

Effectiveness and Stakeholder Views of Community-Based Allied Health on Acute Care Utilization: A Mixed Methods Review

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Abstract: The aim of this mixed methods systematic review was to synthesize contemporary evidence on effectiveness of community-based allied health (AH) services on acute care utilizations and views from relevant stakeholders. An a priori protocol was registered with PROSPERO [CRD42023437013]. Inclusion criteria were: (a) stand-alone interventions led by practitioners/graduates from one or more target AH professions (audiology, exercise physiology, diabetes educator, nutrition and dietetics, occupational therapy, physiotherapy, podiatry, psychology, social work, and speech pathology); (b) examined acute care utilization-related outcomes with/without perceptions of relevant stakeholders; and (c) published after 2010 and in English. Eligible studies were identified from: (a) bibliographic databases (MEDLINE, Embase, EmCare, PsycINFO, CINAHL complete, and the Cochrane Library) (September 19, 2023); (b) online databases (ProQuest Central and ProQuest Dissertations & Theses Global) and theses repository (Trove) (September 20, 2023); (c) Google and Google Scholar (October 17–18, 2023); and (d) citation searching. A modified version of McMaster Critical Appraisal Tools and McGill Mixed Methods Appraisal Tool were used to assess methodological quality. Data synthesis was through convergent segregated approach. Certainty of evidence was assessed using the Grading of Recommendations, Assessment, Development and Evaluation. There were 67 included papers. The integrated quantitative and qualitative findings demonstrated mixed evidence, likely influenced by the heterogeneity of the evidence base, for the effectiveness of AH services on acute care utilizations. Patients and their carers were largely positive about these services, highlighting opportunities to build on these experiences. The certainty of evidence for patient-important outcomes was however “very low”, emphasizing cautious interpretation. The findings of this review shed light on the breadth and scope of AH in the community sector, and its potential impact on the acute sector. Further investment in, and ongoing research on, community-based AH can strengthen primary healthcare and relieve pressure on the acute sector.

Keywords: allied health personnel, primary health care, community health services, hospitalization, hospital emergency service, length of stay

Introduction

At the global level, healthcare systems have been confronted with a plethora of challenges, including the upward trends in non-communicable diseases (NCDs) and aging populations, increasing healthcare costs, technological difficulties, issues with healthcare workforce supply and distribution, quality and safety concerns, health inequality and inequity, and more recently, the impact of coronavirus disease (COVID-19).^{1–5} A mismatch between service demand and supply, particularly at the community level, has been linked to inappropriate acute care utilizations. Acute care utilization is defined as “the use of hospital services in the form of emergency department (ED) or inpatient hospital visits”.⁶ Examples of inappropriate acute care

utilizations include use of ED for non-urgent conditions, premature hospital admissions, and unwarranted delayed discharges.^{7,8} Consequently, these can lead to profound negative impacts on the wider healthcare system. For example, ample evidence has shown that ED crowding is associated with treatment delays, declined quality of care, increased hospital length of stay (LOS), higher mortality rates, dissatisfaction and burnout of healthcare workers, poor patient satisfaction and experience, and greater healthcare costs.^{9–12}

As a means of tackling inappropriate acute care utilizations, multifaceted initiatives have been planned or implemented; of which, primary healthcare (PHC)-oriented approaches are one aspect of the focus.^{13,14} PHC is widely recognized as a “gateway” to the wider healthcare system, addressing the health needs of all people – ranging from health promotion and disease prevention to treatment, rehabilitation and palliative care – at the community level.¹⁵ Approximately 90% of healthcare demands can be managed through PHC.¹⁶ Research has shown that a robust PHC system is associated with better population health, lower healthcare costs, reduced health inequity, improved patient satisfaction, and better health outcomes (eg fewer unnecessary hospital admissions).¹⁵

The body of literature on community-based interventions targeting acute care utilizations is rapidly expanding. There is a heterogeneous collection of interventions delivered by various healthcare workers, with nurses and physicians being largely involved. For example, a systematic review¹⁷ investigating community-based interventions for childhood asthma reported that most interventions were delivered by a multidisciplinary team, with nurses being the dominant provider. Similarly, another systematic review¹⁸ found that hospital-at-home interventions for community-dwelling adults with chronic diseases were conducted by nurses and/or physicians through home visits.

Allied health (AH) professions are an integral pillar of PHC. As one of the first point of contact, allied health professionals (AHPs) are equipped with unique and essential skills that other PHC providers may not possess to provide a wide spectrum of health services, particularly in the prevention, management, and treatment of chronic and complex conditions.^{19,20} Specifically, AHPs engage with patients in decision-making about their own care, and support them in setting and achieving goals that optimize functional capacity, maintain or improve quality of life, and maximize safe and independent community living.²⁰ However, AH’s contribution in this context and its impact on acute care utilizations remain under-researched. Where there is research, it is limited to a single profession with inconclusive findings (eg^{21–23}).

Therefore, the aim of this systematic review was to investigate the effects of community-based, AHP-led services on acute care utilizations and explore perceptions and perspectives of relevant stakeholders in this context. As there is no standard or agreed definition of AH internationally,²⁴ non-hospital Medicare-subsidised AH services in the Australian context,²⁵ findings from preliminary searching of existing literature (ie the Allied, Scientific and Complementary [ASC] Health Model²⁴ and existing reviews on this topic [eg^{21–23}]), and end-users’ needs, were used to underpin the selection of target AH professions for this review. Consequently, the following ten AH professions were included: audiology, exercise physiology, diabetes educator, nutrition and dietetics, occupational therapy, physiotherapy (or physical therapy), podiatry, psychology, social work, and speech pathology (or speech-language pathology).

This systematic review has been undertaken and reported as two papers. The first paper (reported here) aims to investigate the effectiveness of community-based AH services on acute care utilizations and explore stakeholders’ perceptions and perspectives about these services. Additionally, participants’ adherence to intervention and adverse events are also included as secondary outcomes. The second paper, which will be published subsequently, will summarize evidence on economic perspectives of these AH services.

Methods

Design

A mixed methods systematic review approach was utilized considering various advantages and novelties. First, the combination of quantitative and qualitative methodological approaches enhances a comprehensive understanding of complex phenomena, which better informs decision-making. Second, the approach facilitates contextualization of, and explanation about, findings from quantitative research through the lens of qualitative research, and vice versa. Third, the opportunity to triangulate and confirm findings from the available quantitative and qualitative evidence strengthens reliability and accuracy of conclusions.²⁶

Protocol and Registration

This review was conducted and reported in accordance with the Preferred Reporting Items for a Systematic review and Meta-Analysis (PRISMA) 2020 statement (refer to PRISMA Checklist in [Table S1](#)).²⁷ An a priori protocol was registered with PROSPERO [CRD42023437013].

Eligibility Criteria

Primary quantitative, qualitative, and mixed methods research studies with no restrictions on study designs were included if they met the eligibility criteria outlined in [Table 1](#).

Information Sources

The following six bibliographic databases were searched on September 19, 2023: MEDLINE (Ovid platform), Embase (Ovid), EmCare (Ovid), PsycINFO (Ovid), CINAHL [Cumulative Index to Nursing and Allied Health Literature] complete (EBSCOhost), and the Cochrane Library. To maximize the retrieval of relevant literature and minimize publication bias, gray literature searching was also conducted on September 20, 2023, through online databases (ProQuest Central and ProQuest Dissertations & Theses Global) and theses repository (Trove), as well as on October 17 and 18, 2023 via search engines (Google and Google Scholar). Additionally, reference lists of included studies and relevant reviews were further searched.

Search Strategy

The development of search strategy was underpinned by three concepts: *AH profession*, *Service type/Setting* and *Outcome*. An academic librarian at the University of South Australia independently validated the search strategy. [Table 2](#) presents examples of the search terms and subject headings for each concept. Full search syntaxes for each database and search engine are presented in [Tables S2–S11](#). All searches were limited to English language and publications from 2010 and onwards and were conducted by one reviewer (EJT).

Table 1 Inclusion and Exclusion Criteria

| Concepts | Inclusion Criteria | Exclusion Criteria |
|---|---|---|
| Population | All populations with no restrictions | Not applicable |
| Exposure (intervention/ phenomenon of interest) | <ul style="list-style-type: none"> Any AHP-led, stand-alone intervention with / without involvement of other professions other than medicine and nursing / midwifery (eg pharmacy, community health workers, AH assistants etc.), delivered in primary care and community settings (eg general practice clinics, community health centers, private practices, individual client's own home, aged care facilities etc). Interventions delivered by qualified AHPs and / or AH graduates or students who completed or in the process of completing requirements for an AH qualification. Target AH professions: audiology, exercise physiology, diabetes educator, nutrition and dietetics, occupational therapy, physiotherapy (or physical therapy), podiatry, psychology, social work, and speech pathology (or speech-language pathology). | <ul style="list-style-type: none"> Community-based health services which were: (a) delivered by the target AHPs as part of a multidisciplinary intervention (ie involving medicine, nursing or midwifery), or (b) solely delivered by health professionals from other disciplines (eg medicine, nursing / midwifery, or other AH disciplines). AH services delivered in non-primary care and community settings (eg acute care settings including hospitals, EDs and outpatient departments, or sub-acute / rehabilitation settings). |
| Outcome (measurement / perspective) | <ul style="list-style-type: none"> ED presentation and hospital admission associated outcomes (eg hospital / ED (re)admission rates, LOS, admission associated expenditure, cost savings etc). Perspectives (eg satisfaction, experience, attitude etc.) from relevant stakeholders (eg consumers, AHPs etc). | Outcomes other than the aforementioned measurements and perspectives |

Abbreviations: AH, allied health; AHP(s), allied health professional(s); ED(s), emergency department(s); LOS, length of stay.

Table 2 Examples of Search Terms and Subject Headings

| Concepts | Examples of Search Terms | Examples of Subject Headings |
|-------------------------------|--|---|
| AH profession | Allied health OR nutrition* OR dietetic* OR "occupational therap*" OR physiotherap* OR psycholog* OR podiatr* OR chiropod* OR "social work*" OR "diabetes educat*" OR audiolog* OR "speech language patholog*" | Allied Health Personnel/ OR Dietetics/ OR Occupational Therapy/ OR Physical Therapists/ OR psychology, clinical/ OR Social Work/ OR Podiatry/ OR Audiology/ OR Speech-Language Pathology/ |
| Service type / Setting | Primary healthcare OR home care OR preventive health* OR community-based | Primary Health Care/ OR Community Health Services/ OR Home Care Services/ OR Community Health Centers/ OR Preventive Health Services/ |
| Outcome | ((hospital OR "emergency department*") adj2 (admit* OR present* OR avoid*)) OR hospitalisation* OR re-hospital* OR "length of stay" OR patient admission* OR patient readmission* | Hospitalization/ OR Length of Stay/ OR Patient Admission/ OR Patient Readmission/ |

The publication year limiter was chosen considering the following aspects: (a) timing of major health reforms. For example, the introduction of the National Health Reform Agreement in Australia in 2011²⁸ and the enactment of the Patient Protection and Affordable Care Act in the United States (US) in 2010,²⁹ (b) development of the ASC Health Model in 2009, which was proposed as a new model to reflect current and future face of Australian AH professions;²⁴ and (c) existing systematic reviews on similar topics (eg^{21–23,30,31}), which predominantly included primary studies published prior to 2010. These factors, along with the evolving healthcare context (eg impacts from the COVID-19 pandemic, increasing uptake of telehealth and virtual care, and changing workforce and service delivery models), created a need for contemporary evidence on this topic. Therefore, a date limit was implemented.

Study Selection Process

Records identified from the databases were exported to EndNote (version 20, Clarivate) and subsequently uploaded to Covidence (Veritas Health Innovation) for removal of duplicates and screening. A two-stage screening, comprising title and abstract screening, followed by full-text screening, was conducted. Four independent reviewers were involved, with one reviewer (EJT) screened all records and three reviewers (SK, PM and LI) screened the records in duplicate. Papers retrieved from gray literature searching (Trove, Google and Google Scholar) and reference list checking were screened by one reviewer (EJT) and independently checked by another reviewer (SK). Any discrepancies were resolved through discussion between two reviewers (EJT and SK). Papers that met all inclusion criteria were included in this review.

Risk of Bias Assessment

A modified version of McMaster Critical Appraisal Tools for quantitative³² and qualitative³³ studies and McGill Mixed Methods Appraisal Tool³⁴ for mixed methods studies and randomized controlled trials (RCTs) with nested qualitative study were used to assess the risk of bias of included papers. The McMaster Critical Appraisal Tools were chosen due to their generic nature by design, that is, they are not specific to individual study designs and as such, they can be used for all types of quantitative and qualitative studies. The McGill Mixed Methods Appraisal Tool was chosen as it allows for concomitant appraisal of quantitative, qualitative and mixed methods components within a study.

The tool for quantitative studies consists of 14 assessment criteria concerning the study purpose, review of relevant background literature, sample, outcomes, interventions, results, and conclusions and clinical implications.³² The tool for qualitative studies comprises 22 criteria concerning the study purpose, review of relevant background literature, identification of theoretical perspective, sampling, data collection (descriptive clarity and procedural rigor), data analysis (analytical rigor, auditability, and theoretical connections), overall rigor (credibility, transferability, dependability, and confirmability), and conclusions and implications.³³ The tool for mixed methods studies includes 17 criteria concerning research questions, study design rationale, integration of qualitative and quantitative components, meta-inference, divergences and inconsistencies, and adherence to the quality criteria of both qualitative and quantitative components.³⁴

Each criterion was rated as “yes”, “no”, “not addressed”, “can’t tell”, or “not applicable”. A scoring system was employed, where each “yes” was given one point; each “no”, “not addressed” or “can’t tell” was scored zero; “not applicable” was omitted from the total score. The final score for each paper was calculated as a percentage to reflect the level of risk of bias, with a higher percentage indicating a lower risk of bias. Four independent reviewers were involved, with one reviewer (EJT) critically appraised all included papers and three reviewers (SK, PM and LI) double-checked approximately 20% (n = 15/67). Any discrepancies were resolved through discussion between two reviewers (EJT and SK/PM/LI).

Data Extraction

Customized data extraction forms developed in Microsoft Excel (version 2308, Microsoft Corporation) were used to extract data pertinent to the review aims. These included: citation details (first author, year of publication, study design, and country of origin) and PEO [Population, Exposure, Outcome] related information (sample size, participant characteristics, AH service parameters, comparator, data sources and collection methods, outcome domains, and main findings). Four independent reviewers were involved, with one reviewer (EJT) extracted data from all included papers and three reviewers (SK, PM and LI) double-checked approximately 20% (n = 15/67). Any discrepancies were resolved through discussion between two reviewers (EJT and SK/PM/LI).

Data Synthesis and Integration

Study interventions, comparators, and acute care utilization outcomes were coded based on their characteristics to facilitate data synthesis. For study interventions, community-based AH services were broadly categorized into *multidisciplinary* and *single disciplinary AH services* according to the number of professions involved and the level of contribution from each profession. *Multidisciplinary AH services* were determined as at least two professions with similar or equivalent contribution to the intervention, whereas *single disciplinary AH services* were considered when one profession led the delivery of an intervention. Comparators were grouped into three categories, namely *usual care*, *no intervention*, and *other intervention*. Acute care utilization outcomes were coded into seven categories, including *hospital admissions*, *ED visits*, *LOS*, *combined utilization*, *emergency service use*, *hospital avoidance*, and *observation stays*.

A convergent segregated approach to synthesis and integration was undertaken.³⁵ This consists of independent synthesis of quantitative and qualitative data, followed by integration of evidence derived from both syntheses via juxtaposing and linking the findings into a line of argument to generate an overall configured analysis.³⁵ Narrative synthesis was conducted for both quantitative and qualitative data, whereby textual description was used to summarize outcomes and describe patterns of effects/perceptions across the included papers.³⁶ This method was chosen as meta-analysis and meta-aggregation were not feasible to yield a meaningful overall finding, given the heterogeneity of the included papers.³⁶ To facilitate the integration of quantitative and qualitative evidence, findings from individual syntheses were compared and contrasted to determine if and how they were supportive or contradictory by using qualitative evidence to contextualize and explain the findings from quantitative synthesis and vice versa, and identify gaps where future research may be useful to explain the relationship or lack thereof.³⁵ The process was led by one reviewer (EJT), with ongoing consultation with, and input from, the other three reviewers (SK, PM and LI) who have extensive expertise and track record of conducting and publishing reviews.

Certainty Assessment of Evidence

The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach was employed to assess the certainty of evidence for outcomes. This approach was chosen as it provides a transparent and systematic framework for developing and presenting summaries of evidence, which underpin evidence-informed decisions for patients, clinicians and policy makers.³⁷ The application of GRADE involves rating the quality of evidence for each outcome that is important for decision-making (ie patient-important outcome), such as mortality, other clinical events, adverse events, and quality of life, from a systematic review that examines alternative management options.^{37,38} In this review, patient-important outcomes including acute care utilizations and adverse events from between-group comparisons (ie multidisciplinary/single disciplinary AH services versus usual care/no intervention/other intervention) were assessed

using GRADE, whereby the quality of evidence was categorized into “very low”, “low”, “moderate” and “high” based on rating down (risk of bias, inconsistency, indirectness, imprecision and publication bias) and rating up (large effect, plausible confounding and dose response gradient) criteria.³⁹ The GRADEpro GDT [Guideline Development Tool] online software was used to develop Summary of Findings (SoF) tables. A footnote was included under each SoF table to provide the reasoning behind the decision in accordance with GRADE guidelines.^{40–44} The assessment was led by one reviewer (EJT), with ongoing consultation with, and input from, the other three reviewers (SK, PM and LI).

Results

A total of 11,093 records were identified from the databases. After removal of 3092 duplicates, 8,001 records were screened for title and abstract relevance; another 7872 records were further excluded as they did not meet the inclusion criteria. The remaining 129 records, along with additional 162 records identified via other methods (ie Google and Google Scholar searching and citation searching) were retrieved for full text screening. Of these, 224 papers were excluded as they did not meet the inclusion criteria, in terms of intervention (n = 192) (eg involvement of physicians and nurses^{45,46}), setting (15) (eg unspecified setting,⁴⁷ setting not limited to primary care and community-based⁴⁸), outcome (14) (eg acute care utilization-related outcomes were not reported separately,⁴⁹ did not measure utilization-related outcomes,⁵⁰ focused on utilization associated costs only^{51–53}), study design (2), and duplicate (1). Of the 67 included papers, two papers were based on the same RCT but focused on different outcomes;^{54,55} another two papers presented findings of a study at two different follow-up times.^{56,57} Therefore, 67 papers presenting findings from 65 studies were included in this review (Figure 1).

Study Characteristics

The study characteristics of the included papers were summarized in terms of study design and country, participant characteristics and AH service parameters, and data sources and collection methods. Table 3 presents detailed study characteristics of each included paper.

