



## Heart failure in nursing homes: A scoping review of educational interventions for optimising care provision

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### ABSTRACT

**Background:** Heart failure has an estimated global prevalence of 64.3 million cases, with an average age of a person living with heart failure at 75.2 years. Approximately 20% of residents living in nursing homes (a long-term residential care environment for some individuals) report living with heart failure. Residents living with heart failure in nursing home environments are often frail, have reduced quality of life, higher rates of rehospitalisation and mortality, and greater complications in heart failure management. Further, nursing home staff often lack the knowledge and skills required to provide the necessary care for those living with heart failure. Interventions for improving heart failure management in nursing homes have proven effective, yet there is a lack of understanding regarding interventions for optimising care provision. The aim of this review was to synthesise the current evidence on educational interventions to optimise care provided to people with heart failure in nursing homes.

**Methods:** A scoping review with four databases searched: Medline, CINAHL, Web of Science, and EMBASE. Relevant reference lists were searched manually for additional records. Studies of nursing home staff or resident outcomes associated with changes in care provision (i.e., resident quality of life, staff knowledge of heart failure) were included. Results from the charting data process were collated into themes: intervention outcomes, changes to practice, and implementation and process evaluation.

**Results:** Seven papers were deemed eligible for inclusion. Most studies (n=6) were comprised of nursing home staff only, with one comprised only of residents. Study aims were to improve heart failure knowledge, interprofessional communication, heart failure assessment and management. Positive changes in staff outcomes were observed, with improvements in knowledge, self-efficacy, and confidence in providing care reported. No difference was reported concerning nursing home resident outcomes. Interprofessional communication and staff ability to conduct heart failure assessments improved post-intervention. Changes to practice were mixed, with issues around

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sustainability reported. Nursing home staff highlighted their appreciation towards receiving education, recommending that videos, images, and humour could improve the intervention content. *Conclusions:* There is a paucity of evidence around educational interventions to support residents living with heart failure in nursing homes. However, available evidence suggests that educational interventions in nursing homes may improve care through improving staff self-efficacy and confidence in providing care, heart failure knowledge and interprofessional communication. The complexity of implementing educational interventions in the nursing home setting must be considered during the development process to improve implementation, effectiveness, and sustainability.

#### What is already known?

- There is a high prevalence of heart failure among residents living in nursing homes.
- Nursing home staff reportedly often lack the necessary knowledge and skills to provide appropriate care for residents with heart failure.
- Educational interventions in nursing homes have proven effective for improving the management of heart failure.

#### What this paper adds?

- There are few educational interventions associated with optimising care provision to nursing home residents with heart failure.
- Existing interventions suggest that they can improve staff knowledge on heart failure, as well as self-efficacy and confidence in providing care. However, there is limited evidence to support interventions for improving resident outcomes.
- By concentrating explicitly on residents in permanent nursing home placements, the paper provides novel insights into heart failure care within a distinct population with specific characteristics and care needs.

## 1. Background

Heart failure, defined as a clinical syndrome characterised by structural and/or functional changes to the heart (Bozkurt et al., 2021), has an estimated prevalence of 64.3 million cases worldwide (Savarese et al., 2022). People living with heart failure often present with three or more comorbidities, such as hypertension, diabetes mellitus and chronic kidney disease, which increases the severity of heart failure symptoms and negatively impacts quality of life and prognosis (Groenewegen et al., 2020). The presence of multi-comorbidities increases the complexity to effectively manage patients with heart failure (Conrad et al., 2018). Consequently, difficulties in management have resulted in higher rates of rehospitalisation (Groenewegen et al., 2020, Komajda, 2015, Wachter and Rommel, 2022), placing a significant demand on hospital facilities and personnel, and incurring substantial healthcare costs (Cleland et al., 2019, Conrad et al., 2018, Lesyuk et al., 2018, Urbich et al., 2020).

Due to an ageing population, improvements in diagnostic testing, and greater survival rates following a cardiovascular event, the incidence of heart failure is expected to continue to rise (Lippi and Sanchis-Gomar, 2020, Savarese et al., 2022). The prevalence of heart failure increases with age, from 1% for those <55 years to 10% for those aged >70 years (McDonagh et al., 2021). In the USA between 2001 and 2014, of the 14.6 million individuals hospitalised due to heart failure, 75.3% were classified as older people (>65 years) (Akintoye et al., 2017). The mean age of this population is 75.2 years (Norhammar et al., 2023).

Nursing homes provide long-term residential care and support for older people in everyday activities of living. The reported prevalence of heart failure in nursing homes varies greatly, with data suggesting rates between 10–45% (Barents et al., 2008, Daamen et al., 2015, Daamen et al., 2010, Heckman et al., 2014, Kantocho et al., 2018, Valle et al., 2005). Findings from an observational study of 15,549 heart failure patients reported that those discharged to nursing homes from hospital were frailer than those discharged home (Allen et al., 2011). Frailty in older people with heart failure is associated with worsened health-related quality of life, greater levels of hospitalisation and mortality, and complications in heart failure management (Heckman et al., 2014). Complications include the presence of non-specific signs and symptoms associated with geriatric syndromes, such as fatigue and delirium, confounding the diagnosis of heart failure exacerbations, and resulting in worsened clinical outcomes (Daamen et al., 2015, Glenny et al., 2012, Heckman et al., 2014, Jarrett, 1995). Thus, it is imperative that nursing home residents with heart failure receive the appropriate care and support to stabilise the condition, improve their quality of life, minimise the need for hospitalisation, and reduce the risk of mortality.

Due to the complexity in providing care to older people with heart failure, nursing home staff must be equipped with the necessary knowledge and skills to provide appropriate care (Spilsbury et al., 2015). Recent qualitative findings suggest that nursing home staff lack the knowledge and competency to appropriately care for residents with heart failure, are unaware of relevant signs and symptoms, do not know how to identify exacerbations, and do not understand the purpose for daily weighing (Morrow et al., 2020). Researchers have also reported that the level of staff training is directly associated with the quality of care being provided to nursing home residents with heart failure (Close et al., 2013). A recent workforce intelligence summary in the United Kingdom (Skills for Care 2022) of UK care

nursing homes has indicated that staff turnover is high (39.4% per year), and this has been increasing since 2013. In addition, since 2012, there has been a 31% decrease in the number of registered nurses working within care home settings (with an associated increase in senior care assistant roles). Therefore, addressing the identified gaps in knowledge and skills among nursing home staff is crucial to ensuring optimal care for older individuals with heart failure. The reported deficiencies in recognising symptoms, identifying exacerbations, and understanding essential care practices underscore the need for targeted training interventions for heart failure and other long-term care conditions (Craig et al. 2023; Mitchell et al. 2016). The direct correlation between staff training levels and the quality of care also emphasises the urgency of investing in continuous education and skill development for nursing home personnel (Mitchell et al. 2017). Moreover, the concerning trends in high staff turnover and the decrease in registered nurses highlight the necessity for strategic workforce management and initiatives to enhance the competency of the nursing home workforce (Cousins et al. 2016).

A scoping review of interventions to support heart failure management in skilled nursing facilities and nursing homes settings was previously carried out in July 2017 (Heckman et al., 2018a). This scoping review reported on interventions for improving heart failure management in both skilled nursing facilities and nursing homes settings. Importantly, this previous review had a broad focus and most of the interventions included in this review were employed exclusively in skilled nursing facilities which are a distinctly different setting to nursing homes. Skilled nursing facilities traditionally provide intermediate or rehabilitative care to patients who are unable to be discharged to their homes. Registered nurses, physicians, physical therapists, occupational therapists and speech and language therapists comprise the professional team that work onsite within skilled nursing facilities (National Library of Medicine, 2021; Heiks and Sabine, 2022). Inpatients that reside within skilled nursing facilities will often do so temporarily until their rehabilitation is concluded.

