ORIGINAL ARTICLE

Influencing factors of resource utilisation in haemodialysis patients—Based on socioecological pyramid model

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Abstract

Aims and objectives: To describe the current situation and analyse influencing factors of resource utilisation in maintenance haemodialysis patients.

Background: The self-management level of patients undergoing maintenance haemodialysis in China is low. The applicability of the Chronic Illness Resources Survey in Chinese maintenance haemodialysis patients has been validated, and this survey can be used to assess the utilisation of self-management support resources among haemodialysis patients. Determining the influencing factors of resource utilisation can help improve the self-management behaviour of haemodialysis patients and control the progression of the disease.

Design: A descriptive study design was chosen.

Methods: A convenience sample of 314 patients undergoing haemodialysis was recruited from dialysis centres in three hospitals in western Xinjiang from June 2018–April 2019. SPSS19.0 software was used to describe the current situation of resource utilisation. Moreover, t test, analysis of variance and multivariate linear regression were applied to explore the influencing factors of patients' resource utilisation. Standards for observational studies STROBE Statement checklist-v4 were chosen on reporting the study process.

Results: The average score of the total resource utilisation was 2.95 ± 0.51. The average item score of seven dimensions from high to low was 3.46 for medical staff, 3.32 for personal, 3.22 for family and friends, 3.16 for work-related, 3.12 for media policy, 2.55 for neighbourhood/community and 2.23 for organisation. Multiple linear regression showed that there have six main factors, which explained 65.4% of the variance of haemodialysis patients' resource utilisation.

Conclusions: The personal, family and friends, work and media and policy subscales were rated the highest, with support from neighbourhood/community and organisation rated the lowest. In general, participants perceived moderate levels of support. Government and healthcare team should pay more attention on haemodialysis patients who had low level of education, poor economic conditions and poor mental condition.

Relevance to clinical practice: ESRD has caused a burden on healthcare expenditure and has become a critical public health problem worldwide. Self-management is particularly important for dialysis patients which have attracted extensive interest. In the future research, we can use this questionnaire to evaluate the related resources of disease management of dialysis patients, encourage patients to make full use of the resources around them and focus on those patients with low education and monthly income level and bad mental state.

KEYWORDS
chronic illness resource, haemodialysis patients, influencing factors, socioecological pyramid model

1 | INTRODUCTION

The incidence of end-stage renal disease (ESRD) has risen markedly in the past 30 years (Hu et al., 2018). It is increasing at an alarming rate due to the increased prevalence of diabetes and hypertension and population ageing (Theodoritsi et al., 2016). In general, most countries have a high incidence of ESRD (100–200/million population) (Jha et al., 2013). According to the Annual Data Report (United States Renal Data System, 2017), the crude incidence rate of ESRD in the United States in 2015 was 378 per million population. By 2020, the prevalence rate of ESRD in China is estimated to reach 1200 per million population (Li, 2011). ESRD has caused a burden on healthcare expenditure and has become a critical public health problem worldwide (Lin et al., 2017; Yu et al., 2016).

Maintenance haemodialysis (MHD) is the most common type of dialysis applied in patients with ESRD. According to the Taiwan Ministry of Health and Welfare, 72,763 patients received haemodialysis in 2013 (Yu et al., 2016), and the Health and Family Planning Commission Statistics showed that 50 million haemodialysis patients were recorded in Mainland China in 2013 (Zhang, 2016). Haemodialysis cannot completely replace the role of the kidneys. Patients not only need to take routine haemodialysis, but they also need to adhere to dietary and fluid restrictions and treatment regimens to prevent complications and take care of arteriovenous fistula (Curtin et al., 2005). All of these practices require patients to have good self-management.

The self-management level of haemodialysis patients is lower than ideal (Li et al., 2014). An international comparison study showed that patients' self-reported frequency of non-adherence (NA) to diet and fluid was 80.4% and 75.3%, respectively (Kugler et al., 2011). Another study in Iran reported that patients' NA to diet and fluid was approximately 41.1% and 45.2%, respectively (Ahrari et al., 2014). Here in China, some aspects of patient's self-management are very poor (Cheng et al., 2016; Li et al., 2014; Li, 2016). Many factors can influence patient's self-management (Chen, Song, et al., ; Li et al., 2014; Wang et al., 2018; Yan et al., 2018). Among them, social support has been gradually acknowledged as one of the most significant factors that exerts a positive influence on haemodialysis patients' lives and disease outcome (Li et al., 2014; Theodoritsi et al., 2016).

