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Original Study

Interventions to Prevent Hospital Admissions in Long-Term Care Facilities: A Rapid Review of Economic Evidence

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A B S T R A C T

Objectives: Hospital admissions can be hazardous for older adults, particularly those living in long-term care facilities. Preventing nonessential admissions can be beneficial for this population, as well as reducing demand on health services. This review summarizes the economic evidence surrounding effective interventions to reduce hospital attendances and admissions for people living in long-term care facilities.
Design: Rapid review of economic evidence.
Setting and Participants: People living in long-term facilities.
Methods: We searched MEDLINE, CINAHL, Cochrane CENTRAL, PubMed, and Web of Science on September 20, 2022, and again on January 10, 2023. Full economic evaluations and cost analyses reporting on advanced care planning, goals of care setting, nurse practitioner input, palliative care, influenza vaccinations, and enhancing access to intravenous therapies were eligible. Data were extracted using a prepiloted data extraction form and critically appraised using either the Drummond-Jefferson checklist or an amended NIH Critical Appraisal Tool appended with questions from a critical appraisal checklist for cost analyses. Data were synthesized narratively.
Results: We included 7 studies: 3 full economic evaluations and 4 cost analyses. Because of lack of clarity on the underlying study design, we did not include one of the cost analyses in our synthesis. Advanced care planning, a palliative care program, and a high-dose influenza vaccination reported potential cost savings. Economic evidence for a multicomponent intervention and a nurse practitioner model was inconclusive. The overall quality of the evidence varied between studies.
Conclusions and Implications: A number of potentially cost-effective approaches to reduce demand on hospital services from long-term care facilities were identified. However, further economic evaluations are needed to overcome limitations of the current evidence base and offer more confident conclusions.

The global population is ageing, with the population aged >60 years growing faster than any other age group.[1] The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million.[1] Across most Organisation for Economic Co-operation and Development (OECD) countries, the availability of long-term care facility beds is decreasing.[2] Long-term care facility residents aged >75 years are 3 times more likely to be admitted to hospital than people of a similar age who live in their own homes.[3]

Finding ways to prevent avoidable hospital admissions from long-term care facilities is an important policy goal in many countries. In the United Kingdom, for example, emergency transfers from long-term care facilities to hospital in the last year of life are increasing, with costs expected to double by 2041.[4] In the United States, nursing

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home residents account for more than 2.2 million emergency department visits annually.[5] Compared with other emergency department patients, nursing home residents have higher medical acuity and complexity.[5]

A range of interventions have been proposed to decrease transfers from long-term care facilities, including shared decision making, advanced care planning, involvement of a palliative care team, interdisciplinary teamwork, and improved communication and handovers.[6-11] Our understanding of what works has been documented across numerous evidence syntheses. However, the majority of previous reviews have focused on single interventions in long-term care facilities and other settings, with hospital utilization as an outcome. As the number of older people in the population continues to rise, with stable long-term care facility bed numbers, policymakers are likely to need a suite of interventions to address the growing demands on health services.

Costs are also likely to be a major consideration for policy makers. Understanding the costs and the utility of an intervention can assist in prioritizing interventions with the greatest cost-effectiveness. Before starting this study, we found one systematic review that studied economic evaluations of interventions with people aged ≥65 years. However, only 1 of the 11 economic evaluations in that review included participants from long-term facilities.[12] This highlights a need to synthesize economic evidence on reducing admissions specifically from long-term care facilities, to support informed decisions on which interventions should be prioritized. The aim of this rapid review was to summarize the economic evidence relating to interventions that have already been found to be effective in reducing unscheduled hospital admissions or attendances from long-term care facilities.[13]

Methods

Rapid review methods were used to achieve the study aims. This approach emerged as an efficient approach to provide decision makers with evidence, wherein usual systematic review processes are streamlined to complete the synthesis more quickly.[14]

Protocol Registration

A protocol was published on PROSPERO on January 17, 2023 (CRD42023390725).[15] The methods are detailed below following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; see Supplementary Table 1).[16]

Search Strategies

The search strategies were adapted from a previously published review of clinical effectiveness.[13] Study design filters for economic evidence from the Centre for Reviews and Dissemination were added to these search strategies.[17] The searches were run in MEDLINE, CINAHL, Cochrane CENTRAL, PubMed, and Web of Science on September 20, 2022, and updated on January 10, 2023. Full details of the search strategies are presented in Supplementary Table 1.

Eligibility Criteria

Any full economic evaluation or cost analysis (studies reporting both cost and effect) attached to either a randomized or non-randomized evaluative study assessing the cost-effectiveness of interventions for reducing hospital admissions in residents of long-term care facilities were eligible.[18] By full economic evaluation, we refer to any study that compares costs and consequences of 2 or more alternative interventions, whereas cost analysis to any study that only compares costs between interventions.[18]

This review uses the term *long-term care facility* as an umbrella term for nursing homes (residents receive nursing as well as personal care), aged care facilities or residential aged care facilities (terms used in Australia and New Zealand for facilities similar to nursing homes), and care homes (a UK term for residential care with and without nursing).[13] Eligible interventions were identified from a previously published systematic review, which were advanced care planning, goal setting, influenza vaccination, nurse practitioner or specialist input, palliative care, and intravenous (IV) therapies. Study designs with any or no comparator were eligible. Any economic outcome [eg, quality-adjusted life years (QALYs) or incremental cost-effectiveness ratios (ICERs)] were included, as long as hospital admissions or unscheduled attendances were assessed. Only articles published in English were eligible. Studies reporting unit costs alone were excluded from the review. To ensure relevance to current policy, we restricted eligibility to articles published from 2010 onward.

Study Selection

All records identified were managed and screened in Rayyan, a web-based screening tool.[19] Three independent reviewers screened one-third of titles and abstracts for eligibility each. The full texts of selected records were retrieved and assessed against the review criteria by a single reviewer and independently checked by a second reviewer. A screening hierarchy was used to minimize conflicts at full-text stage (see Supplementary Material 1). Any disagreements were resolved by discussion or arbitration to a third reviewer.

