	308.4	
		Frequency (N)		**Percentage (%)**	**Rank**
Do you think it is necessary to establish a WeChat group for PD patients	Very necessary	96		73.3	1
	Necessary	33		25.2	2
	Not necessary	2		1.5	3
Total		131		100	
If a WeChat group is established for PD patients, what kind of help or significance do you think is helpful or meaningful?	Facilitating communication between patients and enhancing treatment confidence.	86		65.7	1
	Of great help	27		20.6	2
	Of little help	14		10.7	3
	No reply from doctors or nurses	3		2.3	4
	Of no help	1		0.7	5
Total		131		100	

Notes: The last two questions are single-choice questions, Frequency (N) represents the number of people who chose this option, 131 is the total number of people; Percentage (%) represents the percentage of the total number of people who chose this option because to keep 1 decimal place, only 0.8 can be changed to 0.7, the total can be 100.

patients obtain health knowledge related to PD by consulting the doctors in charge, other PD patients, or nurses using WeChat groups or telephones. About 73.3% of patients considered that it was necessary to establish a WeChat group for PD patients. About 65.7% of patients believed that the significance of establishing a WeChat group for PD patients was to facilitate communication between patients and enhance treatment confidence.

Discussion

The Self-Management Ability of PD Patients is at the Middle Level in Urumqi of Xinjiang of China

The results of this study showed that the scores of the self-management ability of PD patients in Urumqi of Xinjiang of China was (57.6±13.7) points, which was in the middle level in China. This data is consistent with the findings in

Guangxi[26] and Tianjin[27] in China. Our data is high in the findings in Shanghai in China (47.5±12.1).[22] Self- management is an essential and indispensable part of treating patients with chronic diseases.

We found that patients had an awareness of the standard operation and knowledge of dialysis-related complications; however, understanding of dialysis adequacy evaluation needed to be more robust, and their compliance with standard procedures, standardized medications, and monitoring of ultrafiltrate decreased as the duration of dialysis increased. These indicate the importance of re-education on self-management skills in PD patients.

The study has confirmed that peer support can effectively improve the self-management ability of PD patients.[23] It is fascinating to note that A couple of young people in the WeChat group have met - fallen in love - and are married, encouraging and supporting each other in the face of life and illness. WeChat can be an effective tool for the management of chronic diseases.[28] WeChat can provide a peer support platform for communication among patients with chronic diseases°Researchers[29,30] suggest that patients participate in the design of self-management interventions based on their values, culture, and psychosocial needs. These can be used for reference in the future.

Factors Affecting the Self-Management Ability of PD Patients

Our results showed that education level, occupation, and medical insurance form were the factors that affected the self-management ability of PD patients. ①The education level of the patients in this study was mainly at the junior high or technical secondary school level, consistent with a previous study.[26] We suppose that PD patients are aware of standard PD procedures. However, the knowledge of dialysis-related complications and dialysis adequacy assessment is fragile, affecting PD patients' self-management ability. This finding may provide new ideas for enhancing the health knowledge of PD patients. ②The self-management score of PD patients of cadre occupation was the highest, followed by the unemployed, family members, and retired patients, and that of the workers and farmers was the lowest. This may be because cadres have higher education levels, and the unemployed, family members, and retired patients have more time and energy. Thus they tend to pay more attention to health. However, workers and farmers may have no extra energy to pay attention to their health due to the pressure of life. ③PD is a long-term kidney replacement therapy. Patients must strictly follow the dialysis plan at home and visit the hospital for regular review. According to review results, patients can better adjust their PD treatment plan. PD patients with medical insurance or a high proportion of reimbursement have good compliance and relatively high self-management scores, suggesting that healthcare policies will indirectly affect the quality of life and prognosis of patients with kidney failure.[31] We found that self-financed patients had the lowest self-management score. This population may have mental and emotional distress due to the burden of dialysis, lifestyle restrictions, continuous death threats, and symptom burdens, which will weaken the motivation for self-management.[14,18] We also showed that patients with urban employee basic medical insurance had the highest score, and those with the new rural cooperative medical insurance ranked third. These indicate that the absence of medical insurance is not conducive to improving patients' self-management ability. For the above reasons, medical staff should provide targeted health education to PD patients and take adequate measures to provide timely guidance and assistance. PD patients should pay more attention and actively participate in medical insurance to improve their health insurance. However, only two self-pay patients participated in this study, and the sample size could be increased for further validation in the future.