What does this paper contribute to the wider global clinical community?

1. The study identifies that the overall resource utilisation in maintenance haemodialysis patients is moderate.
2. The study provides evidence on the resource that patients receive is unbalanced, government and administrative department should pay more attention on the utilisation of resources in neighbourhood/community and organisation.
3. The study provides implications to government and administrative that education, economic conditions, mental condition were the main influencing factors of resource utilisation in maintenance haemodialysis patients.

Glasgow et al. established a socioecological pyramid model of chronic disease self-management in 2000 (Glasgow et al., 2000). The Chronic Illness Resources Survey (CIRS) questionnaire was developed on the basis of this model with the aim to evaluate the self-management support and resource utilisation among patients with chronic disease. It is a relatively comprehensive model in disease self-management research at present. This model not only considers common types of support but also takes distal sources of support into account, such as workplace, media and public policy. The CIRS questionnaire is now available in English (Glasgow et al., 2005), Spanish (Eakin et al., 2007) and Chinese (Zhong et al., 2016). The Chinese version of this questionnaire has been used in diabetic (Zhong et al., 2016), hypertensive (Chao et al., 2018) and cancer patients (Wang et al., 2013). Previous studies have shown that the CIRS-Chinese questionnaire is a reliable and valid instrument for measuring multilevel support for chronic illness management in patients. In this study, some of the languages were slightly modified due to the cultural and disease differences. The modified questionnaire was tested and exhibited good validity (scale content validity index was 0.904) and high internal consistency (Cronbach's α coefficient=0.928) (Yao et al., 2019).

Determining the influencing factors of resource utilisation is very important. Previous studies have found that age can affect patients' resource utilisation (Eakin et al., 2007; Glasgow et al., 2005; Zhong et al., 2016), and the utilisation level of chronic disease resources in female patients is higher than that in male patients (Zhong, 2015). Some studies have found that the higher the monthly income of the patient's family, the better the utilisation of resources (Suo, 2016; Yan, 2014; Zhong, 2015), and that the longer the disease duration (Zhong, 2015), and the higher the number of complications (Suo, 2016) the better the utilisation of resources. However, these studies lack consistency.

To better understand the influencing factors of resource utilisation among haemodialysis patients, the present study included many factors affecting self-management of haemodialysis patients found in previous studies (Li et al., 2012), such as employment status, financial status, haemodialysis duration, dialysis times (week), primary cause (for renal failure) and level of anxiety and depression.

This study aimed to examine the chronic illness resource utilisation level of haemodialysis patients by using the CIRS questionnaire and discuss the factors influencing resource utilisation in a sample of patients undergoing haemodialysis in Xinjiang, western China.

2 | METHODS

2.1 | Subjects and setting

The study adopted a descriptive design, with Standards for Strengthening the Reporting of Observational studies in Epidemiology (STROBE) Statement checklist-v4 was chosen on reporting the study process (see supplementary file 1). Convenience sampling was used in this study, and 320 patients undergoing haemodialysis were recruited from dialysis centres in three hospitals in Xinjiang from June 2018–April 2019. The inclusion criteria were as follows: (a) undergoing haemodialysis routinely at least three months; (b) 18 years old or older; (c) able to read and write Chinese; (d) willing to participate. The exclusion criteria were as follows: (a) patients who reported psychological or cognitive disorders; (b) physical limitations in self-care. The sample size was estimated by Kendall sample estimation method (Zhang, 2002); Kendall said that the sample size of multivariate analysis was 5–10 times that of the pre-analysis variable. In this survey, a total of 31 predictive influence variables were considered, and we estimated that 10%–20% of the questionnaires are invalid; thus, the sample size should be 171–372 people. A total of 314 participants completed the full questionnaire. A total of 320 questionnaires were recruited in this study, 314 valid questionnaires were recovered, giving a response rate of 98%. Of the six invalid questionnaires, three were terminated due to patient emotional change and its inconvenience to continue filling out the questionnaire, 2 were reluctant to continue filling out questionnaires due to family visits to patients, and 1 was reluctant to fill out questionnaires due to the interruption of nursing operations.

