Review

The Impact of Educational Interventions on Self-Care Behaviors After Cardiac Valve Replacement: A Systematic Review

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Abstract

Introduction. Valvular heart disease (VHD) is a growing global health issue, particularly among aging populations. Surgical valve replacement improves survival and cardiac function, yet long-term outcomes rely heavily on patient engagement in self-care. Educational interventions may enhance self-care behaviors and improve clinical and psychosocial outcomes; however, evidence remains fragmented. This systematic review aimed to evaluate the characteristics and effectiveness of educational interventions designed to support self-care in patients following cardiac valve replacement.

Methods. Following PRISMA guidelines, a systematic search was conducted in PubMed, Scopus, Web of Science, and CINAHL from databases inception up to February 2024. Only randomized controlled trials (RCTs) assessing educational or behavioral interventions aimed at improving self-care after valve surgery were included. Outcomes were categorized as

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clinical (e.g., INR stability, complications), behavioral (e.g., medication adherence), or patient-reported (e.g., quality of life). Risk of bias was assessed using the ROB2 tool. Self-care behaviors targeted by interventions were classified according to to Riegel's Middle Range Theory of Chronic Illness.

Results. Six randomized controlled trials involving 537 patients were included in the review. Interventions varied in delivery mode (all face-to-face, some with telephone or digital support), format (individual or group-based), duration, and frequency. All studies targeted self-care monitoring and management, mainly through INR self-monitoring and anticoagulation adherence, while self-care maintenance behaviors such as diet, physical activity, and psychosocial support were less frequently addressed. Interventions improved INR stability, medication adherence, self-efficacy, and psychological well-being, with some evidence for reduced complications and better quality of life. However, reporting was heterogeneous, theoretical frameworks were rarely applied, and cost-effectiveness and long-term sustainability were seldom evaluated.

Discussion and conclusion. Self-care interventions after valve replacement surgery appear effective in improving anticoagulation control and enhancing psychosocial outcomes. Yet, most programs focus narrowly on anticoagulation, overlooking lifestyle modification and broader recovery needs. Future studies should adopt standardized, theory-driven, and multidimensional approaches, integrate digital health solutions, and evaluate long-term effectiveness and cost-efficiency to ensure sustainable and equitable self-care support.

Keyword: Cardiac Valve Replacement, Self-Care, Educational Intervention, Anticoagulation Therapy, Patient Education, INR Monitoring, Behavior Change Techniques.

Introduction

Valvular heart disease (VHD) is a growing global health concern, particularly in aging populations, with a prevalence expected to rise significantly in the coming decades. VHD impacts around 100 million individuals annually.[1] In Europe, 14 million people are affected, and this prevalence is projected to reach 20 million by 2040.[1]

If untreated, VHD can lead to heart failure, atrial fibrillation, stroke, and increased mortality.[2] Disease progression significantly affects functional capacity and quality of life, contributing to hospitalizations and healthcare costs. [3,4]

Surgical valve replacement is the primary treatment of VHD.[5] While surgery improves survival and cardiac function,[6] post-operative management is crucial for the prevention of complications such as thromboembolism, prosthetic valve dysfunction, and endocarditis.[7] Beyond the prevention of clinical complications, attention is increasingly directed toward the recovery experience. In this context, patient-reported outcomes such as quality of life, functional recovery, and psychological well-being are recognized as pivotal indicators of treatment success.[8,9]

Among the strategies for optimizing post-surgical outcomes in patients with VHD, self-care has emerged as a promising approach.[10] Self-care encompasses a set of behaviors and practices that enable individuals to manage their condition effectively.[11] In chronic disease, self-care has

been associated with improved clinical outcomes, reduced hospital readmissions, and enhanced overall well-being.[12–14] Importantly, empowering patients to develop self-care competencies should begin during hospitalization, where targeted education and support can facilitate a smoother transition to home and foster continuity between inpatient care and post-discharge self-management.[15]

As outlined in the Middle Range Theory of Chronic Illness, self-care is a multidimensional concept composed of three interrelated domains: self-care maintenance (i.e., adherence to prescribed treatments and health-promoting behaviors), self-care monitoring (i.e., recognition of symptoms and physiological changes), and self-care management (i.e., appropriate decision-making in response to symptoms).[16] In the post-surgery setting of patients with VHD, effective self-care includes anticoagulation therapy management, medication adherence, lifestyle modifications, symptom surveillance, and participation in rehabilitation programs.[11] Evidence suggests that patients who actively engage in self-care experience better clinical outcomes, lower rates of hospital readmission, reduced mortality, and improved quality of life.[3,17–19]

To enhance self-care behaviors in patients undergoing cardiac surgery of one or more heart valves, educational interventions have been recommended.[20,21] These interventions vary widely in their delivery methods (e.g., in-person education, digital tools, multimodal programs), intensity, and targeted outcomes. Some interventions prioritize disease-specific competencies, such as anticoagulation management or medication adherence, while others aim to improve broader dimensions of recovery, including psychological well-being, stress reduction, or quality of life. This heterogeneity reflects the multidimensional nature of self-care but also creates challenges in identifying which approaches are most effective for specific patient needs and outcomes.

