Postprint of a Systematic Review of Guidelines Related to Cardiac Rehabilitation for Patients with Coronary Heart Disease

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Abstract

Background Cardiac rehabilitation is widely recognized as an effective intervention for patients with coronary heart disease, yet the quality of relevant guidelines developed domestically and internationally remains unclear, and the recommendations require integration.

Objective To systematically evaluate guidelines on cardiac rehabilitation for patients with coronary heart disease and provide evidence for clinical practice.

Methods In June 2022, a computerized search was conducted on The Cochrane Library, Web of Science, PubMed, CNKI, VIP, and Wanfang Data Knowledge Service Platform, as well as domestic and international guideline websites and relevant academic society websites to collect guidelines related to cardiac rehabilitation for coronary heart disease patients. The search period was from database inception to June 30, 2022. Two researchers independently screened literature and extracted data according to inclusion and exclusion criteria. The AGREE II instrument was used to evaluate the quality of included guidelines, and recommendations for cardiac rehabilitation in coronary heart disease patients were summarized.

Results A total of 10 guidelines were finally included, 8 of which originated from abroad, with publication dates ranging from 2011 to 2020. The average scores of included guidelines across AGREE II domains were: scope and purpose 71%, stakeholder involvement 65%, rigor of development 58%, clarity of presentation 80%, applicability 64%, and editorial independence 45%. Four guidelines had a recommendation level of Grade A, and six guidelines had a recommendation level of Grade B. The main recommendations were summarized into six aspects: basic requirements for cardiac rehabilitation, health education, risk

factor control, psychological support, exercise training, and promoting patient participation in cardiac rehabilitation.

Conclusion The quality of guidelines was at a medium to high level, with improvements still needed in the domains of stakeholder involvement, rigor of development, applicability, and editorial independence. Recommendations across guidelines were generally consistent, but opinions were still insufficient regarding promoting patient participation in cardiac rehabilitation. There remains a quality gap between Chinese and international cardiac rehabilitation guidelines, and high-quality evidence-based cardiac rehabilitation guidelines suitable for coronary heart disease patients in China should be developed.

Full Text

Guidelines on Cardiac Rehabilitation in Patients with Coronary Heart Disease: A Systematic Review

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Abstract

Background: Cardiac rehabilitation is widely recognized as an effective comprehensive intervention for patients with coronary heart disease (CHD). However, the quality of relevant guidelines remains unclear, and recommendations from these guidelines need to be integrated.

Objective: To systematically review guidelines on cardiac rehabilitation in patients with CHD, providing evidence to inform clinical practice.

Methods: In June 2022, guidelines on cardiac rehabilitation for CHD patients were searched across The Cochrane Library, Web of Science, PubMed, CNKI, CQVIP, and Wanfang Data, as well as relevant guideline repositories and association websites from inception to June 30, 2022. Two researchers independently screened literature and extracted data according to inclusion and exclusion criteria. The quality of included guidelines was assessed using the Appraisal of Guidelines for Research & Evaluation II (AGREE II), and recommendations were summarized.

Results: Ten guidelines (eight foreign) published between 2011 and 2020 were

included. The average scores for each AGREE II domain were: scope and purpose 71%, stakeholder involvement 65%, rigor of development 58%, clarity of presentation 80%, applicability 64%, and editorial independence 45%. Four guidelines were rated as grade A and six as grade B. Recommendations were summarized across six aspects: basic requirements of cardiac rehabilitation, health education, risk factor control, psychological support, exercise training, and improvement of cardiac rehabilitation participation.

Conclusion: The quality of included guidelines ranged from moderate to high, though improvements are needed in stakeholder involvement, rigor of development, applicability, and editorial independence. While recommendations across guidelines were generally consistent, guidance on improving patient participation remains insufficient. There is a quality gap between domestic and foreign guidelines, necessitating development of a high-quality, evidence-based cardiac rehabilitation guideline tailored for Chinese CHD patients.

