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Knowledge–Attitude–Practice-Oriented Health Education Improves Psychological Health and Self-Efficacy in Patients with Coexisting Cerebrovascular and Coronary Disease

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Abstract

This study was designed to investigate the influence of health education grounded in the knowledge, attitude, and practice model on individuals suffering from cerebrovascular stenosis combined with coronary heart disease who underwent concurrent interventional treatment. A total of sixty patients diagnosed with cerebrovascular stenosis accompanied by coronary heart disease and admitted to The Third People's Hospital of Hubei Province between February 2019 and April 2021 were enrolled in the research. These participants were randomly allocated into two equal groups: a control group (n = 30) and an intervention group (n = 30). While the control group received conventional nursing care, the intervention group received structured health education based on the knowledge, attitude, and practice framework. The two groups were then compared with respect to their satisfaction levels, anxiety, depression, as well as knowledge, attitude, and practice scores.

Patients in the intervention group reported markedly greater satisfaction than those in the control group. Moreover, the intervention group demonstrated significantly better self-efficacy and exhibited lower levels of anxiety and depression at discharge, 1 month post-discharge, and 3 months post-discharge. In addition, the intervention group obtained substantially higher knowledge, attitude, and practice scores across all three assessment time points compared with the control group ($P < 0.05$). These outcomes indicate that applying the knowledge, attitude, and practice model to patients with cerebrovascular stenosis and coronary heart disease can substantially improve their psychological status, strengthen self-efficacy, and deepen their comprehension of the condition.

Keywords: Health education, Psychological health, Self-efficacy, Patients

Introduction

Cardiovascular diseases remain the number one killer around the world [1], taking the lives of over 17 million people each year. Among them, coronary heart disease (CHD) is the most widespread form, affecting 6.8% of American adults [2]. Thanks to major advances in medical care and prevention, deaths from CHD have declined noticeably; however, many survivors still need ongoing guidance and training after a cardiac episode to control risk factors tied to their daily habits [2, 3]. Despite the enormous toll these illnesses take, most people still know surprisingly little about cardiovascular conditions. Chief contributors include sedentary living, smoking and drinking, and diets high in unhealthy foods [4, 5].

Those suffering from cardiovascular diseases frequently struggle with serious emotional and psychological issues. Since these disorders can threaten life itself, patients are forced to make swift and significant changes to their routines if they hope to recover or stabilize their health [5]. Self-care—the deliberate efforts individuals make to protect and strengthen their well-being—is therefore essential. The American Heart Association strongly

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urges several key changes: quitting tobacco, scheduling regular medical visits, sticking to prescribed drugs, choosing nutritious meals, staying physically active, and keeping body weight in check, all aimed at avoiding repeat heart events. Yet in practice, patients' follow-through with these recommendations tends to fade over months [6].

Right after surgery, many begin following self-care recommendations, but most see their commitment slip substantially by the 6-month mark. Although self-care is undeniably important, it is rarely given the attention it deserves. Targeted patient education helps individuals become active partners in their recovery and learn how to handle their illness more confidently. The World Health Organization highlights patient education as one of the most effective ways to boost engagement in long-term disease control. The best programs draw on proven behavior-change theories and well-chosen teaching methods to address core influences, such as knowledge gaps, personal beliefs, and social pressures, that shape self-care success in cardiovascular patients [6].

In patient education, medical staff provide clear, useful information so that individuals can improve their daily health choices and overall condition [7]. Better-informed patients are far more able to recognize warning signs and track their own progress. Interventions led by nurses have proven helpful in raising disease understanding, strengthening health literacy, and motivating positive lifestyle shifts [8].

Living with coronary heart disease often leads to mental health problems because of the constant effort required to manage the condition. Shifting toward healthier habits is vital, yet many patients battle depression, anxiety, or ongoing stress when they hit roadblocks. Regrettably, very few dedicated programs exist to support these emotional needs. On top of that, inadequate social backing is common, even though it plays a major role in successful disease management. Many healthcare workers themselves feel underprepared to offer high-quality psychological care to people with heart conditions [5].

Altering daily habits stands at the heart of effective cardiovascular disease control. Factors such as knowledge levels, personal attitudes, actual practices (KAP), available social support, and unique individual traits all affect how readily people adopt healthier routines. The KAP model offers a straightforward and practical roadmap for driving these changes. Once caregivers understand the mental and emotional drivers of behavior, they can provide more targeted support that encourages lasting adoption of healthy lifestyles [9].

