TEXTO & CONTEXTO ENFERMAGEM
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MOBILE APP MAPPING FOR HEART FAILURE CARE: A SCOPING REVIEW

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ABSTRACT

Objective: to map mobile apps for care in heart failure.
Method: this is a scoping review based on the method proposed by the Joanna Briggs Institute. The following research question was used: which mobile apps on heart failure are used by health professionals, people with heart failure and their family/caregivers? Health bases and portals were analyzed through the search with the descriptors "Heart Failure", "Mobile Applications", "Patients", "Health Personnel", "Family" and "Caregivers" and the keyword "Applications". Forty-seven studies were selected for analysis.
Results: a total of 47 published studies were analyzed, which allowed mapping 39 mobile applications from four continents, among which 20 (51.3%) were intended for co-management and 19 (48.7%) had as target population patients and health professionals; 23 (58.9%) applications did not use theoretical framework for its construction. The prevalent theme and resources involved daily care (36; 92.3%) and data management (37; 94.9%), respectively.
Conclusion: the themes and resources of the applications assisted patients, family members and professionals in heart failure management. However, a gap was identified in several themes involving individuals and their surroundings, essential for comprehensive care.

DESCRIPTORS: Heart failure. Technology. Telemedicine. Mobile applications. Health promotion. Nursing.

HOW CITED: CESTARI VRF, FLORÊNCIO RS, GARCES TS, SOUZA LC, PESSOA VLMP, MOREIRA TMM. Mobile app mapping for heart failure care: a scoping review. Texto Contexto Enferm [Internet]. 2022 [cited YEAR MONTH DAY]; 31:e20210211; Available from: https://doi.org/10.1590/1980-265X-TCE-2021-0211.

MAPEAMENTO DOS APLICATIVOS MÓVEIS PARA O CUIDADO NA INSUFICIÊNCIA CARDÍACA: REVISÃO DE ESCOPO

RESUMO

Objetivo: mapear os aplicativos móveis para o cuidado na insuficiência cardíaca.
Método: revisão de escopo baseada no método proposto pelo Instituto Joanna Briggs. Com a seguinte questão de pesquisa: quais os aplicativos móveis sobre insuficiência cardíaca são utilizados por profissionais da saúde, pessoas com insuficiência cardíaca e seus familiares/cuidadores? Foram analisados bases e portais de saúde captados via busca com os descritores “Insuficiência cardíaca”, “Aplicativos móveis”, “Pacientes”, “Pessoal de saúde”, “Família” e “Cuidadores” e a palavra-chave “Aplicativos”. Foram selecionados 47 estudos para análise.
Resultados: foram analisados 47 estudos publicados, que permitiu mapear 39 aplicativos móveis, oriundos de quatro continentes, dentre os quais 20 (51,3%) tinham como finalidade o cogerenciamento e 19 (48,7%) tinham como população-alvo pacientes e profissionais da saúde; 23 (58,9%) aplicativos não utilizaram referencial teórico para sua construção. A temática e os recursos prevalentes envolveram cuidados diários (36;92,3%) e gerenciamento dos dados (37;94,9%), respectivamente.
Conclusão: as temáticas e recursos dos aplicativos auxiliaram pacientes, familiares e profissionais na gestão da insuficiência cardíaca. Contudo, identificou-se hiato em diversas temáticas que envolvem o indivíduo e seu entorno, imprescindíveis para o cuidado integral.

DESCRITORES: Insuficiência cardíaca. Tecnologia. Telemedicina. Aplicativos móveis. Promoção da saúde. Enfermagem.

