

The Economic Impact of Community-Based Allied Health on the Acute Sector: A Systematic Review of Economic Evaluations

Esther Jie Tian¹, Saravana Kumar¹, Priya Martin², Lewis A Ingram³, Clarabelle T Pham⁴

¹Innovation, IMplementation and Clinical Translation (IIMPACT) in Health, Allied Health and Human Performance, University of South Australia, Adelaide, South Australia, Australia; ²School of Health and Medical Sciences, University of Southern Queensland, Toowoomba, Queensland, Australia; ³Alliance for Research in Exercise, Nutrition and Activity (ARENA), Allied Health and Human Performance, University of South Australia, Adelaide, South Australia, Australia; ⁴College of Medicine and Public Health, Flinders Health and Medical Research Institute, Flinders University, Bedford Park, South Australia, Australia

Correspondence: Esther Jie Tian, UniSA Allied Health and Human Performance, University of South Australia, GPO Box 2471, Adelaide, South Australia, 5001, Australia, Tel +61883021300, Email jie.tian@mymail.unisa.edu.au

Abstract: Community-based allied health (AH) services have previously demonstrated a potential positive impact on acute care utilization, with wide acceptance among consumers. However, little is known about their economic impact. This systematic review aimed to address this gap. The primary outcomes of interest included: (a) costs of at least one type of acute care utilization; and (b) cost-effectiveness regarding acute care. The secondary outcomes of interest included total healthcare and/or non-healthcare costs. 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; (b) reported acute care utilization costs as a primary or secondary outcome; (c) full or partial economic evaluations; and (d) studies published in English from 2010 onward. Eligible studies were identified from relevant bibliographic databases and gray literature search (September and October 2023). Modified McMaster Critical Appraisal Tool for quantitative studies, McGill Mixed Methods Appraisal Tool, and Consensus on Health Economic Criteria List were used to assess methodological quality. Narrative synthesis and cost-effectiveness planes were used for synthesizing and presenting the findings. Twelve studies, comprising eight cost analyses and four full economic evaluations, were included. Both single disciplinary (led by physiotherapists, dietitians, social workers, or exercise physiologists) and multidisciplinary (involved two to five AH professions) services were identified. Collectively, ten studies showed cost savings in acute care, while seven indicated varying degrees of cost-effectiveness and cost savings in total healthcare and non-healthcare, from pre-post and between-group comparisons. The findings demonstrated trends towards economic benefits of AH, highlighting their potential to alleviate the pressures on the acute sector and even the wider health system. However, the evidence is limited and of lower quality, emphasizing cautious interpretation. This review underscores the value of AH services and highlights key areas requiring action to strengthen the evidence base.

Keywords: allied health occupations, primary health care, community health services, costs and cost analysis

Introduction

Health expenditure is defined as “consumption of a resource with the primary objective of promoting, restoring, and maintaining health”, with the inclusion of spending by all levels of government and non-government entities, such as private health insurers and individuals.^{1,2} Globally, health expenditure has grown substantially from 3.5 trillion United States dollars (USD) in 1995 to 8.0 trillion USD in 2016 and is projected to continue increasing in the next three decades at a rate of 1.84% annually.³ There are a myriad of factors contributing to the growth of health expenditure, spanning socio-demographics (eg, population size and age structure, urbanization); economy (eg, financial resources and price growth); technology (eg, technological advancement, investment in research and development); lifestyle and environment (eg, obesity, greenhouse gas emissions); epidemiological transition and changing patterns of diseases (eg, upward trends in non-communicable diseases); delivery of healthcare (eg, improved access to health services); and administration

and design of the health sector (eg, share of public and private spending, health insurance development).⁴ The substantial and continued growth of health expenditure has become a major challenge for financial sustainability within and beyond the health sector worldwide.^{4,5}

Of the global total health expenditures, curative care in hospital settings accounts for the greatest share; this finding is consistent across low-, middle- and high-income countries.⁶ Evidence suggests that inappropriate utilization of hospital services, such as emergency department (ED) visits for non-urgent complaints and unnecessary hospitalization, plays a prominent role in driving up healthcare costs.^{7–9} It is estimated that only 10% of healthcare demands require hospital-related services, while the remaining 90% can be managed through primary health care (PHC).¹⁰ PHC is commonly identified as a “gateway” to the wider health system, which addresses the health needs of all populations at the community level.¹¹ Research has suggested that strong PHC is associated with various benefits, including fewer unnecessary hospital admissions and lower healthcare costs.¹¹

Initiatives using a PHC approach have been trialed extensively, with a mixed evidence base regarding their effectiveness on the acute sector. For example, a systematic review compared hospital-at-home interventions and in-hospital stay for patients with chronic diseases, and reported a significantly reduced risk of readmission yet a significantly greater length of treatment in the intervention group.¹² Another systematic review examining the effectiveness of community-based interventions for childhood asthma found that multicomponent interventions are associated with a significant reduction in asthma-related ED visits and hospitalizations.¹³ While there is a heterogeneous collection of interventions, they are predominantly led by doctors and nurses.

Allied health (AH), along with medicine and nursing, is an integral pillar of PHC. Allied health professionals (AHPs) are equipped with essential and unique skills to provide wide-ranging health services, where they engage with clients in decision-making and support them in establishing and achieving goals that enhance functional capacity, support safe and independent community living, and maintain or improve quality of life.¹⁴ However, little is known about the impact of interventions led by AHPs on the acute sector due to a limited evidence base. To address this knowledge and research gap, the review team conducted a systematic review to synthesize contemporary evidence regarding the effectiveness of community-based AH services on the acute sector and the perspectives of relevant stakeholders in this context. That review employed a mixed methods approach and identified a substantial body of evidence that indicates community-based AH may alleviate the pressures on the acute sector, with overwhelmingly positive experiences and benefits reported by patients and their carers. The paper has been published.¹⁵

Healthcare stakeholders, such as policymakers and healthcare planners, rely on a combination of effectiveness and efficiency evidence to inform their decision-making. This enhances appropriate deployment of scarce resources to areas with the greatest potential for positive impact.^{16,17} Economic evaluations, which involve a comparative analysis of alternative courses of action in terms of costs and effects, are an essential approach to determining the efficiency of a health intervention.¹⁶ They are generally divided into two categories: full economic evaluations and partial economic evaluations. Full economic evaluations are characterized by comparison of two or more alternative interventions while accounting for both costs and effects, making them the optimal approach and the preferred type for both multipurpose systematic reviews and clinical practice guidelines. By contrast, partial economic evaluations do not fulfill these criteria; however, they may be employed when knowledge is limited.¹⁸ The type of economic evaluation is influenced by the unit used to measure effects. For example, cost-effectiveness analysis (CEA) is used when effects are expressed in natural units (eg, number of symptom events observed); whereas in cost-benefit analysis, effects are expressed in monetary terms.^{16,18}

In the context of community-based AH, economic evaluations would complement the current evidence regarding effectiveness and stakeholders’ perspectives, leading to a more insightful understanding of the impact and enhanced resource allocation decisions among healthcare stakeholders. The evolving healthcare context, such as post-pandemic healthcare reforms and changing workforce and service delivery models, further amplifies the necessity for this study. Therefore, the aim of this review was to evaluate the economic impact of these community-based, AHP-led services on acute care utilization. The primary outcomes of interest for this review were the: (a) costs of at least one type of acute care utilization identified in the previous paper,¹⁵ and (b) cost-effectiveness of AHP-led services regarding acute care. The secondary outcomes of interest included total healthcare and/or non-healthcare costs associated with the

management of target condition(s). Given the emerging evidence in this field, and the outcomes of interest, both full and partial economic evaluations were included in this review to facilitate a comprehensive understanding.

Methods

This systematic review, as a subset of the previous review, utilized the same methods described in detail in the first paper.¹⁵ This section presents a brief summary of the methods, along with a detailed description of the approaches related to the assessment of economic evaluations.

The conduct and reporting of this review were in accordance with the Preferred Reporting Items for a Systematic review and Meta-Analysis (PRISMA) 2020 statement¹⁹ (Table S1). The Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement²⁰ was also followed for the reporting of items relevant to economic evaluations (Table S2).

Eligibility Criteria

Primary research studies meeting the previously described eligibility criteria in terms of Population and Exposure,¹⁵ as well as the eligibility criteria specific to economic evaluations in terms of Outcome and Study type, were included. Table 1 presents a detailed overview of the inclusion and exclusion criteria.

Information Sources and Search Strategy

In summary, systematic searches of relevant bibliographic databases (MEDLINE, Embase, EmCare, PsycINFO, CINAHL [Cumulative Index to Nursing and Allied Health Literature] complete, and the Cochrane Library), online databases and theses repository (ProQuest Central, ProQuest Dissertations & Theses Global, and Trove), and Google and Google Scholar were conducted in September and October 2023. Citation searching was also conducted through examining the reference lists of included studies and relevant reviews. In line with the previous review,¹⁵ the search strategy was underpinned by three concepts: AH profession, Service type/Setting, and Outcome. Examples of search

Table 1 Inclusion and Exclusion Criteria

Concepts	Inclusion Criteria	Exclusion Criteria
Population	All populations with no restrictions	Not applicable
Exposure (intervention/ phenomenon of interest)	- 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 education, nutrition and dietetics, occupational therapy, physiotherapy (or physical therapy), podiatry, psychology, social work, and speech pathology (or speech-language pathology).	- Community-based health services that were: (a) delivered by 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	- Studies that reported costs associated with acute care utilization, either as a primary or secondary outcome. - In line with the previous review,¹⁵ acute care utilization was defined as "the use of hospital services in the form of ED or inpatient hospital visits", and included hospital admission, ED visit, LOS, combined utilization, emergency service use, hospital avoidance, and observation stays.	Studies that did not report costs or only reported: (a) total costs with no breakdown into subcategories where acute care costs could be extracted separately; or (b) intervention costs.
Study type	Full or partial economic evaluations	Not full/partial economic evaluations. For example: - Costs not reported as a primary or secondary outcome - Reporting of a potential cost difference based on a general cost estimate with minimal detail

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

terms and subject headings used for each concept included: AH profession (allied health OR physiotherap* OR Allied Health Personnel/OR Physical Therapists/); Service type/Setting (primary healthcare OR community-based OR Community Health Services/); Outcome (hospitalization* OR “length of stay” OR Patient Admission/). Full search syntaxes were reported previously.¹⁵ All searches were limited to English language and studies from 2010 onward. The searches were undertaken by one reviewer (EJT).

Study Selection Process

The study selection process was described in detail elsewhere.¹⁵ Overall, title and abstract screening and full-text screening were conducted by four independent reviewers, with one reviewer (EJT) screened all records and three reviewers (SK, PM and LI) screened the records in duplicate. As an added step, following the selection of studies that met all inclusion criteria, a fifth reviewer (CP) independently checked approximately 50% of the eligible studies (6 out of 12), to enhance the accuracy of study selection for this review. Any inconsistencies were resolved through discussion.

Risk of Bias Assessment

In line with the previous review,¹⁵ a modified version of McMaster Critical Appraisal Tool for quantitative studies²¹ and McGill Mixed Methods Appraisal Tool for the randomized controlled trial (RCT) with nested quality study²² were used to assess the risk of bias of the included studies. Additionally, the Consensus on Health Economic Criteria List (CHEC-list)²³ was used to assess the methodological quality of the economic evaluations. The CHEC-list was chosen as it is designed for appraisal of trial-based economic evaluations and is widely considered to be subject to more rigorous scrutiny than many other checklists.²⁴

The CHEC-list consists of 19 assessment criteria regarding study details, methodology, the identification, measurement and valuation of costs and outcomes, statistical analysis, and conclusions. Each criterion was rated as “yes” or “no”. A scoring system was employed, where each “yes” was given 1 point and each “no” was scored 0 point. The final score for each study was computed as a percentage to represent the level of quality, with $\geq 75\%$ being high, 51–74% being moderate, and $\leq 50\%$ being low quality.²⁵ Five independent reviewers were involved. One reviewer (EJT) critically appraised all included studies using both tools; four reviewers (CP, SK, PM and LI) double-checked approximately 25% ($n = 3/12$), with three (SK, PM and LI) using the modified McMaster Critical Appraisal Tool for quantitative studies ($n = 1$ per reviewer) and one reviewer (CP) using the CHEC-list ($n = 3$). Any inconsistencies were discussed and resolved between two reviewers (EJT and CP/SK/PM/LI).

Data Extraction

A customized data extraction form developed in Microsoft Excel (version 2402, Microsoft Corporation) was used to extract relevant data, including citation details and information related to PEO [Population, Exposure, Outcome], as described previously,¹⁵ along with economic evaluation characteristics. Five independent reviewers contributed to the process. One reviewer (EJT) conducted data extraction from all included studies; four reviewers (CP, SK, PM and LI) double-checked approximately 25% ($n = 3/12$), with three (SK, PM and LI) checking PEO-related data ($n = 1$ per reviewer) and one reviewer (CP) checking data relevant to economic evaluations ($n = 3$). Any inconsistencies were discussed and resolved between two reviewers (EJT and CP/SK/PM/LI).

Data Synthesis and Analysis

Study interventions and comparators were coded using the same approach described previously.¹⁵ The study outcomes were coded into seven categories based on their characteristics, including *ED visit cost*, *hospital admission/hospitalization cost*, *combined costs* (ie, totaled costs of ED visit and hospital admission/hospitalization), *cost-effectiveness regarding acute care*, *total healthcare costs*, *total non-healthcare costs*, and *other integrated costs* (ie, sum of healthcare and non-healthcare costs).