The knowledge, attitude, and practice (KAP) model serves as a structured rehabilitation tool that enables clinicians to closely examine patients' thoughts and behaviors. By exploring their level of understanding, outlook, and real-world behaviors, professionals can help patients spot unhelpful patterns, question deeply held assumptions, and rebuild healthier thought processes. With this goal in mind, the present study set out to test the value of pairing the KAP model with motivational interviewing to refine and strengthen health education for women living with coronary heart disease [8].

In earlier work, Kang *et al*. [8] reported strong benefits when the KAP model was combined with motivational interviewing for patients with systemic lupus erythematosus (SLE). That project led to better treatment compliance and greater confidence in disease self-management [8]. Likewise, Xiong *et al*. [9] demonstrated that the KAP approach performed well for complex disorders, such as acute pancreatitis and metabolic syndrome. It encouraged healthier daily habits, reduced complications, and improved adherence, indicating the model's broad usefulness across many medical situations [9].

Cardiovascular diseases pose one of the greatest challenges to global public health and call for care plans that tackle both the body and the mind. When cerebrovascular stenosis occurs together with coronary artery disease, the difficulties multiply for patients. Education programs grounded in the Knowledge, Attitude, and Practice (KAP) framework appear especially promising for protecting patients' mental health. By deepening knowledge and building self-confidence, these programs can reduce complications, increase overall satisfaction, and give patients the tools they need to take charge of their recovery.

Materials and Methods

Study design, setting, and participants

This quasi-experimental trial recruited patients with cerebrovascular stenosis and CHD from the Department of Cardiovascular Medicine at Hubei Provincial Third People's Hospital, an affiliated hospital of Jianghan University, China. Participants had to meet the following inclusion criteria: (1) between 18 and 80 years of age, (2) confirmed diagnosis of cerebrovascular stenosis combined with CHD via full cerebral angiography and

coronary angiography, showing asymptomatic cerebrovascular stenosis of at least 70% or symptomatic stenosis of at least 50%, plus coronary artery narrowing of 70% or more; angina symptoms were disregarded, but TIMI grade was limited to 1 or 2, (3) imaging confirmed that both the cerebral and cardiac stenoses were suitable for interventional treatment, and after detailed pre-procedure discussion it was agreed that a combined interventional approach would be appropriate, (4) left ventricular ejection fraction (LVEF) measured at 30% or higher. Patients were excluded if they had: (1) any other major brain or heart disorders, (2) medical conditions in other organs or systems that ruled out surgery, (3) active severe bleeding or a recent history of hemorrhagic illness, or (4) any contraindications to the planned interventional procedures. A power calculation conducted with G*Power (power = 80%, P = 0.05, two groups, four repeated measurements) indicated that 54 participants would be needed to detect a medium effect size of 0.4. Ultimately, 60 suitable patients were enrolled and randomly assigned to two equal groups of 30 each.

Data collection and intervention

Participants were randomly divided into two arms—the intervention group (n = 30) or the control group (n = 30)—through a computer-generated random number sequence. An independent researcher who had no role in delivering the intervention or collecting data performed the randomization. This step was taken to reduce selection bias and safeguard the overall fairness of the trial **(Figure 1)**.