On the contrary, residents living in nursing homes often have different care goals. This is because older people living in nursing homes represent a frail population with impaired physical function (Luo et al. 2015). Furthermore, registered nurses are usually the sole healthcare professional that work onsite at a nursing home with multidisciplinary colleagues holding a community role and serving a large geographical region (for example, general practitioner or community physical therapist). While skilled nursing facilities focus on rehabilitative care and discharge planning, nursing home settings often focus on comfort care and symptom management (Zhang et al. 2019). In addition to this, it is estimated that the overall survival after nursing home admission has been projected at 25.8 months (Reilev et al. 2020).

Given these distinctions and the specific needs of residents in nursing homes, there is a compelling need for a targeted and comprehensive review of evidence-based interventions specifically tailored for heart failure in nursing homes. Considering the contrasting care goals in skilled nursing facilities (SNFs) and nursing homes for heart failure patients, where SNFs often prioritise rehabilitation and discharge, while nursing homes emphasise comfort care and symptom management, it is imperative to tailor interventions accordingly. This scoping review will therefore specifically target evidence relevant to heart failure in nursing home settings.

The aim of this study was therefore to conduct a scoping review to synthesise the current evidence on educational interventions for optimising care of residents with heart failure in nursing homes. This was achieved through three key objectives:

- i). What educational interventions have been implemented to optimise the provision of care for residents living with heart failure in nursing homes?
- ii). Have educational interventions implemented in nursing homes proven effective in improving outcomes associated with optimising heart failure resident care?
- iii). What are the reported experiences of providing educational interventions for optimising care of heart failure residents in nursing homes by nursing home staff, including challenges, facilitators, and barriers?

Beyond this review, the findings will be used by the authors to inform the design of a digital educational intervention to optimise the quality of life of nursing home residents with heart failure (McMahon et al., 2023).

## 2. Methods

This study was guided by Arksey and O'Malley (2005) recommendations for conducting scoping reviews, Levac et al.'s (2010) paper on scoping review methodologies and reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018). A protocol for this review was registered prospectively on Open Science Framework (registration DOI: <https://doi.org/10.17605/OSF.IO/QVXRP>).

### 2.1. Eligibility criteria

Eligibility criteria were developed using the Population, Concept, and Context (PCC) framework recommended by the Joanna Briggs Institute (Peters et al., 2020).

#### 2.1.1. Population

Nursing home residents with heart failure, and nursing home staff involved in providing care for these residents, including care workers/care assistants, nurse/registered nurse, healthcare professionals were included. Nursing home residents with other conditions, such as dementia, were included if a diagnosis of heart failure was present. No restrictions were placed on how long the residents must have resided in a nursing home facility.

2.1.2. Concept

Articles reporting on the implementation of an intervention to improve the provision of care for individuals living with heart failure were considered for inclusion. Interventions could be delivered through any method (e.g., telemedicine or educational interventions), and were included if they reported on outcomes such as quality of life of residents, care staff knowledge, and self-efficacy of staff in providing care. Articles were included when the intervention had a clear element associated with heart failure but this may not have been the primary intention of the intervention. For example, an intervention to improve the cardiovascular health of nursing home residents, but included content and information specifically associated with heart failure. Non-interventional studies, those not clearly related to heart failure, and those reporting on outcomes associated only with management (e.g., medications), were excluded.

2.1.3. Context

Educational interventions implemented in a nursing home setting and other non-hospital long-term care settings were included. Those that take place in hospital, acute or non-nursing home settings were excluded.

2.1.4. Types of evidence sources

All empirical studies reporting on the implementation of an educational intervention for improving care provision for nursing home residents with heart failure were considered for inclusion. Commentary pieces, editorials, and summaries were excluded.

2.2. Search strategy

Search terms were developed through a review of those used previously in systematic and scoping reviews about heart failure or nursing home settings, and in consultation with a subject librarian. The search terms employed by JM during the search of Medline, as an example, can be found below (Table 1). Search terms were adapted appropriately to search CINAHL, Web of Science, and EMBASE in November 2022. No geographical or date restrictions were placed on the search. A search of the WHO International Clinical Trials Registry Platform, UK Clinical Trials Gateway and ClinicalTrials.gov. was also conducted. In addition, European cardiovascular disease and heart failure websites/organisations/charities were searched e.g., Heart Failure Association of the ESC, British Heart Foundation, and Northern Ireland Chest, Heart & Stroke. Lastly, a snowballing technique was employed to search reference lists of relevant systematic and scoping reviews for articles not identified through the database search.

2.3. Study selection and charting the data

All studies identified through the search strategy were imported into Covidence (<https://www.covidence.org/>), a screening and data extraction tool for streamlining the production of reviews. Following the removal of duplicates, JM and GM each independently carried out full screening of the title and abstracts, with the same procedure used for full text screening. Any disagreements throughout the screening process were resolved following a discussion between JM and GM. Charting the data was carried out in Covidence, guided by the ‘JBI template source of evidence details, characteristics and results extraction instrument’ (JBI, 2022). Study characteristics extracted included the location, design, population, intervention, methods, outcomes, and results.

2.4. Summary and reporting of results

Results from the charting data process were collated into themes which, as recommended by Levac et al. (2010), are discussed in

**Table 1**  
Example search terms applied in Medline.

Concept/Search terms		
Nursing home staff	Heart failure	Nursing homes
MeSH headings	MeSH headings	MeSH headings
1. Nurses/ OR	1. Heart failure/ OR	1. Nursing home/ OR
2. Nurse practitioner/ OR		2. Residential care/ OR
3. Nursing assistant/ OR		3. Residential home/ OR
4. Practical nurse/ OR		4. Home for the aged/ OR
5. Registered nurse/ OR		5. Long term care/ OR
		6. Assisted living facility/ OR
Keywords	Keywords	Keywords
1. Nursing home personnel OR	1. Cardiac failure OR	1. Residential facilities OR
2. care worker* OR	2. Myocardial failure OR	2. Care home* OR
3. healthcare professional* OR	3. Heart decompensation AND	3. Long term care setting OR
4. care assistant* OR		4. Long term care facility* OR
5. healthcare assistant* OR		5. Old* people* home OR
6. HCA* OR		6. Old* age home OR
7. support worker* OR		7. Retirement home OR
8. certified nursing assistant* OR		8. Residential care institution* OR
9. CNA* AND		9. Elderly care home* OR
		10. Palliative care home*

the context of the aim of the study. In this case, to inform the design of a digital intervention to optimise quality of life of nursing home residents with heart failure. Themes include intervention outcomes, changes to practice, and implementation and process evaluation. As the aim of this scoping review was to provide an overview of the available evidence rather than a synthesised answer to a specific question, a critical appraisal of the included studies was not conducted (Munn et al., 2018).

### 3. Results

The search strategy yielded 4212 results, with two additional records identified through other sources. Following the removal of duplicates, title and abstract screening was applied to 3,722 records. Following full-text screening of the remaining records (n=18), seven were deemed eligible for inclusion in this review. A PRISMA flow diagram has been provided to summarise the study identification process (Fig. 1).