2.2 | Data collection procedures

Ethical approval for the study was granted (Approval number:2018–003–02), and oral approval was obtained from participating hospitals. After explaining the purpose of the study, consent was obtained from patients who met the inclusion criteria and agreed to participate. The demographic and medical data were obtained from patients and medical records. The five questionnaires that assessed for demographic and disease-related information of patients, use of chronic resources, hope, self-efficacy, and anxiety and depression, took approximately 20–25 min to complete. Face-to-face interviews were conducted by interviewers. Items and response choices were read to participants who had difficulty in reading (because of illiteracy or poor vision) before or after participant dialysis.

2.3 | Instrument

2.3.1 | Demographic and disease-related information

General demographic data included age, gender, marriage, education, economic condition, employment and medical insurance, while disease-related information included vascular access, operation times of arteriovenous fistula, duration and frequency of haemodialysis and complications of disease.

2.3.2 | CIRS

The CIRS-Chinese questionnaire was used to assess the utilisation of chronic illness resources among haemodialysis patients. The CIRS consists of seven dimensions with 21 items (Eakin et al., 2007; Glasgow et al., 2000). The dimensions are as follows: personal, family and friends, healthcare team, media and policy, neighbourhood/community, organisations and worksite. Subjects responded to each item from "never" (1 point) to "very much" (5 points). The scores of subscales were determined by computing the means of subscale items, and the total score of the CIRS was calculated by adding subscale scores and dividing by seven. The total average score of the questionnaire is equal to the total score of all items added and then divided the number of items. High CIRS scores indicate improved utilisation of chronic illness resources by patients. CIRS scores less than 3 indicate the utilisation of chronic illness resources is not very well. The computed overall Cronbach's α for CIRS-Chinese questionnaire was 0.93, with values ranging from 0.75–0.94 across factors in this study.

2.3.3 | Self-efficacy

The six-item Chronic Disease Self-Efficacy Scale was used to measure self-efficacy (Lorig & Holman, 2003). This scale consists of two dimensions. The symptom management dimension comprises four items,

TABLE 1 Scores of total CIRS and CIRS subscale

Subject	Min	Max	≥3 points [n (%)]	<3 points [n (%)]	$\overset{!!}{\chi}$	SD
Total CIRS	1.05	4.09	141 (44.9)	173 (55.1)	2.95	0.51
Healthcare team	2	5	302 (96.2)	12 (3.8)	3.46	0.60
Personal	2	5	267 (85.0)	47 (15.0)	3.32	0.66
Family and friends	1	4	231 (73.6)	83 (26.4)	3.22	0.67
Work	2	5	145 (69.4)	64 (30.6)	3.16	0.58
Media and policy	1	5	219 (69.7)	95 (30.3)	3.12	0.60
Neighbourhood/community	1	4	98 (31.2)	216 (68.8)	2.55	0.59
Organisations	1	4	93 (29.6)	221 (70.4)	2.23	0.88

while the disease common management dimension consists of two items. Subjects responded to each item on a 10-point scale ranging from "not at all confident" to "totally confident." The reported retest reliability estimate was 0.91. The computed overall Cronbach's α for Chronic Disease Self-Efficacy Scale was 0.96 in this study.

2.3.4 | Anxiety and depression

The Hospital Anxiety and Depression Scale (HADS) was used to measure anxiety and depression (Zigmond & Snaith, 1983). HADS has two subscales, each consisting of seven items. The anxiety of patients was evaluated by odd items, and the depression of patients was evaluated by even entries. Each item was scored from 0–3 points (4 grades). The total score of each subscale was 21, and the score of each subscale was added directly, with a score higher than 8 indicating the existence of anxiety or depression (Wang et al., 1999). Cronbach's α of the anxiety and depression subscales was reported as 0.92 and 0.84, respectively, in a study in China (Ye & Xu, 1993). The computed overall Cronbach's α for HADS was 0.95 in this study.

