Self-Management and Its Associated Factors among Patients after Heart Valve Replacement Therapy in China: A Cross-Sectional Study

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Abstract

This study aimed to describe patients' self-management after heart valve replacement and investigate relationships between age, self-efficacy, social support, depression, and self-management. A cross-sectional correlational design was employed to conduct the study. A simple random sampling was used to recruit 135 adults after mechanical valve replacement who came for follow-up at the cardiac surgery outpatient department of one hospital in Wenzhou, China. Instruments included the demographic information questionnaire, The Chinese versions of the Self-Management Scale, the General Self-Efficacy Scale, the Perceived Social Support Scale, and the Self-Rating Depression Scale. The Cronbach's alpha coefficients were 0.91 , 0.96, 0.90, and 0.80, respectively. Data were analyzed using descriptive statistics and Pearson correlation.

The results showed that participants reported moderate self-management scores ($M = 102.07$, $SD = 5.86$). Self-efficacy and social support correlated positively with self-management ($r = .347$, $p < .01$; $r = .474$, $p < .01$, respectively). In contrast, age and depression correlated negatively with self-management ($r = -.201$, $p < .05$; $r = -.325$, $p < .01$, respectively).

In conclusion, results inform targeted interventions to improve early postoperative self-management, including enhancing self-efficacy, strengthening social support, managing depression, and providing disease education. Such interventions may reduce complications, promote cardiac recovery, and improve quality of life.

Keywords: heart valve replacement, self-management, self-efficacy, social support, depression

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Background and Significance of the Study

Valvular heart disease (VHD) is characterized by abnormal structure or function of the heart valves. VHD can alter cardiac hemodynamics, and is strongly associated with cardiac dysfunction and mortality. A study conducted from 2012 to 2015 found the prevalence of heart valve disease in China to be 3.8%, affecting approximately 25 million people[1]. Heart valve surgery is the only viable major clinical approach that has significantly improved patient survival and health-related quality of life over recent decades. According to statistics, there were 88,737 heart valve surgeries performed in China in 2023, accounting for 26.0% of the total heart surgeries[2].

Post-surgery, patients face many challenges that require effective self-management to reduce complications and promote cardiac function recovery[3]. These challenges include dietary management, infection prevention, timely administration of anticoagulant medications, regular medical follow-ups, and vigilant monitoring for symptoms of complications. For patients who have undergone heart valve replacement, self-management encompasses symptom management, treatment adherence, daily life management, emotional management, information management, and self-efficacy management[4]. Effective self-management can improve self-efficacy and medication adherence while reducing the risk of all-cause mortality, thromboembolism, and major bleeding events[5]. However, numerous studies have demonstrated that self-management among Chinese patients after surgery needs improvement[6,7]. Studies have shown that thrombosis and anticoagulation-related complications account for 75% of all complications, usually occurring within 6 months postoperatively, and are major contributors to patient morbidity and mortality, with a serious negative impact on quality of life[5]. Therefore, understanding the factors that influence a patient's self-management ability after surgery, particularly in the early postoperative period (within 6 months), is essential. Based on the literature review and Ryan and Sawin's Model of the Individual and Family Self-Management Theory (IFSMT)[8], this study identified four key factors—age, self-efficacy, social support, and depression—as important correlates of patient self-management after heart valve replacement.

Research has demonstrated that *age* significantly affects patient self-management, with older patients typically demonstrating lower self-management abilities[7]. This age-related difference may be attributed to older patients generally having lower levels of education and less familiarity with using the internet to obtain health information, resulting in reduced self-management capabilities compared to younger patients[9]. In addition to age, *self-efficacy* reflects patients' confidence in managing their disease. Patients with higher self-efficacy demonstrate stronger confidence in coping with their condition, which contributes to improved health behaviors and self-management abilities[10]. Evidence indicates a positive correlation

between self-efficacy and self-management ($r = .41$, $p < .01$)[11], suggesting that higher self-efficacy corresponds with enhanced self-management ability. Another significant factor is *social support*. Patients with inadequate social support typically demonstrate poorer self-management capabilities. Conversely, positive social support provides patients with both emotional and material assistance while helping them maintain a positive attitude toward their condition despite various pressures, thereby improving their self-management levels[7]. In contrast, *depression* is negatively associated with self-management. Factors such as the operation itself, the necessity for anticoagulation therapy, close medical follow-up, and high treatment costs can trigger anxiety and depression in patients[12]. Patients experiencing depression typically demonstrate poorer treatment compliance and a higher incidence of complications such as bleeding and thrombosis[13].