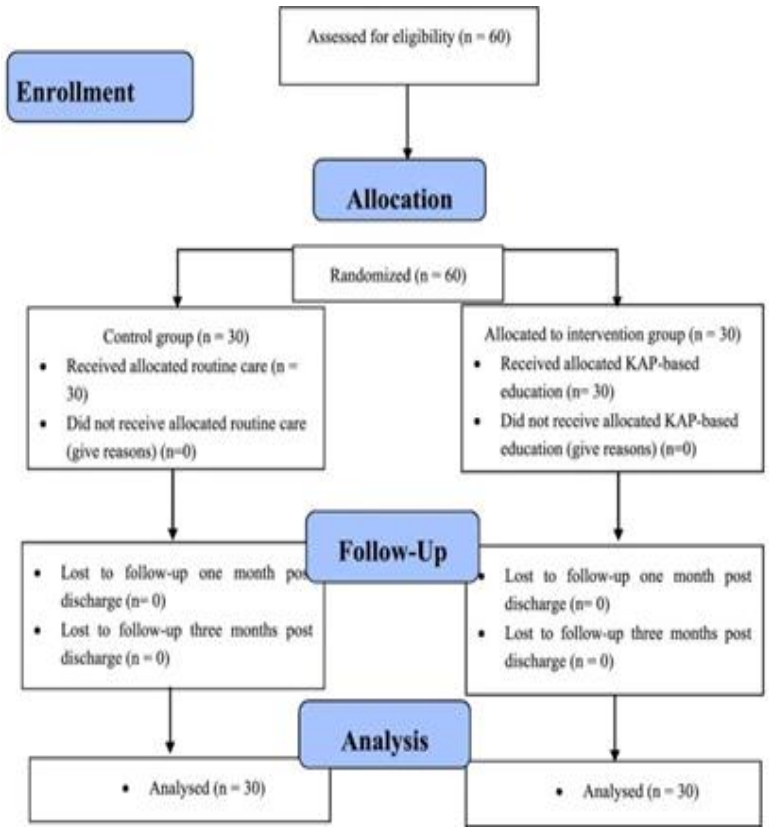


Figure 1. Flow chart of the study.

Control group

On admission, every patient received standard medical care that included oral drug therapy, dual antiplatelet treatment, and statin medication. This regimen involved daily evening doses of enteric-coated aspirin tablets (100 mg), clopidogrel sulfate tablets (75 mg), and rosuvastatin calcium tablets (10 mg), and was continued for at least 5 days [10]. Blood tests were performed to evaluate the patient's status, and appropriate symptomatic relief was given when required. High-risk elements were actively managed, blood pressure was kept around 120–140/60-90 mmHg, and a definitive

diagnosis supporting combined treatment was confirmed. Neurosurgeons and cardiologists worked together to create a personalized surgical strategy. A comprehensive care plan was prepared that accounted for pre-procedure preparation, exact treatment locations, risk evaluation, and perioperative care. An experienced neurosurgeon, together with a cardiologist, performed the combined procedure. Access was gained via the femoral artery using the Seldinger technique, and the interventions followed a standard sequence. Cerebral protection devices were used during carotid artery stenting (CAS) to reduce the risk of complications. Systemic heparinization, along with Tirofiban, was given to prevent stroke, starting with an intravenous bolus of 10–25 μg/kg, followed by a continuous infusion of 0.15 μg/(kg·min) [11]. After the operation, patients received fluid replacement consisting of 1,000 mL of crystalloid solution and 1,000 mL of colloid solution to help clear the contrast agent. Low-molecular-weight heparin was used for anticoagulation over the next 3 days. Dual antiplatelet therapy and statins were continued for up to 3 months postoperatively. Blood pressure was tightly regulated within the target range, with additional antihypertensive drugs added as needed. Regular follow-up assessments were arranged.

For patients admitted urgently for percutaneous coronary intervention (PCI), the control group followed conventional cardiology management. They provided written informed consent and completed the study questionnaires. Healthcare team members delivered structured guidance covering several areas, including:

• Disease education: Delivering clear information on acute myocardial infarction (AMI), proper medication use, quitting smoking, and the advantages of cardiac rehabilitation programs.
• Post-operative education: Carrying out a second round of health teaching to encourage adoption of healthier daily habits, better control of risk factors, and active involvement in rehabilitation activities.
• Discharge guidance: Supplying details about scheduled follow-up appointments, continued rehabilitation after leaving the hospital, and providing a discharge instruction booklet.
• Post-discharge follow-up: Conducting periodic checks on patient progress and offering ongoing advice as needed.

Intervention group

Drawing on the knowledge, attitude, and practice model, the intervention group received a tailored health education initiative. The specific steps carried out were as follows:

In-hospital intervention program

The purpose, procedures, and content of the study were clearly explained to the patient and their family members. Written informed consent was obtained, and full cooperation was secured. A baseline questionnaire was administered once the patient was medically stable and showed no signs of worsening condition. Details of the health education and training schedule are presented in **Table 1**.

Table 1. Summary of the intervention program based on the KAP model.

