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REVIEW

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Systematic review of interventions targeting fundamental care to reduce hospital-associated decline in older patients

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Abstract

Aims: To examine the effectiveness of targeted nursing interventions on mobilization, nutrition and cognitive engagement to reduce functional and hospital-associated decline (HAD) in older patients.

Design: Systematic review of experimental studies using randomized and quasi-experimental designs.

Data sources: We searched electronic databases CINAHL, MEDLINE, EMBASE, Cochrane library, google scholar and BMJ quality reports from January 2009 to February 2020.

Review methods: We reviewed intervention studies that targeted ward nursing teams to increase mobilization, nutrition or cognitive engagement of older adults. Inclusion criteria included older patients, acute care (medical, surgical and older adult wards) and reporting patient level outcomes. Quality appraisal included the Joanna Briggs Critical Appraisal Checklist for Quasi-Experimental Studies.

Results: From 1729 papers, 18 studies using quasi-experimental and pre-post designs were selected. Study heterogeneity necessitated a narrative synthesis. The quality of evidence was low to moderate. All studies used multicomponent strategies, and 10 studies used evidence translation frameworks to align interventions to local barriers. Overall, 74% (n = 14) of studies reported a significant improvement in the stated primary outcome. Eight studies reported a significant increase in mobilization (e.g., sitting in a chair or walking), and four reported improved functional outcomes. Five studies improved nutrition outcomes (e.g., protein or energy intake), and three studies reported a significant reduction in delirium.

Conclusion: Acknowledging methodological limitations, the evidence indicates that nursing teams using evidence-translation frameworks can improve mobilization, nutrition and cognitive engagement in acute care settings. Future research requires higher-quality pragmatic trial designs, standardized outcomes, staff co-designed interventions, evidence-translation frameworks and patient engagement to make more confident inference about effectiveness.

Impact: Nursing teams with the support of hospital management have to address ward and system barriers to prioritize fundamental care to improve patient outcomes. There is sufficient evidence on multicomponent interventions and implementation strategies to inform nurse-led quality improvement.

KEYWORDS
acute care, cognitive engagement, functional decline, fundamental care, hospital-associated decline, mobilization, nursing, nutrition, older adults

1 | INTRODUCTION

Healthy ageing is more than the absence of disease, it is the maintenance of functional and cognitive ability in older adults that enables well-being and independent living for as long as possible (WHO, 2015). Whilst many people age well, increased age is associated with higher health and social service utilization including acute hospital care (Rechel et al., 2013; Searle & Rockwood, 2018). Older people are three times more likely to be admitted to hospital, stay longer, and account for over half of in-patient bed days (Boltz et al., 2012; Lisk et al., 2019; Smyth et al., 2017). During a period of hospitalization, older patients are at higher risk of hospital-associated decline (HAD), that is acceleration of functional or cognitive decline resulting in the onset of new disability not present at admission (Zisberg et al., 2015). HAD is attributed to hospital processes, ward-level routinized practice and uncoordinated disease-specific models of care that inadequately meet the functional and psychological needs of older patients (Asmus-Szepesi et al., 2015; World Health Organization, 2017a, 2017b; Zisberg et al., 2015). HAD is a multifaceted concept with no standardized outcome measures. The main indicators of HAD are functional decline in activities of daily living (ADL) and deterioration in mobility that contributes to a longer hospital stay (Mudge et al., 2019; Wald et al., 2012). Yet, patient ambulation, supervision of mealtimes, and emotional and psychological support are among the most frequently omitted or rationed fundamental care activities that result in negative patient outcomes (Schubert et al., 2020). At a ward level, a nursing team culture that prioritizes patients' mobilization, nutrition and cognitive engagement is thought to be protective against HAD (Lafont et al., 2011; Lafrenière et al., 2017; Zisberg et al., 2015). To date, there is no systematic review of interventions that enable ward nursing teams to prioritize and consistently deliver fundamental care activities to reduce functional decline or HAD in acute care settings.

2 | BACKGROUND

The ageing process is associated with an increased risk of chronic disease and functional and cognitive decline (Ahmed & Pearce, 2010; Covinsky et al., 2011; Dent et al., 2019). Globally, there is a focus on preventative medicine and primary care for older people and the avoidance of unnecessary hospital admission (Kringos et al., 2015). Nonetheless, there will always be a need for hospitalization to manage acute health crisis and illness in older people.

The hospitalization process can adversely affect older people due to prolonged bed rest, physiological stress, polypharmacy and sub-optimal nutrition (Falvey et al., 2015; Zisberg et al., 2011). During hospitalization, older adults can be largely sedentary, spending 9% of their day walking or in a standing position (Mudge et al., 2016) or less than 12 min a day mobilizing (McCullagh et al., 2016). Inactivity leads to loss of muscle strength (sarcopenia) which is compounded by undernutrition, especially low protein intake (Paddon-Jones & Rasmussen, 2009, Cederholm et al., 2017).

Left unchecked these factors accelerate functional decline and contribute to HAD and other hospital adverse events such as falls, incontinence, pressure ulcers and delirium (Brown et al., 2009; Covinsky et al., 2011; Hoogerduijn et al., 2012; Mudge et al., 2016; Zisberg et al., 2015). The prevalence of HAD at discharge varies from 30% to 40% (Covinsky et al., 2011; Hoogerduijn et al., 2012; Zisberg et al., 2011) and in some cases, the deficit is still present at one-year follow-up (Boyd et al., 2008; Hoogerduijn et al., 2012). Older patients who are frail experience higher rates of HAD (Covinsky et al., 2011; Fimognari et al., 2017) and are more susceptible to accelerated functional decline and adverse hospital events (Clegg et al., 2013).

Fundamental care activities related to early mobilization, optimum nutrition and cognitive engagement are the key modifiable factors that impact HAD. The challenge is to enable ward nursing teams to prioritize these aspects of fundamental care over competing demands to improve patient outcomes. Lack of time, staff shortages and an increased focus on technological aspects of nursing care are consistently identified as barriers to delivering high-quality fundamental care (Algoso et al., 2016; Ball et al., 2014; Straughair, 2012).

