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REVIEW

Evidence Summary of Management Strategies for Cognitive Impairment in Patients with Heart Failure

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Purpose: Cognitive impairment presents significant challenges for the management and prognosis of patients with heart failure. Previous studies have underscored the importance of evidence-based investigation of cognitive impairment in this population; however, specific management strategies have not yet been clearly identified. This study aims to systematically retrieve, extract, appraise, and synthesize evidence on management strategies for cognitive impairment in patients with heart failure to inform clinical nursing practice.

Methods: Guided by the 6S evidence pyramid, we systematically identified evidence on strategies to manage cognitive impairment in patients with heart failure. We included guidelines, clinical decision-making documents, expert consensus statements, and systematic reviews; searches covered database inception to 18 May 2024. Two researchers independently appraised the methodological quality, and evidence was extracted and synthesised thematically.

Results: Nine documents were included: one guideline, two clinical decision tools, two expert consensus statements, and four systematic reviews. Evidence was synthesised across four domains—assessment, cognitive training and rehabilitation; dietary and exercise interventions; and multi-stakeholder support management systems—yielding 17 evidence statements. Routine standardized cognitive assessment, structured cognitive rehabilitation, individualized exercise and dietary interventions, and multidisciplinary management models with caregiver involvement may improve cognitive function and enhance self-care and treatment adherence in patients with heart failure.

Conclusion: This study synthesizes current evidence on management strategies for cognitive impairment in heart failure and provides a reference for clinical nursing practice and guidance for healthcare teams in developing and implementing related management plans.

Keywords: heart failure, cognitive impairment, management, evidence summary, evidence-based nursing

Introduction

Heart failure (HF) is a chronic, progressive syndrome characterised by persistently high prevalence, readmission, and mortality rates, imposing a substantial economic and caregiving burden on public health systems and patients' families.[1] Epidemiological data indicate that there are approximately 63.4 million patients with HF worldwide;[2] in China, there are about 13.7 million cases, with older adults accounting for roughly 75%.[3] In addition to causing structural and/or functional cardiac damage, HF can affect the physiological functions of multiple organs.[4] Among these manifestations, HF-related cognitive impairment (CI) is relatively common in clinical practice. Still, it is often overlooked,[5] possibly due to factors such as heavy clinical workloads, insufficient awareness of the issue, and diagnostic and therapeutic focus on cardiac function.

Cognitive impairment is a clinical syndrome defined by acquired, persistent cognitive dysfunction that results in declines in activities of daily living and occupational performance, together with behavioral changes.[6] The term encompasses the continuum from mild cognitive impairment (MCI) to dementia.[7] Multiple pathophysiological mechanisms—including cerebral hypoperfusion, blood–brain barrier disruption, systemic inflammation, and reduced cardiac