2.3.5 | Herth Hope Index (HHI)

The HHI comprised 12 items. Participants were asked to rate each item on a 4-point Likert scale. Subjects responded to each item from "strong disagree" (1 point) to "strong agree" (4 points). The total score of HHI ranged from 12–48, with a higher total score indicating a greater level of hope. Items three and six have an inverted score. The psychometric properties of HHI have been empirically tested by Herth (Herth, 1992), showing that it has an adequate construct validity and good internal consistency and test–retest reliabilities. The computed overall Cronbach's α for HHI was 0.91, with values ranging from 0.74–0.83 across factors in this study.

2.4 | Data analysis

All data were entered in duplicate into the EpiData Info version 3.1 database, and data entry screens were set to logical error check options. Data were analysed with descriptive and inferential statistics using SPSS19.0 statistical software. Descriptive statistics were reported as frequency, percentage, mean and standard deviation (SD). Inferential procedures included t test, one-way analysis of variance, Spearman/Pearson correlation and multiple linear regression. Results with p-values < 0.05 were considered to be statistically significant.

3 | RESULTS

3.1 | Demographic and disease-related data

The typical characteristics of participants were as follows: male (59.6%); 53.58 years old (SD = 13.12); married (84.7%); retired or not working (33.3%); graduated from high school and above (40.8%). The majority of patients received dialysis three times per week (67.5%). The top three causes of haemodialysis are hypertensive nephropathy (39.8%), glomerulonephritis disease (30.3%) and diabetic nephropathy (21%).

3.2 | Level of chronic illness resource utilisation

The total score of CIRS in haemodialysis patients ranged from 32–80, and the average score of the item was 2.95 ± 0.51. The average scores of the following dimensions are from high to low: healthcare team, personal, family and friends, work, media and policy, neighbourhood/community and organisations (Table 1).

3.3 | Analysis of single influencing factor

3.3.1 | Resource utilisation of respondents with different demographic variables

The results of the bivariate analysis showed 8 independent demographic variables that were significantly related to the CIRS total score: marital status, main caregiver, level of education, employment status, monthly income of family (yuan), type of medical insurance, hospital and financial status. Neither age nor gender were significantly associated with the CIRS score ($p < .05$), as shown in Table 2.

3.3.2 | Resource utilisation of respondents with different disease-related factors

We found that five disease-related factors were significant in the total score of CIRS ($p < .05$), including type of vascular access, times of arteriovenous fistula operation, dialysis times per week, comorbidity and urine volume. Neither primary cause for renal failure nor haemodialysis duration were significantly associated with the CIRS score, as shown in Table 3.

3.4 | Relationship between resource utilisation and influencing factors

The resource utilisation level of haemodialysis patients was positively correlated with self-efficacy(0.67) and hope level(0.66), and was negatively correlated with anxiety(−0.41) and depression(−0.37). All of these correlations were found to be statistically significant ($p < .001$), as shown in Table 4.

3.5 | Multiple linear regression

The multiple linear regression equation was established by stepwise regression with the significant variables in the results of single factor analysis, and correlation analysis as independent variable and the total score of CIRS as dependent variable. Prior to the analysis, categorical variables were dummy coded. When tolerance (TOL)<0.1 or variance inflation factor (VIF)>10, there will be serious collinearity between the independent variables, a serious collinearity exists between independent variables (Zhang, 2002), the results of this study showed that the TOL ranged from 0.295–0.822, and the variance VIF ranged from 1.217–3.384; therefore, no collinearity was present in this study. The residual distribution histogram shows that the residual distribution is uniform and basically normal. As shown in the scatter diagram, the residuals were randomly distributed on both sides of the horizontal line at point 0 and scattered between ±2, which basically met the homogeneity of variance. Six variables were entered in the equation and sorted by the influence on the resource utilisation score (standard beta value): hope level, hospital, self-efficacy, anxiety score, monthly income and education level, which could explain 65.45% of the variance in CIRS (Table 5).

4 | DISCUSSION

4.1 | Demographic and disease-related characteristics of participants

Among the respondents in this study, male haemodialysis patients accounted for nearly 60% of the total number of participants. The average age of all participants was (53.58 ± 13.52) years, and most of them were middle-aged, with middle-aged patients accounting

for the majority. This result is consistent with the epidemiological characteristics of chronic renal failure (You & Wu, 2017). The common causes of chronic renal failure in China are glomerulonephritis, diabetic nephropathy and hypertensive renal arteriosclerosis (Wang & Yin, 2013). The results of this study showed that the top three causes of chronic renal failure in MHD patients are hypertensive nephropathy (39.8%), glomerular disease (30.3%) and diabetic nephropathy (21.0%).