Phase	Program component	Sessions/Time point	Content description
	Education	First session	Introduced the pathophysiology and etiological factors of AMI, cardiac function, post-PCI activity guidance, pharmacological knowledge, and the advantages of cardiac rehabilitation. A health education manual was provided, covering cardiac anatomy, common cardiovascular diseases, rehabilitation prescriptions, and cardiopulmonary resuscitation training. A WeChat group was used to deliver continuous health education and distribute an acute coronary syndrome follow-up handbook.
		Second session	Emphasized lifestyle modification strategies, such as reducing prolonged sitting, smoking cessation, adopting a balanced diet, and maintaining psychological well-being. Continued health education through a WeChat group, along with the dissemination of the acute coronary syndrome follow-up manual.
		Third session	Focused on post-discharge management, including medication adherence, scheduled follow-up visits, self-monitoring of blood

In-hospital intervention program			pressure and heart rate at home, and home-based rehabilitation practices. Ongoing health education and distribution of the acute coronary syndrome follow-up guide via WeChat group.
	Practice	During hospitalization	Patients were encouraged to reflect on healthy lifestyle behaviors and identify the personal motivations behind their daily habits. Guidance was provided on rehabilitation exercises and heart rate self-monitoring; sedentary individuals were advised to engage in at least 30 minutes of daily physical activity. Smoking cessation support was offered to smokers, including resources and behavioral assistance, while non-smokers were advised to avoid exposure to secondhand smoke. Patients experiencing anxiety or depressive symptoms were encouraged to use self-regulation strategies such as music listening or reading to support emotional balance and healthier living patterns. These interventions aimed to reshape patient perceptions and strengthen belief in healthy living, thereby encouraging sustained health-promoting behaviors after recovery.
Out-of-hospital intervention program	**Education**	Weekly (up to 3 months post-discharge)	Weekly educational content was delivered via videos, text messages, and slide presentations covering topics such as cardiac rehabilitation prescriptions, healthy dietary practices, physical exercise, management of coronary stents, blood lipids, and glucose levels, post-myocardial infarction emotional state and sleep quality, medication adherence, smoking cessation, and returning to work.
	Practice	Weekly (up to 3 months post-discharge)	Individualized dietary planning based on patient habits and needs, with emphasis on controlling sugar and fat intake in hypertensive patients, improving lipid and glucose management, and strengthening dietary self-management skills; exercise programs were tailored according to personal preferences and health conditions. Encouragement of regular monitoring of daily activity and work patterns, promoting at least 4–5 exercise sessions per week. A WeChat-based peer support group was used to facilitate mutual supervision and encouragement, along with guidance on a gradual return to work, depending on job type and workload. Continuous assessment of self-management in hypertension, smoking, and hyperglycemia was conducted, with reinforcement of effective behaviors and targeted intervention for inadequate risk factor control.

Out-of-hospital intervention program

Health knowledge, education, and training activities were extended for 3 months following discharge from the hospital. Patients were encouraged to raise any questions they had, with dedicated response sessions scheduled on Wednesdays and Fridays. Extra guidance was offered during follow-up outpatient visits. Questionnaires were distributed at the one- and three-month points to track progress, after which customized health education was provided based on the survey results. Moreover, several additional tactics were applied to reinforce positive health beliefs and stimulate beneficial behavioral shifts:

· Regularly scheduled health education: Useful health-related material was distributed through a dedicated WeChat group, with topics tailored to each patient's schooling background and comprehension ability.

· Informative videos and real-life clinical examples: These materials helped build deeper insight and delivered hands-on, applicable knowledge.

· Peer support: Individuals who had managed to stop smoking were asked to recount their personal journeys and motivate fellow group members.

· Psychological concerns: Emphasis was placed on helping out-of-hospital patients cope with issues such as anxiety, depression, and other emotional difficulties.

· Building confidence: Activities aimed at increasing patients' belief in their capacity to change harmful habits and equipping them with skills to uphold healthy routines over the long term **(Table 1)**.

Measures

Based on an extensive review of published studies and consultations with specialists, a 10-item survey was developed to assess patients' satisfaction with their care. The questions fell into four response categories: very pleased, pleased, general, and displeased. Overall satisfaction was computed by combining the percentages for the very satisfied, satisfied, and normal categories.

The Chinese childbirth self-efficacy inventory (CBSEI-C32) is a reliable and well-validated scale for assessing childbirth self-efficacy. It features two separate subscales: outcome expectancy (OE-16) and self-efficacy expectancy (EE-16). Both subscales use a Likert scale from 1 to 10. For the OE-16 subscale, a rating of 1 denotes that the item offers no help at all, while 10 indicates it is extremely helpful. On the EE-16 subscale, 1 indicates complete doubt, and 10 represents firm confidence. The full CBSEI-C32 score ranges from 32 to 320, with higher scores indicating stronger self-efficacy. This inventory demonstrates strong internal consistency, as evidenced by a Cronbach's α of 0.96. It further shows robust test–retest reliability (0.85) and solid construct validity (0.85). There is also a notable correlation of 0.85 linking the EE-16 and OE-16 subscales [12, 13].