#### 3.1. Characteristics of included studies

Of the seven studies included in this review (Table 2), three were conducted in the USA (Kim et al., 2016, Lekan et al., 2010, Sullivan, 2017), three in Canada (Boscart et al., 2017, Heckman et al., 2018b, Huson et al., 2015), and one in the UK (Hancock et al., 2012). Five were pilot studies (Boscart et al., 2017, Hancock et al., 2012, Heckman et al., 2018b, Huson et al., 2015, Kim et al., 2016), one a feasibility study (Lekan et al., 2010), and one non-randomised controlled trial (Sullivan, 2017). Five studies were peer-reviewed journal articles (Boscart et al., 2017, Hancock et al., 2012, Heckman et al., 2018b, Kim et al., 2016, Lekan et al., 2010), one a conference abstract (Huson et al., 2015), and one a thesis as part of a Doctor of Nursing Practice degree (Sullivan, 2017). The composition of participants varied: five were comprised of only nursing home staff professionals (Boscart et al., 2017, Heckman et al., 2018b, Huson et al., 2015, Kim et al., 2016, Lekan et al., 2010), and one of only residents with heart failure (Hancock et al., 2012). One study strived to include both (Sullivan, 2017), but were unable to recruit any residents. Of those studies that reported on sample size, a total of 215 participants were recruited. Of the four studies that reported the gender of participants (Boscart et al., 2017, Hancock et al., 2012, Heckman et al., 2018b, Kim et al., 2016), 122 of the 151 participants were female (81%).

#### 3.2. Intervention characteristics

The aims of the interventions included in this review can largely be grouped into three categories – improving interprofessional communication (Boscart et al., 2017, Heckman et al., 2018b, Huson et al., 2015, Lekan et al., 2010), improving heart failure knowledge (Boscart et al., 2017, Heckman et al., 2018b, Huson et al., 2015, Kim et al., 2016, Lekan et al., 2010, Sullivan, 2017), and

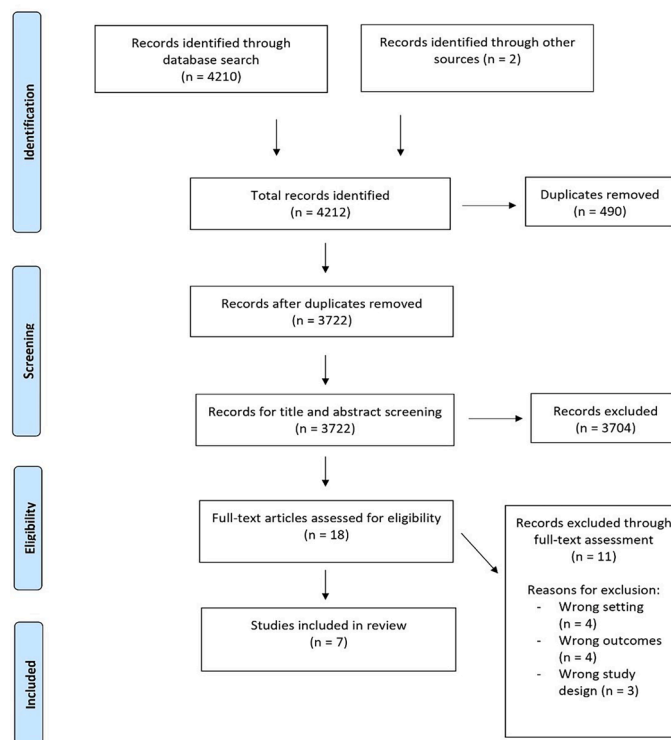


Fig. 1. PRISMA flow diagram.

**Table 2**  
Study and intervention characteristics.

Author, year, country	Study design	Participants, sample size, age	Study aim	Intervention	Methods	Outcomes of interest
Lekan et al., 2010 USA	Feasibility study	Nursing home staff Participant sample size and age not described.	To develop, implement, and feasibility test 'The Connected Learning Model'	The Connected Learning Model – aim to improve communication and learning capacity. Educational program facilitated by a Geriatric Advanced Practice Nurse. Classroom (presentations/discussions/handouts), unit-based (role play/presentations/discussions) and bedside (practical application). Practical materials (FACES card and clinical work sheets) to aid recall and application in practice.	Twenty-six education sessions over 7 months. Time-points and methods of data collection not described.	Staff knowledge of heart failure, completion of heart failure worksheets (audits and nursing rounds), quality of interactions and relationships between nurses and medical providers (verbal feedback).
Heckman et al., 2018b Canada	Pilot study	Nursing home staff Sample size = 27 Gender = 88.2% female Age ranges = <35-65 (44.4% between 35-44 years).	To evaluate the acceptability and feasibility of an intervention to improve heart failure care in long-term care facilities	Enhancing Knowledge and Interprofessional care for HF (EKWIP-HF). Five phases: 1) 'Address knowledge gaps'. Interactive case-based education sessions. Provided pocket cards. 2) 'Develop communication processes for HF'. Identify barriers in communication processes. Develop/adapt communication processes. 3) 'Implement communication processes and consolidate knowledge'. Identify changes and resolve knowledge and communication problems. 4) 'Address knowledge gaps'. Interactive education to improve clinical and procedural skills. 5) 'Full interprofessional integration'. Bi-weekly bedside sessions, case conferences, individualised care management plans.	Mixed-methods repeated-measures design. Data collection: baseline, 6-months.	Primary: Heart failure knowledge (Dutch heart failure knowledge scale and Nurses Knowledge of Heart Failure Education Principles), self-efficacy in heart failure care (The Bridge Project surveys), interprofessional communication (Individualized Care Communication Subscale and Interprofessional Socialization and Valuing Scale). Secondary: Feasibility, acceptability, preliminary impact.
Huson et al., 2015 Canada	Pilot study	Nursing home staff Sample size = 29 Age and gender not described.	To report on the quantitative findings of a study assessing the acceptability, feasibility, and preliminary impact of an intervention to improve nursing home staff knowledge of heart failure, develop efficient interprofessional communication processes, and integrate	Employed the 'Enhancing Knowledge and Interprofessional care for HF' (EKWIP-HF) intervention. See Heckman et al. (2018b) above.	Mixed methods repeated measures design. Data collection: baseline, 3 months.	Heart failure knowledge (Dutch heart failure knowledge scale), self-efficacy in providing care (survey not described).

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Table 2 (continued)

Author, year, country	Study design	Participants, sample size, age	Study aim	Intervention	Methods	Outcomes of interest
Boscart et al., 2017 USA	Pilot study	Nursing home staff Sample size = 30 Gender = 83% female Age = Mean 40.7 years	improved knowledge and communication processes. To report on the qualitative findings of a study to assessing the acceptability, feasibility, and preliminary impact of an intervention to improve nursing home staff knowledge of heart failure, develop efficient interprofessional communication processes, and integrate improved knowledge and communication processes.	Employed the 'Enhancing Knowledge and Interprofessional care for HF' (EKWIP-HF) intervention. See Heckman et al. (2018b) above.	Mixed methods repeated measures design. Data collection: baseline, weekly for 6 months.	Staff knowledge of heart failure, communication and information exchange (field notes, monthly workshops, semi-structured interviews).
Hancock et al., 2012 UK	Pilot randomised controlled trial	Nursing home residents with heart failure Sample size = 28 Gender = 57% female Mean age = 83.6 years	To evaluate the implementation of a heart failure team delivering onsite assessment and management compared to routine general practitioner care.	Assessment visit by consultant cardiologist to initiate plan of treatment at admission. One to bi-weekly visits by heart failure specialist nurses to enact plan, including blood tests, assessment of symptoms and signs, educational advice, and medication titration.	Intervention duration: 12-months, Data collection: baseline, 6, 12 months	Changes in functional capacity and quality of life (EQ-5D and EQ-VAS) Acceptability of heart failure service
Sullivan, 2017 USA	Non-randomised controlled trial	Nursing home residents with heart failure and nursing home staff Sample size = 35 (100% nurses). No residents recruited. Age and gender of participants not described.	To evaluate the effectiveness of customizable heart failure clinical guidelines to enhance self-efficacy, and reduce anxiety among patients, family, and nursing home staff.	Nursing staff provided education on heart failure. Clinical guidelines sheet to promote critical thinking and provide education on signs and symptoms. Nursing home residents provided with a clinical guideline sheet, educated on self-identification and how to report exacerbations.	Intervention duration: 1 month, data collection: baseline, 1 month.	Anxiety related to heart failure (Generalized Anxiety Disorder 7 Item Scale) Nursing home staff self-efficacy in providing care to heart failure residents (Heart failure self-efficacy scale).
Kim et al., 2016 USA	Pilot quality improvement study	Certified nursing assistants in a long-term care facility Sample size = 66 Gender = 86.9% female Age ranges = 21->60. 34.4% between 30-39.	To improve certified nursing assistants knowledge of heart failure management strategies, reporting of acute changes in status of heart failure residents, reduce rehospitalization rates.	Heart failure education program facilitated by a nurse practitioner, three 20-minute sessions, once per week. Materials adapted from HFSA 2010 Comprehensive Heart Failure Practice Guidelines, and developed on measures outlined in the Heart Failure Assessment Guidelines for Long Term Care. Content includes pathophysiology, nutrition, management strategies, signs and symptoms, FACES pocket card. Training on 'Stop and Watch' tool.	Mixed-methods study. Data collection varied for outcomes, occurring at baseline, 1, 2, 3, 4, 8, 12 weeks. Verbal feedback gathered continuously.	Heart failure knowledge (adapted version of the Atlanta Heart Failure Knowledge Test), communication of heart failure symptoms to nursing staff (audit of 'Stop and Watch' tool, program feedback (verbal feedback on understanding of heart failure signs and symptoms, ability to identify and report exacerbations, and communication barriers).

