

# Summary of Best Evidence to Address Kinesiophobia Post Percutaneous Coronary Intervention: An Evidence-Based Review

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**Objective:** The objective of this study is to systematically explore and summarize the best evidence on intervention programs for patients with kinesophobia following percutaneous coronary intervention (PCI) to provide a comprehensive reference for clinical practice interventions.

**Methods:** Evidence on interventions for kinesophobia post-PCI was retrieved from Chinese and international integrated databases, treatment guidelines, and websites of professional associations, including systematic reviews and expert consensuses. The evidence considered in this study extends up to May 2022, encompassing information available since the inception of the databases. Two researchers independently evaluated the articles included in the review and extracted and summarized the available evidence.

**Results:** By extracting and integrating data from the 14 articles included in this review, we identified six categories: pre-intervention assessment, psychological intervention, health education, rehabilitation training, social support, and quality control. A total of 21 pieces of evidence were summarized, including mental health assessment, physical fitness evaluation, timing and content of health education, development of personalized exercise prescriptions, and risk control.

**Conclusion:** In clinical settings, using evidence-based practices requires developing feasible intervention programs based on comprehensive consideration of hospital resources, allocation of medical personnel, and consideration of patients' preferences to reduce the kinesophobia of patients post-PCI and improve their compliance with exercise rehabilitation.

**Keywords:** evidence-based nursing, evidence summary, intervention, kinesophobia, post-PCI

## Introduction

Coronary heart disease (CHD) occurs when coronary atherosclerosis induces vessel stenosis or occlusion, precipitating an ischemic and hypoxic state in the cardiac muscle. As per the *Report on Cardiovascular Diseases in China 2020*,<sup>1</sup> more than 300 million people suffer from cardiovascular disease in China, including 11.39 million with CHD. Percutaneous coronary intervention (PCI) is a primary mode of treating patients with CHD; however, they require continuous cardiac rehabilitation (CR) after the procedure due to irreversible arteriosclerosis.

Exercise rehabilitation is a crucial component of CR and can be conducted independently or in conjunction with the management of other disease-related risk factors within CR programs.<sup>2</sup> Despite the numerous benefits of exercise rehabilitation, patient compliance with rehabilitation is notably low.<sup>3,4</sup> It may be due to a fear that exercise will exacerbate cardiac strain and lead to a recurrence of their condition. This irrational fear of rehabilitative exercise and daily activities is known as kinesophobia.<sup>5</sup> Such fear significantly impacts patients' adherence to exercise rehabilitation, causing them to avoid activities. This avoidance can result in complications like thromboembolism, disuse syndrome, or provoke conditions such as tachycardia and hypotension during normal activities. It can also lead to negative emotions

such as anxiety and depression, severely affecting patient recovery.<sup>6</sup> A previous study has found that six months after a cardiac event, 20% of CHD patients exhibited high levels of kinesiophobia.<sup>7</sup> In another study, 86.7% of patients undergoing cardiac surgery had kinesiophobia before revascularization.<sup>8</sup> In China, a survey revealed that out of 189 patients with CHD 107 exhibited kinesiophobia, accounting for 56.6% of the total surveyed population.<sup>9</sup> Liu et al<sup>10</sup> found that the kinesiophobia score for patients post-coronary stent implantation was  $46.67 \pm 19.96$ , while Wang et al<sup>11</sup> reported a score of  $40.27 \pm 4.68$ . The discrepancy in results may be due to differences in the selection of study subjects and the timing of questionnaire distribution. In summary, patients with CHD, especially those who have undergone coronary stent implantation, exhibit high levels of kinesiophobia. Research on kinesiophobia in cardiac patients in China is still in its early stages, lacking systematic, targeted, and effective intervention programs.

Hence, we conducted a comprehensive review of pertinent literature in this domain to assess the quality, extract evidence, and summarize the best available information on intervention programs for individuals experiencing kinesiophobia post-PCI. The aim is to provide a reference for the clinical formulation of nursing management strategies and interventions aimed at addressing this concern.