Mean cost per person in individual studies were converted to Australian dollars (AUD) using the online Campbell & Cochrane Economics Methods Group – Evidence for Policy and Practice Information – Center (CCEMG-EPPI-Center) Cost Converter (version 1.7),²⁶ whereby the cost data was adjusted from their original cost currency and price year to AUD 2024 based on the International Monetary Fund (IMF) dataset for purchasing power parity (PPP) values. Where the

price year was not reported, the year of publication was used. For the studies that reported cost per group, mean cost per person was manually calculated based on the reported total costs and participant numbers. Statistical significance could not be assessed for these studies, due to reliance on aggregated data, which precludes individual-level testing.

The cost-effectiveness plane was used as a tool to analyze and graphically represent the data related to the cost-effectiveness of AH services regarding acute care. The plane consists of four quadrants, with X-axis measuring the change in mean effect per person and Y-axis measuring the change in mean cost per person. The change in mean effect was estimated as the difference in all acute care admissions (ED and hospital admissions) or hospital LOS between the intervention and comparison group or pre- and post-implementation. The unit of measure for effect was reported as number of participants, admissions or bed days across the included studies. Where reported, the mean effect per person was either derived directly from the study or manually calculated based on the reported total effects/percentages and participant numbers. The effects in individual studies were reported previously.¹⁵ Similarly, the change in mean cost was estimated as the difference in the costs for all admissions or hospital LOS and the cost of the intervention between the intervention and comparison group or pre- and post-implementation. Where the intervention cost was not reported or could not be manually calculated, it was regarded as having zero cost when calculating the total cost per person. This is due to limitations associated with estimating the true intervention cost, including lack of reported data for essential cost components, and substantial variations in input data across jurisdictions and types of AH services. Studies were omitted from the cost-effectiveness plane if: (a) the mean effect was not reported or could not be manually calculated;^{27,28} (b) pre-post or between-group difference was not evaluated;²⁹ or (c) the mean cost deviated substantially from other values.³⁰ [Table S3](#) outlines the effects and their units of measure, as well as the costs and associated methods of obtaining estimates for individual studies.

Narrative synthesis was performed to summarize outcomes and describe patterns of costs and cost-effectiveness across the included studies.³¹ This approach was selected as meta-analysis was not feasible to render a meaningful overarching conclusion, considering the heterogeneity of the included studies, in terms of target populations/conditions, types of AH services, comparators, units of measure for effects, and methods for obtaining acute care costs.³¹

Results

The database searches yielded a total of 11,093 records. After removing 3,092 duplicates, 8,001 records were screened for title and abstract relevance. From this, 7,872 records were further excluded as they did not meet the eligibility criteria. The subsequent 129 records, along with another 162 records identified via other methods were retrieved for full-text screening. Of these, 279 studies were deemed ineligible based on intervention ($n = 192$) (eg, involvement of doctors and nurses),^{32,33} outcome ($n = 69$) (eg, did not measure acute care utilization associated costs,³⁴ reported a potential cost saving based on a general cost estimate with minimal detail,³⁵ no separate reporting of acute care costs),³⁶ setting ($n = 15$) (eg, unspecified setting,³⁷ not limited to primary care and community-based settings),³⁸ study design ($n = 2$), and duplicate ($n = 1$). Therefore, a total of 12 studies were included in this review ([Figure 1](#)).

Study Characteristics

All studies were quantitative research with various designs, including RCT ($n = 3$),^{28,39,40} pre-post ($n = 2$),^{41,42} retrospective cohort ($n = 2$),^{29,43} secondary analysis of RCT ($n = 2$),^{27,44} controlled interrupted time series ($n = 1$),³⁰ prospective cohort ($n = 1$),⁴⁵ and RCT with nested qualitative study ($n = 1$).⁴⁶ The studies were published between 2011 and 2023 and were from eight countries, including the United States (US) ($n = 3$),^{29,30,43} Australia ($n = 2$),^{42,44} the United Kingdom (UK) ($n = 2$),^{27,46} Finland ($n = 1$),⁴⁰ Israel ($n = 1$),²⁸ Norway ($n = 1$),⁴¹ Sweden ($n = 1$),⁴⁵ and the Netherlands ($n = 1$).³⁹ ([Table 2](#)).

A range of community-based AH services targeting different populations and conditions were explored across the included studies ([Table 2](#)). The type of AH services was generally grouped in *multidisciplinary* and *single disciplinary*. Two to five professions were included in multidisciplinary AH services, involving various healthcare workers including dietitians, exercise specialists, medical social workers, occupational therapists (OTs), physiotherapists/physical therapists (PTs), and speech-language pathologists (SLPs). The type of multidisciplinary AH services included home-based rehabilitation with telemonitoring guidance³⁹ and early supported discharge with continued rehabilitation at home.⁴⁵

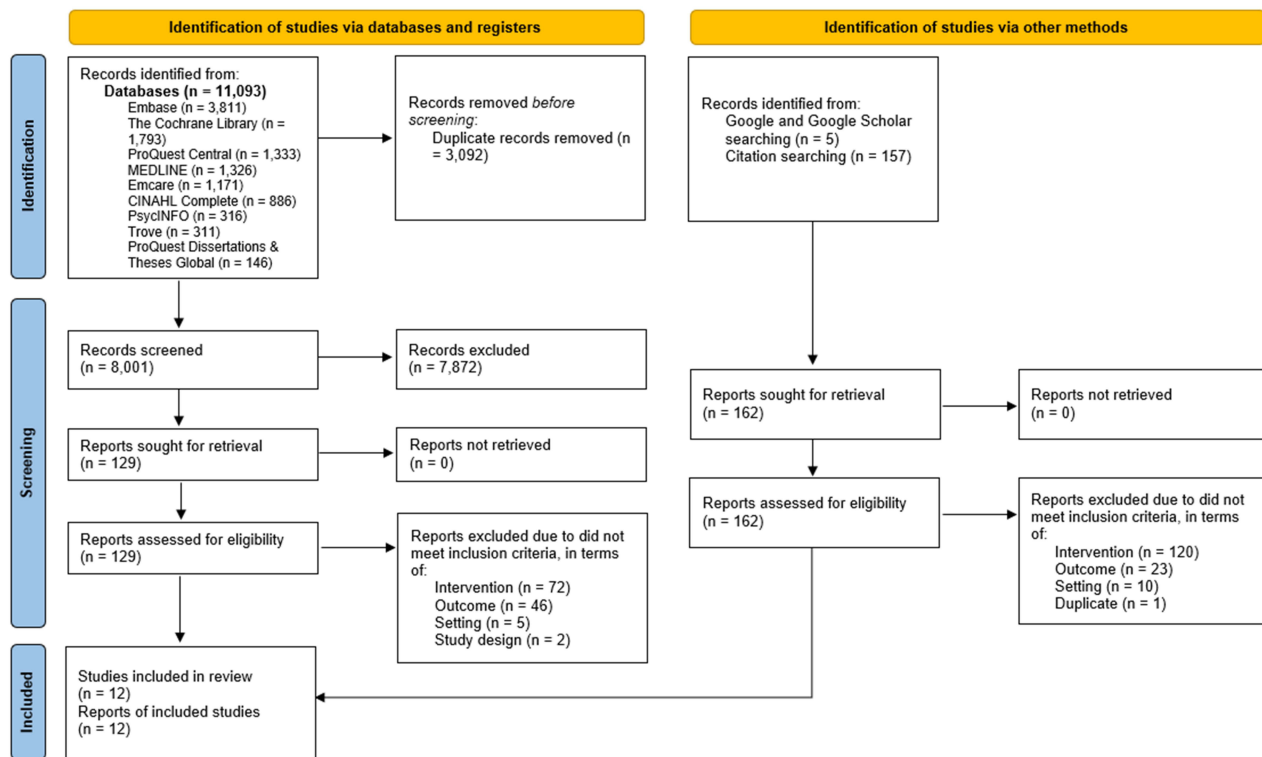


Figure 1 PRISMA flow diagram.

The former targeted participants who were at low-to-moderate cardiac risk and was delivered at least three times per week for a duration of 12 weeks with each training session lasting between 45 and 60 minutes,³⁹ the latter focused on stroke patients and involved various AHP visits, with mean frequencies ranging from one to 14.⁴⁵

Four AH professions led single disciplinary AH services, including physiotherapy (or physical therapy), nutrition and dietetics, social work, and exercise physiology. Of these, six studies examined various physiotherapy services targeting different populations and conditions. These included exercises for heart failure patients,²⁷ recently discharged elderly⁴⁴ and pre-frail and frail elderly,⁴⁰ primary care referral of low back pain (LBP) to physiotherapy,²⁹ a telephone assessment and advice service for musculoskeletal problems,⁴⁶ and telerehabilitation for chronic obstructive pulmonary disease (COPD) patients.⁴¹ Each session lasted between 20^{27,44} and 90 minutes⁴⁶ with frequencies up to six times per week⁴⁴ for a duration of eight weeks²⁷ to 12 months.^{40,44} The nutrition and dietetics services focused on an individualized intensive nutritional intervention for community-dwelling elderly at nutritional risk²⁸ and a meal delivery service combined with medical nutrition therapy for chronically ill and nutritionally at-risk individuals.³⁰ The nutritional counseling lasted between 30 and 45 minutes, with a frequency of five sessions,²⁸ while meals were delivered three times daily, seven days a week.³⁰ One study focused on a social work service involving a transitional care program for high acute care utilizers, who received the service for 35 days after hospital discharge.⁴³ Another study included an exercise physiologist (EP) or a PT supervised exercise targeting elderly with fall-related concerns or a history of falling.⁴² The intervention was delivered twice per week for 12 weeks, with each session lasting between 60 and 90 minutes; this was followed by six months of optional exercise maintenance.⁴² These single disciplinary AH services were primarily provided at the participants' homes.

Overall, the sample size across included studies ranged from 10⁴¹ to 2,249.⁴⁶ All studies focused on participants aged 18 years and over, with the majority included people aged 50 years and over. Collectively, the participants aged between 24 and 93 years⁴⁵ (Table 2).

Table 2 General Study Characteristics

First Author, Year, Study Design and Country	Sample Size (n)	Participant Characteristic	AH Service Parameter			Comparator [Category] ^a
			Type	Setting	Frequency and Duration	
Multidisciplinary AH services						
Kraal, 2017 ³⁹ 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 ± SD = (I) 60.5 ± 8.8 years; (C) 57.7 ± 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 session: 45–60 mins per session and ≥2 sessions per week Individual coaching: once per week Intervention duration: 12 weeks	Group-based training at outpatient clinic [other intervention]
Tistad, 2015 ⁴⁵ Prospective longitudinal Sweden	150 (I = 40; C = 110)	Target population/condition: stroke Sex: (I) 53% M and 47% F; (C) 58% M and 42% F Age: (I) ranged 41–93 years; mean ± SD = 70 ± 12; (C) ranged 24–91 years; mean ± SD = 67 ± 15	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 dietitian visit	Conventional rehabilitation [usual care]
Single disciplinary AH services – physiotherapy (physical therapy)						
Cowie, 2014 ²⁷ Secondary analysis of RCT UK	46 (I = 15; CGI = 15; CG2 = 16)	Target population/condition: HF Sex: (I) 87% M and 13% F; (CG1) 87% M and 13% F; (CG2) 100% M Age: mean = (I) 63.3 years; (CG1) 69.2; (CG2) 60.4	Interval, aerobic circuit DVD training with monitoring from a senior cardiac rehabilitation PT via phone	Participant's home	Training: 1-hour twice weekly training PT contact: 2 times (20-min call per participant) Intervention duration: 8 weeks	CG1: hospital-based training [other intervention] CG2: specialist HF nursing input [usual care]
Farag, 2016 ⁴⁴ 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 ± SD = (I) 82 ± 8 years; (C) 81 ± 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	Care from local health and support services and GPs, and provision of a fall prevention booklet [usual care]

(Continued)

Table 2 (Continued).

First Author, Year, Study Design and Country	Sample Size (n)	Participant Characteristic	AH Service Parameter			Comparator [Category] ^a
			Type	Setting	Frequency and Duration	
Fritz, 2012 ²⁹ Retrospective cohort US	2,234	Target population/condition: LBP Sex: 54% F Age: mean $\pm$ SD = 43.6 $\pm$ 9.9 years [timing of physiotherapy (early: n = 1,102; delayed: 975)] Sex: (early) 57% F; (delayed) 53% F Age: mean $\pm$ SD = (early) 43.1 $\pm$ 10.2 years; (delayed) 44.0 $\pm$ 9.5 [content of physiotherapy (adherent: n = 413; nonadherent: 1,504)] Sex: (adherent) 48% F; (nonadherent) 56% F Age: mean $\pm$ SD = (adherent) 42.5 $\pm$ 10.3 years; (nonadherent) 44.1 $\pm$ 9.7	Primary care referral to physiotherapy	NR	Mean $\pm$ SD number of visits = 6.4 $\pm$ 5.1	N/A
Salisbury, 2013 ⁴⁶ RCT with nested qualitative study UK	Quant: 2,249 (I = 1,506; C = 743)	Target population/condition: MSK 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)	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 MSK physiotherapy care pathway [usual care]
Suikkanen, 2021 ⁴⁰ 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
Zanaboni, 2013 ⁴¹ 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

Single disciplinary AH services – nutrition and dietetics						
Endevelt, 2011 ²⁸ RCT Israel	127 (I = 35; CG1 = 33; CG2 = 59)	Target population/condition: community dwelling elderly at nutritional risk Sex: (I) 40% M; (CG1) 36% M; (CG2) 37% M Age: mean $\pm$ SD = (I) 84.5 $\pm$ 5.6 years; (CG1) 84.2 $\pm$ 6.0; (CG2) 84.7 $\pm$ 4.7	Individualized intensive nutritional intervention delivered by a dietitian	Clinic or participant's home	Frequency: 5 visits Session duration: first 2 visits lasted for 45 mins and other visits lasted for 30 mins	CG1: primary care physician-led medical treatment, with a booklet on nutrition education [other intervention] CG2: standard care [usual care]
Guvey, 2013 ³⁰ 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 Dietitian counseling: NR	No intervention (matched control)
Single disciplinary AH services – social work						
Weerahandi, 2015 ⁴³ 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	Matched control (standard care involving a floor social worker who manages psychosocial needs) [usual care]
Single disciplinary AH services – exercise physiology						
Brusco, 2023 ⁴² Pre-post Australia	50	Target population/condition: elderly concerned about falling or had ≥ 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

Note: ^acoded by the review authors based on comparator characteristics.

