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SYSTEMATIC REVIEW

Clinical outcomes of nurse-coordinated interventions for frail older adults discharged from hospital: A systematic review and meta-analysis

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Abstract

Aim: To determine the effects of nurse-coordinated interventions in improving readmissions, cumulative hospital stay, mortality, functional ability and quality of life for frail older adults discharged from hospital.

Design: Systematic review with meta-analysis.

Methods: A systematic search using key search terms of 'frailty', 'geriatric', 'hospital' and 'nurse'. Covidence was used to screen individual studies. Studies were included that addressed frail older adults, incorporated a significant nursing role in the intervention and were implemented during hospital admission with a focus on transition from hospital to home.

Data Sources: This review searched MEDLINE (Ovid), CINAHL (EBSCO), PubMed (EBSCO), Scopus, Embase (Ovid) and Cochrane library for studies published between 2000 and September 2023.

Results: Of 7945 abstracts screened, a total 16 randomised controlled trials were identified. The 16 randomised controlled trials had a total of 8795 participants, included in analysis. Due to the heterogeneity of the outcome measures used meta-analysis could only be completed on readmission ($n = 13$) and mortality ($n = 9$). All other remaining outcome measures were reported through narrative synthesis. A total of 59 different outcome measure assessments and tools were used between studies. Meta-analysis found statistically significant intervention effect at 1-month readmission only. No other statistically significant effects were found on any other time point or outcome.

Conclusion: Nurse-coordinated interventions have a significant effect on 1-month readmissions for frail older adults discharged from hospital. The positive effect of interventions on other health outcomes within studies were mixed and indistinct, this is attributed to the large heterogeneity between studies and outcome measures.

Relevance to Clinical Practice: This review should inform policy around transitional care recommendations at local, national and international levels. Nurses, who constitute half of the global health workforce, are ideally situated to provide transitional

care interventions. Nurse-coordinated models of care, which identify patient needs and facilitate the continuation of care into the community improve patient outcomes.
Implications for the Profession and/or Patient Care: Review findings will be useful for key stakeholders, clinicians and researchers to learn more about the essential elements of nurse-coordinated transitional care interventions that are best targeted to meet the needs of frail older adults.
Impact: When frail older adults experience transitions in care, for example discharging from hospital to home, there is an increased risk of adverse events, such as institutionalisation, hospitalisation, disability and death. Nurse-coordinated transitional care models have shown to be a potential solution to support adults with specific chronic diseases, but there is more to be known about the effectiveness of interventions in frail older adults. This review demonstrated the positive impact of nurse-coordinated interventions in improving readmissions for up to 1 month post-discharge, helping to inform future transitional care interventions to better support the needs of frail older adults.
Reporting Method: This systematic review was reported in accordance with the Referred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.
Patient or Public Contribution: No Patient or Public Contribution.

KEYWORDS
frailty, hospital to home, multimorbidity, nurse-coordinated, transitional care

1 | INTRODUCTION

Frail older adults being discharged from hospital and returning home are at risk of poor health outcomes including reduced quality of life, rehospitalisation and mortality (Cunha et al., 2019). Ageing also increases the rates of frailty and multimorbidity, which further reduces peoples' ability to cope with stressor events and increases their risk for institutionalisation, hospitalisation, disability and death (Fried et al., 2001; Mitnitski et al., 2001). Rates of admissions for older people with complex multimorbidity can be as high as 40% (Heppenstall et al., 2018; Ofori-Asenso et al., 2019). Current health systems are ill-prepared to address the health complexity associated with multimorbidity and frailty, and their inevitable transitions in care (Coleman et al., 2006; Hirschman et al., 2015; Mercer et al., 2016). Transitional care is the act of implementing care coordination as patients transfer to and from different settings and levels of care (Coatsworth-Puspoky et al., 2021; Coleman & Boult, 2003). Managing the transitional care needs of older people living with frailty and multimorbidity, and receiving care by different healthcare providers, across different healthcare settings, is difficult (Naylor & Keating, 2008). Poor transitions in care are often characterised by episodes of acute clinical deterioration, miscommunication, medical misadventure and poor coordination (Mudge & Hubbard, 2019). Therefore, reframing health systems as complex adaptive organisations that have the capabilities of providing person-centred care is vital to maintain continuity of care for this vulnerable population.

What does this paper contribute to the wider global community?

- Greater prioritisation of autonomy as a positive facilitator to keep frail older adults in their place of choice. Increased importance of addressing psychosocial well-being and quality of life within interventions to increase success.
- Underscoring the strengths of nurses as a solution to support the nexus of healthcare service reliance and geriatric syndromes in an ageing population.

To date, there has been wide global research and financial investment into processes to improve the experience for older adults during transitions between healthcare settings, although this is inconclusive (Bryant-Lukosius et al., 2015; Dent et al., 2014, 2017; Hendry et al., 2019; Joo & Liu, 2023; Weeks et al., 2018). Historically, models are often targeted at specific population groups and chronic illnesses (e.g. patients who have had a stroke), and these models have shown various positive effects on these populations including rehospitalisation, treatment adherence and patient satisfaction, as a few examples (Allen et al., 2014; Bryant-Lukosius et al., 2015). Nurse-coordinated interventions have historically demonstrated that transitional care models, with nurses at the forefront, can

effectively support adults with chronic conditions, such as heart failure (Joo & Liu, 2023; Naylor et al., 2017). Nurses are ideally positioned in healthcare settings to ensure continuous care and foster patient-centred approaches (Jo Delaney, 2018; Kitson et al., 2013). However, there is still much to explore regarding the impact of nurse-led transitional care on the multifaceted health outcomes of complex, frail older patients, who are influenced by a variety of health factors (Chen et al., 2021; Lee et al., 2022; Suksatan & Tankumpuan, 2022; Verhaegh et al., 2014). This systematic review aims to evaluate the effectiveness of nurse-led transitional care interventions for frail older adults moving from hospital to home, focusing on how these strategies can improve multidimensional health outcomes.

2 | THE REVIEW, AIMS AND METHODS

This systematic review was reported in accordance with the Referred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Data S1) (Page et al., 2021). The protocol for the systematic review is registered on PROSPERO (CRD42022310831 published: 05/2022, updated in 11/2022).

2.1 | Aims

This systematic review aims to:

1. Examine the effects of nurse-coordinated interventions among frail older adults discharged from hospital.
2. Determine the effective components of nurse-coordinated interventions in improving readmissions, cumulative hospital stay, mortality, functional ability and quality of life for frail older adults discharged from hospital.
3. Describe intervention components used in nurse-coordinated interventions from hospital to home.
4. Describe common outcome measures used in intervention studies for transitional care.

2.2 | Search strategy and information sources

The development of the search strategy originated in preliminary academic database searches in which key search terms were developed: 'frailty', 'geriatric', 'nurse' and 'hospital'. These search terms, MeSH terms and other like terms, were searched within the academic electronic databases of MEDLINE (Ovid), CINAHL (EBSCO), PubMed (EBSCO), Scopus, Embase (Ovid) and Cochrane library. The search strategy included studies published in the English language between January 2000 and September 2023. The search strategy was developed with a health librarian from the University of Technology and is included as (Appendix A) for reference.

2.3 | Eligibility criteria and selection of studies

After comprehensive search of specified electronic databases was completed and duplicates removed, studies were screened using Covidence (Veritas Health Innovation, 2023), a web-based collaboration software platform that streamlines the production of systematic reviews. All studies were screened by two independent reviewers by title and abstract, and any conflicts were resolved by consensus. Following this process, a full-text screening by two independent reviewers was completed. Studies included were published in the English language from 2000 onwards with the participant population as older adults aged 65 years or over and described as 'frail'. Any studies with specialised subgroup populations (e.g. cancer patients) without generalisable interventions were excluded. Randomised controlled trials which have a nurse coordinated or nurse-led component within the intervention were included in this review. Only studies that followed patients transferring from hospital to home, which includes either an intervention throughout the transition from hospital to home or recruitment initiated during hospital presentation and intervention commencing in the community. The search was limited to publications 2000 and onwards as an arbitrary cut-off point to account for dated reporting and trial standards for conduct, and to include recent evidence to reflect scientific relevance of healthcare interventions. This review did not screen by outcome measure and included all studies that sit within the criteria as described above. Excluded studies will be explained and reported within the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.

2.4 | Quality and bias assessment

Included studies were critically appraised using the Cochrane Risk of Bias 2.0 for Randomised Controlled Trials (Sterne et al., 2019). Two independent reviewers (KP and JM) assessed quality and bias using Covidence, and consensus was reached on discrepancies through discussion. Study risk of bias was assessed against the following domains: randomisation, intervention deviations, missing outcome data, outcome measurement and selective outcome reporting. Each potential source of bias was judged as either high, some concerns or low with an overall study rating of bias.

