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Self-management of Arteriovenous Fistula and Its Associated Factors among Patients Undergoing Maintenance Hemodialysis: A Cross-sectional Study

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Abstract: *This study investigated the status of arteriovenous fistula (AVF) self-management among patients on maintenance hemodialysis and explored the roles of self-efficacy and quality of life in influencing these behaviors. A cross-sectional survey was conducted at a tertiary hospital in China, involving 336 participants. Data were collected using the ASBHD-AVF scale, the Chronic Disease Self-Efficacy Scale, and the WHOQOL-BREF. The results showed that the mean AVF self-management score was 82.65±16.32, with only 31.25% of patients achieving a high level of self-management. Significant differences in scores were observed based on education, dialysis vintage, and complication history. Furthermore, AVF self-management was significantly and positively correlated with self-efficacy and multiple domains of quality of life. The findings indicated that AVF self-management was at a moderate level and was heavily influenced by patient confidence and overall well-being. Consequently, nursing strategies were recommended to focus on enhancing self-efficacy and providing targeted education for high-risk groups, such as those with lower education levels or shorter dialysis histories, to prevent complications and protect this vital treatment lifeline.*

Keywords: *Maintenance hemodialysis; Arteriovenous fistula; Self-management; Self-efficacy; Quality of life; Nursing*

1. Introduction

For patients with end-stage renal disease (ESRD), maintenance hemodialysis (MHD) remains the primary life-sustaining treatment[1]. The arteriovenous fistula (AVF) is widely regarded as the "lifeline" of MHD patients due to its superior patency rates and lower infection risks compared to other vascular accesses[2]. However, the long-term functionality of AVF is frequently compromised by complications such as thrombosis, stenosis, and infection, often stemming from inadequate patient self-management.

Self-management is defined as the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition[3]. While clinical nursing focuses on intra-dialytic care, the daily maintenance of AVF falls upon the patients themselves[4]. Previous studies[5] have indicated that self-efficacy—the belief in one's ability to execute behaviors necessary to produce specific performance attainments—is a key psychological determinant of health behaviors. Furthermore, the quality of life (QoL) is not only an ultimate goal of healthcare but also a factor that may influence a patient's motivation for self-care[6].

Currently, there is a lack of comprehensive data regarding the status of AVF self-management and its relationship with psychological and clinical outcomes in Chinese MHD populations[7]. Therefore, this study aims to: (1) investigate the current level of AVF self-management; (2) identify demographic and clinical factors influencing these behaviors; and (3) explore the correlations between self-management, self-efficacy, and quality of life.

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2. Methods

2.1 Study Design and Participants

A cross-sectional survey was conducted at the hemodialysis center of a tertiary grade A hospital in December 2025. Using the item-to-sample ratio method (1:10) [8], a total of 336 patients were recruited. Inclusion criteria: (1) age ≥18 years; (2) undergoing MHD for ≥3 months with a functioning AVF; (3) clear consciousness and ability to communicate. Exclusion criteria: (1) severe acute complications (e.g., heart failure); (2) diagnosed psychiatric disorders. The study was approved by the hospital ethics committee, and all participants provided written informed consent.

2.2 Instruments

1) General Information Questionnaire: Developed by the researchers, covering age, gender, education, dialysis vintage, and history of AVF complications.

2) Assessment of Self-care Behaviors with Arteriovenous Fistula in Hemodialysis (ASBHD-AVF): Originally developed by Sousa et al[9]. and revised by Han et al[10]. The 28-item scale includes two dimensions: symptoms/signs management and complication prevention. It uses a 5-point Likert scale (Total: 28–140), where higher scores indicate better self-management. The Cronbach's α was 0.926[11].

3) Self-Efficacy Scale for Managing Chronic Disease (SSMCD): Developed by Lorig et al[5]. and translated by Siu et al[11]. The 6-item scale measures confidence in managing symptoms and general disease issues (Score 1–10). A mean score ≥7 indicates high self-efficacy.

4) WHO Quality of Life-BREF (WHOQOL-BREF): The Chinese version by Fang et al[12]. was used to assess four domains: physiological, psychological, social relationships, and environment.

2.3 Statistical Analysis

Data were analyzed using SPSS 26.0[8]. Descriptive statistics were used for scores. Independent t-tests and one-way ANOVA were employed for univariate analysis. Pearson correlation analysis was performed to explore relationships between variables. $P < 0.05$ was considered statistically significant.

3. Results

3.1 Demographic and Clinical Characteristics

The characteristics of the 336 participants are summarized in Table 1.