## Materials and Methods

### Creation of a Specialized Team

A dedicated nine-member team was created to investigate the established evidence base, comprising 3 nursing managers, 3 clinical nurses, and 3 postgraduates in nursing. The nursing managers assumed responsibility for the overall coordination of the study; the nursing postgraduates were responsible for article search, evidence extraction, and evaluation; and the clinical nurses were responsible for analyzing the practical feasibility of the best evidence. All members underwent systemic training in evidence-based nursing.

### Problem Determination

Evidence-based nursing problems were constructed using the PIPOST principle:<sup>12</sup> P (Population): the target population was patients with kinesiophobia post-PCI; I (Intervention): interventions included exercise guidance, psychological interventions, health education, family support, and so on; P (Professional): the professionals involved were medical and healthcare personnel; O (Outcome): outcomes included the degree of cardiac kinesiophobia, anxiety, and depression, the success rate of the 6-minute walk test, self-care ability in daily life, and self-efficacy in CHD exercises; S (Setting): the place where evidence was applied was mainly hospitals; T (Type of evidence): this included randomized controlled trials (RCTs), quasi-experiments, clinical practice guidelines, expert consensus statements, and systematic reviews.

### Search Strategy

All articles related to post-PCI kinesiophobia intervention were retrieved from the following sources as per the “6S” evidence model:<sup>13</sup> 1) Clinical decision-making support systems: BMJ Best Practice and UpToDate; 2) Clinical practice guideline websites: the National Guideline Clearinghouse (NGC) guideline website, the UK guideline website (NICE), and the Medlive guideline website; 3) Websites of professional associations: websites of the American Heart Association, American College of Cardiology, and the European Society of Cardiology; 4) Integrated databases: China Biology Medicine disc (SinoMed), China National Knowledge Infrastructure (CNKI), Wanfang Database, PubMed, and Embase Database.

The English keywords used for the search were “Percutaneous coronary intervention/Coronary Intervention, Percutaneous/Coronary Interventions, Percutaneous/Intervention, Percutaneous Coronary/Interventions, Percutaneous Coronary/Percutaneous Coronary Interventions/Percutaneous Coronary Revascularization/Percutaneous Coronary Revascularization/Revascularization, Percutaneous Coronary”, “Exercise/Physical Activity/Activities, Physical/Activity, Physical/Exercise, Physical/Exercises, Physical/Acute Exercise/Exercise, Isometric/Exercise, Aerobic/Exercise Training” and “Anxiety/Nervousness/Anxiousness/dread/frightened/depressed”.

The following is an example of the search mode in PubMed:

#1 (Percutaneous coronary intervention[Title/Abstract]) OR (Coronary Intervention, Percutaneous[Title/Abstract]) OR (Coronary Interventions, Percutaneous[Title/Abstract]) OR (Intervention, Percutaneous Coronary[Title/Abstract]) OR (Interventions, Percutaneous Coronary[Title/Abstract]) OR (Percutaneous Coronary Interventions[Title/Abstract]) OR (Percutaneous Coronary Revascularization[Title/Abstract]) OR (Coronary Revascularization, Percutaneous[Title/Abstract]) OR (Coronary Revascularizations, Percutaneous [Title/Abstract]) OR (Percutaneous Coronary Revascularizations[Title/Abstract])

#2 (Exercise[Title/Abstract]) OR (Physical Activity[Title/ Abstract]) OR (Activities, Physical[Title/Abstract]) OR (Activity, Physical[Title/Abstract]) OR (Physical Activities[Title/Abstract]) OR (Exercise, Physical[Title/Abstract]) OR (Exercises, Physical[Title/Abstract]) OR (Physical Exercise[Title/Abstract]) OR (Acute Exercise[Title/Abstract]) OR (Acute Exercises[Title/Abstract]) OR (Exercise, Acute [Title/Abstract]) OR (Exercises, Acute[Title/Abstract]) OR (Exercise, Isometric[Title/Abstract]) OR (Isometric Exercise[Title /Abstract]) OR (Exercise, Aerobic[Title/Abstract]) OR (Aerobic Exercise [Title/Abstract]) OR (Exercises, Aerobic[Title/Abstract]) OR (Exercise Training[Title/Abstract]) OR (Training, Exercise[Title/Abstract])