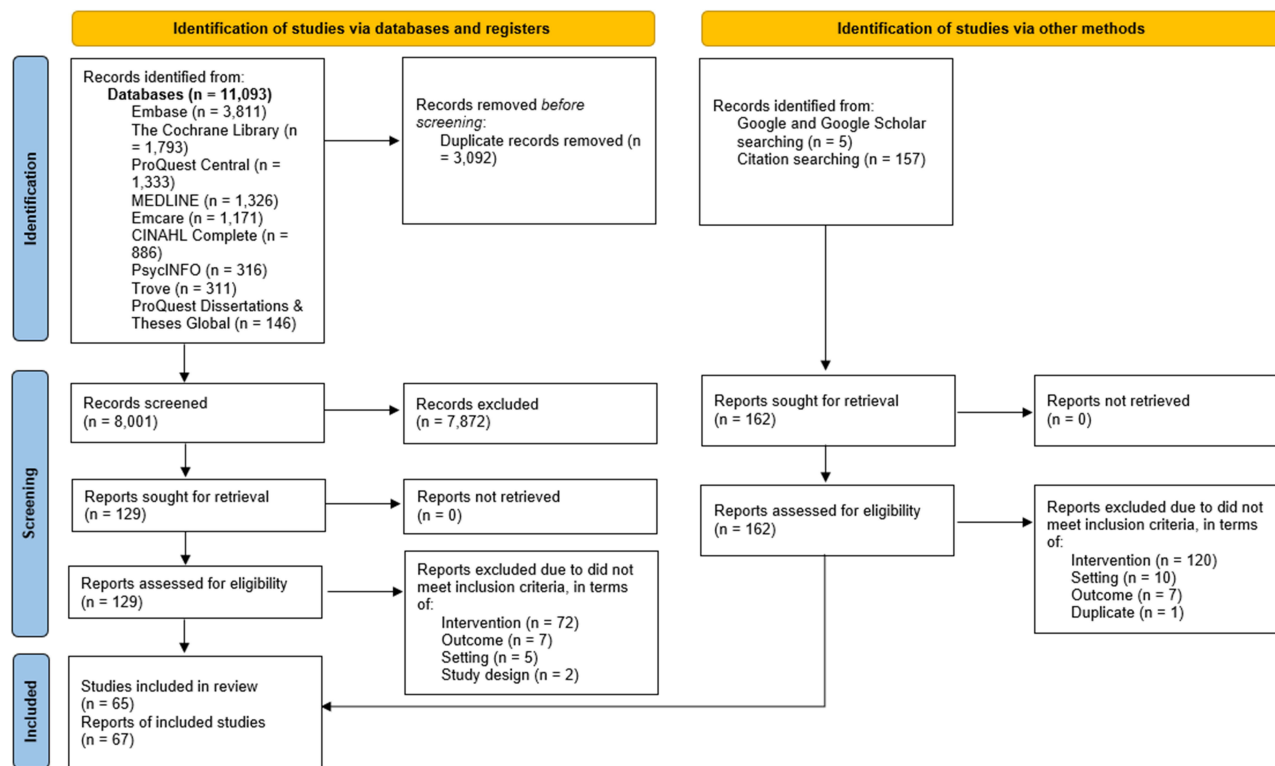


Figure 1 PRISMA flow diagram.

Table 3 Study Characteristics

| First Author, Year, Study Design and Country | Sample Size (n) | Participant Characteristics | AH Service Parameters | | | Comparator [Category] ^a | Data Sources and Collection Methods |
|---|---|--|--|--|---|---|---|
| | | | Type | Setting | Frequency and Duration | | |
| Multidisciplinary AH services | | | | | | | |
| Barr, 2019 ⁵⁸ Prospective longitudinal Australia | 5,771 | Target population/condition: chronic conditions Sex: NR Age: ≥45 years | Physiotherapy, podiatry, and other AH services (including dietetics, exercise physiology and chiropractic) claims under a GPMP or TCA | Private practice | Up to 5 sessions per calendar year | N/A | Linked data set from various sources |
| Beck, 2016 ⁵⁹ Cluster RCT Denmark | 95 (I = 55; C = 40) from 3 nursing home and 3 home-care areas | Target population/condition: undernutrition in elderly Sex: (I) 75% F; (C) 75% F Age: mean ± SD = (I) 86.0 ± 8.4 years; (C) 87.3 ± 7.6 | Multidisciplinary nutrition support comprises exercise supported by a PT, nutrition supported by a dietician, dysphagia and eating problems supported by an OT, and weekly team meetings, in addition to nutrition coordinators and standard AH services | Participant's home and nursing home | PT intervention: 30–45 mins exercise of moderate intensity twice per week Dietician intervention: mean = 4.5 home visits or phone contacts OT intervention: mean = 3 home visits or phone contacts Intervention duration: 11 weeks | Nutrition coordinators and standard AH services from PT, dietician, OT, and care dentistry [other intervention] | A standardized assessment system and municipality care register system |
| Bernard, 2021 ⁶⁰ Retrospective cohort Ireland | 178 | Target population/condition: elderly required low acuity emergency medical services Sex: 36% M and 64% F Age: mean ± SD = 79.6 ± 7.6 years | Alternative care pathway to ED conveyance comprises a 'Rapid Response Team' led by advanced paramedic and OT/PT and a 'Follow-Up Team' led by OT and PT | Participant's home | Over 5 months | N/A | Hospital patient administration system and survey with participants and their next-of-kin |
| Comino, 2015 ⁶¹ Prospective cohort Australia | 20,433 | Target population/condition: diabetes Sex: 56% M and 44% F Age: ranged 45–75+ years; 47% in the 60–74 age group | Multidisciplinary care claims under MBS (≥1 claim of podiatrist, dietician, diabetes educator, PT or EP) | Primary care | Claims within 15 months | N/A | Linked data set from various sources |
| Finlayson, 2018 ⁶² RCT Australia | 111 (I = 56; C = 55) | Target population/condition: elderly at high risk of hospital readmission Sex: (I) 42% F; (C) 37% F Age: mean ± SD = (I) 77.6 ± 6.5 years; (C) 77.9 ± 6.2 | Transitional care intervention comprises tailored exercise program provided by hospital PT and in-home f/u visits by EP | Inpatient (exercise plan) and participant's home | Weekly 2-hour visits over 6 weeks | Usual care | Hospital medical records and self-report |

(Continued)

Table 3 (Continued).

| First Author, Year, Study Design and Country | Sample Size (n) | Participant Characteristics | AH Service Parameters | | | Comparator [Category] ^a | Data Sources and Collection Methods |
|---|--------------------------------|---|---|--|---|--|--|
| | | | Type | Setting | Frequency and Duration | | |
| Freburger, 2018 ⁶³ Retrospective cohort US | 21,073 (I = 7,206; C = 13,867) | Target population/condition: stroke survivors Sex: (I) 34% M; (C) 46% M Age: mean \pm SD = (I) 79.8 \pm 7.7 years; (C) 76.7 \pm 7.3 | Home health therapy from PT and/or OT in the first 30 days post discharge | Participant's home | Mean \pm SD number of visits = 7.5 \pm 4.5 | No PT/OT use [no intervention] | Claims data from various sources |
| Gitlin, 2017 ⁶⁴ Retrospective cohort US | 717 | Target population/condition: caregivers of persons with dementia [Caregivers] Relationship to person with dementia: 58% non-spouse and 42% spouse Sex: 27% M and 73% F Age: ranged 20–91 years; mean \pm SD = 63.0 \pm 13.2 [Persons with dementia] Sex: 40% M and 60% F Age: ranged 48–99 years; mean \pm SD = 79.0 \pm 9.1 | Community-based dementia care program comprises Basic (including dementia education, care strategies, and social support) and Enhanced (additional OT contacts) services, delivered by social workers and OTs | Participant's home or in-office | Basic: up to 5 phone and in-person contacts for a total of 5.75 hours over 12 months Enhanced: up to 4, 1-hour, additional home visits with OTs | N/A | Self-report |
| Knott, 2013 ⁶⁵ Retrospective cohort Canada | 1,029 (I = 451; C = 578) | Target population/condition: recently discharged elderly with home care admission Sex: (I) 44% M and 56% F; (C) 59% M and 41% F Age: mean \pm SD = (I) 77.0 \pm 7.0 years; (C) 74.4 \pm 6.3 | Home-based occupational therapy and/or physiotherapy | Participant's home | OT visits only: ranged 1–22; mean \pm SD = 3 \pm 2.5 PT visits only: ranged 1–24; mean \pm SD = 5 \pm 3.0 Both: (OT) ranged 1–16; mean \pm SD = 4 \pm 2.7; (PT) ranged 1–16; mean \pm SD = 6 \pm 4.2 | No intervention | Routinely collected data from various administrative databases |
| Kraal, 2017 ⁶⁶ RCT The Netherlands | 90 (I = 45; C = 45) | Target population/condition: at low-to-moderate cardiac risk Sex: (I) 89% M and 11% F; (C) 89% M and 11% F Age: mean \pm SD = (I) 60.5 \pm 8.8 years; (C) 57.7 \pm 8.7 | Telemonitoring guided home-based training comprises 3 in-person introductory sessions supervised by a PT and an exercise specialist, and home-based sessions with individual coaching via phone from the PT | Outpatient clinic (introductory sessions) and participant's home | Training sessions: 45–60 mins per session and \geq 2 sessions per week Individual coaching: once per week Duration: 12 weeks | Group-based training at outpatient clinic [other intervention] | Self-report and electronic patient records |

| | | | | | | | |
|--|--------------------------|--|--|---|---|--|---|
| Langstaff, 2014 ⁶⁷ Interrupted time series Canada | 524 | Target population/condition: new stroke survivors Sex: NR Age: ≥16 years | Enhanced rehabilitation service comprises occupational therapy, physiotherapy, speech-language pathology, and social work services | Participant's home or residential setting | First month post discharge: up to 3 PT and OT visits per week; up to 2 SLP visits per week; up to 1 social worker visit per week Second month post discharge: up to 2 PT and OT visits per week; up to 1 SLP visit per week; up to 1 social worker visit per fortnight Intervention duration: 2 months | Community-based rehabilitation with lower intensity (pre-implementation) | Hospital and community databases |
| Moreno, 2021 ⁶⁸ Quasi-experimental US | 1,120 (I = 420; C = 700) | Target population/condition: linguistically and culturally diverse elderly with complex medical and social needs Sex: (I) 41% M and 59% F; (C) 40% M and 60% F Age: mean = (I) 74.4 years; (C) 75.0 | Connecting Provider to Home program addresses social needs and supports primary care, delivered by a team of a social worker and a CHW | Participant's home | Initial home visit by the team, followed by ≥1 per month f/u phone call by the CHW | Usual care (matched control) | Administrative and claims data and telephone survey with participants |
| Naar, 2018 ⁶⁹ RCT US | 170 (I = 84; C = 86) | Target population/condition: African American adolescents with moderate-to-severe persistent asthma Sex: (I) 61% M and 39% F; (C) 61% M and 39% F Age: mean ± SD = (I) 13.3 ± 1.3 years; (C) mean ± SD = 13.6 ± 1.4 | Multisystemic Therapy-Health Care comprises tailored social-ecological behavioral interventions, delivered by 1 psychologist and 3 social workers | Participant's home and community setting | Number of sessions: ranged 4–62; mean ± SD = 27.1 ± 12.0 Intervention Duration: 6 months | Home-based supportive family counseling [other intervention] | Medical records and self-report |
| Orpen, 2010 ⁷⁰ Phenomenology UK | 10 | Target population/condition: total hip replacement surgery Sex: 40% M and 60% F Age: ranged 54–85 years | Preoperative occupational therapy with/without physiotherapy | Participant's home | NR | N/A | Semi-structured interviews |
| Richardson, 2010 ⁷¹ RCT Canada | 303 (I = 152; C = 151) | Target population/condition: ≥ 1 chronic condition Sex: (I) 35% M and 65% F; (C) 38% M and 62% F Age: ranged 46–95 years | A multi-component rehabilitation intervention delivered by a PT and an OT, including collaborative goal setting, a 6-week chronic disease self-management workshop, referral to community programs and a web-based education program | Primary care | PT visits: mean = 6 visits per person; 35 mins per visit OT visits: mean = 4 visits per person; 57 mins per visit | Usual care | Self-report |

(Continued)

Table 3 (Continued).

| First Author, Year, Study Design and Country | Sample Size (n) | Participant Characteristics | AH Service Parameters | | | Comparator [Category] ^a | Data Sources and Collection Methods |
|---|--|---|--|---|---|--|--|
| | | | Type | Setting | Frequency and Duration | | |
| Siddle, 2018 ⁷² Pre-post US | 203 | Target population/condition: recently discharged COPD, pneumonia, MI and HF patients Sex: 49% F Age: mean \pm SD = 58.6 \pm 10.5 years | Transitional care intervention comprises in-home assessments, medication review and care coordination, delivered by a paramedic/social worker dyad via in-person and phone contacts | Participant's home | Initial post-discharge visit within 48 hours, with additional visits and phone f/u as needed | N/A | Electronic health records |
| Tistad, 2015 ⁷³ Prospective longitudinal Sweden | 150 patients (I = 40; C = 110) 56 caregivers (I = 18; C = 38) | [Patients] Target population/condition: stroke Sex: (I) 53% M and 47% F; (C) 58% M and 42% F Age: (I) ranged 41–93 years; mean \pm SD = 70 \pm 12; (C) ranged 24–91 years; mean \pm SD = 67 \pm 15 [Caregivers] Sex: mostly F Relationship: mostly partner | Early supported discharge from hospital with continued rehabilitation at home, coordinated by an interdisciplinary team including OTs, PTs, SLPs, medical social workers, and dietitians | Inpatient (at discharge) and participant's home | Mean = 14 SLP visits; 12.5 social worker visits; 7.5 PT visits; 6 OT visits; 1 dietician visit | Conventional rehabilitation [usual care] | County council's computerized database and self-report |
| Single disciplinary AH services – physiotherapy (physical therapy) | | | | | | | |
| Bean, 2019 ⁷⁴ Quasi-experimental US | 168 (I = 68; C = 100) | Target population/condition: community-dwelling elderly at risk of mobility decline Sex: (I) 47% M; (C) 45% M Age: mean \pm SD = (I) 77.4 \pm 6.0 years; (C) 77.4 \pm 7.3 | Tele-physiotherapy using computer tablet and a commercially available app, in addition to combined in-person outpatient and home visits | Participant's home and outpatient rehabilitation center | Frequency: mean in-person visits per person = 6.1 (4.8 outpatient; 1.3 home); remote monitoring and communication during the first 9 months Intervention duration: 12 months | No intervention (matched control) | Self-report and survey with participants |
| Farag, 2016 ⁷⁵ Secondary analysis of RCT Australia | 340 (I = 171; C = 169) | Target population/condition: recently discharged elderly Sex: (I) 38% M and 72% F; (C) 24% M and 76% F Age: mean \pm SD = (I) 82 \pm 8 years; (C) 81 \pm 8 | PT-led weight-bearing exercise with a focus on enhancing mobility and preventing falls | Participant's home | PT visits: 40–60 mins per visit; 10 visits in total Exercise: 20–30 mins exercise; up to 6 times per week Intervention duration: 12 months | Usual care | Self-report |

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|--|-------------------------------|---|--|---|---|---|---|
| Fritz, 2013 ⁷⁶ Retrospective cohort US | 2,184 (I = 286; C = 1,898) | Target population/condition: LBP Sex: (I) 54% F; (C) 50% F Age: mean \pm SD = (I) 39.4 \pm 12.2 years; (C) 39.9 \pm 12.3 | Initial physiotherapy management within the first 14 days following the index primary care visit | Physiotherapy clinic within community-based primary care clinic | Frequency: mean \pm SD = 3.9 \pm 3.2 sessions Duration: mean \pm SD = 16.9 \pm 17.9 days | No physiotherapy as initial management [no intervention] | Electronic medical records and insurance claims data |
| Hill, 2011 ⁷⁷ RCT UK | 851 (I = 568; C = 283) | Target population/condition: LBP Sex: (I) 58% F; (C) 60% F Age: mean \pm SD = (I) 50.1 \pm 15.0 years; (C) 49.1 \pm 14.3 | PT-led stratified approach for low-, medium- and high-risk patients. All received initial assessment and treatment session, with medium-risk group referred for further standardized physiotherapy and high-risk group referred for psychologically informed physiotherapy | Local community physiotherapy premise | Initial session: 30 mins Flu (medium risk): 30 mins; up to 6 sessions Flu (high risk): 45 mins; up to 6 sessions Intervention duration: 3 months | Current best practice [usual care] | Self-report |
| Holland, 2017 ⁷⁸ RCT Australia | 166 (I = 80; C = 86) | Target population/condition: COPD Sex: (I) 60% M and 40% F; (C) 59% M and 41% F Age: mean \pm SD = (I) 69 \pm 13 years; (C) 69 \pm 10 | Home-base rehabilitation comprises aerobic exercise training, resistance training and self-management education, delivered by a PT via home visit and f/u phone calls | Participant's home | Frequency: 1 home visit followed by 7 weekly phone calls Session duration: mean \pm SD = 27 \pm 8 mins for first phone call; 20 \pm 7 mins for subsequent calls Intervention duration: 8 weeks | Center-based rehabilitation [other intervention] | Medical record review and self-report |
| Karvelas, 2017 ⁷⁹ Prospective cohort US | 4,723 (I = 628; C = 4,095) | Target population/condition: elderly with a new episode of acute LBP Sex: (I) 63% F; (C) 65% F Age: mean \pm SD = (I) 73.0 \pm 6.4 years; (C) 73.8 \pm 6.9 | Initial physiotherapy management within the first 28 days following the index primary care visit | Integrated healthcare center | NR | No physiotherapy within the first 28 days [no intervention] | Electronic medical record data |
| Menon, 2020 ⁸⁰ Retrospective cohort US | 1,729 (I = 293; C = 1,436) | Target population/condition: total joint arthroplasty Sex: (I) 57% F; (C) 58% F Age: mean \pm SD = (I) 67.8 \pm 8.9 years; (C) 67.0 \pm 9.6 | Peri-operative physiotherapy program comprises pre-operative assessment, home environment assessment, home exercise program, and post-operative mobility assessment | Participant's home | Pre-operative assessments at 1 month prior to surgery and post-operative assessment within 1–7 days after discharge | Usual care (matched control) | Retrospective chart review |
| Mitchell, 2014 ⁸¹ RCT UK | 184 (I = 89; C = 95) | Target population/condition: COPD Sex: (I) 61% M and 39% F; (C) 49% M and 51% F Age: mean \pm SD = (I) 69 \pm 8.0 years; (C) 69 \pm 10.1 | PT-led, self-management program underpinned by a COPD manual comprising educational material and an exercise regime | Participant's home | Frequency: a 30–45-min introductory consultation; f/u phone calls at weeks 2 and 4 Intervention duration: 6 weeks | Usual care | Patients' records from primary and secondary care databases |

(Continued)

Table 3 (Continued).