Abbreviations: C, comparator; CG, comparison group; COPD, chronic obstructive pulmonary disease; EP, exercise physiologist; F, female; f/u, follow up; GP(s), General Practitioner(s); HF, heart failure; I, intervention; IQR, interquartile range; LBP, low back pain; M, male; min(s), minute(s); MSK, musculoskeletal; N/A, not applicable; NR, not reported; OT(s), occupational therapist(s); PT(s), physiotherapist(s)/physical therapist(s); RCT, randomized controlled trial; SD, standard deviation; SLP(s), speech-language pathologist(s); UK, United Kingdom; US, United States.

All studies used a trial-based analytic approach, with eight studies reporting partial economic evaluations^{27–30,41,43–45} and four presenting full economic evaluations.^{39,40,42,46} The eight partial economic evaluations were cost analyses, with only three reporting a health system perspective.^{27,44,45} The remaining five studies did not report on the perspective of the evaluation. Among the four full economic evaluations, two studies reported a cost-utility analysis (CUA),^{39,40} one focused on both cost-consequence analysis and CUA,⁴⁶ and another study performed both CUA and CEA.⁴² While one study did not report on the perspective,⁴⁰ the other three adopted a societal perspective.^{39,42,46} Across the 12 studies, time horizons ranged between 180 days⁴³ and five years,²⁷ with 12 months being the most commonly reported duration.^{30,39,41,44,45} While most studies did not report discounting, three stated that discounting was not required due to the short time horizon.^{39,42,46} All studies specified their currency unit, including US dollar (n = 4),^{28–30,43} Australian dollar (n = 2),^{42,44} euro (n = 2),^{39,40} British pound (n = 2),^{27,46} Norwegian krone (n = 1),⁴¹ and Swedish krona (n = 1).⁴⁵ Of these, seven studies further reported the price year or the year of conversion,^{27,39,40,42,44–46} ranging between 2009⁴⁶ and 2020/21.⁴² While none of the partial economic evaluations conducted uncertainty analysis, all full economic evaluations described approaches for uncertainty analysis (Table 3).

Methodological Quality

The study-level risk of bias assessments and the methodological quality assessments of economic evaluations are presented in Tables S4–S6. With regard to general risk of bias, the quality scores ranged between 69% and 100%. All quantitative studies clearly indicated the purpose of the research and described the justification of the need for their research. While all of them justified the sample size, one study did not describe the sample in detail.⁴² The reliability and/or validity of the outcome measures were addressed in six studies.^{27,28,39–41,45} Apart from the studies with an observational design, all but one³⁰ described their interventions in detail. Of those including more than one study arm, only three studies clearly indicated that contamination was avoided,^{28,30,44} and none scored for avoidance of cointervention. All but one²⁷ reported results in terms of statistical significance, while another⁴¹ did not describe analysis method(s). All studies reported dropouts, with the exception of those involved a secondary analysis or conducted retrospectively (scored as “not applicable”).^{27,29,30,42,43} Clinical importance was discussed across the included studies, with appropriate conclusions presented.

The RCT with nested qualitative study⁴⁶ addressed all criteria related to the qualitative and quantitative (RCT) components. The study also provided rationale for utilizing the mixed methods approach, effectively integrated different components, addressed the inconsistencies and divergences between qualitative and quantitative data.

With regard to the methodological quality of economic evaluations, the scores ranged from 26% to 100%, suggesting the quality varied between low and high. In particular, six studies were rated as low,^{27–30,41,43} three studies were rated as moderate,^{40,44,45} and a further three studies were rated as high quality.^{39,42,46} In terms of study details, the research question was clearly defined across the included studies. All but one study⁴² clearly described study populations, while the majority provided a detailed description of competing alternatives.^{27–30,39,40,43–46} In terms of methodology, the economic study design was considered to be appropriate among the full economic evaluations.^{39,40,42,46} All studies chose the time horizon appropriately. Five studies explicitly stated and justified their chosen perspective.^{27,39,42,45,46} In terms of costs and outcomes, less than half of the included studies identified all important and relevant costs and outcomes based on the chosen perspective and the research question.^{39,42,44–46} Four studies did not report intervention costs.^{28,30,41,44} While nine studies measured the costs appropriately in physical units with valid sources/instruments,^{27,28,39,40,42–46} only two studies explicitly addressed the validity of the outcome measures.^{39,46} Six studies reported sources of valuation for costs and their reference years,^{39,40,42,44–46} and four described the method of outcome valuation.^{39,40,42,46} In terms of statistical analysis, only two full economic evaluations performed an appropriate incremental analysis.^{42,46} Further, only three studies stated and justified discounting^{39,42,46} and four studies analyzed uncertainty.^{39,40,42,46} Conclusions were supported by the data reported across all studies. Over half of the studies discussed generalizability of the results.^{28–30,39,42,44,46} All but one⁴¹ reported the existence or absence of conflicts of interest of study researcher(s) and funder(s), as well as discussing ethical and distributional aspects.

Table 3 Characteristics and Key Findings of Economic Evaluations

Study; Country	Type of Economic Evaluation	Perspective	Time Horizon	Currency (Symbol); Price Year	Discounting; Analysis of Uncertainty	Key Findings (Mean per Person; in Whole AUD 2024) [Original Currency]
Multidisciplinary AH services						
Kraal, 2017 ³⁹ The Netherlands	CUA	Societal	12 months	Euro (€); 2015	No discounting; sensitivity analysis involving presenteeism and use of non-parametric bootstrapping in uncertainty analysis	ED visit cost IG: \$116 [€49] CG: \$88 [€37] Mean difference = \$28 [€12]; P = 0.452 Hospital admission/hospitalization cost IG: \$1,192 [€503] CG: \$1,616 [€682] Mean difference = - \$424 [- €179]; P = 0.645 Cost-effectiveness regarding acute care Change in effect (n of patients) = 9.73 Change in cost = - \$448 Total healthcare costs IG: \$5,733 [€2,419] CG: \$6,766 [€2,855] Mean difference = - \$1,033 [- €436; 95% CI - €562 to €1,436]; P = 0.392 Total non-healthcare costs IG: \$9,115 [€3,846] CG: \$15,568 [€6,569] Mean difference = - \$6,453 [- €2,723; 95% CI - €699 to €6,145]; P = 0.119 Other integrated costs IG: \$27,899 [€11,772] CG: \$42,322 [€17,858] Mean difference = - \$14,423 [- €6,086; 95% CI - €76 to €3,259]; P = 0.070
Tistad, 2015 ⁴⁵ Sweden	Cost analysis	Health system	12 months	Swedish krona (kr); 2012	NR	Hospital admission/hospitalization cost • Inpatient care IG: \$12,453 [kr54,228] CG: \$16,261 [kr70,807] Mean difference = - \$3,808 [- kr16,579] • Inpatient rehabilitation IG: \$1,407 [kr6,126] CG: \$2,208 [kr9,613] Mean difference = - \$801 [- kr3,488] • Totalled hospitalization IG: \$13,860 [kr60,354] CG: \$18,468 [kr80,420] Mean difference = - \$4,608 [- kr20,066] Cost-effectiveness regarding acute care Change in effect (n of days) = -3.00 Change in cost = \$1,825 Total healthcare costs IG: \$59,807 [kr260,425] CG: \$66,131 [kr287,964] Mean difference = - \$6,324 [- kr27,539]; P = 0.52

(Continued)

Table 3 (Continued).

Study; Country	Type of Economic Evaluation	Perspective	Time Horizon	Currency (Symbol); Price Year	Discounting; Analysis of Uncertainty	Key Findings (Mean per Person; in Whole AUD 2024) [Original Currency]
<i>Single disciplinary AH services – physiotherapy (physical therapy)</i>						
Cowie, 2014 ²⁷ UK	Cost analysis	Health system (NHS)	5 years	British pound (£); 2013/14 salary costs and 2011/12 admission costs	NR	Hospital admission/hospitalization cost IG: \$20,085 [£7,015] CG1: \$18,799 [£6,566] CG2: \$28,150 [£9,832] IG versus CG1: mean difference = \$1,286 [£449] IG versus CG2: mean difference = - \$8,065 [- £2,816] Total healthcare costs IG: \$20,630 [£7,212] CG1: \$19,413 [£6,788] CG2: \$28,150 [£9,832] IG versus CG1: mean difference = \$1,217 [£424] IG versus CG2: mean difference = - \$7,520 [- £2,620]
Farag, 2016 ⁴⁴ Australia	Cost analysis	Healthcare system	12 months	Australian dollar (\$); 2012	NR	Hospital admission/hospitalization cost IG: \$8,113 [\$6,199] CG: \$6,442 [\$4,922] Mean difference = \$1,671 [\$1,277] ED visit cost IG: \$65 [\$50] CG: \$73 [\$56] Mean difference = - \$8 [- \$6] Cost-effectiveness regarding acute care Change in effect (n of admissions) = 0.14 Change in cost = \$1,663 Total non-healthcare costs IG: \$3,504 [\$2,677] CG: \$2,752 [\$2,103] Mean difference = \$752 [\$574]

Fritz, 2012 ²⁹ US	Cost analysis	NR	18 months	US dollar (\$); NR	NR	ED visit cost Delayed: \$49 [\$25] Early: \$51 [\$26] Adherent: \$49 [\$25] Nonadherent: \$57 [\$29] Delayed versus Early: Mean difference = - \$2 [- \$1] Adherent versus Nonadherent: Mean difference = - \$8 [- \$4] Hospital admission/hospitalization cost • Surgical/injection procedures Delayed: \$5,389 [\$2,761] Early: \$1,989 [\$1,019] Adherent: \$2,820 [\$1,445] Nonadherent: \$3,837 [\$1,966] Delayed versus Early: Mean difference = \$3,400 [\$1,742] Adherent versus Nonadherent: Mean difference = - \$1,017 [- \$521] • Inpatient nonsurgical procedures Delayed: \$453 [\$232] Early: \$127 [\$65] Adherent: \$316 [\$162] Nonadherent: \$279 [\$143] Delayed versus Early: Mean difference = \$326 [\$167] Adherent versus Nonadherent: Mean difference = \$37 [\$19] • Totalled hospitalization Delayed: \$5,842 [\$2,993] Early: \$2,116 [\$1,084] Adherent: \$3,136 [\$1,607] Nonadherent: \$4,116 [\$2,109] Delayed versus Early: Mean difference = \$3,726 [\$1,909] Adherent versus Nonadherent: Mean difference = - \$980 [- \$502] Total healthcare costs Delayed: \$11,487 [\$5,885] Early: \$6,144 [\$3,148] Adherent: \$7,044 [\$3,609] Nonadherent: \$9,654 [\$4,946] Delayed versus Early: Mean difference = \$5,343 [\$2,737; 95% CI \$1,810.67 to \$3,661.78] Adherent versus Nonadherent: Mean difference = - \$2,610 [- \$1,337; 95% CI \$202.28 to \$2,546.31]
---------------------------------	---------------	----	-----------	--------------------	----	--

(Continued)

Table 3 (Continued).

Study; Country	Type of Economic Evaluation	Perspective	Time Horizon	Currency (Symbol); Price Year	Discounting; Analysis of Uncertainty	Key Findings (Mean per Person; in Whole AUD 2024) [Original Currency]
Salisbury, 2013 ⁴⁶ UK	Cost consequences and CUA	Societal (including NHS, patient and carer; and lost productivity)	6 months	British pound (£); 2009	No discounting; uncertainty was addressed by estimating CIs around the net benefit statistic and CEACs, sensitivity analyses and multiple imputation of missing data	ED visit cost IG: \$9 [£3] CG: \$6 [£2] Mean difference = \$3 [£1] Hospital admission/hospitalization cost IG: \$105 [£35] CG: \$153 [£51] Mean difference = - \$48 [- £16] Cost-effectiveness regarding acute care Change in effect (n of admissions) = 0.01 Change in cost = - \$33 Total healthcare costs (including physiotherapy) IG: \$590 [£196] CG: \$569 [£189] Mean difference = \$21 [£7; 95% CI - £49.68 to £64.10] Total non-healthcare costs IG: \$725 [£241] CG: \$834 [£277] Mean difference = - \$109 [- £36; 95% CI - £174.69 to £102.66] Other integrated costs IG: \$337 [£112] CG: \$99 [£33] Mean difference = \$238 [£79; 95% CI - £54.91 to £212.85]

Suikkanen, 2021 ⁴⁰ Finland	CUA	NR	24 months	Euro (€); corrected to the 2018 level	NR; bootstrapping	ED visit cost 12 months IG: \$1,305 [€683] CG: \$1,127 [€590] Mean ratio = 1.16; 95% CI 0.66 to 1.65; mean difference = \$178 [€93] 24 months IG: \$1,383 [€724] CG: \$1,104 [€578] Mean ratio = 1.25; 95% CI 0.76 to 1.75; mean difference = \$279 [€146] Hospital admission/hospitalization cost 12 months IG: \$9,422 [€4,931] CG: \$6,963 [€3,644] Mean ratio = 1.35; 95% CI 0.48 to 2.22; mean difference = \$2,459 [€1,287] 24 months IG: \$9,677 [€5,064] CG: \$7,559 [€3,956] Mean ratio = 1.28; 95% CI 0.53 to 2.03; mean difference = \$2,118 [€1,108] Cost-effectiveness regarding acute care 12 months Change in effect (n of days) = 1.31 Change in cost = \$15,349 24 months Change in effect (n of days) = 1.02 Change in cost = \$8,806 Other integrated costs 12 months IG: \$64,662 [€33,839] CG: \$40,417 [€21,151] Mean ratio = 1.60; 95% CI 1.23 to 1.98; mean difference = \$24,245 [€12,688] 24 months IG: \$56,233 [€29,428] CG: \$45,786 [€23,961] Mean ratio = 1.23; 95% CI 0.95 to 1.50; mean difference = \$10,447 [€5,467]
Zanaboni, 2013 ⁴¹ Norway	Cost analysis	NR	12 months	Norwegian krone (kr); NR	NR	Combined costs Pre: \$5,254 [kr20,287] Post: \$3,853 [kr14,875] Mean difference = - \$1,401 [- kr5,412] Cost-effectiveness regarding acute care Change in effect (n of days) = -0.60 Change in cost = - \$1,401
Single disciplinary AH services – nutrition and dietetics						

(Continued)

Table 3 (Continued).