#3 (Anxiety[Title/Abstract]) OR (Nervousness[Title/Abstract]) OR (Anxiousness[Title/Abstract]) OR (dread[Title/Abstract]) OR (frightened[Title/Abstract]) OR (depressed[Title/Abstract])

#4 #1 AND #2 AND #3

We conducted a search for evidence spanning from the inception of the databases up to May 10, 2022.

## Inclusion and Exclusion Criteria for Articles

Inclusion criteria: 1) the target population was patients with kinesophobia post-PCI; 2) the intervention program included exercise, psychological interventions, health education, family support, and so on; 3) outcome indexes included the degree of cardiac kinesophobia, anxiety, and depression, the success rate of the 6-minute walk test, self-care ability in daily life, and self-efficacy in CHD exercises; 4) the types of articles included guidelines, evidence summaries, expert consensus statements, meta-analyses, RCTs, and systematic reviews published in China and other countries; 5) the languages of publication were Chinese and English.

Exclusion criteria: 1) articles where the full text was unavailable; 2) republished articles; 3) articles of poor quality; 4) meeting abstracts, drafts, excerpts, and such other publications; 5) articles in which the subjects had other systemic diseases or serious infections, shock, or other complications.

## Article Screening and Data Extraction

Two evaluators independently screened the articles that were retrieved. They reviewed the title and abstract of the articles and then further read the full text of the articles that could be potentially included. In instances of disagreement, a third researcher decided on the inclusion of the concerned article. The relevant information from the selected articles was uploaded and managed in Excel. The main contents that were extracted included the title, article source, date of publication, and nature of the article.

## Quality Evaluation of the Articles

The quality evaluation was as per the nature of the study design. The quality of RCTs was evaluated as per the Cochrane risk of bias assessment criteria.<sup>14</sup> We evaluated the quality of quasi-experiments using the JBI quality evaluation tool for quasi-experiment studies. The evaluation of systematic reviews was conducted using AMSTAR.<sup>15</sup> The quality of guidelines was evaluated using the AGREE II clinical practice guideline evaluation tool.<sup>16</sup> Evaluation of the quality of expert consensus was done using the expert consensus evaluation criteria of the JBI evidence-based healthcare center.<sup>17</sup>

## Evidence Extraction, Summary, and Evaluation

We employed the evidence grading system of the JBI evidence-based healthcare center<sup>18</sup> for quality evaluation. This assessment was conducted based on the evidence level and recommendation index of the included articles.

## Results

### Results of the Article Screening

A total of 1506 articles were searched, among which 14 articles were finally included after eliminating duplicates and those that did not meet the inclusion criteria.<sup>19–32</sup> These included 4 guidelines, 3 systematic reviews, 3 expert consensus, and 4 RCTs from China, the USA, the UK, and other countries. The flowchart for article screening is shown in Figure 1, and the general information about the articles included in our review is shown in Table 1.

