

Nursing Interventions in Long-term Heart Failure Management

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Abstract

Introduction: The current landscape lacks a standardized program for educating heart failure nurses and other healthcare professionals in Europe, and the ideal level of experience, training, and education for this role remains a topic of debate. This review is centered on interventions led by healthcare workers aimed at enhancing outcomes for patients with heart failure through education and capacity-building initiatives.

Methods: A comprehensive search for studies was conducted using Ovid MEDLINE and EMBASE databases, with the assistance of a librarian, focusing on English language literature published between 2000 and August 2022. Studies were included if they followed a randomized design. Relevant papers were also sought through searches in CINAHL, MEDLINE, SCOPUS, the Cochrane Controlled Trials Register, and the National Research Register. Additionally, the reference lists of retrieved papers were scrutinized to ensure no relevant studies were overlooked. A data extraction tool was devised based on established appraisal frameworks and sample data extraction forms, and its suitability for this review was confirmed through testing on three studies. The tool was structured to facilitate summarization of primary studies, streamlining the data synthesis process.

Results: This review scrutinized findings from 9 studies assessing the efficacy of interventions targeting heart failure management. These interventions primarily involved nurse-led symptom monitoring via telephone communication with patients. Results indicated a 20% relative risk reduction in heart failure-related hospitalizations and deaths, predominantly attributed to fewer heart failure hospitalizations. Moreover, there was a notable 47% decrease in the primary outcome of all-cause hospitalization or emergency room visits.

Conclusions: Timely intervention and a collaborative, multidisciplinary approach to management, incorporating advanced practice registered nurses, have the potential to enhance survival rates and prolong disease progression in individuals with heart failure.

Keywords: *Nurse, Education, Training, Heart failure, Cost-effective.*

Introduction

Heart failure (HF) is a prevalent and significant health issue in developed nations, causing physical discomfort, emotional stress, and financial strain for many individuals [1]. The primary objective in managing HF is to impede disease progression, alleviate symptoms, and minimize hospitalizations, posing a complex challenge for healthcare providers as they strive to optimize patient functioning while containing healthcare costs. With the growing population affected by HF, effective strategies for disease management are crucial. Contributing to its increasing prevalence in industrialized nations are factors such as decreased mortality from acute myocardial infarction, enhanced treatment modalities, and prolonged life expectancy [2]. HF incidence rises with age, affecting approximately 1% of individuals in their 50s and over 10% of those aged 80 and above. Notably, HF carries a grim prognosis, significantly diminishing quality of life and exerting a considerable burden on healthcare systems, with hospitalization rates on the rise. Despite these challenges, advancements in pharmacotherapy, notably ACE inhibitors and beta-blockers, have contributed to improved survival rates and enhanced quality of life for HF patients [3].

Recognizing the frequent hospitalizations endured by HF patients, healthcare authorities acknowledge the substantial financial strain on healthcare systems. To mitigate this burden, there is a growing trend towards nurse-led management initiatives for HF patients, often integrating patient education as a central component. These programs, commonly administered in specialized HF clinics, aim to empower patients with a deeper understanding of their treatment regimens and foster self-care practices. Such programs are increasingly prevalent across various European nations [4]. Patient education plays a pivotal role in equipping patients with the knowledge and skills needed to modify attitudes and behaviors, thereby maintaining or improving their health. Nurses, increasingly recognizing their role as educators, emphasize the importance of empowering patients with chronic illnesses to assume primary

responsibility for their health and well-being. HF can profoundly impact physical and psychological health, social interactions, and daily routines, necessitating significant lifestyle adjustments and effective symptom management [5]. A key objective of patient education is to enhance patients' self-care capabilities, encompassing adherence to dietary restrictions, medication adherence, symptom monitoring, and prompt seeking of medical assistance when necessary. The European Society of Cardiology has delineated specific patient education domains in their HF treatment guidelines. Nonetheless, determining patients' informational needs and preferences poses a challenge for healthcare professionals, underscoring the crucial roles of nurses and physicians in delivering tailored education and support [4]. Patient education for heart failure can take place in a variety of settings, including hospitals, outpatient clinics, and patients' homes. It is traditionally thought that education leads to improved knowledge, which leads to behavioral changes, which in turn leads to improved outcomes. However, research has shown that this is not always the case, and that simply increasing knowledge does not necessarily lead to improved adherence to treatment recommendations. Many patients with heart failure may not be aware of their condition or the self-care measures they should take, even if they have received education from healthcare professionals [6].

