

Telemedicine interventions for heart failure dyads: a scoping review protocol

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ABSTRACT

Objective: The objective of this review is to identify and map the available evidence on interventions for heart failure dyads through telemedicine.

Introduction: Heart failure is a chronic and progressive condition that requires significant lifestyle changes and daily support from informal caregivers. Due to the shared burden of care, the patient-caregiver dyad should be treated as a single unit in the management of the disease. Although telemedicine interventions for dyads are increasing, their application for dyads with heart failure remains largely unexplored, revealing a critical gap in the field.

Eligibility criteria: We will include all quantitative, qualitative, and mixed methods studies focusing on adult dyadic interventions for heart failure delivered via telemedicine. Studies involving dyads who do not share the same household will also be considered. Dyadic interventions aim to reduce discrepancies between patients and caregivers in their approach to the disease (dyadic appraisal), foster greater collaboration in planning appropriate responses to the disease (dyadic behavior), and improve the overall health status of both individuals (dyadic health). These interventions can be provided by various health care professionals using any device.

Methods: The scoping review will be conducted according to JBI methodology for scoping reviews. We will comprehensively search electronic databases, including PubMed, CINAHL, Web of Science, and Embase. Gray literature will also be considered. Two independent reviewers will screen the studies according to predefined criteria. Data extraction will be performed using a customized tool. Review findings will be analyzed and displayed using charting techniques in table format.

Review registration: OSF osf.io/nwafp

Keywords: caregiver; dyad; heart failure; telemedicine

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Introduction

Heart failure (HF) is a complex clinical syndrome caused by structural or functional heart abnormalities that impair the ability of the heart to pump or fill with blood effectively.¹ These impairments can result from weakened or remodeled heart muscles or valve dysfunction, which reduces blood circulation and potential complications.² The progressive course of the disease is characterized by a chronic phase with substantial clinical stability interspersed

with episodes of acute decompensation, during which worsening signs and symptoms are linked to clinical deterioration and an increased risk of mortality.^{1,2}

The prevalence of HF has increased due to advancements in treatment and improved survival rates.³ As a result, HF is now recognized as a growing global epidemic, affecting more than 64 million individuals worldwide.⁴

In addition to its widespread prevalence, distressing symptoms such as dyspnea, reduced activity tolerance, fatigue, dizziness, and lower limb edema significantly impair individuals' quality of life. These symptoms limit daily activities and increase the risk of emotional burden and social isolation.^{5,6} To describe their severity, the New York Heart Association

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(NYHA) classification is an internationally recognized tool that categorizes HF into 4 classes, ranging from the least severe (I) to the most severe (IV), based on the presence of symptoms in relation to physical activity.²

To effectively manage symptoms and reduce the risk of exacerbations, people living with HF must adopt critical self-care practices, such as restricting fluid intake, following a low-sodium diet, monitoring daily weight, and seeking prompt medical assistance during critical incidents.^{7,8} Due to the complexity of these requirements, people with HF often rely on daily support from an informal caregiver, typically a family member, who assists them in managing medications, monitoring symptoms, maintaining dietary restrictions, and ensuring regular medical follow-ups.⁹ This shared responsibility for care can harm the caregiver's physical, psychological, and social well-being, even during early stages of the disease when the functional limitations appear (eg, NYHA class II, characterized by slight limitations in physical activity, such as ordinary activity resulting in symptoms such as fatigue or shortness of breath).¹⁰⁻¹² Therefore, HF management should prioritize the patient-caregiver dyad (hereafter referred to as the HF dyad) rather than addressing the patient or caregiver individually.¹³

The patient-caregiver relationship functions as an interconnected system in which changes in one person's health or behavior directly influences the other, ultimately affecting the well-being of the entire unit.¹⁴ A recent meta-analysis demonstrated that dyadic care interventions, especially those aimed at enabling and motivating self-care practices, fostering collaborative coping within HF dyads, or improving the relationship between nurses and caregivers, significantly enhance patient and caregiver outcomes.¹⁵

Since the coronavirus pandemic, telemedicine interventions have become increasingly common.¹⁶ These interventions have been designed to overcome the geographic, physical, and structural barriers that impede the provision of health care services.¹⁷ Telemedicine delivers health care services through information and communication technologies when the health care provider and patient are not physically present in the same location.^{17,18} It encompasses various aspects of health care, including prevention, treatment, diagnosis, monitoring, and rehabilitation. Through telemedicine, the HF dyad can access disease information and care, including services such as psychological counseling, skills training, and therapeutic guidance, all of which