The self-rating anxiety scale (SAS) consists of 20 items and is designed to measure the intensity of anxiety symptoms. Items are rated on four levels according to how frequently the symptoms appear. A score of 1 corresponds to little or no occurrence, 2 to occasional occurrence, 3 to frequent occurrence, and 4 to nearly constant occurrence. Of the 20 items, five specific ones [5, 9, 12, 14, 15] receive reverse scoring from 4 down to 1, whereas the other items are scored normally from 1 to 4. The preliminary total is found by summing all item scores, multiplying the sum by 1.25, and rounding the result to the closest integer. Final scores range from 25 to 100. Results below 50 point to an absence of anxiety, 50 to 59 suggest mild anxiety, 60 to 69 indicate moderate anxiety, and anything above 69 signals severe anxiety. The SAS enjoys broad acceptance as a self-administered tool for capturing anxiety. It encompasses four main symptom clusters: motor, autonomic, cognitive, and central nervous system manifestations. Typical items capture everyday anxiety signs, for instance, "I feel more tense and anxious than usual, and my hands are numb or tingling." Five items among the twenty are phrased in the negative direction. Ramirez and Lukenbill [16] noted excellent internal consistency for the SAS, with a reliability coefficient of 0.80. Research conducted by Pang *et al*. [17] indicated a Cronbach's alpha of 0.78 and a split-half reliability coefficient of 0.75 for the Chinese adaptation of the SAS.

The self-rating depression scale (SDS) functions as an assessment tool for determining the degree of depressive symptoms. This 20-item scale organizes responses into four frequency-based categories. A rating of 1 reflects almost no time spent experiencing the symptom, 2 a small portion of time, 3 a large portion of time, and 4 most or all of the time. Ten particular items [2, 5, 6, 10, 11, 13, 14, 17–19] are reverse-scored from 4 to 1, while the rest follow standard 1-to-4 scoring. The initial score is derived by totaling all responses, multiplying by 1.25, and rounding to the nearest whole number. Scores on this scale range from 20 to 80. Various investigations have confirmed that the SDS possesses acceptable internal consistency reliability, with Cronbach's alpha coefficients ranging from 0.68 to 0.87; one Chinese study specifically reported an alpha of 0.84. These results support the SDS as a dependable instrument for depression assessment.

The knowledge, attitude, and practice level evaluation scale was originally developed by Tong Shen *et al*. [19] to assess patients' understanding, beliefs, and actual behaviors related to health education efforts. The KAP questionnaire applied in the current research contains 45 items spread across three core sections: the knowledge section (20 questions) probes awareness of healthy living habits, cardiovascular conditions, and available treatments; the attitude section (13 questions) investigates patients' viewpoints regarding heart-related wellness; and the practice section (12 questions) gauges how closely individuals follow recommended health actions and make real behavioral adjustments. Answers were collected using a 4-point Likert scale. Affirmative replies earned a score of 1, while unfavorable replies earned 0. This binary-style scoring makes data processing straightforward and enables outcomes to be presented as percentages. The survey also includes items exploring patients' financial concerns and their use of publicly funded initiatives such as Medisave and Medishield.

Both English and Chinese versions of the questionnaire exist. A small-scale pilot trial helped confirm that the wording was clear and consistent. Shen *et al*. [19] had already verified the tool's validity and reliability in prior work. This scale is useful for identifying variations in knowledge, attitudes, and practices linked to gender and cultural background among those with cardiovascular

disease, and the insights gained can guide the creation of more precise, patient-centered health education strategies [19].

Statistical analysis

Two researchers entered the collected information into Excel spreadsheets and performed all statistical analyses using SPSS version 20.0. No data were missing. Percentages and proportions were used for categorical variables, while the chi-square test was used to analyze grouped data. General participant characteristics were summarized using descriptive statistics expressed as mean ± standard deviation. Following a normality assessment, independent-samples t-tests compared differences between the control and intervention arms, whereas paired-samples t-tests examined changes within each group from pre- to post-intervention. A repeated-measures ANOVA was used to analyze scores collected at multiple time points before and after the intervention. Index variations across various time intervals were tracked, and Mauchly's test of sphericity evaluated whether the sphericity assumption held. When sphericity was satisfied, the F-test results required no adjustment. When sphericity was violated, the Greenhouse–Geisser correction was implemented to modify the degrees of freedom. A significance threshold of $\alpha = 0.05$ was established, with P-values below 0.05 interpreted as statistically meaningful.