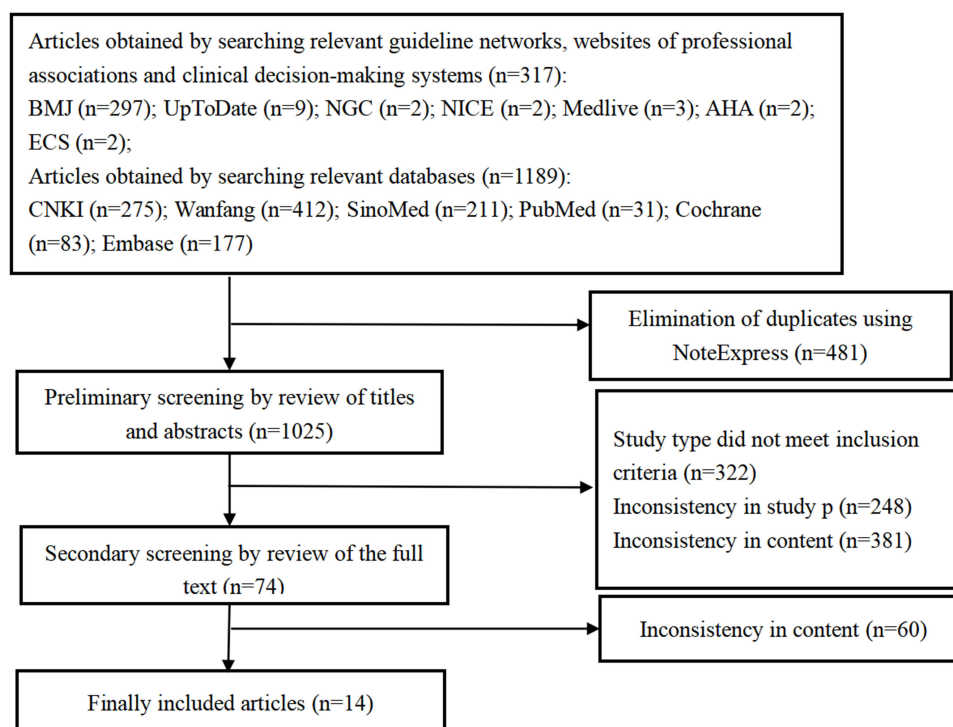
### Results of the Quality Evaluation of Articles

#### Guidelines

The four guidelines included in our review<sup>19–22</sup> consisted of two from China, one from the UK, and one from the USA. The evaluation results indicated a grade of “B”, as shown in Table 2.

#### Systematic Reviews

Three systematic reviews were included in our study. The evaluation of all items in the review by Albus et al<sup>24</sup> was positive, resulting in a quality rating of “grade A”, suggesting that they were of high quality. The evaluation of the review by Marino et al<sup>23</sup> was as follows: the evaluation results of item 1 (“Is a preliminary plan provided?”) and item 4 (“Is the publication status considered in the inclusion criteria, such as grey articles?”) were “unclear”, while those of other items were “yes”, and the quality was rated as “grade B”. For the review by Minmin et al,<sup>25</sup> the evaluation results of items 1, 4, and 11 (“Are conflicts of interest reported?”) were “unclear”, while those of other items were “yes”, and the overall quality was rated as “grade B”, suggesting that they were of high quality.



**Figure 1** Article screening flowchart.

**Abbreviations:** BMJ, British Medical Journal; NGC, National Guideline Clearinghouse; NICE, the UK guideline website; AHA, American Heart Association; ECS, European Society of Cardiology. CNKI, China National Knowledge Infrastructure.