2.5 | Data extraction, analysis and synthesis

Data extraction was undertaken by the reviewers manually and using Covidence software and described in a summary table (Table 1). Items of data extraction included setting, intervention and control, sample size, baseline demographics, primary and secondary outcomes and results. The outcome measures of interest in this systematic review investigated readmissions, cumulative hospital stay, mortality, functional ability and self-rated quality of life. While these

TABLE 1 Summary table of included studies.

Author Year Country	Setting	*N* = Total participants (I/C)	Participant description	Intervention and description	Outcomes: P = primary S = secondary	Results
Alakare et al. (2021) Finland	ED	*N* = 432 (213/219)	Aged ≥75 years; frail, or at risk of frailty, defined by the Clinical Frailty Scale level of 4–9; and residency in the hospital service area	Systematic Geriatric Assessment Geriatric assessment with the patient in ED, multidimensional recommendations regarding care (medications, nutrition, mobility and rehabilitation) applied to ward (if admitted) and home. With evaluation and organisation of home care if needed	P = Cumulative hospital stay S = Admission rate, Readmissions, ED admissions, Mortality, proportion of patients living at home, quality of life, falls-related ED presentation	Cumulative hospital stay during one-year follow-up as rate per 100 person-years (RR 1.10, 95% CI .55–2.19, $p = .78$). No secondary outcomes were statistically significant
Berglund et al. (2013) Berglund et al. (2015) Ebrahimi et al. (2017) Ekelund and Eklund (2015) Eklund et al. (2013) Wilhelmson et al. (2017) Sweden	ED and inpatient, then community	*N* = 161[a] (85/76) Note: Ekelund (2015) *N* = 158	Aged ≥80 years, or aged 65–79 years with at least one chronic disease and dependent in at least one activity of daily living	Continuum of care Nurse based assessment on needs for rehabilitation, nursing, geriatric and social care. Assessment communicated to the ward (if admitted) and case manager in the municipality. Discharge planning prior to discharge home with comprehensive care plan developed and initiated at home. With case manager follow-ups at home for 12 months	Quality of care Life satisfaction Self-rated health, experiences of security/ safety and symptoms Self determination ADL and frailty ADL, readmissions, and healthcare use	Perceived higher quality of care regarding care planning ($p \leq .005$ for all values) and knowledge of who to contact ($p \leq .03$ at 3 and 12 months). Statistically significant improvements in 6-to 12-month satisfaction in functional capacity, psychological health and financial situation. Improvement in self-rated health and symptoms between groups and in self-determination in activities at home and social relationships. No statistically significant differences in frailty. At 3- and 12-month doubled odds for improved ADL independence and halved odds for decreased ADL independence. Increase in home visit by OT/PT ($p = .024$), no statistically significant improvement in readmissions although mean time to readmission was almost doubled for independent participants in intervention

(Continues)

TABLE 1 (Continued)

Author Year Country	Setting	*N* = Total participants (I/C)	Participant description	Intervention and description	Outcomes: P = primary S = secondary	Results
Cohen et al. (2002) United States	Inpatient to community	*N* = 1388[b] (I-I = 346 I-C = 348 C-I = 346 C-C = 348)	Aged ≥65 years, hospitalisation on a medical or surgical ward, an expected length of stay of ≥2 days and a frail condition	Geriatric Evaluation and Management Inpatient and outpatient geriatric evaluation with screening for geriatric syndromes; develop a list of problems; assess functional, cognitive, affective, and nutritional status; evaluate the caregiver capabilities and social situation. Plan of care developed to manage problems identified	P = Mortality, HR-QoL S = ADLs, physical performance, utilisation of health services and cost	Significantly greater improvements in the scores for four of the eight SF-36 subscales, activities of daily living, and physical performance. Mean days in long term care were statistically significantly lower, intervention (15.0±1.8) versus control (17.1±1.8), $p = .03$. No significant differences in survival and 12-month cost
Courtney et al. (2009) Courtney et al. (2012) Australia	Inpatient	*N* = 128 (64/64)	Aged ≥65 years, admitted with a medical diagnosis, and at least one risk factor for readmission	Older Hospitalised Patients' Discharge Planning and In-home Follow-up Protocol (OHP-DP) Comprehensive patient assessment and developed goal-directed, individualised care plan in consultation with the patient, health professionals, family and caregivers. Nurse home visit post discharge to support and address transitional concerns	Emergency health service utilisation, HRQOL Index of ADL, IADL and modified WIQ	Fewer emergency hospital readmissions (22% intervention, 47% control, $p = .007$) and emergency GP visits (25% intervention, 67% control, $p < .001$). Improvements in mean Mental (intervention 56.5(6.8) vs. control 47.6 (9.2), $p < .001$) and Physical (intervention 39.4(8.0) vs. control 29.0(9.2), $p < .001$) component scores. Improvements in IADL scores ($p < .001$), ADL scores ($p < .001$) and WIQ scale scores ($p < .001$)
Ekerstad et al. (2017) Sweden	Inpatient	*N* = 408 (206/202)	Aged ≥75 years, having in-hospital treatment and fulfilled the foundation of frailty according to FRESH	Hospital Unit CGA and intervention focusing on somatic and mental health, medication review, social situation, early discharge planning, and functional and activity ability	P = HRQOL S = Mortality, rehospitalisation and cost	Less likely to present with decline in HRQOL in 6/8 dimensions at 3 months. Lower 3-month mortality (HR = .55, 95% CI .32–.96) and no significant differences in terms of hospital care costs

TABLE 1 (Continued)

Author Year Country	Setting	N = Total participants (I/C)	Participant description	Intervention and description	Outcomes: P = primary S = secondary	Results
Finlayson et al. (2018)	Inpatient to community	N = 222[b] (I^3 = 57 I^2 = 54 I^1 = 56 C = 55)	Aged ≥65 years, admitted with a medical condition and who had at least one risk factor for readmission	Exercise and Nurse follow-up (1) exercise program, (2) nurse home visit and telephone follow-up (N-HaT), and (3) exercise and nurse home visit and telephone follow-up (ExN-HaT). ExN-HaT received tailored exercise program, in-home visit and 24-week telephone follow-up by a specialist geriatric nurse. Exercise only and N-HaT groups received usual care and only the exercise or gerontic nurse respectively	P = Unplanned hospital admission	Reduced readmission rates 28 days following discharge ExN-HaT (HR .278, 95% CI .09–.88, p = .029) and N-HaT (HR .38, 95% CI .13–1.07, p = .067). Less likely to have an unplanned readmission within 12 weeks of discharge ExN-HaT (HR .47, 95% CI .23–.97, p = .04) and N-HaT (HR .38, 95% CI .18–.82, p = .014). No significant differences at 24 weeks
Hansen et al. (2021) Denmark	Inpatient to community	N = 3103 (Community = 1545 Hospital = 1558)	Aged ≥75 years, local community and: moderately/severely frail; accepted to receive home visits; not terminally ill, without stroke or hip fracture	Transitional Care Intervention Municipality-based versus a hospital-based geriatric MDT transitional care intervention including nursing follow-ups and various referrals to appropriate services and GP linkage	P = Unplanned readmission S = Mortality and index LOS	Readmission rates were 22% in municipality-based, and 18% in hospital-based: OR 1.27, 95% CI (1.06–1.52), p = .008. No significant difference in mortality or LOS
Kircher et al. (2007) Germany	Inpatient	N = 435[a] (129/105) + n = 81 comparison group	Aged ≥65 years, expected length of stay of at least 8 days, with functional impairment and potential breakdown of the home situation	Geriatric Evaluation and Management Evaluation with recommendations for treatment. Team conferences were held at least weekly, where treatment was evaluated, and the recommendations appraised. With discharge and follow-up procedures and post discharge follow-up phone call/home visit	P = Rehospitalisation and nursing home placement S = survival, functional, emotional, and cognitive status, social situation and quality of life	No significant difference in readmission rates (intervention 56%, control 50.4%, p = .31, RR 1.11, 95% CI .91–1.35) or nursing home placement (intervention 19%, control 14%, p = .27) at 12 months. No other statistically significant results for any other secondary measures

(Continues)

TABLE 1 (Continued)