While numerous studies have examined patient self-management after heart valve surgery, limited attention has been directed toward factors associated with patient self-management specifically during the early postoperative period. This period is particularly critical as it presents an elevated risk for various complications that not only threaten patients' lives but also increase family and societal burdens. Therefore, this study aimed to investigate self-management and its associated factors among patients after heart valve replacement in Wenzhou, China. The findings could help nurses develop interventions that support patients and families in improving self-management practices, promoting cardiac recovery, reducing complications, maintaining overall health, and enhancing quality of life.

Research Objectives

1. To describe self-management among patients after heart valve replacement in Wenzhou, China.

2. To examine the relationships between age, self-efficacy, social support, depression and self-management among patients after heart valve replacement in Wenzhou, China.

Research Framework

This study employed the Individual and Family Self-Management Theory (IFSMT)[8] to guide the study's framework. The IFSMT conceptualizes self-management as a dynamic phenomenon encompassing three dimensions: context, process, and outcome.

Context includes risk and protective factors across condition-specific, physical, and social environments, as well as individual and family characteristics. The process encompasses knowledge and beliefs, self-regulation skills and abilities, and social facilitation. Outcomes comprise proximal (short-term) outcomes that facilitate the attainment of distal (long-term) outcomes. According to

the theory, contextual factors affect individual and family participation in the self-management process and directly influence outcomes, while strengthening the process produces positive proximal and distal outcomes[8].

In this study, variables were classified within the IFSMT framework as follows: age and depression as individual characteristics (context dimension), self-efficacy as knowledge and beliefs (process dimension), and social support as social facilitation (process dimension). Based on the IFSMT, we hypothesized that older patients would demonstrate lower self-management than younger patients; patients with high self-efficacy and social support would exhibit higher self-management; and patients with high depression levels would show lower self-management than those with low depression levels. The research conceptual framework is presented in Figure 1.

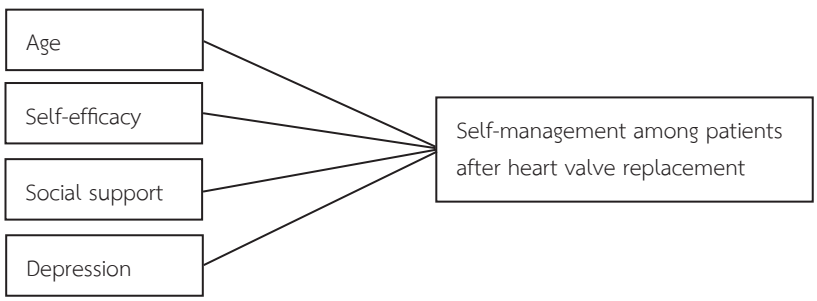


Figure 1. Conceptual Framework

Methods

Study Design: A cross-sectional descriptive correlational design was employed in this study.

Participants and Setting: The study population comprised adults who were one to six months post-discharge following first-time mechanical valve replacement surgery. They attended follow-up visits at a hospital's cardiac surgery outpatient department in Wenzhou, Zhejiang Province, China. The sample was selected from a population with the inclusion criteria of: (1) age 18 - 64 years; (2) ability to speak, read, and write in Chinese; (3) no documented history of intellectual disability or mental illness based on medical records; and (4) stable health condition at the time of recruitment. Participants were recruited using simple random sampling.

The sample size was calculated using G*Power 3.1.9.7 for a correlational design with a significance level of α = 0.05, statistical power of 0.80, and a medium effect size of 0.25. The minimum required sample size was 123 participants. Accounting for a 10% potential dropout rate, the target sample size was set at 135 participants.

Instruments: Data were collected using five questionnaires, with permission from the original authors, as follows:

1. The demographic information questionnaire included age, gender, marital status, educational level, living condition, individual income, payment method of medical expenses, working status, travel time to the hospital, duration after surgery, operation type, current cardiac function status, current symptoms, and warfarin-related complications.

2. The Self-Management Scale of patients after Mechanical Heart Valve Replacement (MHVR) was developed by Deng[4]. It comprises 27 items across six dimensions. Items are rated on a 5-point Likert scale, where higher scores indicate better self-management abilities. Total scores range from 27 to 135. To standardize scores, a scoring rate was calculated using the formula: (actual score/ maximum possible score) × 100%. Self-management levels were categorized as high (scoring rate > 80%), moderate (60 - 80%), and low (< 60%). The Cronbach's alpha for this study was 0.91.