**Table I** General Information About Included Articles

Author/s	Article Source	Nature of the Article	Topic of the Article	Date of Publication
Chinese Medical Association, etc. <sup>19</sup>	Medlive	Guideline	Guideline for Primary Care of Cardiac Rehabilitation of Coronary Heart Disease	2020
Specialty Committee of Cardiovascular Diseases, Chinese Association of Rehabilitation Medicine <sup>20</sup>	Chinese Medical Journal Full-text Database	Guideline	Guidelines for Cardiovascular Rehabilitation and Secondary Prevention in China (2018 simplified edition)	2018
Thomas et al <sup>21</sup>	PubMed	Guideline	2018 ACC / AHA clinical performance and quality measures for cardiac rehabilitation: a report of the American College of Cardiology/ American Heart Association Task Force on Performance Measures	2018
Ibanez et al <sup>22</sup>	ECS	Guideline	2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation	2017
Marino et al <sup>23</sup>	PubMed	Systematic review	Mindfulness-based interventions for physical and psychological wellbeing in cardiovascular diseases: A systematic review and meta-analysis	2022
Albus et al <sup>24</sup>	PubMed	Systematic review	Additional effects of psychological interventions on subjective and objective outcomes compared with exercise-based cardiac rehabilitation alone in patients with cardiovascular disease: A systematic review and meta-analysis	2020
Cai et al <sup>25</sup>	Wanfang	Systematic review	Meta-analysis of the effect of early rehabilitation nursing on patients with acute myocardial infarction after PCI	2019
Chen et al <sup>26</sup>	Medlive	Expert consensus	Expert Consensus on Psychological Nursing of Hospitalized Patients with Coronary Heart Disease	2021
Specialty Committee of Prevention and Rehabilitation, Chinese College of Cardiovascular Physicians <sup>27</sup>	Medlive	Expert consensus	Experts' Consensus for Exercise Rehabilitation of the Post-PCI Treatment	2016
Preventive Medicine Group of Cardiovascular Branch of Chinese Medical Association, Cardiovascular Disease Professional Committee of Chinese Rehabilitation Medicine Association <sup>28</sup>	Chinese Medical Journal Full-text Database	Expert consensus	Chinese Expert Consensus on Exercise Therapy for Patients with Coronary Heart Disease	2015
Liu et al <sup>29</sup>	Chinese Medical Journal Full-text Database	RCT	Application of cardiac exercise rehabilitation combined with mindful music training in patients with acute myocardial infarction after percutaneous coronary intervention	2022
Wu <sup>30</sup>	Chinese Medical Journal Full-text Database	RCT	Application of health education based on feedback theory in post-PCI treatment of patients with acute myocardial infarction	2022
Xu et al <sup>31</sup>	CNKI	RCT	Effect analysis of ESPCS nursing model in perioperative period of PCI in patients with acute myocardial infarction	2022
Yang et al <sup>32</sup>	PubMed	RCT	Observation of the effect of a 7-day gradual early functional exercise program in middle-aged and young patients with acute myocardial infarction after percutaneous coronary intervention	2021

## Expert Consensus

Three expert consensuses were included in this study.<sup>26–28</sup> For all three consensuses, the evaluation results of item 7 (“Are the recommended suggestions or ideas supported by peers?”) were “unclear”, while those of other items were “yes”, suggesting that they were of high quality.

**Table 2** Results of the Evaluation of Guidelines

Standardized Percentage in each field	Included Guidelines			
	Guideline for Primary Care of Cardiac Rehabilitation of Coronary Heart Disease <sup>19</sup>	Guidelines for Cardiovascular Rehabilitation and Secondary Prevention in China (2018 Simplified Edition) <sup>20</sup>	2018 ACC/AHA Clinical Manifestations and Quality Measurement of Cardiac Rehabilitation: A Report of ACC/AHA Manifestation Measurement Group <sup>21</sup>	2017 ESC Guidelines for the Management of Acute myocardial Infarction in Patients Presenting with ST-segment Elevation <sup>22</sup>
1. Scope and objective	80.56%	86.11%	83.16%	88.9%
2. Participants	50%	33.33%	82.13%	61.1%
3. Rigor of development	55.21%	72.92%	83.75%	68.9%
4. Clarity of presentation	86.11%	86.11%	79.54%	94.4%
5. Applicability of guidelines	33.33%	58.33%	61.34%	31.25%
6. Independence of compilation	41.67%	37.5%	28.41%	91.7%
	6	6	6	6
	2	3	5	5
Recommendation level	B	B	B	B

## RCTs

Four RCTs were included in this study. In the studies of Liu et al,<sup>29</sup> Wu,<sup>30</sup> Xu et al,<sup>31</sup> and Yan et al,<sup>32</sup> the evaluation results of items other than “allocation concealment” and “blindness” (“unclear”) were “low risk”, and the quality was rated as “grade B”.

## Evidence Summary

Following the extraction and integration of evidence, we ultimately compiled 21 pieces of information categorized into six groups: pre-intervention assessment, psychological intervention, health education, social support, rehabilitation exercise, and quality control. These findings are detailed in Table 3.