MAPEO DE APLICACIONES MÓVILES PARA LA ATENCIÓN DE LA INSUFICIENCIA CARDÍACA: REVISIÓN DEL ALCANCE

RESUMEN

Objetivo: mapear aplicaciones móviles para el cuidado de la insuficiencia cardíaca.
Método: revisión del alcance basado en el método propuesto por el Instituto Joanna Briggs. Con la siguiente pregunta de investigación: ¿qué aplicaciones móviles de insuficiencia cardíaca utilizan los profesionales sanitarios, las personas con insuficiencia cardíaca y sus familiares/cuidadores? Se analizaron bases de datos y portales de salud capturados mediante búsqueda con los descriptores “Insuficiencia cardíaca”, “Aplicaciones Móviles”, “Pacientes”, “Personal de Salud”, “Familia” y “Cuidadores” y la palabra clave “Aplicaciones”. Se seleccionaron 47 estudios para su análisis.
Resultados: se analizaron 47 estudios publicados, que permitieron mapear 39 aplicaciones móviles, de cuatro continentes, de las cuales 20 (51,3%) tenían la finalidad de cogestión y 19 (48,7%) tenían como población objetivo pacientes y profesionales de la salud; 23 (58,9%) aplicaciones no utilizaron un marco teórico para su construcción. El tema y los recursos prevalentes fueron el cuidado diario (36;92,3%) y la gestión de datos (37;94,9%), respectivamente.
Conclusión: los temas y características de las aplicaciones ayudaron a pacientes, familias y profesionales en el manejo de la insuficiencia cardíaca. Sin embargo, se identificó una brecha en varios temas que involucran al individuo y su entorno, los cuales son fundamentales para la atención integral.

DESCRIPTORES: Insuficiencia cardíaca. Tecnología. Telemedicina. Aplicaciones móviles. Promoción de la salud. Enfermería.

INTRODUCTION

Heart failure (HF) is an emerging global threat, with a worldwide prevalence of 64.34 million cases (8.52 per 1,000 inhabitants), representing 9.91 million years lost due to disability and spending of US$346.17 billion,1 with perspective of increase, despite the therapeutic advance. HF puts patients at high risk of sudden death or progressive organ failure, besides causes physical, clinical, social and psychological disorders. Thus, improving care and prognosis of these patients is an essential goal of public health.

In this sense, health care should extrapolate the restoration of clinical parameters. It demands conditions for health promotion, protection and recovery, because it involves factors such as food, work, income, access to goods, services and information[2–4], which requires professionals, patients and caregivers/family members adaptability and skills to reinvent care, due to the chronic character of HF, which has symptoms and treatments for prolonged periods. From this perspective, adopting digital and mobile health technologies, such as applications (APPs), is an alternative for expanding care, without disregarding the subjects to whom care actions are intended, in addition to practicality and the ability to interact[5].

In HF, APPs can encourage the adoption of healthy behaviors, allow monitoring of patients, increase knowledge of the disease and also help professionals in clinical decision-making[6], as they enable access to information and applications anywhere and anytime. However, the indication and insertion of this technology in professionals' care routine, patients with HF and their families to meet demands that result in effective gains, must be assessed.

Therefore, it is justified to map APPs that have already been developed to assess their quality and their actual use in the routine care of patients with HF. However, it appears that themes already addressed in the literature are reduced and fragmented in the context of self-care and management, and exclude professionals and family members/caregivers[5–6]. In this area, this study is relevant because it fills a literary gap about APPs on HF, highlighting the need to expand existing knowledge, in order to know the contents and resources presented.

Thus, this research aimed to map mobile applications for care in HF.

METHOD

This is a scoping review, whose construction followed the Joanne Briggs Institute (JBI)[7] guidelines and the Preferred Reporting Items checklist for Systematic Reviews and Meta-Analyses - Extension for Scoping Review (PRISMA-ScR) recommendations[8]. As this is a review study, approval by an Institutional Review Board is not required.

The research question was constituted as: which mobile applications about hf are used by health professionals, People with HF and their family members/caregivers? Eligibility criteria were defined using the acronym PCC (Population, Concept and Context). For the population, health professionals, people with HF and their family members/caregivers were chosen; for the concept, studies on development, usability, feasibility and validation of APPs on HF were selected; and, as a context, HF was used. Articles electronically published in full, with no restriction on language or year of publication were types of evidence sources.

For this, studies were searched on the Latin American and Caribbean Literature on Health Sciences (LILACS), Spanish Bibliographic Index of Health Sciences (IBECS) ScienceDirect, Web of Science, Scopus, Cumulative Index to Nursing and Allied Health Literature (CINAHL), EBSCO, Embase, PsycInfo and PubMed portal databases.

The searches and study selection process took place from December 2019 to August 2020. The descriptors were used according to the terminology of the Health Science Descriptors (DeCS) and Medical Subject Headings (MeSH): “Heart Failure”, “Mobile Apps”, “Patients”, “Health Personnel”, “Family” and “Caregivers”. It is reiterated that the keyword “Applications” was included in the searches, in order to expand the findings. Searches were performed with these terms, integrating them using the Boolean operators “AND” and “OR”.