Study; Country	Type of Economic Evaluation	Perspective	Time Horizon	Currency (Symbol); Price Year	Discounting; Analysis of Uncertainty	Key Findings (Mean per Person; in Whole AUD 2024) [Original Currency]
Endevelt, 2011 ²⁸ Israel	Cost analysis	NR	6 months	US dollar (\$); NR	NR	Hospital admission/hospitalization cost IG: \$2,213 [\$1,113] CG1: \$3,333 [\$1,676] CG2: \$3,092 [\$1,555] IG versus CG1: mean difference = - \$1,120 [- \$563] IG versus CG2: mean difference = - \$879 [- \$443] P = 0.15
Gurvey, 2013 ³⁰ US	Cost analysis	NR	12 months	US dollar (\$); NR	NR	Hospital admission/hospitalization cost • Within-group Pre: \$225,765 [\$117,692] Post: \$93,700 [\$48,846] Mean difference = - \$132,065 [- \$68,846] • Between-group (calculation not possible due to insufficient data) ED visit cost • Between-group (calculation not possible due to insufficient data) Cost-effectiveness regarding acute care • Within-group Change in effect (n of admissions) = -0.3 Change in cost = - \$132,065 Total healthcare costs • Within-group Pre: \$312,943 [\$163,138] Post: \$223,139 [\$116,323] Mean difference = - \$89,804 [- \$46,815] • Between-group (calculation not possible due to insufficient data)
Single disciplinary AH services – social work						

Weerahandi, 2015 ⁴³ US	Cost analysis	NR	180 days	US dollar (\$); NR	NR	ED visit cost • Within-group (30 days) Pre: \$267 [\$143] Post: \$216 [\$116] Mean difference = - \$51 [- \$27] • Within-group (180 days) Pre: \$1,029 [\$552] Post: \$895 [\$480] Mean difference = - \$134 [- \$73] • Between-group (30 days) IG: \$216 [\$116] CG: \$166 [\$89] Mean difference = \$50 [\$27] • Between-group (180 days) IG: \$895 [\$480] CG: \$833 [\$447] Mean difference = \$62 [\$33] Hospital admission/hospitalization cost • Within-group (30 days) Pre: \$39,852 [\$21,375] Post: \$8,779 [\$4,709] Mean difference = - \$31,073 [- \$16,666] • Within-group (180 days) Pre: \$83,864 [\$44,982] Post: \$38,845 [\$20,835] Mean difference = - \$45,019 [- \$24,147] • Between-group (30 days) IG: \$8,779 [\$4,709] CG: \$11,537 [\$6,188] Mean difference = - \$2,758 [- \$1,479] • Between-group (180 days) IG: \$38,845 [\$20,835] CG: \$37,790 [\$20,269] Mean difference = \$1,055 [\$566] Cost-effectiveness regarding acute care • Within-group (30 days) Change in effect (n of admissions) = -154.95 Change in cost = - \$30,997 • Between-group (30 days) Change in effect (n of admissions) = -0.08 Change in cost = - \$2,581 • Between-group (180 days) Change in effect (n of admissions) = 0.10 Change in cost = \$1,264 Total healthcare costs • Within-group (30 days) Pre: \$40,118 [\$21,518] Post: \$9,123 [\$4,893] Mean difference = - \$30,995 [- \$16,625] • Within-group (180 days) Pre: \$84,894 [\$45,534] Post: \$39,885 [\$21,393] Mean difference = - \$45,009 [- \$24,140] • Between-group (30 days) IG: \$9,123 [\$4,893] CG: \$11,705 [\$6,278] Mean difference = - \$2,582 [- \$1,385] • Between-group (180 days) IG: \$39,885 [\$21,393] CG: \$38,623 [\$20,716] Mean difference = \$1,262 [\$678]
Single disciplinary AH services – exercise physiology						

(Continued)

Table 3 (Continued).

Study; Country	Type of Economic Evaluation	Perspective	Time Horizon	Currency (Symbol); Price Year	Discounting; Analysis of Uncertainty	Key Findings (Mean per Person; in Whole AUD 2024) [Original Currency]
Brusco, 2023 ⁴² Australia	CUA and CEA	Societal	18 months	Australian dollar (\$); 2020–21	No discounting; bootstrapping and sensitivity analyses to characterize cost and effect uncertainty	Hospital admission/hospitalization cost Pre: \$6,247 [\$5,650] Post: \$523 [\$473] Mean difference = - \$5,724 [- \$5,177]; P = 0.123 Cost-effectiveness regarding acute care Change in effect (n of days) = -2.42 Change in cost = - \$3,094 Other integrated costs (including intervention and maintenance) Pre: \$10,796 [\$9,764] Post: \$5,726 [\$5,179] Mean difference = - \$5,070 [- \$4,585]; P = 0.227

Note: cost-effectiveness regarding acute care includes the costs of all admissions and intervention.
Abbreviations: AUD, Australian dollar; AH, allied health; CEA, cost-effectiveness analysis; CEAC(s), cost-effectiveness acceptability curve(s); CG, comparison group; CI(s), confidence interval(s); CUA, cost-utility analysis; ED, emergency department; IG, intervention group; n, number; NHS, National Health Service; NR, not reported; UK, United Kingdom; US, United States.

Findings from Multidisciplinary AH Services

Two studies^{39,45} evaluated the economic impact of multidisciplinary AH services on the acute sector, in comparison to *other intervention* and *usual care*. Both reported changes in at least two primary outcome domains, including cost-effectiveness regarding acute care ($n = 2$), hospital admission/hospitalization cost ($n = 2$), and ED visit cost ($n = 1$). For secondary outcomes, while both studies reported a change in total healthcare costs, only one study further revealed changes in total non-healthcare costs and other integrated costs. [Table 3](#) outlines key findings of the included studies; [Table S7](#) presents detailed outcomes extracted from individual studies; and [Table S8](#) shows a breakdown of the changes in effects and costs for evaluating cost-effectiveness.

Primary Outcome – Cost-Effectiveness Regarding Acute Care

Both studies were plotted on the cost-effectiveness plane, showing mixed findings ([Figure 2](#)). Kraal et al³⁹ suggested that the AH service was cost-saving but less effective compared to *other intervention*. The breakdown of the mean difference in effect and cost highlighted that the intervention was associated with an increase in hospital admissions but a decrease in associated cost ([Table S8](#)). By contrast, Tistad and von Koch⁴⁵ found that the AH service was more effective but costly than *usual care* due to high intervention cost ([Table S8](#)).

Primary Outcome – Hospital Admission/Hospitalization Cost

Both Kraal et al³⁹ and Tistad and von Koch⁴⁵ suggested a cost saving in favor of the AH service, with one³⁹ further suggesting the finding being statistically non-significant. Specifically, Kraal et al³⁹ indicated a lower cost of AUD 424 per person during the one-year study period, when comparing telemonitoring guided home-based cardiac rehabilitation with an outpatient clinic-based mode [*other intervention*]. Similarly, Tistad and von Koch⁴⁵ found that early supported discharge with continued home-based rehabilitation was associated with lower recurrent inpatient care and rehabilitation

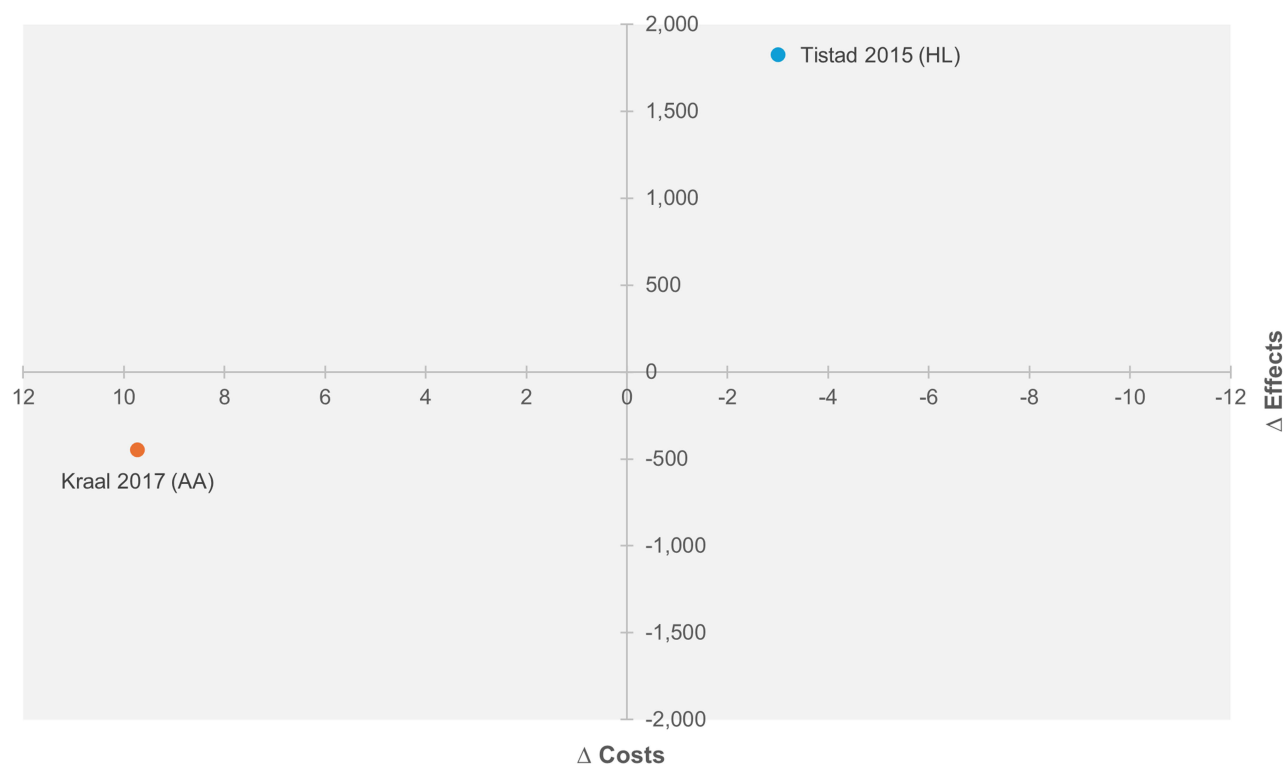


Figure 2 Cost-effectiveness plane for multidisciplinary AH services. Estimates in the northwestern quadrant indicate the intervention is less effective and more costly; estimates in the southwestern quadrant indicate the intervention is less effective and less costly; estimates in the southeastern quadrant indicate the intervention is more effective and less costly; estimates in the northeastern quadrant indicate the intervention is more effective and more costly. Key: Δ , change.

Abbreviations: AA, all admissions; AH, allied health; HL, hospital length of stay.

costs (AUD 3,808 and AUD 801 per person, respectively) than conventional rehabilitation [*usual care*] for patients during the first year after stroke onset, leading to an overall cost saving of AUD 4,608 per person.

Primary Outcome – ED Visit Cost

In contrast to the cost savings related to hospitalizations, Kraal et al³⁹ reported a higher, non-significant cost of AUD 28 per person in the intervention group, compared to the comparison group at the one-year follow-up.

Secondary Outcome – Total Healthcare Costs

Despite varied use of healthcare resources between the two studies, both revealed non-significant cost savings in favor of the AH service.^{39,45} Kraal et al³⁹ assessed the combined costs of healthcare visits, healthcare admissions, medication use and interventions, and reported a cost saving of AUD 1,033 per person at the one-year follow-up. Consistently, Tistad and von Koch⁴⁵ found a cost saving of AUD 6,324 per person, when compared the total costs of all healthcare services, in terms of inpatient care and rehabilitation, specialized outpatient care and rehabilitation, and primary care, between the AH service and the comparator over 12 months after stroke.

Secondary Outcome – Total Non-Healthcare Costs

In addition to total healthcare costs, Kraal et al³⁹ also estimated total non-healthcare costs during the one-year study period, consisting of paid and unpaid absenteeism. The study identified a non-significant cost saving of AUD 6,453 per person in favor of the intervention.

Secondary Outcome – Other Integrated Costs

From a societal perspective (ie, the sum of total healthcare and non-healthcare costs with presenteeism), Kraal et al³⁹ further identified a non-significant cost saving of AUD 14,423 per person favoring the home-based cardiac rehabilitation.

Findings from Single Disciplinary AH Services – Physiotherapy

Six studies assessed the economic impact of physiotherapy services on the acute sector.^{27,29,40,41,44,46} All reported a difference in at least one primary outcome domain, including hospital admission/hospitalization cost (n = 5), ED visit cost (n = 4), cost-effectiveness regarding acute care (n = 4), and combined costs (n = 1). For secondary outcomes, three studies identified changes in total healthcare costs, two reported changes in total non-healthcare costs, and a further two revealed changes in other integrated costs. Both within- and between-group comparisons were described within relevant outcome domains. For between-group comparisons, the impact of the physiotherapy service was compared with *usual care* and *other intervention* (Tables 3, S7 and S8).