Author Year Country	Setting	*N* = Total participants (I/C)	Participant description	Intervention and description	Outcomes: P = primary S = secondary	Results
Lembeck et al. (2019) Denmark	Inpatient to community	*N* = 537 (270/267)	Aged ≥65 years, discharge with any diagnosis from the Medical, Geriatric, Emergency, Surgical or Orthopaedic departments during study duration	Discharge planning with community continuity. Discharge planning the day before discharge and nurse accompanied the patient home and met with the municipal nurse. Together reviewed cognition, medicine, nutrition, mobility, functional status and future appointments, intervening if appropriate	P = Unplanned readmission S = time to first readmission, number of readmissions, LOS and readmission with an ACSC diagnosis, GP visits, community services and mortality	Similar readmission rates at 8 days ($p = .61$), 30 days ($p = .38$) and 180 days ($p = .71$). Similar mortality between groups throughout and no significant differences in results for any secondary outcomes
Leung et al. (2004) Hong Kong	Inpatient to community	*N* = 92 (45/47)	Frail older adults, aged 65 years and over	Case management Case management services with assigned case managers and paired geriatricians for medical support. Services included: regular monitoring of subjects' health status; phone assistance daily 8am-9pm; home visits if necessary, prescribing community based supportive services	P = Utilisation of hospital services S = Functional status	Significant reduction in mean number of hospital bed-days, mean number of rehabilitation bed-days, mean total episodes of unplanned hospital admissions, and mean total number of attendances at outpatients
Nikolaus and Bach (2003) Germany	Inpatient to community	*N* = 360 (181/179)	Older adults living at home; multiple chronic conditions/functional decline; discharged home	Home Intervention Team CGA followed by a diagnostic home visit and home intervention including advice re environmental hazards, home modifications, facilities and advice	P = Falls and fall related injuries	The intervention group had 31% fewer falls (IRR = .69, 95% CI .51–.97, $p = .03$)

TABLE 1 (Continued)

Author Year Country	Setting	N = Total participants (I/C)	Participant description	Intervention and description	Outcomes: P = primary S = secondary	Results
Prestmo et al. (2015) Norway	Inpatient	N = 397 (198/199)	Home-dwelling people aged ≥70 years who had been able to walk 10 m before the fracture	Comprehensive Geriatric Care Structured, systematic interdisciplinary CGA and care focusing on somatic health; mental health; function and social situation. Early discharge planning with early mobilisation and initiation of rehabilitation	P = Mobility S = ADLs, cognition, QOL, readmissions, cost, and institutionalisation	Mean SPPB scores at 4 months were improved in intervention group (between-group difference .74, 95% CI .18–1·30, $p = .01$). Statistically significant results at 1, 4 and 12 months for mobility, ADLs and QOL. Intervention cost was significantly higher than control ($p < .0001$)
Rytter et al. (2010) Denmark	Inpatient to community	N = 331[a] (148/145)	Aged ≥78 years, discharged from the geriatric or internal medical ward, and hospitalised for a minimum of 2 days	Post Discharge follow-up Structured home visit by the GP and the district nurse 1 week after discharge followed by two contacts after 3 and 8 weeks, with the nurse if needed	P = Readmission rate S = Medications, mortality, and cost	Reduced readmission rates (intervention 52%, control 40%, $p = .03$, RRR 23%) and number of days to first readmission (HR = .69, 95% CI .50–.95, $p = .02$). Statistically significant results for medications GP were unaware and did not take medication prescribed by GP. Mortality at 26 weeks, 15 intervention versus 20 control (HR .72 95% CI .37–1.41)
Schapira et al. (2022) Argentina	Inpatient to home	N = 240 (120/120)	Aged ≥75 years, who had an unplanned hospital admission to the internal medicine service and fulfilled the definition of frailty according to the frailty index	Geriatric co-management and interdisciplinary transitional care CGA during hospitalisation, providing recommendations to minimise geriatric syndromes and planned transition of care. Health and social care counsellor oversaw continuity of care at home after discharge	P = Readmission rate S = Mortality and ED presentations	Reduced readmission rates at 30 days (intervention 18% vs. control 35%, RR .524, 95% CI .334–.821, $p = .04$); and reduced ED visits within 6 months after discharge (intervention 43.3% vs. control 60%, RR .722, 95% CI .562–.929, $p = .01$). Mortality was not statistically significant

(Continues)

TABLE 1 (Continued)

Author / Year / Country	Setting	*N* = Total participants (I/C)	Participant description	Intervention and description	Outcomes: P = primary S = secondary	Results
Thygesen et al. (2015) Denmark	Discharged to community	*N* = 531 (270/261)	Aged ≥65 years; discharged; living in surrounding municipalities; and dementia or two various geriatric conditions or indicators	Post Discharge Follow-Up Home visits with a GP and municipal nurse within 7 days of discharge focusing on medication, rehabilitation plan, functional level, and need for further health care initiatives. Concluded with planning of further visits in third and eighth week after discharge	P = Readmission S = Primary health care and municipal service utilisation	At 30 days and 180 days no difference in readmissions (intervention 24%, control 23%, $p = .93$ and intervention 52%, control 51%, $p = .91$ respectively). Significant increase in community-based nursing services
Westgard et al. (2018) Sweden	Inpatient (feasibility RCT)	*N* = 30 (16/14)	Frail people aged 75 and older, who required an acute admission to hospital	Comprehensive Geriatric Assessment CGA on a geriatric medical ward by the MDT to address physical health, functional ability, psychological state, cognition, and social circumstance	P = Recruitment and retention rates S = Services during admission	Feasibility-pilot study found 100% recruitment and at study close 13% had withdrawn

Abbreviations: ACSC, ambulatory care sensitive conditions; ADL, activities of daily living; C, control; CGA, comprehensive geriatric assessment; CI, confidence interval; ED, emergency department; ExN-HaT, exercise and nurse home visit and telephone follow-up; FRESH Frail, elderly support research group; GP, general practitioner; HRQOL, health-related quality of life; I^1, intervention one; I^2, intervention two; I^3, intervention 3; IADL, instrumental activities of daily living; IRR, incidence rate ratio, I/C, intervention/control, LOS, length of stay; MDT, multidisciplinary team; N-HaT, nurse home visit and telephone follow-up; QOL, quality of life; RCT, randomised controlled trial; RR, risk ratio; RRR, relative risk ratio; WIQ, walking impairment questionnaire.

[a]Missing data from baseline clinical assessments.

[b]4 Trial arms.

were primary outcomes of interest, all outcomes included within studies were reported in narrative synthesis. Meta-analysis was undertaken using Review Manager (RevMan), 2020 Version 5.4.1, when outcome measures and assessments correlate. All included outcomes were dichotomous variables and are reported using Risk Ratio calculations using a random effects model due to the heterogeneity in interventions used within studies (Dettori et al., 2021). Heterogeneity was calculated using I^2 and statistical significance reported at $p < .05$. Where there are more than two studies measuring the same outcome with the same assessment tool and reporting of results, exploration into meta-analysis was completed and reported where appropriate (Valentine et al., 2010). Biostatistician consult was also completed to confirm meta-analysis method and reporting. Results unable to be included in meta-analysis were manually synthesised and thematically analysed and described in a narrative review.

3 | RESULTS

3.1 | Study selection

The initial search yielded 7945 citations after the removal of duplicates and, after title and abstract screening was completed, 176 full-text studies were extracted and reviewed. One hundred and fifty-four studies were excluded, with reasons as described in Figure 1. A total of 16 randomised controlled trials (RCT) were identified, one RCT of a 'continuum of care for frail older people' had 6 associated publications (Berglund et al., 2013, 2015; Ebrahimi et al., 2017; Ekelund & Eklund, 2015; Eklund et al., 2013; Wilhelmson et al., 2017). A second RCT (Courtney et al., 2009) had one additional study publication (Courtney et al., 2012), resulting in a total of 22 studies included in this review.

3.2 | Study characteristics

Characteristics and results of the included studies are reported in Table 1 below. Trials were conducted in Denmark ($n = 4$), Sweden ($n = 3$), Australia ($n = 2$), Germany ($n = 2$), Finland ($n = 1$), United States ($n = 1$), Hong Kong ($n = 1$), Norway ($n = 1$) and Argentina ($n = 1$). The 16 RCTs had a total of 8795 participants with a mean age of 81 years (range 65–103 years of age) and 60% of participants were female. Participants were described as old and frail by either using a specific frailty measure ($n = 6$), including Clinical Frailty Scale, Eight Frailty Indicators, FRESH-screening, FRAIL Scale and Multidimensional Prognostic Index, or by using functional assessment or comorbidities ($n = 10$) including Charlson Comorbidity Index, Barthel Index, Geriatric Screening and number of comorbidities/health problems to indicate vulnerability and decline.