Data Extraction and Critical Appraisal

A data extraction form was developed in Microsoft Excel and piloted on 20% of included studies by 2 reviewers. Following piloting, 2 reviewers extracted 50% of the remaining records each, with a third reviewer checking all extractions. The following items were extracted: author and date of publication, clinical and economic study design, aims and objectives, clinical and economic outcome measures, country and setting(s), number of participants, inclusion and exclusion criteria, participants' age, intervention, comparator (if applicable), study funding sources, and any reported conflicts of interest. Economic concepts extracted were currency, cost year, perspective, time horizon, currency conversion methods, and discount rate. Incremental costs, incremental benefits, ICERs, and any disaggregated cost data relating to hospital admissions or readmissions were extracted from the full economic evaluations, whereas overall intervention cost and cost savings related to hospital admissions or readmissions were extracted from the cost analyses.

Full economic evaluations were critically appraised using the Drummond-Jefferson checklist.[20] Cost analyses were critically appraised using the appropriate NIH Quality Assessment tool relevant to the underlying study design (eg, randomized, cohort, before-after study).[21] To assess the health economics aspects of the cost analyses, questions 5 to 11 of a consensus-based critical appraisal checklist for cost analyses were appended to the NIH tool.[22] Two independent reviewers undertook critical appraisal on 20% of included studies, resolving disagreements through discussion or by arbitrating to a third reviewer. Two reviewers appraised 50% of the remaining records each, with a third reviewer checking all appraisals.

Data Synthesis

The evidence was grouped into 2 categories: full economic evaluations and cost analyses. Characteristics of studies and the evidence

on cost-effectiveness were tabulated and summarized in a narrative synthesis.

Results

Seven studies (3 full economic evaluations and 4 cost analyses) were included in the review (Figure 1). We were unable to identify the underlying clinical study design for one of the cost analyses,[23] which prevented critical appraisal of this article. As such, this cost analysis was not included in the synthesis. Reasons for excluding at full text are presented in Supplementary Table 2.

Characteristics of Included Studies

A summary of characteristics of economic evaluations is shown in Table 1 and characteristics of cost analyses are shown in Table 2.

The 3 included economic evaluations were all cost-effectiveness analyses (CEAs).[24-26] The studies were based in Switzerland,[24] Canada,[25] and multiple countries across the EU (Belgium, Finland, Italy,

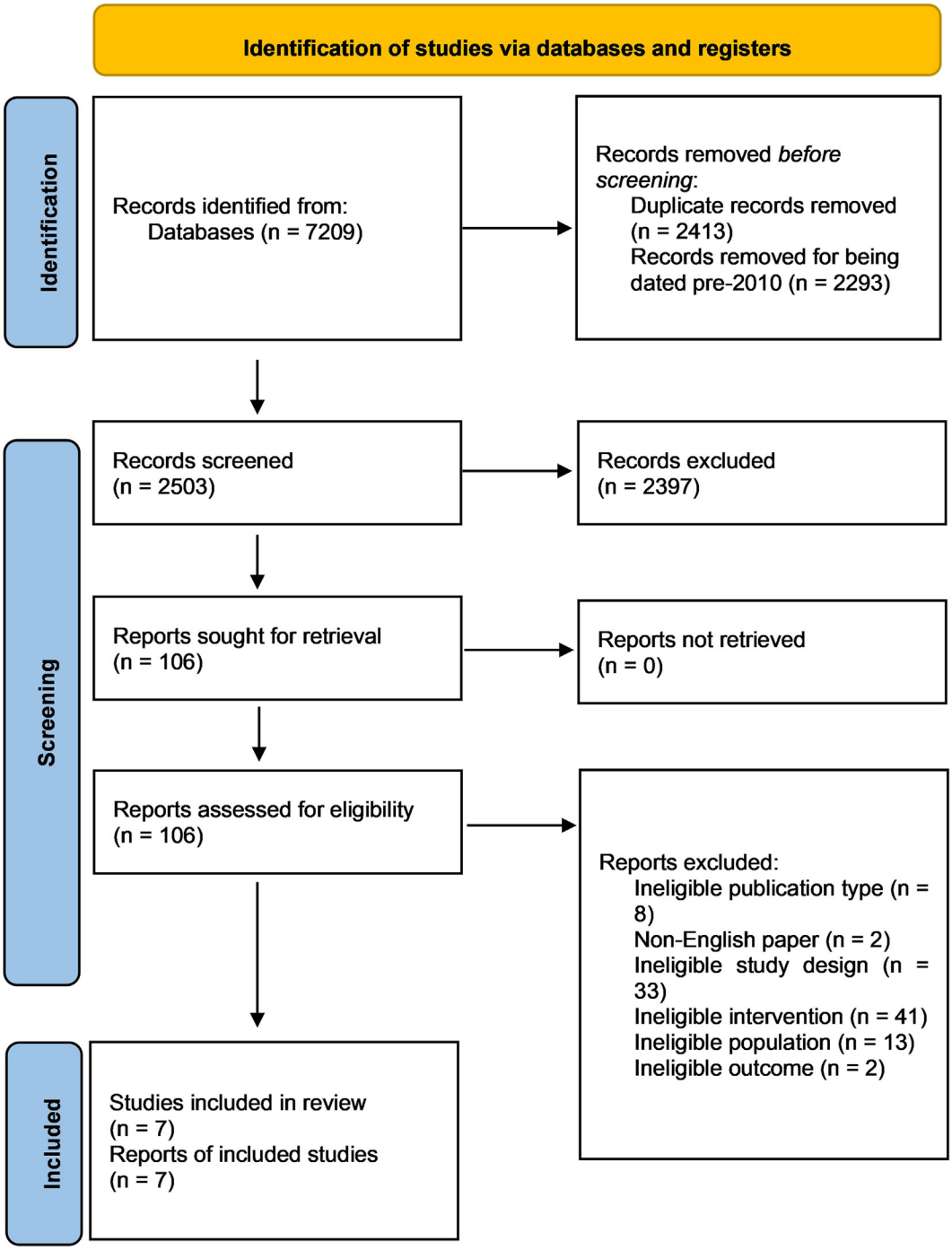

Fig. 1. PRISMA flow diagram.