Primary Outcome – Cost-Effectiveness Regarding Acute Care

Four studies were plotted on the cost-effectiveness plane, presenting mixed findings (Figure 3). In comparison to *usual care*, two studies suggested that the physiotherapy service was less effective and costed more,^{40,44} while one study found the intervention was slightly less effective but cost-saving.⁴⁶ For the latter study, the breakdown of the mean difference in effect and cost highlighted that the AH service was associated with no difference in hospital admissions and a decrease in associated cost (Table S8). For pre-post comparison, Zanaboni et al⁴¹ showed that the implementation of the physiotherapy service was more cost-effective (intervention costs not reported).

Primary Outcome – Hospital Admission/Hospitalization Cost

Collectively, five studies demonstrated mixed findings regarding hospital admission/hospitalization cost. Of these, one study²⁹ examined costs associated with the timing and content of the physiotherapy service; the remaining studies assessed between-group differences, including two reported positive findings favoring the comparator,^{40,44} one found a positive finding favoring the physiotherapy service,⁴⁶ and another reported mixed findings.²⁷

Fritz et al²⁹ estimated within-group changes by comparing the timing (delayed versus early) and content (adherent versus nonadherent) of physiotherapy for LBP management during the 18-month follow-up. The study identified greater costs for both surgical/injection and inpatient nonsurgical procedures among participants who received delayed physiotherapy, compared to those with early physiotherapy (AUD 3,400 and AUD 326 per person, respectively), leading to

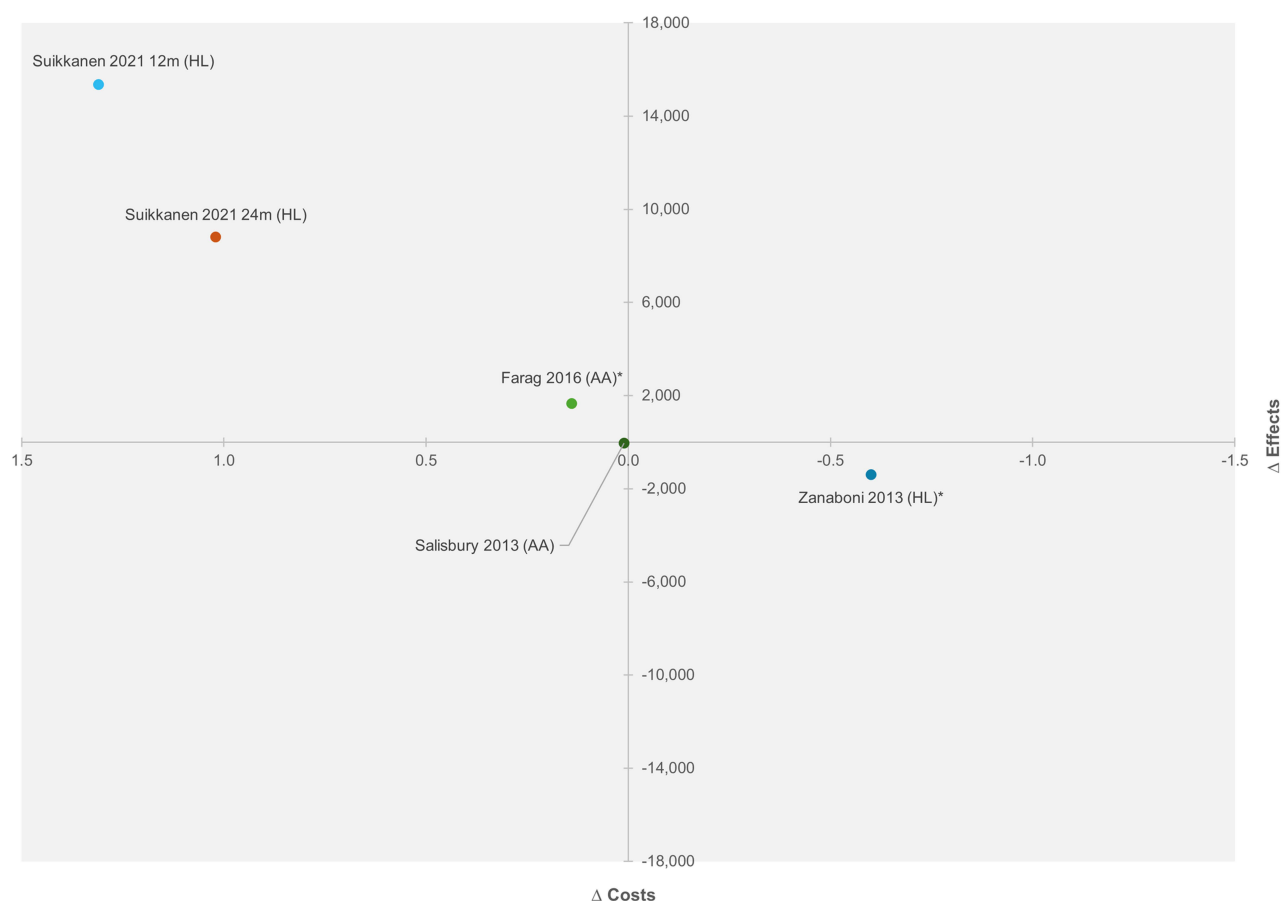


Figure 3 Cost-effectiveness plane for physiotherapy services. Estimates in the northwestern quadrant indicate the intervention is less effective and more costly; estimates in the southwestern quadrant indicate the intervention is less effective and less costly; estimates in the southeastern quadrant indicate the intervention is more effective and less costly; estimates in the northeastern quadrant indicate the intervention is more effective and more costly. Key: Δ , change; *, intervention costs not reported. **Abbreviations:** AA, all admissions; HL, hospital length of stay; m, months.

an overall increase in cost of AUD 3,726. On the other hand, adherent physiotherapy was associated with a total cost saving of AUD 980 per person than nonadherent physiotherapy, resulting from a lower cost of AUD 1,017 for surgical/injection procedures but a greater cost of AUD 37 for inpatient nonsurgical procedures.²⁹

In comparison to *usual care*, two studies^{40,44} identified a greater cost in the intervention group, albeit one study⁴⁰ suggested no significant between-group difference; conversely, two other studies^{27,46} indicated a cost saving in the intervention group. While Farag et al⁴⁴ discovered that recently discharged elderly receiving home-based exercise spent AUD 1,671 more per person during the 12-month study period, Suikkanen et al⁴⁰ found a higher cost of AUD 2,459 per person among pre-frail and frail elderly receiving home-based physical exercise for the same duration. The latter study further highlighted the enduring elevated cost at 24 months, with a difference of AUD 2,118 per person.⁴⁰ By contrast, Salisbury et al⁴⁶ evaluated a telephone assessment and advice service for musculoskeletal problems and reported a cost saving of AUD 48 per person at the six-month follow-up. Consistently, Cowie and Moseley²⁷ found a cost saving of AUD 8,065 per person of delivering a home-based exercise training versus *usual care* in heart failure patients over five years. However, when the intervention was compared with hospital-based training [*other intervention*], a greater cost of AUD 1,286 per person was discovered during the five-year study period.²⁷

Primary Outcome – ED Visit Cost

Collectively, four studies identified mixed findings regarding ED visit cost. Of these, one study²⁹ focused on within-group change; the remainder evaluated between-group differences, with two suggesting positive findings favoring the comparator,^{40,46} and another reporting a positive finding favoring the AH service.⁴⁴

Fritz et al²⁹ compared the timing and content of the physiotherapy service and reported cost savings of AUD 2 per person for delayed versus early physiotherapy, and AUD 8 per person for adherent versus nonadherent physiotherapy at the 18-month follow-up.

Three studies discussed differences between the physiotherapy service and *usual care*.^{40,44,46} Salisbury et al⁴⁶ found a greater cost of AUD 3 per person in the intervention than the control group at the six-month follow-up. This finding was supported by Suikkanen et al,⁴⁰ in which higher costs were associated with the intervention at both the 12-month and 24-month follow-ups (AUD 178 and AUD 279 per person, respectively), despite statistical significance not being achieved. By contrast, Farag et al⁴⁴ reported a cost saving of AUD 8 per person in favor of the intervention during the 12-month study period.

Primary Outcome – Combined Costs

Zanaboni et al⁴¹ compared the difference in COPD-related hospital costs (a combination of hospital admissions, visits and LOS) between six months before and six months after implementation of a home-based telerehabilitation. The study suggested a cost saving of AUD 1,401 per person post-implementation, as a result of fewer hospital visits and shorter LOS.

Secondary Outcome – Total Healthcare Costs

Collectively, three studies discovered mixed findings regarding total healthcare costs. Of these, one study²⁹ assessed within-group change; the other two estimated between-group differences, with one suggesting mixed findings,²⁷ and another reporting a positive finding favoring the comparator.⁴⁶

Fritz et al²⁹ investigated within-group change in total LBP-related healthcare costs, including imaging procedures, doctor visits, surgical/injection procedures, inpatient nonsurgical procedures, ED visits, prescription medication, and other LBP-related costs, over the 18-month study period. The study found that delayed physiotherapy incurred a significantly greater cost of AUD 5,343 per person, compared to early physiotherapy; whereas adherent physiotherapy led to a significant cost saving of AUD 2,610 per person, compared to nonadherent physiotherapy.

Salisbury et al⁴⁶ compared the physiotherapy service with *usual care* regarding total costs of healthcare resource use relevant to the management of musculoskeletal conditions, in terms of primary and community care, hospital care, and the use of the service. The study found a higher non-significant cost of AUD 21 per person at the six-month follow-up.⁴⁶ By contrast, Cowie and Moseley²⁷ focused on totaled costs of hospital admissions and interventions, and reported a cost saving of AUD 7,520 per person favoring the intervention during the five-year study period. However, when the home-based exercise training was compared with *other intervention*, there was a greater cost of AUD 1,217 per person.²⁷

Secondary Outcome – Total Non-Healthcare Costs

Two studies identified mixed findings regarding total non-healthcare costs, when compared the physiotherapy service with *usual care*. Salisbury et al⁴⁶ estimated the cost of lost production associated with time off work and usual activities by patients and their carers, and found a non-significant cost saving of AUD 109 per person favoring the intervention over six months. By contrast, Farag et al⁴⁴ reported that participants who received the home-based exercise experienced higher total costs for social support services during the 12-month study period, with a difference being AUD 752 per person.

Secondary Outcome – Other Integrated Costs

Two studies further evaluated between-group differences in other integrated costs, including total direct and indirect costs to patients and their families, or use of healthcare and social services.^{40,46} Both suggested positive findings favoring *usual care*. While Salisbury et al⁴⁶ reported a non-significant difference of AUD 238 per person regarding total costs to patients and their carers at the six-month follow-up, Suikkanen et al⁴⁰ found differences of AUD 24,245 and AUD 10,447 per person at the 12-month and 24-month follow-ups, respectively, with the 12-month difference showing statistical significance.

Findings from Single Disciplinary AH Services – Nutrition and Dietetics

Two studies estimated the economic impact of nutrition and dietetics services on the acute sector.^{28,30} Both reported a cost difference in hospital admission/hospitalization cost; one study also examined cost-effectiveness regarding acute care, and changes in total healthcare costs. Both within- and between-group comparisons were described within relevant outcome domains. For between-group comparisons, the impact of the nutrition and dietetics service was compared with *other intervention* and *usual care*. Both studies did not report intervention costs (Tables 3, S7 and S8).

Primary Outcome – Cost-Effectiveness Regarding Acute Care

Based on the pre-post change in hospital admissions and cost, Gurvey et al³⁰ suggested that the implementation of the AH service was more cost-effective. This study was not plotted on the cost-effectiveness plane due to a substantial deviation from other cost values.

Primary Outcome – Hospital Admission/Hospitalization Cost

Both Endevelt et al²⁸ and Gurvey et al³⁰ reported a cost saving in favor of the AH service, with one²⁸ further suggesting the finding being statistically non-significant. Specifically, Gurvey et al³⁰ reported a reduced cost of AUD 132,065 per person in chronically ill and nutritionally at-risk individuals during the six months after receiving a meal delivery service combined with medical nutritional therapy, compared to the six months prior. Endevelt et al²⁸ compared an individualized intensive nutritional intervention to medical treatment combined with an educational booklet [*other intervention*] and standard care [*usual care*] for malnourished community-dwelling elderly, and indicated cost savings of AUD 1,120 and AUD 879 per person, respectively, during the six-month follow-up.

Secondary Outcome – Total Healthcare Costs

Gurvey et al³⁰ further examined within-group change regarding total healthcare costs and revealed a cost saving of AUD 89,804 per person during the six months following implementation, compared to before implementation.

Findings from Single Disciplinary AH Services – Social Work

One study⁴³ evaluated the impact of a psychosocial transitional care program for high hospital service utilizers, with both within- and between-group changes in cost-effectiveness regarding acute care, hospital admission/hospitalization cost, ED visit cost, and total healthcare costs being estimated. For between-group comparison, the social work service was compared with the matched control group receiving standard care [*usual care*] (Tables 3, S7 and S8).

Primary Outcome – Cost-Effectiveness Regarding Acute Care

The pre-post change at 30 days and the between-group differences at both 30 and 180 days were plotted on the cost-effectiveness plane (Figure 4). Collectively, mixed findings were identified. In comparison to pre-implementation, Weerahandi et al⁴³ suggested that the implementation of the AH service was more cost-effective. This was supported by the between-group comparison at 30 days. However, the intervention became more costly and slightly less effective at 180 days.