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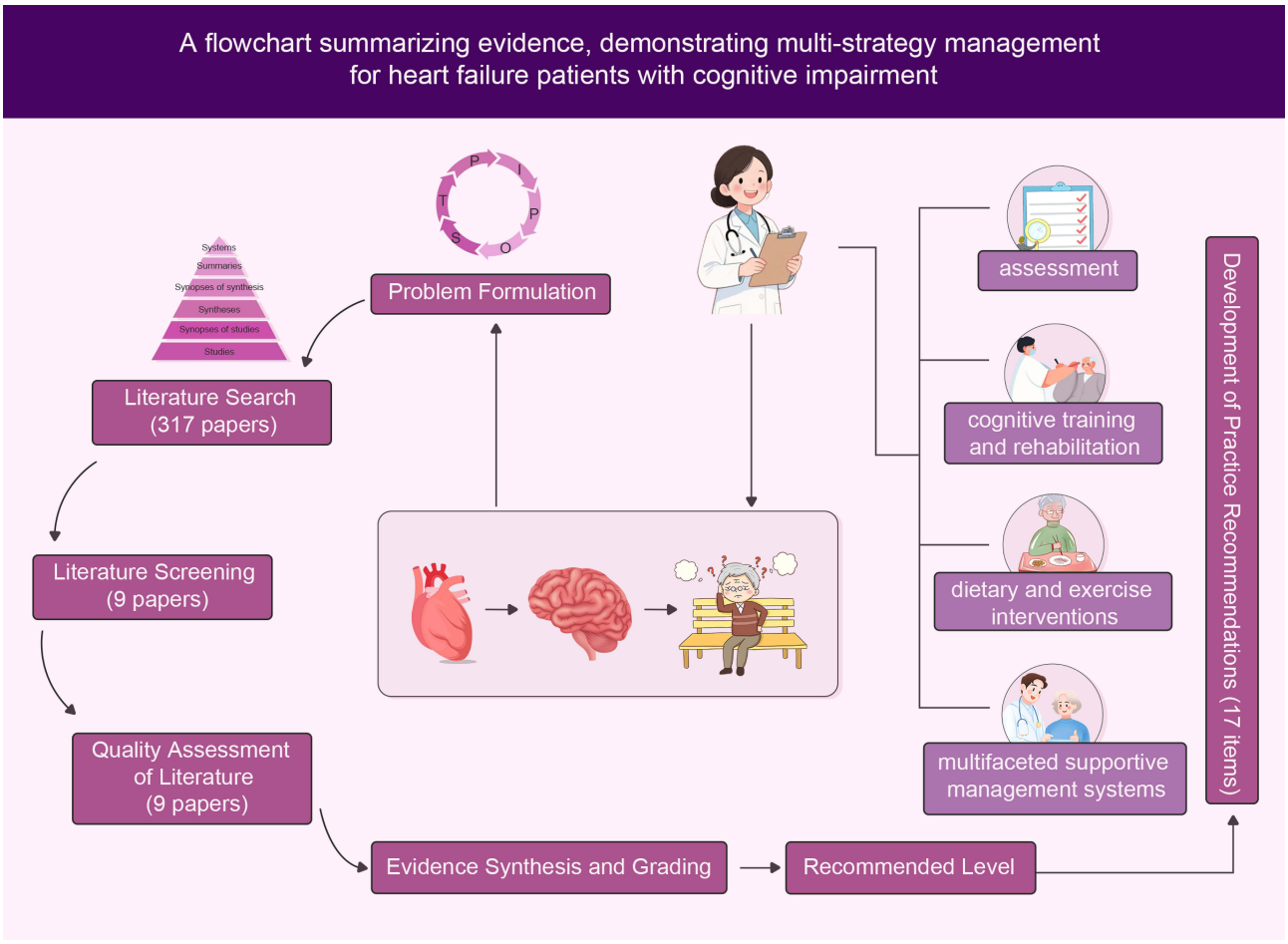
Graphical Abstract



output—are implicated.[8] Reported prevalence varies widely (14%–81%), largely owing to heterogeneity in assessment instruments, diagnostic thresholds, and clinical settings.[9] Compared with cognitively intact peers, HF patients with cognitive impairment have approximately a twofold higher risk of rehospitalization and up to a fivefold higher risk of mortality.[10] This cognitive vulnerability impairs self-management and accelerates functional decline, reinforcing a bidirectional vicious cycle between HF symptom burden and neurocognitive deterioration; early identification and intervention are therefore imperative.[11–13]

Several expert consensus statements[14] and systematic reviews[7,15,16] have been published in managing cognitive impairment in patients with heart failure; however, the existing evidence is fragmented and lacks a unified framework because of differences in study objectives and evaluative emphases. Meanwhile, at the international level, there is still no systematic evidence synthesis of comprehensive management strategies for heart failure with concurrent cognitive impairment from a nursing perspective, limiting clinical nursing staff in obtaining timely and precise guidance. Given that cognitive impairment in HF is closely associated with reduced treatment adherence, impaired self-management, and increased risks of rehospitalization and mortality, there is an urgent need for systematic evidence synthesis in this field to develop a structured and actionable nursing management framework that will provide evidence-based support for subsequent guideline development and standardized practice. This study has been registered at the Fudan University Centre for Evidence-Based Nursing, registration number: ES20244628.