Table 1
Characteristics of Included Economic Evaluations

Study ID	Type of EE/Clinical Study Design	Country and Settings	Intervention	Comparison	Currency and Cost Year	Currency Conversion Methods	Perspective	Time Horizon	Discount Rate
Bartakova et al (2022)[24]	CEA, nonrandomized stepped-wedge design	Switzerland: 11 nursing homes (6 single nursing homes and 1 cluster of 5 homes)	INTERCARE: nurse-led care model focusing on strengthening interprofessional collaboration, using expanded role of nurses, comprehensive geriatric assessment, advanced care planning, data-driven quality improvement	Usual care	Swiss Francs (CHF); cost year not reported	No currency conversion	Participating nursing homes	Not explicit	0%
Lacny et al (2016)[25]	CEA, controlled before-and-after design	Canada: 2 nursing homes	Nurse practitioner–family physician (NP-FP) model of care: a collaborative practice agreement between NP working with 3 house physicians	Internal control (FP-only model): with residents in the same nursing home as the intervention group External control (FP-only model): with residents in a nearby, similar nursing home	CAD; Medication costs 2006-2008	Not reported	Health care system	Not explicit	Not reported
Wichmann et al (2020)[26]	CEA, cluster RCT	Belgium, Finland, Italy, Netherlands, Poland, England, Switzerland; 73 long-term care facilities	PACE Steps to Success: aims to integrate general palliative care into daily routines in long-term care facilities through training	Usual care - allowed to use all supportive services without restriction	Euros; 2017	Not reported	Health care	1 month	Not reported

CEA, cost-effectiveness analysis; EE, economic evaluation; FP, family physician; PACE, Palliative Care for Older People; RCT, randomized controlled trial.

Netherlands, Poland, England, and Switzerland).[26] The currencies used in the economic evaluations varied [CHF (Swiss francs)[24]; CAD (Canadian dollars)[25]; and euros].[26] The interventions considered in the 3 economic evaluations were as follows: a nurse practitioner/specialist input model,[25] a palliative care intervention (PACE),[26] and a multicomponent intervention that blended elements of advanced care planning and nurse practitioner/specialist input.[24]

The 3 cost analyses were set in long-term care facilities in Ireland,[27] Singapore,[28] and the USA.[29] Currencies used across the cost analyses were euros,[27] Singapore dollars (SGD),[28] and US dollars (USD),[29] respectively. The interventions considered in the 3 cost analyses were 2 advanced care planning programs[27,28] and a high-dose influenza vaccine.[29]

Critical Appraisal of Studies

Full details of the critical appraisals for both economic evaluations and cost analyses are shown in Supplementary Table 3. In brief, the quality of the included studies varied. For the economic evaluations, there were some concerns about some of the reporting of the methods (including estimating quantities and unit costs, price adjustments, and discount rates). Reporting of the economic component of the cost analyses was generally fair, though none discounted future costs.

Cost-Effectiveness

Economic Evaluations

Cost savings resulting from hospital admissions and/or emergency transfers varied between the economic evaluations. Hospital admission results are presented in Supplementary Table 3.

Bartakova et al reported that although the INTERCARE intervention was more costly,[24] it was also more clinically effective than pre-intervention care. As no willingness to pay thresholds exist within the care homes, the authors could not reach a conclusion about the cost-effectiveness of this approach. The base-case ICER per avoided hospitalization was 22,595 CHF. The mean additional nursing home cost during the intervention period was 2937 CHF $\pm$ 630 CHF per 1000 nursing days. The study authors presented a sensitivity analysis, calculating the ICER based on the assumption that the salary rate for staff was in the upper limit of the range. The sensitivity analysis ICER was 31,300 CHF per avoided hospitalization. Furthermore, the average daily loss of revenue to the nursing home per resident due to a hospitalization between 2017 and 2020 was reported as 160 CHF (range 120-201 CHF).

For the economic evaluation of the nurse practitioner/family physician model of Lacny et al,[25] the nurse practitioner/family physician intervention dominated the internal family practitioner-only control group and the combined control. As a result, ICERs were not calculated. However, the study authors stated that there was uncertainty surrounding the distribution of costs and effects; thus, they were unable to make a definitive conclusion on the cost-effectiveness of the nurse practitioner/family physician model.[25]

The ACP-focused intervention PACE Steps to Success was considered cost-effective. Costs decreased by €257.52 in the intervention group and increased by €600.75 for dying residents in the control group. After bootstrapping and controlling for variables (age, gender, residents' disease severity and country), there was reported to be a statistically significantly lower mean difference (MD) of −€983.23 (95% CI −€1762.22 to −€321.46, $P = .02$), which the study authors attributed to lower hospital admissions costs (−€919.51). The authors of the economic evaluation concluded that timely palliative care in long-term care settings could lead to significant cost savings and prevent lengthy hospitalizations while also retaining quality of life.[26]

Table 2
Characteristics of Included Cost Analyses

Study ID	Clinical Study Design	Country and Settings	Intervention	Comparison	Currency and Cost Year	Currency Conversion Methods	Perspective	Time Horizon	Discount Rate
O'Sullivan et al (2016)[27]	Before-and-after feasibility study	Ireland: 3 LTCs: 2 private, 1 publicly funded nursing homes	Let Me Decide (LMD): Advance care planning program	None	Euros; cost year not reported	Average per diem cost was estimated to account for the variation in average length of stay (LOS) associated with the inpatient case mix cost and the LOS reported in this study.	Long-term care facilities	Pre (baseline: January 2010 to June 2012, 30 mo) and post (July 2013 to June 2015, 24 mo) implementation	Not reported
Teo et al (2014)[28]	Case-control historical cohort	Singapore: 7 nursing homes	Project Care at the End-of-Life for Residents in homes for the Elderly (CARE) program: to provide advance care planning and palliative care for residents identified to be at risk of dying within 1 year. It involves training staff in nursing homes to provide palliative care for residents with complex symptoms	A historical cohort of NH residents who have resided in the NH for at least 3 mo was used as control group	SGD; 2011	Inflated to 2011 SGD using the Consumer Price Index (CPI)	Health care system	Less than 3 mo and 1 mo prior to death	Not reported
Shireman et al (2019)[29]	Cluster RCT	USA: 823 nursing homes	High dose of influenza vaccine	Low dose of influenza vaccine	USD; cost year not reported	Not reported	Payer (Medicare)	November 1, 2013, to May 31, 2014	Not reported

LTC, long-term care facility; NH, nursing home; RCT, randomized controlled trial.

Cost Analyses

In terms of costs relating to hospital admissions, all 3 cost analyses claimed cost savings in various contexts. Results of the cost analyses are presented in Supplementary Table 4.