| First Author, Year, Study Design and Country | Sample Size (n) | Participant Characteristics | AH Service Parameters | | | Comparator [Category] ^a | Data Sources and Collection Methods |
|--|--|--|--|---------------------------------|--|---|---|
| | | | Type | Setting | Frequency and Duration | | |
| Román, 2013 ⁸² RCT Spain | 97 (IG1 = 32; IG2 = 33; CG = 32) | Target population/condition: moderate COPD Sex^b: (IG1) 81% M and 19% F; (IG2) 82% M and 18% F; (CG) 83% M and 17% F Age^b: mean = (IG1) 64.9 years; (IG2) 64.1; (CG) 63.4 | PT-led, group-based pulmonary rehabilitation comprises education program, respiratory physiotherapy, and low intensity peripheral muscle training with (IG1) or without (IG2) maintenance program including respiratory physiotherapy and low intensity peripheral muscle training | Primary care center | Rehabilitation program: 3, 60-min sessions per week for 3 months Maintenance program: weekly session for 9 months | Routine care [usual care] | Hospital medical records and self-report |
| Salisbury, 2013 ⁸³ RCT with nested qualitative study UK | Quant: 2,249 (I = 1,506; C = 743) Qual: 57 patients from IG and 32 other key stakeholders | [Quant] Target population/condition: musculoskeletal problems Sex: (I) 40% M and 60% F; (C) 41% M and 59% F Age: median (IQR) = (I) 48.3 (36.7–61.0) years; (C) 48.2 (36.0–61.9) [Qual (patients)] Sex: 46% M and 54% F Age: mean \pm SD = 58 \pm 16.9 years [Qual (stakeholders)] Disciplines: n = 16 PTs, 4 physiotherapy managers, 8 GPs, and 4 commissioners | A telephone assessment and advice service from a senior PT, with written self-management and exercise advice sent by post and face-to-face treatment if necessary | Community physiotherapy service | Frequency: mean \pm SD = 2.87 \pm 2.94 consultations Session duration: mean \pm SD = 91.70 \pm 95.40 mins | Usual care | Quant: self-report and resource-use data from various sources Qual: individual semi-structure interviews |
| Stevens-Lapsley, 2023 ⁸⁴ RCT US | 150 (I = 75; C = 75) | Target population/condition: Veterans with multimorbidity and hospital-associated deconditioning Sex: (I) 77% M and 23% F; (C) 92% M and 8% F Age: mean \pm SD = (I) 76.6 \pm 9.0 years; (C) 76.7 \pm 8.8 | Progressive, high-intensity physiotherapy intervention comprises strengthening exercise, gait training, and functional training | Participant's home | 12 visits over 30 days (3 visits per week) | Standardized physiotherapy [other intervention] | Medical records, and PT's and outcome assessor's reports |

| | | | | | | | |
|--|--|--|--|--------------------|---|----------------------------|---|
| Suikkanen, 2021 ⁸⁵ RCT Finland | 299 (I = 150; C = 149) | Target population/condition: pre-frail and frail elderly Sex: (I) 76% F; (C) 74% F Age: mean \pm SD = (I) 82.2 \pm 6.3 years; (C) 82.7 \pm 6.3 | PT-supervised physical exercise comprises tailored strength, balance, flexibility and functional exercises, with nutrition counseling | Participant's home | Frequency: 2, 60-min exercises per week Intervention duration: 12 months | Usual care | Medical records and social insurance registers |
| Taylor, 2023 ⁸⁶ RCT with nested qualitative study Australia | Quant: 38 (I = 20; C = 18) Qual: 10 from IG | Target population/condition: community-dwelling elderly recovering from surgically managed hip fracture Sex: (I) 50% F; (C) 72% F Age: mean \pm SD = (I) 78 \pm 9 years; (C) 80 \pm 9 | PT-led, prescribed moderate-intensity walking program underpinned by behavior change interventions including goal setting, weekly supervision, monitoring, and encouragement to engage in social supports | Community | Frequency: 100-min walking including 30-min supervised session per week Intervention duration: 12 weeks | Standard care [usual care] | Quant: health service records Qual: semi-structured phone interviews |
| Wilson, 2020 ⁸⁷ Descriptive study US | 18 | Target population/condition: community-dwelling elderly at risk of homebound or fall Sex: 50% M and 50% F Age: range 65–84 years; mean \pm SD = 79 \pm 10 | Prevention-focused home care physiotherapy comprises assessments of physical ability, healthy lifestyle behaviors and environmental limitations, a fall-prevention exercise program, recommendations for home modification, and referrals to relevant community services | Participant's home | 6 in-home and 3 telehealth visits over 6 months | N/A | Self-report via telephone survey |
| Zanaboni, 2013 ⁵⁶ Pre-post Norway | 10 | Target population/condition: moderate/severe COPD Sex: 50% M and 50% F Age: median (IQR) = 54.0 (51.0–56.8) years | PT-led telerehabilitation comprises tailored exercise training, telemonitoring and education/self-management | Participant's home | Mean \pm SD = 2.0 \pm 1.1 training sessions and 0.5 \pm 0.1 videoconference contacts per week | N/A | Electronic records and telephone interview with participants |
| Zanaboni, 2017 ⁵⁷ Pre-post Norway | 10 | Target population/condition: moderate/severe COPD Sex: 50% M and 50% F Age: ranged 48–67 years; mean \pm SD = 55.2 \pm 6.1 | PT-led telerehabilitation comprises tailored exercise training, telemonitoring and education/self-management | Participant's home | Mean = 1.7 training sessions per week with each session lasted \geq 30 mins; weekly individual videoconferencing sessions with the PT | N/A | National patient registry |

(Continued)

Table 3 (Continued).

| First Author, Year, Study Design and Country | Sample Size (n) | Participant Characteristics | AH Service Parameters | | | Comparator [Category] ^a | Data Sources and Collection Methods |
|--|---|---|--|---|---|--|--|
| | | | Type | Setting | Frequency and Duration | | |
| Zanaboni, 2023 ⁸⁸ RCT Multi-country (Norway, Australia and Denmark) | 120 (IG = 40; CG1 = 40; CG2 = 40) | Target population/condition: moderate/severe/very severe COPD Sex: (IG) 58% M; (CG1) 50% M; (CG2) 58% M Age: mean ± SD = (IG) 64.9 ± 7.1 years; (CG1) 64.0 ± 7.7; (CG2) 63.5 ± 8.0 | PT-led telerehabilitation comprises tailored exercise training, telemonitoring and education/self-management, delivered with two levels of supervision | Participant's home | Exercise training: continuous (3–5 times per week) or interval training (3 times per week) with each session lasted for ≥30 mins; strength training 2–3 days per week Intensive supervision: 1 weekly videoconference in the first 8 weeks Maintenance supervision: 1 monthly videoconference after the first 8 weeks Intervention duration: 2 years | CG1: tailored unsupervised home-based training [other intervention] CG2: standard care [usual care] | Health records (Australia) and registries (Denmark and Norway) |
| Single disciplinary AH services – social work | | | | | | | |
| Altfeld, 2013 ⁸⁹ RCT US | 720 (I = 360; C = 360) | Target population/condition: elderly at risk of post-discharge medical or psychosocial complications Sex: NR Age: mean ± SD = (I) 74.1 ± 6.9 years; (C) 75.0 ± 6.9 | Social worker-led telephone transitional care comprises biopsychosocial assessment and an individualized plan to address post-discharge psychosocial and health needs | Participant's home | Frequency: initial phone contact within 2 working days of discharge, with additional contacts when needed Intervention duration: mean ± SD = 5.8 ± 11.3 days | Usual care | Insurance claims or self-report, and telephone survey with patients/caregivers |
| Boockvar, 2022 ⁹⁰ Cluster RCT US | 202 (I = 87 from 25 primary care teams; C = 115 from 27 primary care teams) | Target population/condition: older veterans Sex: (I) 99% M; (C) 98% M Age: mean ± SD = (I) 77.7 ± 8.5 years; (C) 76.3 ± 7.4 | Social worker-led care transitions focusing on patient activation, medication and condition knowledge, patient-centered record-keeping and f/u, in addition to real-time health information exchange notifications | Participant's home | A home visit 2–3 days after arrival home and 3 phone calls within 30 days | Real-time health information exchange notifications alone with usual care [other intervention] | Electronic health records |
| Boutwell, 2016 ⁹¹ Controlled clinical trial US | 6,824 (I = 1,546; C = 5278) | Target population/condition: Medicare beneficiaries at risk of hospital readmission Sex: NR Age: ≥ 50 years | Social work-based model of transitional care to assess and address individual's social and logistical needs, by managing care coordination tasks, engaging with family or professional caregivers and collaborating with other professionals | Inpatient (at discharge) and participant's home | Initial assessment prior to discharge with 2 additional assessments within 2 days and at 30 days post discharge via phone contacts | No intervention (matched control) | Insurance claims |

| | | | | | | | |
|--|------------------------|---|--|---|---|--------------------------------------|--|
| Bronstein, 2015 ⁹² RCT US | 89 (I = 45; C = 44) | Target population/condition: at moderate to high risk of rehospitalization Sex: (I) 49% M; (C) 41% M Age: ranged 51–92 years; mean \pm SD = (I) 70.9 \pm 10.6; (C) 70.4 \pm 11.3 | Social work care coordination intervention delivered by social work interns, with a focus on assessing, identifying, and alleviating barriers to patients remaining at home | Participant's home | Phone contact within 3–5 days post discharge, followed by a home visit between days 7 and 14, and a final phone contact at 21 days post discharge | Standard care [usual care] | NR for readmission related data; satisfaction survey with participants |
| Chan, 2014 ⁹³ Cross-sectional Singapore | 1,509 | Target population/condition: (re)admitted patients in medical wards Sex: 56% M and 44% F Age: ranged 21–96 years; mean \pm SD = 60.8 \pm 16.5 | Community-based social work service | NR | NR | N/A | Hospital record system and face-to-face survey with participants |
| Enguidanos, 2011 ⁹⁴ Retrospective cohort US | 5,654 | Target population/condition: elderly receiving home health services Sex: 41% M and 59% F Age: mean \pm SD = 78.0 \pm 7.7 years | Home visits by social workers | Participant's home | NR | N/A | Home Health Outcome and Assessment Information Set (OASIS) and electronic home health service data |
| Hengartner, 2016 ⁹⁵ RCT Switzerland | 151 (I = 75; C = 76) | Target population/condition: mental health disorders Sex: (I) 50% M and 50% F; (C) 49% M and 50% F Age: mean \pm SD = (I) 42.1 \pm 11.4 years; (C) 41.0 \pm 11.3 | Psychosocial post-discharge intervention comprises a brief case management and network coordination, delivered by social workers | Inpatient (at discharge) and participant's home | Frequency: f/u visit within the first week after discharge and subsequent visits as per individual's needs Intervention duration: \leq 3 months post-discharge | Usual care | Clinical registry records |
| Kogan, 2014 ⁹⁶ RCT US | 181 (I = 90; C = 91) | Target population/condition: elderly at risk of readmission Sex: 51% M and 49% F Age: 49% aged 62–79 years and 51% aged 80 years or more | Social worker-led care transitions comprises psychosocial assessment, home safety evaluation, medications reconciliation, problem solving therapy, health goal setting, scheduling physician f/u appointments, and home- and community-based service referrals | Participant's home | Up to 2 in-home visits (initial visit within 48 hours after discharge) and 4 f/u phone contacts | Usual care | Electronic health records |
| Nguyen, 2016 ⁹⁷ Quasi-experimental US | 416 (I = 256; C = 160) | Target population/condition: recently discharged patients Sex: (I) 49% M; (C) 51% M Age: mean = (I) 61 years; (C) 57 | Social work-based transition to outpatient healthcare comprises review of diagnosis, discharge medications, f/u appointments, consultations, and overall plan of care | Participant's home | Phone contact within 48 hours of discharge | Pre-implementation [no intervention] | Chart reviews |

(Continued)

Table 3 (Continued).

| First Author, Year, Study Design and Country | Sample Size (n) | Participant Characteristics | AH Service Parameters | | | Comparator [Category] ^a | Data Sources and Collection Methods |
|--|----------------------------|---|--|---|---|---|---|
| | | | Type | Setting | Frequency and Duration | | |
| Rowe, 2016 ⁹⁸ Retrospective cohort US | 640 | Target population/condition: elderly with unmet non-medical needs Sex: 38% M and 62% F Age: ranged 60–98 years; mean \pm SD = 72.4 \pm 8.6 | Integrated care intervention comprises patient engagement, assessment and care plan development, case management, and ongoing care as needed, delivered by social workers via in-person and/or phone contacts | Primary care clinic | Frequency: mean \pm SD = 1.43 \pm 0.8 referrals Intervention duration: 6 weeks | Wider local hospital and national/regional populations (details NR) [no intervention] | Electronic health records |
| Watkins, 2012 ⁹⁹ Descriptive study US | 292 | Target population/condition: frail elderly Sex: NR Age: ranged 63–100 years; mean \pm SD = 80 \pm 8 | A hospital-to-home transition program involves a social worker who navigates health-related needs and instrumental activities of daily living, and a contracted home care agency who provides in-home assistance | Inpatient (for home health services arrangement) and participant's home | Social worker visits: mean = 2.7 home visits and 3.5 phone calls In-home assistance: mean = 16 hours Intervention duration: 30–120 days; mean \pm SD = 63 \pm 44 | Elderly across the county (details NR) [no intervention] | Self-report and survey with participants and their family |
| Weerahandi, 2015 ¹⁰⁰ Retrospective cohort US | 1,158 (I = 579; C = 579) | Target population/condition: high hospital service utilizers Sex: (I) 53% F; (C) 52% F Age: (I) mean = 63.8 years; (C) 64.3 | Social worker-led transitional care program comprises psychosocial assessment and tailored interventions in collaboration with patients and their family via phone contacts, home visits and during medical appointments | Inpatient (for appointment scheduling) and participant's home | 35 days of post-discharge f/u | Standard care (matched control) [usual care] | Electronic medical records |
| Single disciplinary AH services – nutrition and dietetics | | | | | | | |
| Berkowitz, 2018 ¹⁰¹ Prospective cohort US | 1,135 (I = 133; C = 1,002) | Target population/condition: dually eligible Medicare and Medicaid beneficiaries at nutritional risk Sex: (I) 56% F; (C) 53% F Age: mean \pm SD = (I) 57.4 \pm 8.4 years; (C) 57.9 \pm 5.4 | Medically tailored meals program involves a registered dietician who tailors meals to individual's medical needs | Participant's home | Delivery of 5 days' worth of lunches, dinners, and snack per week | No intervention (matched control) | Healthcare claims |
| Berkowitz, 2019 ¹⁰² Retrospective cohort US | 1,020 (I = 499; C = 521) | Target population/condition: at nutritional and social risk Sex: 56% F Age: mean \pm SD = 52.7 \pm 14.5 years | Medically tailored meal delivery under supervision of registered dietitians to meet individual's medical needs | Participant's home | Frequency: weekly delivery of 10 meals per week Intervention duration: mean \pm SD = 12.4 \pm 10.6 months | No intervention (matched control) | Healthcare claims |

| | | | | | | | |
|---|-------------------------------|---|--|---|--|-------------------------------------|----------------------------|
| Black, 2013 ¹⁰³ Pre-post Australia | 174 children from 55 families | Target population/condition: child(ren) from low-income Aboriginal families Sex: 47% M Age: mean \pm SD = 7.6 \pm 4.2 years | A fruit and vegetable subsidy program with complementary seasonal recipes and practical cooking and nutrition education sessions facilitated by dietitians, combined with preventive health services (annual dental and hearing check-ups) | Local Aboriginal health service | Weekly box of fruits and vegetables over 12 months | N/A | Health records audits |
| Cho, 2023 ¹⁰⁴ Pre-post US | 1,009 | Target population/condition: homebound elderly at risk for pre-diabetes, diabetes, or malnutrition Sex: 34% M and 66% F Age: mean \pm SD = 79.0 \pm 8.8 years | Meals on Wheels nutritional counseling program comprises home-delivered meals, and individualized nutrition education and counseling by a registered dietitian | Participant's home | Meal delivery: mean = 6.71 meals per week Nutrition counseling (low- to moderate-risk): a 1-hour home visit and 2 f/u phone calls Nutrition counseling (high-risk): an initial home visit, attempted f/u home visits, and up to 4 f/u phone calls Nutrition counseling (all): a 6-month f/u visit | N/A | Health administration data |
| Cramon, 2021 ¹⁰⁵ Pilot RCT Denmark | 40 (I = 21; C = 19) | Target population/condition: elderly at risk of readmission Sex: (I) 52% F; (C) 37% F Age: (I) ranged 66–92 years; median = 79; (C) ranged 65–94 years; median = 74 | Dietary counseling and a nutrition plan upon discharge, combined with home visits and f/u phone calls between visits by an educated nutritionist | Inpatient (at discharge) and participant's home | Frequency: 2 home visits with f/u phone calls 1 week after each home visit Intervention duration: 4 weeks | Standard treatment [usual care] | Electronic medical records |
| Gurvey, 2013 ¹⁰⁶ Controlled interrupted time series (pilot) US | 698 (I = 65; C = 633) | Target population/condition: chronically ill and nutritionally at-risk individuals Sex: (I) 58% M and 42% F; (C) 64% M and 36% F Age: (I) ranged 31–62 years; mean \pm SD = 52.0 \pm 6.2; (C) ranged 27–68 years; mean \pm SD = 51.0 \pm 1.2 | Meal delivery service with registered dietitians who provide medical nutrition therapy and offer support through nutrition counseling and meal planning | Participant's home | Meal delivery: 3 meals per day; 7 days per week Dietician counseling: NR | No intervention (matched control) | Healthcare claims |
| Kurien, 2012 ¹⁰⁷ Prospective cohort UK | 400 (I = 313; C = 87) | Target population/condition: gastrostomy Sex: (I) 52% M; (C) 48% M Age: mean \pm SD = (I) 61 \pm 14 years; (C) 67 \pm 12 | Community gastrostomy management provided by a home enteral feed team including 2 dietitians and a dietetic assistant | Predominantly participant's home and residential/nursing home | Input on 2,237 occasions to 280 separate patients over the 1-year study period | No intervention (historical cohort) | Local gastrostomy register |

(Continued)

Table 3 (Continued).

| First Author, Year, Study Design and Country | Sample Size (n) | Participant Characteristics | AH Service Parameters | | | Comparator [Category] ^a | Data Sources and Collection Methods |
|---|--|--|---|--|--|---------------------------------------|--|
| | | | Type | Setting | Frequency and Duration | | |
| Lindegard Pedersen, 2017 ¹⁰⁸ RCT Denmark | 208 (IG1 = 73; IG2 = 68; CG = 67) | Target population/condition: malnourished or at-risk elderly Sex: (IG1) 78% F; (IG2) 90% F; (CG) 82% F Age: (IG1) ranged 77–103 years; mean ± SD = 86.4 ± 5.5; (IG2) ranged 75–97 years; mean ± SD = 85.6 ± 5.3; (CG) ranged 75–100 years; mean ± SD = 86.3 ± 6.2 | Individually tailored nutritional f/u care after discharge via in-person (IG1) or phone (IG2) consultations by a clinical dietician, with professional home carers involved | Participant's home | Frequency: at 1, 2 and 4 weeks after discharge Session duration: home visits = 45 mins; phone contacts = 15 mins | Standard care [usual care] | Patients' electronic records |
| Meena, 2023 ¹⁰⁹ RCT India | 100 (I = 50; C = 50) | Target population/condition: decompensated cirrhosis Sex: (I) 92% M and 8% F; (C) 84% M and 16% F Age: mean = (I) 49.5 years; (C) 52.0 | Home-based intensive nutrition therapy involves tailored high calorie, protein-rich, low sodium meal plan prescribed by a senior liver dietician | Participant's home | Frequency: once per week during the first month, then once per month Intervention duration: 6 months | Standard medical therapy [usual care] | Patient charts |
| Rocca, 2022 ¹¹⁰ Mixed methods US | Quant: 158 patients (I = 21; C = 137) Qual: 21 patients from IG and 6 staff | [Patients (quant)] Target population/condition: malnutrition Sex^b: 53% M and 47% F Age^b: ranged 18–94 years; mean = 67 [Staff (qual)] Disciplines: n = 2 registered dietitians, 2 case management team members/ clinical care coordinators, and 2 registered nurses | Dietician-led transitions of care comprises assessment, education, individualized plan, and communication with other health professionals | Inpatient (pre-discharge interview) and participant's home | Pre-discharge interview: mean = 45 mins Post-discharge flu: 3 phone calls at day 3 (mean = 15 mins), week 3 (mean = 15 mins) and week 5 (mean = 25 mins) Intervention duration: 5 weeks | No intervention (details NR) | Quant: chart reviews and self-report Qual: survey with patients and interviews with staff |
| Sandhu, 2022 ¹¹¹ Retrospective cohort Canada | 390 (I = 119; C = 271) | Target population/condition: home enteral nutrition users Sex: 64% M and 36% F Age: mean ± SD = 65.3 ± 15.3 years | Community registered dietician f/u | Participant's home, independent living facility, or assisted living facility | Over 6 years | No intervention | Electronic medical records |