3.3 | Quality and bias assessment

Included studies risk of bias is demonstrated in Figure 2 below (McGuinness & Higgins, 2021; Sterne et al., 2019). In all studies,

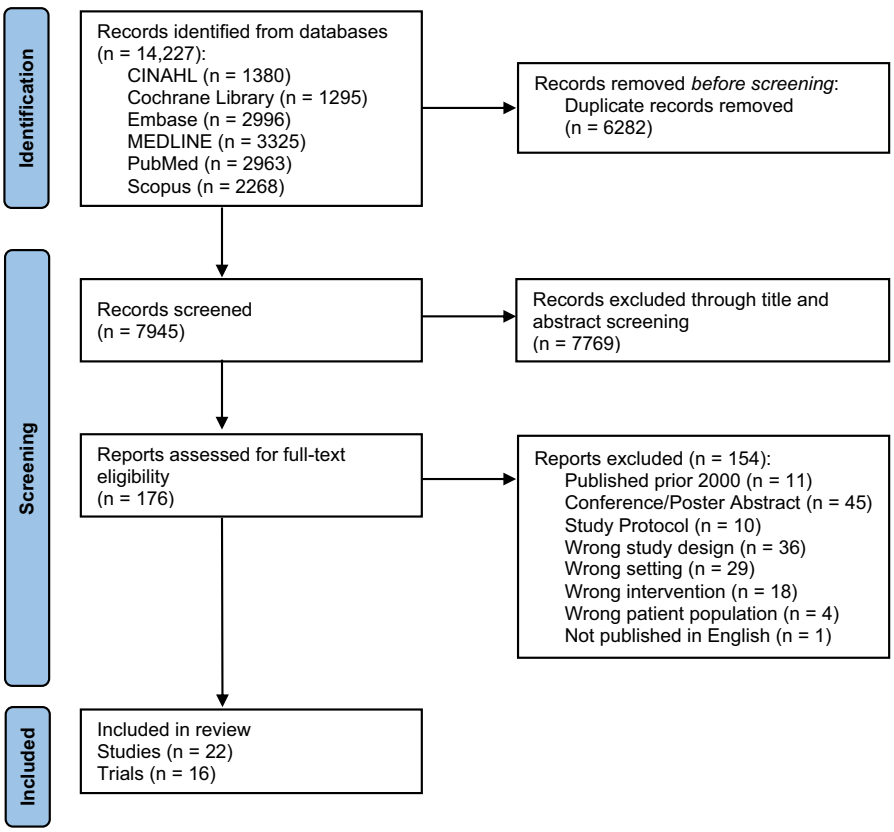

FIGURE 1 PRISMA flow diagram of included studies (Page et al., 2021). [Colour figure can be viewed at wileyonlinelibrary.com]

FIGURE 2 Risk of bias summary of included studies (McGuinness & Higgins, 2021). [Colour figure can be viewed at wileyonlinelibrary.com]

study personnel delivering interventions and/or participants were aware of intervention received, due to the nature of components of interventions (e.g. home visits) and this risk of bias is represented in domain 2. Often data collectors were blinded to participant allocation, but this was not always achieved. All but three studies reported, and explained missing outcome data, and documented their analysis appropriately (Kircher et al., 2007; Leung et al., 2004; Nikolaus & Bach, 2003). Six studies received a high risk of bias in any of the 5 domains, therefore merited an overall high risk of bias as per the ROB2 tool (Ekerstad et al., 2017; Kircher et al., 2007; Leung et al., 2004; Nikolaus & Bach, 2003; Schapira et al., 2022; Westgard et al., 2018).

3.4 | Types of interventions

Interventions included within this review were characterised by being hospital-based, community-based or incorporating both throughout the transition. As per inclusion criteria, all included studies focused on a primary nursing role within the intervention, for example geriatric or specialist nurse care, nursing-based assessment, ward-based nursing care, or community nurse home visit. Figure 3 below demonstrates intervention components across included studies, noting number of trials that included each different intervention components. The most common intervention component was a systematic (comprehensive) geriatric assessment ($n=14$), followed by recommendations for care with formalised care plan or treatment plan ($n=9$). Community-based components were common within interventions, including community services referral ($n=12$) and community-based follow-up ($n=12$). Most trials consisted of two arms ($n=13$), with two trials including four trial arms, and one trial including an intervention arm and a control arm with an additional comparison group. Follow-up duration widely varied between studies, with a maximum follow-up period of 12 months.

3.5 | Outcome measures

Primary and secondary follow-up outcome measures and assessments of included studies are displayed within Table 2. For comparison, assessments were completed at index and at certain follow-up time points. Those completed at index (baseline, at time of recruitment or at discharge) were not identified in the table below. Only outcome assessments outside the intervention were included in the table. Between 22 studies and 16 RCTs included, there was a total of 59 outcome measure assessments and tools used across nine different follow-up time points.

3.6 | Data analysis

Due to the heterogeneity of the outcome measures used meta-analysis could only be completed on readmission ($n=13$) and mortality ($n=9$). Narrative synthesis was used for all remaining outcome measures as a result of the high heterogeneity in interventions and studies included within this review. The narrative synthesis

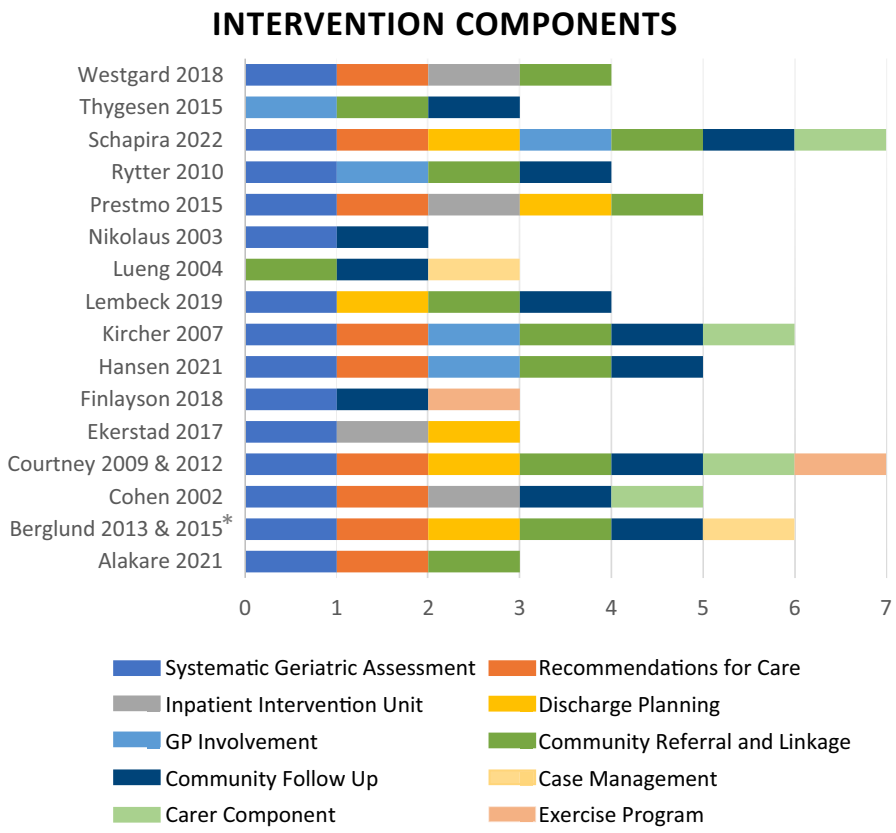

FIGURE 3 Intervention components included across randomised controlled trials. [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 2 Summary of outcome assessments and tools.

Theme	Outcome measure	Assessment tool
Meta analysis	Hospital readmissions	Medical records/National Register (Alakare et al., 2021; Courtney et al., 2009; Ekerstad et al., 2017; Finlayson et al., 2018; Hansen et al., 2021; Lembeck et al., 2019; Leung et al., 2004; Prestmo et al., 2015; Rytter et al., 2010; Schapira et al., 2022; Thygesen et al., 2015; Wilhelmson et al., 2017)
		Self/proxy reported (Courtney et al., 2009; Finlayson et al., 2018; Kircher et al., 2007)
	Mortality	Medical records/National Register (Alakare et al., 2021; Ekerstad et al., 2017; Hansen et al., 2021; Lembeck et al., 2019; Rytter et al., 2010; Schapira et al., 2022; Thygesen et al., 2015)
		Phone follow-up (Cohen et al., 2002; Kircher et al., 2007)
The nexus of healthcare service reliance and geriatric syndromes in an ageing population	ED presentations	Medical records/National Register (Alakare et al., 2021; Courtney et al., 2009; Leung et al., 2004; Schapira et al., 2022)
		Self/proxy reported (Courtney et al., 2009)
	Cumulative hospital stay	Medical Records (Alakare et al., 2021; Ekerstad et al., 2017; Lembeck et al., 2019; Leung et al., 2004; Thygesen et al., 2015; Wilhelmson et al., 2017)
	Institutionalisation	Medical records/National Register (Alakare et al., 2021; Cohen et al., 2002; Prestmo et al., 2015)
		Self/proxy reported (Kircher et al., 2007)
	Length of stay (Hospital or ED)	Medical records/National Register (Alakare et al., 2021; Thygesen et al., 2015)
	Community service utilisation	Medical records/National Register (Cohen et al., 2002; Lembeck et al., 2019; Leung et al., 2004; Thygesen et al., 2015; Wilhelmson et al., 2017)
		Self/proxy reported (Courtney et al., 2009; Kircher et al., 2007)
	Cost	Medical records (Cohen et al., 2002; Ekerstad et al., 2017; Prestmo et al., 2015; Rytter et al., 2010)
Prioritising autonomy keeping frail older adults in their place of choice	Functional ability/Frailty	Frailty (deficit accumulation) (Eklund et al., 2013)
		Vision/hearing deterioration (Kircher et al., 2007) /Visual acuity chart (Eklund et al., 2013)
		ADL Staircase (Eklund et al., 2013; Wilhelmson et al., 2017)[a]
		Barthel Index (Kircher et al., 2007; Prestmo et al., 2015)
		Berg Balance Scale (Eklund et al., 2013)
		Hand grip (Eklund et al., 2013; Kircher et al., 2007)
		Index of ADL (Courtney et al., 2012)
		IADL (Courtney et al., 2012)
		Katz ADL (Cohen et al., 2002)
		MDS-HC (Leung et al., 2004)
		Motility Index (Kircher et al., 2007)
		Nottingham Extended ADL Scale (Prestmo et al., 2015)
		Physical Performance Test (Cohen et al., 2002)
		SPPB (Prestmo et al., 2015)
		Timed-Up-And-Go-Test (Kircher et al., 2007; Prestmo et al., 2015)
		Walking Impairment Questionnaire (Courtney et al., 2012)
		Wheelchair use (Kircher et al., 2007)
	Falls	Medical records (Alakare et al., 2021)
		Self/proxy reported (Nikolaus & Bach, 2003)
		Falls Efficacy Scale International-short form (Prestmo et al., 2015)
	Medications	Self/proxy reported (Kircher et al., 2007; Rytter et al., 2010)