While self-care interventions have been extensively investigated in heart failure and other chronic conditions, evidence in the context of valve surgery remains limited and fragmented.[22] Given the diversity of available educational strategies, ranging from highly focused approaches targeting medication adherence to broader programs addressing lifestyle changes, psychological recovery, or quality of life, different interventions may influence distinct aspects of patient outcomes. For this reason, it is necessary to evaluate not only clinical endpoints such as complications and hospital readmissions, but also behavioral outcomes reflecting engagement in self-care practices, and patient-reported outcomes that capture the individual's lived experience of recovery. By integrating these dimensions, this review aims to provide a comprehensive synthesis of the effectiveness of educational interventions for patients undergoing heart valve surgery, and clarify which intervention features (i.e., delivery mode, format, duration, and intensity) are most relevant in influencing outcomes across the recovery continuum.

Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency and methodological rigor.[23] The protocol was retrospectively registered in PROSPERO, after the launch of the search string in the databases (ID: CRD420250654829). A structured approach was employed, including identification, selection, data extraction, synthesis, and reporting.

Search strategy

The PICO framework was applied to define the research question: P = adults (≥18 years) who had undergone heart valve surgery; I = educational interventions aimed at improving self-care behaviors (e.g., symptom monitoring, medication adherence, lifestyle modifications, rehabilitation participation); C = usual care or other self-care interventions; O = clinical outcomes, behavioral measures, or patient-reported outcomes. A comprehensive search was conducted in four databases (PubMed via NLM, Scopus via Elsevier, Web of Science via Clarivate Analytics, and CINAHL via EBSCO) for studies published with no time restrictions until February 2024. The search strategy combined Medical Subject Headings (MeSH) and free-text keywords related to cardiac valve replacement, self-care, self-management, self-monitoring, and self-maintenance, including synonyms and variations. The full PubMed search string is provided in Supplementary Material (Table S1). Reference lists of all included articles were hand-searched to identify additional relevant studies.

Eligibility criteria

Studies were included if they were RCTs with concealed allocation, evaluated behavioral or educational self-care interventions in adults undergoing heart valve surgery, and reported at least one relevant outcome, such as clinical events, hospital readmission, adherence to self-care, or quality of life. Only peer-reviewed full-text articles published in English were considered, and reference lists of included studies were screened for additional records. Studies were excluded if they focused primarily on atrial fibrillation, included mixed cardiac populations without stratified results for valve surgery patients, or investigated only pharmacological or surgical interventions without a self-care component

Study selection

Study selection followed a two-phase process. An initial title and abstract screening was conducted, followed by a full-text review to confirm eligibility. Two independent reviewers screened all studies, classifying them as included, excluded, or undecided. Discrepancies were resolved through discussion, and if consensus was not reached, a third reviewer provided the final decision. The screening process was conducted using Rayyan software.[24]

Data extraction

Data extraction was performed using a standardized data collection form, with two independent reviewers ensuring accuracy. Extracted variables included study characteristics (e.g., author, year, country, design, aim), sample characteristics (e.g., sample size, gender), type and anatomical site of valve replacement, self-care intervention characteristics (e.g., mode of delivery, format, structure, professionals involved, setting, follow-up), and outcomes (e.g., clinical indicators, behavioral outcomes, and patient-reported measures). Self-care components were categorized into self-care maintenance, self-care monitoring, and self-care management, in alignment with the Middle-Range Theory of Self-Care.[16]

Risk of bias assessment

The Revised Cochrane Risk of Bias Tool for Randomized Trials (ROB2) was used to assess study quality across five domains: the randomization process, deviations from intended interventions, missing outcome data, outcome measurement, and selection of reported results.[25] Studies were classified as having low, some concern, or high risk of bias. Two independent reviewers conducted the assessments, with disagreements resolved by a third reviewer.