3. The Chinese version of the General Self-Efficacy Scale (GSES) was translated and validated by Wang et al.[14] from the original scale developed by Schwarzer and Jerusalem[15]. The GSES is a unidimensional 10-item instrument rated on a 4-point Likert scale. Total scores range from 10 - 40, with higher scores indicating greater self-efficacy. Self-efficacy levels were categorized as high (31 - 40), moderate (23 - 30), and low (10 - 22). The Cronbach's alpha for this study was 0.96.

4. The Chinese version of the Perceived Social Support Scale (PSSS) was developed by Zimet et al.[16] and translated by Jiang et al.[17]. It has three dimensions and 12 items. The total score ranges from 12 to 84, 12 - 36 reflects a low level, 37 - 60 indicates a moderate level, and 61 - 84 represents a high level of perceived support. The Cronbach's alpha for this study was 0.90.

5. The Chinese version of the Self-Rating Depression Scale (SDS) was developed by Zung[18], and translated by Wang & Chi[19], which comprises 20 items. Each item is rated on a 4 - point Likert scale. Notably, items 2, 5, 6, 11, 12, 14, 16, 17, 18, and 20 are reverse-scored to account for positive wording. The sum of all item scores is multiplied by 1.25, yielding a final score ranging from 25 to 100. Depression levels were categorized as no depression (25 - 49), mild depression (50 - 59), moderate depression (60 - 69), and severe depression (70 - 100). The Cronbach's alpha for this study was 0.80.

Psychometric Properties of the Instruments

The Chinese version of all the instruments were used in this study, and they were tested and validated by the experts in previous studies, which indicated that all instruments had good validity. Cronbach’s alpha coefficient was reported in previous studies to show that the reliability of all instruments applied in this study was ideal. Cronbach’s alpha was also used to determine the reliability of each questionnaire with 30 adults after heart valve

replacement, who had the same characteristics as the study sample. The Chinese versions of the Self-Management Scale, the General Self-Efficacy Scale, the Perceived Social Support Scale, and the Self-Rating Depression Scale had Cronbach's alpha coefficients of 0.91, 0.96, 0.90, and 0.80, respectively.

Data Collection

Participants who met the inclusion criteria were randomly selected and invited to participate in the study. The researchers provided a detailed explanation of the study's objectives and procedures. Upon obtaining informed consent, participants completed the questionnaire in a private setting to ensure confidentiality and minimize potential distractions. Completion of the entire set of questionnaires took approximately 15 - 20 minutes. Following submission, the researchers reviewed the questionnaires to ensure completeness and accuracy.

Ethical Considerations

This study received ethical approval from the Institutional Review Board of Burapha University under Protocol code G-HS029/2565 and the Ethics Committee of the First Affiliated Hospital of Wenzhou Medical University (Protocol No. KY 2022-144). The approval was granted on August 30, 2022, and its validity period ended on August 30, 2023. Before data collection, all participants were provided with detailed information regarding the study's objectives, procedures, and their rights as research subjects. Informed consent was obtained from all participants, who voluntarily agreed to participate in the study.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 27.0. A significant level of α = .05 was adopted for all statistical tests. Descriptive statistics, including frequencies, means, and standard deviations, were employed to summarize participants' demographic characteristics. Pearson product-moment correlation analyses were conducted to examine the relationships among age, self-efficacy, social support, depression, and self-management. All assumptions required for Pearson's correlation analysis were assessed and met prior to conducting the analysis.

Results

1. Description of Participant Characteristics: The study included 135 patients with heart valve replacement aged 29 - 64 years (Mean = 49.32, SD = 7.57), with most participants aged 45 - 59 years (71.8%). The sample was evenly distributed by gender, male (50.4%) and predominantly married (93.3%). Most participants had primary education (51.1%), had high school or higher education (13.3%), lived with family (91.9%), and had low monthly incomes of < ¥3,000 (57.8%). Nearly all had insurance (97.0%), though half were unemployed (50.4%). Travel time to the hospital was 1 - 2 hours (55.6%). In terms of surgery, 58.5% underwent

mitral valve replacement, with 21.5% at 5 months and 37.0% at 6 months post-surgery. Clinical status was favorable: 79.3% had level 1 heart function, 89.6% were asymptomatic, and 91.9% had no warfarin-related complications.