contribute to improving results and providing optimal care.^{18,19}

A preliminary search of MEDLINE, PROSPERO, and *JBI Evidence Synthesis* did not identify any in-progress or existing reviews on dyadic telemedicine interventions for HF; however, previous reviews have addressed related topics. A 2018 systematic review examined the characteristics, context, and results of interventions facilitating HF dyadic self-care.²⁰ Building on this report, another systematic review conducted across 3 databases in 2022, identified and described studies on HF dyadic self-care interventions provided in hospital settings.²¹ These reviews focus specifically on dyadic interventions aimed at self-care practices, delivered in person or remotely, without considering interventions designed for other purposes. A 2023 state-of-the-art review provided a narrative synthesis of qualitative and quantitative research on HF dyads.²² Although this review offers valuable insights into the topic, the authors did not clarify their research strategy. In the same year, an integrative review summarized the evidence on nurse-led educational interventions for HF dyads²³; however, it overlooked dyadic interventions provided by other health care professionals. To the best of our knowledge, dyadic interventions delivered via telemedicine have only been analyzed in other contexts, such as neurological²⁴ and oncological settings.²⁵

As highlighted in these reviews, dyadic HF support is a relatively young field, and substantial work is still needed to advance research and understanding in this area.^{15,20-23} With the rapid expansion of telemedicine driven by technological advancements and the need for more sustainable models of care for chronic disease management, it is crucial to systematically explore the scope and nature of the existing evidence on dyadic HF telemedicine interventions.

The findings of this review will help guide current practices and serve as a valuable resource for health care professionals to design remote services for HF dyads. Therefore, the aim of this scoping review is to identify and map the available evidence on interventions administered to HF dyads through telemedicine. Identifying, mapping, and classifying these interventions in relation to the HF dyad will not only facilitate the delivery of targeted interventions to both patients and caregivers, but also support health care professionals in identifying the most appropriate telemedicine intervention for their specific context.

Review questions

What features characterize telemedicine interventions delivered to the HF dyad?

Sub-questions include:

- i) What type of relationship characterizes the members of the HF dyad?
- ii) What type of intervention and purpose (prevention, treatment, diagnosis, rehabilitation, and monitoring) are the telemedicine interventions provided to the HF dyad?
- iii) Who are the health professionals who provide HF dyadic telemedicine interventions?
- iv) What outcomes were measured for telemedicine interventions administered to the HF dyad?
- v) What is the level of acceptability and satisfaction of recipients of dyadic telemedicine interventions for HF?

Eligibility criteria

Participants

For this review, the HF dyad will be defined as a pair consisting of an adult patient (>18 years) with HF at any stage and a caregiver who assists with management and caregiving, typically on an unpaid basis. The dyad members may be bound by various ties (ie, kinship ties, such as spouses or adult children), may be cohabiting partners, have other familial relationships, or be friends. Dyads who do not share the same households were also considered.

Concept

The concept under analysis is HF dyadic intervention delivered through telemedicine. Dyadic telemedicine interventions are characterized by the active remote participation of both individuals affected by HF and their caregivers.¹⁸ In accordance with the Theory of Dyadic Illness Management,²⁶ interventions can be designed to assess or improve outcomes related to dyadic appraisal (ie, reducing discrepancies between the patient and caregiver in their approach to the disease), dyadic management behaviors (ie, promoting greater collaboration in planning appropriate responses to the disease), and dyadic health (ie, improving the physical and psychological well-being of both individuals). These interventions can be delivered through various tools (smartphones, tablets, and personal computers) and occur synchronously or asynchronously between chronic patients and caregivers.²⁷

Context

This review will encompass studies investigating telemedicine interventions conducted at patients' and caregivers' homes. Consistent with the definition of telemedicine,¹⁷ it is crucial that health care professionals delivering the intervention and the dyad are not physically collocated. This review will consider studies from high- and low-income countries.

Types of sources

This scoping review will consider quantitative, qualitative, and mixed method study designs for inclusion. In addition, studies using multi-methods approaches will also be considered. Systematic reviews, texts, and opinion papers will be considered for inclusion.

Methods

The proposed scoping review will be conducted in accordance with the JBI methodology for scoping reviews²⁸ and in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).²⁹ The review protocol has been registered with OSF (osf.io/nwafp).

Search strategy

An initial search of PubMed, CINAHL, Web of Science, and Embase was performed to identify relevant articles. With the support of an expert librarian, we used the key terms contained in the titles and abstracts of the appropriate articles and the associated index terms to develop a complete search strategy for PubMed (see Appendix I). The search strategy will be adapted for each source of information, including all the identified keywords and index terms. The reference lists of all included studies will be screened for additional relevant papers.

PubMed, CINAHL Ultimate (EBSCOhost), Web of Science, and Embase will be searched. We will search for gray literature via ProQuest Dissertations and Theses Global. No language limitations will be imposed on the papers selected for inclusion. Texts in languages other than English and Italian will be translated with the assistance of GPT-4o (OpenAI, San Francisco, USA). Evidence that is translated using GPT-4o will be verified by a professional translator. No publication date limitations will be applied.