Data synthesis

Due to substantial heterogeneity in intervention content, populations, and outcome measures, only a narrative synthesis was conducted. Intervention characteristics were examined according to target behaviors, delivery modality, intensity, frequency, and duration. Outcomes were thematically categorized as clinical (e.g., INR stability, complications), behavioral (e.g., adherence, self-monitoring), or patient-reported (e.g., quality of life, psychological well-being). Additionally, the use of behavior change techniques was analyzed where applicable. The synthesis was guided conceptually by the Middle-Range Theory of Self-Care.[16]

Results

A total of 3,448 records were retrieved, with 2,968 screened after removing duplicates. Following full-text assessment, six studies were included (Figure 1).

Characteristics of the included studies

The included studies encompassed 537 patients, with 271 in the treatment group and 266 in the control group. Sample sizes varied from 33 to 136 patients per study, with a mean age of 53.10 years (SD ± 8.63) and all included trials reported mixed-sex cohorts, although gender distribution was inconsistently detailed. Studies were conducted in Asia (n=4; 67%) and Europe (n=2; 33%). All the included studies involved patients with mechanical prostheses (n=6; 100%; N=538 patients), while three also included bioprosthetic valves (n=3; 50%; N=266 patients). The aortic valve was the most frequently replaced site (n=3; 50%; N=143 patients), followed by the mitral valve (n=3; 50%; N=148), with several studies including patients with multiple valve replacements (n=3; 50%; N=75 patients).

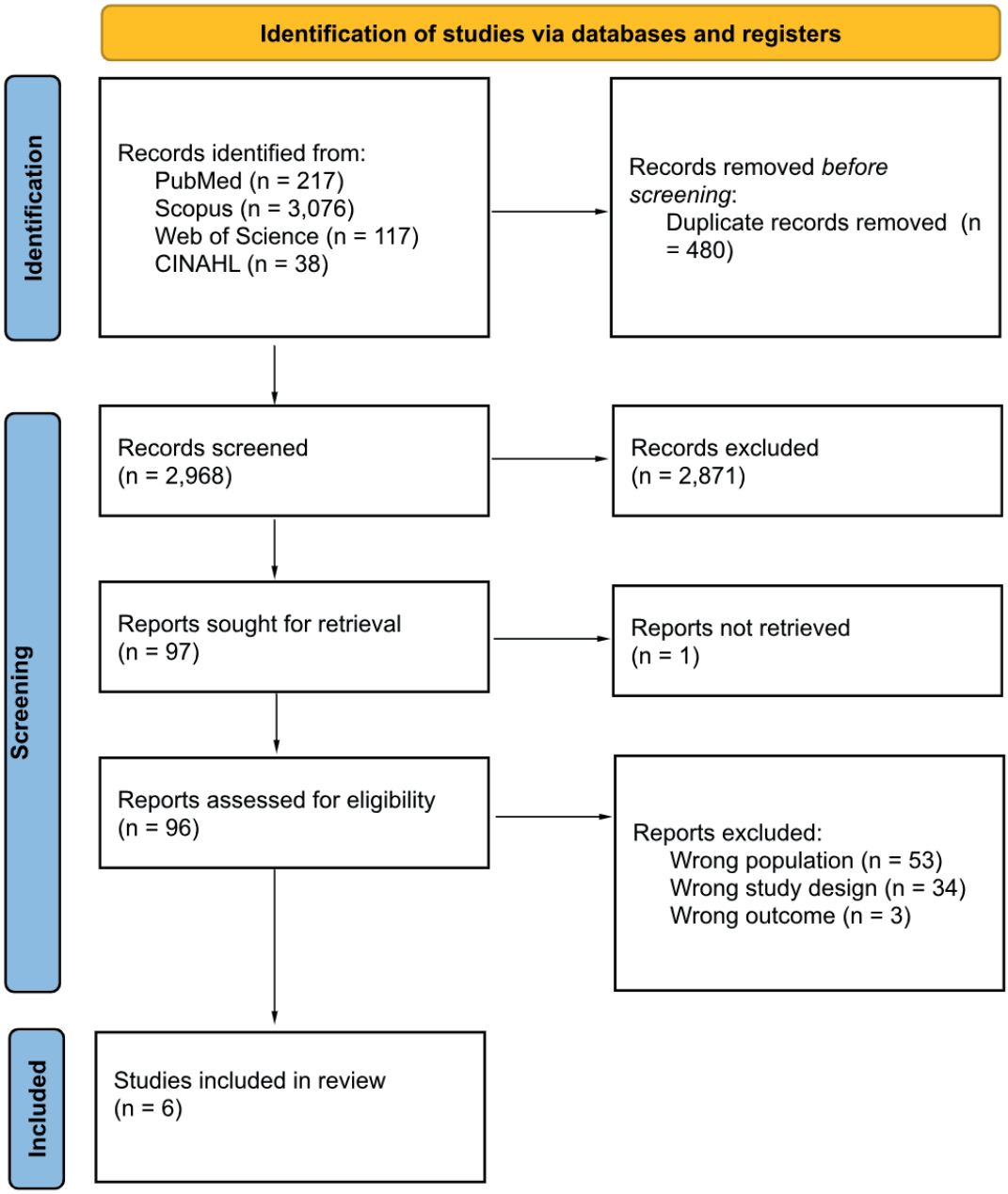

Figure 1. PRISMA flow diagram of studies screening and selection process.