Method

At present, there is no universally unified reporting standard for evidence synthesis. Therefore, the Evidence-Based Nursing Centre of Fudan University developed a reporting standard for evidence synthesis based on the principles proposed by the Joanna Briggs Institute (JBI). This standard covers six components: problem identification, literature search, literature screening, literature appraisal, evidence synthesis and grading, and formulation of practice recommendations. This study adopted the evidence synthesis reporting standard developed by the Evidence-Based Nursing Centre of Fudan University.[17]

Problem Formulation

The research question was formulated using the PIPOST framework.[18] The population (P) comprised patients aged ≥18 years diagnosed with heart failure and concomitant cognitive impairment. The interventions (I) included assessment of cognitive impairment management strategies, non-pharmacological interventions, caregiver support, and education. The professionals/implementers (P) included clinical and community healthcare professionals and patients' family members and partners. The outcomes (O) focused on cognitive function, quality of life, and self-care ability. The settings (S) in which the evidence applies were primarily hospitals, community settings, and homes. The types of evidence (T) included guidelines, clinical decision-making tools, systematic reviews, and expert consensus documents.

Evidence Retrieval

Based on the 6S evidence resource pyramid model,[19] pieces of evidence were retrieved electronically from databases in descending order in the evidence hierarchy. The databases searched were: BMJ Best Practice; UpToDate; the JBI Center for Evidence-Based Health Care; Cochrane Library; the Scottish Intercollegiate Guidelines Network (SIGN); the Registered Nurses' Association of Ontario (RNAO); the European Society of Cardiology (ESC); the American Heart Association (AHA); the Heart Failure Society of America (HFSA); the American College of Cardiology (ACC); Google Scholar; Medlive; PubMed; CINAHL; Embase; Web of Science; ProQuest; CNKI; SinoMed; the Wanfang Data; and the VIP Database.

The search terms included: heart failure / cardiac failure / myocardial failure/heart decompensation / cognitive impairment* / cognitive dysfunction / cognitive decline* / cognitive disorder* / mental deterioration* / guideline / expert consensus / clinical decision / systematic review/expert testimony / expert opinion* / evidence summary / clinical decision-making.

The search timeframe extended from the inception of each database to 18 May 2024. Figure 1 provides an example of the PubMed search strategy. The detailed search strategies of the other databases are listed in Supplementary Table S1.

#1 "heart failure"[MeSH]

#2 heart failure OR cardiac failure OR myocardial failure OR heart decompensation[Title/Abstract]

#3 #1 OR #2

#4 "cognitive dysfunction"[MeSH]

#5 cognitive dysfunction OR cognitive impairment*OR cognitive decline* OR cognitive disorder* OR mental deterioration*[Title/Abstract]

#6 #4 OR #5

#7 guideline OR expert consensus OR clinical decision OR systematic review OR Expert Testimony OR expert opinion* OR evidence summary OR Clinical Decision-Making[Title/Abstract]

#8 #3 AND #6 AND #7

Figure 1 PubMed search strategy.

Inclusion and Exclusion Criteria for Evidence

Inclusion Criteria

Inclusion criteria were: (1) Study population: patients aged ≥18 with heart failure and cognitive impairment. (2) Literature focus: assessment, prevention, and intervention regarding cognitive impairment. (3) Outcome measures: cognitive function, self-care ability, and quality of life. (4) Types of literature: guidelines, clinical decisions, systematic reviews, and expert consensus.

Exclusion Criteria

Exclusion criteria were: (1) publications not written in Chinese or English; (2) incomplete data; (3) inability to obtain original data; (4) duplicate publications or updated versions of the same paper; (5) literature with a quality rating of C.

Literature Screening

The retrieved literature and duplicate records were imported into NoteExpress reference management software. Two researchers with evidence-based practice backgrounds independently assessed the quality of the papers, excluding literature that did not match the research content, for which the full text could not be obtained, or that was of low quality. When the two researchers' opinions conflicted, a third expert made the final decision. In evidence acceptance, evidence-based priority, high-quality, and the latest published evidence priority were followed.

Quality Assessment of the Literature

The guidelines were evaluated using the Appraisal of Guidelines for Research and Evaluation II (AGREE II),[20] which assesses six domains: scope and purpose, stakeholder involvement, rigour of development, clarity of presentation, applicability, and editorial independence. Each item was scored independently within these six domains, and domain scores were standardised using the prescribed formula, with the results expressed as percentages. Guidelines were categorised into three levels: if scores in all six domains were 60% or higher, the guideline was directly recommended (Level A); if scores in three domains were 30% or higher but less than 60%, the guideline could be recommended after revision (Level B); if scores in three domains were less than 30%, the guideline was temporarily not recommended (Level C). The quality of the included systematic reviews was evaluated using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Systematic Reviews and Research Syntheses,[21] which consists of 11 items, each evaluated as "yes", "no", "unclear", or "not applicable."