improving onsite assessment and management of heart failure symptoms (Hancock et al., 2012). A variety of techniques were employed across the interventions to achieve these aims. Heart failure education was central to all but one intervention (Hancock et al., 2012). The study by Hancock et al. 2012 did however meet the inclusion criteria because bi-weekly visits by heart failure specialist nurses included an educational component in the form of advice to residents and nurses. Three of the studies (Boscart et al., 2017, Heckman et al., 2018b, Huson et al., 2015) report on the 'Enhancing Knowledge and Interprofessional care for HF (EKWIP-HF)' intervention which combines education with the development of new communication processes. One intervention centred on the creation of a heart failure team to assess residents and deliver an individualised heart failure management plan (Hancock et al., 2012). The duration of the studies ranged from 1-12 months.

#### 4. Outcomes

Outcomes assessed in the studies varied, with outcomes for both nursing home staff and residents reported.

##### 4.1. Nursing home staff

Staff knowledge of heart failure was reported in five studies (Boscart et al., 2017, Heckman et al., 2018b, Huson et al., 2015, Kim et al., 2016, Lekan et al., 2010). All studies reported improvements post-intervention, one of which was statistically significant (Kim et al., 2016). Three studies assessed nursing home staff self-efficacy in providing care to residents with heart failure (Heckman et al., 2018b, Huson et al., 2015, Sullivan, 2017). Improvements were reported in all, two of which were significant (Heckman et al., 2018b, Sullivan, 2017). One study (Boscart et al., 2017) reported improvements in staff confidence, improving their ability to provide appropriate care to heart failure residents and better assess residents not previously diagnosed with heart failure for the presence of signs and symptoms. The final outcome assessed was anxiety related to providing care (Sullivan, 2017), with statistically significant improvements reported.

##### 4.2. Nursing home residents with heart failure

Only one study reported on nursing home resident outcomes (Hancock et al., 2012). Assessing change to functional capacity and quality of life (EQ-VAS and EQ5D questionnaires), no improvements were observed in the intervention group.

##### 4.3. Change to practice

For the purpose of this review, changes to practice relate to any change in the operational processes or practices within the nursing home. Reported changes to practice occurred both directly as an aim of the educational interventions, and indirectly following a review of current processes post-implementation. First, changes to interprofessional communication were reported in five studies through qualitative data and observations (Boscart et al., 2017, Heckman et al., 2018b, Huson et al., 2015, Kim et al., 2016, Lekan et al., 2010), all of which reported improvements. Of note, one study also reported improvements in interprofessional communication towards overall resident care, indicating a spill-over effect as a result of the intervention (Lekan et al., 2010). The study by Heckman et al. (2018b) employed a mixed method design, with a quantitative survey supporting the qualitative findings, though these improvements were non-significant.

Of interest, the study by Boscart et al. (2017) reported that the implementation of the intervention prompted a review and refinement of existing communication processes to incorporate new practices for managing critical care episodes in residents with heart failure. The final study reporting on interprofessional communication (Kim et al., 2016) did so through the 'Stop and Watch' communication tool. The 'Stop and Watch' tool, developed to identify non-specific changes in health conditions, was utilised to improve the identification, evaluation, and communication of changes in heart failure status of nursing home residents. However, six audits were conducted during the study period, with the tool found to have not been completed by participants at any time point.

Four studies reported changes related to the assessment of heart failure by nursing home staff. Nursing home staff in the studies that employed the EKWIP-HF intervention (Boscart et al., 2017, Heckman et al., 2018b, Huson et al., 2015) reported a perceived ability to better conduct heart failure assessments and identify associated signs and symptoms. The final study reporting on assessment (Lekan et al., 2010) utilised 'heart failure worksheets' to aid recall, guide assessment, and provide a clear process for documenting/reporting changes to symptoms. Audits indicated that nursing home staff were completing the worksheets and ensuring timely reporting of new heart failure related signs and symptoms, yet there was a drop-off in completion of worksheets observed towards the end of study (7 months). Prior to the intervention, there were no processes in place for assessing heart failure, indicating that the implementation of such worksheets for conducting assessments may be accepted by nursing home staff.

##### 4.4. Implementation and process evaluation

Two studies (Boscart et al., 2017, Heckman et al., 2018b) reported qualitative feedback from nursing home staff related to education as an intervention component. Both studies reported positive results, with nursing home staff highlighting that education enhanced their knowledge of heart failure, ability to identify signs and symptoms, improve diagnoses, and make better decisions on appropriate care. Of significance was the perceived ability to better distinguish signs and symptoms associated with heart failure with other conditions or syndromes (e.g., delirium). Participants in both studies also highlighted their appreciation for the 'ANEWLEAF



pocket card' (to assist clinical assessments and for developing appropriate care planning for heart failure residents. The ANEWLEAF mnemonic lists the main symptoms of heart failure and is designed for use specifically in nursing home settings (Harrington, 2008). Further, participants in the study by Heckman et al. (2018b) noted the value of clinical guidance sheets available in residents' rooms. The guidance sheets not only assisted heart failure assessments, but reportedly facilitated greater self-management by both residents and their family. However, the methods in which self-management was improved was not reported by the authors.

Participant feedback highlighted the benefits of 'bedside sessions', providing an opportunity for staff to conduct assessments as a team. Not only did the perceived ability to conduct assessments improve, but conducting these as a team was perceived to also improve interprofessional communication. Improvements were observed due to staff feeling more valued and that their voice was being heard, reportedly improving the quality of care as a result (Heckman et al., 2018b). Only one study reported feedback related to intervention content (Heckman et al., 2018b). Employing the EKWIP-HF intervention, participants indicated that the intervention materials could be improved through incorporating video, images, and humour.

Intervention fidelity was discussed in one study (Heckman et al., 2018b), reporting mixed findings on the implementation of new communication and documentation processes. Participants highlighted that several processes were easier to implement than others, although no further detail was provided by the authors. However, due to such difficulties, refresher workshops were necessary four months into the six-month intervention. In addition, nursing home staff were encouraged to conduct daily weight monitoring which, although deemed feasible, proved burdensome to the residents. Nursing home staff perceived daily weight monitoring as unnecessary as the intervention was ensuring that appropriate care was being provided.