Results and Discussion

This investigation enrolled 60 patients with cerebrovascular stenosis and CHD, with recruitment between February 2019 and April 2021. Participants were randomly assigned to either the control or intervention arm. Within the control arm, there were 18 males and 12 females, with an average age of 65.45 ± 3.78 years. In the intervention arm, the group included 13 males and 17 females, with an average age of 65.44 ± 3.56 years. Baseline characteristics revealed no statistically meaningful differences between the two arms ($P > 0.05$).

Comparison of nursing satisfaction

The intervention arm achieved a 100.00% satisfaction rate, with 20 cases rated very pleased, 8 pleased, and 2 normal. By contrast, the control arm recorded a satisfaction rate of 83.33%, with 14 cases rated very pleased, 6 pleased, 5 normal, and 5 displeased. Overall, nursing satisfaction levels proved markedly higher in the intervention arm than in the control arm ($P < 0.05$).

Comparison of self-efficacy scores

Before any intervention, self-efficacy scores displayed no meaningful difference between groups ($P > 0.05$). Following the intervention, however, the intervention arm recorded noticeably higher self-efficacy scores compared with the control arm ($P < 0.05$) **(Table 2)**.

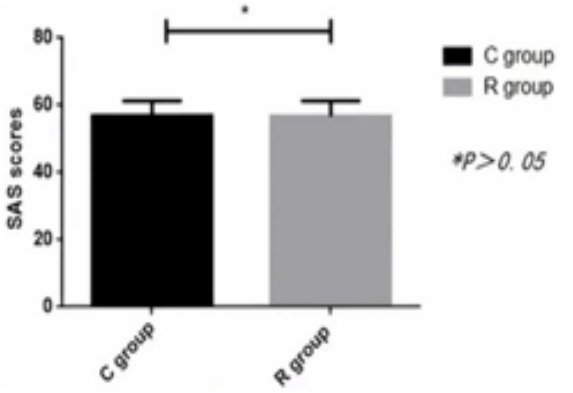
Table 2. Comparison of self-efficacy scores [± s, points].

Group N	EE-16		OE-16	
	Before nursing	**After nursing**	**Before nursing**	**After nursing**
Control group 30	112.59 ± 14.67	116.94 ± 10.33	122.49 ± 12.34	132.92 ± 15.44
Research group 30	112.49 ± 14.67	126.49 ± 10.89	122.77 ± 12.43	141.86 ± 15.49
t	0.026	3.484	0.087	2.238
Effect size	0.007	0.899	0.023	0.578
P	> 0.05	< 0.01	> 0.05	< 0.01

Abbreviations: OE = outcome expectancy; EE = self-efficacy expectancy.

SAS score comparison

SAS scores showed no meaningful difference between groups before the intervention. Nevertheless, the intervention arm showed clear reductions in SAS scores at hospital discharge, 1 month after discharge, and 3 months after discharge **(Figures 2a–2d)**.



a)