O'Sullivan et al reported projected savings for the Let Me Decide advanced care planning program,[27] should the intervention be rolled out nationally across Ireland. Based on €4081 per episode and an average inpatient case mix cost across common diagnosis-related groups, the study authors reported per annum (gross) average cost per episode of care of €37,487,265 before intervention and €19,686,419 per annum after intervention. This yielded an expected overall cost reduction of €17,800,847 (gross) per annum if the probability of hospitalization per resident reduced from 0.28 to 0.15 after the intervention. Additionally, the study authors reported a reduction in costs per length of stay in hospitals (based on €491 per day) of €10,158,173 per annum (gross) and a reduction of costs per ambulance transfer (based on €97 per transfer) of €423,453 per annum (gross). After applying a scenario analysis adjusting for length of stay data (reference hospital data and costs of €491 per day), the expected cost reduction on average length of stay increased further to €24.39 million (gross) (95% CI €6.05 million to €48.55 million). Furthermore, probabilistic sensitivity analysis on the ACP intervention based on €4081 per hospitalization episode was reported to show a continued average cost reduction owing to reduced hospitalizations of €17.95 million (95% CI €1.15 million to €58.90 million).

After adjusting for differences in baseline characteristics, Teo et al reported significantly lower incremental costs per resident for those undertaking Project CARE at 3 months prior to death (SGD 7129, 95% CI SGD 4544 to SGD 9714) and in the last month of life (SGD 3703, 95% CI SGD 1848 to SGD 5557), compared to the control group.[28] After bootstrapping, adjusted incremental cost savings per resident were still reported to be lower for those undertaking Project CARE in the last 3 months of life (SGD $5348, 95% CI SGD 2807 to SGD 7315) and in the final month of life (SGD 3703, 95% CI SGD 1848 to SGD 5557). Cost savings were also attributed to the intervention's effect on inpatient length of stay, emergency department visits, and specialist outpatient clinic visits at both 3 and last months prior to death, but these data were not explicitly reported.

Finally, Shireman et al reported on cost savings and lower Medicare expenditures for Medicare beneficiaries residing in nursing homes for those receiving a higher dose of influenza vaccine, compared with a standard dose vaccine.[29] The mean per-participant direct medical costs for acute inpatients for high-dose vaccines was USD 3043 (95% CI USD 2773 to USD 3313) compared with USD 3255 (95% CI USD 2998 to USD 3512) for the standard dose. Other direct inpatient costs were reported as USD 338 (95% CI USD 248 to USD 427) for the high-dose vaccine and USD 419 (95% CI USD 324 to USD 513) for the standard dose. Direct emergency department and observation costs were reported as USD 133 (95% CI USD 248 to USD 427) for the high-dose vaccine and USD 135 (95% CI USD 123 to USD 148) for the standard dose. After adjusting for facility clusters, the study authors reported reductions in mean differences in per participant direct medical costs for the high-dose vaccine compared with the low dose as USD 262 (95% CI USD −0.06 to USD 524) for acute inpatients, USD 85 (95% CI USD 2 to USD 168) for other inpatients and USD 6 (95% CI USD −7 to USD 18) for emergency department and observation costs. The study authors attributed 48% of the cost savings to lower inpatient hospital costs.

Discussion

This rapid review aimed to synthesize the economic evaluation evidence for effective interventions to reduce hospital attendances and admissions from long-term care facilities, as previously identified

in a recent review.[13] Cost savings were reported for 2 advanced care planning interventions, a palliative care program (PACE), and a high-dose influenza vaccine. A multicomponent intervention that blended advanced care planning and nurse practitioner/specialist input was more costly, yet also more effective, than preintervention care. Cost-effectiveness for this multicomponent intervention could not be determined because of a lack of a WTP threshold in care homes. These findings suggest there are a number of promising options available to long-term care facilities to reduce avoidable hospital admissions for residents. A model based on nurse practitioner/specialist input did not offer conclusive cost-effectiveness due to uncertainty surrounding the distribution of costs and effects.

Previous work suggests there is no shortage of evaluations of approaches to minimize hospital admissions for residents of long-term care facilities. Our review suggests that the economic contribution to this evidence base is, by comparison, relatively novel. Just 7 studies published in the last 13 years were eligible for this review, of which only half were full economic evaluations. Sources of bias identified in our critical appraisal also signal limitations to this small evidence base. For example, some studies were unable to conduct sensitivity analyses to account for uncertainty because of short time horizons,[25,29] whereas one presented scenario analyzes using aggregated level data that were theoretical.[27] Consequently, these findings should be considered indicative rather than conclusive.

Our work has highlighted a need for further research to strengthen the economic evidence around interventions to reduce hospital admissions from long-term care facilities. We noted a lack of transparency in the reporting, particularly the estimation of quantities and unit costs, price adjustments, and discount rates. There was also a dearth of full economic evaluations based on robust primary research assessing ACP, goal setting, influenza vaccinations, nurse practitioner or specialist input, palliative care, and IV therapies. Some of these interventions, such as vaccination, offer clear benefits to residents, and primary research could not be justified. Future research efforts may be better focused on evaluation of the many real-world initiatives that have been introduced, particularly those operating at a subnational level, and less likely to have been the subject of critical assessment. For example, one regional ambulance service in England developed an assessment model for care home staff to identify which service to contact, when a resident was unwell.[30] Introduced in 2017, this model is now operating in 200 care homes, and has been associated with a 30% reduction in emergency calls from care homes. Other initiatives to avoid hospital admissions have included the use of specialist paramedics, or a combination of therapists on call.[30] Some countries have directed resources at enhancing the response to common causes of potentially avoidable conditions in long-term care facilities. In the United States, hospitalization rates for 6 conditions (urinary tract infection, pneumonia, heart failure, congestive heart failure, dehydration, chronic obstructive pulmonary disease or asthma, and skin ulcers) fell by 31% over 5 years.[31] A broader program was introduced to improve quality of health care in long-term care facilities in England, but the impact on hospital utilization is not yet clear.[32] There may be much to learn from these different initiatives, often introduced as a local response to a perceived problem, but without an underlying evidence base or funded evaluation.