Computer-based patient education, including through CD-ROMs or the internet, has been found to be effective in improving knowledge, self-care behavior, and hope in patients with conditions such as diabetes and asthma. It has been suggested that providing personalized, targeted information may be more effective than providing general information [6,7]. Bennett et al. developed the "Heart Messages" intervention, which involves delivering tailored messages to patients with heart failure in an effort to improve adherence to self-care recommendations. There is a lack of standardized tools for measuring knowledge in heart failure patients, so researchers have had to create their own instruments for this purpose. Many researchers view knowledge as a

qualitative variable and evaluate it through interviews [8]. Most heart failure management programs emphasize the importance of improving self-care behaviors in order to improve adherence, quality of life, and reduce mortality, morbidity, and healthcare costs. There are several instruments, both general and disease-specific, that measure health-related quality of life. The number of patients with heart failure has significantly increased in recent years, making it important to consider the economic impact of heart failure management programs. Many studies on heart failure management programs include patient education as one component of their interventions, but do not provide a detailed description of this aspect, making it difficult to replicate and evaluate [5, 9]. The first study to experimentally evaluate a heart failure management program with a strong focus on education was conducted by Rich et al. Home-based education and follow-up have been shown to reduce mortality, morbidity, and healthcare costs [10].

Two studies in Sweden have evaluated the impact of education and nurse-led follow-up in heart failure management. Heart failure nurses, who often run heart failure clinics and are specialized in cardiac care, play a crucial role in heart failure management [11,12]. There is currently no standardized education or training program for becoming a heart failure nurse in Europe, and the optimal level of experience, training, and education for this role is still being debated. This review focused on the educational and capacity building of interventions led by health workers which aimed to improve outcomes of patients with heart failure.

Methods

For this review, studies were gathered from searches of Ovid MEDLINE and EMBASE databases, with the help of a librarian, for English language literature from 2000 to August 2022. The inclusion criteria for the studies required a randomized design. The following databases were searched for relevant papers: CINAHL, MEDLINE, SCOPUS, the Cochrane Controlled Trials Register, and the National Research Register. The reference lists of all retrieved papers were also checked to make sure no relevant papers

were missed. A data extraction tool was created based on existing appraisal frameworks and examples of data extraction forms, and was tested on three studies to ensure its suitability for this review. The data extraction tool was designed to provide a summary of the primary studies to make it easier to synthesize the data. The data were analyzed by grouping the papers according to the health outcomes used as measurement tools. One investigator reviewed the abstracts of all studies retrieved through the literature search and two investigators independently assessed each article to determine its suitability for inclusion. The bibliographies of the studies retrieved from the original search were also examined for additional relevant studies, as well as articles recommended by experts in the field. The methods used to gather and select the studies resulted in a total of six quality assessment criteria. For this review, we searched for studies that focused on the use of telemedicine, telecommunication, telecare, telehealth, telenursing, telemanagement, telecardiology, teleconsult, teliagnosis, remote diagnosis, remote consult, and remote monitoring to manage heart failure, congestive heart failure, and related conditions. In evaluating the quality of the trials, we followed the guidelines of the York Centre for Reviews and Dissemination. Some of the interventions involved nurses using decision support software to schedule phone calls with patients to monitor their symptoms, while others involved the use of automated systems to monitor signs and symptoms remotely.

Results and discussion

This review analyzed the results of 9 studies that looked at the effectiveness of interventions for managing heart failure. These interventions involved symptom monitoring by nurses through telephone calls with patients. The review found that there was a 20% relative risk reduction in the combined outcome of heart failure hospitalizations and deaths, largely due to reductions in heart failure hospitalization [12]. There was also a 47% reduction in the primary outcome of all-cause hospitalization or emergency room visits. In one of the studies, the intervention was found to be cost-saving, with the average cost of acute care being \$1000 less per patient in the intervention group over 6 months and the 6-month intervention cost

being \$443 per patient. However, not all of the studies showed a benefit, with some showing no significant difference in heart failure hospitalization rates. The content and implementation of the interventions varied widely across the studies. In some cases, cardiac nurses reviewed data, but it was the responsibility of the patients' physicians to act on the information and keep them updated about the patients' status.

The WHARF trial evaluated the use of telemonitoring, a method of remotely monitoring patients' health using technology, to see if it could reduce hospitalization rates [13]. The trial found that there was no difference in hospitalization rates between the group receiving telemonitoring and the group receiving nurse home visits. However, the telemonitoring group did experience a 40% reduction in heart failure admissions compared to the nurse home visit group. The telemonitoring intervention was also found to be more cost effective, with a daily cost of \$2.87 and 6-month cumulative readmission charges of \$223,638, compared to \$500,343 for the group receiving nurse visits. Another study compared the use of telemonitoring through video conferencing and telephone support and found that both interventions improved outcomes compared to usual care, but there were no differences in the primary outcome (days lost to death or hospitalization) between the two groups [14]. However, the study had a small sample size and was unable to calculate relative risks for admissions and mortality between the groups. Overall, the use of telemonitoring can be effective in improving patient outcomes and may be cost beneficial, but more research is needed to fully understand its impact on hospitalization rates.