Nurses are pivotal in assuring quality care for older people by promoting basic functionality whilst providing acute care (Zisberg et al., 2015). Richards et al. (2018) reviewed 149 studies of nursing interventions (nutrition, mobility, elimination and patient hygiene) and concluded there was insufficient evidence to recommend changes to clinical practice. This broad review lacked specificity to acute care settings and did not report on HAD or other functional outcomes. There is some evidence that specialized acute care older adult wards that emphasize interdisciplinary, person-centred, and

high-quality fundamental care improve health outcomes for older patients (Baztan et al., 2011; Fox et al., 2013). However, such wards are a scarce resource, and the majority of older patients are managed on medical and surgical wards; thus, there is a need to improve standards of fundamental care for older patients regardless of speciality.

Several other systematic reviews have examined the impact of individual patient exercise programmes or oral nutritional supplements (ONS) to improve outcomes (Cortes et al., 2019; Kosse et al., 2013; Smart et al., 2018; Stratton et al., 2013). The intervention studies tended to recruit volunteer patients and were mainly led by allied health professionals (AHPs) with nursing teams on the periphery. Nursing teams represent a constant presence at the patient bedside and are key to continuous delivery of high-quality fundamental care. Thus, interventions that target ward teams to prioritize fundamental care may improve outcomes for all patients.

3 | THE REVIEW

3.1 | Aims

The aims of this study were to (a) identify ward-based interventions primarily targeting nursing teams to improve fundamental care concerning mobilization, nutrition and/or cognition; (b) identify intervention components and implementation strategies; (c) examine the effect of the interventions on patient level primary and secondary outcomes and appraise the quality of the evidence.

3.2 | Design

We undertook a systematic review that was reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009).

3.3 | Search methods

Using a PICOS (Population, Intervention, Comparison, Outcome, Setting) framework, we undertook a systematic search of the literature from January 2009 to January 2019, with a further update to February 2020. We searched the databases CINAHL, PUBMED, EMBASE and Web of Science. In consultation with a librarian, keywords and Mesh terms related to the following concepts were searched: older age, acute hospital*, mobilization (walk*, ambulat*) nutrition (mealtime) and hospital-associated decline (functional decline) (Appendix S1 PICOS and search log). Reference lists and bibliographies of identified publications were searched. In addition, we searched the Cochrane Library, clinical trial registers, google scholar and BMJ Quality Improvement Reports for relevant studies. This study was registered with the International Prospective Register of Systematic Reviews (Registration number is CRD42020177969, 10 July 10 2020).

3.4 | Eligibility criteria

Studies had to describe interventions that aimed to improve patients' mobilization, nutrition or cognition (either singularly or in combination), plus were targeted at ward nursing teams [nurses and health-care assistants (HCAs)] with or without the involvement of the wider multidisciplinary team (MDT). We did not restrict to 'nurse-led' studies; for example, a project could be led by a medical consultant or AHP. Study settings were restricted to acute care hospital wards that included medical, general, surgical, older adult wards and other sub-specialities such as orthopaedic and renal cardiac. The study population had to include older adults (≥65 years) and report patient-level outcomes (e.g., functional ability) or process outcomes (e.g., sitting out of bed, walking distance and food intake). Studies were included if a quasi-experimental or experimental design was used. Only studies published in English were included.

We excluded interventions that evaluated specific models of geriatric care such as comprehensive geriatric assessment or ward models such as Geriatric Evaluation and Management units. We did not include studies that mainly described AHP interventions or evaluation of ONS. Studies based in the emergency department, intensive care or long-term care settings were excluded as these interventions may not be generalized to acute care settings. We excluded studies that only reported staff attitudes or knowledge without considering patient outcomes.

3.5 | Search outcomes

One author (MDF) undertook the search; all results were downloaded into a citation management system (EndNote) and duplicates removed. The remaining citations were imported into Covidence reference management system. Two reviewers (MDF and CN) independently screened titles and abstracts to identify potentially eligible studies. Eligible studies were independently reviewed by the authors. All disagreements were resolved through discussion.

3.6 | Data extraction

One reviewer (MDF) extracted the following from eligible papers: authors, year of publication, country, study aim, study design, setting, sample characteristics (age and sex), intervention components and duration, outcome measures, results of primary and secondary outcome, and conclusion. Extracted data on all studies were independently checked by two reviewers (CN and HC), and discrepancies were resolved through discussion.

3.7 | Quality appraisal

The risk of bias (ROB) and internal study quality criteria were assessed using validated tools for each design. For quality improvement/

implementation science studies, three reviewers (MDF, CN and HC) used Rubenstein et al. (2015) Quality Improvement Minimum Quality Criteria Set (QI-MQCS). All other studies were assessed using the Joanna Briggs Critical Appraisal Checklist for Quasi-Experimental Studies (Joanna Briggs Institute, 2017). A ROB appraisal was undertaken using the Evidence Project ROB tool (8-criteria) for non-randomized studies (Kennedy et al., 2019) (Appendix S2). We modified this tool to include two additional criteria from the Cochrane ROB tool on measurement bias and non-selective outcome reporting (Cochrane Handbook). Two reviewers (MDF) and (CN) independently assessed the studies using these criteria. The inter-rater reliability for each criterion was calculated using Cronbach's alpha >0.70 (Appendix S2).

3.8 | Synthesis of results

Meta-analysis was not possible due to the heterogeneity of interventions and outcomes reported, and a narrative synthesis of the data was undertaken. Study interventions were grouped under (i) mobilization, (ii) nutrition and (iii) multi-domain interventions (targeted two or more activities). A descriptive summary and overview of the studies are reported in Table 1.

4 | RESULTS

We identified 1729 studies after removal of duplicates; following title and abstract screening, we excluded 1655 studies and 74 papers were read in full (Figure 1). We contacted the authors of one protocol paper on an randomized controlled trial (RCT) which is awaiting publication (Mudge et al., 2017).

In total, we identified 198 eligible studies described in 20 papers. Four studies reported on a 10-year continuous improvement project conducted in Australia targeting patient mobility, nutrition and cognitive engagement (Mudge et al., 2008, 2015; Young et al., ,2013, 2018). Cohen et al. (2019) and Zisberg et al. (2018) published the protocol and study outcomes in the WALK-FOR study as two papers, as did Moore et al. (2014) and Liu et al. (2018) in the MOVE-ON study (Table 1).