We chose to carry out the search with descriptors in the English language, as the equation enabled the identification of a greater number of articles, when compared to searches with descriptors in Portuguese and Spanish. On LILACS and IBECS, the strategy was set up (tw:(*insuficiência cardíaca*)) AND (tw:(*aplicativos móveis*)) OR (tw:(*aplicativos*)) AND (tw:(*pessoal da saúde*)) OR (tw:(*paciente*)) OR (tw:(*família*)) OR (tw:(*cuidadores*)); on the PubMed portal, ((((((heart failure) and mobile applications) or applications) and pacients) or health personnel) or family) or caregivers; on Web of Science and ScienceDirect, the equation was used (heart failure) AND (mobile applications or “applications”) AND (patients) OR (health personnel) OR (family) OR (caregivers) AND TÓPICO: (“heart failure”); on Scopus, (TITLE-ABS-KEY (heart failure) AND TITLE-ABS-KEY (mobile applications or “applications”) AND TITLE-ABS-KEY (patients) OR TITLE-ABS-KEY (health personnel) OR TITLE-ABS-KEY (family) OR TITLE-ABS-KEY (caregivers); on EBSCO, CINAHL and Embase, (heart failure) AND (mobile applications or “applications”) AND (patients) OR (health personnel) OR (family) OR (caregivers); e, por fim, na PsycInfo, Title: heart failure AND Any Field: mobile applications OR Any Field: “applications” AND Any Field: “health personnel” OR Any Field: “patients” OR Any Field: “family” OR Any Field: “health caregivers”.

Furthermore, the studies were selected by two independent reviewers. Disputes were resolved with critical discussion among reviewers. If they were unable to reach a consensus, a third reviewer would assist in the process. Furthermore, data collection was carried out in September 2020 and they were organized in a spreadsheet in Microsoft Excel®. Each study was coded with the letter “A”, followed by a number.

For data extraction, the JBI[7] instrument was adapted, considering the following aspects: identification (title, authors, language, country, place, journal, year of publication and APP name); methodological aspects (objectives, research design, framework, sampling, data processing); and critical analysis (themes covered, resources, strengths and weaknesses and main conclusions).

Finally, the presentation of the obtained data was given in a table, with a synthesis of the studies and figures to map the information related to the country of development of the researches and contents and resources identified in the APPs.

RESULTS

The search identified 747 potentially relevant studies, of which 409 were removed for duplication. The remaining 338 studies were selected by title and abstract. Of this total, 132 studies were included for full-text analysis by two independent reviewers. Then, after reading in full, another 85 studies were excluded for not answering the research question, leaving 47 studies (Figure 1).

Therefore, data pertinent to the acronym that founded the research question and the purpose of this review were extracted from primary studies, such as authors, application name, purpose, method and target population, which are characterized below in Chart 1.