2. Descriptive Characteristics of the Study Variables: Participants reported overall self-management scores ranged from 80 to 132 (M = 102.07, SD = 5.86), indicating moderate self-management levels. Analysis of subscale dimensions revealed that treatment compliance management achieved the highest performance (M = 13.98, SD = 1.43). The remaining five areas showed moderate performance, with information management performing the lowest (Table 1).

Self-efficacy scores ranged from 17 to 40 (Mean = 26.63, SD = 4.53), indicating moderate levels among participants. Social support demonstrated a high overall levels, with scores ranging from 53 to 84 (Mean = 64.38, SD = 4.37). Depression scores ranged from 25 to 53 (Mean = 41.19, SD = 5.38), indicating no depression (Table 2).

Table 1. Self-management and its Dimensions among the Participants (n = 135)

Variables	Possible score	Actual score	M (SD)	Scoringrate (%)	Level
Self-management	27 - 135	80 - 132	102.07 (5.86)	75.60	Moderate
Symptom management	5 - 25	15 - 25	19.85 (1.25)	79.40	Moderate
Treatment compliance management	3 - 15	8 - 15	13.98 (1.43)	93.20	High
Daily life management	5 - 25	17 - 25	19.88 (1.29)	79.52	Moderate
Emotional management	3 - 15	8 - 15	11.41 (1.00)	76.06	Moderate
Information management	5 - 25	7 - 23	16.02 (2.21)	64.08	Moderate
Self-management efficiency	6 - 30	14 - 30	20.91 (2.13)	69.70	Moderate

Table 2. Self-Efficacy, Social Support, and Depression among the Participants (n = 135)

Variables	Possible score	Actual score	Mean	SD	Level
Self-efficacy	10 - 40	17 - 40	26.63	4.53	Moderate
Social support	12 - 84	53 - 84	64.38	4.37	High
Depression	25 - 100	25 - 53	41.19	5.38	No depression

3. Relationships among Age, Self-Efficacy, Social Support, Depression, and Self-Management among Patients after Heart Valve Replacement: Correlation analysis revealed several significant relationships with self-management among heart valve replacement patients. Age demonstrated a significant weak negative correlation with self-management ($r = -.201$, $p < .05$). Self-efficacy ($r = .347$, $p < .01$) and social support ($r = .474$, $p < .01$) both showed significant moderate positive correlations with self-management. Depression exhibited a significant moderate negative correlation with self-management ($r = -.325$, $p < .01$) (Table 3).

Table 3. Association between Self-Management and its Related Factors (n = 135)

Variables	Self-management
Age	-.201*
Self-efficacy	.347**
Social support	.474**
Depression	-.325**

* p < .05, ** p < .01

Discussion

Self-Management among Patients after Heart Valve Replacement Therapy

In this study, patients who underwent heart valve replacement reported a moderate self-management level (M = 102.07, SD = 5.86), which was consistent with the results of some other investigations in China[9,20]. Considering the subscale, a high level of treatment compliance management indicated that participants prioritized regular follow-up appointments and medication adherence. However, self-management efficacy scores were low, reflecting participants' limited confidence in their self-management abilities. In addition, information management scored lowest, possibly due to participants' inadequate access to timely and relevant health information.

The study results are consistent with the Individual and Family Self-management Theory (IFSMT)[8], which proposes that demographic factors such as educational level, income, living conditions, travel time to the hospital, and heart function influence self-management[8].

The findings revealed that over half of the participants had a primary school education (51.1%). Individuals with higher education levels are more likely to accept and understand their disease and demonstrate greater confidence in disease management compared to those with lower levels of education[21]. Nearly all participants lived with family members (91.9 %), and were married (93.3%), indicating available family support and home care. Strong family support can enhance treatment compliance, medication adherence, and regular follow-up attendance[6].

However, 57.8% of participants reported low income, and half were unemployed (50.4%), suggesting financial constraints that may limit access to optimal disease management resources and facilities[10]. Additionally, over half of the participants (55.6%) lived 1 - 2 hours from the hospital, requiring considerable time and energy for health care visits[7]. These economic pressures and transportation barriers impede access to self-management resources, directly affecting participants' self-management capabilities[22]. Notably, 79.3% of participants had New York Heart Association Class I functional status, indicating good recovery and ability for self-care.