**Table 3** Summary of Best Evidence on Post-PCI Intervention Programs for Patients with Kinesophobia

Item	Evidence Summary	Evidence Level	Recommendation
Pre-intervention assessment	1. General data evaluation: including evaluation tools such as interview, physical examination, ECG, echocardiography, biochemical detection, and assessment with quality of life scale. <sup>19,27</sup>	Level I	A
	2. Evaluation of risk factors for cardiovascular diseases: smoking, obesity, hypertension, hyperglycemia, hyperlipidemia, etc. <sup>19</sup>	Level I	A
	3. Nutritional state: to understand patients' daily use of meat, proteins, vegetables, fruits, oil and salt, alcohol use, and family dietary habits, which can be recorded in a dietary diary or collected using a fat meal questionnaire or a food frequency questionnaire. <sup>19</sup>	Level I	A
	4. Psychological health: to preliminarily identify whether patients suffer from psychological disorders by interviewing them; for those with psychological disorders, the mental screening self-rating scale Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7) combined with Somatic Self-rating Scale (SSS) or Patient Health Questionnaire-15 (PHQ-15) <sup>19,26</sup> are recommended for further screening.	Level I	A
	5. Sleep evaluation: patients' sleep quality is evaluated using the Pittsburgh Sleep Quality Index (PSQI). <sup>19</sup>	Level I	A
	6. Evaluation of exercise capacity: common methods for evaluating aerobic exercise tolerance include the 6-minute walk test, cardio-pulmonary exercise test, ECG exercise stress test, etc. <sup>19</sup>	Level I	A
Psychological interventions	7. Pharmacological and non-pharmacological interventions are provided for patients' psychological problems. Non-pharmacological interventions include mindfulness meditation for reducing blood pressure, mindfulness music, health education, exercise training, cognitive-behavioral therapy, and other methods, which are used to improve patients' adverse emotional states, confidence, and quality of life. <sup>19,24,26,29,32</sup>	Level I	A

(Continued)

Table 3 (Continued).

Item	Evidence Summary	Evidence Level	Recommendation
Health education	8. Benefits of health education: 1) to improve the self-care ability of patients undergoing PCI; 2) to relieve the anxiety and depression of patients undergoing PCI; 3) to improve the treatment compliance of patients undergoing PCI. <sup>32</sup>	Level 2	B
	9. Timing of health education: rehabilitation education on patients receiving emergency PCI should be conducted during inpatient rehabilitation after PCI; rehabilitation education on patients receiving elective PCI should be conducted before PCI, and these patients are encouraged to participate in preoperative rehabilitation training to improve their cardio-pulmonary and physical reserve and surgical tolerance. <sup>22,27</sup>	Level I	A
	10. Content of health education: 1) cardiovascular anatomy, pathophysiological and risk factors, and clinical symptoms of the disease; 2) introduction to surgical and drug treatment of the cardiovascular disease; 3) healthy diet, physical activities, drug treatment and weight management; 4) introduction to methods of quitting smoking; 5) mental and emotional self-management; 6) guidance for daily life and returning to work; 7) cardio-pulmonary resuscitation and cardiac self-rescue technology. <sup>19,20</sup>	Level I	A
Rehabilitation exercise	11. Indications for starting rehabilitation of training: stable conditions with normal basic vital signs in the past 8 hours. Indications for stopping rehabilitation of training: significant changes in vital signs; dynamic changes in ST-segment of the ECG; second or third atrioventricular block; obvious ventricular and atrial tachycardia; symptoms of exercise intolerance, such as palpitation, chest pain, obvious shortness of breath and dyspnea. <sup>19,22</sup>	Level I	A
	12. Early rehabilitation should also be arranged before PCI to improve the cardio-pulmonary and exercise capacity reserve, which can help promote surgical tolerance and postoperative recovery, and lay a foundation for participating in postoperative rehabilitation. <sup>27</sup>	Level 5	B
	13. A personalized exercise prescription is developed, which mainly includes exercise time, intensity, frequency, form, and precautions. <sup>19,22,27</sup>	Level I	A
	14. Exercise training is conducted during hospitalization to recover the activities of daily living. It is recommended that the exercise prescription for outpatient cardiac rehabilitation focuses on aerobic exercise supplemented by resistance exercise, and flexibility and balance exercise may be conducted during the warm-up and recovery phases. <sup>19</sup>	Level I	A
	15. Phase II exercise rehabilitation consists of three steps: 1) warm-up; 2) exercise training; 3) relaxing exercise. <sup>27</sup>	Level 5	B
	16. Other cardiovascular disease rehabilitation methods: traditional Chinese rehabilitation methods, such as <i>Tai Chi</i> , health <i>Qigong</i> , and <i>Baduanjin</i> , and respiratory exercise all contribute to the rehabilitation of patients with cardiovascular diseases. <sup>20</sup>	Level I	A
Social support	17. Lack of social support is an important predictor for the incidence, prognosis, and mortality rates of patients with coronary heart disease. <sup>26</sup>	Level 5	B
Quality control	18. System control: includes developing clear intervention programs and procedure files of each link, and staff are regularly trained and are required to master all skills. <sup>19</sup>	Level I	A
	19. Process control: includes developing procedure files on the requirements for evaluation content, timing and frequency and individualized intervention programs, and evaluating the implementation of intervention programs and patients' self-management ability. <sup>19</sup>	Level I	A
	20. Outcome control: includes evaluating patients' clinical indexes, behavioral indexes, health indexes, and service indexes. <sup>19</sup>	Level I	A
	21. Risk control: emphasizing risk evaluation, risk monitoring, risk stratification, and standardized rescue procedure. <sup>19,27</sup>	Level I	A