The quality of the expert consensus was evaluated using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Text and Opinion Papers from the Australian JBI Centre for Evidence-Based Healthcare, which consists of six items. Each item was rated using the options: "yes", "no", "unclear", or "not applicable." Although the level and quality of evidence are highly valued in clinical decision-making, there is currently no unified standard method for their assessment.[22] Therefore, the appraisal of literature quality still depends on the source of evidence, and appropriate evaluation criteria must be selected according to the type of literature.

Evidence Extraction and Synthesis

Two researchers independently extracted and synthesised the literature content, after which a third researcher verified the results. Synthesis followed these principles: evidence was extracted and summarised under four aspects; evidence with consistent findings was categorised and integrated; for conflicting evidence, priority was given to evidence-based sources, higher-quality evidence, and more recently published authoritative literature. All included evidence was traced back to its sources. According to the study design, evidence levels were classified as Levels 1–5 using the 2014 JBI Centre for Evidence-Based Healthcare Levels of Evidence system,[23] with Level 1 the highest and Level 5 the lowest. Based on the evidence level, a group discussion was conducted to determine the recommendation grade, which was classified as Grade A (strong recommendation) or Grade B (weak recommendation).

Result

Search Results

A total of 317 relevant documents were identified through the search strategy; 9 documents were ultimately included: 1 guideline,[24] 2 clinical decisions,[25,26] 4 systematic reviews,[16,27–29] and 2 expert consensus statements.[14,30] The flowchart of the screening process is shown in Figure 2, and the general characteristics of the included documents are presented in Table 1.

Literature Quality Evaluation Results

Quality Evaluation Results of Guidelines

One guideline was included[24] and appraised using the AGREE II instrument. Standardised domain scores were: Scope and Purpose 86.1%, Stakeholder Involvement 77.8%, Rigour of Development 77.1%, Clarity of Presentation 69.4%, Applicability 75.0%, and Editorial Independence 50.0%, yielding an overall Grade B.

Quality Evaluation Results of Clinical Decision-Making

Two clinical decision resources,[25,26] were of high quality and both were included.

Quality Evaluation Results of Systematic Reviews

Four systematic reviews were included.[16,27–29] All four rated Item 9, "Was the possibility of publication bias assessed?" as "No". Stewart et al[27] rated Item 4, "Were the databases or resources used for literature retrieval adequate?" as "Unclear".