Study selection

After the search, all identified records will be collated and uploaded to Covidence (Veritas Health Innovation, Melbourne, Australia), and duplicates removed. Two independent reviewers will screen titles and abstracts to assess their eligibility against the eligibility criteria. Relevant sources will be retrieved in full and evaluated against the eligibility criteria for the review. Before initiating the full-text screening phase, the reviewers will carry out a pilot test on 10 full-text documents, aiming to achieve at least 80% agreement within this subset. Once this level of concordance is reached during the pilot stage, each full-text document will be independently evaluated by 2 reviewers, who will reach a consensus on whether to include or exclude documents based on the eligibility criteria. Any disagreements between reviewers will be resolved through discussion or with a third reviewer.

The reasons for exclusion will be noted and reported in the review. At each selection step, conflicts between reviewers will be resolved through discussion or by consulting a third reviewer. The results of the search and study inclusion processes will be fully reported in the final scoping review and presented in a PRISMA flow diagram.³⁰

Data extraction

Data will be extracted from studies included in the scoping review by 2 independent reviewers using a data extraction tool.

The extracted data will encompass details regarding participants, concepts, context, methodology, and critical results of the review questions. Examples of the extracted data include the following: types of telemedicine intervention and device delivery, health professionals providing interventions, assessed outcomes (if any), characteristics and geographic locations of the dyads, and perceived barriers or facilitators.

The data extraction will be preceded by an additional pilot phase. Two reviewers will compare the extraction of 10 manuscripts to evaluate data consistency and improve the alignment of the extracted information. The draft extraction tool is provided (see Appendix II). As data are extracted from each included study, the draft data extraction tool will be adjusted and modified as required. These changes will be reported and justified in the scoping review. Any disagreements with the reviewers will be resolved through discussion or by a third reviewer. If needed, the authors

of the studies included will be contacted up to 2 times to request any missing or additional data.

Data analysis and presentation

The review's findings will be examined and presented using charting techniques in tabular format. In addition to the tabulated data, descriptive counts, frequencies, and content analyses will illustrate how the results relate to the review's goal. The presentation of the results will follow the graphical indications supplied in the *JBI Manual of Evidence Synthesis*.²⁸

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Author contributions

CV, IB, EB, ADM developed the concept and initial strategy and drafted the manuscript. CV, IB, EB developed the search strategy and conducted the search. IB, AD, EB, ADM revised the manuscript.

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Appendix I: Search strategy

PubMed		
Search conducted: December 22, 2024		
Search	Query	Records retrieved
#1	"Heart Failure" [MeSH] OR "Heart Failure, Diastolic"[Mesh] OR "Heart Failure, Systolic"[Mesh] OR "cardiac failure*" [Title/Abstract] OR "heart decompensation*" [Title/Abstract] OR "heart failure*" [Title/Abstract] OR "myocardial failure*" [Title/Abstract]	287,654
#2	"Caregivers" [MeSH] OR caregiv* [Title/Abstract] OR carer* [Title/Abstract] OR "care giver*" [Title/Abstract] OR Spous* [Title/Abstract] OR famil* [Title/Abstract] OR Relative* [Title/Abstract] OR "next of kin*" [Title/Abstract] OR "Family" [Mesh] OR Kinship* [Title/Abstract] OR couple* [Title/Abstract] OR dyad* [Title/Abstract] OR dyad* intervention* [Title/Abstract]	3,793,937
#3	"Telemedicine" [Mesh] OR "Telenursing" [Mesh] OR virtual* [Title/Abstract] OR remote* [Title/Abstract] OR videoconferenc* [Title/Abstract] OR digital* [Title/Abstract] OR "Telerehabilitation" [MeSH] OR "Remote Consultation" [Mesh] OR mhealth [Title/Abstract] OR ehealth [Title/Abstract] OR tele* [Title/Abstract] OR "telehealth" [Title/Abstract] OR "Distance Counseling" [Mesh] OR "Mental Health Teletherapy" [Mesh] OR Technology [Mesh]	1,238,377
	#1 AND #2 AND #3	1013
No date limits. No language limits.		

Appendix II: Draft data extraction instrument

Scoping review details	
Scoping review title	
Review objective/s	
Review question/s	
Inclusion/exclusion criteria	
Population	
Concept	
Context	
Types of evidence source	
Evidence source and characteristics	
Citation details (eg, author/s, date, title, journal, volume, issue, pages)	
Country	
Context	
Participants (eg, age/sex and number)	
Details/results extracted from source of evidence (in relation to the concept of the scoping review)	
Type of telemedicine intervention and device being delivered	
Health professionals providing the interventions	
Assessed outcomes (if any)	
Characteristics and geographical location of the dyad	
Barriers or facilitators perceived	