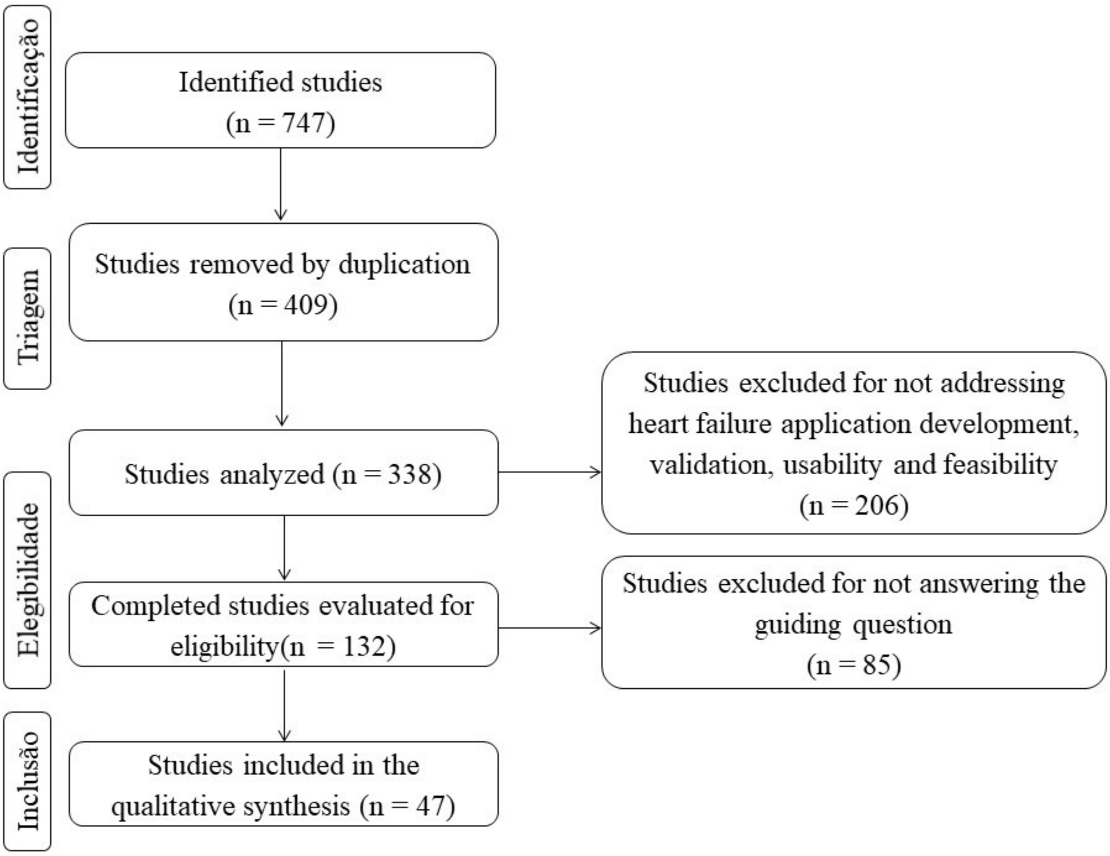

Figure 1 - Diagram of the study selection process according to PRISMAScR guidelines. Fortaleza, CE, Brazil, 2021.

Chart 1 - Characterization of articles selected for scoping review. Fortaleza, CE, Brazil, 2021.

Authors	**Application name**	**Purpose**	**Method**	**Target population**
Du et al.[9]	NI*	Knowledge and Self-care	Development, feasibility and aceitabilidade	People with HF† Family members/ caregivers
Wonggom et al.[10]	NI*	Self-care	Clinical validation	People with HF†
Kiyarosta et al.[11]	My Smart Heart	Self-care	Clinical validation	People with HF†
Heiney et al.[12]	Healthy Heart	Self-monitoring	Feasibility and usability	People with HF†
Cornet et al.[13]	Power of the Pacient	Knowledge	Feasibility and usability	Health professionals
Yanicelli et al.[14]	SiTe iC	Co-management	Development	People with HF†
Yanicelli et al.[15]	SiTe iC	Co-management	Clinical validation	People with HF†
DeVore et al.[16]	CONNECT-HF (HealthStar)	Co-management	Clinical validation	People with HF†
Woods et al.[17]	Care4MyHeart	Co-management	Development	People with HF† Family members/ caregivers Health professionals

Chart 1 - Cont.

Authors	Application name	Purpose	Method	Target population
Ware et al.[18]	Medley	Self-monitoring	Clinical validation	People with HF†
Werhahn et al.[19]	CPMP	Co-management	Feasibility	People with HF†
Sharma et al.[20]	TARGET-HF-DM	Self-care	Clinical validation	People with HF†
Arulnathan, Vaaheesan and Denecke[21]	Eletronic Heart Diary	Co-management and motivation	Development	People with HF†
Windmon et al.[22]	TussisWatch	Diagnosis	Development	People with HF†
Woods et al.[23]	Care4MyHeart	Self-management	Usability	People with HF† Family members/ caregivers Health professionals
Baik et al.[24]	mi.Symptoms	Self-care	Clinical validation	People with HF†
Kongsofla et al.[25]	MySmartHeart	Self-care and knowledge	Internal validation	People with HF† Family members/ caregivers Health professionals
Lloyd et al.[26]	Penn State Heart Assistant	Self-care	Clinical validation	People with HF†
Zhang, Babu and Gimbel[27]	iHeartU	Self-care	Usability	People with HF† Health professionals
Scherr et al.[28]	MOBITEL	Co-management	Clinical validation	People with HF†
Athilingam et al.[29]	CHF Info App	Knowledge	Adequacy and readability	People with HF†
Guo et al.[30]	NI*	Co-management	Clinical validation	People with HF†
Haynes and Kim[31]	OnPoint	Self-management	Adequacy	People with HF† Profissionais
Portz et al.[32]	HF App	Self-care	Internal validation	People with HF†
Foster[33]	HF App	Self-care	Development	People with HF†
Spanakis, Psaraki and Sakkalis[34]	NI*	Co-management	Development and usability	People with HF†
Baert et al.[35]	HeartMan	Co-management	Clinical validation	People with HF†
Athilingam, Clochesy and Labrador[36]	HeartMapp	Co-management	Internal validation	People with HF† Health professionals
Athilingam et al.[37]	HeartMapp	Co-management	Clinical validation	People with HF† Health professionals
Safdari et al.[38]	NI*	Co-management	Development	Health professionals
Darling et al.[39]	Heart Vest Control App	Co-management	Development	People with HF†
Srinivas, Cornet and Holden[40]	Engage	Self-care	Development	People with HF† Family members/ caregivers
Alnosayan et al.[41]	NI*	Co-management	Development and usability	People with HF†