Table 1. Demographic and Clinical Characteristics and Univariate Analysis (N=336)

Variables	n (%, n/336)	AVF Self-management Score ($\bar{x} \pm s$)	t/F value	P value
Gender			0.625	0.532
Male	192(57.14)	83.25±16.86		
Female	144 (42.86)	81.82±15.68		
Age (years)			1.028	0.358
<45	78 (23.21)	84.12±17.25		
45~60	156 (46.43)	82.36±16.12		
>60	102 (30.36)	81.58±15.96		
Educational level			18.652	<0.001*
Junior high school or below	207 (61.61)	76.29±12.86		
Senior high school/technical secondary school	89 (26.49)	85.36±13.25		
College or above	40 (11.90)	98.52±14.68		
Dialysis vintage			8.965	<0.001*
<3 years	159 (47.32)	74.85±13.62		
≥3 years	177 (52.68)	89.72±15.86		
History of AVF complications			9.658	<0.001*
Yes	98 (29.17)	70.25±12.38		
No	238 (70.83)	87.36±15.92		

Note: *, statistically significant; AVF=Arteriovenous Fistula

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3.2 AVF Self-management Levels

The mean score of 82.65±16.32 indicates a moderate performance. Detailed dimension scores are shown in Table 2.

Table 2. Scores of AVF Self-management Dimensions (N=336)

AVF Self-management Dimensions	Score Range	Actual Score ($\bar{x}\pm s$)	Score Rate (%)*
Symptom and sign management	14~70	45.26±8.95	64.66
Complication prevention	14~70	37.39±8.12	53.41
Total score	28~140	82.65±16.32	59.04

Note: Score rate = (Actual mean score / Maximum possible score) ×100%; AVF=Arteriovenous Fistula

3.3 Factors Associated with Self-management

Univariate analysis showed that education level, dialysis vintage (≥3 years), and lack of complication history were protective factors for better self-management (Table 1). Patients with high self-efficacy scores (≥7) performed significantly better than the low-efficacy group (Table 3).

Table 3. Comparison of AVF Self-management Scores by Self-efficacy Level (N=336)

Self-efficacy Level	n (%, n/336)	AVF Self-management Score($\bar{x}\pm s$)	t value	P value
High (SSMCD score ≥7)	152(45.24)	92.58±14.26	7.896	<0.001*
Low (SSMCD score <7)	184(54.76)	74.32±13.85		

Note: *, statistically significant; AVF=Arteriovenous Fistula; SSMCD=Self-Efficacy Scale for Managing Chronic Disease

3.4 Correlation Analysis

Pearson correlation results are presented in Table 4.

Table 4. Pearson Correlation between AVF Self-management, Self-efficacy, and Quality of Life

Variables	AVF Self-management Total Score	Self-efficacy Total Score	Physiological Domain	Psychological Domain
AVF Self-management Total Score	1.000	0.582**	0.526**	0.498**
Self-efficacy Total Score	/	1.000	0.455**	0.482**
Physiological Domain	/	/	1.000	0.615**
Psychological Domain	/	/	/	1.000

Note: **, statistically significant; AVF=Arteriovenous Fistula; Correlation coefficients (r) are shown at the intersections

4. Discussion

Our findings confirm that nearly 70% of MHD patients do not reach a high level of AVF care, highlighting a significant clinical gap.

The Role of Experience and Education: Patients with longer dialysis history (vintage ≥3 years) likely developed "experiential knowledge," making them more adept at identifying early signs of fistula failure[4].

The Power of Self-efficacy: The strong correlation (r=0.582) suggests that confidence is the bridge between knowledge and behavior. Nurses should not only provide "what to do" but also "how to feel confident doing it". [8]

Impact on QoL: The positive link with QoL indicates that better self-management reduces the psychological burden of fearing "lifeline" failure [13], thereby improving mental health.

5. Conclusion

This study demonstrates that AVF self-management among MHD patients is influenced by

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educational, clinical, and psychological factors. Nursing interventions should be tailored to patients with shorter dialysis experience and lower education. Enhancing self-efficacy through structured education (e.g., PDCA cycle or health belief models) could be a vital strategy to improve self-management behaviors and ensure the longevity of the AVF "lifeline."

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Ethics approval and consent to participate

All steps followed the relevant guidelines and regulations of the Declaration of Helsinki (DoH-Oct. 2008). This study was reviewed by the Medical Ethics Committee of Shaanxi Provincial People's Hospital, China. All patients signed an informed consent form and were informed of their right to withdraw from the study at any time.

Competing interests

The authors declare no competing interests.

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