4.2 | Level of total CIRS score among haemodialysis patients

In general, participants perceived moderate levels of support. In this study, the total score of CIRS in MHD patients was 2.95 ± 0.51, and there is no significant difference between the total score of CIRS and 3 points (single-sample t test); however, more than half of the patients scored below 3 points (55.1%). In combination with the score of each CIRS subscale, the main reason for this phenomenon was the low utilisation of resources in the neighbourhood/community and organisation, which decreased the overall resource utilisation level. This result is similar to that of patients with hypertension (2.99 ± 2.57) (Wu et al., 2016), higher than that of community diabetic patients (2.86 ± 0.63) (Zhong, 2015), and lower than that of diabetic hospitalised patients (3.16 ± 0.68) (Yan, 2014).

4.3 | Level of CIRS subscale score among haemodialysis patients

The scores of CIRS subscales were different, with the lowest and highest scores varying widely. The following dimensions had average scores from high to low: healthcare team, personal, family and friends, work, media and policy, neighbourhood/community, and organisations. Among them, the neighbourhood/community and organisations were lower than 3 points. Individuals with non-moderate resource utilisation in the neighbourhood/community accounted for 68.8% of the total respondents, whereas individuals with poor organisation resource utilisation accounted for 70.4% of the total respondents. These results are similar to a survey by Eakin et al. (Eakin et al., 2007) and are different from the study of Zhong et al. (Zhong et al., 2016) on community diabetics. Among Hispanic individuals with chronic diseases, Eakin et al. found that the use of healthcare teams' resource was the best, followed by personal coping.

4.3.1 | Inspiration of the score of healthcare team and personal dimension

The results of this study may be due to different characteristics of different diseases, based on the disease and patients' personal factors, MHD patients who are given haemodialysis at least once a week, patient need to dialysis at least 3 h per time and that kind of

TABLE 2 Resource utilisation of patients with different demographic variables

Variables		n (%)	$\overset{!!}{\chi} \pm$ SD	t/F	p
Gender	Male	187 (59.6)	2.95 ± 0.49	1.827	.18
	Female	127 (40.4)	2.97 ± 0.54		
Age (year)	<45	76 (24.2)	2.99 ± 0.47	1.015	.36
	45–59	132 (42.0)	2.98 ± 0.50		
	≥60	106 (33.8)	2.90 ± 0.54		
Marital status	Single	21 (6.7)	2.99 ± 0.57	3.456	.02
	Married	266 (84.7)	2.98 ± 0.51		
	Widowed	21 (6.7)	2.63 ± 0.45		
	Divorced	6 (1.9)	2.77 ± 0.52		
Main caregiver	Living alone	29 (9.2)	2.93 ± 0.52	2.963	.02
	Parents	16 (5.1)	2.85 ± 0.46		
	Children	14 (4.5)	2.67 ± 0.47		
	Spouse	251 (79.9)	2.99 ± 0.50		
	Others	4 (1.3)	2.36 ± 0.46		
Education level	Elementary or below	78 (24.8)	2.73 ± 0.49	11.269	<.001
	Junior high school	108 (34.4)	2.91 ± 0.49		
	Secondary	68 (21.7)	3.12 ± 0.48		
	College or above	60 (19.1)	3.15 ± 0.49		
Employment status	Employed	209 (66.6)	3.06 ± 0.52	13.945	<.001
	Retired	82 (26.1)	2.73 ± 0.40		
	Unemployed	23 (7.3)	2.85 ± 0.53		
Monthly income RMB/per month	<1000	9 (2.9)	2.36 ± 0.49	43.244	<.001
	1000–3000	140 (44.6)	2.71 ± 0.36		
	3000–5000	117 (37.3)	3.10 ± 0.48		
	>5000	48 (15.3)	3.42 ± 0.46		
Medical insurance	Employee	177 (56.4)	2.93 ± 0.50	13.559	<.001
	Citizen	96 (30.6)	3.15 ± 0.49		
	Rural	9 (2.9)	2.44 ± 0.47		
	Others	32 (10.2)	2.63 ± 0.32		
Visiting hospital	Hospital A	116 (36.9)	2.62 ± 0.30	147.623	<.001
	Hospital B	84 (26.8)	2.79 ± 0.41		
	Hospital C	114 (36.3)	3.42 ± 0.39		
Financial status	Sufficient	170 (54.1)	3.13 ± 0.51	34.156	<.001
	Barely sufficient	117 (37.3)	2.83 ± 0.42		
	Insufficient	27 (8.6)	2.42 ± 0.39		