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|---|---------------------------|--|--|--|---|--|---|
| Smith, 2020 ¹¹² RCT UK | 308 (I = 154; C = 154) | Target population/condition: at medium or high risk of malnutrition Sex: (I) 34% M and 66% F; (C) 32% M and 68% F Age: mean \pm SD = (I) 71.3 \pm 11.2 years; (C) 71.6 \pm 10.3 | Dietary advice on food modification combined with delivery of ready-made ONS by a dietician | Participant's home | Over 12 weeks | Dietary advice alone [<i>other intervention</i>] | Self-report |
| Single disciplinary AH services – occupational therapy | | | | | | | |
| Chu, 2017 ¹¹³ RCT China (Hong Kong) | 198 (I = 95; C = 103) | Target population/condition: community-dwelling elderly with a recent fall-related ED visit Sex: (I) 32% M and 68% F; (C) 26% M and 74% F Age: mean \pm SD = (I) 78.6 \pm 6.0 years; (C) 78.1 \pm 6.1 | OT-led fall reduction home visit program comprises an environmental hazard evaluation, a daily life routine assessment, recommendations for modification, prescription of assistive devices, customized fall reduction care plans, on-site skills training, and referrals to community agencies for other services | Participant's home | A 1.5-hour single home visit within 2 weeks after ED discharge, with phone f/u on home modification and assistive devices 2 months post the visit | A well-wishing visit from a research assistant [<i>other intervention</i>] | Self-report and data from centralized electronic clinical management system |
| Clemson, 2016 ¹¹⁴ RCT Australia | 400 (I = 198; C = 202) | Target population/condition: elderly discharged from hospital Sex: (I) 60% F; (C) 64% F Age: ranged 70–96 years; mean \pm SD = (I) 80.2 \pm 6.4; (C) 80.7 \pm 5.7 | OT-led enhanced discharge planning intervention comprises pre- and post-discharge home visits, goal setting and f/u | Inpatient (rapport building and assessment) and participant's home | Pre-discharge home visit, followed by post-discharge home visit within the first week after discharge, and phone calls at 2 and 4 weeks | Usual care | Self-report |
| Engelbrecht, 2019 ¹¹⁵ Pre-post South Africa | 44 | Target population/condition: mental health disorders Sex: 68% M and 32% F Age: ranged 17–57 years; mean \pm SD = 28.8 \pm 9.0 | Therapeutic program led by an OT and an occupational therapy technician, including group activities, life skills, gardening, psychoeducation, drumming, and nutrition education (by nutrition degree students) | Day treatment center | 2–4 groups per day on 3–4 days per week | N/A | Hospital's electronic records |
| Garvey, 2015 ¹¹⁶ RCT Ireland | 50 (I = 26; C = 24) | Target population/condition: multimorbidity Sex: (I) 35% M and 65% F; (C) 37% M and 63% F Age: (I) ranged 50–83 years; median = 65; (C) ranged 42–84 years; median = 67.5 | OT-led self-management program comprises fatigue management, healthy eating, maintaining physical activity (delivered by a community PT), maintaining mental health, managing medications (delivered by a pharmacist), effective communication strategies and goal setting | Local community health center | Frequency: weekly 3-hour group sessions Intervention duration: 6 weeks | Waiting list (received usual care) [<i>usual care</i>] | Family practice medical records |

(Continued)

Table 3 (Continued).

| First Author, Year, Study Design and Country | Sample Size (n) | Participant Characteristics | AH Service Parameters | | | Comparator [Category] ^a | Data Sources and Collection Methods |
|--|--|---|---|--------------------|--|------------------------------------|---|
| | | | Type | Setting | Frequency and Duration | | |
| Lockwood, 2019 ¹¹⁷ RCT Australia | 77 (I = 37; C = 40) | Target population/condition: hip fracture Sex: (I) 76% F; (C) 68% F Age: mean ± SD = (I) = 83.4 ± 7.1 years; (C) 80.9 ± 7.3 | A single home visit by an OT prior to discharge, involving assessment of mobility, self-care and household safety, and provision of education, advice and recommendations on equipment, home adaptations and community support services | Participant's home | 1-hour visit between 1 and 5 days prior to discharge | Usual care | Medical records |
| Tistad, 2018 ¹¹⁸ Secondary analysis of cluster RCT Sweden | 38 (I = 13; C = 25) | Target population/condition: stroke Sex: (I) 54% M and 46% F; (C) 60% M and 40% F Age: (I) ranged 60–84 years; mean = 75; (C) ranged 52–86 years; mean = 71 | OT-led rehabilitation with integration of the principles of client-centered practice and individual's unique lived experiences for goal setting and collaboration | Participant's home | Mean number of OT contacts = 21.9 | Usual rehabilitation [usual care] | County council's computerized database |
| Van Dam, 2022 ¹¹⁹ Convergent parallel mixed methods Australia | Quant: 100 clients and 30 referring clinicians Qual: 4 clients and 6 carers | [Clients (quant)] Target population/condition: at high risk of imminent hospital presentation Sex^b: 38% M and 62% F Age^b: mean ± SD = 76.8 ± 12.4 years [Clinicians] Disciplines: n = 16 community/district nursing staff; 6 ambulance staff; the remainder from emergency multidisciplinary assessment team, community AH and others | Extended scope occupational therapy comprises short-term interventions related to falls, mobility and nutrition, and onward referrals to other services | Client's home | Median number of interventions per client = 4 | N/A | Quant: routinely collected organizational data and online survey with referring clinicians Qual: semi-structured face-to-face interviews with clients and their carers |

| Single disciplinary AH services – psychology | | | | | | | |
|--|------------------------|--|---|---|--|--|---|
| Coultas, 2016 ⁵⁴ RCT US | 305 (I = 149; C = 156) | Target population/condition: COPD Sex: (I) 50% F; (C) 51% F Age: mean \pm SD = (I) 70.8 \pm 9.5 years; (C) 69.8 \pm 9.5 | COPD self-management education combined with a behavioral intervention for lifestyle physical activity using a structured workbook, delivered by a trained health coach who has an undergraduate degree in psychology | Participant's home | Self-management education (6 weeks): weekly phone call from the health coach Behavioral intervention (20-week active phase): one-on-one phone counseling with the health coach every other week supplemented by computer assisted phone calls on alternate weeks. Behavioral intervention (40-week maintenance phase): health coach initiated calls every other month | COPD self-management education combined with usual care [other intervention] | Hospitalization records and self-report |
| Coultas, 2018 ⁵⁵ Secondary analysis of RCT US | 305 (I = 149; C = 156) | Target population/condition: COPD Sex: (I) 50% F; (C) 51% F Age: mean \pm SD = (I) 70.8 \pm 9.5 years; (C) 69.8 \pm 9.5 | COPD self-management education combined with a behavioral intervention for lifestyle physical activity using a structured workbook, delivered by a trained health coach who has an undergraduate degree in psychology | Participant's home | Self-management education (6 weeks): weekly phone call from the health coach Behavioral intervention (20-week active phase): one-on-one phone counseling with the health coach every other week supplemented by computer assisted phone calls on alternate weeks. Behavioral intervention (40-week maintenance phase): health coach initiated calls every other month | COPD self-management education combined with usual care [other intervention] | Self-report |
| Single disciplinary AH services – exercise physiology | | | | | | | |
| Brusco, 2023 ¹²⁰ Pre-post Australia | 50 | Target population/condition: elderly concerned about falling or had \geq 1 falls in the past 12 months Sex: 78% F Age: mean \pm SD = 72.8 \pm 7.4 years | Structured, supervised exercise delivered by accredited EP or PT, followed by optional exercise maintenance (independent at no cost or supervised group classes with potential cost) | Senior exercise park in local community | A 1–1.5-hour structured session delivered twice per week over 12 weeks, followed by 6-month maintenance | N/A | Self-report |

Notes: ^acoded by review authors based on comparator characteristics; ^bBaseline data prior to further exclusion/drop out for sample size.

Abbreviations: AH, allied health; C, comparator; CG, comparison group; CHW, community health worker; COPD, chronic obstructive pulmonary disease; ED, emergency department; EP, exercise physiologist; F, female; f/u, follow-up; GP(s), general practitioner(s); GPMP, General Practice Management Plan; HF, heart failure; I, intervention; IG, intervention group; IQR, interquartile range; LBP, low back pain; M, male; MBS, Medicare Benefits Schedule; MI, myocardial infarction; min(s), minute(s); n, number; N/A = not applicable; NR, not reported; ONS, oral nutritional supplement; OT(s), occupational therapist(s); PT(s), physiotherapist(s)/physical therapist(s); qual, qualitative; quant, quantitative; RCT, randomized controlled trial; SD, standard deviation; SLP(s), speech-language pathologist(s); TCA, Team Care Arrangement; UK, United Kingdom; US, United States.

Study Design and Country

Of the 67 papers, there were 64 quantitative, two mixed methods^{110,119} and one qualitative research.⁷⁰ For quantitative research, wide-ranging study designs were involved, including RCT (n = 24),^{54,62,66,69,71,77,78,81,82,84,85,88,89,92,95,96,105,108,109,112–114,116,117} retrospective cohort (11),^{60,63–65,76,80,94,98,100,102,111} pre-post (7),^{56,57,72,103,104,115,120} prospective cohort (6),^{58,61,73,79,101,107} quasi-experimental (3),^{68,74,97} secondary analysis of RCT or cluster RCT (3),^{55,75,118} cluster RCT (2),^{59,90} (controlled) interrupted time series (2),^{67,106} RCT with nested qualitative study (2),^{83,86} descriptive study (2),^{87,99} controlled clinical trial (CCT) (1),⁹¹ and cross-sectional (1).⁹³ All papers were published between 2010 and 2023 and were from 16 countries, including the US (n = 28),^{54,55,63,64,68,69,72,74,76,79,80,84,87,89–92,94,96–102,104,106,110} Australia (11),^{58,61,62,75,78,86,103,114,117,119,120} the United Kingdom (UK) (6),^{70,77,81,83,107,112} Canada (4),^{65,67,71,111} Denmark (3),^{59,105,108} Ireland (2),^{60,116} Norway (2),^{56,57} Sweden (2),^{73,118} China (1),¹¹³ Finland (1),⁸⁵ India (1),¹⁰⁹ Singapore (1),⁹³ Spain (1),⁸² South Africa (1),¹¹⁵ Switzerland (1),⁹⁵ the Netherlands (1),⁶⁶ and multi-country (Norway, Australia and Denmark) (1).⁸⁸

Participant Characteristics and AH Service Parameters

A broad spectrum of community-based AH services targeting diverse populations and conditions were investigated across the included papers. The type of AH services was broadly categorized into *multidisciplinary* and *single disciplinary*. For multidisciplinary AH services, two to five professions from the ten target AH professions and health professions other than medicine and nursing/midwifery were included, with involvement of various healthcare workers including advanced paramedics/paramedics, chiropractors, community health workers, diabetes educators, dietitians, exercise physiologists (EPs), exercise specialists, occupational therapists (OTs), podiatrists, psychologists, physiotherapists/physical therapists (PTs), speech-language pathologists (SLPs), and social workers. The type of multidisciplinary AH services varied greatly, including alternative care pathway to ED, transitions of care, care coordination, prehabilitation, rehabilitation, and multidisciplinary management for a health condition. The services were predominantly delivered at participant's home. Each visit lasted between 30⁵⁹ and 120 minutes⁶² with frequency varied from five times per year⁵⁸ to six visits per week⁶⁷ for a duration of 30 days⁶³ to 15 months.⁶¹ Different populations and conditions were targeted, including participants who required emergency medical services or were recently discharged from the hospital, those with NCDs or complex medical and social needs, and people with a specific condition (eg undernutrition, total hip replacement surgery).

Six AH professions led single disciplinary AH services, including physiotherapy, social work, nutrition and dietetics, occupational therapy, psychology and exercise physiology. Each profession (except psychology and exercise physiology) included a wide range of services targeting different populations and conditions. In particular, physiotherapy services varied from prevention focused programs targeting community-dwelling elderly at risk of mobility decline, homebound or fall, to rehabilitation programs or treatment approaches for a specific condition (eg chronic obstructive pulmonary disease [COPD], low back pain [LBP]); social work services predominantly focused on transitions of care or care coordination that targeted at-risk populations (eg elderly at risk of readmission, people with medical or psychosocial complications); nutrition and dietetics services mainly consisted of meal delivery programs and/or nutrition therapy for at-risk populations (eg malnourished people, people with chronic illness), along with other community-based/public health interventions (eg gastrostomy management, fruit and vegetable subsidy program); occupational therapy services involved pre and post discharge planning, management for a specific condition (eg multimorbidity, mental health disorders), stroke rehabilitation, and transdisciplinary service for people at risk of hospital presentation; psychology service focused on COPD self-management education combined with lifestyle physical activity; and exercise physiology service included structured, supervised exercise for elderly in local senior park. Several community-based settings were involved in the delivery of single disciplinary AH services, with participant's home, primary care clinic/center, and local community health center/service being the most commonly reported. Each session lasted between 15^{108,110} and 180 minutes¹¹⁶ with frequency varied from one-off⁹⁷ to six times per week^{75,88} for a duration up to six years.¹¹¹

Overall, the sample size for community-based AH services varied from 10^{56,57,70} to 21,073.⁶³ All but three papers^{67,69,103} included a cohort aged 18 years and over, with majority focused on people aged 45 years and over. Collectively, the age of the participants ranged between approximately eight¹⁰³ and 103 years.¹⁰⁸

Data Sources and Collection Methods

A variety of data sources and collection methods were used for different outcome domains across the included papers. Acute care utilization-related data were generally collected from health/medical records and registries (eg^{66,88}), administrative data (eg^{65,68}), insurance claims (eg^{76,85}), and self-report (eg^{64,71}). Satisfaction and perceived stress were broadly collected via survey with patients and their caregivers by using questionnaires that were specifically developed for the study (eg^{60,74}) or existing tools, including Consumer Quality index (CQ index),⁶⁶ Patient Satisfaction Questionnaire Short Form (PSQ-18),⁷¹ Caregiver Strain Index (CSI),⁷¹ and Caregiver Burden Scale (CBS).⁷³ Semi-structured interviews were a dominant approach to exploring experiences of patients, their caregivers, and other key stakeholders (eg^{70,83}).

Methodological Quality

The risk of bias assessments for the included papers are presented in [Tables S12–S14](#). Overall, quality scores ranged between 57% and 100%. For papers with a quantitative study design (n = 62), all but one⁹¹ clearly stated the research purpose. All papers reviewed relevant background literature and justified the need for their research. While all papers justified their sample size, eight^{58,67,72,87,91,97,107,120} did not describe their sample in detail. The psychometric properties of the outcome measures (reliability and/or validity) were not explicitly addressed in over half of the included papers. Apart from papers with an observational study design, majority described their intervention in detail; for those that included more than one study arm, less than half clearly indicated that contamination was avoided, while only two papers scored for avoidance of cointervention. Four included papers did not report results in terms of statistical significance^{60,87} or provide details regarding the analysis method(s).^{56,99} All papers reported dropouts, except those conducted retrospectively, without follow-up, or involved a secondary analysis (scored as “not applicable”). Clinical importance was discussed, and conclusions were appropriate given the methods and results across the included papers.

For papers with mixed methods study design or RCT with nested qualitative study (n = 4), all clearly addressed the research question. The criteria related to qualitative data collection, analysis, and interpretation were adequately and appropriately addressed in all four papers.^{83,86,110,119} For quantitative data, while two papers^{83,86} scored for all criteria related to RCT (in terms of randomization, baseline balance, complete outcome data, blinding, and adherence to intervention assignment), one paper¹¹⁰ only scored for the appropriate use of measurements and complete outcome data for non-RCT, and another¹¹⁹ did not provide sufficient information for assessing the risk of non-response bias for descriptive study. With regard to the overall criteria, all papers provided adequate rationale for using the mixed methods approach to address the research question, effectively integrated the qualitative and quantitative components with adequate interpretation, and addressed the divergences and inconsistencies between qualitative and quantitative data. However, owing to the weaknesses associated with the quantitative component, one paper¹¹⁰ was rated down for adherence to the quality criteria of both qualitative and quantitative components.

The qualitative study⁷⁰ clearly stated the research purpose and reviewed relevant background literature. A theoretical perspective was not identified, due to use of a phenomenological approach. All sampling criteria were met, in terms of purposeful selection process, data saturation, and informed consent. While assumptions and biases of the researcher were identified, the site, participants, role of the researcher, and relationship with participants were not explicitly described. Procedural rigor during data collection was also identified. While development of decision trail was not addressed, analytical rigor was scored, and the data analysis process was adequately described. As theoretical perspective was not identified, there were no theoretical connections merged. Credibility, dependability, and confirmability were addressed as part of overall rigor; however, there was a lack of evidence for transferability. The conclusions and implications were considered appropriate.

Findings from Multidisciplinary AH Services

Overall, 16 papers examined acute care utilizations, as well as perceptions and perspectives regarding multidisciplinary AH services. All reported one or more outcomes related to acute care utilizations, in terms of hospital admissions (n = 13), ED visits (8), LOS (5), combined utilization (1), emergency service use (1), hospital avoidance (1), and observation stays (1). Both within- and between-group comparisons were summarized under relevant outcome domain. The between-group comparisons were further described according to comparator categories, where the effect of the multidisciplinary AH service was compared with *usual care*, *other intervention* and *no intervention*. Additionally, six papers evaluated satisfaction, perceived stress and

experiences of patients and their caregivers. Furthermore, adherence rates and adverse events were reported in four papers. Table 4 and Table 5 present an overview of the outcomes across the included papers; Table S15 presents the detailed outcomes of individual papers.