Chart 1 - Cont.

Authors	Application name	Purpose	Method	Target population
Athilingam et al.[42]	HeartMapp	Co-management	Development and internal validation	People with HF†
Curcio et al.[43]	e-CRTD	Decision-making	Clinical validation	People with HF†
Madias[44]	AliveCor	Co-management	Development	People with HF†
Chantler et al.[45]	SUPPORT-HF	Co-management	Usability	People with HF†
Radhakrishnan et al.[46]	Heart Health	Self-management	Development and feasibility	People with HF†
Dithmer et al.[47]	The Heart Game	Cardiac rehabilitation	Development and feasibility	People with HF†
Riley et al.[48]	Care beyond Walls and Wires	Co-management	Development and usability	People with HF†
Triantafyllidis et al.[49]	SUPPORT-HF	Co-management	Development	People with HF†
Goldstein et al.[50]	NI*	Self-monitoring	Clinical validation	People with HF†
Bartlett et al.[51]	SMART	Self-care	Realistic assessment	People with HF†
Martín et al.[52]	CardioManager	Co-management	Feasibility	People with HF†
Vuorinen et al.[53]	NI*	Co-management	Clinical validation	People with HF†
Suh et al.[54]	WANDA	Co-management	Development	People with HF†
Winkler et al.[55]	NI*	Co-management	Feasibility	People with HF†

*NI: not informed, †: heart failure.

The American continent concentrated the largest number of publications (26; 55.3%), especially the United States (23; 48.9%)[12–13,16,20,22,24,26–27,29,31–33,36–37,39–42,44,46,48,50,54], Canada (1; 2.1%)[18] and Argentina (2; 4.3%)[14–15], followed by the European continent, with thirteen (27.7%) studies, three (6.4%) from the United Kingdom[45,49,51], Germany (2; 4.3%)[19,55] and Austria, [28]Switzerland[21], Greece[34], Belgium[35], Italy[43], Denmark[47], Spain[52] and Finland[53], with one (2.1%) publication each. The Asian continent concentrated five (10.6%) publications from China (1; 2.1%)[30], Thailand (1; 2.1%)[10] and Iran (3; 6.4%)[11,25,38], and Oceania, three (6.4%), developed by Australia (3; 6.4%)[9,17,23].

The studies were published between 2011[54–55] and 2020[9–21]. The methods were varied, but clinical validation studies of APPs predominated (15; 31.9%)[10–11,15–16,18,20,24,26,28,30,35,37,43,50,53]. The 47 published studies brought 39 APPs on HF, among which 20 (51.3%)[14,16–17,19,22,26,29,34–35,38–39,41–42,44–45,48,52–55] had co-management purposes and eight (20.5%)[9,30,34,38,41,50,53,55] had no names disclosed.

The other information extracted from the studies related to the APPs' target population, theoretical and thematic framework and resources used. It was observed that 19 APPs (48.7%)[14,16,19,21–22,28,30,34,38–39,41–42,44–55,48,52–55] had as target population patients and health professionals; 15 (38.5%)[9,11–13,18,20,24,26–27,29,31–32,46,50–51] were directed only to patients; two (5.1%)[40,47] for patients and their families; one (2.6%)[43] for professionals only and one (2.6%)[17] for all those involved in the care process: patients and their families and health professionals.