TABLE 2 (Continued)

Theme	Outcome measure	Assessment tool
Growing emphasis on mental and emotional well-being to increase intervention efficacy	Quality of life	EQ-5D-3L (Prestmo et al., 2015) / EQ-5D-5L (Alakare et al., 2021)
		EQ-VAS (Alakare et al., 2021; Ekerstad et al., 2017)
		Goteborg Quality of Life (Ebrahimi et al., 2017)
		HUI-3 (Ekerstad et al., 2017)
		PGCMS (Kircher et al., 2007)
		QALY (Prestmo et al., 2015)
		SF-12v2 (Courtney et al., 2009) / SF-36 (Cohen et al., 2002)
		Social Situation Score (Kircher et al., 2007)
	Depression and anxiety	Brief Psychiatric Rating Scale (Kircher et al., 2007)
		Geriatric Depression Scale (Kircher et al., 2007; Prestmo et al., 2015)
		Montgometry Asberg Depression Rating Scale (Kircher et al., 2007)
	Cognition	Clinical Dementia Rating scale (Prestmo et al., 2015)
		Mini-Mental State Examination (Eklund et al., 2013; Kircher et al., 2007; Prestmo et al., 2015)
		Money counting test (Kircher et al., 2007)
		Recognition of time test (Kircher et al., 2007)
		Telephone test (Kircher et al., 2007)
	Self-rated health and determination	Quality of care (Berglund et al., 2013)
		Life satisfaction (Berglund et al., 2015)/Experiences of security and safety (Ebrahimi et al., 2017)
		IPA-O (Ekelund & Eklund, 2015)
		Self-rated Health (Singe item from SF-36) (Ebrahimi et al., 2017)
Pilot feasibility	Trial process outcomes	Retention rates (Westgard et al., 2018)

Abbreviation: ADL, activities of daily living; ED, emergency department; EQ-5D-3L, european quality of life 5 dimensions 3 level version; EQ-5D-5L, european quality of life 5 dimensions 5 level version; EQ-VAS, european quality of life visual analogue scale; FP, frailty phenotype; GP, general practitioner; HUI-3, health utilities index-3; IADL, instrumental activities of daily living; IPA-O, impact on participation and autonomy for older person; MDS-HC, minimal data set-home care version; PGCMS, philadelphia geriatric centre morale scale; QALY, quality-adjusted life-year; SF-12v2, medical outcomes study 12-item short-form general health survey version 2.0; SF-36, medical outcomes study 36-item short-form general health survey; SPPB, short performance physical battery.

[a]Dual reported, assessed in trial and reported in two publications Eklund (2013) (primary outcome) and Wilhelmson (2017) (sub-group analysis).

encompassed three domains across the nurse-coordinated interventions from hospital to home: (1) the nexus of healthcare service reliance and geriatric syndromes in an ageing population, (2) prioritising autonomy keeping frail older adults in their place of choice and, (3) growing emphasis on psychosocial well-being and quality of life to increase intervention efficacy.

3.7 | Meta-analysis

3.7.1 | Readmissions

Hospital readmission was defined as all-cause (planned, unplanned, emergency and general readmission) and was measured in 13 studies over seven different time points (Alakare et al., 2021; Courtney et al., 2009; Ekerstad et al., 2017; Finlayson et al., 2018; Hansen et al., 2021; Kircher et al., 2007; Lembeck et al., 2019; Leung et al., 2004; Prestmo et al., 2015; Rytter et al., 2010; Schapira et al., 2022; Thygesen et al., 2015; Wilhelmson et al., 2017). Finlayson et al., 2018. found reduced readmission rates at 28 days following discharge with exercise and nurse home visit and telephone follow-up (HR .278, 95% CI .09–.88, $p = .029$) and nurse home visit and telephone follow-up (HR .38, 95% CI .13–1.07, $p = .097$). Patients were less likely to have an unplanned readmission within 12 weeks of discharge with exercise and nurse home visit and telephone follow-up (HR .47, 95% CI .23–.97, $p = .04$) and nurse home visit and telephone follow-up (HR .38, 95% CI .18–.82, $p = .014$) (Finlayson et al., 2018). Readmission rates at 1 month were statistically significantly reduced by intervention effects within another 3 studies; Schapira et al. (2022) (intervention 18%, control 35%; RR .524, 95% CI .334–.821, $p = .004$), Ekerstad et al. (2017) (intervention 40 (19%), control 56 (28%), $p = .048$) and Hansen et al. (2021) 22% in municipality-based and 18% in hospital-based (OR 1.27, 95% CI [1.06–1.52], $p = .008$). At 26 weeks. Rytter et al. (2010) was able to demonstrate statistically significant improved readmissions also (intervention 52%, control 40%, $p = .03$, RRR 23%). Leung et al. (2004) were able to produce statistically significant effect on mean total episodes of hospital admissions (intervention −.7(2.8), control 1.3(2.9), U 626.5, $p = .001$). Seven studies (Alakare et al., 2021;

Courtney et al., 2009; Kircher et al., 2007; Lembeck et al., 2019; Prestmo et al., 2015; Thygesen et al., 2015; Wilhelmson et al., 2017) were unable to produce statistically significant results on intervention effect for readmissions. Figure 4 represents meta-analysis of 1-, 3-, 6- and 12- month readmissions. Statistically significant overall effect was noted in 1-month readmissions (RR .78, 95%CI [.63, .97], $p = .02$), with heterogeneity as demonstrated by $I^2 = 62\%$ ($p = .01$).

3.7.2 | Mortality

A total of 9 studies assessed mortality at 5 different time points using either medical records, registry data or phone follow-up (Alakare et al., 2021; Cohen et al., 2002; Ekerstad et al., 2017; Hansen et al., 2021; Kircher et al., 2007; Lembeck et al., 2019; Rytter et al., 2010; Schapira et al., 2022; Thygesen et al., 2015). No studies