Strengths and Limitations of This Review

A comprehensive search strategy, based on a previously published systematic review of clinical evidence and applied to numerous clinical databases, guarantees this rapid review is exhaustive.[13] We enhanced the applicability of the searches to economic evidence by using validated search filters.[17] Furthermore, 2 independent researchers piloted our data extraction form and critical appraisal tools on a proportion of records before refining and continuing the process. This piloting is considered good practice for rapid reviews according to guidance from the Cochrane Rapid Reviews Methods Group.[14]

We focused on the economic evidence for a select group of interventions: advanced care planning, goal setting, influenza vaccination, nurse practitioner or specialist input, palliative care, and intravenous (IV) therapies. Our previous review established that these interventions can successfully reduce hospital admissions for long-term care facility residents. This approach meant that we may have missed economic evaluations of interventions that are not clinically effective. We do not consider this a major shortcoming; our approach has enabled us to draw more expedient inferences regarding cost-effectiveness, adding to what was already known about clinically effective interventions. A further limitation of our approach is that we may have missed evidence about interventions that have been evaluated and published since the Searle et al review, from which the interviews were drawn.[13] However, this is unlikely to present a major risk to our conclusions given the relative recency of the work published by Searle and colleagues.[13]

Conclusions and Implications

Advanced care planning, a palliative care program (ie, PACE), and a high-dose influenza vaccination may be cost-effective interventions to reduce hospital attendance from long-term care facilities. This is an emerging evidence base and further, high-quality economic evaluations are needed to draw more confident conclusions.

Disclosures

The authors declare no conflicts of interest.

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Appendix

Supplementary Material 1: Screening hierarchy for full-texts

1. Is the study published in the English language? If Yes, go to Q2. If no, exclude on LANGUAGE.
2. Does the study report on an eligible design (ie, full economic evaluation/cost analysis attached to a randomized or nonrandomized study)? If so, go to Q3. If no, exclude on STUDY DESIGN.
3. Does the study evaluate the intervention for residents living in long-term care facilities? If yes, go to Q4. If no, exclude on POPULATION.
4. Does the study report an evaluation of an eligible intervention to reduce hospital admissions, attendance or readmissions? If yes, INCLUDE. If no, exclude on INTERVENTION.

Supplementary Table 1
Search Strategies

All searches were conducted on September 20, 2022, and updated on January 10, 2023

#	Searches
MEDLINE	
1	nursing homes/or intermediate care facilities/or skilled nursing facilities/
2	Homes for the Aged/
3	(nursing adj (home* or facilit*)).tw.
4	(home? for the aged or home? for the elderly).tw.
5	((intermediate or long-term or longterm) adj care facilit*).tw.
6	or/1-5
7	hospitalization/or "length of stay"/or patient admission/or patient readmission/or patient transfer/
8	(hospital adj3 (treat* or stay or days or care)).tw.
9	(stay adj2 length).tw.
10	(hospitaliz* or hospitalis* or rehospitalis* or rehospitaliz*).tw.
11	((hospital? or patient?) adj3 (admit* or admis* or readmit* or readmis* or transfer)).tw.
12	emergency service, hospital/or trauma centers/
13	Emergency medical services/
14	((acute or immediate or emergency or critical) adj (care or service)).tw.
15	use of emergency department?.tw.
16	emergency department? use.tw.
17	trauma cent?r*.tw.
18	or/7-17
19	6 and 18
20	economics/
21	exp “costs and cost analysis”/
22	economics, dental/
23	exp “economics, hospital”/
24	economics, medical/
25	economics, nursing/
26	economics, pharmaceutical/
27	(economic$ or cost or costs or costly or costing or price or prices or pricing or pharmacoeconomic$).ti,ab.
28	(expenditure$ not energy).ti,ab.
29	value for money.ti,ab.
30	budget$.ti,ab.
31	or/20−30
32	((energy or oxygen) adj cost).ti,ab.
33	(metabolic adj cost).ti,ab.
34	((energy or oxygen) adj expenditure).ti,ab.
35	or/31−34
36	31 not 35
37	letter.pt.
38	editorial.pt.
39	historical article.pt.
40	or/37−39
41	36 not 40
42	Animals/
43	Humans/
44	42 not (42 and 43)
45	41 not 44
46	19 and 45
Cochrane CENTRAL	
1	MeSH descriptor: [Nursing Homes] explode all trees
2	MeSH descriptor: [Homes for the Aged] this term only
3	(nursing NEXT (home* or facilit*)):ti,ab,kw
4	("home? for the aged" OR "home? for the elderly"):ti,ab,kw
5	((intermediate or long-term or longterm) NEXT care facilit*):ti,ab,kw
6	(#1 OR #2 OR #3 OR #4 OR #5)
7	MeSH descriptor: [Hospitalization] explode all trees
8	(hospital NEAR/3 (treat* or stay or days or care)):ti,ab,kw
9	(stay NEAR/2 length):ti,ab,kw
10	(hospitaliz* or hospitalis* or rehospitalis* or rehospitaliz*):ti,ab,kw
11	((hospital? or patient?) NEAR/3 (admit* or admis* or readmit* or readmis* or transfer)):ti,ab,kw
12	MeSH descriptor: [Emergency Service, Hospital] explode all trees
13	MeSH descriptor: [Emergency Medical Services] this term only
14	((acute or immediate or emergency or critical) NEXT (care or service)):ti,ab,kw
15	use of emergency department?:ti,ab,kw
16	emergency department? use:ti,ab,kw
17	(trauma center*):ti,ab,kw or (trauma centr*):ti,ab,kw
18	(#7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17)
19	(#6 AND #18)
Embase	
1	nursing home/
2	nursing home patient/
3	home for the aged/
4	(nursing adj (home* or facilit*)).tw.
5	(home? for the aged or home? for the elderly).tw.
6	((intermediate or long-term or longterm) adj care facilit*).tw.
7	or/1-6
8	hospitalization/
9	"length of stay"/
10	hospital admission/
11	hospital readmission/
12	patient transport/
13	(hospital adj3 (treat* or stay or days or care)).tw.
14	(stay adj2 length).tw.
15	(hospitaliz* or hospitalis* or rehospitalis* or rehospitaliz*).tw.
16	((hospital? or patient?) adj3 (admit* or admis* or readmit* or readmis* or transfer)).tw.
17	emergency health service/
18	((acute or immediate or emergency or critical) adj (care or service)).tw.
19	"use of emergency department?".tw.
20	"emergency department? use".tw.
21	trauma cent?r*.tw.
22	or/8-21
23	7 and 22
24	Health Economics/
25	exp Economic Evaluation/
26	exp Health Care Cost/
27	pharmacoeconomics/
28	24 or 25 or 26 or 27
29	(econom$ or cost or costs or costly or costing or price or prices or pricing or pharmacoeconomic$).ti,ab.
30	(expenditure$ not energy).ti,ab.
31	(value adj2 money).ti,ab.
32	budget$.ti,ab.
33	29 or 30 or 31 or 32
34	28 or 33
35	letter.pt.
36	editorial.pt.
37	note.pt.
38	35 or 36 or 37
39	34 not 38
40	(metabolic adj cost).ti,ab.
41	((energy or oxygen) adj cost).ti,ab.
42	((energy or oxygen) adj expenditure).ti,ab.
43	40 or 41 or 42
44	39 not 43
45	animal/
46	exp animal experiment/
47	nonhuman/
48	(rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep).ti,ab,sh.
49	45 or 46 or 47 or 48
50	exp human/
51	human experiment/
52	50 or 51
53	49 not (49 or 52)
54	44 not 53
55	0959-8146.is.
56	(1469-493X or 1366-5278).is.
57	1756-1833.en.
58	55 or 56 or 57
59	54 not 58
60	conference abstract.pt.
61	59 not 60
62	23 and 61
ISI Web of Science	
18	#17 AND #16