TABLE 1 Overview of studies

Country	Australia (8), USA (5), Canada (2), Netherlands (1), Spain (1), Israel (1)
Study design	Quasi-experimental pre-post (9), Prospective cohort (4), Interrupted time series (2), Serial cross-sectional (1), Comparative repeated measures (1), Controlled before-after (1), Non-equivalent control design (1)
Intervention	Mobilisation (10), Nutrition (6), Multidomain (includes cognition) (4)
Population	Mean sample size 2834 (min 39, max 27,754) Mean age (min 52.1, max 82.2) Gender distribution 51.8% female

4.1 | Overview of studies

The interventions targeted behaviour change of nursing teams (nurses and HCAs) with varying levels of multidisciplinary collaboration. The overarching aim across the studies was to enable nursing teams to prioritize mobilization (n = 8), nutrition (n = 6), or multidomain [cognition with mobilization or nutrition (n = 4)]. There was a wide range of pragmatic quasi-experimental or pre-post study designs, but there were no RCTs (Table 2).

4.2 | Intervention components

All studies used multicomponent interventions combining specific strategies targeting mobilization, nutrition or cognition with generic implementation strategies (such as education or audit and feedback) (Table 3). In total, there were 22 different change ideas, Zisberg et al. (2018) described 11 whilst Juneau et al. (2018) and Padula et al. (2009) described four strategies (Table 3).

4.2.1 | Mobilization-specific interventions

Thirteen studies targeted mobilization either singularly or as part of multidomain interventions. There was no standard definition of what constituted mobilization, and outcomes included walking (n = 5), sitting out of bed (n = 1) or nursing records of mobilization events (n = 4). The remaining studies did not report a mobility related outcome.

Mobility interventions were mainly centred on setting generic targets such as all patients sitting out of bed by 12 mid-day (Liu et al., 2018) or individualized patient goals (Boltz et al., 2014; Hoyer et al., 2016; Klein et al., 2018). Nurse-led mobility assessment featured in seven studies using assessment tools like the Bedside Mobility Assessment tool (Jones et al., 2020), Genesis mobility protocol (Padula et al., 2009) or Ambulation, Bed-Chair, Cannot transfer (ABC) tool (Liu et al., 2018; Moore et al., 2014) to reduce reliance on physiotherapy referral. Two studies (Hoyer et al., 2016; Klein et al., 2018) used the Johns Hopkins Highest Level of Mobility Scale or the Johns Hopkins Mobility Goal Calculator to enable nurses to set daily mobilization goals with patients.

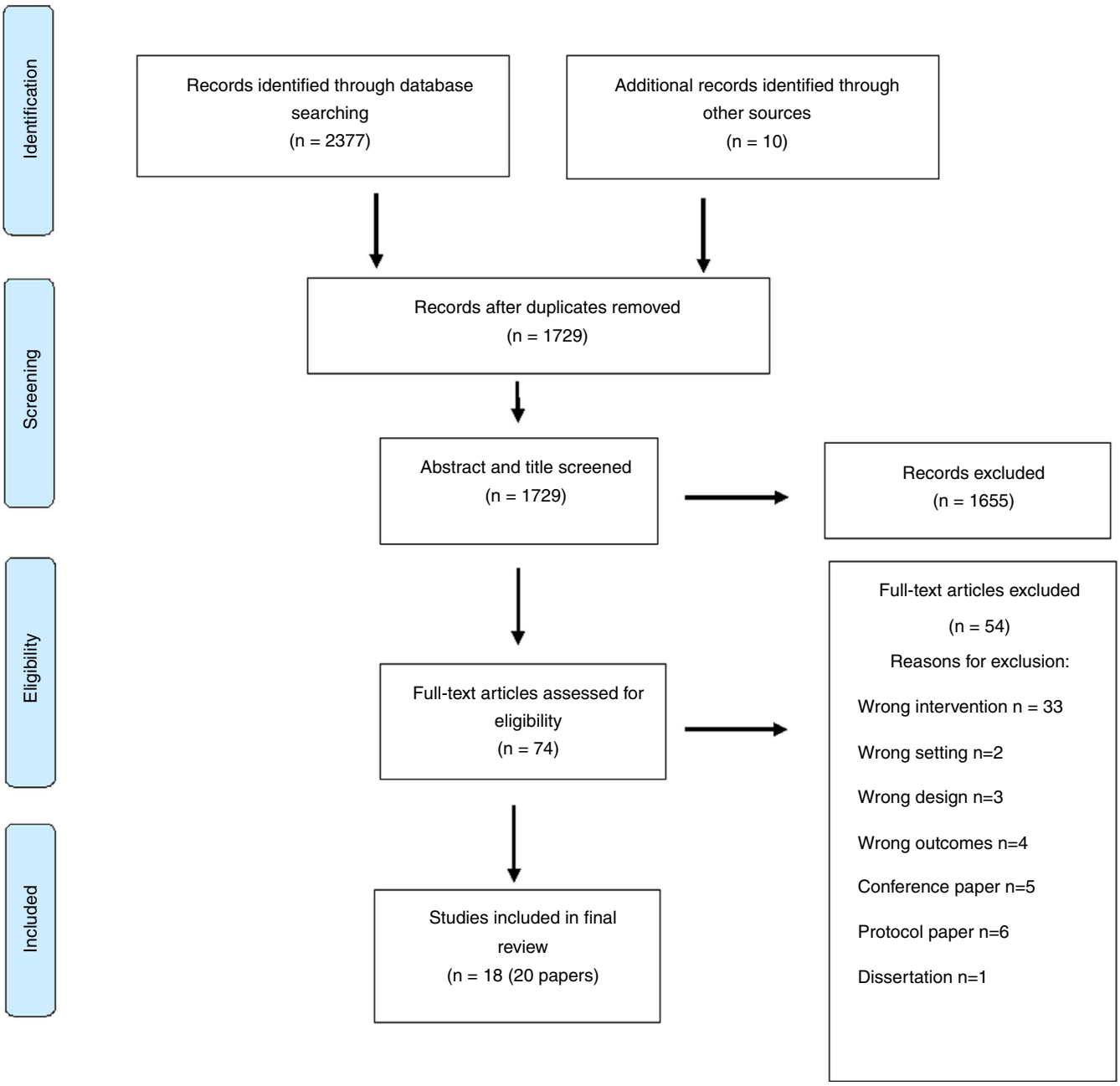

FIGURE 1 PRISMA 2009 flow diagram

4.2.2 | Nutrition-specific interventions

Six studies were specific to nutrition or in combination with other care activities. Diet re-design to increase energy and protein content of meals or snacks occurred in all studies except Byrnes et al. (2018). Two studies introduced high-protein high-energy (HPHE) diets for all patients regardless of nutritional status (Roberts et al., 2019; Young et al., 2018), whilst three studies provided HPHE diets for patients deemed nutritionally at risk (Bell et al., 2014; Bell et al., 2014; Hoekstra et al., 2011; Young et al., 2018). As part of other strategies, ONS was prescribed for nutritionally at-risk patients in three studies (Bell, Bauer, et al., 2014; Bell, Rossi, et al., 2014; Young et al., ,2013, 2018). Four studies implemented food record charts to monitor intake (Bell, Bauer, et al., 2014; Bell, Rossi, et al., 2014; Hoekstra et al., 2011; Young et al., 2013, 2018).