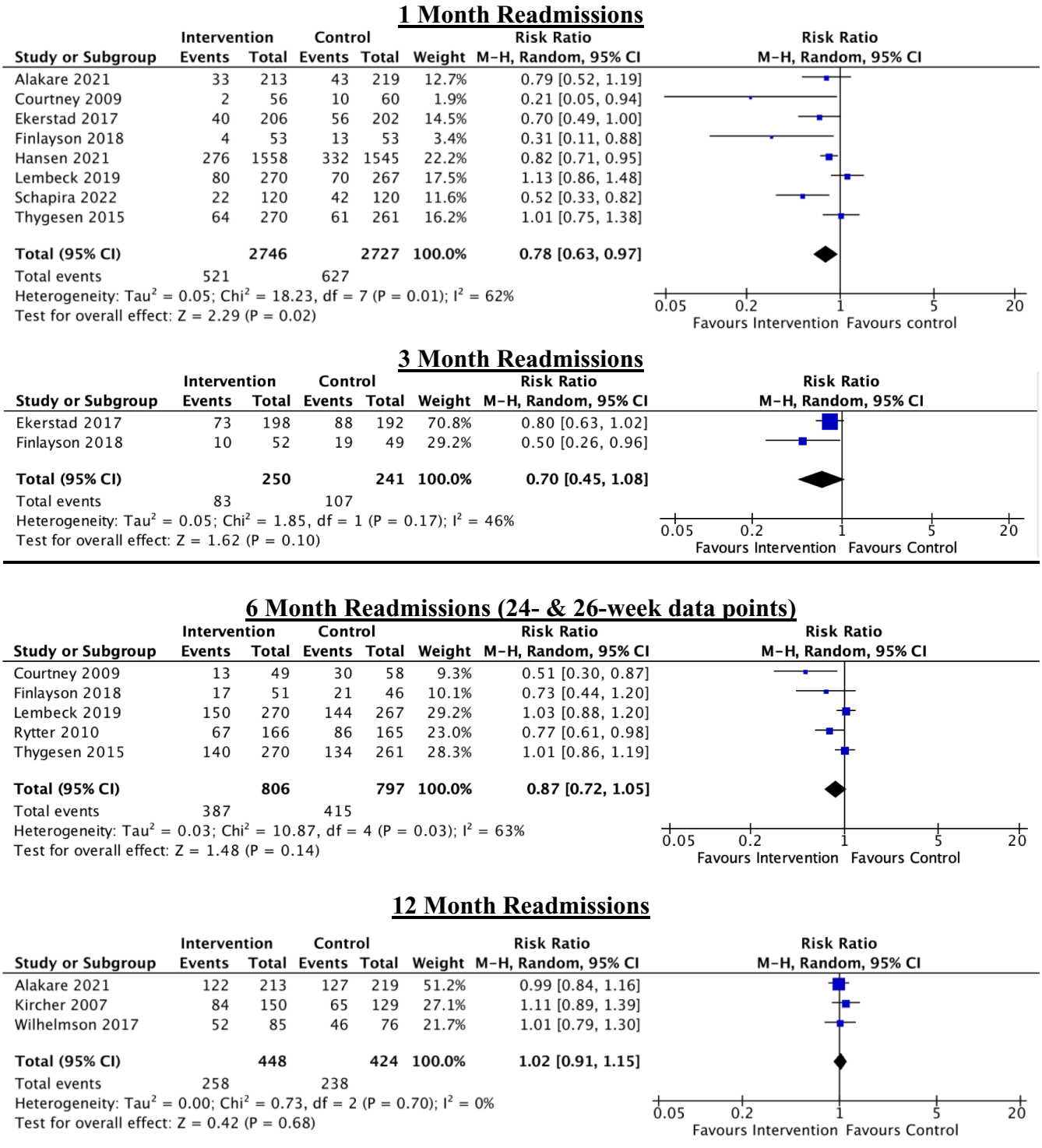

FIGURE 4 Meta-analysis and forest plot for 1-, 3-, 6- and 12-month all-cause readmissions. [Colour figure can be viewed at wileyonlinelibrary.com]

reported the intervention to have a statistically significant effect on mortality. Similar mortality between groups was common over study duration at data collection time points. Ekerstad et al. (2017) found lower 3-month mortality adjusted by cox regression (HR .55, 95% CI .32–.96), although this was insignificant. Rytter et al. (2010) reported mortality at 26 weeks post discharge (HR .72, 95% CI .37–1.41). Mortality at 1-, 3-, 6- and 12- month time points are demonstrated in Figure 5 below, demonstrating no overall statistically significant effect on mortality.

3.8 | Narrative synthesis

3.8.1 | The nexus of healthcare service reliance and geriatric syndromes in an ageing population

Complex health conditions and geriatric syndromes impact health service usage and strain, hence often measured across included studies. Hospital utilisation in the form of ED presentations and cumulative and hospital length of stay were explored by four (Alakare

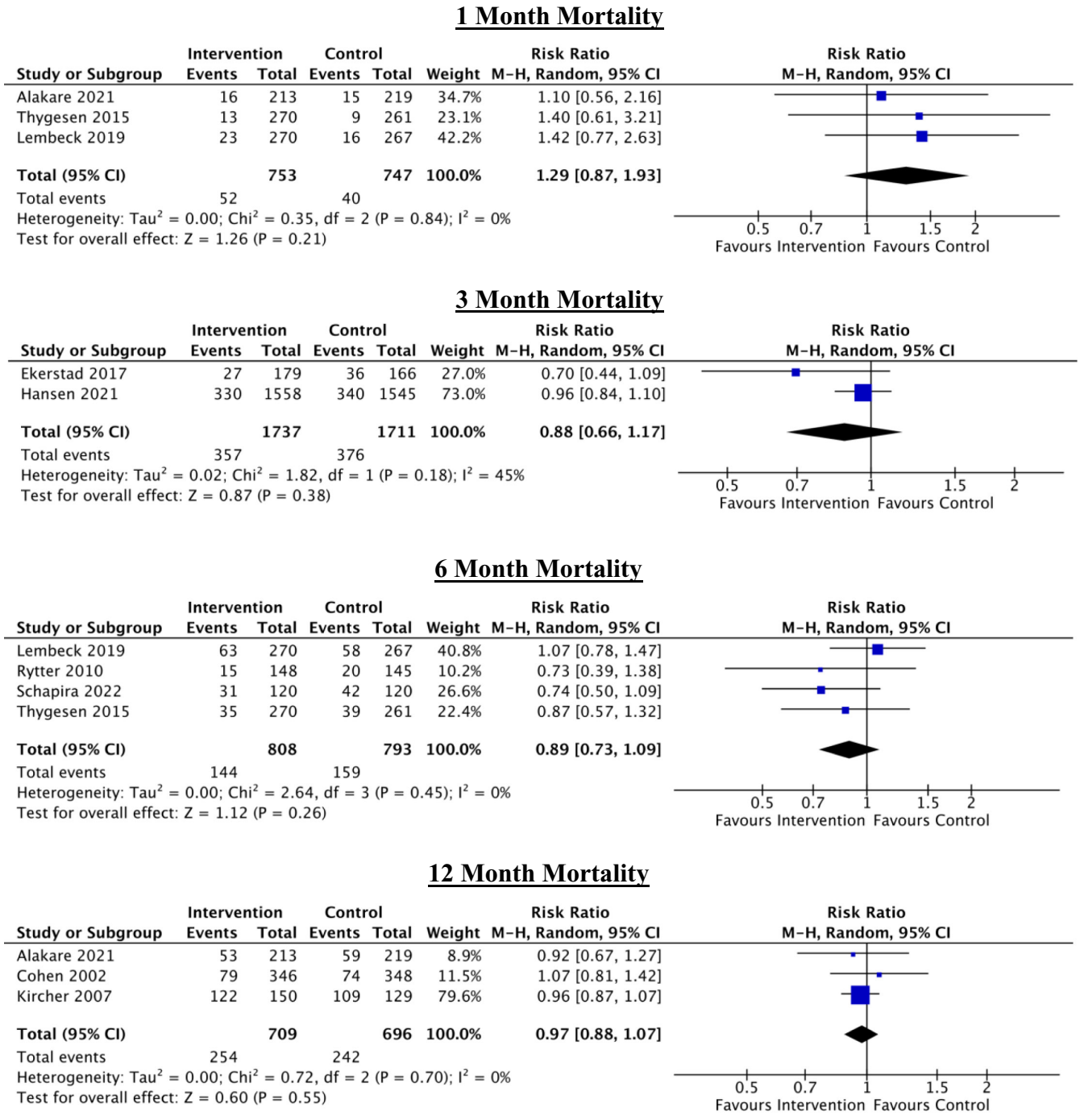

FIGURE 5 Meta-analysis and forest plot for 1-, 3-, 6-, and 12-month mortality. [Colour figure can be viewed at wileyonlinelibrary.com]

et al., 2021; Courtney et al., 2009; Leung et al., 2004; Schapira et al., 2022) and six (Alakare et al., 2021; Ekerstad et al., 2017; Lembeck et al., 2019; Leung et al., 2004; Thygesen et al., 2015; Wilhelmson et al., 2017) studies respectively. Only one of the four studies intervention (large multicomponent intensive geriatric treatment and evaluation) was able to demonstrate statistically significant reduction in ED presentations within 6 months after discharge (intervention 43%, control 60%, RR .722, 95% CI .562–.929, $p = .010$) (Schapira et al., 2022). Lueng et al. utilised case management, monitoring, treatment evaluation and follow-up (as demonstrated in Figure 3) within the intervention and were able to demonstrate a statistically significant reduction in mean number of hospital bed days (intervention −7.9 (32.0), control 17.2 (54.4), U 635, $p = .001$) and mean total number of attendances at the outpatient department (intervention −.8(9.9), control .2(7.3), U 809.5, $p = .05$) (Leung et al., 2004). Five studies found statistically insignificant intervention effect for hospital stay at each study conclusion (3-, 6- and 12-month) and results were frequently similar between intervention and control (Alakare et al., 2021; Ekerstad et al., 2017; Lembeck et al., 2019; Thygesen et al., 2015; Wilhelmson et al., 2017). Four studies included in this review measured institutionalisation (Alakare et al., 2021; Cohen et al., 2002; Kircher et al., 2007; Prestmo et al., 2015), which is defined as living in a residential facility for example, nursing home. Cohen et al. (2002) was the only study to demonstrate improvement in mean number of days in long-term care for intervention (15.0 ± 1.8) versus control (17.1 ± 1.8), $p = .03$.