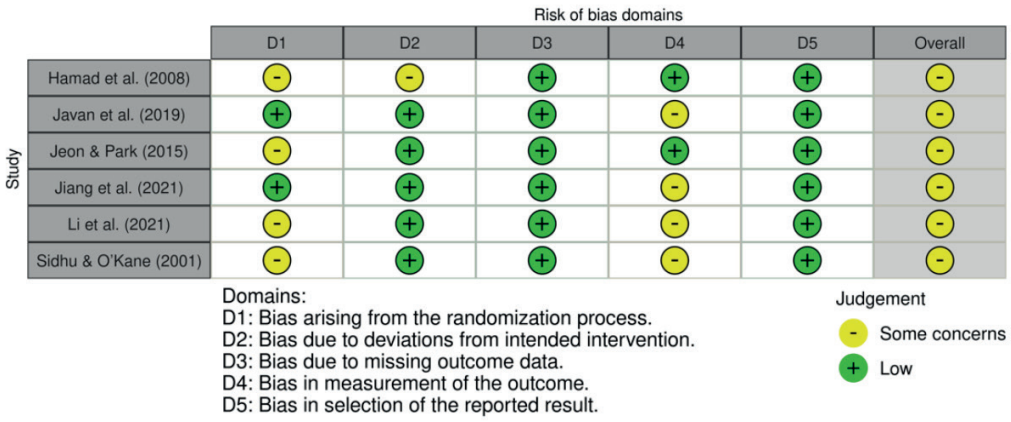

Figure 2. Risk of bias assessment of included studies.

Risk of bias assessment

All six randomized controlled trials were evaluated using the RoB 2 tool. The most frequent issues were related to the randomization process (Domain 1) and the measurement of the outcome (Domain 4), whereas deviations from intended interventions (Domain 2), missing outcome data (Domain 3), and selective reporting (Domain 5) were consistently judged at low risk of bias. A visual summary of the risk-of-bias assessment is provided in Figure 2.

Characteristics of the interventions

The six included trials (100%) showed marked variability in delivery mode, format, and structure. All interventions were delivered face-to-face,[26–31] with two (33%) additionally incorporating telephone or telematic support, such as follow-up calls or WeChat groups.[27,30] Four studies (67%) used predominantly individual sessions,[26,28–30] including personalized monitoring[29] and small-group formats involving two to ten participants.[27,30,31]

Intervention duration and intensity varied considerably. Three studies (50%) implemented structured programs lasting from one week to six months,[28–30] whereas two (33%) delivered shorter interventions over a few hours.[26,31] Session length ranged from 45 minutes to three hours,[26,31] often combining theoretical instruction with practical training in INR monitoring. Three of the trials (50%) did not report session duration.[27,28,30]

Frequency of sessions was equally inconsistent. Some interventions (n=2; 33%) consisted of a single session,[26,29] while others (33%) delivered two to six sessions .[27,28] One study (17%) adopted an intensive model with 24 weekly sessions.[30] The timing of delivery also varied, with some interventions (n=2; 33%) scheduled during the immediate postoperative period,[29,30] while others were initiated later in recovery.

Self-care concepts and self-care behaviors

In line with the middle-range theory of self-care in chronic illness, all six interventions targeted self-care monitoring and self-care management, while self-care maintenance was less frequently addressed. Self-care monitoring (n=6; 100%) primarily involved regular control of anticoagulation values and systematic recording of results or symptoms.[26–31]

Self-care management focused on treatment adherence and decision-making in response to monitored values. This included independent dose adjustment of anticoagulant therapy (n=3; 50%),[26,28,31] consistent adherence to prescribed medication (n=3; 50%),[27,29,30] as well as additional behaviors such as dietary regulation (n=1; 17%) 30 and strategies for pain and emotional control (n=1; 17%).[29]

Self-care maintenance was less consistently emphasized. Selected interventions encouraged healthy lifestyle routines, balanced diet, physical activity, and psychosocial well-being (n=2; 33%).[29,30]

Applied behavior change techniques

The six interventions incorporated a range of several behavior change techniques (BCTs) to enhance self-care. Education and skills training were applied consistently, aiming to improve knowledge, adherence, and monitoring practices (n=6; 100%).[26–31] Self-monitoring was a universal component, with patients encouraged to track clinical indicators, treatment adherence, or health behaviors.