Byrnes et al. (2018) focused on early initiation of post-operative oral nutrition in patients following gastrointestinal surgery. The other studies introduced 'assisted mealtimes' or 'protected mealtimes' to maximize the number of staff available to assist during mealtimes and reduce nonessential interruptions. One study implemented a visual identification system (colour coded magnets) for nutritionally at-risk patients (Roberts et al., 2019).

TABLE 2 Summary of included studies

Reference, year, country	Study design	Sample size	Profile, age (mean), female, gender (%)	Setting	Primary outcome
Mobilisation					
Cohen et al. (2019) and Zisberg et al. (2018) Israel *Mobility*	Quasi-experimental pre-post comparison and Prospective cohort *Theory:* *SEIPS*	*N* = 377 (IG 189) (CG 188)	75 *F* = 41	Medical Ward	Change in MBI score from pre-admission to discharge and 1-month post discharge *Instrument:* *Modified Barthel index (MBI)* Staff knowledge, behaviour, and attitude to mobilisation *Instrument:* *Barriers to Early Mobility of Hospitalised General Medical Patients questionnaire*
Hoyer et al. (2016) USA *Mobility*	Quality Improvement (QI) pre-post	QI *N* = 3352 Pre *N* = 3302 Post *N* = 3352	54 *F* = 54	Medical Units	Change in JH-HLM (Johns Hopkins Highest Level of Mobility) score from ramp up, late QI and post QI periods *Instrument:* *JH-HLM*
Jones et al. (2020) USA *Mobility*	Quality Improvement Pre-post	*N* = 27,754 (Pre 14,081) (Post 13,673)	No age stated *F* = 55	Medical Surgical Units	Change in mean daily nurse-led mobilisations *Instrument: Chart review*
Juneau et al. (2018) Canada *Mobility*	Pilot Study	*N* = 39 (IG 19) (CG 20)	80 *F* = 56	Geriatric Assessment Unit	Trial design outcomes: Number of patients enrolled in SPRINT program, fidelity of program *No instruments*
King et al. (2016) USA Mobility	Pilot Study pre-post *Theory:* *SEIPS*	*N* = 15 Nurses + Nurse assistants	—	General Medical Unit	Increase in patient ambulation frequency, ambulation distance and increased ambulation documentation by nurses *Instrument:* *Chart review*
Klein et al. (2018) USA *Mobility*	Controlled pre-post Quality Improvement *Theory:* *SMART*	*N* = 4130 Pre 1966 (IG 1086) (CG 880) Post 2164 (IG 1208) (CG 956)	52.1 *F* = 54	Acute Care Units	Increase in JH-HLM score from baseline to discharge *Instrument:* *Chart review*
Liu et al. (2018) and Moore et al. (2014) Canada *Mobility*	Quasi-experimental interrupted time series *Theory:* *Integrated knowledge translation & COM-B*	12,490 Pre 3318 During 2786 Post 6386	79.9 *F*= 53	Medical Unit	Change in mobilisation status of patient pre, during and post intervention *Instrument:* *Visual audit*
Padula et al. (2009) Australia *Mobility*	Non- equivalent control group	50 (25 IG) (25 CG)	80.4 *F* = 54	Medical Unit	Change in MBI score from admission to discharge *Instrument:* *MBI*

Secondary outcome	Intervention components	Duration	Quality score
Decline in IADL (instrumental activities of daily living) score and Community mobility from pre-admission to 1-month post discharge *Instrument:* *Lawton's IADL* *Yale Physical Activity Survey* Level of mobility achieved i.e.: ≥900 steps per day *Instrument:* *Attitudes towards in-hospital mobility scale* *Accelerometers*	Walking ≥900 steps per day, Tailored mobility program for staff + patients, Nurse mobility assessment, Mobility documentation, Environment redesign	12 months	14/16 12/16
Change in mobility from admission to discharge in ramp up, late QI and post QI Median LOS (length of stay) pre post	JH-HLM score documented tds, Mobility huddles 5 times/week Education of nurses Audit and feedback Re-education at 7 months Audit for 4 months post QI	12 months	12/16
Appropriateness of physiotherapy referrals Complete bedrest orders	Pre-implementation survey to find barriers BMAT (Bedside Mobility Assessment Tool) implemented Education sessions Mobility coordinator hired, Mobility Champions Standardisation of nurse assessed mobility orders Standard criteria for physiotherapy referral	1 year	13/16
Discharge destination LOS (length of stay) *Instrument:* *Chart review*	SPRINT: 4 colour coded exercise categories for patient's (alone or supervised) Environmental + verbal reminders for patients and staff SPRINT coach (RN or Auxiliary nurse)	4 months	12/16
Staff perceptions of MOVIN (Mobilising Older adult patients Via a Nurse driven intervention) *Instrument:* *Focus groups*	MOVIN: psychomotor skills training for nurses, communication tools for information sharing, ambulation pathways and distance markers, ambulation resources, ambulation culture	13 weeks	14/16
% of JH-HLM goals met % JH-HLM goals exceeded	Mobility goal algorithm, Staff education by clinical nurse specialist (CNS), Mobility prioritisation, Documentation review, Audit and feedback	16 months	14/16
Length of stay Discharge destination *Instrument:* *Chart review*	MOVE-ON: Mobility assessment within 24 h Mobilise at least 3 times daily Mobility is tailored to each individual MOVE-ON staff education by team	24 months	13/16
Change in UP and Go score from admission to discharge	Nurse led mobility protocol GENESIS (Geriatric Friendly Environment through Nursing Evaluating Specific Interventions for Successful Healing)	—	8/9

(Continues)

TABLE 2 (Continued)