Seven studies (Cohen et al., 2002; Courtney et al., 2009; Kircher et al., 2007; Lembeck et al., 2019; Leung et al., 2004; Thygesen et al., 2015; Wilhelmson et al., 2017) examined community services utilisation post intervention and four of these were able to demonstrate statistically significant results. Another study with a focus on follow-up and community services linkage found a statistically significant greater utilisation of community nursing services at 1-month after discharge (intervention $n = 154$ (61%), control $n = 85$ (35%), $p < .001$) and 1–6 months (intervention $n = 149$ (64%), control $n = 85$ (38%), $p < .001$) (Thygesen et al., 2015). These concepts of behaviour change in outpatient service usage was continued in two large multicomponent interventions with results showing a higher mean number of outpatient visits to/by a physician among participants physically independent (intervention 6.8 (3.5) and control 9.8 (5.3), $p = .05$), and a higher proportion of intervention participants receiving a home visit by an occupational therapist or physiotherapist at 1-year (intervention $n = 22$ (26%) and control $n = 9$ (12%), $p = .024$) (Wilhelmson et al., 2017). The second large multicomponent intervention demonstrated fewer emergency GP visits (intervention $n = 13$, control $n = 86$, $z = -4.9$, $p < .001$) and fewer emergency allied health service visits (intervention $n = 2$, control $n = 13$, $z = -2.0$, $p = .04$) at 24 weeks (Courtney et al., 2009). Participants health conditions and needs were complex often meaning these outcome measures were not positively or statistically improved. Finally, three studies were not able to prove any statistically significant differences between intervention and control on community services utilisation (Cohen et al., 2002; Kircher et al., 2007; Lembeck et al., 2019).

An key factor when examining healthcare usage is cost. Four studies in this review considered the cost of intervention (Cohen et al., 2002; Ekerstad et al., 2017; Prestmo et al., 2015; Rytter et al., 2010). Prestmo and colleague's geriatric care unit was statistically significantly more costly than standard orthopaedic care (difference estimate 2331, 95% CI [1483 to 3178], $p > .0001$) (Prestmo et al., 2015). Although, when costed per patient differences were non-significant. An economic analysis of total healthcare expenses completed by Rytter et al. (2010) demonstrated a propensity towards socioeconomic gain in support of the intervention. The remaining two studies found total costs were similar for intervention and control (Cohen et al., 2002; Ekerstad et al., 2017).

3.8.2 | Prioritising autonomy keeping frail older adults in their place of choice

It is widely understood that prioritising functional autonomy is an important consideration in transitional care interventions to help patients remain at home for longer. Within this review, seven studies (Cohen et al., 2002; Courtney et al., 2012; Eklund et al., 2013; Kircher et al., 2007; Leung et al., 2004; Prestmo et al., 2015; Wilhelmson et al., 2017) assessed for functional ability using 16 different assessment tools and three studies (Alakare et al., 2021; Nikolaus & Bach, 2003; Prestmo et al., 2015) assessed for falls. One trial which utilised an inpatient comprehensive geriatric care ward with multidisciplinary support (including early discharge planning and individualised rehabilitation plans) for post-operative care used mobility as their primary outcome and were able to demonstrate a statistically significant improvement in 4- and 12- month mobility (difference .74 95% CI [.18–1.30], $p = .01$ and difference .69 95% CI [.10–1.28], $p = .023$, respectively) and 4- and 12- month ADL (difference 6.17 95% CI [2.57–9.78], $p = .001$ and difference 6.39 95% CI [2.59–10.19], $p = .001$, respectively) (Prestmo et al., 2015). This study also assessed for fear of falling and found statistically significant results between intervention and control group at 1-month (difference − 1.24 95% CI [−2.24–.24], $p = .015$), 4-month (difference − 1.27 95% CI [−2.27 to −.27], $p = .013$) and 12-month (difference − 1.21 95% CI [−2.24 to −.18], $p = .021$) (Prestmo et al., 2015). The large continuum of care intensive multicomponent intervention with community follow-up through a case manager within a week after care planning then monthly for a year, addressed functional ability as an outcome and found no significant changes to frailty, although demonstrated doubled odds for improved ADL independence at 3 months (OR 2.37, 95% CI [1.20–4.68]) and 12 months (OR 2.04, 95% CI [1.03–4.06]), and halved odds for decreases in ADL independence at 6 months (OR .52, 95% CI [.27–.98]) (Eklund et al., 2013). Another study from the same trial found those participants classified as ADL independent had improvements in health service use also (Wilhelmson et al., 2017).

Another large multicomponent trial with a substantial exercise training component found greater significant improvement in the intervention group for IADL [$F(3,282)=30.645$, $p<.001$], ADL scores [$F(3,282)=9.733$, $p<.001$] walking distance [$F(3,231)=19.49$, $p<.001$], walking speed [$F(3,231)=17.66$, $p<.001$] and for climbing stairs [$F(3,231)=16.98$, $p<.001$] (Courtney et al., 2012). Nikolaus and Bach (2003) used falls as their primary outcome measure in their intervention which included inpatient assessment and nurse and allied health home visits. They found the intervention group had a statistically significant effect with 31% fewer falls (IRR=.69, 95% CI [.51–.97], $p=.032$). Participants with a history of falls in the previous year who received the intervention, had a 37% lower fall rate (IRR=.63, 95% CI [.43–.94], $p=.028$). Another trial with an inpatient management unit showed a significant mean change in score in basic ADLs (intervention .23, control .15, $p<.001$) and physical performance (intervention 3.12, control 1.75, $p<.001$) at discharge, but this was not statistically significant at 12 months (Cohen et al., 2002). These positive effects were not carried across other studies with non-significant effects in overall functional ability and falls (Alakare et al., 2021; Kircher et al., 2007; Leung et al., 2004).

Another important consideration in autonomy is medication usage and management, which was measured by two studies (Kircher et al., 2007; Rytter et al., 2010). Only Rytter et al. (2010) found a statistically significant effect of prescribed medication usage of which GP was unaware (intervention 51 (34%), control 70 (48%), $p=.02$), GP reporting of medication not taken (intervention 42 (28%), control 57 (39%), $p=.05$) and a significantly higher median (interquartile range) number of drugs taken (intervention 7 (5–10) vs. control 6 (4–8), $p=.0005$).

3.8.3 | Growing emphasis on psychosocial well-being and quality of life to increase intervention efficacy

Understanding the mental and emotional factors that facilitate successful transitional care is an important consideration when developing interventions for frail older adults. Transitional support that is comprehensive inpatient care or multicomponent interventions were able to improve quality of life measures within study follow-up time points, although this was not true for one study (Kircher et al., 2007). Inpatient hospital unit interventions that used a systematic assessment to address somatic and mental health needs (among others) by Ekerstad et al. (2017) found a 3 month decline in HRQOL in 6/8 dimensions. The intervention by Prestmo et al. (2015) was similar and found a statistically significant improvement at 4- and 12- month time points with the EQ-5D-3L (difference .08 95% CI [.01–.15], $p=.033$ and difference .09 95% CI [.02–.16], $p=.015$, respectively) and 12- month quality of life as assessed by the QALY (difference .07 95% CI [.01–.13], $p=.019$). Cohen et al. (2002) as per the SF-36, found significantly greater scores for 4 of 8 subscales for intervention participants. Another multicomponent intervention study demonstrated statistically significant improvements in the SF-12v2 means at 4 weeks for both the Mental (intervention 56.5(6.8) and control 47.6(9.2), $p<.001$) and Physical (intervention 39.4(8.0) and control 29.0(9.2), $p<.001$) components (Courtney et al., 2009). Ebrahimi et al. (2017). found a positive intervention effect on symptoms through positive relative positions for the intervention group at 3 months (RP .06 95% CI [−.06–.17]), 6 months (RP .10 95% CI [−.03–.22]) and, 12 months (RP .10 95% CI [−.04–.21]).

Cognition was assessed between three of the included studies using varying instruments as presented in Table 2 (Eklund et al., 2013; Kircher et al., 2007; Prestmo et al., 2015). Prestmo et al. (2015) found improvements in Mini-Mental State Examination scores at 12 months (intervention $n=152$, control $n=132$, difference estimate 1.44 [95%CI .12 to 2.77], $p=.033$). The remaining two studies found no significant differences between the groups (Eklund et al., 2013; Kircher et al., 2007). Two studies assessed depression and anxiety at different time points, but both found no statistically significant effect (Kircher et al., 2007; Prestmo et al., 2015).