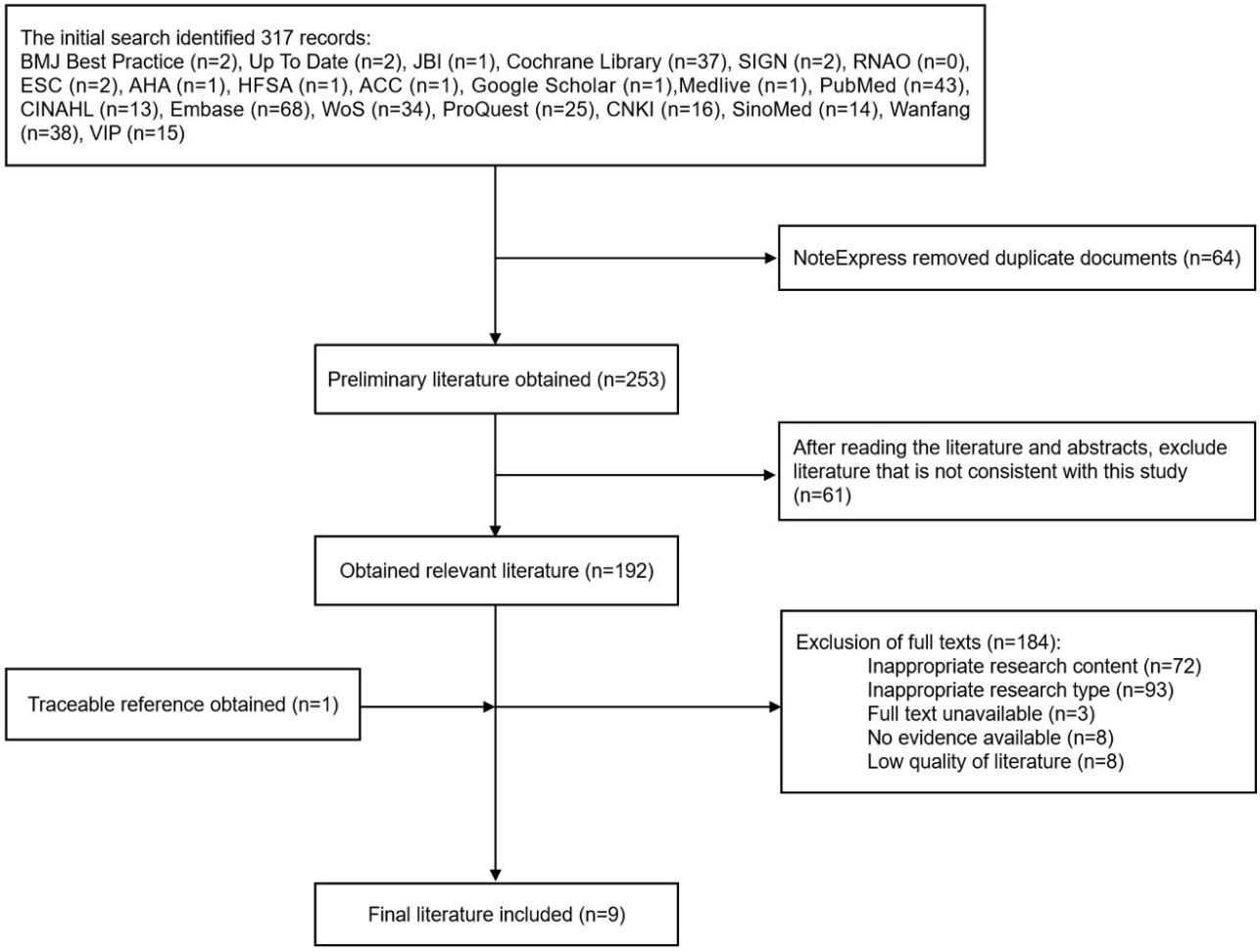


Figure 2 Literature screening flow chart.

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Table 1 Basic Characteristics of Included Studies

	Year of Publication	Source	Type of Literature	The Literature Theme
Chinese Medical Doctor Association, Neurologist Branch et al[24]	2022	Full-text database of Chinese medical journals	Guideline	Chinese Guidelines for Cognitive Training
Larson et al[25]	2022	UpToDate	Best practice	Evaluation of cognitive impairment and dementia
Wenger et al[26]	2024	UpToDate	Best practice	Cardiac rehabilitation in older adults
Stewart et al[27]	2015	PubMed	Systematic review	Nutrition and Cognition in Older Adults With Heart Failure: A Systematic Review
Lovell et al[28]	2019	PubMed	Systematic review	Self-management of heart failure in dementia and cognitive impairment: A systematic review
Hickman et al[29]	2020	PubMed	Systematic review	Key elements of interventions for heart failure patients with mild cognitive impairment or dementia: A systematic review
Zhao et al[16]	2023	PubMed	Systematic review	Non-pharmacological interventions for cognitive impairment in older adults with heart failure: A systematic review
Chinese Medical Association Cardiovascular Disease Branch et al[30]	2023	CNKI	Expert consensus	Chinese Expert Consensus on Cardiovascular Disease and Cognitive Impairment
Goyal et al[14]	2024	PubMed	Expert consensus	Cognitive Impairment in Heart Failure: A Heart Failure Society of America Scientific Statement

Lovell et al[28] rated Item 7, "Were measures taken to reduce errors during data extraction?" as "Unclear". Hickman et al[29] rated Items 8 and 10, "Was the method of combining studies appropriate?" and "Are the policy or practice recommendations based on the results of the systematic review?" as "Unclear"; all other items were rated "Yes". Overall, methodological quality was high, and all were included.

Quality Evaluation Results of Expert Consensus

Two expert consensus[14,30] were rated "Clear" for all items except Item 6, "Whether the views presented are inconsistent with previous literature", which was rated "Unclear". Overall quality was high, and both were included.