Reference, year, country	Study design	Sample size	Profile, age (mean), female, gender (%)	Setting	Primary outcome
Nutrition					
Bell, Bauer, et al. (2014) and Bell, Rossi, et al. (2014) Australia *Nutrition*	Controlled before and after *Theory: Action research*	82 (44 pre) (38 post)	82.2 *F* = 57	Orthopaedic Geriatric Unit	Total energy and Total protein intake in 24 h mean *Instrument: weighted plate waste*
Byrnes et al. (2018) Australia *Nutrition*	Mixed methods (prospective and pre-post) *Theory: i-PARIHS*	155 (IG 92) (CG 63)	73.25 *F* = 42	Surgical Wards	Proportion of patients receiving early nutrition by post op day 1 *Instrument: chart review*
Hoekstra et al. (2011) Netherlands *Nutrition*	Controlled prospective cohort	127 (IG 61) (CG 66)	80 *F* = 75 Hip fracture	Trauma Department	Increase in average daily nutritional intake for 7 days post operatively and at 3 months post discharge *Instrument: Dietary record*
Roberts et al. (2019) Australia *Nutrition*	Observational pre-post *Theory: Integrated knowledge translation*	207 Pre 116 Post 91	71.5 *F* = 56	Acute Medical Unit	Change in mean energy and protein intake *Instrument: Visual estimation of consumption*
Young et al. (2013) Australia *Nutrition*	Prospective pre-post	254 Pre 139 Post 139 (3 groups) Grp1 *n* = 39 Grp2 *n* = 58 Grp3 *n* = 42	80.5 *F*=55	Medical Unit	Change in daily energy and protein intake *Instrument: Visual estimation of plate waste and direct observation*
Young et al. (2018) Australia *Nutrition*	Prospective evaluation of 3 cohorts *Theory: PARIHS*	*N* = 320 Baseline grp 1 = 129 Post: Grp2 = 139 Grp3 = 52	81 *F* = 54	Medical Wards	Change in daily energy and protein intake *Instrument (direct observation -visual estimation of plate waste)*
Multi-domain intervention					
Boltz et al. (2014) USA *Mobility & cognition*	Comparative repeated measure *Theory: Self-regulation theory*	*N* = 97 (IG 50) (CG 47)	80.6 *F* = 51	Medical Units	Improved ADL from admission to discharge and 14- and 60-days post discharge *Instrument: BI (Barthel index)*
Mudge et al. (2008) Australia *Mobility & cognitive*	Prospective cohort trial	125 (IG 62) (CG 62)	82 *F* = 58	General Medical Units	Change in functional status from admission to discharge *Instrument: MBI*

Secondary outcome	Intervention components	Duration	Quality score
Discharge nutritional status	Nutrition as medicine, oral nutritional supplements (ONS) high protein high energy (HPHE) snacks Nutrition Champions	7 months	14/16
Implementation acceptability, adoption, appropriateness, feasibility, and fidelity	Early nutrition post operatively, Facilitator led change, audit, and feedback	31 months	15/16
Effect of nutritional intake on nutritional status and QOL (quality of life) post- operative + 3 months post discharge *Instrument:* *Mini Nutritional Assessment (MNA)* *Euro-QOL*	Multidisciplinary: Nurse encourages increased nutrition, daily food record, mealtime environment and assistance, nutrition discussion during every encounter	13 months	9/9
Mealtime observations of activity, interruptions, and low consumption	Traffic light magnets for nutrition risks Education of all ward staff Introduction of HPHE breakfast and altered mealtime	12 weeks	7/9
Mealtime assistance Nursing actions during mealtimes *Instrument:* *Direct observation*	Grp1: Protected mealtimes (PM): Whole team limit activates + interruptions during meals, encourage + assist where needed Grp 2: Assistant in Nursing (AIN): Assist with set up for meal, encourage intake, assist with some or all intake, record intake, encourage HPHE diets Grp3: Combination of PM + AIN	8 months	5/8
Nutrition care processes *Instrument:* *Direct observation + chart review*	Phase 1: Encouraging, Assisting and Time to Eat. Mealtimes prioritised by all staff, limited activity and interruptions. AIN recruited to assist staff with set up, encouraging and feeding Phase 2: Eat Walk Engage. Clinical champions, Audit + feedback AHA (allied health assistant) to prevent malnutrition, functional decline + delirium HPHE diets for all	7 years	14/16
Improvement in walking distance, delirium severity from admission to discharge and 14- and 60-days post discharge	Environment redesign, Patient, family and Staff joint goal setting, Education, Family Centred Resource Nurse and Unit Champion, Post-acute follow up care	10 months	9/9
Change in mobility from admission to discharge, LOS, discharge destination, delirium occurrence *Instrument:* *TUG (Timed Up and Go) + chart review*	Graduated exercise program Education of staff and patients to promote mobility and functional independence Cognitive intervention	10 weeks	8/9

(Continues)

TABLE 2 (Continued)

Reference, year, country	Study design	Sample size	Profile, age (mean), female, gender (%)	Setting	Primary outcome
Mudge et al. (2015) Australia *Nutrition, mobility, cognition*	Pilot Study serial cross sectional *Theory: PARIHS*	49 4 time points (T) T1 = 11; T2 = 12, T3 = 13 T4 = 13	—	General Medical Wards	Documentation by nurses on key domains of care: mobility, activity, nutrition, cognition *Instrument: chart review*
Vidán et al. (2009) Spain *Mobilisation, nutrition& sensory*	Prospective controlled clinical trial	542 (IG 170) (CG 372)	84 *F* = 56	Geriatric Acute Care + Medical Units	Incidence of delirium during hospitalisation Instrument: CAM

Abbreviations: CG, Control Group; IG, Intervention Group; i-PARIHS, integrated Promoting Action on Research Implementation in Health Services; SEIPS, System Engineering Initiative for Patient Safety; SMART, Specific Measurable Achievable Relevant Time-bound.