Table 4 Acute Care Utilization Outcomes

| Study | Outcome Domains | | | | | | |
|---|---------------------|-----------------------|--------|----------------------|-----------------------|--------------------|-------------------|
| | Hospital Admissions | ED Visits | LOS | Combined Utilization | Emergency Service Use | Hospital Avoidance | Observation Stays |
| Multidisciplinary AH services | | | | | | | |
| Barr, 2019 ⁵⁸ | Mixed* | | | | | Mixed* | |
| Beck, 2016 ⁵⁹ | Mixed | | | | | | |
| Bernard, 2021 ⁶⁰ | | ≥75% remained at home | | | | | |
| Comino, 2015 ⁶¹ | Mixed* | | | | | | |
| Finlayson, 2018 ⁶² | ↓ | | | | | | |
| Freburger, 2018 ⁶³ | Mixed | | | | | | |
| Gitlin, 2017 ⁶⁴ | ↓* | ↓* | | | ↓* | | |
| Knott, 2013 ⁶⁵ | ↓* | ↓* | | Mixed* | | | |
| Kraal, 2017 ⁶⁶ | ↑ | ↑ | | | | | |
| Langstaff, 2014 ⁶⁷ | Mixed | | ↓ | | | | |
| Moreno, 2021 ⁶⁸ | ↓* | ↓* | | | | | |
| Naar, 2018 ⁶⁹ | ↓* | Mixed | | | | | |
| Orpen, 2010 ⁷⁰ | | | ↓ | | | | |
| Richardson, 2010 ⁷¹ | | ↔ | ↓* | | | | |
| Siddle, 2018 ⁷² | ↓* | ↑ | ↓* | | | | ↑ |
| Tistad, 2015 ⁷³ | ↓ | | Mixed* | | | | |
| Single disciplinary AH services – physiotherapy (physical therapy) | | | | | | | |
| Bean, 2019 ⁷⁴ | Mixed* | ↓* | | | | | |
| Farag, 2016 ⁷⁵ | ↑ | ↓ | ↑ | | | | |
| Fritz, 2013 ⁷⁶ | | | | ↓ | | | |
| Holland, 2017 ⁷⁸ | Mixed* | | ↔ | | | | |
| Karvelas, 2017 ⁷⁹ | | ↔ | | | | | |
| Menon, 2020 ⁸⁰ | ↔ | ↔ | ↓* | | | | |
| Mitchell, 2014 ⁸¹ | ↓ | ↓ | | | | | |
| Román, 2013 ⁸² | Mixed | | | | | | |
| Salisbury, 2013 ⁸³ | | ↔ | ↔ | | | | |
| Stevens-Lapsley, 2023 ⁸⁴ | Mixed | Mixed | | | | | |

(Continued)

Table 4 (Continued).

| Study | Outcome Domains | | | | | | |
|--|------------------------------------|-----------|-----|----------------------|-----------------------|------------------------|-------------------|
| | Hospital Admissions | ED Visits | LOS | Combined Utilization | Emergency Service Use | Hospital Avoidance | Observation Stays |
| Suikkanen, 2021 ⁸⁵ | ↓ | ↑ | ↑ | | | | |
| Taylor, 2023 ⁸⁶ | ↓ | ↑ | | | | | |
| Wilson, 2020 ⁸⁷ | 17/18 did not require an admission | | | | | | |
| Zanaboni, 2013 ⁵⁶ | ↔ | | ↓ | ↓ | | | |
| Zanaboni, 2017 ⁵⁷ | ↑ | | ↑ | | | | |
| Zanaboni, 2023 ⁸⁸ | Mixed* | Mixed* | | Mixed* | | | |
| Single disciplinary AH services – social work | | | | | | | |
| Altfeld, 2013 ⁸⁹ | ↑ | | | | | | |
| Boockvar, 2022 ⁹⁰ | Mixed | Mixed | | Mixed | | | |
| Boutwell, 2016 ⁹¹ | ↓* | | | | | | |
| Bronstein, 2015 ⁹² | ↓* | | | | | | |
| Chan, 2014 ⁹³ | ↓* | | | | | | |
| Enguidanos, 2011 ⁹⁴ | ↓* | | | | | | |
| Hengartner, 2016 ⁹⁵ | ↑ | | ↔ | | | | |
| Kogan, 2014 ⁹⁶ | ↓* | | | | | | |
| Nguyen, 2016 ⁹⁷ | Mixed* | Mixed* | | | | | |
| Rowe, 2016 ⁹⁸ | Mixed* | ↓* | | | | | |
| Watkins, 2012 ⁹⁹ | ↓ | | | | | | |
| Weerahandi, 2015 ¹⁰⁰ | ↓* | Mixed | | | | | |
| Single disciplinary AH services – nutrition and dietetics | | | | | | | |
| Berkowitz, 2018 ¹⁰¹ | ↓* | ↓* | | | ↓* | | |
| Berkowitz, 2019 ¹⁰² | ↓* | | | | | | |
| Black, 2013 ¹⁰³ | | ↓ | | | | | |
| Cho, 2023 ¹⁰⁴ | ↓* | ↓* | ↓* | | | | |
| Cramon, 2021 ¹⁰⁵ | ↑ | | | | | | |
| Gurvey, 2013 ¹⁰⁶ | ↓* | ↑* | ↓* | | | | |
| Kurien, 2012 ¹⁰⁷ | ↓* | | | | | 227 admissions avoided | |
| Lindegard Pedersen, 2017 ¹⁰⁸ | ↓* | | | | | | |
| Meena, 2023 ¹⁰⁹ | ↓* | | | | | | |
| Rocca, 2022 ¹¹⁰ | | | ↑ | Mixed | | | |

(Continued)

Table 4 (Continued).

| Study | Outcome Domains | | | | | | |
|---|---------------------|-----------|-------|----------------------|-----------------------|----------------------------------|-------------------|
| | Hospital Admissions | ED Visits | LOS | Combined Utilization | Emergency Service Use | Hospital Avoidance | Observation Stays |
| Sandhu, 2022 ¹¹¹ | | | ↔ | ↑* | | | |
| Smith, 2020 ¹¹² | ↔ | ↓* | ↓* | ↓ | | | |
| Single disciplinary AH services – occupational therapy | | | | | | | |
| Chu, 2017 ¹¹³ | ↓ | ↓ | | | | | |
| Clemson, 2016 ¹¹⁴ | ↑ | ↑ | | | | | |
| Engelbrecht, 2019 ¹¹⁵ | ↓* | | ↓* | | | | |
| Garvey, 2015 ¹¹⁶ | ↑ | | | | | | |
| Lockwood, 2019 ¹¹⁷ | ↓* | | ↓* | | | | |
| Tistad, 2018 ¹¹⁸ | | ↔ | Mixed | | | | |
| Van Dam, 2022 ¹¹⁹ | | | | | | 81% prevented imminent admission | |
| Single disciplinary AH services – psychology | | | | | | | |
| Coultas, 2016 ⁵⁴ | Mixed* | | | | | | |
| Coultas, 2018 ⁵⁵ | | | Mixed | Mixed* | | | |
| Single disciplinary AH services – exercise physiology | | | | | | | |
| Brusco, 2023 ¹²⁰ | | | ↓ | | | | |

Notes: *One or more outcomes being statistically significant; ↓ = decrease; ↑ = increase; ↔ = similar/ no (significant) difference; mixed = mixed findings.

Color codes: green, positive findings favoring community-based allied health services; amber, equivalent/mixed findings; red, positive findings favoring comparators.

Abbreviations: AH, allied health; COPD, chronic obstructive pulmonary disease; ED, emergency department; EP, exercise physiologist; LBP, low back pain; LOS, length of stay; OT, occupational therapist; PT, physiotherapist/physical therapist; SLP, speech-language pathologist.

Table 5 Perceptions and Perspectives of Patients, Caregivers and Other Stakeholders

| Study | Outcome Domains | | | |
|--------------------------------------|----------------------|------------------|---|-----------------------------------|
| | Patient Satisfaction | Perceived Stress | Experiences of Patients | Experiences of Other Stakeholders |
| Multidisciplinary AH services | | | | |
| Bernard, 2021 ⁶⁰ | ≥98% satisfaction | | | |
| Kraal, 2017 ⁶⁶ | ↑* | | | |
| Moreno, 2021 ⁶⁸ | High satisfaction | | | |
| Orpen, 2010 ⁷⁰ | | | Valued the process and outcome of the service | |
| Richardson, 2010 ⁷¹ | ↑* | ↓ | | |
| Tistad, 2015 ⁷³ | | Mixed* | | |

(Continued)

Table 5 (Continued).

| Study | Outcome Domains | | | |
|---|----------------------|------------------|---|---|
| | Patient Satisfaction | Perceived Stress | Experiences of Patients | Experiences of Other Stakeholders |
| Single disciplinary AH services – physiotherapy (physical therapy) | | | | |
| Bean, 2019 ⁷⁴ | | | 64–89% rated positively on technological aspects | |
| Hill, 2011 ⁷⁷ | ↑* | | | |
| Salisbury, 2013 ⁸³ | Mixed* | | Broadly acceptable to patients | Mixed |
| Taylor, 2023 ⁸⁶ | High satisfaction | | Valued psychosocial and physical health benefits, support and social contact from PT, and PT's personal characteristics | |
| Wilson, 2020 ⁸⁷ | | | Most valued benefits of various components, with some reported practical issues | |
| Zanaboni, 2013 ⁵⁶ | | | Positive feedback regarding physical and psychological benefits | |
| Single disciplinary AH services – social work | | | | |
| Altfeld, 2012 ⁸⁹ | | Mixed | | |
| Bronstein, 2015 ⁹² | High satisfaction | | | |
| Watkins, 2012 ⁹⁹ | High satisfaction | | | |
| Single disciplinary AH services – nutrition and dietetics | | | | |
| Rocca, 2022 ¹¹⁰ | High satisfaction | | Mixed | Discussed process related barriers and potential solutions |
| Smith, 2020 ¹¹² | ↑* | | High acceptance and perceived convenience* | |
| Single disciplinary AH services – occupational therapy | | | | |
| Van Dam, 2022 ¹¹⁹ | | | Valued both physical and psychological benefits of the service | ≥75% “agreed” or “strongly agreed” the timeliness, utility, ease of use and continuation of the service |

Notes: *One or more outcomes being statistically significant; ↑ = increase; mixed = mixed findings. **Color codes:** green, positive perceptions and perspectives towards community-based allied health services; amber, mixed findings; red, discussion of perceived issues.

Abbreviations: AH, allied health; COPD, chronic obstructive pulmonary disease; ED, emergency department; LBP, low back pain; OT, occupational therapist; PT, physiotherapist/physical therapist; SLP, speech-language pathologist.

Acute Care Utilization – Hospital Admissions

Thirteen papers investigated the effects of multidisciplinary AH services on hospital admissions. Collectively, seven papers identified positive findings favoring the AH service with five being statistically significant, five reported mixed findings, and another paper found positive finding favoring the comparator.

Seven papers measured within-group changes and reported mixed findings. Of these, four reported statistically significant positive findings following the AH service. Gitlin et al⁶⁴ assessed a dementia care program targeting caregivers and identified a significant reduction in hospitalization from baseline to three months post, regardless of the intervention intensity. Siddle et al⁷² also found a significant decrease in 90-day hospitalization from pre to post implementation of a transitional care intervention for high utilizers of acute care. These findings were supported by two other papers with a longer-term follow-up. Naar et al⁶⁹ indicated a decrease in hospitalization at one-year follow-up,

resulting from delivery of a multi-systemic therapy approach for asthma management among high-risk adolescents. Consistently, Moreno et al⁶⁸ reported a significant increase in the number of participants without a hospital admission from one year pre to one year post implementation of a social determinants program for linguistically and culturally diverse elderly with complex medical and social needs. Furthermore, Langstaff et al⁶⁷ conducted a sub-group analysis and observed that stroke survivors discharged directly home with enhanced rehabilitation experienced the lowest one-year readmission rate. However, the magnitude of this effect appeared to be influenced by the receipt of inpatient rehabilitation prior to discharge. This was evident by similar readmission rates among those who discharged home from inpatient rehabilitation with or without enhanced rehabilitation.⁶⁷ For readmitted patients, the paper further observed similar frequency of readmissions among those who received rehabilitation, regardless of the setting and intensity.⁶⁷

Two other papers^{58,61} investigated the association between AH care claims and hospital admissions and reported mixed findings. Comino et al⁶¹ found that receipt of multidisciplinary care was associated with a significant decrease in hospitalization during the following 12 months. However, further analysis of individual AH claim suggested that care from diabetes educator, PT, EP, or dietician was associated with a significant reduction in hospitalization, whereas no significant change was associated with care from podiatrist. These findings were echoed by Barr et al,⁵⁸ who discovered that participants with five or more physiotherapy claims or one to two other AH claims within 12 months had significantly fewer admissions in the subsequent five years. Additionally, the association between three to four other AH claims and declined admission was approaching significance level. No significant association was found for podiatry claims, although having three to four claims tended to be associated with increased admission.⁵⁸

Eight papers measured between-group differences and reported mixed findings. In comparison with *other intervention*, three papers collectively showed mixed findings. Naar et al⁶⁹ identified significantly fewer hospitalizations in the intervention group than in the comparison group that received non-directive supportive family counseling at one-year follow-up. Similarly, Beck et al⁵⁹ compared between a multidisciplinary nutrition support and nutrition coordinators plus standard AH services for elderly with undernutrition and reported fewer admissions in the intervention group immediately upon completion, albeit the difference was not significant. This finding appeared to be driven by the home care subgroup, in which there was an almost significant between-group difference. In contrast, Kraal et al⁶⁶ assessed the effect of a telemonitoring guided home-based cardiac rehabilitation, compared with outpatient clinic-based mode, and found that more participants in the intervention group had hospital admissions during the one-year follow-up period.

When compared with *usual care*, all three papers reported positive findings in favor of the AH service with one being statistically significant. Finlayson et al⁶² investigated the effect of a transitional care intervention for elderly at high risk of hospital readmission. While the paper found fewer unplanned hospital readmissions in the intervention group in 28 days, 12 weeks and 24 weeks following the index admission, there were no significant between-group differences. After adjusting for all variables, participants who received the intervention were also less likely to be readmitted at both 28 days and 12 weeks, albeit statistical significance was not achieved. Both Moreno et al⁶⁸ and Tistad and von Koch⁷³ reported positive findings at one-year follow-up. In particular, Tistad and von Koch⁷³ found that fewer participants who received early supported discharge with continued rehabilitation at home after stroke had recurrent hospitalizations. Moreno et al⁶⁸ indicated a significantly lower relative risk of hospitalization among elderly who received the intervention.

In comparison with *no intervention*, another two papers reported mixed findings. Freburger et al⁶³ showed no significant difference in 30-day hospital readmission between elderly stroke survivors who received home-based occupational therapy and/or physiotherapy and those who did not use home-based therapy, in the first 30 days following discharge, despite a slightly higher risk for the intervention relative to the comparator. The paper further suggested that more and earlier therapist visits were associated with a lower risk of hospital readmission, albeit not significant.⁶³ Knott⁶⁵ also evaluated home-based occupational therapy and/or physiotherapy targeting recently discharged elderly; conversely, they found significantly longer time to a hospital admission in the intervention group.

Acute Care Utilization – ED Visits

Eight papers investigated the effects of multidisciplinary AH services on ED visits. Collectively, four papers indicated positive findings favoring the AH service with three being statistically significant, two reported positive findings favoring the comparator, one found no difference, and another suggested mixed findings.

Five papers measured within-group changes and reported mixed findings. Bernard et al⁶⁰ evaluated an alternative care pathway to ED conveyance for elderly patients requiring low-acuity emergency medical services. They found no ED re-presentation within 24 hours following the initial visit, and 90% and 75% of the participants did not re-present to the ED within seven and 30 days, respectively. Gitlin et al⁶⁴ also indicated a significant reduction in ED visits from baseline to three months post, regardless of the intervention intensity. Consistently, while Naar et al⁶⁹ noticed a small decrease in ED visits at one-year follow-up, Moreno et al⁶⁸ also reported a significant increase in the number of participants without an ED visit from one-year pre to one-year post intervention. In contrast, Siddle et al⁷² discovered a pre-post increase for 90-day ED visit, albeit not significant.

Five papers measured between-group differences and reported mixed findings. When compared with *usual care*, two papers collectively showed mixed findings. While Moreno et al⁶⁸ indicated a significantly lower risk of ED visits in the intervention group, Richardson et al⁷¹ found no significant between-group difference after implementation of a multi-component rehabilitation for chronic diseases.

In comparison with *other intervention* (non-directive supportive family counseling or outpatient clinic-based cardiac rehabilitation), two papers collectively showed mixed findings. While Naar et al⁶⁹ found a small decrease in ED visits in the intervention group, a similar decline was found in the comparison group, leading to non-significant between-group difference at one-year follow-up. Conversely, Kraal et al⁶⁶ reported fewer participants in the comparison group experienced ED admissions during one-year follow-up.

Furthermore, Knott⁶⁵ compared time-to-event between home-based occupational therapy and/or physiotherapy and no intervention and reported a significantly longer time to an ED visit in the intervention group.

Acute Care Utilization – LOS

Five papers investigated the effects of multidisciplinary AH services on LOS. Collectively, four papers indicated positive findings favoring the AH service with two being statistically significant, and another reported mixed findings.

Three papers measured within-group changes and indicated positive findings, with one being statistically significant. Orpen and Harris⁷⁰ explored participants' perceptions of preoperative home-based occupational therapy and/or physiotherapy prior to total hip replacement surgery, with three participants believed the intervention positively impacted on their shorter LOS postoperatively. Siddle et al⁷² reported a significant reduction in both overall hospital and Intensive Care Unit LOS from 90 days pre to 90 days post the intervention. Additionally, Langstaff et al⁶⁷ found a decrease in LOS within two years for the subgroup that received inpatient rehabilitation.

Two papers measured between-group differences by comparing the AH service with *usual care* and reported mixed findings. While Richardson et al⁷¹ discovered significantly fewer planned hospital days in the intervention group during 15-month follow-up, Tistad and von Koch⁷³ only found a significantly shorter LOS in the intervention group for the initial three months of care. The authors further reported a lack of significant between-group difference after totaling all inpatient healthcare during the 12-month period, albeit the intervention group appeared to have a shorter LOS.⁷³

Acute Care Utilization – Combined Utilization

Knott⁶⁵ compared home-based occupational therapy and/or physiotherapy with no intervention and found that fewer participants who received the intervention experienced a hospital encounter (ie a visit to the ED or an inpatient admission), albeit no significant between-group difference. Furthermore, associations between therapy characteristics and hospital encounters were investigated, from which significant associations between occupational therapy and recurrence of a hospital encounter, as well as longer waiting time (in terms of admission to referral and first rehabilitation visit) and hospital encounter were identified. Despite physiotherapy was associated with fewer hospital encounters, it did not achieve statistical significance. Likewise, the number of OT or PT visits was substantially similar between participants with a hospital encounter and those without, with no significant differences.⁶⁵

Acute Care Utilization – Emergency Service Use

Gitlin et al⁶⁴ assessed the impact of the dementia care program targeting caregivers on calls to emergency medical services and reported a significant reduction at three months post, compared with baseline, regardless of the intervention intensity.