It was found that 23 (58.9%)[14,16,19–20,22,24,28–30,32,35,38–39,43–44,46,50–55] studies did not report the use of a theoretical framework for the development and/or validation of the constructed APPs. Among those who used it, user-centered design (6; 37.5%)[13,27,31,40,42,47], followed by codesign (4; 25%), stood out[9,11–12,17]. The other frameworks were used only by one (6.2%) study each: Continuous Design

Guidelines[21], Cognitive Social Theory[26], Internet of Things[34], Scientific Design Research[41], Agile Development Methodology[45] and Unified Theory of Acceptance and Use of Technology[18],

All the studies included collected various information regarding the content (thematic) and features (functionalities) contained in the APP (Figure 2). The themes involved daily care (36; 92.3%)[9,11–38,40–42,45–55], well-being (10; 25.6%)[11–12,21,24,29,34–35,42]. [-45] and treatments and examinations (7; 17.9%)[13,21–22,39,41,43–44]. Available features (features) were categorized into: configuration requirements (6; 15.4%)[11,14,17,34,50,52], data management (37; 94.9%)[11–18,20–55], data transfer (22; 56.4%)[11–12,14,17,19–22,28,30–34,38–39,41–42,45,50,53–55] and gamification (5; 12.8%)[9,21,28,46–47].

We also sought to identify positive and negative aspects of the development and use of selected APPs. In general, they allowed better data management;[9–10,12,16–18,26–27,31,36–38,41,46,51,54] guided clinical decision-making;[21–22,36–37,43] allowed personalized care;[14–15,28,31] assisted in the organization and proper use of medicines;[9,18,26–27,31] can be used at any time;[18,54] information could be shared and enabled daily communication with health professionals;[18–19,28,31,41,53–55] allowed to perform tasks and daily activities proposed more quickly;[31,38,43,54] and reduced health costs[52].

However, some limitations were highlighted, such as technical and/or design problems;[18,31,40–41,51] requirement of technological literacy and understanding of user types;[9,29,31,36–37,42,47] needs for connectivity and protection of personal information;[9–11,14–15,20–23,25,28–32,34,37–39,41–42,44–46,49–50,53–55] operating system restriction;[9,19–29,31] need other devices;[31,35,39,54–55] and high cost for development, maintenance and use[28,31].