Factors Associated with Self-Management among Patients after Heart Valve Replacement Therapy

Pearson's product-moment correlation analysis revealed several significant relationships between the variables and self-management among patients following heart valve replacement, which supported the hypotheses. Age demonstrated a significant weak negative correlation with self-management ($r = -.201$, $p < .05$). Self-efficacy and social support showed significantly moderate positive relationships with self-management ($r = .347$, $p < .01$; $r = .474$, $p < .01$, respectively). Depression exhibited a significant moderate negative correlation with self-management ($r = -.325$, $p < .01$). These findings are discussed as follows:

Age is an individual factor within the context dimension of IFSMT, influencing individual's self-management behaviors[8] In this study, age was significantly negatively associated with SM ($r = -.201$, $p < .05$). This means that advancing age was associated with decreased self-management abilities, even within a relatively younger adult population (under 65 years of age). Prior research suggests that increasing age, even among non-elderly populations, may be linked to decline in memory and cognitive function, which can affect health management abilities[6]. Additionally, most participants in this study were late adulthood and had undergone valve replacement surgery within the past 6 months. This may have limited their physical capacity, reduced their use of digital health tools and increased their dependence on family members for regular follow-up care, contributing to lower self-management[7].

Self-efficacy, a process dimension of the IFSMT, reflects self-management processes that improve disease management capabilities and promote health[8]. Participants demonstrated moderate self-efficacy levels (Mean = 26.63, SD = 4.53), which correlated significantly and positively with self-management abilities ($r = .347$, $p < .01$). This means that participants with higher self-efficacy demonstrated better self-management abilities. This findings aligns with previous studies[3,10,11]. Higher self-efficacy enhances patients' confidence in illness management, increasing their likelihood of seeking disease-related knowledge and support from healthcare providers and family members, thereby improving self-management abilities[23]. One study reported a positive association between self-efficacy and self-management ($r = .41$, $p < .01$), confirming this relationship[11].

Social support represents the social facilitation component of the IFSMT process dimension. Social facilitation operates through interpersonal relationships to enhance individuals' capacity for behavioral change and positively influences engagement in preventive health behaviors[8]. The results revealed that social support was at a high level (Mean = 64.38, SD = 4.37), and had a positive relationship with self-management ($r = .474$, $p < .01$), which indicated that patients with high social support had high self-management. Positive social support not

only helps patients with emotional and material support but also helps patients take a positive attitude toward the disease and improve their self-management level[24]. In this study, 91.9 % of participants were living with family. One study showed that patients living with family members were better at self-management than those living alone, since family members played a major care and support role[6].

Depression, an individual factor within the context dimension of IFSMT[8], serves as a risk factor for poor self-management outcomes. In this study, depression was negatively correlated with self-management ($r = -.325$, $p < .01$), indicating that greater depression severity was associated with poorer self-management abilities. This is primarily attributed to factors including greater surgical trauma, higher operative risk and cost, anticoagulation requirement, and intensive follow-up protocols[11]. Depression significantly impacts medication adherence, with higher depression levels associated with reduced medication adherence ($r = -.223$, $p = .006$), leading to decreased quality of life, and increased mortality risk[25].

These findings support the study hypotheses and are consistent with the IFSMT. The study demonstrated that patients in the early postoperative period (6 months) after cardiac mechanical valve replacement exhibited moderate self-management levels. Self-efficacy and social support were positively related to self-management, while age and depression showed negative associations. These findings enable healthcare providers to implement timely preventive and intervention strategies to enhance patients'self-management abilities, reduce complication rates, promote cardiac functional recovery, and improve quality of life.

Implications and Recommendations

This study provides guidance for clinical nursing practice and research, informing the development of evidence-based patient interventions. Findings support a comprehensive approach addressing information management, health education, social support, and targeted care for vulnerable populations.

Nurses should enhance patient information management through structured health education during hospitalization and maintain continuity via telephone follow-up or WeChat groups post-discharge. Building patient confidence requires collaborative development of self-management plans and regular follow-up visits. Social support should also be strengthened by encouraging family participation in patient care and connecting patients with broader support networks. In addition, patients with depression require professional psychological intervention to optimize outcomes.

Recommendations for Further Studies

Future studies should conduct muti-site surveys across diverse hospital settings to enhance generalizability and strengthen evidence credibility. Additionally, research investigating specific interventions to optimize self-management capacity in heart valve replacement patients warrants further investigation.

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