Acute Care Utilization – Hospital Avoidance

Barr et al⁵⁸ examined the association between potentially preventable hospitalizations (PPHs) and AH care claims for NCDs. While this paper identified fewer PPHs over five years for those who claimed for physiotherapy or three to four times of other AH services within 12 months, and more PPHs for those who had one to four claims of podiatry service, a significant association was merely found between five or more physiotherapy claims within 12 months and declined PPHs in the subsequent five years.⁵⁸

Acute Care Utilization – Observation Stays

Siddle et al⁷² evaluated the effect of the transitional care intervention for high acute care utilizers and reported an increase in observation stays from 90 days pre to 90 days post the intervention, albeit not significant.

Patient Satisfaction

Four papers further investigated patient and carer satisfaction. Collectively, patients and their caregivers reported high level of satisfaction with multidisciplinary AH services. Bernard et al⁶⁰ and Moreno et al⁶⁸ showed high satisfaction with alternative care pathway to ED and home-based social determinants program, respectively, in terms of the process and outcome of the service, quality of care, and communication/attitude/manner of the team. Similarly, Richardson et al⁷¹ reported significantly greater general satisfaction as well as satisfaction in technical quality, interpersonal manner, communication, financial aspects, time spent, and accessibility of a multi-component rehabilitation intervention for chronic diseases, when compared with usual care. Kraal et al⁶⁶ also reported significantly higher satisfaction among participants undergoing home-based cardiac rehabilitation with telemonitoring guidance, compared with those that participated in outpatient clinic-based rehabilitation.

Caregivers Perceived Stress

Two papers measured between-group differences in perceived stress by caregivers. Collectively, both showed lower levels of strain and burden perceived by caregivers following rehabilitation interventions compared with usual care. While Richardson et al⁷¹ highlighted the finding was inadequately powered to assess any significant difference, Tistad and von Koch⁷³ found significantly lower general strain, isolation, disappointment, emotional involvement, and total scores at 12 but not three months.

Experiences of Participants

Orpen and Harris⁷⁰ explored participants' experiences with preoperative home-based occupational therapy and/or physiotherapy prior to total hip replacement. Participants described the benefits of the service, in terms of early access to and use of equipment

... because my condition was deteriorating, the aids that she gave me at that stage made all the difference between just existing and actually being able to do a bit of living,⁷⁰

timely visits from the therapists (“I am glad mine was when it was because remembered [what I was told]”⁷⁰), and reassurance regarding the surgery and returning home

I was confident about coming out of hospital because I had actually walked through in my mind at the home visit, those issues of cleanliness, going to the toilet, getting up and downstairs, which bed to sleep in, which chair to sit in, issues that had not been in my mind at all before the visit and would not have come to my mind until 3 days after the op.⁷⁰

The home-based feature was also valued by participants, as it facilitated therapists' ability to provide more tailored advice, enabled participants to interpret information more accurately, and allowed participants to visualize management strategies in their home environment following the surgery. For example, one participant stated, “They would not have realized the problems of this flat [if they had not visited me at home] [...]”⁷⁰ Another added,

Yes, it's difficult for you as a patient to translate anything that's said [in hospital] into your home environment. Well it is for me anyway. I wouldn't be able to imagine everything that I would need at home while I was sitting in hospital with somebody just talking about it.⁷⁰

The participants further emphasized the importance of social support during the pre and post operative periods, suggesting potential benefits of social support from the therapists, especially for people with limited support networks.⁷⁰

Adherence Rates and Adverse Events

Adherence rates for multidisciplinary AH services ranged between 69% and 100%.^{59,64,66} Three papers reported no adverse events related to the AH service.^{59,66,69} Furthermore, Gitlin et al⁶⁴ reported a significant decline in falls from baseline to three months post, as part of adverse health-related events.

Findings from Single Disciplinary AH Services – Physiotherapy

Overall, 17 papers investigated acute care utilizations, as well as stakeholders' perceptions and perspectives regarding physiotherapy services. Of these, 16 reported one or more outcomes related to acute care utilizations, in terms of hospital admissions (n = 13), ED visits (10), LOS (7), and combined utilization (3). Both within- and between-group comparisons were summarized under relevant outcome domains. The between-group comparisons were further described according to comparator categories, where the effect of the physiotherapy service was compared with *usual care*, *other intervention* and *no intervention*. Six papers also explored satisfaction and experiences of patients and other relevant stakeholders. Furthermore, adherence rates and adverse events were reported in 11 papers (Tables 4, 5 and S15).

Acute Care Utilization – Hospital Admissions

Thirteen papers investigated the effects of physiotherapy services on hospital admissions. Collectively, five papers reported mixed findings, four indicated positive findings favoring the AH service, two suggested positive findings favoring the comparator, and another two found no difference.

Four papers measured within-group changes and reported mixed findings. Wilson et al⁸⁷ evaluated a prevention-focused home care physiotherapy for elderly at risk of homebound or fall and found all but one participant did not require a hospitalization upon completion of the program. Similarly, Román et al⁸² showed reduced COPD exacerbation hospitalizations from baseline to 12 months after among participants who received group-based pulmonary rehabilitation, regardless of further maintenance. Two other papers presented conflicting findings from a home-based telerehabilitation service targeting COPD patients. In particular, while hospital admissions remained unchanged from six months before to six months after enrolment,⁵⁶ there was an increase in COPD-related hospitalizations from two years pre to two years post.⁵⁷

Ten papers investigated between-group differences and reported mixed findings. In comparison with *usual care*, seven papers collectively showed mixed findings. Taylor et al⁸⁶ found fewer elderly who received a community-based moderate-intensity walking program after hip fracture were admitted during the 12-week implementation period, with non-significant between-group difference. Consistently, Mitchell et al⁸¹ assessed a home-based self-managed intervention for COPD and reported fewer respiratory and all-cause admissions in the intervention group at six-month follow-up, albeit not significant. Suikkanen et al⁸⁵ also noted that more pre-frail and frail elderly who received a home-based physical exercise remained at home without temporary inpatient care over the 24-month study period. These findings were further supported by Zanaboni et al,⁸⁸ who suggested a significantly lower incidence rate in the intervention group that received a home-based telerehabilitation for COPD over two years. However, there was no significant between-group difference in time-to-first event.⁸⁸ On the other hand, Menon et al⁸⁰ investigated the effect of a home-based peri-operative physiotherapy after total joint arthroplasty and indicated similar 90-day readmission rates between the two groups. The authors further showed a lack of significant association between the intervention and readmission, after adjusting for confounding factors.⁸⁰ This finding was echoed by Román et al,⁸² who also suggested similar hospitalizations at 12 months, regardless of further maintenance. In contrast, Farag et al⁷⁵ found more readmissions among recently discharged elderly who received home-based weight-bearing exercise during the 12-month study period, with no significant between-group difference.

When compared with *other intervention*, three papers collectively showed mixed findings. Holland et al⁷⁸ compared home-based with center-based rehabilitation for COPD and reported that while fewer participants in the intervention group were admitted for all or respiratory cause, the number of admissions for both causes was similar between the two

groups. Nevertheless, between-group differences were not significant. Further analysis in this paper suggested a significantly longer time to hospital admission for those who completed rehabilitation, regardless of the group allocation. Zanaboni et al⁸⁸ compared the intervention with unsupervised home-based training and suggested no significant between-group difference in time-to-first event for two years. Furthermore, Stevens-Lapsley et al⁸⁴ measured the impact of high-intensity versus standardized physiotherapy on veterans with multimorbidity and hospital-associated deconditioning and found a fluctuating pattern across 30, 60, 90 and 180 days with no significant between-group differences.

Bean et al⁷⁴ compared tele-physiotherapy with *no intervention* (matched control) for community-dwelling elderly at risk of mobility decline. Despite significantly fewer hospitalizations in the intervention group at 12 months, changes in hospitalization rates over time did not reach statistical significance, relative to the comparator.⁷⁴

Acute Care Utilization – ED Visits

Ten papers investigated the effects of physiotherapy services on ED visits. Collectively, all papers measured between-group differences; three papers indicated positive findings favoring the AH service with one being statistically significant, three found no difference, two suggested mixed findings, and another two papers reported positive findings favoring the comparator.

When compared with *usual care*, seven papers collectively showed mixed findings. Mitchell et al⁸¹ reported fewer respiratory ED visits in the intervention group at six-month follow-up, albeit not significant. Farag et al⁷⁵ also found fewer ED presentations at 12 months among participants who received the intervention, with no significant between-group difference. While Zanaboni et al⁸⁸ indicated a significantly lower incidence rate in the intervention group over two years, no significant between-group difference was identified for time-to-first event. Furthermore, Salisbury et al⁸³ evaluated a telephone assessment and advice service and noticed similar ED visits between the two groups at six-month follow-up. This was supported by Menon et al,⁸⁰ who identified a similar proportion of participants with ED visits between the two groups. They further noted no association between the intervention and ED visits, after controlling for confounding factors.⁸⁰ By contrast, Taylor et al⁸⁶ noticed more participants in the intervention group experienced ED presentations during 12-week follow-up. Consistently, Suikkanen et al⁸⁵ indicated more ED visits in the intervention group at 12 and 24 months. However, both papers showed non-significant between-group differences.

Compared with *other intervention* (standardized physiotherapy or unsupervised home-based training), Stevens-Lapsley et al⁸⁴ and Zanaboni et al⁸⁸ collectively reported mixed findings. The former paper reported a fluctuating pattern across 30, 60, 90 and 180 days with no significant between-group differences.⁸⁴ The latter paper found no significant between-group difference in time-to-first event.⁸⁸

Two other papers compared physiotherapy services with *no intervention* and reported mixed findings. Bean et al⁷⁴ identified significantly fewer ED visits in the intervention group at 12 months, as well as a significant decrease in ED visits over time, relative to their matched control. On the other hand, Karvelas et al⁷⁹ evaluated early use of physiotherapy for a new episode of acute LBP in elderly and found substantially similar ED visits between the two groups at 12 months, with no significant between-group difference after adjustment for confounding factors.

Acute Care Utilization – LOS

Seven papers examined the effects of physiotherapy services on LOS. Collectively, three papers reported positive findings favoring the comparator, two indicated positive findings favoring the AH service with one being statistically significant, and another two found no difference.

Two papers assessing the same intervention measured within-group changes and reported conflicting findings. At six months, there was a decrease in LOS from pre to post;⁵⁶ whereas at two years, LOS increased slightly from pre to post.⁵⁷

Five papers investigated between-group differences and reported mixed findings. In comparison with *usual care*, four papers collectively showed mixed findings. Both Farag et al⁷⁵ and Suikkanen et al⁸⁵ suggested a longer LOS in the intervention group at 12 months, with the latter paper further indicated constant finding at 24 months; however, no significant between-group differences were identified. In contrast, Menon et al⁸⁰ reported a significantly shorter LOS among participants enrolled in the service during the 15-month study period. The service was further found to be significantly associated with a shorter LOS, after adjusting for confounding factors.⁸⁰ Furthermore, Salisbury et al⁸³

discovered equivalent inpatient stays between the two groups at six-month follow-up. Consistently, Holland et al⁷⁸ found substantially similar total and respiratory hospital days at 12-month follow-up, when compared with *other intervention* (center-based rehabilitation).

Acute Care Utilization – Combined Utilization

Three papers investigated the effects of physiotherapy services on combined utilization (hospital visits, emergency care use, or combined hospitalizations and ED visits). Collectively, two papers reported positive findings favoring the AH service and another paper indicated mixed findings.

One paper⁵⁶ measured within-group change and reported a decrease in hospital visits from six months pre to six months post enrolment of the service. Another two papers examined between-group changes and reported mixed findings. Fritz et al⁷⁶ found less emergency care use (including ED visit or ambulance service use) within one year following the index primary care visit among participants who used physiotherapy as initial management for LBP, compared with those who did not use physiotherapy [*no intervention*]. While early use of physiotherapy was associated with a lower risk of emergency care use, it did not achieve statistical significance.⁷⁶ Zanaboni et al⁸⁸ also discovered less combined utilization, in terms of hospitalizations and ED visits, in the intervention group than *usual care*, with the incidence rate being significantly lower in the intervention group. However, there were no significant between-group differences in time-to-first event, when compared with unsupervised home-based training [*other intervention*] and *usual care*.⁸⁸

Patient Satisfaction

Three papers further investigated patient satisfaction. Collectively, two papers reported positive findings favoring the AH service, while another discussed mixed findings. Taylor et al⁸⁶ discovered high satisfaction among participants from the intervention group (“I would recommend the program to anybody, and I think it should be compulsory”⁸⁶). Consistently, Hill et al⁷⁷ compared a stratified approach with current best practice [*usual care*] for LBP management and found that patients in the intervention group were significantly more likely to be satisfied with care than those in the comparison group. On the other hand, Salisbury et al⁸³ showed significantly greater overall satisfaction and satisfaction with consultation quality for usual care. While there was no significant between-group difference in satisfaction with service access, free-text comments on waiting time indicated more positive comments from the intervention group.

Experiences of Patients and Other Stakeholders

A total of five papers explored the experiences of patients and other relevant stakeholders. Collectively, the patients broadly valued the benefits of physiotherapy services, whereas other stakeholders shared mixed perspectives. Participants from Zanaboni et al⁵⁶ appreciated the benefits of the telerehabilitation service, as highlighted in the following example quote:

It meant a lot. I got in good physical shape, and improved psychologically as well. It also helped me in coping. [...] I look better, and I have received good comments. I have only positive things to say about the training.⁵⁶

Participants from Taylor et al⁸⁶ resonated with the physical and psychosocial benefits of the walking program that focused on hip fracture recovery, including being “almost back to normal”, “feeling a lot more energised” and restoration of confidence. They also valued the support and social contact from the PT and praised their personal characteristics.⁸⁶ While Wilson et al⁸⁷ identified that almost all participants “agreed” or “strongly agreed” with the benefits of the fall prevention exercise component, with some further specified health benefits since participation (eg improved sleep quality, balance, and range of motion), a small proportion reported various physical and environmental difficulties in completing the exercise. Additionally, fewer participants agreed with the benefits of the home modification and nutrition education components of this service. Furthermore, technological aspects of the service were evaluated, with majority “agreed” or “strongly agreed” with the benefits of the devices, albeit some reported issues in wearing and using them. Similarly, Bean et al⁷⁴ found that majority of the participants from the tele-physiotherapy intervention rated positively regarding their experiences across technological domains.

Salisbury et al⁸³ explored the experiences and perceptions of both patients and other key stakeholders, including PTs, managers, general practitioners (GPs), and commissioners regarding the telephone assessment and advice service for the

management of musculoskeletal problems. Overall, the service was broadly acceptable to patients, PTs and their managers; whereas GPs and commissioners appeared to hold ambivalent perceptions and considered the service as acceptable, provided it was acceptable to patients and reduced waiting times. In particular, patients valued easy and timely access to the service and viewed the service as helpful. However, they felt that the acceptable features of the service were traded off against some less acceptable features

Not having somebody there seeing how far you can bend it or move it in a certain direction just takes a little bit of the personal side out of it. But, you know, on the flip side, it takes a lot of the time waiting to be able to see a physiotherapist.⁸³

While PTs and their managers perceived that safe and accurate diagnoses could be made over the phone and considered the service as an effective medium for self-management advice, they shared several concerns regarding delivery and service implementation. Examples included lack of individualized advice

[...] I think we should have the scope to treat people differently, according to their individual, not just [...] their clinical needs but also their mental needs and the whole attitude of the patients, they will all be slightly different. I just feel that we're, kind of, being squeezed into boxes and you are got to fit into the box where you are not going to get anywhere,⁸³

potential negative impacts on clinician–patient relationship and continuity of care

It's just nice, you can build up a really nice rapport with patients and I like that, whereas, you would not necessarily get that over the phone because perhaps it would be more of a one-off, or, you would not necessarily be the person taking the call off the same patient, if they phoned back [...],⁸³

difficulty in accurately predicting patient volume

[...] we would have to look it quite differently as to how we rolled it out because [...] if patients aren't going to use it we can't afford to have a physio in every hospital, sitting waiting for phone calls. Because that would be half my workforce [...] it just wouldn't be feasible [...],⁸³

and PT's reluctance to spend much of their time working in this approach.

On the other hand, GPs generally felt ambivalent about the service due to little feedback received from patients, its limited impact on their practices, and lack of understanding about the service

Well we got the feedback, but I didn't even bother reading the pieces of paper [...] as long as they were dealt with, I didn't really care [laughs], and so I knew it was happening, but I didn't really know what was happening, I didn't know how it worked or how well it was going.⁸³

However, they expressed concerns about reduced face-to-face contact and “hands-on” treatment that both they and (they supposed) their patients would expect from PTs

[...] I think that would be my concern, is getting the proportion of phone time as opposed to seeing the patients. Cause there is only so much you can do on the phone. And if the purpose of the GP referring the patient is to get them treated, you know, to actually have hands-on treatment for the injury.⁸³

From the commissioner's perspective, physiotherapy services were generally not perceived as high priority on their agendas, except issues associated with quality indicators, such as long waiting times

So unless somebody says, we haven't got enough physiotherapy, there's a problem with physiotherapy, our patients are complaining about physiotherapy, physiotherapy might not get looked at, because we can't look at everything, we have to align our health needs with our priorities and if it's ticking along, nobody's complaining about it.⁸³

However, they perceived that the service would be cheaper than in-person care but were concerned about the cost-effectiveness of using experienced PTs to deliver such service.⁸³

As a result of perceived benefits and positive experiences, participants either continued the intervention upon completion or indicated their preference in receiving the service in the future,^{74,86} with one paper⁸³ suggested a

significant increase in preference at six-month follow-up. However, some indicated their inability or unwillingness to pay for the intervention.⁸⁷

Adherence Rates and Adverse Events

Ten papers reported participants' adherence to physiotherapy services over the course of the study, with rates ranging between 61% and 100%.^{56,57,74,75,77,78,83–86} Some further indicated changes during the study or between-group. Taylor et al⁸⁶ showed a gradual increase in the duration of supervised sessions during the study. This finding was supported by another paper, in which Bean et al⁷⁴ observed greater rates of “good adherence” or “excellent adherence” among participants when active PT contact was in place. Another four papers suggested similar or lower adherence rates in the comparison group.^{77,78,83,84} Both Holland et al⁷⁸ and Salisbury et al⁸³ further indicated a significant association between the AH service and decreased non-adherence rate.

While four papers reported no adverse events,^{78,83,86,88} exercise-related mild transient muscle soreness, mild joint pain, falls (including those required medical attention), and deaths (unspecified causes) were identified in two papers.^{84,85} Stevens-Lapsley et al⁸⁴ further indicated no significant between-group differences in all falls and deaths, despite fewer participants in the intervention group experienced these events.

Findings from Single Disciplinary AH Services – Social Work

Overall, 12 papers investigated acute care utilizations, as well as stakeholders' perceptions and perspectives regarding social work services. All reported one or more outcomes related to acute care utilizations, in terms of hospital admissions (n = 12), ED visits (4), LOS (1), and combined utilization (1). Both within- and between-group comparisons were summarized under relevant outcome domains. The between-group comparisons were further described according to comparator categories, where the effect of the social work service was compared with *usual care*, *no intervention* and *other intervention*. Three papers also examined patient satisfaction and stress perceived by patients and their caregivers. Furthermore, adherence rates were reported in one paper (Tables 4, 5 and S15).