## Discussion

### Conducting an Early Psychological Evaluation of Patients Who Have Undergone PCI Helps in the Timely Identification of Adverse Psychological States in Patients, Especially Those with Kinesophobia

Early cardiac rehabilitation is instrumental in facilitating patients' recovery post-PCI and reducing their mortality and family burden. Patients experiencing poor emotional wellbeing, however, may be less enthusiastic to participate in early rehabilitation that is primarily focused on exercise. Studies have indicated the detrimental impact of kinesophobia on subsequent rehabilitation efforts.<sup>33</sup> Patients with kinesophobia may exhibit psychological resistance to exercise and an increased fear response following exercise. Such a vicious cycle leads to poor rehabilitation outcomes. In clinical practice in China, not much attention is paid to the psychological problems of patients post-PCI.<sup>26</sup>



In light of these findings, healthcare professionals should prioritize the evaluation of kinesophobia in patients with CHD post-PCI and implement proactive interventions to improve patients' compliance with exercise and help them return to a normal social life as soon as possible.

## **Development of Comprehensive Post-PCI Intervention Programs for Patients with Kinesophobia**

### **Early Psychological Interventions are Conducted to Relieve Anxiety, Depression, and Other Negative Emotions, Consequently Addressing Kinesophobia**

Psychological issues play an important role in the onset, development, and prognosis of cardiovascular diseases. Among these, anxiety and depression are the two key contributors that pose challenges to patients' postoperative rehabilitation and social reintegration.<sup>34</sup> Studies<sup>7</sup> have suggested that the severity of anxiety and depression is positively correlated with kinesophobia, which is consistent with the physiological understanding that anxiety is the primary emotion in phobias.

Therefore, to reduce patients' kinesophobia, healthcare professionals should accurately identify psychological problems such as anxiety and depression, as well as symptoms like chest pain in patients, using psychological evaluation tools at the time of admission. Subsequent non-pharmacological or pharmacological interventions can be tailored based on the extent of anxiety and depression.

### **Health Education is Actively Carried Out to Rectify Patients' Misconceptions and Promote Behavioral Changes**

Studies have indicated that patients who have more awareness about their disease have less kinesophobia. This may be attributed to the fact that an accurate understanding of the disease can help reduce patients' concern about exercise, enhance their confidence in actively participating in exercise rehabilitation, and thus improve their compliance with exercise intervention. Many experts consider "exercise rehabilitation education" the crucial first step in cardiac rehabilitation,<sup>35</sup> and health education in the initial stages of recovery can contribute to patients' correct understanding of exercise rehabilitation and self-efficacy, thereby reducing their kinesophobia.