Primary Outcome – Hospital Admission/Hospitalization Cost

Weerahandi et al⁴³ identified mixed findings regarding 30- and 180-day readmission costs. For pre-post comparison, the study identified cost savings of AUD 31,073 and AUD 45,019 per person for 30- and 180-day readmission, respectively, after the implementation of the social work service. Similarly, a cost saving of AUD 2,758 per person at 30 days was found in the intervention group, compared to *usual care*. However, the cost saving was not sustained at 180 days, as the intervention group incurred a higher cost of AUD 1,055 than the comparison group.

Primary Outcome – ED Visit Cost

In line with the previous outcome domain, mixed findings were also discovered for 30- and 180-day ED visit costs.⁴³ The within-group comparison demonstrated cost savings of AUD 51 and AUD 134 per person for 30- and 180-day ED visit, respectively, after the implementation of the social work service. By contrast, the costs associated with ED visits were

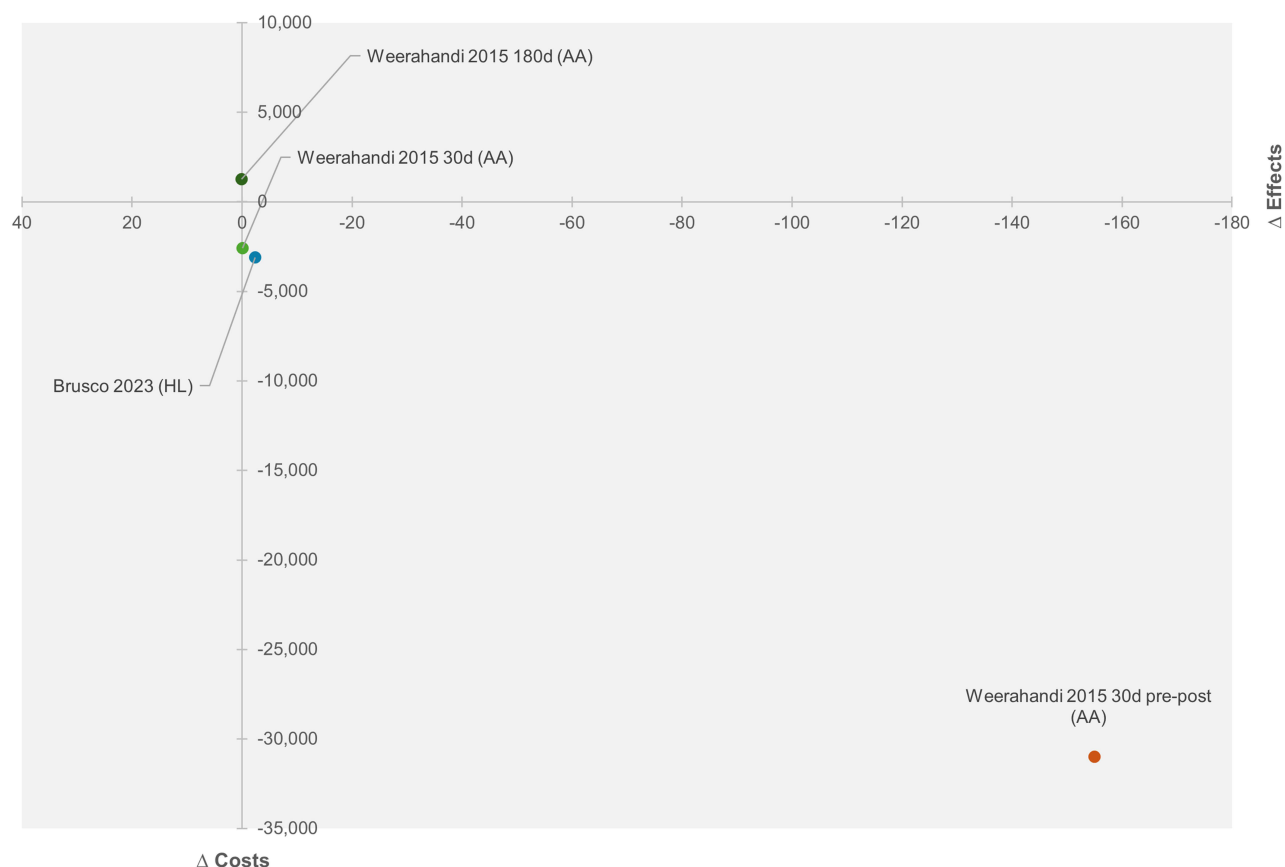


Figure 4 Cost-effectiveness plane for social work and exercise physiology services. Estimates in the northwestern quadrant indicate the intervention is less effective and more costly; estimates in the southwestern quadrant indicate the intervention is less effective and less costly; estimates in the southeastern quadrant indicate the intervention is more effective and less costly; estimates in the northeastern quadrant indicate the intervention is more effective and more costly. Key: Δ , change. **Abbreviations:** AA, all admissions; d, days; HL, hospital length of stay.

greater in the intervention group than the comparison group at both 30 and 180 days (AUD 50 and AUD 62 per person, respectively).

Secondary Outcome – Total Healthcare Costs

Weerahandi et al⁴³ further estimated the combined costs of ED visits, hospitalizations and the intervention. When compared to pre-implementation, cost savings of AUD 30,995 and AUD 45,009 per person were found at 30- and 180-day post-implementation, respectively. Consistently, a cost saving of AUD 2,582 per person at 30 days was found in the intervention group, compared to *usual care*. However, the cost saving was not sustained at 180 days, with the intervention group experiencing a higher cost of AUD 1,262 per person.

Findings from Single Disciplinary AH Services – Exercise Physiology

One study⁴² investigated within-group changes in cost-effectiveness regarding acute care, hospital admission/hospitalization cost, and other integrated costs following a structured, supervised exercise for elderly in local senior exercise parks (Tables 3, [S7](#) and [S8](#)).

Primary Outcome – Cost-Effectiveness Regarding Acute Care

The cost-effectiveness plane indicated that the implementation of the AH service was more cost-effective than pre-implementation (Figure 4).⁴²

Primary Outcome – Hospital Admission/Hospitalization Cost

Brusco et al⁴² found a cost saving of AUD 5,724 per person during the six-month post-implementation period, compared to the six-month period prior to participation, albeit statistical significance was not achieved.

Secondary Outcome – Other Integrated Costs

The study also estimated the combined costs of health and services utilizations, productivity loss and the intervention, and revealed a non-significant cost saving of AUD 5,070 per person post-implementation.⁴²

Summary of Evidence

Drawing from a moderate body of research evidence that encompasses various study designs, types of economic evaluations, and methodological quality, this review discovered mixed findings regarding the economic impact of community-based AH services in three aspects. For acute care costs, the majority of included studies showed some level of cost savings associated with the AH service, in terms of ED visit and/or hospital admission/hospitalization costs (Figure 5). For cost-effectiveness regarding acute care, a greater proportion of the evidence suggested that the AH service is more cost-effective, or at least demonstrates potential cost-effectiveness depending on the cost-effectiveness threshold (ie, cost-saving but less effective, or more effective but costly) (Figure 6). However, this evidence base was formed from a smaller cohort of the included studies ($n = 9$). For total healthcare and non-healthcare costs, most studies revealed cost savings favoring the AH service, albeit with varied use of healthcare and community/social support resources and from diverse economic perspectives (Figure 7). Likewise, the evidence was based on a smaller proportion of the included studies ($n = 9$).

Collectively, there are two key aspects to be considered when interpreting these findings. First, the methodological flaws related to general study designs and economic evaluations, such as small sample size, limited reporting of items relevant to economic evaluations (eg, perspective, method of outcome valuation, discounting, and sensitivity analysis), issues with partial economic evaluations (eg, lack of incremental analysis), and inadequate reporting of psychometric properties of the outcome measures and avoidance of contamination and co-interventions. Second, the heterogeneity of the evidence base, in terms of target populations/conditions, types of AH services, economic perspectives, data collection and analysis approaches, and outcomes, which challenged robust comparisons.

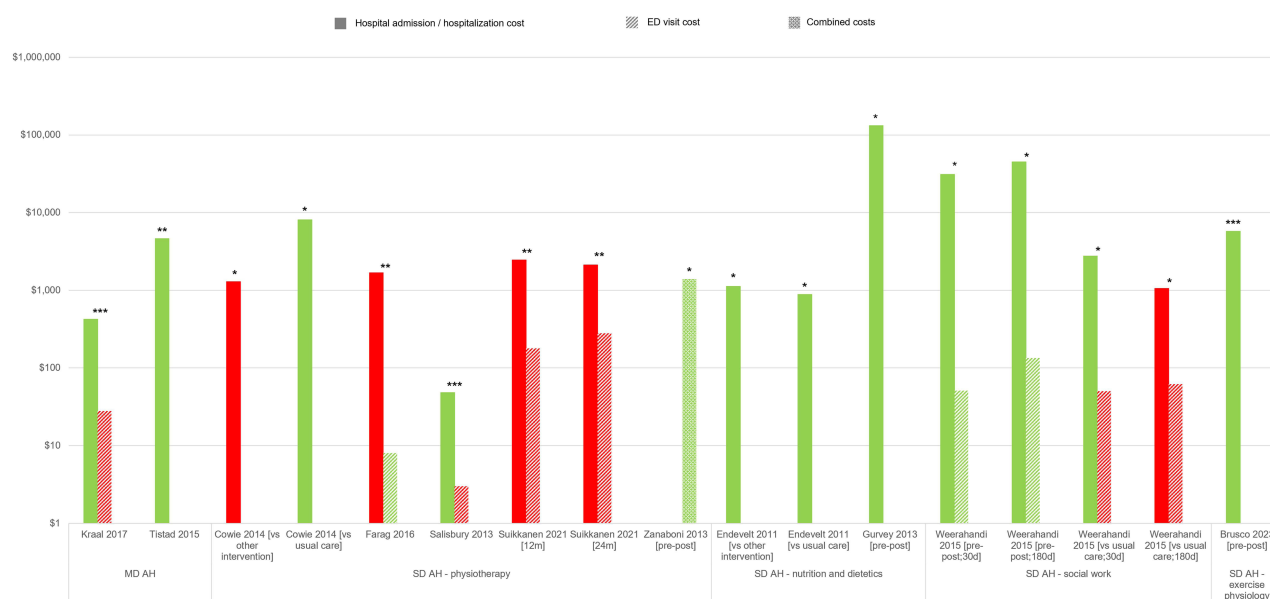


Figure 5 Overview of acute care costs. Color code: Green, cost saving favoring the AH service; Red, cost saving favoring the comparator. Key: ***, high methodological quality of economic evaluation; **, moderate methodological quality of economic evaluation; *, low methodological quality of economic evaluation.

Abbreviations: AH, allied health; d, days; m, months; MD, multidisciplinary; SD, single disciplinary; vs, versus.

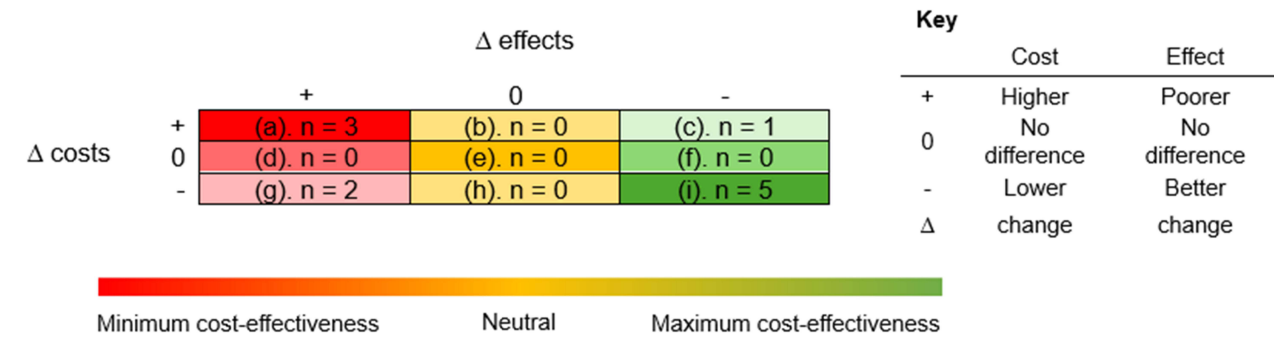


Figure 7 Overview of total healthcare and non-healthcare costs. Color code: Green, cost saving favoring the AH service; Red, cost saving favoring the comparator. Key: ***, high methodological quality of economic evaluation; **, moderate methodological quality of economic evaluation; *, low methodological quality of economic evaluation.

Abbreviations: AH, allied health; d, days; m, months; MD, multidisciplinary; SD, single disciplinary; vs, versus.