TABLE 3 Intervention components

Intervention component	Generic implementation strategies								
Author et al.	Barrier identification	Education	Audit + feedback	Champion	New workforce	Facilitator	New resource	Environment	Communication
Bell, Bauer, et al. (2014) and Bell, Rossi, et al. (2014)	✓	✓		✓					✓
Boltz et al. (2014)	✓	✓		✓		✓	✓	✓	✓
Byrnes et al. (2018)	✓	✓	✓			✓			✓
Cohen et al. (2019) and Zisberg et al. (2018)	✓	✓	✓				✓	✓	✓
Hoekstra et al. (2011)		✓							✓
Hoyer et al. (2016)	✓	✓	✓						✓
Jones et al. (2020)	✓	✓	✓	✓	✓		✓	✓	
Juneau et al. (2018)		✓		✓					
King et al. (2016)	✓	✓					✓	✓	✓
Klein et al. (2018)		✓	✓			✓			✓
Liu et al. (2018)	✓	✓				✓			✓
Mudge et al. (2008)		✓		✓			✓	✓	✓
Mudge et al. (2015)	✓	✓	✓		✓	✓	✓	✓	
Padula et al. (2009)		✓							✓
Roberts et al. (2019)	✓	✓	✓			✓			
Vidán et al. (2009)		✓					✓	✓	
Young et al. (2013)	✓	✓	✓	✓	✓	✓			
Young et al. (2018)	✓	✓	✓	✓	✓	✓			

4.2.3 | Cognitive-specific interventions

There were no studies that focused solely on cognitive orientation or engagement, but it was a component in four studies. Maintaining patient orientation was a feature in all multidomain studies using orientation boards (Mudge et al., 2008, 2015), orientation clocks and verbal reminders (Vidán et al., 2009). The patients and families were educated on the importance of cognitive stimulation and social interaction to prevent delirium and support return to normal activities (Boltz et al., 2014). An allied health assistant provided cognitive activities for patients, and a senior AHP led weekly group activity sessions (Mudge et al., 2015). Mudge et al. (2008) delivered a

Secondary outcome	Intervention components	Duration	Quality score
Patient reported mobility, feeding assistance, therapeutic activity	EAT WALK ENGAGE HPHE diet, Protected Mealtime environment change, Exercise program, Orientation boards, Weekly activity, Allied Health Assistant	18 months	13/16
Incidence of functional decline from baseline to discharge Instrument: ADL score (0–6)	Educational program for staff Patient orientation Sensorial perception Sleep preservation Medical order for early mobilisation & Hydration Daily food intake chart	52 weeks	8/9

			Mobilisation			Nutrition				Multi-domain		
Documentation	Posters	Patient or family leaflet	Goal setting	Tailored mobilisation programme	Nurse led mobility assessment	Protected mealtimes	Diet redesign	Standardised guidelines	Food Chart	Medication review	Cognitive activity	Enhanced sleep routine
	✓	✓				✓	✓	✓	✓			
	✓		✓	✓								
	✓					✓	✓	✓				
✓	✓	✓		✓	✓							
✓		✓				✓	✓	✓	✓			
✓			✓		✓							
✓	✓				✓							
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✓	✓		✓		✓							
✓	✓	✓		✓	✓							
	✓	✓		✓							✓	
	✓	✓		✓		✓	✓				✓	
				✓	✓							
						✓	✓	✓				
✓	✓	✓					✓			✓		✓
	✓					✓		✓	✓			
						✓	✓	✓	✓			

psychologist led group session for patients 3–4 afternoons per week with a focus on preventing the psychological hazards of hospitalization. Vidán et al. (2009) implemented a medication reconciliation by a Geriatrician to reduce psychoactive drugs and an enhanced sleep routine (comforting drinks, reduce sleep disturbance activity).

In addition to specific interventions, there was a wide range of generic implementation strategies reported (Table 3). These were categorized as education, mapping barriers and audit, enhanced communication, additional workforce, environment upgrade and new documentation.

4.2.4 | Education

Nurse and HCA education was a feature in all the studies; this was mainly delivered face-to-face with three studies using online resources (Cohen et al., 2019; Hoyer et al., 2016; Liu et al., 2018). Nine studies involved multidisciplinary education (Bell, Bauer, et al., 2014; Bell, Rossi, et al., 2014; Byrnes et al., 2018; Juneau et al., 2018; Liu et al., 2018; Mudge et al., 2008; Roberts et al., 2019; Vidán et al., 2009; Young et al., 2013, 2018), whilst five studies included family education (Bell, Bauer, et al., 2014; Bell, Rossi, et al., 2014; Boltz et al., 2012, 2014; Cohen et al., 2019; Mudge et al., 2008; Vidán et al., 2009).

4.2.5 | Mapping barriers and audit

Twelve studies undertook a detailed appraisal of local barriers to inform the intervention design, whilst 10 studies used behaviour change theory or evidence-translation frameworks to guide implementation strategies (Table 3). Nine studies used audit (mainly documentation) and feedback to engage staff in the implementation process.

4.2.6 | Enhanced communication

Nine studies improved communication opportunities either in the nursing team using huddles (n = 5) or among the MDT using structured handovers or bedside whiteboards (n = 4). Three studies adopted patient diaries during the intervention to promote patient goal setting and self-management (Hoekstra et al., 2011; Mudge et al., 2008; Padula et al., 2009).

4.2.7 | Additional workforce

Four studies increased the workforce allocation, mainly additional nurse assistant or therapists' assistant hours to support mealtimes or mobilization. Eight studies used a clinical facilitator; in three studies, a dedicated nurse or AHP was appointed (Boltz et al., 2014; Liu et al., 2018; Mudge et al., 2015); seven studies used nurse champions to influence their peers.

4.2.8 | Environment upgrade and new documentation

Environmental changes (improving signage and decluttering walking spaces) were mainly a feature of the mobilization and cognitive interventions. New resources included orientation boards, clocks, and mobility aids. Introducing new nursing documentation occurred in seven studies. Other change ideas were posters and patient education leaflets, and Vidan et al. (2009) provided family information pamphlets.

4.3 | Outcome measures

There was a heterogeneous range of primary and secondary outcomes reported across studies, even among studies testing similar interventions. In the mobilization studies, process outcomes were used such as steps walked or patient highest mobility level. Five studies reported patients' functional ability using the Barthel Index (BI), modified (mBI) or Time-up and go walking speed. Energy and protein intake was measured in five studies; Bell, Bauer, et al., 2014; Bell, Rossi, et al., 2014 used a weighed plate measure whilst the other studies used observation of mealtimes, but there was a lack of standardization in reporting nutrition data (Hoekstra et al., 2011; Roberts et al., 2019; Young et al., 2013, 2018). Byrnes et al. (2018) reported the percentage of patients receiving full diet upgrade post operatively. In multidomain studies, delirium was the main outcome reported. Length of hospital stay (LOS) was the most widely reported secondary outcome.