The timing for starting health education is thus essential. Specifically, patients undergoing elective PCI receive educational inputs prior to the procedure, while those who undergo emergency PCI are generally educated during rehabilitation in the hospital after the operation. Health education practices, often perceived as routine, lack emphasis on patients' comprehension. However, through feedback teaching and enabling education, a more targeted and planned approach for teaching patients can be employed to enable them to become more confident and compliant with treatment and less fearful about exercise.<sup>30</sup>

### **A Comprehensive Rehabilitation Plan is Developed to Help Patients Reduce Their Fear and Restore Their Confidence Through Gradual Exercise**

According to the expert consensus,<sup>28</sup> a common issue among patients is the lack of awareness of when to initiate exercise as well as the quantum and frequency of exercise post-PCI, due to which they tend to avoid engaging in exercise. Cardiac rehabilitation therapists should develop comprehensive, personalized exercise plans based on the condition of individual patients. This approach can enable patients to perceive the physiological changes in their bodies during exercise and correctly understand the reasons for local and systemic reactions. Consequently, this heightened self-awareness can reduce their fears related to increased heart rates, breathing, and other exercise-induced symptoms.

### **The Social Support System of the Patient is Actively Mobilized to Improve Patients' Motivation and Encourage Their Continuous Engagement in Cardiac Rehabilitation**

Patients who are hospitalized get social support mainly from medical staff, wardmates, and family members, all of whom play a crucial role in promoting behavioral changes in them.<sup>35</sup> Patients who receive support from the treatment team tend to become more compliant.<sup>36</sup> Support from fellow wardmates can strengthen patients' confidence, while support from family members, especially spouses, is a powerful motivating factor for patients. Therefore, involving the family in interventions to address kinesophobia can play a positive role in alleviating patients' fears.



# Quality Control Measures Should Be Rigorously Enforced Throughout the Entire Cardiac Rehabilitation Process to Ensure the Safety of Patients

Post-PCI, patients experience serious and rapidly changing medical conditions. This necessitates the prompt detection of problems by the medical team and the implementation of effective safeguard measures during exercise. In addition to developing detailed procedures for quality control, strengthening the training of medical staff and encouraging them to gain adequate practical experience are essential to ensuring patients' safety.

## Conclusion

In this review, we consolidated the best evidence pertaining to post-PCI intervention programs for individuals experiencing kinesophobia. The findings are organized into six categories: pre-intervention assessment, rehabilitation exercise, psychological interventions, health education, social support, and quality control. The aim is to provide a more comprehensive and secure foundation for evidence-based nursing practices aimed at alleviating post-PCI kinesophobia in patients. However, it is noteworthy that there is a lack of direct evidence within the identified articles and guidelines demonstrating the efficacy of interventions in reducing patients' kinesophobia. However, this study has certain limitations. The included literature does not cover qualitative research on the needs and barriers of patients with post-PCI kinesophobia. Future studies should incorporate relevant literature to provide a more comprehensive summary of the evidence.

To establish the validity of the evidence presented, it is imperative to subject these findings to verification through the implementation of clinical practices in various hospitals at different levels and in different regions. Feasible intervention programs should be developed by considering the actual working environment, experience of personnel, hospital resources, allocation of medical staff, and patients' preferences. Additional investigations are warranted to contribute to acquiring more direct and substantiated evidence, thereby offering valuable insights and references for clinical practice.

## Abbreviations

PCI, percutaneous coronary intervention; RCT, Randomized controlled trial.

## Data Sharing Statement

The datasets generated and analysed during the current study are not publicly available but are available from the corresponding author (Lu Chen) on reasonable request.

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## Disclosure

None of the authors have any financial disclosure or conflict of interest.

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