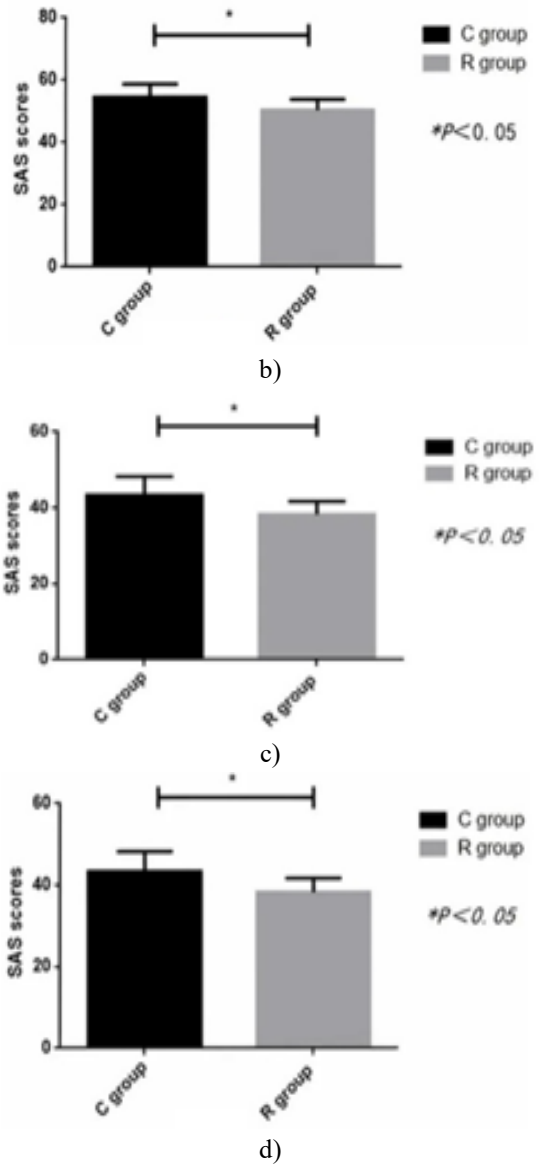


Figure 2. Comparison of the self-rating anxiety scale (SAS) score between the two groups: (a) before the intervention, (b) at the time of hospital discharge, (c) 1 month after hospital discharge, and (d) 3 months after hospital discharge.

SDS score comparison

Before the intervention, SDS scores revealed no notable differences across groups. After the intervention, the intervention arm displayed lower SDS scores at discharge, 1 month post-discharge, and 3 months post-discharge. All relevant data appear in **Table 3**.

Table 3. Comparison of self-rating depression scale scores [± s, points].

Group	N	At discharge	Baseline (before nursing)	3 months post-discharge	1 month post-discharge
Control group	30	59.19 ± 2.45	62.59 ± 3.66	45.29 ± 5.54	51.39 ± 3.34
Intervention (research) group	30	52.93 ± 3.31	62.48 ± 3.74	38.19 ± 2.45	44.19 ± 3.35
t-value	—	8.326	0.115	6.419	8.336
Effect size	—	2.366	0.030	1.657	2.152
P-value	—	< 0.01	> 0.05	< 0.01	< 0.01

Comparison of knowledge, attitudes, and practice scores

Before the intervention, knowledge, attitude, and practice scores showed no significant differences between groups ($P > 0.05$). After the intervention, however, the intervention arm achieved substantially higher scores at discharge, 1 month after discharge, and 3 months after discharge ($P < 0.05$) **(Figure 3)**.

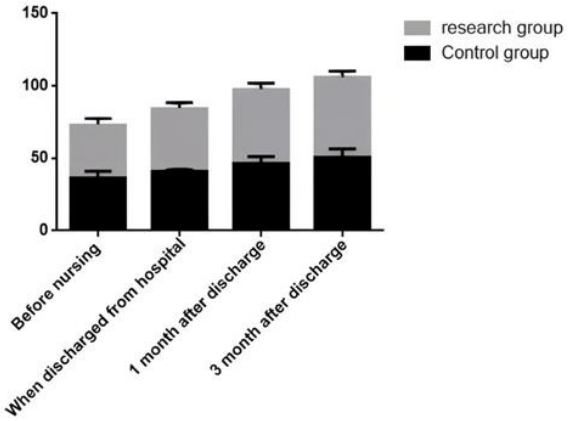


Figure 3. Comparison of knowledge, attitude, and practice scores between the two groups at different times.

This research showed that incorporating the KAP model into health education led to notable gains in the psychological health of individuals dealing with cerebrovascular stenosis combined with coronary artery disease. Levels of anxiety and depression dropped, and self-efficacy rose. These outcomes not only validate the influence of structured teaching on patients' understanding and awareness but also highlight the importance of thorough, well-organized educational strategies. Stronger self-care habits and firmer health beliefs emerged as central benefits, which in turn

supported greater treatment compliance and fewer complications.

The present work highlighted the program's beneficial effects on patients' sense of self-efficacy. These gains mirror earlier investigations into online learning resources for handling long-term illnesses. One earlier project noted that raising awareness and supplying practical resources can markedly strengthen self-efficacy [20]. The current findings align with a systematic review of teaching strategies to boost self-efficacy among people with coronary heart disease. That overview stressed the advantages of combining several methods, such as face-to-face meetings, electronic resources, peer groups, and printed materials. It further noted that digital aids such as smartphone applications and reminder systems help maintain ongoing commitment to therapy. Taken together, the evidence supports using the KAP framework alongside individualized teaching methods and group-based support to enhance patients' confidence, drive, and consistency in following recommendations [21]. In addition, the current study observed clearer improvements in patients' daily self-care actions. These observations align with previous reports showing that teaching efforts can increase adherence to prescribed regimens and reduce the risk of postoperative complications. Li *et al*. [20] underlined the advantages of multi-component teaching strategies for empowering patients. Earlier work has also shown that regular, close contact between nurses and patients can increase adherence and self-assurance among those recovering from coronary artery bypass grafting [22]. Moreover, the KAP model prompts patients to play a more proactive role in managing their condition by deliberately acquiring self-management skills, often resulting in superior problem-solving compared with conventional nursing support alone [23].