Feedback and reinforcement were included in most trials (n=5; 83%), providing participants with tailored information or reminders to sustain self-care.[26–30] Goal setting was explicitly reported in three studies (50%), guiding patients to establish individual targets related to treatment or lifestyle practices.[26,30,31]

Additional BCTs included social support, delivered through family involvement or peer groups (n=3; 50%),[27,29,30] emotional regulation and stress management strategies (n=1; 17%),[29] and empowerment/self-regulation, enabling patients to take independent responsibility for treatment within structured protocols (n=2; 33%).[26,31]

Outcomes of interventions

Across the six trials (100%), structured self-care interventions consistently improved self-care monitoring, self-care management, and, to a lesser extent, self-care maintenance. In the self-care monitoring domain, intervention groups demonstrated higher adherence to INR checks and more consistent tracking of health status, resulting in greater anticoagulation stability. Patients achieved higher proportions of INR values within the therapeutic range and

Table 1. Characteristics of included studies.

Author (year), country	Study design	Aim	Sample characteristics	Valve type/ site	Intervention description	Delivery mode	Intensity / Duration / Follow-up	
Hamad et al. (2008), Netherlands	RCT	To assess impact of a self-management program on INR control and QoL post-surgery.	N=62 (58 completed, 29 per group); Mean age ~56 years; both groups comparable; mixed sex (not detailed %)	Mechanical (n=58); elective aortic valve replacement	Self-management of anticoagulation using CoaguChek device after structured training (website registration, supervised exam, dosing adjustment, online reporting)	Face-to-face training + home self-testing with online platform	Training 3 weeks pre-op, supervised practice, 1-year follow-up	
Javan et al. (2019), Iran	RCT	To evaluate effects of self-management on self-efficacy and adherence in MHV pts.	N=80 (40 per group); Age 15–60; 65% female in intervention vs 42.5% in control; no significant baseline differences	Mechanical (n=80); on Warfarin ≥1-year post-surgery; anatomical site not specified	Self-management program: 2 small-group educational sessions (3–5 members, 1h each), educational booklet, weekly 10–15 min follow-up phone calls for 8 weeks	Group sessions, written material, telephone follow-up	8-week intervention, outcomes assessed post-intervention	
Jeon & Park (2015), South Korea	RCT	To assess effectiveness of a PT INR self-management program on knowledge, behavior, and INR control.	N=36 randomized; 33 analyzed (16 intervention, 17 control); Mean age ~60; mixed sex; majority unemployed; mostly mitral or aortic valve replacement	Mechanical and tissue valves (n=33); anatomical site not specified (mixed)	5-week INR self-management program: (1) individual education (40 min pre-discharge, booklet + exercise training), (2) PT INR self-monitoring weekly at home with CoaguChek XS, (3) weekly telephone counseling for 4 weeks, (4) daily self-management checklist recording	Face-to-face education, booklet, POC INR device, telephone follow-up, self-recording	5-week program; 1 pre-discharge session + 4 weeks home monitoring/calls + post-test at 5 weeks	
Jiang et al. (2021), China	RCT	To evaluate effects of a self-efficacy-based nursing intervention on medication compliance, self-efficacy, mental health, and pain in MHVR patients.	N=140 enrolled; 136 completed (70 intervention, 66 control); Mean age ~50 years; both sexes included (slightly higher proportion male)	Mechanical (n=136); aortic (n=38), mitral (n=68), multiple (n=30); post-surgery (MHVR)	Self-efficacy–based nursing program: mastery experience, vicarious experience, verbal persuasion, emotional regulation, and family support; 4 sessions from admission to day 7 post-op	Face-to-face education, counseling, family engagement	Admission through 7 days post-op; follow-up at 3 months	
Li et al. (2021), China	RCT	To assess impact of phased written health education + healthy diet on QoL, behavior, and adherence post-valve replacement.	N=130 (65 intervention, 65 control); Mean age ~54 years (range 28–75); both sexes (≈60% male)	Mechanical and bioprosthetic (n=130); aortic (n=46), mitral (n=43), multiple (n=41); some with concomitant procedures	Phased written health education + diet across 3 rehab phases (in-hospital, discharge–2 months, 2–6 months). Manuals, weekly face-to-face sessions, WeChat, group discussions, diet & exercise guidance, reminders	Written materials, face-to-face, WeChat, phone, group education	6 months follow-up; 24 structured sessions; ongoing WeChat reinforcement	
Sidhu & O'Kane (2001), United Kingdom	RCT	To evaluate feasibility, safety, and effectiveness of INR self-management in heart valve pts over 2 yrs.	N=100 randomized (51 SMA, 49 control); 34 completed SMA for 2 years; Mean age ~61 years; range 26–85; M:F ~27:24 in SMA, 19:30 in control	Mechanical (n=100); aortic (n=59), mitral (n=37), multiple (n=4)	Self-managed anticoagulation (SMA): 2 × 3h training sessions, covering coagulation, side effects, drug/diet/infection influence. Hands-on INR testing (10 tests), QC test, 10-item exam. Weekly INR self-testing, dose self-adjustment per protocol. Extra testing encouraged with changes/illness. Physician on-call.	Group training + home self-testing + written protocol	2 × 3h training; weekly self-testing; follow-up 24 months	