A further two studies (Hancock et al., 2012, Kim et al., 2016) reported contextual findings related to each respective intervention. Participants in both studies endorsed the interventions, with those in the study by Kim et al. (2016) emphasizing their appreciation towards receiving education. However, the sessions were conducted face-to-face, which proved time intensive for the facilitator due to being delivered over several shift patterns. Further, attendance at the face-to-face sessions were poor, with only 50% (n= 33) of participants attending all three, and 30.3% (n= 20) attending two sessions. Participants in this study also indicated that the lack of using the 'Stop and Watch' tool was due to a poor understanding of how to find and complete the tool, and the perception that it was time consuming.

## 5. Discussion

This scoping review aimed to synthesise the current evidence of educational interventions designed to optimise care provision for nursing home residents with heart failure. As only seven studies were included in this review, there is clearly a dearth of literature in the area. Nonetheless, findings from this review suggest that educational interventions employed in nursing homes may optimise care provision for heart failure residents. This is achieved through improving staff self-efficacy and confidence in providing care, improving heart failure knowledge and interprofessional communication, and reducing care-related anxiety. However, evidence for such interventions improving resident outcomes is not as clear.

Our findings are comparable with a previous scoping review of the literature that focused on heart failure management within skilled nursing facilities and nursing home settings (Heckman et al., 2018a), with similar improvements in staff heart failure knowledge reported. Similarly, a prior systematic review of educational interventions for another common chronic progressive condition in nursing home settings, dementia (Zhao et al., 2021), reported improvements in staff knowledge of dementia and self-efficacy in providing care, whilst also reporting inconsistent statistically significant results. However, in contrast to the findings in this current review, reviews of interventions for improving dementia care in nursing homes have reported a lack of improvements associated with interprofessional communication (Rapaport et al., 2017, Zhao et al., 2021). Interprofessional communication is of significance, promoting teamwork and shared decision making among healthcare professionals, whilst improving patient care (Bok et al., 2020, Busari et al., 2017, Choi and Chang, 2023), and has been found to be a significant barrier to heart failure care in nursing homes (Heckman et al., 2016, Strachan et al., 2014).

Feedback associated with intervention components was limited. In all studies, a face-to-face approach was utilised, and although education appears to be appreciated by participants, it remains unclear whether this is their preferred mode of delivery. Poor attendance at the face-to-face education sessions in the study by Kim et al. (2016), and the reported time burden placed on the intervention facilitator, would suggest that another mode of delivery may be worth exploring. Positively, education was reported to have improved nursing home staff ability to separate common age-related symptoms from those associated with heart failure, an issue known to confound their ability to identify heart failure exacerbations (Daamen et al., 2015, Glenny et al., 2012, Heckman et al., 2014, Jarrett, 1995). Several techniques were utilised to reinforce the education provided and assist with implementation in practice, with pocket cards and clinical guidance sheets welcomed by nursing home staff (Boscart et al., 2017, Heckman et al., 2018b). Secondly, bedside sessions to conduct heart failure assessments as a team improved nursing home staff feelings of being valued, reported to improve the effectiveness of interventions in nursing homes (Kadri et al., 2018, Lawrence et al., 2016, Rapaport et al., 2017).

Resident outcomes were limited to one study only (Kim et al., 2016). Although the study by Sullivan (2017) aimed to assess resident outcomes, they failed to recruit any participants. Barriers towards recruiting nursing home residents include cognitive and physical impairment of residents, and procedural challenges such as the need to build relationships with nursing home staff to act as 'gatekeepers' (Ellwood et al., 2018, Law and Ashworth, 2022, Ritchie et al., 2023). Thus, methods to improve the recruitment of nursing home residents must be considered in research to better understand the potential of interventions for optimising resident-related outcomes associated with optimising the provision of care.

Mixed findings were reported for changes to practice, specifically regarding the completion of the 'Stop and Watch' tool and heart failure worksheets. Both tools were utilised to provide a clear process for documenting and reporting changes to heart failure status of

residents. Although the heart failure worksheets were completed regularly, a drop-off was observed, highlighting a potential concern regarding sustainability of this tool (Lekan et al., 2010). In contrast, the 'Stop and Watch' tool (Kim et al., 2016) was not completed at any time point during the study, with participants citing time constraints and a lack of understanding on how to use the tool as key barriers. Although staff received training on how to access and complete the 'Stop and Watch', their understanding of how to complete the process varied. In addition, nursing home supervisors communicated varied expectations regarding the completion of the tool to staff, leading to confusion and miscommunication. Therefore, for such processes to be successfully implemented, nursing home staff must receive the appropriate education, and senior staff need to understand the importance of these tools to ensure that they are completed consistently. This aligns with prior research which asserts that changes to practice in nursing homes are complex but possible, and that barriers and facilitators should be uncovered with nursing home staff during the conception of the research study to improve the likelihood of success (Low et al., 2015).

Ensuring sustainability of interventions and quality improvement projects in the nursing home setting have proved challenging (Devi et al., 2022, Rapaport et al., 2017, Zhao et al., 2021). One reason for such challenges is the high rates of staff turnover (Castle, 2006, Castle and Engberg, 2005, Gandhi et al., 2021, Thomas et al., 2013), associated with low levels of staff resilience and wellbeing leading to burnout (Mallon et al., 2023). High rates of staff turnover can also directly impact the implementation and sustainability of heart failure guidelines (Nazir et al., 2015), with three of the studies included in this review citing staff turnover as a significant barrier (Heckman et al., 2018b, Kim et al., 2016, Sullivan, 2017). Most interventions included in this review had a duration of 1-6 months, with only one reporting outcomes at 12-months post baseline (Hancock et al., 2012). However, the outcomes in this study were associated only with heart failure management, for example medication management, dietary modifications, fluid balance monitoring, and vital signs. Thus, it is unclear whether interventions can achieve long-term positive effects related to enhancements in the provision of care, such as reducing hospital admissions, enhancing quality of life, and optimising symptom management. Co-production is an example of how improving sustainability of interventions in nursing homes may be achieved, improving integration, acceptability, and success (Peryer et al., 2022), yet research applying co-production in this setting is limited (Hallam-Bowles et al., 2022). Partnerships between care and research are essential to support the design, delivery and translation of research to promote evidence informed care in these environments (Spilsbury et al., 2023).

To improve the potential sustainability and effectiveness of interventions within the nursing home setting, researchers may consider digital health as a mode of intervention delivery. Increasing in prominence, digital health interventions can support healthcare providers in decision making, interprofessional communication, and provide necessary training to improve the provision of healthcare (Fatehi et al., 2020, Stark et al., 2022, World Health Organisation, 2018). Digital health interventions within the nursing home setting are in their infancy. However, they have shown potential for improving staff knowledge and confidence related to dementia care (Tunnard et al., 2022), and improving overall delivery of timely, high-quality care (Gillespie et al., 2019). Thus, digital health interventions may prove an acceptable mode for delivering education to nursing home staff, removing the burden placed on the facilitator and improving ease of access (Cousins et al., 2022).

### 5.1. Strengths and limitations

To our knowledge, this is the first scoping review to synthesise the available evidence on interventions to optimise care provision for residents living with heart failure in nursing homes. The findings of this review advance the literature, with the scoping review by Heckman et al. (2018a) focusing on the management of heart failure, and included interventions employed in skilled nursing facilities. In contrast, the current review assessed outcomes associated with resident care, taking place only in the nursing home setting. Including both quantitative and qualitative findings provide a greater understanding of whether interventions have proven successful, and the reported barriers and facilitators towards implementation. There are two key limitations of this review to note. First, including only studies written in English may omit relevant studies in other languages, causing important findings to be missed. Second, three studies were conducted by the same group and reported on the same intervention (Boscart et al., 2017, Heckman et al., 2018a, Huson et al., 2015), thus potentially skewing the findings.