Acute Care Utilization – Hospital Admissions

Twelve papers investigated the effects of social work services on hospital admissions. Collectively, seven papers indicated positive findings favoring the AH service with six being statistically significant, three found mixed findings and another two reported positive findings favoring the comparator.

Six papers measured within-group changes and reported mixed findings. Weerahandi et al¹⁰⁰ assessed the impact of a psychosocial transitional care program for high hospital service utilizers and found a reduction in 30-day readmission rate from pre to post, albeit not significant. Both Chan and Wong⁹³ and Enguidanos et al⁹⁴ also suggested that community-based social worker visit was a significant factor associated with less likelihood of admission. These findings were echoed by another two papers. Kogan⁹⁶ found a strong but non-significant trend for association between all-cause 30-day readmission and opting out of a care transitions intervention. The multivariate analysis further indicated a significant finding and showed that at-risk elderly who opted out of the intervention were six times more likely to be readmitted. Boockvar et al⁹⁰ found that while older veterans who completed or partially completed a care transitions intervention combined with health information exchange notifications were less likely to experience 90-day (re)admissions, compared with those who did not complete the intervention, the difference remained non-significant. Furthermore, Nguyen et al⁹⁷ reported changes during six months post implementation of a transitions of care intervention for recently discharged patients. Specifically, they discovered a declining trend for 30-day readmissions, with further analysis showed that receiving contact from the social worker within 48 hours of discharge was significantly inversely correlated with 30-day readmission. Additionally, there were fewer readmissions among participants who were contacted within 48 hours, compared with those who were not contacted; however, the difference was not significant.⁹⁷

Nine papers investigated between-group differences and reported mixed findings. When compared with *usual care*, five papers collectively showed mixed findings. Both Altfeld et al⁸⁹ and Hengartner et al⁹⁵ found more readmissions among participants who received a telephone-based transitional care intervention or a psychosocial post-discharge intervention, respectively; however, the between-group differences were not significant. On the other hand, Kogan⁹⁶

discovered that neither the study group assignment nor the intervention intensity significantly predicted 30-day readmission, despite fewer readmissions occurred in the intervention group and among those who had more contacts with the social worker. Conversely, Bronstein et al⁹² suggested that a care coordination intervention for people at risk of readmission significantly improved the likelihood of not being readmitted within 30 days by 22%. Consistently, Weerahandi et al¹⁰⁰ reported significantly lower rates of readmissions at 30, 60 and 90 days in the intervention group; however, albeit a lower rate at 180 days, there was no significant between-group difference.

In comparison with *no intervention*, four papers collectively showed mixed findings. Boutwell et al⁹¹ reported significantly lower all-cause 30-day readmission rates among at-risk participants who received a social work-based model of transitional care, regardless of the receipt of home health care. When further compared with the state-wide cohort discharged with home health care, the intervention group also had a significantly lower readmission rate.⁹¹ Consistently, Watkins et al⁹⁹ found a 61% reduction in hospital readmissions among frail elderly who received a hospital-to-home transition program, compared with the county's readmission rate. While Rowe et al⁹⁸ agreed that elderly with unmet non-medical needs experienced fewer 30-day readmissions after received a care coordination intervention, compared with the wider local hospital and regional populations, conflicting findings were identified regarding six-month hospital admissions. In particular, the cohort had significantly fewer admissions than the wider local hospital cohort, but significantly higher admissions than the national population.⁹⁸ Similarly, Nguyen et al⁹⁷ also reported a significant increase in 30-day readmission rate, compared with that in the pre-implementation cohort.

Boockvar et al⁹⁰ further compared the AH service with *other intervention* (health information exchange notifications alone with usual care) and indicated more 90-day (re)admissions in the intervention group with non-significant difference.

Acute Care Utilization – ED Visits

Four papers investigated the effects of social work services on ED visits. Collectively, three papers found mixed findings and one reported significant positive finding favoring the AH service.

Three papers examined within-group changes and reported mixed findings. Boockvar et al⁹⁰ found that while participants who completed or partially completed the intervention were more likely to experience 90-day ED visits than those who did not complete the intervention, the difference was not significant. Similarly, Nguyen et al⁹⁷ also reported a greater proportion of participants who were contacted by the social worker within 48 hours had ED visits, compared with those who were not contacted; however, the difference was non-significant.⁹⁷ There was a declining trend for ED visits during the six-month post implementation period, with further analysis showed an inverse correlation between contact with the social worker and ED visit.⁹⁷ Furthermore, Weerahandi et al¹⁰⁰ identified decreases in 30- and 180-day ED visits from pre to post, albeit not significant.

Four papers measured between-group differences and identified mixed findings. In comparison with *no intervention*, while Rowe et al⁹⁸ reported significantly fewer ED visits, Nguyen et al⁹⁷ indicated a significant increase in ED visits. On the other hand, Weerahandi et al¹⁰⁰ discovered similar between-group rates at 30 and 180 days post, when compared with *usual care*. Furthermore, Boockvar et al⁹⁰ suggested fewer 90-day ED visits in the intervention group than *other intervention* with no significant between-group difference.

Acute Care Utilization – LOS

Hengartner et al⁹⁵ compared the psychosocial post-discharge intervention targeting mental health disorders with usual care and found similar LOS between the two groups at 12-month follow-up with no significant difference.

Acute Care Utilization – Combined Utilization

Boockvar et al⁹⁰ investigated both within- and between-group changes in the care transitions intervention combined with health information exchange notifications for older veterans. Findings from this paper indicated that participants who completed or partially completed the intervention experienced fewer 90-day hospital (re)admissions or ED visits, compared with those who did not complete the intervention, with non-significant difference. Furthermore, there was no difference in combined utilization between the intervention and comparison [*other intervention*] groups.⁹⁰

Patient Satisfaction

Two papers further investigated patient satisfaction. Overall, most patients and their family reported high level of satisfaction with the social work services. Bronstein et al⁹² found 85% of participants were highly satisfied and 12% were satisfied with the service deliverer, with positive comments about them (“He made me feel that quality help was available if I needed more support”⁹²). This was supported by the findings from Watkins et al,⁹⁹ who reported that 97–100% of patients/family were satisfied with the program, the social worker, in-home assistance and community services. However, mixed written comments were provided by participants. For example, one participant highlighted, “The services provided were a lifesaver. The people have been impressive. I am certain my surgery went well because of this program”,⁹⁹ while another mentioned, “The program could have lasted longer”.⁹⁹

Patients and Caregivers Perceived Stress

Altfeld et al⁸⁹ compared between-group difference in perceived stress by patients and their caregivers. In comparison with those who received usual care, there were fewer patients in the intervention group perceived stress, albeit no significant between-group difference. On the other hand, the proportion of caregivers who perceived stress was the same between the two groups.⁸⁹

Adherence Rates

Boockvar et al⁹⁰ further reported the intervention completion rate, with 75% of the interventions rated as “complete” or “partially complete”, and 25% were considered as “incomplete”.

Findings from Single Disciplinary AH Services – Nutrition and Dietetics

Overall, 12 papers investigated acute care utilizations, as well as stakeholders’ perceptions and perspectives regarding nutrition and dietetics services. All reported one or more outcomes related to acute care utilizations, in terms of hospital admissions (n = 9), ED visits (5), LOS (5), combined utilization (3), emergency service use (1), and hospital avoidance (1). Both within- and between-group comparisons were summarized under relevant outcome domains. The between-group comparisons were further described according to comparator categories, where the effect of the nutrition and dietetics service was compared with *no* intervention, *usual care* and *other intervention*. Two papers also explored satisfaction and experiences of patients and staff. Furthermore, adherence rates and adverse events were reported in five papers (Tables 4, 5 and S15).

Acute Care Utilization – Hospital Admissions

Nine papers investigated the effects of nutrition and dietetics services on hospital admissions. Collectively, seven papers indicated significant positive findings in favor of the AH service, one found positive finding favoring the comparator, and another reported no difference.

Two papers measured within-group changes and reported positive findings favoring the AH service. Cho et al¹⁰⁴ reported a significant decrease in hospitalizations among homebound elderly at risk of pre-diabetes, diabetes or malnutrition from six months before to six months after receiving a Meals on Wheels nutritional counseling program. Kurien et al¹⁰⁷ assessed the impact of community-based gastrostomy management and found that only 2% of hospital admissions over the one-year study period were gastrostomy-related admissions.

Eight papers investigated between-group differences and reported mixed findings. In comparison with *no intervention*, all four papers showed significant positive findings in favor of the AH service. Gurvey et al¹⁰⁶ reported significantly fewer inpatient visits during 12-month follow-up among chronically ill and nutritionally at-risk individuals who received a meal delivery service combined with medical nutrition therapy. Consistently, Kurien et al¹⁰⁷ indicated a significantly greater reduction in gastrostomy-related admissions during one-year follow-up. These findings were further supported by two other papers, which evaluated the same medically tailored meals program that targeted dually eligible Medicare and Medicaid beneficiaries at nutritional risk¹⁰¹ or a wider cohort of medically and socially complex adults.¹⁰² Both found the service was significantly associated with fewer inpatient admissions during two-year follow-up.^{101,102}

When compared with *usual care*, three papers collectively showed mixed findings. Cramon et al¹⁰⁵ assessed the effect of an individualized nutritional intervention for elderly at risk of readmission and found higher 30- and 60-day

readmission rates in the intervention group, with non-significant between-group differences. Lindegaard Pedersen et al¹⁰⁸ investigated the impact of a nutritional follow-up care via home visits or telephone contacts for malnourished or at-risk elderly on 30- and 90-day hospital readmissions by performing both intention-to-treat (ITT) and per-protocol (PP) analyses. While the ITT analysis showed lower risks of readmissions for both subgroups, only the home visit cohort was statistically significant; whereas the PP analysis identified significantly lower risks for both subgroups.¹⁰⁸ These positive findings were echoed by Meena et al,¹⁰⁹ who evaluated a home-based intensive nutrition therapy for decompensated cirrhosis and found that significantly fewer participants in the intervention group required hospitalizations during the six-month study period.¹⁰⁹

The AH service was also compared with *other intervention* (dietary advice alone) in one paper with mixed findings. Smith et al¹¹² compared the difference between dietary advice combined with ready-made oral nutritional supplements (ONS) and dietary advice alone for people at risk of malnutrition over the 12-week implementation period. Both ITT and PP analyses suggested substantially similar elective admissions between the two groups, with no significant differences.¹¹²

Acute Care Utilization – ED Visits

Five papers investigated the effects of nutrition and dietetics services on ED visits. Collectively, four papers reported positive findings favoring the AH service with three being statistically significant, and another found significant positive finding favoring the comparator.

Two papers measured within-group changes and indicated positive findings favoring the AH service. Cho et al¹⁰⁴ reported a significant decrease in ED visits after receiving the AH service. Similarly, Black et al¹⁰³ found a non-significant decrease in ED attendances among Aboriginal children from 12 months before to 12 months after participating in a fruit and vegetable subsidy program, after adjusting for confounding factors.

Three papers investigated between-group differences and reported mixed findings. When compared with *no intervention*, two papers showed conflicting findings. While Berkowitz et al¹⁰¹ reported a significant association between the AH service and fewer ED visits, Gurvey et al¹⁰⁶ found significantly more ED visits among participants who received the AH service. In comparison with *other intervention*, Smith et al¹¹² discovered fewer emergency admissions among participants in the intervention group, with PP analysis showed significant between-group difference.

Acute Care Utilization – LOS

Five papers investigated the effects of nutrition and dietetics services on LOS. Collectively, three papers indicated significant positive findings favoring the AH service, one reported positive finding favoring the comparator, and another found no difference.

Cho et al¹⁰⁴ measured within-group change and reported a significant reduction in LOS resulting from the program participation. The other four papers examined between-group differences and reported mixed findings. When compared with *no intervention*, Rocca¹¹⁰ evaluated a dietician-led transitions of care intervention for malnourished patients and discovered that the intervention group experienced a longer LOS during unplanned readmissions, regardless of the completion status. In contrast, Gurvey et al¹⁰⁶ found significantly shorter LOS associated with the AH service during 12-month follow-up. Additionally, Sandhu et al¹¹¹ reported no significant between-group difference over six-year follow-up of community registered dietician support for home enteral nutrition users. Furthermore, Smith et al¹¹² indicated a shorter LOS among participants who received the intervention, compared with *other intervention*, with PP analysis showed significant between-group difference.

Acute Care Utilization – Combined Utilization

Three papers investigated the effects of nutrition and dietetic services on combined utilization (30-day unplanned readmissions [including a visit to the ED, under observation in the ED, or hospital admission], ED or hospital visits, or total hospital admissions [including both emergency and elective admissions]). Collectively, all three papers measured between-group differences, with one indicated positive finding favoring the AH service, one found significant positive finding favoring the comparator, and another reported mixed findings.

In comparison with *no intervention*, while Sandhu et al¹¹¹ found receipt of the AH service was significantly associated with a greater likelihood of ED or hospital visits, Rocca¹¹⁰ reported fewer 30-day unplanned readmissions, albeit no significant between-group difference. Findings from Rocca¹¹⁰ also indicated that the comparison group experienced a longer period between index discharge and readmission than participants who did not complete the intervention. However, when comparing with participants who completed the intervention, this was reversed as there was a shorter period between index discharge and readmission for those in the comparison group.¹¹⁰ When compared with *other intervention*, both ITT and PP analyses showed fewer total hospital admissions in the intervention group, with no significant between-group differences.¹¹²

Acute Care Utilization – Emergency Service Use

Berkowitz et al¹⁰¹ compared the medically tailored meals program with matched control [*no intervention*] and reported a significant association between the service and reduced use of emergency transportation.

Acute Care Utilization – Hospital Avoidance

Kurien et al¹⁰⁷ examined within-group change of the community-based gastrostomy management. The authors discovered that of the 371 tube- and stoma-related complications, 227 hospital admissions were potentially avoided owing to direct actions taken by the dietetics team.¹⁰⁷

Patient Satisfaction

Two papers further investigated patient satisfaction. Collectively, both reported positive findings favoring the AH service. Smith et al¹¹² found significantly greater satisfaction with the intervention than with *other intervention*. Consistently, Rocca¹¹⁰ identified high satisfaction with the service, with a mean score of 9 out of 10. The patients in this paper further provided general comments to support their satisfaction and feedback on how the intervention helped them. These are highlighted in the following example quotes: “It was helpful to have nutrition things explained to my understanding and useful to have handouts”¹¹⁰ and “the RD [registered dietician] to be very professional, genuine and diligent”.¹¹⁰ The cohort also shared their future expectations from the program, such as provision of ONS, availability of meal delivery services, and more information about nutrition and exercise, as well as simple and low-cost meal ideas.¹¹⁰

Experiences of Patients and Staff

In addition to patient satisfaction, both papers also explored participants’ experiences with mixed findings. Smith et al¹¹² found that majority of participants (92–96%) from both study arms felt the intervention acceptable, with most (92%) also reported that dietary advice was easy to follow. Compared with dietary advice alone [*other intervention*], significantly more participants found the dietary advice combined with ONS convenient. In another paper by Rocca,¹¹⁰ despite patients described staff related and operational barriers throughout the service delivery process (eg lack of time and availability of interpreter services, time and caseload pressure for dietitians, interruptions from staff), they generally appreciated the input from and interaction with the dietician, as well as their involvement in the process.

The latter paper further explored the experiences of the staff involved in the intervention, including dietitians, clinical care coordinators/case management team members, and nurses. They discussed key barriers during the intervention, with some overlapped with patient-reported barriers. These included lack of or insufficient communication, documentation issues, limitations with patient’s ability and attention, time constraints, COVID-related barriers, and lack of knowledge among staff about the intervention. For example, one nurse highlighted,

Sometimes nutrition is not addressed where it definitely should be. and I think a lot of that is that we are being told you know, that we need to get the patient out as fast as we can, as early as we can,¹¹⁰

a case management team member also added, “Sometimes patients aren’t ready to digest new information especially when it’s related to discharge [...]”,¹¹⁰ a dietician further mentioned that “another barrier is making time to see the patient”.¹¹⁰ To tackle some of these barriers, several staff suggested potential approaches, especially in terms of improving communication, documentation, and awareness among the staff. For example, a dietician suggested that

“meet, on a monthly basis with the dietician, doctor, nurse manager or in a CCM or case managers, just to have those key players to help with discharge planning”,¹¹⁰ a nurse also recommended,

I think, maybe there should be a dietician section, you know that alerts us, that hey this person was marked as malnourished, have you discussed with the dieticians further? I think a nutrition part of our discharge planning would be beneficial.¹¹⁰

Adherence Rates and Adverse Events

Five papers reported greatly varied adherence rates for nutrition and dietetics services. For the nutritional counseling component (via home visits and/or telephone contacts), adherence rates among participants ranged between 67% and 100%.^{104,105,108} One paper¹⁰⁸ further indicated poor adherence among professional home carers, with less than 30% took part in one or more sessions. For the dietary advice component, adherence to recommended dietary intake ranged between 56% and 93%;^{105,109,112} whereas adherence to ONS was approximately 80%.¹¹² Two papers also showed improved compliance from baseline¹⁰⁵ and greater compliance than the comparator.¹¹²

Adverse events were further reported in two papers. Meena et al¹⁰⁹ noted some commonly reported adverse effects, including bloating, diarrhea and early satiety; however, no serious adverse events were observed. While Smith et al¹¹² discovered serious adverse events in both study arms, there were fewer events in the intervention group and all adverse events were rated “not likely” or “unlikely” to be related to the intervention.

Findings from Single Disciplinary AH Services – Occupational Therapy

Seven papers examined acute care utilizations, as well as stakeholders’ perceptions and perspectives regarding occupational therapy services. All reported one or more outcomes related to acute care utilizations, in terms of hospital admissions (n = 5), ED visits (3), LOS (3), and hospital avoidance (1). Both within- and between-group comparisons were summarized under relevant outcome domain. The between-group comparisons were further described according to comparator categories, where the effect of the occupational therapy service was compared with *usual care* and *other intervention*. One paper also explored the experiences of patients, caregivers, and clinicians. Furthermore, adherence rates and adverse events were reported in three papers (Tables 4, 5 and S15).

Acute Care Utilization – Hospital Admissions

Five papers investigated the effects of occupational therapy services on hospital admissions. Collectively, three papers indicated positive findings favoring the AH service with two being statistically significant, and another two reported positive findings favoring the comparator.

Two papers measured within-group changes and reported mixed findings. Garvey et al¹¹⁶ showed a non-significant increase in hospital admissions from baseline to immediately post implementation of a self-management support program for multimorbidity. In contrast, Engelbrecht et al¹¹⁵ reported a significant decrease in hospital admissions from 24 months pre to 24 months post attendance of a therapeutic program targeting mental healthcare users, with a medium effect size. Further analysis showed that participants in both “occasional attendance” and “regular attendance” groups had fewer admissions at post, with the latter group had a greater reduction; however, there was no significant difference between the two sub-groups.¹¹⁵

Four papers measured between-group differences and indicated mixed findings. When compared with *usual care*, Lockwood et al¹¹⁷ reported significantly fewer 30-day readmissions among participants with hip fractures who received a single pre-discharge home assessment. The paper further showed fewer readmissions at six months post the index discharge in the intervention group, albeit no significant between-group difference.¹¹⁷ By contrast, Garvey et al¹¹⁶ reported more hospital admissions in the intervention group, albeit no significant between-group difference was observed. This finding was supported by Clemson et al,¹¹⁴ who found that slightly more elderly who received an enhanced discharge planning intervention had 90-day unplanned readmissions; however, there was no significant between-group difference.