This review analyzed the use of telemonitoring, or the use of technology to remotely monitor patients, in adults with heart failure. The different types of telemonitoring included telephone-based symptom monitoring, automated monitoring of signs and symptoms, and automated physiologic monitoring. The studies included in the review assessed the impact of telemonitoring on hospitalization or mortality rates [12, 15-16]. The review did not pool the results of the individual studies due to their heterogeneity in terms of the nature of the intervention, study population, duration of follow-up, and outcomes assessed. The

studies also varied in their design, including who was responsible for initiating management changes, the complexity of the intervention, and patient population enrolled. Some studies compared the effectiveness of different telemonitoring modalities. Despite the diversity of interventions, the studies generally found telemonitoring to be beneficial in reducing heart failure hospitalizations and potentially cost-effective.

These two studies found that telemonitoring was beneficial compared to usual care, and that different forms of telemonitoring were equivalent to each other in terms of effectiveness. This is surprising considering that the forms of telemonitoring used in each study varied significantly in terms of their technical complexity, intensity, and cost. It is worth mentioning that there was no additional benefit observed from using the more expensive telemonitoring methods [5, 17]. Five of the studies included in this review provided information on the distribution of patients, but one of these studies did not include a flow diagram summarizing this information [5-8, 11]. Most of the studies reported losses among participants due to death, withdrawal, or being lost to follow-up.

Approximately half of the studies did not provide information on sample size calculation. All of the studies included a baseline evaluation of subjects to detect differences between the groups, and most of the studies reported that the groups were well-matched. However, a few studies reported imbalanced baseline characteristics for specific characteristics of the sample. Some of the studies used arbitrary levels to report statistical significance instead of providing a precise p-values, and a few of the studies did not perform their analyses on an intention-to-treat basis or did not mention whether this approach was used [18]. The included randomized controlled trials (RCTs) were conducted in Australia, the UK, Ireland, Spain, Italy, the Netherlands, and China. Six of the studies were conducted at multiple centers, with two of these studies involving six centers and the largest study involving 17 centers. The sample sizes of the studies ranged from 70 to 1023, and the duration of the studies ranged from three to 35 months. Four of the studies included high-risk patients, and eight of the studies involved other health professionals, such as dieticians,

pharmacists, physiotherapists, and social workers, in their intervention strategies in addition to nurses and physicians. The post-discharge support provided varied in content and duration, but self-care empowerment and continued education were common components [19]. This review of studies on heart failure management programs found that, overall, the intervention groups had lower rates of heart failure-related and all-cause readmissions compared to the control groups. The duration of post-discharge intervention varied from transition care to extended support up to 2 years. In seven of the heart failure management programs, there were no statistically significant differences in readmissions between the intervention and control groups, but one study showed a reduction in heart failure readmissions in a subgroup of the intervention group.

The subgroup analysis for home visit interventions showed statistically significant reductions in both all-cause and heart failure readmissions [20]. The combination of settings was also effective in reducing heart failure readmission rates. There was statistically significant heterogeneity observed across studies due to the variation in approaches among the heart failure management programs. There was substantial heterogeneity for overall heart failure readmissions and moderate heterogeneity for overall all-cause readmissions. There was moderate heterogeneity for heart failure readmissions and no heterogeneity for all-cause readmissions in the subgroup of home visit interventions [21]. There was no significant heterogeneity in the subgroup of combined settings for heart failure readmissions. Another systematic review analyzed the relationship between the log relative risk of readmission and various factors such as the environment, duration of follow-up, complexity of the intervention, and origin of the study, using random effects meta-regression. The results of the univariable meta-regressions showed that none of these factors had a significant relationship with the log relative risk and therefore did not explain the heterogeneity between the studies. The multivariable analysis also showed similar results, although the association between all-cause readmission and complexity of the intervention was close to the significance level, with an estimated increase in log relative risk for high complexity of 0.26 (95% CI (-0.04, 0.56), p -value =

0.08). Complexity of the studies was determined by the model, with high complexity being defined as interventions with multiple contacts of significant duration, and low or moderate complexity being defined as interventions with fewer contacts or shorter duration contacts [22]. Heart failure is a common cause of hospitalization in people over 65 years old, with about one in five patients being readmitted within 12 months on average.

Heart failure has a significant negative impact on quality of life, affecting physical, role, and social functioning more than other chronic medical conditions such as diabetes, arthritis, or chronic lung disease. Quality of life is not directly related to functional capacity or systolic function, but can be improved through effective management. The diagnosis of heart failure can be complex, as there is no specific cut-off value for cardiac or ventricular dysfunction or changes in flow, pressure, dimension, or volume that can be used reliably to identify patients with heart failure. Co-occurring conditions, age, and medical treatment can also make it difficult to diagnose heart failure [23]. Proper treatment involves not only prescribing the right medications, but also titrating them to the appropriate dosage. Dosages recommended in guidelines should be the goal rather than titrating based on symptom improvement alone. A team approach involving different disciplines with different expertise and skills is necessary to effectively manage heart failure.

Conclusions

Heart failure (HF) should be defined based on a range of characteristics, such as the severity of symptoms and the presence or absence of congestion. Early intervention and a multidisciplinary approach to management, including the use of advanced practice registered nurses, can improve survival and delay disease progression in patients with heart failure.

Conflict of interests

The authors declared no conflict of interests.

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