4.4 | Effectiveness of interventions

Out of the 18 studies, 14 (74%) reported a significant improvement in their primary outcome, with the remaining four showing a positive

TABLE 4 Overview of significant findings

Author / Intervention component	Cohen et al. (2019) and Zisberg et al. (2018)	Hoyer et al. (2016)`	Jones et al. (2020)	Juneau et al. (2018)	King et al. (2016)	Klein et al. (2018)	Liu et al. (2018)	Padula et al. (2009)
Walking/mobilisation	+	+	+	n/m	+	+	+	–
Physical function	+	n/m	n/m	n/m	n/m	n/m	n/m	–
Energy/protein intake	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Nutrition process measure	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
Delirium	n/m	n/m	n/m	n/m	n/m	n/m	n/m	n/m
LOS	n/m	+	n/m	!	n/m	–	+	+
Other[2]				+	+			

+ indicated significant difference in favour of intervention; – no significant difference; ! groups not comparable/no evaluation; n/m = not measured; nutrition process measure indicates snacks offered, protected mealtimes and mealtime interruptions.

trend favouring the intervention. An overview of primary outcomes is presented in Table 4 (see supplemental file for detailed outcomes). The differences between the intervention and comparison groups tended to be small, and the clinical significance of the differences was difficult to interpret as many studies reported process outcomes (increase in nutrition intake/walking distance) without a measure of functional outcomes (ADL) or biological markers such as weight or body mass index.

4.4.1 | Impact on mobilization outcomes

Six of the eight mobilization studies reported significant increases in a mobilization outcome. Cohen et al. (2019) and Padula et al. (2009) measured change in patients BI or MBI from either pre-admission or admission to discharge and post-discharge follow-up. Padula et al. (2009) reported no significant difference at any time point. In contrast, Cohen et al. (2019)/Zisberg et al. (2018) observed a significant increase in average step count (measured using accelerometers) in the intervention group compared with the control group, which was associated with significant less decline in functional performance (mBI). This difference in mBI was still present at 30-day follow-up. Four studies reported increased mobility (level, distance or frequency) based on nurse documentation (Hoyer et al., 2016; Jones et al., 2020; King et al., 2016; Klein et al., 2018). Liu et al. (2018) was the only multi-site study involving 14 hospitals and reported a significant increase in patients sitting out of bed based on serial audits over 24 months.

4.4.2 | Impact on nutrition outcomes

Four of the six nutrition studies reported a significant increase in their primary outcome. Five studies reported an average increase in energy intake of 1162.8 KJ (range 372–3267) and protein intake of 12.8 g (range 0–35 g). Byrnes et al. (2018) reported a significant increase in early post-operative food intake.

4.4.3 | Impact on multicomponent outcomes

Boltz et al. (2014) was the only study to measure delirium severity and reported a 3% reduction at discharge. Two studies reported a reduction of 7%–10% in delirium incidents during admission, which was associated with improvement in functional outcomes (Mudge et al., 2008; Vidán et al., 2009). Mudge et al. (2015) reported improved nurse documentation of mobilization, nutrition and cognition.

4.4.4 | Impact on LOS

Twelve studies reported LOS as a secondary outcome. A median reduction of 3.72 days [interquartile range (IQR) 0.4–11.0] was observed in seven studies (Table 4), whilst five studies found an increase of 0.98 days (IQR 0.4–2.0) in their intervention group (Klein et al., 2018; Mudge et al., 2008; Roberts et al., 2019; Vidán et al., 2009; Young et al., 2013).

4.5 | Quality of the evidence

Overall, the strength of the evidence was low to moderate; there were methodological limitations across all studies. Initially using QI-MQCS or the Joanna Briggs Critical Appraisal Checklist for Quasi-Experimental Studies (Appendix S2), most studies received a high score for reporting study design and results, with only Young et al. (2013) receiving a fair quality rating. According to the risk of bias assessment (Kennedy et al., 2019, Cochrane Handbook), four studies (Bell, Bauer, et al., 2014; Bell, Rossi, et al., 2014; Boltz et al., 2014; Cohen et al., 2019; Mudge et al., 2008) received a high-quality rating (Score ≥7). Six studies were rated as fair quality (score 5–6) (Hoekstra et al., 2011; Hoyer et al., 2016; King et al., 2016; Klein et al., 2018; Padula et al., 2009; Vidán et al., 2009), and the remaining eight studies received a low-quality score (Score ≤4) (Byrnes et al., 2018; Jones et al., 2020; Juneau et al., 2018; Liu et al., 2018; Mudge et al., 2015; Roberts et al., 2019; Young et al., 2013, 2018) (Appendix S2).

Bell, Bauer, et al. (2014) and Bell, Rossi, et al. (2014)	Byrnes et al. (2018)	Hoekstra et al. (2011)	Roberts et al. (2019)	Young et al. (2013)	Young et al. (2018)	Boltz et al. (2014)	Mudge et al. (2008)	Mudge et al. (2015)	Vidán et al. (2009)
n/m	n/m	n/m	n/m	n/m	n/m	+	+	!	n/m
n/m	n/m	n/m	n/m	n/m	n/m	+	+	n/m	+
+	n/m	+	–	+/–	+	n/m	n/m	n/m	n/m
n/m	+	n/m	n/m	+	+	n/m	n/m	!	n/m
n/m	n/m	n/m	n/m	n/m	n/m	+	+	n/m	+
+	n/m	n/m	–	–	n/m	+	–	!	–
+								+	

A limitation across 12 studies was selecting a primary outcome that could not be measured at baseline (prior to the intervention). For example, energy/protein intake could only be measured as an outcome, there is a potential that confounding factors in population characteristics contributed to the observed differences. Only Mudge et al. (2008) attempted to blind the assessor to the intervention. Intervention fidelity was inconsistently reported, and only six studies reported percentages of adherence (Boltz et al., 2014; Byrnes et al., 2018; Mudge et al., 2008; Vidán et al., 2009; Young et al., 2013, 2018).

5 | DISCUSSION

Eighteen quasi-experimental or pre-post studies tested interventions to enable nursing teams to prioritize fundamental care activities focused on mobilization, nutrition or cognitive engagement in acute care settings. The majority of the studies focused on a single fundamental care activity, with only four studies targeting a combination of the major risk factors for HAD. Overall, 14 studies reported a significant improvement in one or more of the main outcomes. The most robust evidence came from four studies with the highest methodological quality (Bell, Bauer, et al., 2014; Bell, Rossi, et al., 2014; Boltz et al., 2014; Cohen et al., 2019; Mudge et al., 2008). Three of these studies reported significant improvement in patient functional outcomes, measured using the BI or mBI, compared with a control group of similar patients (Boltz et al., 2014; Cohen et al., 2019; Mudge et al., 2008). The improvement in patient functional outcomes was associated with a significant reduction in delirium (Boltz et al., 2014; Mudge et al., 2008).