## 6. Conclusions

The findings from this review highlight the potential of interventions implemented in nursing homes for improving care provision to residents with heart failure. However, outcomes reported across the included studies were mostly focused on nursing home staff. Thus, future research is needed to determine whether such interventions are effective in improving outcomes associated with nursing home residents. Also, future research should aim to determine whether such interventions can produce long-term effects and sustainability. Education was a common intervention component employed across the studies, provided face-to-face to nursing home staff. Participant feedback, although limited, indicated that education was well-received and beneficial, improving heart failure knowledge of staff. However, this study reported poor participant attendance at the sessions, with the intervention facilitator indicating that this approach was burdensome. The delivery of a digital intervention may provide greater success, reducing the burden on staff and the need for an intervention facilitator. A digital approach also provides participants with the ability to access the intervention at a time that suits them, potentially improving intervention acceptability, user engagement, and likelihood of success.

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### CRediT authorship contribution statement

**James McMahon:** Writing – original draft, Visualization, Methodology, Investigation, Conceptualization. **David R. Thompson:** Writing – review & editing, Funding acquisition, Conceptualization. **Jan Cameron:** Writing – review & editing. **Christine Brown Wilson:** Writing – review & editing, Funding acquisition, Conceptualization. **Loreena Hill:** Writing – review & editing, Funding acquisition, Conceptualization. **Paul Tierney:** Writing – review & editing, Funding acquisition, Conceptualization. **Doris Yu:** Writing – review & editing. **Debra K. Moser:** Writing – review & editing. **Karen Spilsbury:** Writing – review & editing. **Nittaya Srisuk:** Writing – review & editing. **Jos M. G. A. Schols:** Writing – review & editing. **Mariëlle van der Velden:** Writing – review & editing. **Gary Mitchell:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### References

- Akintoye, E., Briasoulis, A., Egbe, A., Dunlay, S.M., Kushwaha, S., Levine, D., Afonso, L., Mozaffarian, D., Weinberger, J., 2017. National trends in admission and in-hospital mortality of patients with heart failure in the United States (2001–2014). *Journal of the American Heart Association* 6, e006955.
- Allen, L.A., Hernandez, A.F., Peterson, E.D., Curtis, L.H., Dai, D., Masoudi, F.A., Bhatt, D.L., Heidenreich, P.A., Fonarow, G.C., 2011. Discharge to a skilled nursing facility and subsequent clinical outcomes among older patients hospitalized for heart failure. *Circulation Heart Failure* 4 (3), 293–300.
- Arksey, H., O'Malley, L., 2005. Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology* 8 (1), 19–32.
- Barents, M., Van Der Horst, I.C.C., Voors, A.A., Hillege, J.L., Muskiet, F.A.J., De Jongste, M.J.L., 2008. Prevalence and misdiagnosis of chronic heart failure in nursing home residents: The role of b-type natriuretic peptides. *Netherlands Heart Journal* 16 (4), 123–128.
- Bok, C., Ng, C.H., Koh, J.W.H., Ong, Z.H., Ghazali, H.Z.B., Tan, L.H.E., Ong, Y.T., Cheong, C.W.S., Chin, A.M.C., Mason, S., Krishna, L.K.R., 2020. Interprofessional communication (ipc) for medical students: A scoping review. *BMC Medical Education* 20, 372.
- Boscart, V.M., Heckman, G.A., Huson, K., Brohman, L., Harkness, K.I., Hirdes, J., McKelvie, R.S., Stolee, P., 2017. Implementation of an interprofessional communication and collaboration intervention to improve care capacity for heart failure management in long-term care. *Journal of Interprofessional Care* 31 (5), 583–592.
- Bozkurt, B., et al., 2021. Universal definition and classification of heart failure. *Journal of Cardiac Failure* 27 (4), 387–413.
- Busari, J., Moll, F., Duijs, A., 2017. Understanding the impact of interprofessional collaboration on the quality of care: A case report from a small-scale resource limited health care environment. *Journal of Multidisciplinary Healthcare* 10, 227–234.
- Castle, N.G., 2006. Measuring staff turnover in nursing homes. *Gerontologist* 46 (2), 210–219.
- Castle, N.G., Engberg, J., 2005. Staff turnover and quality of care in nursing homes. *Medical Care* 43 (6), 616–626.
- Choi, Y.-R., Chang, S.O., 2023. Exploring interprofessional communication during nursing home emergencies using the sbar framework. *Journal of Interprofessional Care* 37 (1), 83–90.
- Cleland, J.G.F., Van Veldhuisen, D.J., Ponikowski, P., 2019. The year in cardiology 2018: Heart failure. *European Heart Journal* 40 (8), 651–661.
- Close, H., Hancock, H., Mason, J.M., Murphy, J.J., Fuat, A., De Belder, M., Hungin, A.P.S., 2013. It's somebody else's responsibility"- perceptions of general practitioners, heart failure nurses, care home staff, and residents towards heart failure diagnosis and management for older people in long-term care: A qualitative interview study. *BMC Geriatrics* 13, 69.
- Conrad, N., Judge, A., Tran, J., Mohseni, H., Hedgecott, D., Crespillo, A.P., Allison, M., Hemingway, H., Cleland, J.G., McMurray, J.J.V., Rahimi, K., 2018. Temporal trends and patterns in heart failure incidence: A population-based study of 4 million individuals. *Lancet* 391, 572–580.
- Cousins, C., Burrows, R., Cousins, G., Dunlop, E., Mitchell, G., 2016. An overview of the challenges facing care homes in the UK. *Nursing Older People* 28 (9), 18–21. <https://doi.org/10.7748/nop.2016.e817>.
- Cousins, E., Preston, N., Doherty, J., Varey, S., Harding, A., McCann, A., Harrison Denning, K., Finucane, A., Carter, G., Mitchell, G., Brazil, K., 2022. Implementing and evaluating online advance care planning training in UK nursing homes during COVID-19: Findings from the necessary discussions multi-site case study project. *BMC Geriatrics* 22, 419.
- Craig, S., Cao, Y., McMahon, J., Anderson, T., Stark, P., Brown Wilson, C., Creighton, L., Gonella, S., Bavelaar, L., Vlackova, K., Mitchell, G., 2023. Exploring the holistic needs of people living with cancer in care homes: an integrative review. *Healthcare* 11 (24), 3166. Article. <https://www.mdpi.com/2227-9032/11/24/3166>.
- Daamen, M.A.M.J., Hamers, J.P.H., Gorgels, A.P.M., Brunner-La Rocca, H.-P., Tan, F.E.S., Van Dieijen-Visser, M.P., Schols, J.M.G.A., 2015. Heart failure in nursing home residents; a cross-sectional study to determine the prevalence and clinical characteristics. *BMC Geriatrics* 15, 167.
- Daamen, M.A.M.J., Schols, J.M.G.A., Jaarsma, T., Hamers, J.P.H., 2010. Prevalence of heart failure in nursing homes: A systematic literature review. *Scandinavian Journal of Caring Sciences* 24 (1), 202–208.
- Devi, R., Martin, G.P., Banerjee, J., Gladman, J.R., Denning, T., Barat, A., Gordon, A.L., 2022. Sustaining interventions in care homes initiated by quality improvement projects: A qualitative study. *BMJ Quality & Safety* bmjqs-2021-0143.
- Ellwood, A., Airlie, J., Cicero, R., Cundill, B., Ellard, D.R., Farrin, A., Godfrey, M., Graham, L., Green, J., McLellan, V., Siddiqi, N., Forster, A., 2018. Recruiting care homes to a randomised controlled trial. *Trials* 19, 535.
- Fatehi, F., Samadbeik, M., Kazemi, A., 2020. What is digital health? Review of definitions. *Studies in Health Technology and Informatics* 275, 67–71.
- Gandhi, A., Yu, H., Grabowski, D.C., 2021. High nursing staff turnover in nursing homes offers important quality information. *Health Affairs* 40 (3), 384–391.
- Gillespie, S.M., Moser, A.L., Gokula, M., Edmondson, T., Rees, J., Nelson, D., Handler, S.M., 2019. Standards for the use of telemedicine for evaluation and management of resident change of condition in the nursing home. *Journal of the American Medical Directors Association* 20 (2), 115–122.
- Glenny, C., Heckman, G., McKelvie, R., 2012. Heart failure in older persons: Considerations for the primary care physician. *Canadian Geriatrics Society Journal of CME* 2 (1), 9–17.
- Groenewegen, A., Rutten, F.H., Mosterd, A., Hoes, A.W., 2020. Epidemiology of heart failure. *European Journal of Heart Failure* 22 (8), 1342–1356.