Keywords: coronary heart disease; cardiac rehabilitation; guidelines; systematic review

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Cardiovascular diseases such as coronary heart disease remain the leading cause of mortality in China and worldwide, with deaths increasing by 21% over the past decade [1-2]. Driven by global aging and persistent metabolic risk factors, the incidence of CHD continues to rise, with an estimated one myocardial infarction occurring every three minutes [3]. This disease poses a significant threat to human life and health, constituting a major global public health challenge [4]. While percutaneous coronary intervention can effectively improve blood flow in severely stenotic or occluded vessels, save lives in the acute phase, and shorten hospital stays, it cannot inhibit the pathological progression of coronary atherosclerosis. Major adverse cardiovascular events may continue to cause rehospitalization and even death [5]. In recent years, numerous studies have demonstrated that cardiac rehabilitation (CR) is safe and effective in inhibiting plaque progression, controlling coronary symptoms, reducing rehospitalization and mortality rates, and improving patients' quality of life [6-8]. Therefore, implementing cardiac rehabilitation strategies for CHD patients is imperative. Although multiple cardiac rehabilitation guidelines have been developed domestically and internationally [9-18], their quality remains uncertain and their evidence requires integration. This study aims to systematically evaluate the quality of existing cardiac rehabilitation guidelines, compare and summarize their recommendations, and provide references for clinicians and department managers to implement cardiac rehabilitation measures that improve patient outcomes.

1. Methods

1.1 Inclusion and Exclusion Criteria

Inclusion criteria: (1) Published guidelines on cardiac rehabilitation; (2) Study population including adult CHD patients (age $\geq$ 18 years); (3) Clear recommendations; (4) Chinese or English language; (5) If updated versions existed, only the most recent was included.

Exclusion criteria: (1) Guidelines focusing exclusively on post-coronary artery bypass graft patients; (2) Literature considering exercise as the sole cardiac rehabilitation measure; (3) Duplicate publications, direct translations, or guideline interpretations; (4) Unavailable full text.

1.2 Search Strategy

In June 2022, a comprehensive search was conducted using free text and MeSH terms. For English databases (The Cochrane Library, Web of Science, PubMed), search terms included "ischemic heart disease/myocardial ischemia/myocardial infarction/coronary artery disease/coronary heart disease/coronary syndromes, clinical guideline/practice guideline/guideline* ". For Chinese databases (CNKI, CQVIP, Wanfang), search terms were" coronary heart disease/ischemic heart disease/coronary syndrome/angina/myocardial infarction and guideline" . Additionally, the term "cardiac rehabilitation"was used to search guideline repositories and association websites including NICE, SIGN, NZGG, RNAO, GIN, AHA, JCS, and ESC. Medlive.cn was also searched. The search timeframe spanned from database inception to June 30, 2022. The PubMed search strategy is detailed in Table 1 .

1.3 Literature Screening and Data Extraction

Two researchers independently screened literature and extracted data according to inclusion and exclusion criteria, with disagreements resolved by a third researcher. Extracted information included: guideline development organization, publication year, country/region, target population, development methods, and number of references.

1.4 Quality Assessment

Two researchers independently evaluated guideline quality using AGREE II [19], which comprises 23 items across six domains: scope and purpose, stakeholder involvement, rigor of development, clarity of presentation, applicability, and editorial independence, plus overall guideline quality. Each item is scored on a 7-point scale (1 = strongly disagree to 7 = strongly agree). Domain scores are calculated as the sum of item scores, standardized as a percentage of the maximum possible score: (actual score - minimum possible score) / (maximum possible score - minimum possible score) $\times$ 100%. Higher scores indicate better quality. Based on domain scores, guidelines are classified into three levels: Grade

A (all domains ≥ 60%, recommend without modification), Grade B (any domain <60% but $ $3 domains $ 30 $3 domains <30%, not recommended) [20].

1.5 Statistical Analysis

SPSS 18.0 was used for data analysis. Intraclass correlation coefficient (ICC) with a two-way mixed model tested inter-rater consistency [21]. ICC values range from 0 to 1, with $ $0.75 indicating good consistency, 0.4-0.75 moderate, and <0.4 poor. Mean and range (minimum and maximum) described the central tendency and dispersion of standardized domain scores. P<0.05 was considered statistically significant.