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Supplementary Table 1 (*continued*)

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Supplementary Table 1 (*continued*)

All searches were conducted on September 20, 2022, and updated on January 10, 2023

#	Searches
17	TS=("cost benefit analysis" OR "cost of illness" OR "economic evaluation" OR "economic outcome" OR "cost effectiveness")
16	#15 AND #4
15	#14 OR #13 OR #12 OR #11 OR #10 OR #9 OR #8 OR #7 OR #6 OR #5
14	TS=("emergency department$ use")
13	TS=("use of emergency department$")
12	TS=(((acute or immediate or emergency or critical) NEAR (care or service)))
11	TS=((("Trauma center*" or "trauma centr*")))
10	TS=("Emergency medical services")
9	TS=(("hospital emergency service"))
8	TS=(((((hospital? or patient?) NEAR/3 (admit* or admis* or readmit* or readmis* or transfer))))
7	TS=(((hospitaliz* or hospitalis* or rehospitalis* or rehospitaliz*)))
6	TS=(((stay NEAR/2 length)))
5	TS=(((hospital NEAR/3 (treat* or stay or days or care))))
4	#3 or #2 or #1
3	TS=(((((intermediate* or long-term or longterm) NEAR "care facilit*")))
2	TS=(("home$ for the aged" or "home$ for the elderly"))
1	TS=((nursing NEAR (home* or facilit*)))
PubMed	
#44	#17 and #43
#43	#39 not #42
#42	#40 not (#40 and #41)
#41	humans [mesh]
#40	animals [mesh:noexp]
#39	#34 not #38
#38	#35 or #36 or #37
#37	historical article [Publication Type]
#36	editorial [Publication Type]
#35	letter [Publication Type]
#34	#29 not #33
#33	#30 or #31 or #32
#32	energy expenditure [Title/Abstract] OR oxygen expenditure [Title/Abstract]
#31	metabolic cost [Title/Abstract]
#30	energy cost [Title/Abstract] OR oxygen cost [Title/Abstract]
#29	#18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28
#28	budget*[Title/Abstract]
#27	value for money [Title/Abstract]
#26	expenditure*[Title/Abstract] not energy [Title/Abstract]
#25	economic*[Title/Abstract] or cost [Title/Abstract] or costs [Title/Abstract] or costly [Title/Abstract] or costing [Title/Abstract] or price [Title/Abstract] or prices [Title/Abstract] or pricing [Title/Abstract] or pharmacoeconomic*[Title/Abstract]
#24	"Economics, Pharmaceutical" [Mesh]
#23	"Economics, Nursing" [Mesh]
#22	"Economics, Medical" [Mesh:NoExp]
#21	"Economics, Hospital" [Mesh]
#20	"Economics, Dental" [Mesh:NoExp]
#19	"Costs and Cost Analysis" [Mesh]
#18	"Economics" [Mesh:NoExp]
#17	Search (#6 AND #16)
#16	Search (#7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15)
#15	Search ("emergency departments" OR "emergency department")
#14	Search ("acute care" OR "immediate care" OR "emergency care" OR "critical care" OR "acute service" OR "immediate service" OR "emergency service" OR "critical service")
#13	Search ("trauma center" OR "trauma centers" OR "trauma centre" OR "trauma centres")
#12	Search ("emergency medical services" OR "emergency medical service")
#11	Search ("hospital emergency service" OR "hospital emergency services")
#10	Search ((hospital OR hospitals OR patient OR patients) AND (admit* or admis* or readmit* or readmis* or transfer))
#9	Search (hospitaliz* OR hospitalis* OR rehospitalis* OR rehospitaliz*)
#8	Search ("stay length" OR "length of stay" OR "stay lengths" OR "lengths of stay")
#6	Search (#1 OR #2 OR #3 OR #4 OR #5)
#7	Search ((hospital AND (treat* OR stay OR days OR care)))
#5	Search ("long-term care facility" OR "long-term care facilities")
#4	Search ("longterm care facility" or "longterm care facilities")

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Supplementary Table 1 (*continued*)

All searches were conducted on September 20, 2022, and updated on January 10, 2023