The marked drop in anxiety and depression observed in the intervention arm matches findings from studies that tested internet-based teaching programs for people with cardiovascular conditions. Such research indicates that delivering focused information and emotional backing can ease patients' worries [20]. Individuals preparing for or recovering from coronary artery bypass grafting frequently report anxiety and apprehension both before and after the operation [24]. This reality underlines the relevance of the present investigation, since unmanaged anxiety can negatively affect recovery. The outcomes here are consistent with those reported by Hoseini *et al*. [25], who demonstrated that structured teaching can lessen anxiety and depression in cardiac patients. Their project achieved lasting reductions in emotional distress among patients undergoing coronary artery bypass grafting by using audio recordings as an affordable teaching tool. This supports the usefulness of combining various educational resources to promote better mental health [25]. Similarly, Aghakhani *et al*. [26] reported that teaching programs for patients after myocardial infarction led to clear reductions in anxiety and depression symptoms.

Work by Kang *et al*. [8] likewise showed that integrating the KAP model with motivational interviewing was useful for refining health education and managing ongoing conditions such as lupus. The combined approach not only improved patients' willingness to follow treatment but also strengthened their capacity to handle their illness [8]. Many people facing heart surgery feel anxious and fearful both before and after the procedure. Because hospital stays are often brief, patients cannot realistically absorb all the required information and abilities from nursing staff during admission [20]. This situation often creates a care gap upon patients' return home, leaving them and their families feeling unsupported, particularly in remote regions with limited healthcare access [27]. Consequently, gaps in understanding and insufficient ongoing professional guidance tend to impose a heavy emotional load on most individuals living with heart conditions [28]. Studies by Jin *et al*. [29] and Ma *et al*. [30] have proposed that combining family-centered nursing with online support networks and specialized care plans can meaningfully improve recovery and ease negative emotions in patients after coronary artery bypass grafting.

Drawing on KAP theory, individuals who receive tailored information about their condition are more likely to develop stronger self-management skills, gain confidence, and successfully translate that knowledge into beneficial daily health actions [23, 31].

Work by Lindasay and Michie [32] reported high internal consistency ($\alpha = 0.92$) when used with individuals with intellectual disabilities.

Limitations

Although the findings are encouraging, this research has several constraints, including a modest sample size, a focus on one geographic region, and a relatively brief follow-up window, all of which may limit the extent to which the results can be applied. Subsequent investigations should recruit larger, more diverse

participant groups, extend the observation period to evaluate lasting effects, and examine how factors such as age, gender, clinical condition, and socioeconomic background influence outcomes. In addition, direct comparisons between the KAP model and alternative teaching methods, along with assessments of cost-effectiveness, would yield a deeper understanding of its role in healthcare delivery. The study was also conducted at a single hospital in China, further limiting the ability to generalize the results to other environments or patient populations. Additional work across different geographic and cultural settings is therefore recommended.

Implications of the study results

The outcomes of this research suggest that the KAP model can successfully enhance patients' self-efficacy and simultaneously lower anxiety and depression. These insights provide a useful basis for developing uniform teaching programs focused on chronic illness care. Possible practical steps include creating hospital-based teaching sessions, building digital platforms for ongoing patient learning, and improving communication between nurses and patients. Beyond that, the findings may help lower overall healthcare expenses and increase the effectiveness of service delivery systems.

Conclusion

The findings indicate that using the Knowledge, Attitude, and Practice (KAP) Model among patients with cerebrovascular stenosis and coronary heart disease is associated with better psychological health, greater self-efficacy, and greater understanding of the disease. Nevertheless, due to potential biases and other influencing factors, a clear cause-and-effect relationship cannot be definitively confirmed.

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Conflict of Interest: None

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Ethics Statement: The studies involving humans were approved by the Hubei Provincial Third People's Hospital, affiliated with Jianghan University of Cardiovascular Medicine, China. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

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