2. Results

2.1 Literature Search Results

The initial search yielded 1,700 records. After screening, 10 guidelines [9-18] were included. The screening process is shown in Figure 1 [Figure 1: see original paper].

2.2 Basic Characteristics of Included Guidelines

Among the 10 guidelines, two [14,18] were domestic and eight were foreign, originating from the Americas [9,12], Europe [11,13,15,17], and Asia [10,14,16,18]. Only two guidelines [16,18] specifically targeted CHD patients, five [10-14] addressed cardiac rehabilitation broadly (including arrhythmia and transplant patients), and three [9,15,17] included cardiac rehabilitation content. Table 2 summarizes the basic characteristics.

2.3 Quality Evaluation

2.3.1 Consistency Test ICC values for the two researchers' independent evaluations ranged from 0.780 to 0.946, indicating good inter-rater consistency (Table 3).

2.3.2 Standardized Domain Scores and Recommendation Grades Scope and Purpose: Mean score was 71% (range 36%-100%). Six guidelines [9,12-13,15-17] scored $ $60%, clearly describing overall objectives, health questions covered, and target populations. Three guidelines [11,14,18] did not explicitly identify target populations, requiring readers to infer from content. Four guidelines [10,11,14,18] failed to clearly state objectives and health questions at the outset, resulting in lower scores.

Stakeholder Involvement: Mean score was 65% (range 33%-94%). One guideline [11] omitted information on development experts, while others detailed team members, affiliations, and specialties. Three guidelines [9,14,18] did not specify experts' expertise, experience, or roles, yielding lower scores. Four

guidelines [13,15-17] incorporated patient, family, and healthcare provider perspectives during development. Six guidelines [10,12-13,15-17] clearly described target populations, with two [13,17] providing patient versions. Four guidelines [9,11,14,18] inadequately described applicability, requiring readers to analyze content independently.

Rigor of Development: Mean score was 58% (range 30%-88%). Four guidelines [13,15-17] clearly described literature search processes and evidence inclusion/exclusion criteria in the main text or appendices. Six guidelines [9,10,13,15-17] clearly reported evidence strengths and limitations, while four [11-12,14,18] did not report specific recommendations or evidence grades. Six guidelines [10,12-13,15-17] detailed recommendation formulation methods and approaches for resolving disagreements. Six guidelines [9,10,13,15-17] described health benefits, potential risks, and side effects of recommendations. Five guidelines [10,12-13,15-16] explicitly linked recommendations to evidence, while two [9,17] only summarized recommendations without discussion, lacking necessary connections. Seven guidelines [9-10,12-13,15,17] underwent external review before publication but did not detail review methodologies or how feedback was incorporated. Eight guidelines [9,10,12-17] planned updates but only specified timing without detailed procedures.

Clarity of Presentation: Mean score was 80% (range 56%-94%). Except for one guideline [14] with vaguely presented important recommendations (score 56%), all others scored $ $60%, indicating clear, unambiguous recommendations with detailed descriptions of options and health issues. Guidelines used italics, boldface, capitalization, parentheses, tables, flowcharts, and increased paragraph spacing to highlight key recommendations.

Applicability: Mean score was 64% (range 31%-88%). All guidelines provided facilitators for implementation, but only three [10,15-16] reported potential barriers, and three [13-14,18] offered alternative options for resource-limited settings. All provided supplementary materials, tools, and online resources. Five guidelines [10,12-13,15-16] considered resource implications, while five [9,11,14,17-18] did not elaborate. All provided measurable recommendations to facilitate precise application and evaluation.

Editorial Independence: Mean score was 45% (range 0%-88%), indicating poor independence. Six guidelines [10-12,14-15,18] did not address potential influence from competing interests. Two guidelines [13,17] identified sponsoring organizations but did not explain funding usage or potential bias. Six guidelines [9,12-13,16-18] disclosed conflicts of interest in appendices or at the end, while four [10,11,14-15] omitted this information.