- Hallam-Bowles, F.V., Logan, P.A., Timmons, S., Robinson, K.R., 2022. Approaches to co-production of research in care homes: A scoping review. *Research Involvement and Engagement* 8 (1), 74.
- Hancock, H.C., Close, H., Mason, J.M., Murphy, J.J., Fuat, A., de Belder, M., Hunt, T., Baker, A., Wilson, D., Hungin, A.P.S., 2012. Feasibility of evidence-based diagnosis and management of heart failure in older people in care: A pilot randomised controlled trial. *BMC Geriatrics* 12 (1), 70.
- Harrington, C.C., 2008. Assessing heart failure in long-term care facilities. *Journal of Gerontological Nursing* 34 (2), 9–14.
- Heckman, G.A., Boscart, V.M., D'Elia, T., Kaasalainen, S., McAiney, C., Kelley, M.L., Stolee, P., Strachan, P., McKelvie, R.S., 2016. The role of unregulated care providers in managing heart failure patients in long-term care facilities. *Journal of Clinical Nursing* 26, 849–861.
- Heckman, G.A., Boscart, V.M., Huson, K., Costa, A., Harkness, K., Hirdes, J.P., Stolee, P., McKelvie, R.S., 2018b. Enhancing knowledge and interprofessional care for heart failure (EKWIP-HF) in long-term care: A pilot study. *Pilot and Feasibility Studies* 4, 9.
- Heckman, G.A., Boscart, V.M., McKelvie, R.S., 2014. Management considerations in the care of elderly heart failure patients in long-term care facilities. *Future Cardiology* 10 (4), 563–577.
- Heckman, G.A., Shamji, A.K., Ladha, R., Stapleton, J., Boscart, V., Boxer, R.S., Martin, L.B., Crutchlow, L., McKelvie, R.S., 2018a. Heart failure management in nursing homes: A scoping literature review. *Canadian Journal of Cardiology* 34 (7), 871–880.
- Heiks, C., Sabine, N., 2022. Long-Term Care and Skilled Nursing Facilities. *Delaware Journal of Public Health* 8 (5), 144–149. <https://doi.org/10.32481/djph.2022.12.032>.
- Huson, K., Boscart, V., McKelvie, R., Hirdes, J.P., Stolee, P., Heckman, G., 2015. Interprofessional care processes to manage residents with heart failure in long-term care. *Canadian Journal of Cardiology* 31, S128.
- Jarrett, P.G., 1995. Illness presentation in elderly patients. *Archives of Internal Medicine* 155, 1060–1064.
- JB1, 2022. JBI template source of evidence details, characteristics and results extraction instrument. Retrieved 21 November, 2022, from <https://jbi-global-wiki.refined.site/space/MANUAL/4687579/Appendix+11.1+JBI+template+source+of+evidence+details%2C+characteristics+and+results+extraction+instrument>.**
- Kadri, A., Rapaport, P., Livingston, G., Cooper, C., Robertson, S., Higgs, P., 2018. Care workers, the unacknowledged persons in person-centred care: A secondary qualitative analysis of uk care home staff interviews. *PLoS One* 13 (7), e0200031.
- Kantoch, A., Gryglewska, B., Wojkowska-Mach, J., Heczko, P., Grodzicki, T., 2018. Treatment of cardiovascular diseases among elderly residents of long-term care facilities. *Journal of the American Medical Directors Association* 19 (5), 428–432.
- Kim, J., Ea, E., Parish, A.L., Levin, R.F., 2016. A nurse practitioner-led heart failure education program for certified nursing assistants in a long-term care facility. *Annals of Long-Term Care* 24 (5), 27–34.
- Komajda, M., 2015. Current challenges in the management of heart failure. *Circulation Journal* 79 (5), 948–953.
- Law, E., Ashworth, R., 2022. Facilitators and barriers to research participation in care homes: Thematic analysis of interviews with researchers, staff, residents and residents' families. *Journal of Long Term Care* (2002), 49–60.
- Lawrence, V., Fossey, J., Ballard, C., Ferreira, N., Murray, J., 2016. Helping staff to implement psychosocial interventions in care homes: Augmenting existing practices and meeting needs for support. *International Journal of Geriatric Psychiatry* 31 (3), 284–293.
- Lekan, D., Hendrix, C.C., McConnell, E.S., White, H., 2010. The connected learning model for disseminating evidence-based care practices in clinical settings. *Nurse Education in Practice* 10 (4), 243–248.
- Lesyuk, W., Kriza, C., Kolominsky-Rabas, P., 2018. Cost-of-illness studies in heart failure: A systematic review 2004–2016. *BMC Cardiovascular Disorders* 18, 74.
- Levac, D., Colquhoun, H., O'Brien, K.K., 2010. Scoping studies: Advancing the methodology. *Implementation Science* 5 (1), 69.
- Lippi, G., Sanchis-Gomar, F., 2020. Global epidemiology and future trends of heart failure. *AME Medical Journal* 5, 15.
- Low, L.-F., Fletcher, J., Goodenough, B., Jeon, Y.-H., Etherton-Beer, C., Macandrew, M., Beattie, E., 2015. A systematic review of interventions to change staff care practices in order to improve resident outcomes in nursing homes. *PLoS One* 10 (11), e0140711.
- Luo, H., Lum, T.Y.S., Wong, G.H.Y., Kwan, J.S.K., Tang, J.Y.M., Chi, I., 2015. Predicting adverse health outcomes in nursing homes: A 9-year longitudinal study and development of the FRAIL-minimum data set (MDS) quick screening tool. *Journal of the American Medical Directors Association* 16, 1042–1047.
- Mallon, A., Mitchell, G., Carter, G., McLaughlin, D., Wilson, C.B., 2023. A rapid review of evaluated interventions to inform the development of a resource to support the resilience of care home nurses. *BMC Geriatrics* 23, 275.
- McDonagh, T.A., et al., 2021. 2021 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. *European Heart Journal* 42 (36), 3599–3726.
- McMahon, J., Brown Wilson, C., Hill, L., Tierney, P., Thompson, D.R., Cameron, J., Yu, D., Moser, D.K., Spilsbury, K., Srisut, N., Schols, J.M.G.A., Van Der Velden, M., Mitchell, G., 2023. Optimising quality of life for people living with heart failure in care homes: Protocol for the co-design and feasibility testing of a digital intervention. *PLoS One* 18 (7), e0288433.
- Mitchell, G., McGreevy, J., Preshaw, D.H.L., Agnelli, J., Diamond, M., 2016. Care home managers' knowledge of palliative care: A Northern Irish study. *International Journal of Palliative Nursing* 22 (5), 230–235. <https://doi.org/10.12968/ijpn.2016.22.5.230>.
- Mitchell, G., Cousins, C., Burrows, R., Cousins, G., 2017. A review of safe-staffing models and their applicability to care homes. *Journal of Nursing Management* 25 (2), 157–162. <https://doi.org/10.1111/jonm.12450>. Advance online publication.
- Morrow, C.D., Reeder, B.P., Perrailon, M.C., Ozkaynak, M., Wald, H.L., Eber, L.E., Trojanowski, J.I., Battaglia, C., Boxer, R.S., 2020. Information needs of skilled nursing facility staff to support heart failure disease management. *AMIA Annual Symposium Proceedings* 2020, 878–885.
- Munn, Z., Peters, M.D.J., Stern, C., Tufanaru, C., McArthur, A., Aromataris, E., 2018. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology* 18 (1).
- National Library of Medicine, 2021. Skilled Nursing or Rehabilitation Facilities. U.S. Department of Health and Human Services. National Institutes of Health. <https://medlineplus.gov/ency/patientinstructions/000435.htm>.
- Nazir, A., Dennis, M.E., Unroe, K.T., 2015. Implementation of a heart failure quality initiative in a skilled nursing facility: Lessons learned. *Journal of Gerontological Nursing* 41 (5), 26–33.
- Norhammar, A., Bodegard, J., Vanderheyden, M., Tangri, N., Karasik, A., Maggioni, A.P., Sveen, K.A., Taveira-Gomes, T., Botana, M., Hunziker, L., Thuresson, M., Banerjee, A., Sundström, J., Bollmann, A., 2023. Prevalence, outcomes and costs of a contemporary, multinational population with heart failure. *Heart* 109, 548–556.
- Peryer, G., Kelly, S., Blake, J., Burton, J.K., Irvine, L., Cowan, A., Akdur, G., Killelt, A., Brand, S.L., Musa, M.K., Meyer, J., Gordon, A.L., Goodman, C., 2022. Contextual factors influencing complex intervention research processes in care homes: A systematic review and framework synthesis. *Age and Ageing* 51, 1–16.
- Peters, M.D.J., Marnie, C., Tricco, A.C., Pollock, D., Munn, Z., Alexander, L., McInerney, P., Godfrey, C.M., Khalil, H., 2020. Updated methodological guidance for the conduct of scoping reviews. *JB1 Evidence Synthesis* 18 (10), 2119–2126.
- Rapaport, P., Livingston, G., Murray, J., Mulla, A., Cooper, C., 2017. Systematic review of the effective components of psychosocial interventions delivered by care home staff to people with dementia. *BMJ Open* 7 (2), e014177.
- Reilev, M., Lundby, C., Jensen, J., Post Larsen, S., Hoffmann, H., Pottegård, A., 2020. Morbidity and mortality among older people admitted to nursing home. *Age and Ageing* 49 (1), 67–73. <https://doi.org/10.1093/ageing/afz136>.
- Ritchie, L.A., Gordon, A.L., Penson, P.E., Lane, D.A., Akpan, A., 2023. Stop and go: Barriers and facilitators to care home research. *Journal of Frailty & Aging* 12 (1), 63–66.
- Savarese, G., Becher, P.M., Lund, L.H., Seferovic, P., Rosano, G.M.C., Coats, A.J.S., 2022. Global burden of heart failure: A comprehensive and updated review of epidemiology. *Cardiovascular Research* 118 (17), 3272–3287.
- Skills for Care, 2022. Workforce Intelligence Summary: Care homes with nursing in the adult social care sector. Retrieved 20 Dec 2023 from: <https://www.skillsforcare.org.uk/Adult-Social-Care-Workforce-Data/Workforce-intelligence/documents/State-of-the-adult-social-care-sector/Summary-of-care-home-services-with-nursing-2022.pdf>.
- Spilsbury, K., Hanratty, B., McCaughan, D., 2015. Supporting nursing in care homes. Retrieved 10 Oct, 2023, from <https://rcnfoundation.rcn.org.uk/Funded-projects/Improving-Patient-Care/Supporting-Nursing-in-Care-Homes>.