uninterrupted therapy has led to a closer link between patients and hospitals. Similarly, healthcare team in blood purification centres is closely related to dialysis patients through each dialysis treatment, health education, and activity of patients association.

Furthermore, the score of personal resources of dialysis patients in this study was 3.32 ± 0.66, which ranked second in the seven dimensions. This finding indicated that the resources of this dimension were better utilised. Compared with that in diabetic and hypertensive patients, the influence of complications in haemodialysis patients is not easy to perceive. However, if haemodialysis patients do not take good care of their health, such as diet and fluid restriction, medication and nursing management, their lives may be threatened. The majority of individuals in Zhong's study were elderly people (Zhong, 2015). Elderly people may have decreased physical functions compared with young people, thus decreasing their confidence in coping with the disease.

TABLE 3 Resource utilisation of patients with different disease-related factors

Variables		n (%)	$\overset{!!}{\chi} \pm S$	F	p
Vascular access	Arteriovenous fistula	268 (85.4)	2.96 ± 0.49	7.723	.001
	Central venous catheter	42 (13.4)	2.86 ± 0.58		
	Artificial blood vessel	4 (1.3)	3.89 ± 0.22		
Arteriovenous fistula surgery (operation times)	None	29 (9.2)	2.73 ± 0.53	3.53	.015
	Once	195 (62.1)	3.01 ± 0.50		
	Twice	55 (17.5)	3.05 ± 0.46		
	Others	6 (1.9)	3.28 ± 0.49		
Haemodialysis duration (year)	<1	54 (17.2)	2.92 ± 0.51	1.221	.302
	<3	95 (30.2)	2.89 ± 0.52		
	3–5	65 (20.7)	2.99 ± 0.53		
	>5	100 (31.8)	3.02 ± 0.48		
Dialysis times (per week)	2 times	51 (16.2)	2.75 ± 0.44	7.417	<.001
	3 times	212 (67.5)	3.04 ± 0.53		
	Five times every two weeks	44 (14.0)	2.76 ± 0.36		
	Others	7 (2.2)	2.96 ± 0.49		
Primary cause (for renal failure)	Glomeruli of kidney	95 (30.3)	2.93 ± 0.46	0.530	.714
	Hypertensive	125 (39.8)	3.01 ± 0.52		
	Diabetes	66 (21.0)	2.92 ± 0.54		
	Polycystic kidney	10 (3.2)	2.88 ± 0.43		
	Others	18 (5.7)	2.90 ± 0.56		
Comorbidity	None	86 (27.4)	3.04 ± 0.49	5.207	.006
	One	149 (47.5)	2.99 ± 0.52		
	Two and above	79 (25.2)	2.80 ± 0.47		
Urinary volume (ml/day)	< 100	218 (69.4)	3.04 ± 0.53	12.347	<.001
	1>X<1000	57 (18.2)	2.70 ± 0.39		
	>1000	39 (12.4)	2.82 ± 0.38		

TABLE 4 Correlation between CIRS and other scales

Variables	$\overset{!!}{\chi} \pm S$/M (P25, P75)[a]	r	p
Self-efficacy score	8.06 ± 1.24	0.674	<.001
Hope score	35.63 ± 4.59	0.655	<.001
Anxiety score	0 (0, 3)	−0.407	<.001
Depression score	1 (0, 2)	−0.372	<.001

[a]M (P25, P75) means quartile range.

4.3.2 | Inspiration of the score of neighbourhood/community and organisation dimension

The resource utilisation of neighbourhood/community and organisation indicating that MHD patients place little value on neighbourhood/community and organisation resources to their disease self-management or that this kind of resources is not adequately supported (Glasgow et al., 2000).