2.4 Summary of Main Recommendations

Recommendations were extracted and summarized across six domains: basic requirements of cardiac rehabilitation, health education, risk factor control, psychological support, exercise training, and promoting patient participation (Table

5).

3. Discussion

3.1 Overall Guideline Quality and Areas for Improvement

The quality of included guidelines ranged from moderate to high. Among AGREE II domains, "Clarity of Presentation" and "Scope and Purpose" scored highest, followed by "Stakeholder Involvement" and "Applicability," while "Rigor of Development" and "Editorial Independence" scored lower—consistent with other guideline evaluations [22,23]. Developing high-quality guidelines using international standards remains challenging. Regarding stakeholder involvement, six guidelines did not incorporate patient perspectives, and four that did failed to detail patients' cultural backgrounds, religious beliefs, or specific roles. As healthcare decision participants and ultimate beneficiaries, patients' values and preferences must be emphasized [24]. Limited patient involvement may stem from professional background gaps and clinicians' dominant "discourse power" [23]. Additionally, most guidelines target healthcare workers, using technical language that intimidates patients without medical knowledge, preventing them from accessing authoritative health information. Emphasizing patient perspectives requires their presence throughout guideline development and concurrent release of patient versions to enhance engagement. Patients must also recognize their responsibility for their health and actively participate in guideline development to protect their decision-making rights.

Rigor of development is crucial for scientific validity [25]. Some guidelines lacked literature search processes, evidence selection criteria, or reporting of recommendation grades. Guidelines must be evidence-based [26], systematically collecting latest research and grading evidence to form recommendations—foundational for scientific validity and healthcare quality. Without clear search processes, evidence comprehensiveness cannot be ensured. Without selection criteria, recommendation grades and strength cannot be specified, confusing frontline clinicians. Organizations must strictly follow development procedures to maintain guideline authority and promote clinical application.

Regarding applicability, most guidelines inadequately described implementation barriers. As authoritative guidance, guidelines should anticipate individual, organizational, and system-level obstacles across settings [27] and provide practical solutions. "Editorial Independence" scored lowest, primarily because most guidelines did not address sponsorship influence or member conflicts of interest. Recommendation formation requires comprehensive evidence assessment by expert teams, and conflicts directly affect recommendations [28]. Guideline development is complex and costly, making external funding sometimes unavoidable. Organizations should adopt international methods for managing conflicts, engage third parties when necessary, and prioritize public welfare funding. If commercial sponsorship is required, detailed declarations of funding sources, usage, and conflict mitigation are essential to ensure objective, neutral recom-

mendations and enhance overall quality.

3.2 Consistency of Recommendations and Patient Participation

Recommendations across guidelines were largely consistent, emphasizing comprehensive cardiac rehabilitation strategies for CHD patients. Unlike Mehra et al. [5], who summarized only three European guidelines, this study included guidelines from Europe, the Americas, and Asia (including recent Chinese and Korean guidelines), making some recommendations more relevant for Asian populations. While the safety, efficacy, and cost-effectiveness of cardiac rehabilitation are well-established, participation rates remain low globally, with some countries reporting only 4-8% [10]. All guidelines addressed promoting participation, but recommendations focused primarily on healthcare provider actions to increase patient awareness and engagement. In practice, major barriers include time, cost, distance, and physical limitations—factors healthcare providers alone cannot change [29]. Countries should learn from developed nations by including cardiac rehabilitation in national insurance [10,16], establishing regional rehabilitation centers, developing referral systems, and creating community- or home-based models [30] to provide convenient access across settings. Healthcare institutions should explore incorporating cardiac rehabilitation into performance metrics [31] and use media to disseminate short educational videos about rehabilitation benefits, ultimately improving participation and promoting patients' return to normal life.

3.4 Limitations

This study only included Chinese and English guidelines, potentially causing selection bias. AGREE II evaluates reporting and methodological quality but cannot assess whether recommendation grades and evidence levels are appropriate, so quality ratings may differ from actual quality. Additionally, with only two researchers conducting quality assessments, results may be subject to subjective influence.

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Note: Figure translations are in progress. See original paper for figures.