The evidence of patient benefit from increased nutrition (Cawood et al., 2012; Mills et al., 2018), mobilization (Cortes et al., 2019; Smart et al., 2018) and cognitive monitoring and delirium risk reduction (Lee et al., 2020) is well established. However, most of these studies poorly describe the role of nursing teams in delivering interventions and the sustainability of changes beyond the study period. This is the first review, we are aware of, that focuses on nursing team fundamental care interventions that target the major modifiable risk factors for functional decline and HAD in acute care. All patients, but especially older people, admitted to hospital have interrelated risk factors that predispose them to HAD and other hospital-related adverse outcomes. The nature of nursing work with input from the MDT is to address multiple risk factors simultaneously, thus looking at the evidence as siloed interventions do not reflect clinical reality for ward nursing teams.

In a similar systematic review across all care settings, Richards et al. (2018) found little evidence of the impact of fundamental care interventions that nurses could utilize. They concluded that poor reporting and low methodological quality across the studies rendered it impossible to make recommendations for practice guidelines to support nurses in their daily care (Richards et al., 2018). We acknowledge the methodological limitations in some studies, but we disagree that there is no evidence to support nursing practice. The majority of studies in our review indicate that by using implementation science and quality improvement methodologies, nursing teams can prioritize fundamental care activities above competing demands on their time and reduce the risk of functional decline and HAD in older people.

In the current review, nine studies undertook detailed pre-intervention mapping to identify local barriers and involved staff in the intervention design. Consistent barriers reported were knowledge and skills deficits, especially in relation to safe mobilization (Jones et al., 2020; Moore et al., 2014), staffing levels and lack of time (Zisberg et al., 2018), and a restrictive patient safety culture (Byrnes et al., 2018; Mudge et al., 2015). Tailoring interventions to local barriers and context to overcome the 'impeding' effect of individual staff or ward culture is essential (Baker et al., 2015). The studies that adopted implementation science frameworks such as integrated Promoting Action on Research Implementation in Health Services or behaviour change theory like Capability, Opportunity and Motivation Behaviour had a better grasp of the complexity of affecting change at a team level and in complex organization culture (Harvey & Kitson, 2016; Michie et al., 2011). At ward level, a nursing team culture is fundamentally influenced by the prevailing organizational culture; thus, sustaining changes in fundamental care practice depends on wider system change that requires active facilitation at the ward and system level (Doherty-King & Bowers, 2013; Harvey & Kitson, 2016).

Particular barriers identified by nursing teams were inadequate staffing levels and lack of time, but this was not measured in any of the studies. Five studies in this review recruited an additional staff member for the study period. Griffiths et al. (2016), examining the evidence on nurse staffing levels, observed an association between higher numbers of registered nurses and improved patient outcomes, which was not seen with HCA substitution. A recent scoping review on missed care or care left undone suggests that better staffing levels alone may not be sufficient to improve global patient outcomes. In addition, nursing teams need strategies to prioritize fundamental care above competing demands (Schubert et al., 2020).

In future studies on fundamental care and HAD, staffing levels and grades should be measured as an important contextual factor in the implementation process. Equally, the sustainability of behaviour change of the nursing teams was not well evaluated; learning from the 'Eat Walk Engage' program in Australia suggests that ongoing facilitation and resources are required for sustainability (Mudge et al., 2008, 2015).

The quality of the evidence available was variable. Future research in this field needs to include standardized patient functional outcomes, control groups for comparison, adequate sample size and intervention fidelity. However, pragmatic or stepped wedge design may better account for workplace culture and environmental factors, resources, training needs and varied staff roles when evaluating intervention effectiveness rather than RCT methodologies (Bell, Bauer, et al., 2014; Bell, Rossi, et al., 2014). Many of the studies in this review included all patients rather than a volunteer subgroup; this is a strength of this evidence compared with RCTs which are

challenging to replicate and often exclude patients at higher risk of HAD (Ford & Norrie, 2016). In future research, we strongly advocate for the use of implementation science frameworks to better align intervention components to local barriers, and lastly, we call for more multidomain research that targets the core modifiable factors of HAD, especially patient cognition and engagement during hospitalization.

5.1 | Limitations

We limited our search to studies where interventions were primarily targeted at ward team level (cluster). We limited studies to the English language, and we did not include an extensive search of the grey literature. A meta-analysis was not possible due to study heterogeneity which may limit the strength of our recommendations.

5.2 | Implications for practice

This review synthesizes evidence delivered by ward nursing teams to improve mobilization, nutrition and cognitive engagement. Although we could not undertake a meta-analysis, findings from this review suggest that it is possible to impact modifiable risk factors for HAD through multicomponent ward-based interventions tailored to local barriers. Whilst there are methodological limitations, in our view, there is sufficient evidence on the implementation of these interventions to make recommendations for nursing practice on fundamental care for older adults in acute care settings.

In the context of coronavirus disease 2019 (COVID-19), the evidence from this review is immediately relevant to nursing practice. The prolonged restrictions due to the pandemic have caused deconditioning in older people. When admitted to hospital, they require early mobilization, enhanced nutrition and cognitive engagement to arrest the accelerated functional decline and frailty to prevent further HAD during hospitalization (De Biase et al., 2020).

6 | CONCLUSION

This review has identified a growing body of evidence on fundamental care interventions delivered by nursing teams that positively impact patient process and functional outcomes related to HAD. Whilst there is a need to improve methodological quality and standardize outcome measures to make more confident inference about effectiveness, we have sufficient evidence on how to prioritize fundamental care. The legacy of COVID-19 will persist for older people long beyond control of the virus. Prioritizing nutrition, early mobilization and cognitive engagement are always important nursing interventions, but they have taken on a new urgency. Nursing teams need solution-focused approaches and access to quality improvement or implementation science expertise in their organizations to normalize a ward culture of high-quality age-attuned care. Equally, organizations are responsible for addressing safe staffing and system barriers to enable ward nursing teams to sustain evidence-based changes to prioritize fundamental care above competing demands.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors have agreed and approved the final version of the manuscript. MDF +CN made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data. HC was involved in independent quality review. HC, VB and RMC were involved in revising it critically for important intellectual content.

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DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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