In this study, patients who made good use of neighbourhood/community resources had higher scores in community physical environment resources (park, fitness equipment) compared with those who made less use of neighbourhood/community resources. This finding suggested that community managers should increase the construction of public resources such as community pavilions, fitness walkways and chessboard to increase the utilisation of neighbourhood and physical resources.

By comparing the results of other studies using CIRS questionnaire, we found that the organisational dimension has the lowest score (Eakin et al., 2007; Wang, Chen, et al., 2013; Yan, 2014), indicating that dialysis patients have less involvement in communities, and other organisations and receive limited support resources in group organisations. In addition, the hospital resources will affect the utilisation of organisational dimension resources. We found that the content and frequency of health education and health lectures in hospital C were higher than those of hospitals A and B. In addition, the monthly income of patient's family will affect the utilisation of organisational resources. The higher the score of organisational resource utilisation of patients, the higher the monthly family income. In this study, after dialysis expenses were deducted from patient's monthly income, the patients who had remaining money were more willing to take part in some activities such as chess and

TABLE 5 Multiple linear regression analysis for predictors in CIRS

Independent variable	Unstandardised	Standardised			Collinearity	
	B	β	t	p	TOL	VIF
Hope score	0.729	0.330	5.755	<.001	0.370	2.699
Hospitals	3.478	0.298	6.049	<.001	0.501	1.996
Self-efficacy score	0.438	0.287	4.465	<.001	0.295	3.384
Anxiety score	−0.468	−0.217	−2.300	.022	0.400	2.500
Monthly income	1.526	0.122	2.682	<.001	0.591	1.693
Education level	0.865	0.094	2.437	.015	0.822	1.217

card games, calligraphy classes and elderly universities. Moreover, the results showed that educational level and personal psychological state also affect the use of organisations, and patients with a high level of education were more likely to acquire disease-related knowledge (Li, 2011). The individual psychological state will affect the positive initiative of patient's behaviour (Zhang, 2016; Zhong, 2015).

4.4 | Influencing factors

4.4.1 | Psychological factors

Hope was one of the main influencing factors of resource utilisation and had a positive effect on it. The higher the patient's hope level, the better the utilisation of resources. The results in this study were similar to those of Yan's study (Yan, 2014). According to the Herth hope level score, the overall hope of patients in this study was at the upper to middle level, which is consistent with the results of Zhang et al. on the hope level of young dialysis patients (Zhang, 2016). Hope theory emphasises that hope is an important psychological mechanism that regulates emotion and psychological adaptation and plays an important role in predicting patients' anxiety and depression, improving mental health (Chan et al., 2012; Rahimipour et al., 2015). This finding suggests that the healthcare team should provide patients with the necessary social support and relevant information, determine factors that affect patients' hope and strengthen the psychological guidance of patients. At the same time, managers can conduct various forms of psychological guidance, organise patient meeting and other activities, enhance patient communication with each other.

Self-efficacy was positively correlated with overall CIRS score. The results of regression analysis indicated that self-efficacy had an important influence on CIRS score. This result is similar to other studies on diabetics (Zhong et al., 2016), which indicated that conducting intervention measures is important to improve the self-efficacy of haemodialysis patients, promote the implementation of healthy behaviour and improve the survival rates and qualities of life of these patients. Self-success experience is the most important influencing factor of self-efficacy (Li et al., 2014; Oka & Chaboyer,

2001). Dialysis patients need to summarise their previous dialysis experience, grasp the most suitable dry weight during personal dialysis and adhere to dietary and fluid restrictions (Bao et al., 2018). Patients can gain successful experience and persuasion of others in the communication, which will help to increase their sense of self-efficacy (Tian et al., 2018; Yan et al., 2018).

The anxiety level of patients was negatively correlated with the total score and subscale of resource utilisation. The higher the level of anxiety, the poorer the resource utilisation. The results also showed that anxiety and depression can affect the utilisation of medical resources. When patients filled out the questionnaire, the investigators found that anxiety patients have worse comfort, more complications and worse self-care ability than other patients the investigators found that anxious patients had poor comfort, many complications and poor self-care ability. Some anxious patients were only dialysed for three months, which was not suitable. Skin pruritus and fatigue after dialysis are difficult to alleviate (Hu et al., 2018). In addition, new dialysis patients have difficulty adhering to diet and fluid restrictions; thus, the score of personal dimensions of chronic disease resources is low.