One trial used an intensive and multicomponent intervention which used a continuum of care with case management, care planning and linkage from hospital to community. This trial measured self-rated health and determination and reported their results for these outcomes across four different studies (Berglund et al., 2013, 2015; Ebrahimi et al., 2017; Ekelund & Eklund, 2015). Statistically significant intervention effect at 3 months was found in self-determination for activities at home and 3 and 6 months for social relationships (Ekelund & Eklund, 2015). Statistically significant improvement in self-rated life satisfaction from 6-month to 12-month follow-up for financial situation (OR 2.08 95% CI [1.04–4.14], $p=.04$), functional capacity (OR 2.39 95% CI [1.22–4.67], $p=.01$) and psychological health (OR 3.08 95% CI [1.55–6.16], $p=.00$) (Berglund et al., 2015). The third study proved a higher perceived quality on care planning at 3 months ($p\leq.005$ for all values) and an increased understanding of service referral and contacts after 3 months (intervention $n=69$ and control $n=51$, $p=.011$) and 12 months (intervention $n=63$ and control $n=50$, $p=.027$) (Berglund et al., 2013). The fourth study demonstrated statistically significant improvement in self-rated health (relative rank variance above .1 during follow-up) (Ebrahimi et al., 2017).

4 | DISCUSSION

Sixteen randomised controlled trials were included to determine the effective components of nurse-coordinated interventions in improving outcomes for frail older adults discharged from hospital. Meta-analysis demonstrated statistically significant intervention effect at 1-month for readmissions. However, found no other statistically significant intervention effect at 3-, 6- and 12-month readmissions. Those studies that reported statistically significant healthcare utilisation at varying time points all differed in intervention components, highlighting the inconsistent and mixed intervention effects among transitional care research. This variation in significant results carried through to functional and psychosocial outcomes.

Meta-analysis found no statistically significant intervention effects at 1-, 3-, 6- and 12-month mortality. The large diversity in outcome assessments used to measure the complexity of frail older adults and nurse-coordinated interventions from hospital to home is evident, as this review highlighted the use of 59 different outcome measure assessments and tools collected at varying time points, representing the diverse comprehensive assessments currently being undertaken in this population. Population ageing is rapidly growing, and the findings of this review highlight this with a mean age of 81 years (Naughtin et al., 2022). This presents a risk for the increasing demand for healthcare in the context of finite resources (Australian Institute of Health and Welfare, 2021; Henry, 2004). This review highlights the importance of advancing nurse-coordinated transitional care to improve health outcomes in frail older adults.

The results of this review are consistent with previous systematic reviews and meta-analysis demonstrating mixed intervention effect, with consideration on follow-up frequency and duration as primary factors affecting positive health outcomes (Lee et al., 2019; Lin et al., 2022; Weeks et al., 2018). Growing older often precipitates an increase in health service utilisation and resource burden (Bettger, 2018). Sustained benefits of interventions over study duration often waivered and this is consistent with other systematic reviews which were unable to demonstrate improved readmission rates over time (Bryant-Lukosius et al., 2015; Lee et al., 2022; Weeks et al., 2018). This presents an interesting consideration of intervention 'dose' and its greatest effect over follow-up time points. Highlighting the importance of recognising study elements that consider intervention 'dose' increases success in geriatric research. In this review there was no correlation between intervention component size and significant findings, as both large multi-component interventions and smaller component interventions were able to demonstrate varied significance in their chosen outcomes (e.g. quality of life and falls) (Ekerstad et al., 2017; Nikolaus & Bach, 2003). Another RCT focusing on acute cardiovascular disease and evidence of frailty or pre-frailty that did not meet inclusion criteria for this review, used a multicomponent inpatient intervention and was able to demonstrate improvement in quality of life and, anxiety and depression, but not readmissions or mortality (Fountotos et al., 2023). Another systematic review by Bryant-Lukosius et al. (2015) provides commentary on how nurse-coordinated intervention intensity can impact the patients' response and receptivity to intervention elements. They propose that when intervention dose is tailored to the patients' needs, for example patient specific care and treatment plans, with the appropriate intensity this can facilitate best success with expected outcomes. This systematic review supports these findings and highlights the need for closer examination of the economic impact of these interventions.

Older adults at risk of adverse outcomes deserve high quality continuity of care. Nurses, who make up approximately 50% of the global health workforce, are in best position to offer transitional care interventions from hospital to home (World Health Organization, 2020). This review found inconsistencies between studies on definition and overall reporting of frailty within study participants (Nourhashémi et al., 2001). As science advances, this needs to be unified across geriatric research (Rodríguez-Mañas et al., 2012). Therefore, the first recommendation from this review is for a global consensus standard for frailty assessments that can be used across various geriatric research studies. An example of this is in stroke research, the Modified Rankin Scale is a single item, global outcomes rating scale measuring a person's disability after stroke and is used widely in stroke research (Broderick et al., 2017). Second, the need to evaluate the impact of transitional care interventions on patient-centred outcomes in geriatrics, such as patient satisfaction, less pills and residing in place of choice over hospital-centric outcome measures. These are often considered subjective measures of care, and there is an ongoing debate that patient experience evaluations identify care 'adequacy' rather than overall care 'quality' (Devkaran, 2014; Manary et al., 2012; Shale, 2013). Included studies in this review that measured satisfaction and self-rated outcomes with interventions had positive results, and these were often statistically significant (Berglund et al., 2013, 2015; Ebrahimi et al., 2017; Ekelund & Eklund, 2015). Therefore, researchers should consider the benefits of consumer set outcomes and the overall value of the patient experience when developing new frailty interventions, although these should be used with careful consideration when used as a greater healthcare capacity and development evaluation (Sezgin et al., 2020). This review also highlights the need to involve frail older adults in the design, delivery, and evaluation of transitional care interventions. There was limited reporting within studies of involvement of patients and carers in the design and development of the hospital to home interventions. This is not a new finding. Another past transitional care review found similar limited consumer and end-user input into intervention co design (Allen et al., 2014). Interventions that do not include the voice of the consumer fall short of knowing and meeting what matters to patients, and neglect the opportunity of increasing intervention adherence and engagement (Oyesanya et al., 2021).

4.1 | Strengths and limitations

This review only included studies published in the English language and this is a key limitation. The authors acknowledge the different terminology worldwide around 'hospital to home' and how different countries refer to inpatient stays and community services using varying terminology. Therefore, the search strategy may not have captured studies with different phrasing of this transition. The aim to this review was to only include those patients returning directly home, and therefore findings cannot be applied to those transferring to long-term rehabilitation or nursing homes and this is a limitation of this review. The patient population selected for this review was frail older adults, although in some studies frailty was not measured and participants were described as 'frail' which brings into question if participants were merely 'old' and hence described as 'frail older adults' or truly frail as determined by a validated tool. Due to

the high heterogeneity in interventions, outcomes and assessments used within the included trials, succinct meta-analysis was complex. The lack of significant results regarding readmissions for durations of 3 months and more may be attributed to the limited number of studies included in the analyses. Studies used widely variable time points to report results and thus meta-analysis of other outcomes (e.g. cumulative hospital stay, functional ability) was not possible. A biostatistician was consulted during meta-analysis to discuss heterogeneity and confirm analysis and reporting. Definitions on 'readmission' varied between studies, including 'unplanned', 'emergency' and all-cause hospital readmission. A strength to this review includes authors' rigour in contacting authors to clarify definitions and, source and confirm readmission data for meta-analysis.

5 | CONCLUSION

This systematic review has highlighted the positive impact of nurse-coordinated interventions in improving readmissions for frail older adults discharging hospital and returning home, for up to 1 month. The positive effect of interventions on other health outcomes within studies were mixed and indistinct, this is attributed to the large heterogeneity between studies and outcome measures. This review has underscored the strengths of nurses as a potential solution to support older adults living with chronic diseases move between healthcare settings. The three main findings of this review emphasise the nexus of healthcare service reliance and geriatric syndromes in an ageing population, the need for prioritisation of autonomy as a positive facilitator keeping frail older adults in their place of choice and the growing importance of including psychosocial well-being and quality of life in transitional care interventions to increase success in patient outcomes.

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CONFLICT OF INTEREST STATEMENT

The authors would like to declare no competing interests when completing this research study.

DATA AVAILABILITY STATEMENT

Systematic review data and analysis can be sourced from the corresponding author on reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX A

Search strategy in CINAHL

#	Query	Results
S17	S3 AND S7 AND S14 AND S15 Limiters to published date 2000-Present	960
S16	S3 AND S7 AND S14 AND S15	1052
S15	"Nurs*"	940,104
S14	S8 OR S9 OR S10 OR S11 OR S12 OR S13	1,150,135
S13	"Aging"	45,312
S12	"elder*"	118,899
S11	Old* n3 (people* OR person* OR adult*)	124,429
S10	(MH "Aging") OR "Aging"	93,409
S9	"Geriatric*"	52,534
S8	"Aged*"	1,056,936
S7	S4 OR S5 OR S6	648,535
S6	"tertiary"	55,238
S5	(MH "Acute Care") OR "acute care"	24,638
S4	"Hospit*"	614,503
S3	S1 OR S2	19,618
S2	"functionally impaired elderly"	21
S1	"Frail*"	19,601