#	Searches
#3	Search ("intermediate care facility" OR "intermediate care facilities")
#2	Search ("home for the aged" OR "homes for the aged" OR "home for the elderly" OR "homes for the elderly")
#1	Search ("nursing home" OR "nursing homes" OR "nursing facility" OR "nursing facilities")
CINAHL	
S45	S23 AND S44
S44	S41 NOT (S42 OR S43)
S43	(ZT "doctoral dissertation") or (ZT "masters thesis")
S42	MH "Animal Studies"
S41	S36 NOT S40
S40	S37 or S38 or S39
S39	PT commentary
S38	PT letter
S37	PT editorial
S36	S34 or S35
S35	TI (cost or costs or economic* or pharmacoeconomic* or price* or pricing*) OR AB (cost or costs or economic* or pharmacoeconomic* or price* or pricing*)
S34	S30 or S33
S33	S31 or S32
S32	MH "Health Resource Utilization"
S31	MH "Health Resource Allocation"
S30	S24 NOT S29
S29	S25 OR S26 or S27 OR S28
S28	MH "Business+"
S27	MH "Financing, Organized+"
S26	MH "Financial Support+"
S25	MH "Financial Management+"
S24	MH "Economics+"
S23	S7 AND S22
S22	S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21
S21	trauma cent#r*
S20	emergency department? use
S19	use of emergency department*
S18	((acute or immediate or emergency or critical) N1 (care or service))
S17	(MH "Emergency Medical Services")
S16	(MH "Trauma Centers")
S15	(MH "Emergency Service")
S14	((hospital* or patient*) N3 (admit* or admis* or readmit* or readmis* or transfer))
S13	(hospitaliz* or hospitalis* or rehospitalis* or rehospitaliz*)
S12	(stay N2 length)
S11	(hospital N3 (treat* or stay or days or care))
S10	(MH "Patient Admission")
S9	(MH "Length of Stay")
S8	(MH "Hospitalization")
S7	S1 OR S2 OR S3 OR S4 OR S5 OR S6
S6	((intermediate or long-term or longterm) N1 care facilit*)
S5	(home* for the aged or home* for the elderly)
S4	(nursing N1 (home* or facilit*))
S3	(MH "Nursing Home Patients")
S2	(MH "Skilled Nursing Facilities")
S1	(MH "Nursing Homes")

Supplementary Table 2
List of Excluded Studies and Reasons for Exclusion

Study	Reason for Exclusion
Adlbrecht C, Huelsmann M, Berger R, et al. Cost analysis and cost-effectiveness of NT-proBNP-guided heart failure specialist care in addition to home-based nurse care. *Eur J Clin Invest.* 2011;41 (3):315-322.	Ineligible population
Asmus-Szepesi KJ, de Vreede PL, Nieboer AP, et al. Evaluation design of a reactivation care program to prevent functional loss in hospitalised elderly: a cohort study including a randomised controlled trial. *BMC Geriatr.* 2011;11:36.	Ineligible population
Barrett DL, Secic M, Borowske D. The Gatekeeper Program: proactive identification and case management of at-risk older adults prevents nursing home placement, saving healthcare dollars program evaluation. *Home Healthc Nurse.* 2010;28 (3):191-197.	Ineligible population
Beaupre LA, Lier D, Magaziner JS, et al. An outreach rehabilitation program for nursing home residents after hip fracture may be cost-saving. *J Gerontol A Biol Sci Med Sci.* 2020;75 (10):e159-e165.	Ineligible intervention
Beck AM, Gogsig Christensen A, Stenbaek Hansen B, et al. Study protocol: cost-effectiveness of multidisciplinary nutritional support for undernutrition in older adults in nursing home and home-care: cluster randomized controlled trial. *Nutr J.* 2014;13:86.	Ineligible intervention
Bermejo Boixareu C, Lovatti Gonzalez R, Aparicio Molla S, Perez Rodriguez P, Fernandez Arana L, Gomez-Pavon J. [Implementation of a Geriatric liaison team in coordination with Primary Care attending 60 nursing homes in the northwest community healthcare network of the Community of Madrid]. *Semergen.* 2022; 48 (5):334-343.	Not published in English
Blewett LA, Johnson K, McCarthy T, Lackner T, Brandt B. Improving geriatric transitional care through inter-professional care teams. J Eval Clin Pract. 2010; 16 (1):57-63.	Ineligible intervention
Bond CM, Holland R, Alldred DP, et al. Protocol for a cluster randomised controlled trial to determine the effectiveness and cost-effectiveness of independent pharmacist prescribing in care homes: the CHIPPS study. *Trials.* 2020;21 (1):103.	Ineligible intervention
Bond CM, Holland R, Alldred DP, et al. Protocol for a cluster randomised controlled trial to determine the effectiveness and cost-effectiveness of independent pharmacist prescribing in care homes: the CHIPPS study. *Trials.* 2020;21 (1):103.	Duplicate record
Bond WF, Kim M, Franciskovich CM, et al. Advance care planning in an accountable care organization is associated with increased advanced directive documentation and decreased costs. *J Palliat Med.* 2018;21 (4):489-502.	Ineligible population
Bruhmann BA, Reese C, Kaier K, et al. A complex health services intervention to improve medical care in long-term care homes: study protocol of the controlled coordinated medical care (CoCare) study. *BMC Health Serv Res.* 2019;19 (1):332.	Ineligible intervention
Brydak L, Roiz J, Faivre P, Reygrobellet C. Implementing an influenza vaccination programme for adults aged >/= 65 years in Poland: a cost-effectiveness analysis. *Clin Drug Investig.* 2012;32 (2):73-85.	Ineligible study design
Bull JH, Whitten E, Morris J, et al. Demonstration of a sustainable community-based model of care across the palliative care continuum. *J Pain Symptom Manage.* 2012;44 (6):797-809.	Ineligible study design
Carey N, Boersema GC, du Toit HS. Improving early detection of infection in nursing home residents in South Africa. Int J Afr Nurs Sci. 2021; 14:100288.	Ineligible study design
Carter HE, Lee XJ, Dwyer T, et al. The effectiveness and cost effectiveness of a hospital avoidance program in a residential aged care facility: a prospective cohort study and modelled decision analysis. *BMC Geriatr.* 2020;20 (1):527.	Ineligible intervention
Carter HE, Lee XJ, Farrington A, et al. A stepped-wedge randomised controlled trial assessing the implementation, effectiveness and cost-consequences of the EDDIE + hospital avoidance program in 12 residential aged care homes: study protocol. *BMC Geriatr.* 2021;21 (1):347.	Ineligible intervention
Carter HE, Lee XJ, Farrington A, et al. A stepped-wedge randomised controlled trial assessing the implementation, effectiveness and cost-consequences of the EDDIE + hospital avoidance program in 12 residential aged care homes: study protocol. *BMC Geriatr.* 2021;21 (1):347.	Duplicate record
Chess D, Whitman JJ, Croll D, Stefanacci R. Impact of after-hours telemedicine on hospitalizations in a skilled nursing facility. *Am J Manag Care.* 2018;24 (8):385-388.	Ineligible study design
Condelius A, Edberg AK, Hallberg IR, Jakobsson U. Utilization of medical healthcare among people receiving long-term care at home or in special accommodation. *Scand J Caring Sci.* 2010;24 (2):404-413.	Ineligible study design
Cordato NJ, Kearns M, Smerdely P, Seeher KM, Gardiner MD, Brodaty H. Management of nursing home residents following acute hospitalization: efficacy of the "Regular Early Assessment Post-Discharge (REAP)" intervention. *J Am Med Dir Assoc.* 2018;19 (3):276e11-276e19.	Ineligible study design
Correard F, Montaleytang M, Costa M, et al. Impact of medication review via tele-expertise on unplanned hospitalizations at 3 months of nursing homes patients (TEM-EHPAD): study protocol for a randomized controlled trial. *BMC Geriatr.* 2020;20 (1):147.	Ineligible intervention
Correard F, Montaleytang M, Costa M, et al. Impact of medication review via tele-expertise on unplanned hospitalizations at 3 months of nursing homes patients (TEM-EHPAD): study protocol for a randomized controlled trial. *BMC Geriatr.* 2020;20 (1):147.	Duplicate record
Courtney MD, Edwards HE, Chang AM, Parker AW, Finlayson K, Hamilton K. A randomised controlled trial to prevent hospital readmissions and loss of functional ability in high risk older adults: a study protocol. *BMC Health Serv Res.* 2011;11:202.	Ineligible population
Crecelius C. Working to reduce skilled nursing facility hospitalizations. *Caring Ages.* 2014;15 (2):11.	Ineligible publication type
Daley CM. A hybrid transitional care program. Crit Pathw Cardiol. 2010; 9 (4):231-4.	Ineligible population
DaVanzo JE, El-Gamil AM, Dobson A, Sen N. A retrospective comparison of clinical outcomes and Medicare expenditures in skilled nursing facility residents with chronic wounds. *Ostomy Wound Manage.* 2010;56 (9):44-54.	Ineligible intervention
de Bot R, Veldman HD, Witlox AM, van Rhijn LW, Hiligsmann M. Hip protectors are cost-effective in the prevention of hip fractures in patients with high fracture risk. *Osteoporos Int.* 2020;31 (7):1217-1229.	Ineligible study design
Desborough J, Houghton J, Wood J, et al. Multi-professional clinical medication reviews in care homes for the elderly: study protocol for a randomised controlled trial with cost effectiveness analysis. *Trials.* 2011;12:218.	Ineligible intervention
Desborough JA, Clark A, Houghton J, et al. Clinical and cost effectiveness of a multi-professional medication reviews in care homes (CAREMED). *Int J Pharm Pract.* 2020;28 (6):626-634.	Ineligible intervention
Diaz-Gegundez M, Paluzie G, Sanz-Ballester C, Boada-Mejorana M, Terre-Ohme S, Ruiz-Poza D. [Evaluation of an intervention program in nursing homes to reduce hospital attendance]. *Rev Esp Geriatr Gerontol.* 2011;46 (5):261-264.	Not published in English
Dixon J, Matosevic T, Knapp M. The economic evidence for advance care planning: Systematic review of evidence. *Palliat Med.* 2015;29 (10):869-884.	Ineligible study design
Elia M, Parsons EL, Cawood AL, Smith TR, Stratton RJ. Cost-effectiveness of oral nutritional supplements in older malnourished care home residents. *Clin Nutr.* 2018;37 (2):651-658.	Ineligible intervention
Fan L, Lukin B, Zhao J, et al. Cost analysis of improving emergency care for aged care residents under a Hospital in the Nursing Home program in Australia. *PLoS One.* 2018;13 (7):e0199879.	Ineligible intervention
Forbat L, Liu WM, Koerner J, et al. Reducing time in acute hospitals: a stepped-wedge randomised control trial of a specialist palliative care intervention in residential care homes. *Palliat Med.* 2020; 34 (5):571-579.	Ineligible outcome
Frankenthal D, Lerman Y, Kalendaryev E, Lerman Y. Intervention with the screening tool of older persons potentially inappropriate prescriptions/screening tool to alert doctors to right treatment criteria in elderly residents of a chronic geriatric facility: a randomized clinical trial. *J Am Geriatr Soc.* 2014;62 (9):1658-1665.	Ineligible study design