Evidence Summary and Description

After collating evidence on cognitive impairment in heart failure, we synthesised it separately across four aspects—assessment, cognitive training and rehabilitation, dietary and exercise interventions, and multifaceted supportive management systems—resulting in 17 evidence items (Table 2).

Discussion

Refining the Content and Timing of Assessments from an Evidence-Based Perspective

In the clinical management of patients with heart failure, the assessment of cognitive impairment is a critical component of clinical treatment. To ensure the scientific validity and effectiveness of evaluation results, it is essential to refine assessments' content, tools, and timing from an evidence-based perspective, while also considering individual characteristics. Neuropsychological evaluations should encompass multiple domains, including memory, executive function, and

Table 2 Summary of Evidence on Management Strategies for Cognitive Impairment in Patients with Heart Failure

Aspects	Description of Evidence	Evidence Level	Recommended Level
Assessment	1. It is recommended to employ objective and appropriate methods—such as neuropsychological assessments and neuroplasticity indicators (eg, neuroimaging and electrophysiological measures)—to comprehensively evaluate the effectiveness and transfer effects of cognitive training[16,24,28]	Level 1	A
	2. In patients with heart failure and cognitive impairment, use the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA) to evaluate cognitive status[24,30]	Level 5	A
	3. Patients receiving cognitive training should undergo cognitive function assessment every 6–12 months.[24]	Level 5	A
Cognitive training and rehabilitation	4. Establishing an on-site cognitive training center at the training venue can enhance the effectiveness of cognitive training.[24]	Level 1	B
	5. A combined approach is recommended, integrating multiple training methods to cover various cognitive domains, including memory training, attention training, behavioural training, and logical reasoning, etc.[24,30]	Level 2	A
	6. Regarding duration and frequency, it is recommended that digital cognitive training consist of sessions of at least 30 minutes, delivered at a minimum of three sessions per week, with a cumulative total training time of no less than 20 hours.[24,30]	Level 1	A
	7. In terms of training methods, computer-assisted cognitive training and recall therapy are recommended[16,24,29]	Level 1	A
	8. Regarding training equipment, it is recommended that virtual reality (VR) technology be applied to the cognitive training of patients with cognitive impairment to increase their interest and Participation in cognitive training.[16,24]	Level 1	B
	9. Regarding training categories, cardiac rehabilitation can improve cognitive function in patients with heart failure.[26]	Level 1	A
Diet and exercise intervention	10. Exercise every other day for 30 minutes per session.[30]	Level 5	A
	11. It is recommended to select aerobic exercise modalities (eg, walking, cycling, resistance training, Tai Chi) based on cardiopulmonary exercise testing, using the anaerobic threshold as the reference point, and maintaining heart rate within ±5 beats per minute[16,30]	Level 5	A
	12. The Mediterranean diet and antihypertensive dietary therapy mainly include a high intake of whole grains and vegetables, a moderate intake of poultry and fish, and restricted salt intake, which can improve cognitive function and reduce the risk of dementia[27,30]	Level 5	A
Multifaceted supportive management systems	13. It is recommended that cognitive training centres be staffed with qualified specialists, neuropsychological assessors, cognitive rehabilitation therapists, and nursing personnel to develop individualised cognitive function training programmes for patients and to implement an integrated disease management model that encompasses the centre, the community, and the home[14,24,28]	Level 1	B
	14. It is recommended that clinical healthcare professionals comprehensively consider simplifying patients' medication regimens by using combination drugs to reduce the number of medications. For example, when a patient is taking two separate drugs, aspirin and clopidogrel, a clopidogrel–aspirin fixed-dose combination tablet can be used as a substitute to improve patient compliance[14,29]	Level 2	A
	15. Establish a follow-up system and recommend the use of internet-based platforms to monitor and manage patients' cognitive training and to conduct regular follow-up evaluations[24,29]	Level 4	B
	16. Family members and caregivers should participate in developing treatment plans for patients with heart failure and cognitive impairment, assist patients in implementing the treatment plans, provide emotional support, participate in rehabilitation training, help patients with self-monitoring, and participate in health education[14,16,25,29]	Level 5	A
	17. It is recommended that healthcare professionals employ feedback methods to provide written information in easy-to-understand language tailored to the patient's cognitive level when communicating with patients, and teach patients to use memory aids such as mobile phone memos and alarms to improve their self-care abilities[13]	Level 2	A