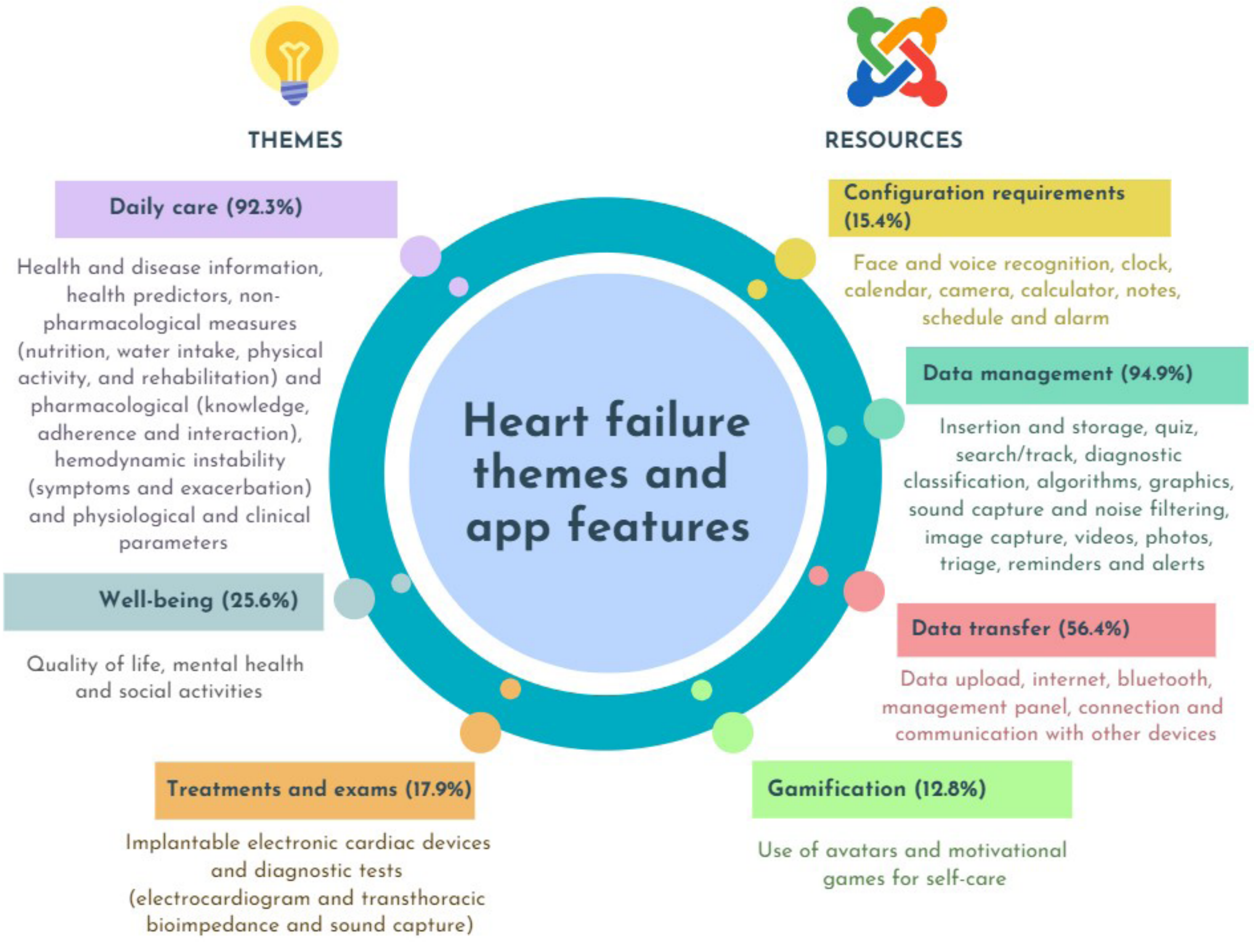

Figure 2 - Categories of themes and resources identified in the studies. Fortaleza, CE, Brazil, 2021.

DISCUSSION

The growing search for the quality of care through APP for people with HF portrays the relevance of new therapeutic modalities that favor users, family members and professionals, enhancing positive health outcomes with greater flexibility. With the growth of the Internet, it increases the sale of smartphones and, with this, intensifies the development of studies of APP construction, validation, usability, readability, accessibility and adequacy.

In HF, the first published studies on APP were in 2011, from the United States and Germany. Despite the expansion over the years, Americans still focus on most studies. The United States is marked by intense social inequities, evidenced by the geographical variation in mortality rates of the disease[12–13]. Still, there are many risk factors for the development of HF, such as inadequate lifestyle habits[16]. that corroborate the high prevalence of the disease in the country.

It is emphasized that there are no studies from Brazil, despite the high prevalence of the disease in the country. Despite the existence of Brazilian APPs in the main virtual stores (Google play and Apple store), it was not possible to find, in the literature, research that describes the process of construction and validation. This finding is worrisome, because the creation of these technological tools requires adequately defined and structured steps for the APP to be useful to the end user.

The clinical heterogeneity of HF is perceived in several management strategies and care actions implemented. Thinking about the person with HF is valuing the individual, understanding the uniqueness of the other. Thus, care cannot be conceived in a timely manner, but through an enlarged look. In this perspective, the plurality of the purposes, themes (contents) and resources identified in the studies is justified. However, developing a technology for care requires caution. Furthermore, researchers demand a thorough investigation of socioeconomic, behavioral and cognitive aspects of users, in addition to choosing the appropriate method for technological structuring. Different theoretical frameworks that guide the construction of APP emerged, with emphasis on user-centered design (UCD) and codesign.

The UCD method was used to develop APP with the objective of increasing knowledge levels[13], self-care[27,40]. self-management[31] and co-management[36–37,42]. It establishes collaboration between users and researchers in the design phase[27,47]. Codesign was employed in APP whose purpose was to increase knowledge and self-care[9–11], self-monitoring[12] and co-management[17,23]. It is the creative and participatory process that involves diverse group of individuals interested in exploring, developing and testing a technology[9–12,17].

The two approaches converge on the relevance of the insertion of users in the project, because designers are not always able to understand their health demands. However, the chronicity and complexity of HF are not only associated with biological changes from the disease, but involve individuals' surroundings, where social, economic and demographic determinants influence the prognosis[12–13,17,19,27,34], making it vulnerable. Thus, methods with the participation of all those involved in the care process, which consider social, physical and cognitive aspects of their public, are essential for APP development[33,38–39], acceptability[9], adequacy[29,31] and feasibility[46–47,52,55].

As for the purposes, it was found the researchers' concern in stimulating self-care and management of HF. Self-care involves taking actions and adoption of health-maintained behaviors[11,20,24,26], while management or management is the active participation of patients in their treatment[16,21,24,36]. In HF, these purposes are interconnected because self-care is vital to successful management.