Legend. **α** = Cronbach's alpha; **GSES** = General Self-Efficacy Scale; **INR** = International Normalized Ratio; **KR-20** = Kuder–Richardson Formula 20; **MHV** = Mechanical Heart Valve; **MHVR** = Mechanical Heart Valve Replacement; **MMS** = Morisky Medication Scale; **PCS QoL** = Physical Component Summary of Quality of Life; **POC** = Point-of-Care; **PT** = Prothrombin Time; p: p-value; **QoL** = Quality of Life; **RCT** = Randomized Controlled Trial; **SCL-90** = Symptom Checklist-90; SF-36v2: 36-Item Short Form Health Survey version 2; **SMA** = Self-Managed Anticoagulation; **VAS** = Visual Analogue Scale; **WHOQOL-BREF** = World Health Organization Quality of Life – BREF.

	Professionals involved in intervention delivery	Comparator	Outcomes measured	Timing of outcomes	Main results	Behavior Change Techniques (BCTs)
	Thrombosis Service Center staff, Eindhoven (unspecified roles)	Conventional management by Dutch Thrombosis Service	% of INR values within therapeutic range; period of risk (days with INR out of range); Quality of Life (SF-36v2); complications/ mortality	Baseline (pre-op), 1-year post-op	Self-management group had higher % INR in range (72.9% vs 53.9%, p=0.01), shorter period of risk (22.2% vs 28.7%, p<0.001), and significant improvement in PCS QoL. No difference in complications/mortality.	Self-monitoring, feedback, patient education, goal setting
	Nurses, physicians	Usual care (no intervention)	Primary: Self-efficacy; Secondary: Medication adherence, PT, INR	Baseline, post-intervention (8 weeks)	Significant improvement in self-efficacy (118.2 vs 100.4, p<0.001), medication adherence (94.9 vs 80.8, p<0.001), PT and INR significantly higher in intervention vs control	Patient education, self-monitoring, feedback, social support
	Nurses, physicians	Usual care: brief education (10 min) + 2 follow-up phone calls (general)	Self-management knowledge (20-item tool, KR-20=0.85); Self-efficacy (13-item, ⊠=0.93); Self-management behavior (20-item, ⊠=0.84); PT INR within therapeutic range	Baseline, 5 weeks post-discharge	Intervention group showed significant improvements in knowledge, self-efficacy, and self-management behavior. Higher proportion maintained INR in therapeutic range (81.3% vs 43.8%, p=0.028)	Patient education, self-monitoring, feedback, self-recording, social support
	Nurses, physicians	Routine perioperative nursing care only	Self-efficacy (GSES); Mental health (SCL-90); Pain (VAS); Infection incidence; Medication compliance	Baseline, hospital stay, 3 months post-op	Intervention group had significantly higher self-efficacy, better mental health, lower pain, fewer infections, and higher adherence (all p<0.05)	Patient education, feedback, social support, emotional regulation, mastery experience, vicarious learning
	Nurses, physicians, nurse coordinator, dietitian	Routine health education (standard postoperative counseling and anticoagulation advice)	Medication compliance (MMS); Anticoagulant knowledge; Healthy behavior ability scale; QoL (WHOQOL-BREF)	Baseline, in-hospital, 2 months, 6 months	Intervention group showed higher compliance (≥95% vs 78–82%, p<0.01), better anticoagulant knowledge, improved behavior ability, and higher QoL scores (p<0.001)	Goal setting, written instructions, reminders, social support, feedback, self-monitoring, reinforcement
	Physicians	Conventional anticoagulation management via hospital clinic or family physician	% INR in therapeutic range; Time in therapeutic range (Rosendaal); Mortality; Morbidity (bleeding/ thromboembolic events)	Continuous INR monitoring; outcomes at 3, 6, 12, 24 months	SMA group had more INR values in therapeutic range (67.6% vs 58.0%) and higher time in range (76.5% vs 63.8%, p<0.0001). No significant difference in mortality or major morbidity.	Patient education, skills training, self-monitoring, feedback, goal setting, empowerment

longer time in range than those receiving usual care (n=3; 50%).[26,28,31]