The Self-Management Ability of PD Patients Was Positively Correlated with the Course of Uremia and Attending Lectures on PD

Our findings showed that the self-management ability of PD patients was positively correlated with the course of uremia and attending lectures on PD. This suggests that higher self-management ability may help reduce the number of hospitalizations and indirectly reduce medical expenses. Moreover, although the time of PD, the number of peritoneal infections, the current body weight, and the number of hospitalizations within six months was not statistically significant, these indicators negatively correlated with self-management ability. In other words, the patients' self-management ability may decrease as the dialysis time increases. Hence, the importance of providing additional dialysis-related knowledge should be taken seriously. Some studies have also confirmed that retraining can help reduce the incidence of PD-related peritonitis and improve self-efficacy.[16,18]

The Main Influencing Factor of the Self-Management Ability of PD Patients Was the Education Level

Our study indicates that the educational level was the main factor affecting the self-management ability of ambulatory PD patients. It is shown that higher self-management ability means that patients have better nutrition and higher body weight.[17] Improved self-management ability can reduce the occurrence of PD-related peritonitis,[16,18] thereby reducing the number of hospitalization and the patient's financial burden. The patient's excellent self-management ability is inseparable from the patient's positive and optimistic attitude toward life.[22] Therefore, targeted self-management education on PD should be provided according to the educational level of different PD patients.

Health Knowledge Needs of PD Patients

Through the questionnaire survey, we found that during PD treatment, patients expected to obtain health guidance on disease knowledge, diet, and medications, suggesting that this information should be provided as crucial health education content in the future. Currently, most patients obtain health knowledge related to PD by consulting the doctors in charge, other PD patients, or nurses using WeChat groups or telephones.

With the development of e-health, the ways of getting medical consultations have changed. WeChat, a mobile phone-based social networking service similar to WhatsApp.[32] Moreover, more importantly, WeChat has powerful functions, including sending messages in various formats (eg, texts, videos, and images) to an individual or a specific group, check-in, punch-in, examination, assessment, and interaction, So WeChat has become increasingly popular as an interactive communication tool in recent years.[33–35]

WeChat is a general social application in China. It is simple to operate and can provide a variety of functions. Many studies have reported using WeChat to manage chronic diseases such as hypertension, diabetes, coronary heart disease, and cancer.[28,36–41] WeChat has also positively impacted medical students[42] and patients with schizophrenia.[43] Herein, 73.3% of patients considered it necessary to establish a WeChat group for PD patients, and 65.7% believed that the significance of establishing a WeChat can provide Relatively comfortable relationship. The multi-way interaction in the WeChat group improves the relationship between nurses, patients, doctors, and patients. Extensive communication content can train patients' PD skills and health literacy. This communication makes it easy to create a relaxed working and learning atmosphere, understand patients' personalities, self-management ability, and psychological dynamics, reduce patients' possible distance, and improve their learning enthusiasm.[44] Tracing the outcome of patients' conditions through the WeChat platforms helps understand a disease's general and individual characteristics, optimize the patient administration and disease administration.[28,41,44]

WeChat group for PD patients was to facilitate communication between patients and enhance treatment confidence. WeChat can provide a feasible way for the public to promote health information.[45] As the primary way for Chinese patients to obtain information, WeChat has excellent potential for health intervention.[46–49] It has become an ideal platform for managing many patients with chronic diseases by a small number of medical workers.[50] WeChat can be an effective tool for managing chronic diseases, but promoting this mode needs support and efforts from various aspects to realize improving public health eventually.[28] Provide evidence and new ideas for self-management and re-education models for PD patients and chronic diseases.

Limitations

The present study has some limitations. First, we selected PD patients from western Chinese cities in a convenience sample conducted in only one tertiary hospital in Urumqi, and the sample may only be representative of some PD patients in China, which may limit the generalizability/ universality of the results. Based on the ethnic diversity of China, future studies could recruit research subjects from a broader range of cultures and backgrounds. Second, no causal relationship can be inferred from the current study, and future longitudinal studies are needed. Third, the current study analyzed self-reported data from PD patients, which may pose a potential risk to the validity of the measurements.

Conclusion

Chinese patients with PD in Xinjiang were generally intermediate in China. Education level was the main factor influencing their self-management ability. It provides a basis for future targeted intervention strategies. Medical professionals should pay attention to the management of mental health assessment psychological construction in this population of PD to improve the motivation of their self-management ability. In addition, WeChat is currently the most preferred way for PD patients in Xinjiang, China, to obtain disease-related information.

Abbreviations

PD, Peritoneal Dialysis; CKD, Chronic kidney disease; HD, Hemodialysis.

Ethical Considerations and Consent Statement

This study conformed to the standards of the Declaration of Helsinki. Ethical approval was granted by the Ethics Committee of the First Affiliated Hospital of Xinjiang Medical University (No. K201908-06). Patients signed informed consent in this study.

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Disclosure

The authors report no conflicts of interest in this work.

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