Furthermore, Chu et al¹¹³ compared a fall reduction home visit program with attention control [*other intervention*] and reported slightly fewer fall-related hospitalizations in the intervention group, despite statistical significance was not achieved.

Acute Care Utilization – ED Visits

Three papers investigated the effects of occupational therapy services on ED visits. Collectively, one paper indicated positive finding favoring the AH service, one reported positive finding favoring the comparator, and another found no difference.

All three papers measured between-group differences and reported mixed findings. When compared with *usual care*, Clemson et al¹¹⁴ found that more elderly in the intervention group experienced 90-day ED visits, albeit no significant between-group difference. On the other hand, Tistad et al¹¹⁸ evaluated a home-based stroke rehabilitation and reported an equivalent median number of ED visits between the two groups during 12-month follow-up. In contrast, Chu et al¹¹³ reported fewer fall-related ED visits in the intervention group at both the six- and 12-month follow-up, compared with *other intervention*, with no significant between-group differences.

Acute Care Utilization – LOS

Three papers investigated the effects of occupational therapy services on LOS. Collectively, while two papers found statistically significant positive findings favoring the AH service, one reported mixed findings.

Engelbrecht et al¹¹⁵ measured within-group change and identified positive finding. In particular, the authors reported a significant decrease in LOS from pre to post, with a large effect size. Further analysis showed that participants in both “occasional attendance” and “regular attendance” groups had shorter LOS at post, with the latter group had a greater decline; however, there was no significant difference between the two sub-groups.¹¹⁵

Two other papers measured between-group differences and reported mixed findings. When compared with *usual care*, Lockwood et al¹¹⁷ indicated a significantly shorter LOS in the intervention group at both 30 days and six months post the index discharge. In contrast, Tistad et al¹¹⁸ found a slightly longer LOS during initial hospitalizations but similar inpatient care during recurrent hospitalizations, leading to a slightly shorter total LOS among participants from the intervention group over 12-month follow-up, albeit no significant between-group differences.

Acute Care Utilization – Hospital Avoidance

Van Dam et al¹¹⁹ examined the impact of an extended scope of occupational therapy service on hospital avoidance and found that 81% of clients had a significant risk addressed by the service team, which likely prevented a hospital admission.¹¹⁹

Experiences of Patients, Caregivers and Clinicians

Van Dam et al¹¹⁹ also reported broadly positive experiences of clients, their carers, and referring clinicians. From the clinician’s perspective, at least three quarters of them either “agreed” or “strongly agreed” with the timelines, utility, and ease of use of the service, albeit some were unsure about the value of the service to clients. Additionally, over 80% “agreed” or “strongly agreed” that the service should be continued. From the client’s and carer’s perspective, they believed that the tools and education provided through the service helped to prevent falls. They further expressed that the OT made them feel important and “human” (“She had time for him and explained it to him in such a way that he understood”¹¹⁹). The service also alleviated clients’ concerns about being taken away from their home indefinitely (“He doesn’t want to leave home, it is his world”¹¹⁹) and reduced their anxiety about arranging care (“If you have someone sick [in your family] you don’t know where to get help”¹¹⁹).

Adherence Rates and Adverse Events

Two papers further assessed adherence rates to occupational therapy services. Chu et al¹¹³ evaluated participants’ adherence to OT’s recommendations at two-month follow-up and found varied adherence rates for different recommendations, with educational advice being the lowest (39%) and advice on environmental hazards and daily life routines being the highest (76%). Additionally, Garvey et al¹¹⁶ discovered that majority of the participants (76%) attended three or

more of the six scheduled sessions, whereas 13% never attended any session. No adverse events, apart from falls and readmissions, were reported.¹¹⁷

Findings from Single Disciplinary AH Services – Psychology

Two papers based on the same RCT examined acute care utilizations, in terms of hospital admissions, LOS, and combined utilization. Both within- and between-group comparisons were summarized under relevant outcome domains. The between-group comparisons were further described according to comparator categories, where the effect of the psychology service was compared with *other intervention*. Adverse events were further reported in one paper (Tables 4 and S15).

Acute Care Utilization – Hospital Admissions

Coultas et al⁵⁴ assessed the differences in COPD exacerbation, cardiac, and other related hospitalizations between a behavioral intervention for lifestyle physical activity and usual care, when combined with COPD self-management education. The paper identified that the intervention group had significantly fewer COPD exacerbation-related hospitalizations, but more hospitalizations for cardiac-related events and other medical conditions during the 18-month study period.⁵⁴

Acute Care Utilization – LOS

A secondary analysis of the RCT⁵⁵ was conducted to compare within- and between-group differences in LOS. While both groups experienced an initial decrease in LOS, it commenced immediately in the comparison group, whereas the trend of reduction occurred after six months in the intervention group. Following the initial six-month reduction, the LOS in both groups started to increase. At 18 months, the LOS was similar between the two groups, with both being lower than baseline.⁵⁵

Acute Care Utilization – Combined Utilization

Acute care utilizations encompassing any urgent care/ED visit or hospitalization were evaluated by Coultas et al,⁵⁵ in aspects of lung-related, non-lung-related and overall utilizations over the 18-month study period. Specifically, lung-related utilization was significantly lower in the intervention group; however, the difference was limited to participants with severe spirometric impairment. Additionally, the behavioral intervention component was an independent factor that was significantly associated with reduced lung-related utilization, after adjusting for risk factors. However, no significant between-group differences were found for non-lung-related and overall acute care utilizations, despite the overall utilization appeared to be lower in the intervention group. After adjusting for risk factors, the behavioral intervention component was associated with increased non-lung-related utilization, but declined overall utilization, albeit statistical significance was not achieved.⁵⁵

Adverse Events

Coultas et al⁵⁴ discovered that 37% of the participants had at least one adverse event, leading to 194 adverse events reported over the course of the study, with no significant between-group difference. In addition to hospitalizations, deaths (unspecified causes), injuries/falls, and non-COPD related surgeries were adverse events reported by the participants. Although the number of deaths was similar, the intervention group had higher rates of injuries/falls and surgeries. In contrast, serious adverse events were greater in the comparison group, albeit not significant.⁵⁴

Findings from Single Disciplinary AH Services – Exercise Physiology

One paper examined the effect of exercise physiology or physiotherapy service on within-group change in LOS and indicated adherence rate among the participants (Tables 4 and S15).

Acute Care Utilization – LOS

Brusco et al¹²⁰ investigated the effect of a structured, supervised exercise for elderly in local senior exercise park and reported a decrease in LOS from six months before to six months after completion of the program, albeit the pre-post change was not significant.

Adherence Rates

Brusco et al¹²⁰ further assessed participants' adherence to exercise during maintenance following the supervised sessions and found that 60% of the participants continued to utilize the park.

Integration of Quantitative and Qualitative Evidence

In summary, the quantitative data focused on acute care utilizations and satisfaction and stress perceived by patients and their families, whereas the qualitative data explored the experiences of patients, their families, and other relevant stakeholders. The integrated data suggested that community-based AH services may have a positive impact across a range of outcomes, which was complemented by the positive views of patients and their families. However, current evidence base suggested two major gaps. First, research on the views of patients and other stakeholders on community-based AH services formed a smaller cohort of the included papers. Specifically, of the 67 included papers, only 18 papers examined patients' satisfaction, perceived stress, and experiences, and three papers explored other stakeholders' perceptions. Second, research that measured key stakeholders' views and perceptions of community-based AH services (such as healthcare professionals, managers, and funders) was under-reported. Large-scale quantitative studies, with a measurement focus, that target these stakeholders would complement findings from qualitative research. [Figure 2](#) presents the key findings from quantitative and qualitative evidence.

Certainty Assessment of Evidence

The certainty of the available evidence for patient-important outcomes was rated as “very low” according to GRADE guidelines ([Tables S16–S30](#)). The main reasons for downgrading the quality of evidence included: (a) risk of bias (ie lack of/limited blinding and use of unvalidated outcome measures for RCTs, issues related to non-randomized experimental studies, and failure to adequately control confounding for observational studies); (b) indirectness (ie differences in populations and interventions); and (c) imprecision (ie small sample size and wide confidence intervals with inclusion of no effect).

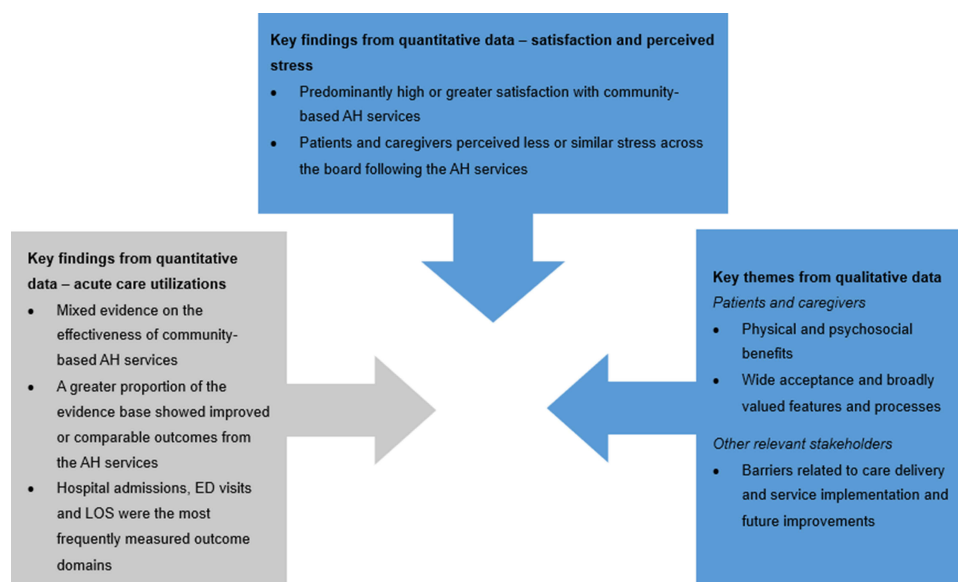


Figure 2 Key findings from quantitative and qualitative data.

Abbreviations: AH, allied health; ED, emergency department; LOS, length of stay. *Color codes:* blue, findings related to perceptions and perspectives; gray, findings related to acute care utilizations.

Discussion

AH professions play an integral role in delivering PHC services. However, the impact of community-based, AHP-led services on acute care utilizations is poorly understood. This mixed methods systematic review sought to address this research and knowledge gap. A substantial body of evidence, comprising 67 papers, was identified. The findings revealed mixed evidence regarding the effectiveness of community-based AH services on acute care utilizations, with a greater proportion of the evidence demonstrating either improved or comparable outcomes from AH services. However, the certainty of evidence for patient-important outcomes was rated as “very low” due to methodological limitations and heterogeneity of the evidence base. These findings were further complemented by generally positive views held by patients and their carers, along with perceptions of service delivery shared by other relevant stakeholders, although these were based on a limited evidence base.

There is mixed evidence on the effectiveness of community-based AH services on acute care utilizations, which resonates with, and adds to, current evidence based on community-based healthcare services. For example, a systematic review²¹ assessed the effects of community pharmacist-led medication review programs on ED visits, hospital (re) admissions and LOS and reported positive effects in favor of the intervention from majority of the included studies, while a small proportion reported negative findings. Another systematic review¹⁸ compared between hospital-at-home interventions delivered by nurses and/or physicians and in-hospital stay and discovered a significantly lower risk of readmission but a significantly greater length of treatment in the intervention group.

A likely explanation for the mixed findings in this review is the heterogeneity of the evidence base. Given the diverse nature of AH professions and the wide-ranging patient populations that AHPs care for, it was not surprising to find considerable variability. Even within an individual profession, where the focus of, and parameters underpinning, the intervention were expected to be mostly similar (eg fall prevention initiatives delivered by PTs, transitions of care delivered by social workers), variability was observed. These variabilities also extended to outcome measures (eg different data collection methods) and outcomes (eg varied follow-up duration for an outcome), making it difficult for robust comparisons.

The quantitative findings are complemented by the extensive positive perceptions and perspectives of patients and their families, which are an encouraging finding from this review. A previous systematic review⁸ suggested that negative perception of primary care providers is a factor contributing to ED visits for non-urgent conditions. This highlights the importance of capturing and understanding consumers’ viewpoints, which can then inform the development and implementation of community-based strategies to reduce the burden on the acute sector. While this review did include 18 papers that examined patients’ and caregivers’ satisfaction, perceived stress and experiences,^{56,60,66,68,70,71,73,74,77,83,86,87,89,92,99,110,112,119} more research could be undertaken to strengthen this knowledge base. Patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) are well-documented measurements that capture feedback from patients or their proxies to inform healthcare system performance.¹²¹ However, applying PROMs and PREMs is not without challenges, due to variations existing across countries (eg nationally mandated use in the US versus voluntary, state and territory-based use in Australia),¹²¹ and persistent barriers to implementation (eg complexity of the healthcare system, lack of planning and leadership, difficulties with data sharing).¹²²

In addition to patients and their carers, staff involved in care delivery and service implementation is another important cohort, whose perspectives can inform the success and sustainability of healthcare services. In this review, only three papers^{83,110,119} explored the perceptions and experiences of clinicians and other relevant staff (eg AHPs, GPs, managers, commissioners). Of these, frontline clinicians and staff from leadership/management in two papers^{83,110} shared perceived barriers (and some solutions) throughout the implementation process, several of which overlapped with patient-reported barriers. Patey and Soong¹²³ emphasized the critical role of “bottom-up” approach (support for and from healthcare providers) in de-implementation of low-value care (eg overuse, underuse, or misuse of health services). They further highlighted that effective de-implementation initiatives are characterized by a combination of “top-down” (from policy-makers and administrators) and “bottom-up” approaches, as a means of actively engaging all stakeholders to achieve value-based healthcare (VBHC).

VBHC is regarded as an approach to achieving the Quadruple Aim of healthcare – improved patient experience, better outcomes, lower costs, and clinician wellbeing.^{124,125} In the context of an over-stretched healthcare system, economic evaluation is an essential tool used by policymakers for resource allocation decisions.¹²⁶ In PHC, economic evaluations have been conducted, despite not universally, with mixed evidence base. For example, Wong and colleagues¹²⁷ undertook a systematic review to demonstrate economic outcomes of home enteral nutrition interventions. The authors highlighted inconclusive findings owing to the poor quality of the included studies, albeit a cost-saving trend in some populations. Another systematic review¹²⁸ suggested lower costs for early-supported discharge interventions, but higher or comparable costs for home-based rehabilitation among stroke patients. To enhance evidence-informed decision-making among policymakers and funders, an economic evaluation of these community-based, AHP-led services is required as such research is currently lacking.

Strengths and Limitations

This systematic review was underpinned by best practice standards in the conduct and reporting of systematic reviews (ie PRISMA). The use of mixed methods approach to integrating quantitative and qualitative evidence was another strength, as it enabled a comprehensive summary of the existing literature on this topic. Furthermore, the use of GRADE to evaluate the certainty of evidence for patient-important outcomes was also a strength of this review. However, as with any research, there are limitations to consider. First, publication and language bias should be acknowledged, due to the complexity and imprecise nature of searching and the focus on studies published in English language only. Second, there were some concerns regarding the methodological quality of the included papers. In particular, the psychometric properties of outcome measures and avoidance of contamination and co-intervention were not explicitly addressed in most of the included papers, leading to potential imprecise measures and introduction of bias. Finally, this review focused on ten AH professions. Given the lack of a standard or universally accepted definition of AH,²⁴ there may be variations in classifying professions under AH among different jurisdictions. Therefore, these findings may not be generalizable to all AH professions (eg optometry, medical imaging, art/music therapy etc).

Implications for Practice, Policy, and Future Research

Based on the findings from this review, there are several recommendations spanning clinical practice, policy, and research to be proposed. First, given that community-based AH services may have a positive impact on acute care utilizations, there needs to be ongoing investment in and support for AHP-led services, to complement other healthcare services, in the PHC sector. This could reduce reliance on acute care, improve efficiency of health services and strengthen PHC to provide timely and accessible care, which could reduce the strain on acute care facilities. The development and implementation of AH services could be informed through engagement with stakeholders to ensure services meet their needs. While policymakers and healthcare planners could use this evidence to guide future decisions, an economic evaluation of community-based AH services can further enhance their decision-making process to ensure resources are appropriately deployed to areas with the greatest potential for positive impact. As this review highlights the significance of AH professions in community settings, enhancing their roles in these settings could optimize resource utilization across the health sector. Future initiatives could leverage the breadth and scope of AH through innovative models of care to address persistent challenges confronting the health system (eg telehealth/virtual care to address access issues especially for those in rural and regional settings, use of advanced and extended scope AHPs in the community). Finally, ongoing high-quality research is required to strengthen the evidence base as well as address existing knowledge gaps. These include investigation of the impact of AH across the health sector (such as aged care, disability) and impact of other disciplines that seek to add value towards healthcare (such as complementary and alternative therapies).

Conclusion

There are ongoing, concerted efforts to strengthen PHC as a means of alleviating the increasing pressure on the acute sector. AH plays a crucial role in PHC, and numerous AH services in this context have been trialed. Overall, the findings suggest that community-based AH services may positively impact acute care utilizations, highlighting their potential to alleviate the pressure on acute care. While patients and their families are supportive of these services, the certainty of

evidence for patient-important outcomes is “very low”, emphasizing cautious interpretation. These findings present opportunities for further investment and for strengthening evidence base on community-based AH services by evaluating their economic impact and investigating the impact of AH services across the health sector.

Abbreviations

AH, allied health; AHP(s), allied health professional(s); ASC Health Model, Allied, Scientific and Complementary Health Model; CBS, Caregiver Burden Scale; CCT, controlled clinical trial; COPD, chronic obstructive pulmonary disease; CQ index, Consumer Quality index; CSI, Caregiver Strain Index; ED(s), emergency department(s); EP(s), exercise physiologist(s); GP(s), general practitioner(s); GRADE, Grading of Recommendations, Assessment, Development and Evaluation; ITT, intention to treat; LBP, low back pain; LOS, length of stay; NCD(s), non-communicable disease(s); ONS, oral nutritional supplements; OT(s), occupational therapist(s); PHC, primary healthcare; PP, per protocol; PPH(s), potentially preventable hospitalization(s); PREMs, patient-reported experience measures; PRISMA, Preferred Reporting Items for a Systematic review and Meta-Analysis; PROMs, patient-reported outcome measures; PSQ-18; Patient Satisfaction Questionnaire Short Form; PT(s), physiotherapist(s)/physical therapist(s); RCT(s), randomized controlled trial(s); SLP(s), speech-language pathologist(s); SoF, Summary of Findings; UK, United Kingdom; US, United States; VBHC, value-based healthcare.

Data Sharing Statement

All relevant data are included in the article and Supplementary Materials; further inquiries can be directed to the corresponding author.

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