For self-care management, interventions enhanced patients' ability to follow and adapt treatment regimens. Strategies such as education, reinforcement, and structured protocols (n=3; 50%) improved medication adherence, knowledge, and self-regulation of anticoagulant therapy.[27,29,30]

Self-care maintenance outcomes were reported less frequently (n=1; 17%) but included improved lifestyle behaviors, particularly diet and nutrition,[30] as well as better emotional regulation, increased self-efficacy, and reduced pain and psychological distress (n=3; 50%).[27–29]

Follow-up durations ranged from five weeks to two years.[31] While interventions demonstrated feasibility and effectiveness, several studies highlighted challenges in sustaining long-term self-care behaviors in the absence of ongoing support and resources.

Discussion

The aim of this systematic review was to examine the characteristics and outcomes of self-care interventions for patients undergoing cardiac valve replacement, using Riegel's Middle-Range Theory of Self-Care as a guiding framework.[16] Overall, the findings indicate that self-care interventions, particularly those focusing on INR self-monitoring and anticoagulation management, were associated with significant clinical, behavioral, and psychosocial benefits. These included greater INR stability, fewer thromboembolic and hemorrhagic complications, improved medication adherence, enhanced self-efficacy, and better quality of life. Across studies, interventions predominantly addressed self-care monitoring and self-care management, whereas self-care maintenance behaviors, such as physical activity, dietary support, and psychosocial well-being, were less frequently incorporated. This imbalance underscores the need to expand intervention content beyond anticoagulation management to reflect the multidimensional trajectory of recovery after valve surgery.

To our knowledge, this is the first systematic review to adopt a theory-driven perspective in analyzing self-care interventions after valve replacement. By mapping intervention components to the three dimensions of Riegel's theory, self-care maintenance, monitoring, and management, this review offers a structured and conceptually grounded understanding of existing programs. The novelty of this approach lies in identifying both the strengths of current practice, namely strong integration of monitoring and management, and its shortcomings, particularly the underrepresentation of maintenance behaviors.

A central and consistent finding was the emphasis on INR self-monitoring and treatment management. All included studies required patients to monitor anticoagulation values, with several also supporting dose adjustments through structured education or digital tools. These strategies are effective because they directly address a critical clinical risk in this population. Evidence from broader anticoagulation research confirms that self-monitoring improves time in therapeutic range and reduces adverse events.[32,33] Our findings reinforce that interventions tightly linked to measurable clinical outcomes are most likely to demonstrate benefit.

In addition to clinical stability, several trials demonstrated improvements in psychosocial and behavioral outcomes. Patients participating in structured self-care interventions reported enhanced self-efficacy, better adherence, and improved emotional well-being, including reduced anxiety and greater stress management. These outcomes are consistent with the reinforcing mechanisms described in the self-care literature, where higher self-efficacy fosters adherence, and better emotional regulation supports sustained engagement in daily self-care.[34,35] Interventions that combine psychological support with disease management appear particularly effective, acting through multiple, mutually reinforcing pathways.

In contrast, self-care maintenance was notably less emphasized, with only a minority of interventions including lifestyle modification, dietary counseling, or psychosocial support. This gap is important because maintenance behaviors are known to improve long-term outcomes yet remain underrepresented in current programs. International guidelines highlight lifestyle modification, structured education, and long-term follow-up as essential components of post-surgical car.[36,37] Similarly, strong evidence supports exercise-based cardiac rehabilitation in improving functional capacity, reducing rehospitalization, and enhancing quality of life.[38]

Emerging models, including telemonitoring and technology-supported rehabilitation, further strengthen the case for embedding maintenance behaviors into standard self-care interventions, particularly for minimally invasive procedures such as Transcatheter Aortic Valve Implantation (TAVI).[39,40]

The structural design of interventions also warrants attention. Most programs relied on face-to-face, individual sessions delivered by nurses or physicians, with limited involvement of psychologists, dietitians, or physiotherapists. Yet recovery after valve surgery is shaped by physical, psychological, and lifestyle factors that require multidisciplinary expertise. Interdisciplinary approaches are therefore better positioned to meet the full spectrum of recovery needs. Moreover, group sessions and telehealth formats were rarely implemented, despite evidence that these models enhance accessibility, foster peer support, and increase scalability in chronic disease management.