- Spilsbury, K., Peryer, G., Devi, R., Haunch, K., Jordao, M., Thompson, C., Goodman, C., 2023. On your marks, get set, pause: What care home teams should consider before partnering with a trial research group. *Nursing and Residential Care* 25, 1–5.
- Stark, P., McKenna, G., Wilson, C.B., Tsakos, G., Brocklehurst, P., Lappin, C., Quinn, B., Mitchell, G., 2022. Interventions supporting community nurses in the provision of oral healthcare to people living at home: A scoping review. *BMC Nursing* 21, 269.
- Strachan, P.H., Kaasalainen, S., Horton, A., Jarman, H., D'Elia, T., Van Der Horst, M.-L., Newhouse, I., Kelley, M.L., McAiney, C., McKelvie, R., Heckman, G.A., 2014. Managing heart failure in the long-term care setting: Nurses' experiences in ontario, canada. *Nursing Research* 63 (5), 357–365.
- Sullivan, T.J., 2017. Taking a closer look at how to manage heart failure patients in long term nursing care facilities. Doctor of Nursing Practice. University of North Carolina at Charlotte.
- Thomas, K.S., Mor, V., Tyler, D.A., Hyer, K., 2013. The relationships among licensed nurse turnover, retention, and rehospitalization of nursing home residents. *Gerontologist* 53 (2), 211–221.
- Tricco, A.C., et al., 2018. Prisma extension for scoping reviews (prisma-scr): Checklist and explanation. *Annals of Internal Medicine* 169 (7), 467–473.
- Tunnard, I., Gillam, J., Harvey, C., Davies, N., Vickerstaff, V., Ellis-Smith, C., Evans, C.J., 2022. The acceptability and effectiveness of ehealth interventions to support assessment and decision-making for people with dementia living in care homes: A systematic review. *Frontiers in Dementia* 1 (1), 9775.
- Urbich, M., Globe, G., Pantiri, K., Heisen, M., Bennison, C., Wirtz, H.S., Di Tanna, G.L., 2020. A systematic review of medical costs associated with heart failure in the USA (2014–2020). *PharmacoEconomics* 38 (11), 1219–1236.
- Valle, R., Aspromonte, N., Barro, S., Canali, C., Carbonieri, E., Ceci, V., Chinellato, M., Gallo, G., Giovino, P., Ricci, R., Milani, L., 2005. The nt-probnp assay identifies very elderly nursing home residents suffering from pre-clinical heart failure. *European Journal of Heart Failure* 7 (4), 542–551.
- Wachter, R., Rommel, K.P., 2022. Hospitalization for heart failure: A window of opportunity. *European Heart Journal* 43 (23), 2235–2236.
- World Health Organisation, 2018. Classification of digital health interventions. Retrieved 13 June, 2023, from <https://saluddigital.com/wp-content/uploads/2019/09/DigitalHealthClassificationsBooklet.pdf>.**
- Zhao, Y., Liu, L., Chan, H.Y.L., 2021. Dementia care education interventions on healthcare providers' outcomes in the nursing home setting: A systematic review. *Research in Nursing & Health* 44 (6), 891–905.
- Zhang, X., Dou, Q., Zhang, W., et al., 2019. Frailty as a predictor of all-cause mortality among older nursing home residents: A systematic review and meta-analysis. *Journal of the American Medical Directors Association* 20, 657–663.