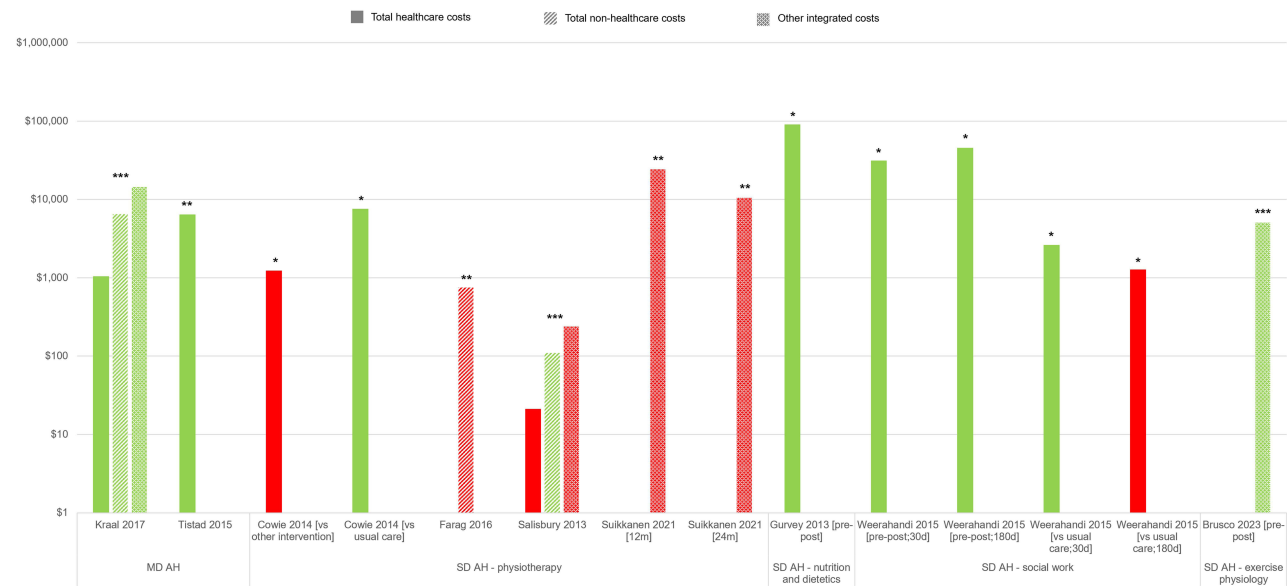


Figure 7 Overview of total healthcare and non-healthcare costs. Color code: Green, cost saving favoring the AH service; Red, cost saving favoring the comparator. Key: ***, high methodological quality of economic evaluation; **, moderate methodological quality of economic evaluation; *, low methodological quality of economic evaluation.

Abbreviations: AH, allied health; d, days; m, months; MD, multidisciplinary; SD, single disciplinary; vs, versus.

Discussion

Decisions underpinned by evidence that primarily focuses on the effectiveness of a health intervention may lead to inefficient, even wasteful practice and policy approaches. In the context of community-based AH, while the previous review¹⁵ suggested a potential positive impact on acute care utilization with wide acceptance among consumers, little is known about their economic outcomes. This systematic review aimed to address this gap. A moderate body of evidence, consisting of 12 studies, was identified. The findings revealed mixed evidence regarding the impact of community-based AH on acute care costs and cost-effectiveness. The mixed evidence base was also observed for the secondary outcomes of total healthcare and non-healthcare costs. For both primary and secondary outcomes, there was a considerable proportion of the evidence indicating trends towards cost savings and cost-effectiveness favoring the AH service. However, most findings were formed from a smaller cohort of studies, suggesting a limited evidence base.

The mixed findings regarding the impact of community-based AH on acute care costs resonate with, and add to, the current body of evidence on community-based health services. For example, a systematic review⁴⁷ examined the effectiveness and related costs of nurse-led case management for community-dwelling patients with heart failure on reducing unplanned hospital admissions and LOS. The review reported mixed findings, including no significant difference between case management and usual care, and cost savings favoring the intervention.⁴⁷ Another integrative review⁴⁸ assessed the impact of community nurse-led interventions on hospital use among elderly, and found cost savings associated with the intervention.

Based on the changes in acute care costs and effects, cost-effectiveness was further examined to determine if community-based AH provides good value for money. Overall, a greater proportion of the evidence showed that the AH service was more cost-effective than the comparator. This was driven by the number and the magnitude of cost savings associated with hospital admissions and LOS, coupled with the beneficial effects on utilization. This is not surprising as hospital LOS is a key driver of the consumption of hospital resources.⁴⁹ Another three included studies also partially contributed to the cost-effectiveness evidence base. Specifically, two studies^{39,46} found cost savings with reduced effects, suggesting a potential reduction in hospital LOS and/or diagnostic severity. Another study⁴⁵ showed a greater effect but at a higher cost, which was driven up by the intervention cost. The AH service in this study may gradually demonstrate cost-effectiveness in the longer term, as the upfront intervention costs are less diluted by discounting over a short time horizon, potentially outweighing the cost savings.⁵⁰ However, whether these interventions are considered cost-effective depend on society's willingness to pay for perceived benefits, or their willingness to accept reduced effects for a cost saving.

Cost-effectiveness was not assessed in all of the included studies, as some^{27,28} did not explicitly report a measure of effect. Therefore, the evidence base in this review is limited. This is in line with other reviews investigating cost-effectiveness of AH services in general (eg, ^{51–53}). Nevertheless, this review adds value to the existing body of literature from two key perspectives. First, unlike other reviews that have evaluated a single AH service among a specific population (eg, physiotherapy for chronic conditions⁵⁴ or following total hip replacement,⁵¹ occupational therapy for cognitive and/or functional decline,⁵² and nutrition therapy for type 2 diabetes⁵³), this review focuses on the diverse nature of AH in one healthcare setting (ie, PHC). The collection of literature can shed light on the economic benefits of AH through different lenses. Second, this review has a particular interest in short-term effects (ie, ED visits, hospital admissions, and LOS), as opposed to long-term effects that have been commonly reported in other reviews (eg, quality-adjusted life year [QALY], and number of falls).^{51,52,54} While long-term cost-effectiveness is important for health interventions, like AH, that target life-long consequences including morbidity and disability, short-term cost-effectiveness is equally important to demonstrate the impact at different levels and across multiple sectors.

Total healthcare and non-healthcare costs that are directly or indirectly related to the management of the target condition(s) were another key aspect assessed in this review. Collectively, the findings were mixed, albeit most studies revealed cost savings favoring the AH service. The varied use of healthcare and community/social support resources, and the adoption of various economic perspectives are likely contributors to the heterogeneous evidence base. Given the diverse scope of practice of AH professions, it is unsurprising to discover considerable variability in target populations with varying needs in the management of their conditions. This likely leads to the different use of healthcare and non-healthcare resources. Healthcare costs can vary significantly across jurisdictions, due to differences in health systems, such as economic policies, healthcare pricing and insurance coverage, and costs of resources.⁵⁵ Non-healthcare costs resulting from productivity loss, transportation, and use of community/social support resources can be influenced by factors including availability and accessibility of the needed services.⁵⁵ Depending on the economic perspective, healthcare and non-healthcare costs can also vary substantially. For example, out-of-pocket payments constitute a considerable proportion of the overall costs from the patient's perspective; whereas from the healthcare provider's perspective, they have minimal impact on the overall costs.

In this review, only half of the included studies explicitly indicated an economic perspective, including three that adopted a societal perspective, and a further three reported from a health system perspective. Adoption of a societal perspective in economic evaluations has been recommended across several international guidelines and some AH literature, as it considers a broad scope of costs that affect a wide range of relevant stakeholders.^{52,54,56} However,

Sittimart et al⁵⁶ argued that there is no one-size-fits-all approach, the selection of the “right” perspective is influenced by the context (eg, policymakers’ and stakeholders’ views, availability of resources and data) and intended use of the analysis (eg, the research question).⁵⁶

A consistent message stemming from community-based health service as well as AH literature is the lack of or limited availability of cost data (eg,^{47,48,52,53,57}), posing a significant challenge in drawing unequivocal conclusions on the economic benefits. This is supported by the findings from this systematic review. While the previous review¹⁵ identified a substantial body of evidence on the effectiveness of community-based AH on acute care utilization, less than 20% of the included studies described relevant cost data. Furthermore, most studies were not specifically designed as economic evaluations. Measuring outcomes and costs is one of the four domains used to assess a country’s alignment with value-based health care.⁵⁸ Therefore, routine collection, sharing, and analysis of health outcome and cost data and other relevant information is essential to the creation of value.⁵⁸

Strengths and Limitations

This review has several strengths. First, it followed best practice standards in the conduct and reporting of systematic reviews (ie, PRISMA). As recommended by van Mastrigt et al,¹⁸ the CHEERS 2022 statement was also used for reporting items relevant to economic evaluations. Another strength was the inclusion of both full and partial economic evaluations with various perspectives, which facilitated a comprehensive synthesis of results from the existing literature. However, there are some limitations to consider when interpreting, applying and generalizing the findings. First, the imprecise and complex nature of gray literature searching and the focus on studies published in English may be associated with publication and language biases. Second, the methodological flaws related to general study designs and economic evaluations among the included studies may lead to imprecise measures and the introduction of bias. Due to limited reporting of relevant information in several included studies, the data assumptions and accuracy of data conversions, including estimations of mean cost and effect per person, intervention costs and currency conversion, may underestimate the true costs and effects associated with the interventions. Additionally, classification of AH professions varies across different jurisdictions, as there is currently no universally agreed definition of AH.⁵⁹ Consequently, the findings may not be generalizable to all AH professions (eg, medical imaging, optometry, music/art therapy, etc). Furthermore, eight countries were included in this review, all of which were developed countries in the Western world. Therefore, the generalizability of the findings may be limited to other countries, especially developing countries.

Implications for Practice, Policy, and Future Research

Based on the findings from this review, a number of key implications for practice, policy, and future research emerge. Given the trends towards the economic benefits of community-based AH, ongoing investment in, and support for, AHP-led services are needed to complement other health services in the PHC sector. This may alleviate the pressures on acute care facilities and more broadly, promote financial sustainability within the health sector. The development and implementation of standardized mechanisms for routine collection, sharing, and analysis of relevant health outcome and cost data is imperative to strengthen future cost-effectiveness analysis. This requires not only health informatics infrastructure but also supportive policies and regulations, and organizational capabilities. To better inform future resource allocation decisions, it is recommended that economic evaluations be incorporated into routine practice when evaluating AH services. While the societal perspective is deemed as the most comprehensive approach to evaluating economic outcomes, future research should select the evaluation perspective based on the specific context and research question. A key issue in the studies included in this review was the limited reporting of all relevant data. Therefore, future economic evaluations could use current guidelines, such as the CHEERS 2022 statement,²⁰ to facilitate standardized reporting. This would enhance the methodological quality of economic evaluations in the field of AH. Furthermore, the findings from an economic evaluation are often limited to a specific setting or country. Therefore, it is important to assess the transferability (ie, the extent to which the results can be extrapolated from one setting or context to another) of economic evaluations when applying or generalizing the findings.¹⁸ This can be achieved by using one of the checklists identified by Goeree et al.⁶⁰

Conclusion

PHC plays a crucial role in keeping people well in the community and reducing the need for acute services. AH is an integral pillar of PHC. Community-based AH services have demonstrated their potential to alleviate the pressures on acute care utilization, with wide acceptance among consumers. However, decisions on resource allocation are underpinned by both effectiveness and efficiency perspectives. This review addresses the efficiency of community-based AH on the acute sector. Overall, the findings suggest trends towards the economic benefits of community-based AH, highlighting their potential to reduce the strain on the acute sector and the wider health system. However, the evidence base informing this review was limited. The findings present opportunities for future investment and ongoing research in services led by AHPs. Incorporation of economic evaluations into routine practice, standardized mechanisms for data collection, sharing and analysis, and use of existing tools in the conduct and reporting of economic evaluations are important aspects to consider as a means of strengthening the evidence base.

Abbreviations

AH, allied health; AHP(s), allied health professionals(s); AUD, Australian dollar; CCEMG-EPPI-Center, Campbell & Cochrane Economics Methods Group – Evidence for Policy and Practice Information – Center; CEA, cost-effectiveness analysis; CHEC-list, Consensus on Health Economic Criteria List; CHEERS, Consolidated Health Economic Evaluation Reporting Standards; COPD, chronic obstructive pulmonary disease; CUA, cost-utility analysis; ED, emergency department; EP, exercise physiologist; IMF, International Monetary Fund; LBP, low back pain; LOS, length of stay; OT(s), occupational therapist(s); PEO, Population, Exposure, Outcome; PHC, primary health care; PPP, purchasing power parity; PRISMA, Preferred Reporting Items for a Systematic review and Meta-Analysis; PT(s), physiotherapist(s)/physical therapist(s); RCT, randomized controlled trial; QALY, quality-adjusted life year; SLP(s), speech-language pathologist(s); UK, United Kingdom; US, United States; USD, United States dollar.