In the studies analyzed, patients who used APP for self-care and co-management presented better health results, because they allowed the organization of care and the sharing of information with health professionals[29,31,36–37]. Thus, they contributed to self-perception of alarm symptoms[33], participation of patients in professionals' clinical decision-making process[21,43], contributing to the elaboration of reliable diagnoses and targeted therapeutic guidelines/approaches[14–15].

There was a predominance of studies with patients and professionals, few were developed in order to integrate family members/caregivers. Self-care and disease management practices are more effective when all actively participate in care actions. Therefore, it is relevant that family members make use of these tools to strengthen care and invest in safer care[43]. When developed for patients, APPs function as facilitating strategies of self-care, maintenance of autonomy and independence. For family members/caregivers who play an important role in the care of patients with HF, APPs are an additional form of information[17,47].

Multiple themes were addressed in the studies, mainly related to daily care. However, despite the number of studies, themes such as the functioning of the network system and public policies, economic support, with explanation about the rights, benefits and aid of the government, sexual activity and family planning, breathing exercises, oral hygiene, vaccination, palliative care, hospital discharge, and health vulnerability were neglected. This absence reaffirms the complexity of the disease and highlights relevant gaps in the scientific literature.

HF requires daily reorganization of affected people. Adhering to therapy requires discipline and resilience, in addition to understanding the various situations of vulnerability experienced[10]. In this scope, the incorporation of resources is an essential strategy for managing information and thus facilitating care. HF demands innovative actions that allow reinventing the way of caring, in a creative and, several times, playful way, with positive reinforcements. In the studies, resources programmed and invested in the APPs included configuration, management, data transfer, and gamification requirements.

The chronic character of HF requires changes in lifestyle, which can increase patients' quality of life and life expectancy. Continuous monitoring and care of daily vital signs allow them to recognize changes or complications early. However, self-monitoring rates are low, as patients often forget to record relevant information, such as signs and symptoms, vital signs, and medications in use[21,56]. This complicates check-ups and makes it difficult to identify condition worsening.

This said, APPs that provide resources that offer comfortable use to patients, with interactive elements that provide reliable information, such as data insertion and transmission, can increase patient safety, decrease hospitalization episodes, and share their data with health professionals. APP with risk stratification and diagnostics feature are tools essential to health professionals and patients for providing prognosis and personalized treatment[22,43].

Finally, among the resources, strategies such as gamification with the use of avatars and motivational games proved to be effective in personalized health training, knowledge improvement, maintenance and trust for self-care, through daily challenges and scoring systems, in addition to winning medals and rewards[9–10,47].

The methods adopted, purposes, themes and resources allowed the availability of APP with numerous positive aspects. However, authors reinforced the need to know the profiles of users, which can affect the way the system is used[31], which requires care in the use of APPs from other cultures. Moreover, it is important to observe the need for adaptation for people with visual and/or hearing impairment[9]. Dependence on a wireless Internet-type technology system was also a limiting factor for low-power populations[31–32]. It is also important to note that gamified APPs can generate a sense of defeat by working with punctuation and requiring high digital literacy[47].

This scoping review has as limitations the inclusion of selected studies in nine databases and health portals, and only those available electronically in full were analyzed, factors that may have limited access to other relevant data.

CONCLUSION

The mapping of mobile applications for care in HF has shown that, despite the globalized technological expansion, the United States still concentrates the majority of studies on the met. Even though there are Brazilian APPs in the main virtual stores (Google play and Apple store), it was not possible to find, in the literature, searches that describe the process of construction and validation of Brazilian applications available in the virtual stores.

This finding is worrisome, as the creation of these technological tools requires properly defined and structured steps for the APP to be useful to the end user. Therefore, different theoretical frameworks that guide the construction of APP emerged with emphasis on UCD and codesign.

Nevertheless, the findings showed a small number of APPs aimed at family members and/or caregivers of people with HF. Even, they pointed out hiatus in several themes that involve individuals and their surroundings, essential for comprehensive care.

It is expected that, from the realities identified and presented throughout this review, new research may emerge and serve as support to raise awareness of the theme. It also aims to assist in the production of technologies based on solid theoretical frameworks to then restructure practices of care for patients with HF.

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NOTES

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CONFLICT OF INTEREST

There is no conflict of interest.

EDITORS

Associated Editors: Gisele Cristina Manfrini, Monica Motta Lino.
Editor-in-chief: Roberta Costa.

HISTORICAL

Received: June 10, 2021.
Approved: October 19, 2021.

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