Notes: The Joanna Briggs Institute (JBI) grading system was applied to classify the quality of evidence supporting each recommendation. Grade A (strong recommendation): supported by high-quality evidence; benefits clearly and substantially outweigh potential harms; generally applicable across most settings. Grade B (weak recommendation): based on moderate-quality or uncertain evidence; implementation should be individualized, taking into account patient preferences and the specific clinical context.

visuospatial abilities. The MMSE and MoCA are currently the most widely used cognitive assessment tools in clinical practice. Current research indicates that the MoCA has a sensitivity of 90% and a specificity of 87%, making it more effective in identifying mild cognitive impairment within the normal range of MMSE scores.[31] Therefore, it is recommended that the MMSE and MoCA assessment tools be combined in clinical practice to improve the accuracy of cognitive function assessment significantly.

Regarding the timing of assessment, for patients undergoing cognitive training, the assessment should be conducted 6–12 months after training.[24] By conducting continuous, dynamic assessments of patients, healthcare professionals can monitor the effectiveness of rehabilitation training in real time, thereby providing practical guidance for clinical treatment. Additionally, Chen et al[1] noted that the primary risk factors influencing the development of cognitive impairment in heart failure patients include low educational attainment, advancing age, coronary heart disease, physical frailty, and diastolic dysfunction. Therefore, healthcare professionals should fully consider these influencing factors during patient assessment, conduct an in-depth analysis of the underlying causes, and implement targeted interventions to improve patients' quality of life.

Develop Personalised Cognitive Training and Rehabilitation Programmes Based on the Patient's Current Cognitive Status

Evidence from items 4 to 8 summarises practical approaches for improving cognitive impairment in heart failure. These approaches primarily involve cognitive rehabilitation training, covering aspects such as training methods, duration, frequency, and types, with high-quality evidence supporting them. Forms of cognitive training include computer-assisted cognitive training and reminiscence therapy. Computer-assisted cognitive training improves overall cognitive and language abilities in patients with mild vascular cognitive impairment,[32] whereas reminiscence therapy is more effective in enhancing memory.[33] Existing evidence[24] indicates that cognitive training can improve memory, executive function, attention, and language abilities in patients with mild cognitive impairment, as well as alleviate psychological disorders such as depression.

Multiple studies[16,30,34] suggest incorporating virtual reality (VR) technology into patients' cognitive training. By creating realistic three-dimensional environments for cognitive training, the sense of realism for patients is enhanced, increasing their interest and Participation in the intervention, thereby better promoting cognitive function recovery.[35] However, several technical challenges remain to be overcome, such as discomfort associated with device wear and patients' difficulty adapting to the technology; these issues require prompt resolution to optimize the user experience.[36] To enhance patients' experience, greater emphasis should be placed on familiarizing patients with VR devices, increasing training time, and adopting more advanced technological support. Research by Jung et al[34] indicates that Nature-VR has substantial potential to be deployed for at-home use at relatively low cost (for example, an Oculus Go head-mounted display costs approximately USD 300).

Additionally, there are issues with inconsistent standards, and healthcare personnel lack the necessary qualifications. Therefore, it is recommended that relevant standards be established and training for healthcare personnel in cognitive rehabilitation be strengthened. Furthermore, a professional team should be established to manage cognitive training for heart failure patients, enhancing the scientific rigour and accessibility of cognitive ability training.

Implement Clinical Interventions Based on Scientific Evidence Regarding Diet and Exercise

Physical exercise is considered an intervention method for improving cognitive function, although its specific mechanisms of action remain unclear.[14] However, exercise is widely believed to increase hippocampal and grey matter volumes and stimulate the production of brain-derived neurotrophic factor,[14] thereby improving cognitive function. Due to reduced cardiac pumping function and other factors, this population may struggle to adapt to high-intensity exercise and may experience exercise intolerance. Therefore, exercise recommendations should focus on daily physical activities such as walking, climbing stairs, and practising tai chi. Patients with heart failure-related cognitive impairment often have multiple comorbidities, such as hypertension, diabetes, and atrial fibrillation, which can complicate the implementation of exercise interventions. Healthcare

professionals are advised to provide specific recommendations based on patients' preferences, individual differences, and tolerance and adaptability to physical activity. Heart rate and blood pressure should be monitored during exercise, and patients' perceptions should be prioritised to ensure exercise safety.