4.4.2 | Social and demographic factors

The results of this study showed that different hospitals have different utilisation of resources. According to the pyramid model, the hospital belongs to the environmental resources in the second layer of the model, and the medical team provided by the hospital belongs to the third layer of the model, which provides the basic support for patients' self-management (Chen, Song, et al., 2017). Three hospitals were investigated in this study. Hospitals A and B are municipal hospitals, while hospital C is a provincial hospital. The total score of CIRS in hospital C was the highest. The comparison of the scores of each dimension among the three hospitals showed that the utilisation of medical staff resources was the best, higher than 3 points. The score of the neighbourhood/community and organisation dimensions among the three hospitals was different (p < .05) and ordered as follows: hospital A<hospital B<hospital C. The differences were mainly related to the number of free lectures organised by the community and the hospital and the frequency of use of

the physical environment in the community. We also learned that hospital C has accumulated rich clinical experience in various treatments, ranking the highest in Xinjiang. Its blood purification centre is the National Dialysis Management Demonstration Center and superior to other hospitals in subject construction and professional technology.

Monthly income and education level are two demographic factors that affect the level of resource utilisation by patients undergoing haemodialysis. The higher the monthly income of patients, the higher the utilisation level of chronic disease resources ($p < .05$). Patients with higher monthly income can pay more attention to their own health on the basis of meeting their daily living expenses and participate more actively in the utilisation of resources (Yan, 2014). Education level has a positive effect on the utilisation of resources. Lorig points out that sufficient and appropriate knowledge is the basis for people to make a decision (Lorig K R, 2003). The higher the degree of education of respondents, the higher the utilisation of chronic disease resources, which is similar to the results of Suo (Suo, 2016).

5 | LIMITATIONS/STRENGTHS

This study provides new knowledge about influencing factors of resource utilisation in haemodialysis patients in China. Theoretically, the socioecological pyramid model can be an effective tool for evaluating chronic disease resource utilisation in haemodialysis patients. The study has some limitations that may affect its outcomes and should be acknowledged. This study uses the convenient sampling method, and it is suggested that the method of random sampling should be used in the follow-up study to determine the sample, so as to avoid bias in the selection of samples. The questionnaire collects data by the answer method of the patient's self-narrative, the patient may avoid the real feeling of the heart by the social expectation, does not give the real answer and suggests that the future study can combine the scale with the patient's relevant objective index to evaluate.

6 | CONCLUSIONS

The overall utilisation level of chronic disease resources in haemodialysis patients at a moderate level. However, the utilisation of resources in neighbourhood/community and organisation subscales is less than moderate and can be improved. The healthcare team should pay attention to haemodialysis patients with low education level and low income, and psychological status of patients also have a great impact on the degree of resource utilisation. Moreover, in this study, our study only evaluated the utilisation degree of resources, but the poor utilisation of resources may be caused by the lack of resources to be utilised and the abundant resources but poor personal utilisation. Therefore, future research should focus on the causes of low utilisation.

7 | RELEVANCE TO CLINICAL PRACTICE

ESRD has caused a burden on healthcare expenditure and has become a critical public health problem worldwide. Self-management is particularly important for dialysis patients which have attracted extensive interest. In the future research, we can use this questionnaire to evaluate the related resources of disease management of dialysis patients, encourage patients to make full use of the resources around them and focus on those patients who with low education and monthly income level and bad mental state. Appropriate intervention and support guidance should be carried out by government and administrative department according to the influencing factors to maximise the utilisation of potentially available resources.

CONFLICT OF INTEREST

The authors declare no conflict of interest in this study.

AUTHOR CONTRIBUTIONS

(a) The idea and design of this research were performed through YW and XYY. (b) The collection and analysis of the data came from XYY, ZJL, YQL and XLF. (c) YW and XYY contributed to the drafting, writing and revising the manuscript. (d) All five authors have approved this version for publication.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.