The application of BCTs was inconsistent. Education, feedback, and goal setting were frequently used, but few interventions applied structured behavior change frameworks. This limits impact, as theory-based strategies such as the COM-B model or Behavior Change Wheel have been shown to strengthen motivation, capability, and opportunity, thereby improving the sustainability of behavioral change.[41] Similarly, while self-monitoring was universally included, practical training with point-of-care devices such as the CoaguChek S was inconsistently offered, despite evidence that hands-on training enhances competence and adherence.[42]

Other critical health outcomes were seldom addressed. Symptom monitoring of vital parameters such as heart rate or blood pressure, crucial for early detection of deterioration, was rarely included. Likewise, psychological recovery received limited attention, despite its strong association with morbidity and quality of life in cardiac populations.[43] Neglecting these dimensions reduces the scope and potential durability of current interventions.

Finally, none of the included studies evaluated cost-effectiveness or economic sustainability, despite the considerable expense associated with long-term use of self-monitoring devices, test strips, and follow-up care. Previous research highlights the importance of economic evaluation in scaling effective self-care programs.[33] The absence of such analyses limits the translation of promising findings into practice. Follow-up periods also varied widely, from weeks to years, complicating the assessment of long-term value. Standardized longitudinal designs with consistent outcome measures are needed to clarify durability and identify which program components best sustain benefits.

In summary, this review highlights both the promise and limitations of self-care interventions for valve replacement patients. Evidence supports their effectiveness in improving anticoagulation control, adherence, and psychosocial outcomes, but programs remain narrowly focused on monitoring and management while underemphasizing maintenance behaviors, multidisciplinary input, and economic sustainability. Future interventions should adopt comprehensive, theory-driven designs that integrate clinical, behavioral, and psychosocial domains, apply structured behavior change frameworks, and evaluate cost-effectiveness through rigorous long-term trials. Such approaches will provide more reliable, generalizable evidence and guide scalable, patient-centered models of care.

Implications for practice and research

The findings of this review have relevant implications for both clinical practice and future research. In practice, structured self-care interventions should be integrated into standard postoperative care for patients undergoing valve replacement, with education, competency-based training, and long-term follow-up as essential components. Nurses and multidisciplinary teams are well positioned to deliver these programs, while caregiver involvement should also be prioritized to sustain adherence and daily self-care behaviors.[44,45] From a research perspective, future studies should focus on standardized, theory-based interventions that address all three self-care dimensions, moving beyond the predominant emphasis on anticoagulation monitoring. The use of validated instruments, such as adaptations of the Self-Care of Heart Failure Index, would improve methodological rigor and comparability.[46] Research priorities include longitudinal trials with economic evaluations, the testing of digital health solutions to enhance scalability, and multicenter designs with standardized outcomes

to strengthen generalizability.

Strengths and limitations

This review has several strengths, including the use of Riegel's Middle-Range Theory of Self-Care as a guiding framework, which allowed a structured and conceptually coherent synthesis, and a comprehensive literature search strategy that maximized identification of relevant studies. To our knowledge, it is also the first review to focus specifically on self-care interventions after valve replacement surgery. However, limitations must be acknowledged. The substantial heterogeneity in study design, intervention content, duration, and follow-up hindered comparability and precluded meta-analysis, while incomplete reporting and reliance on self-reported outcomes increased the risk of bias. Methodological weaknesses, such as insufficient details on randomization, lack of blinding, and absence of protocol registration, further reduce certainty. Restriction to English-language full-text articles may have introduced selection bias, and critical areas such as lifestyle behaviors, psychological recovery, and cost-effectiveness were rarely addressed. Together, these issues limit the generalizability of the findings and highlight the need for more rigorous, theory-driven, and multidimensional research in this field.

Conclusion

Self-care interventions after valve replacement surgery appear effective in improving INR stability, reducing complications, and enhancing psychosocial outcomes such as self-efficacy and quality of life. However, considerable variability in intervention duration, frequency, and delivery methods limits the generalizability of findings. A more standardized and multidimensional approach, integrating psychological support, lifestyle counseling, remote monitoring, and broader clinical parameter tracking, may optimize patient outcomes and ensure continuity of care. Future research should adopt homogeneous study designs, evaluate long-term feasibility and cost-effectiveness, and explore the role of digital health tools to support self-management. Addressing both economic and behavioral dimensions will be essential for sustainability, while structured involvement of patients, families, and multidisciplinary teams remains central to achieving lasting benefits across recovery and follow-up.

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