Data Sharing Statement

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

Funding

The first author (EJT) is a doctoral student and is supported by the Australian Government Research Training Program Scholarship. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Tan-Torres Edejer T, Garg C, Hernandez P, Van de Maele N, Indikadahena C. Health care costs, structures and trends. In: Heggenhougen HK, editor. *International Encyclopedia of Public Health*. Oxford: Academic Press; 2008:153–160.
2. Australian Institute of Health and Welfare. Health expenditure. Canberra: AIHW; 2024. Available from: <https://www.aihw.gov.au/reports/health-welfare-expenditure/health-expenditure>. Accessed June 24, 2025.
3. Chang AY, Cowling K, Micah AE, et al. Past, present, and future of global health financing: a review of development assistance, government, out-of-pocket, and other private spending on health for 195 countries, 1995–2050. *Lancet*. 2019;393(10187):2233–2260. doi:10.1016/S0140-6736(19)30841-4
4. Meskarpour Amiri M, Kazemian M, Motaghd Z, Abdi Z. Systematic review of factors determining health care expenditures. *Health Policy Technol*. 2021;10(2):100498. doi:10.1016/j.hlpt.2021.01.004
5. Stepovic M. GDP growth and health care expenditures worldwide. *Open Pharmacoe Health Eco J*. 2019;7(1):9–18. doi:10.2174/1874129001907010009
6. Schneider MT, Chang AY, Chapin A, et al. Health expenditures by services and providers for 195 countries, 2000–2017. *BMJ Glob Health*. 2021;6(7):e005799. doi:10.1136/bmjgh-2021-005799
7. Doshmangir L, Khabiri R, Jabbari H, Arab-Zozani M, Kakemam E, Gordeev VS. Strategies for utilisation management of hospital services: a systematic review of interventions. *Global Health*. 2022;18(1):53. doi:10.1186/s12992-022-00835-3

8. Vicente-Guijarro J, San Jose-Saras D, Aranaz-Andres JM. Inappropriate hospitalization: measurement approaches. *Med Clin*. 2024;163(2):91–97. doi:10.1016/j.medcli.2024.01.022
9. Uscher-Pines L, Pines J, Kellermann A, Gillen E, Mehrotra A. Emergency department visits for nonurgent conditions: systematic literature review. *Am J Manag Care*. 2013;19(1):47–59.
10. Rao M, Pilot E. The missing link—the role of primary care in global health. *Glob Health Action*. 2014;7:23693. doi:10.3402/gha.v7.23693
11. van Weel C, Kidd MR. Why strengthening primary health care is essential to achieving universal health coverage. *CMAJ*. 2018;190(15):E463–E466. doi:10.1503/cmaj.170784
12. Arsenault-Lapierre G, Henein M, Gaid D, Le Berre M, Gore G, Vedel I. Hospital-at-home interventions vs in-hospital stay for patients with chronic disease who present to the emergency department: a systematic review and meta-analysis. *JAMA Network Open*. 2021;4(6):e2111568. doi:10.1001/jamanetworkopen.2021.11568
13. Chan M, Gray M, Burns C, et al. Community-based interventions for childhood asthma using comprehensive approaches: a systematic review and meta-analysis. *Allergy Asthma Clin Immunol*. 2021;17(1):19. doi:10.1186/s13223-021-00522-9
14. Lizarondo L, Turnbull C, Kroon T, et al. Allied health: integral to transforming health. *Aust Health Rev*. 2016;40(2):194–204. doi:10.1071/ah15044
15. Tian EJ, Martin P, Ingram LA, Kumar S. Effectiveness and stakeholder views of community-based allied health on acute care utilization: a mixed methods review. *J Multidiscip Healthc*. 2024;17:5521–5570. doi:10.2147/jmdh.S489640
16. Shemilt I, McDaid D, Marsh K, et al. Issues in the incorporation of economic perspectives and evidence into Cochrane reviews. *Syst Rev*. 2013;2(1):83. doi:10.1186/2046-4053-2-83
17. Mosadeghrad AM, Jaafari-pooyan E, Zamandi M. Economic evaluation of health interventions: a critical review. *Iran J Public Health*. 2022;51(10):2159–2170. doi:10.18502/ijph.v51i10.10975
18. van Mastrigt GA, Hiligsmann M, Arts JJ, et al. How to prepare a systematic review of economic evaluations for informing evidence-based healthcare decisions: a five-step approach (part 1/3). *Expert Rev Pharmacoecon Outcomes Res*. 2016;16(6):689–704. doi:10.1080/14737167.2016.1246960
19. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi:10.1136/bmj.n71
20. Huserau D, Drummond M, Augustovski F, et al. Consolidated health economic evaluation reporting standards 2022 (CHEERS 2022) statement: updated reporting guidance for health economic evaluations. *Value Health*. 2022;25(1):3–9. doi:10.1016/j.jval.2021.11.1351
21. Law M, Stewart D, Pollock N, Letts L, Bosch J, Westmorland M. Critical review form – quantitative studies [Internet]. Hamilton: McMaster University; 1998. Available from: <https://canchild.ca/resources/137-critical-review-forms-and-guidelines/>. Accessed June 24, 2025.
22. Hong Q, Pluye P, Fàbregues S, et al. Mixed Methods Appraisal Tool (MMAT), version 2018 [Internet]. Ottawa: Canadian Intellectual Property Office; 2018. Available from: http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/attach/127916259/MMAT_2018_criteria-manual_2018-08-01_ENG.pdf. Accessed June 24, 2025.
23. Evers S, Goossens M, de Vet H, van Tulder M, Ament A. Criteria list for assessment of methodological quality of economic evaluations: consensus on health economic criteria. *Int J Technol Assess Health Care*. 2005;21(2):240–245. doi:10.1017/S0266462305050324
24. Wijnen B, Van Mastrigt G, Redekop WK, Majoie H, De Kinderen R, Evers S. How to prepare a systematic review of economic evaluations for informing evidence-based healthcare decisions: data extraction, risk of bias, and transferability (part 3/3). *Expert Rev Pharmacoecon Outcomes Res*. 2016;16(6):723–732. doi:10.1080/14737167.2016.1246961
25. van Delft LCJ, Kelleners-Smeets NWJ, Peeters A, Mosterd K, Essers BAB. A systematic review of economic evaluations for the interventions of superficial basal cell carcinoma. *EJC Skin Cancer*. 2023;1:100008. doi:10.1016/j.ejcskn.2023.100008
26. Campbell & Cochrane Economics Methods Group and Evidence for Policy & Practice Information Center. CCEMG - EPPI-center cost converter (v.1.7 last update: January 2024). Available from: <https://eppi.ioe.ac.uk/costconversion/>. Accessed January 24, 2025.
27. Cowie A, Moseley O. Home- versus hospital-based exercise training in heart failure: an economic analysis. *Br J Cardiol*. 2014;21. doi:10.5837/bjc.2014.011.
28. Endevelt R, Lemberger J, Bregman J, et al. Intensive dietary intervention by a dietitian as a case manager among community dwelling older adults: the EDIT study. *J Nutr Health Aging*. 2011;15(8):624–630. doi:10.1007/s12603-011-0074-9
29. Fritz JM, Childs JD, Wainner RS, Flynn TW. Primary care referral of patients with low back pain to physical therapy: impact on future health care utilization and costs. *Spine*. 2012;37(25):2114–2121. doi:10.1097/BRS.0b013e31825d32f5
30. Gurvey J, Rand K, Daugherty S, Dinger C, Schmeling J, Lavery N. Examining health care costs among MANNA clients and a comparison group. *J Primary Care Comm Health*. 2013;4(4):311–317. doi:10.1177/2150131913490737
31. Popay J, Roberts H, Sowden A, et al. Guidance on the conduct of narrative synthesis in systematic reviews: a product from the ESRC methods programme. Version. 2006. [Internet]. Available from: <https://citeserx.ist.psu.edu/document?repid=rep1&type=pdf&doi=ed8b23836338f6fdea0c55e161b0fc5805f9e27>. Accessed July 29, 2025.
32. Arslan B, Çolak T, Dağ A. Does home oral nutritional support improve nutritional status and quality of life following colorectal cancer surgery? *Nutr Cancer*. 2023;75(1):174–185. doi:10.1080/01635581.2022.2096911
33. Augustine MR, Davenport C, Ornstein KA, et al. Implementation of post-acute rehabilitation at home: a skilled nursing facility-substitutive model. *J Am Geriatr Soc*. 2020;68(7):1584–1593. doi:10.1111/jgs.16474
34. Altfeld SJ, Shier GE, Rooney M, et al. Effects of an enhanced discharge planning intervention for hospitalized older adults: a randomized trial. *Gerontologist*. 2013;53(3):430–440. doi:10.1093/geront/gns109
35. Langstaff C, Martin C, Brown G, et al. Enhancing community-based rehabilitation for stroke survivors: creating a discharge link. *Top Stroke Rehabil*. 2014;21(6):510–519. doi:10.1310/tsr2106-510
36. Sturkenboom IHW, Hendriks JCM, Graff MJL, et al. Economic evaluation of occupational therapy in 'Parkinson's disease: a randomized controlled trial. *Mov Disord*. 2015;30(8):1059–1067. doi:10.1002/mds.26217
37. Basu A, Kee R, Buchanan D, Sadowski LS. Comparative cost analysis of housing and case management program for chronically ill homeless adults compared to usual care. *Health Serv Res*. 2012;47(1 Pt 2):523–543. doi:10.1111/j.1475-6773.2011.01350.x
38. Frogner BK, Harwood K, Andrilla CHA, Schwartz M, Pines JM. Physical therapy as the first point of care to treat low back pain: an instrumental variables approach to estimate impact on opioid prescription, health care utilization, and costs. *Health Serv Res*. 2018;53(6):4629–4646. doi:10.1111/1475-6773.12984

39. Kraal JJ, Van den Akker-Van Marle ME, Abu-Hanna A, Stut W, Peek N, Kemps HM. Clinical and cost-effectiveness of home-based cardiac rehabilitation compared to conventional, centre-based cardiac rehabilitation: results of the FIT@home study. *Eur J Prev Cardiol.* 2017;24(12):1260–1273. doi:10.1177/2047487317710803
40. Suikkanen SA, Soukkio PK, Aartolahti EM, et al. Effects of home-based physical exercise on days at home and cost-effectiveness in pre-frail and frail persons: randomized controlled trial. *J Am Med Dir Assoc.* 2021;22(4):773–779. doi:10.1016/j.jamda.2020.06.005
41. Zabanoni P, Lien LA, Hjalmsen A, Wootton R. Long-term telerehabilitation of COPD patients in their homes: interim results from a pilot study in Northern Norway. *J Telemed Telecare.* 2013;19(7):425–429. doi:10.1177/1357633x13506514
42. Brusco NK, Hill KD, Haines T, et al. Cost-effectiveness of the ENJOY seniors exercise park for older people: a pre-post intervention study. *J Phys Act Health.* 2023;20(6):555–565. doi:10.1123/jpah.2022-0380
43. Weerahandi H, Basso Lipani M, Kalman J, et al. Effects of a psychosocial transitional care model on hospitalizations and cost of care for high utilizers. *Soc Work Health Care.* 2015;54(6):485–498. doi:10.1080/00981389.2015.1040141
44. Farag I, Howard K, O'Rourke S, et al. Health and social support services in older adults recently discharged from hospital: service utilisation and costs and exploration of the impact of a home-exercise intervention. *BMC Geriatr.* 2016;16(1):82. doi:10.1186/s12877-016-0254-x
45. Tistad M, von Koch L. Usual clinical practice for early supported discharge after stroke with continued rehabilitation at home: an observational comparative study. *PLoS One.* 2015;10(7):e0133536. doi:10.1371/journal.pone.0133536
46. Salisbury C, Foster NE, Hopper C, et al. A pragmatic randomised controlled trial of the effectiveness and cost-effectiveness of 'PhysioDirect' telephone assessment and advice services for physiotherapy. *Health Technol Assess.* 2013;17(2):1–157, v–vi. doi:10.3310/hta17020
47. Huntley AL, Johnson R, King A, Morris RW, Purdy S. Does case management for patients with heart failure based in the community reduce unplanned hospital admissions? A systematic review and meta-analysis. *BMJ Open.* 2016;6(5):e010933. doi:10.1136/bmjopen-2015-010933
48. Dunn T, Bliss J, Ryrie I. The impact of community nurse-led interventions on the need for hospital use among older adults: an integrative review. *Int J Older People Nurs.* 2021;16(2):e12361. doi:10.1111/opn.12361
49. Stone K, Zwiggelaar R, Jones P, Mac Parthaláin N. A systematic review of the prediction of hospital length of stay: towards a unified framework. *PLOS Digit Health.* 2022;1(4):e0000017. doi:10.1371/journal.pdig.0000017
50. Roux L, Pratt M, Tengs TO, et al. Cost effectiveness of community-based physical activity interventions. *Am J Prev Med.* 2008;35(6):578–588. doi:10.1016/j.amepre.2008.06.040
51. Fatoye F, Wright JM, Yeowell G, Gebrye T. Clinical and cost-effectiveness of physiotherapy interventions following total Hip replacement: a systematic review and meta-analysis. *Rheumatol Int.* 2020;40(9):1385–1398. doi:10.1007/s00296-020-04597-2
52. Rahja M, Comans T, Clemson L, Crotty M, Laver K. Economic evaluations of occupational therapy approaches for people with cognitive and/or functional decline: a systematic review. *Health Soc Care Community.* 2018;26(5):635–653. doi:10.1111/hsc.12553
53. Siopis G, Wang L, Colagiuri S, Allman-Farinelli M. Cost effectiveness of dietitian-led nutrition therapy for people with type 2 diabetes mellitus: a scoping review. *J Hum Nutr Diet.* 2021;34(1):81–93. doi:10.1111/jhn.12821
54. Smith-Turchyn J, Richardson J, Sinclair S, et al. Cost-effectiveness of physiotherapy services for chronic condition management: a systematic review of economic evaluations conducted alongside randomized controlled trials. *Physiother Can.* 2023;76(4):402–414. doi:10.3138/ptc-2022-0016
55. Maresova P, Hruška J, Randlova K, Rezný L, Carrillo-de-la-Peña MT, Kuca K. Systematic review of the cost-effectiveness of home-based palliative care interventions in patients with cancer: a critical analysis. *Cancer Manag Res.* 2024;16:1155–1174. doi:10.2147/cmar.S472649
56. Sittimart M, Rattanavipapong W, Mirelman AJ, et al. An overview of the perspectives used in health economic evaluations. *Cost Eff Resour Alloc.* 2024;22(1):41. doi:10.1186/s12962-024-00552-1
57. Wong A, Goh G, Banks MD, Bauer JD. A systematic review of the cost and economic outcomes of home enteral nutrition. *Clin Nutr.* 2018;37(2):429–442. doi:10.1016/j.clnu.2017.06.019
58. Woolcock K. Value Based Health Care: setting the scene for Australia. [Internet]. Deakin: Deakin Institute for Health Policy Research; 2019. Available from: <https://apo.org.au/node/240831>. Accessed June 24, 2025.
59. Turnbull C, Grimmer-Somers K, Kumar S, May E, Law D, Ashworth E. Allied, scientific and complementary health professionals: a new model for Australian allied health. *Aust Health Rev.* 2009;33(1):27–37. doi:10.1071/AH090027
60. Goeree R, He J, O'Reilly D, et al. Transferability of health technology assessments and economic evaluations: a systematic review of approaches for assessment and application. *Clinicoecon Outcomes Res.* 2011;3:89–104. doi:10.2147/ceor.S14404