Evidence 12 comprehensively outlines nutritional intervention measures for heart failure and cognitive impairment, demonstrating strong practical applicability. The National Institutes of Health in the United States noted in a 2010 report that nutrition and diet significantly impact the improvement of neurodegenerative diseases. The Mediterranean diet (such as seafood, fruits, vegetables, and olive oil) is closely related to cognitive ability in older people.[37] Therefore, exercise combined with a reasonable diet can effectively delay cognitive decline in patients with heart failure.

Improve the Multi-Party Support Management System Based on Patients' Clinical Needs

Given the complexity and challenges associated with treating cognitive impairments in heart failure patients, existing treatment methods often fail to provide adequate relief, underscoring the urgent need to establish multidisciplinary research teams. Leveraging the strengths of various specialties through interdisciplinary collaboration to address patients' health issues is also an indispensable component of current evidence-based nursing interventions. Evidence 13 suggests that cognitive training centres should be staffed with qualified specialists, neuropsychological assessors, cognitive rehabilitation therapists, and nursing personnel. However, given that the development of cognitive training centres in China is still in its early stages, more human and material resources are needed. Additionally, patients with cognitive impairment due to heart failure are primarily managed in hospital settings. It is recommended that future development strategies should prioritise expanding the construction of cognitive training centres and, on this basis, conduct in-depth research into integrated management models for centres, communities, and home-based care to optimise patients' overall care pathways.

Research[38] indicates that active involvement of family members and caregivers in discharge education for patients with heart failure-related cognitive impairment can significantly reduce their 30-day readmission rate. Chialà et al[39] found that anxiety and depression are independently associated with cognitive decline in heart failure patients, and emotional support from family members and caregivers plays a positive role in enhancing patients' treatment confidence and coping with the psychological stress caused by the disease. Family members and caregivers also play an irreplaceable role in reminding patients to take medication, supervising diet and exercise, and providing a safe living environment. They also help improve patients' self-care abilities.[14] Self-care is considered a feasible and straightforward decision-making process with naturalistic characteristics.[40] Healthcare professionals should focus on self-management education and support for heart failure patients with cognitive impairments, recommending that they teach patients various self-management strategies, such as using feedback methods to help patients understand medical instructions and employing tools like mobile phone reminders and alarms to aid memory.[14] These measures improve patients' self-care levels and enhance treatment adherence, improving overall patient outcomes.

Conclusion

This study systematically integrates the evidence on managing cognitive impairment in patients with heart failure across four domains: assessment; cognitive training and rehabilitation; dietary and exercise interventions; and multidisciplinary, collaborative management. Accordingly, we recommend translating this evidence into an actionable, scalable, standardized nursing care pathway: conduct systematic cognitive screening at key time points including diagnosis, changes in clinical status, and post-discharge follow-up; implement prescribed cognitive training and rehabilitation, accompanied by individualized aerobic and resistance exercise prescriptions and evidence-based nutritional support; adopt a nurse-led, multidisciplinary model that incorporates caregiver involvement to develop individualized care plans and follow-up pathways; and continuously monitor using quantitative indicators such as cognitive test scores, readmission rates, and quality of life. Meanwhile, this study identifies several critical evidence gaps: insufficient direct evidence for pharmacologic interventions targeting cognitive impairment; substantial heterogeneity and limited standardization in assessment tools and intervention protocols; and a scarcity of evidence on long-term outcomes and cost-effectiveness. Future nursing research and practice should prioritize: conducting multicenter, cross-regional implementation science studies that adopt harmonized outcome measures and reporting standards; optimizing nurse-led, integrated management pathways and

evaluating the effectiveness of combined pharmacologic and nonpharmacologic strategies; advancing equitable access to digital health and remote interventions and their real-world application; and strengthening evaluation of long-term effectiveness, cost-effectiveness, and patient- and caregiver-related outcomes.

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