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Supplementary Table 2 (*continued*)

Study	Reason for Exclusion
Friedman DM, Goldberg JM, Molinsky RL, et al. A virtual cardiovascular care program for prevention of heart failure readmissions in a skilled nursing facility population: retrospective analysis. *JMIR Cardio.* 2021;5 (1):e29101.	Ineligible study design
Gaubert-Dahan ML, Sebouai A, Tourid W, Fauvelle F, Aikpa R, Bonnet-Zamponi D. The impact of medication review with version 2 STOPP (Screening Tool of Older Person's Prescriptions) and START (Screening Tool to Alert doctors to Right Treatment) criteria in a French nursing home: a 3-month follow-up study. *Ther Adv Drug Saf.* 2019;10:2042098619855535.	Ineligible intervention
Gleeson A, Noble S, Mann M. Advance care planning for home health staff: a systematic review. *BMJ Support Palliat Care.* 2021;11 (2):209-216.	Ineligible study design
Gloth FM 3rd, Gloth MJ. A comparative effectiveness trial between a post-acute care hospitalist model and a community-based physician model of nursing home care. *J Am Med Dir Assoc.* 2011;12 (5):384-386.	Ineligible study design
Goldfeld KS, Hamel MB, Mitchell SL. The cost-effectiveness of the decision to hospitalize nursing home residents with advanced dementia. *J Pain Symptom Manage.* 2013;46 (5):640-651.	Ineligible study design
Grant KL, Lee DD, Cheng I, Baker GR. Reducing preventable patient transfers from long-term care facilities to emergency departments: a scoping review. *CJEM.* 2020;22 (6):844-856.	Ineligible study design
Groom LL, McCarthy MM, Stimpfel AW, Brody AA. Telemedicine and telehealth in nursing homes: an integrative review. *J Am Med Dir Assoc.* 2021;22 (9):1784-1801e7.	Ineligible study design
Gruber-Baldini AL, Quinn CC, Roggio AX, Browne BJ, Magaziner JS. Telemedicine for older adult nursing home residents to avoid emergency department visits: the experience of the NHTeleED project in Maryland. *J Am Med Dir Assoc.* 2022;23 (8):1311-1132.	Ineligible study design
Gugkaeva Z, Franson M. Pharmacist-led model of antibiotic stewardship in a long-term care facility. *Ann Longterm Care.* 2012;20:2-6.	Ineligible study design
Hames E, Hames E, Pandya N. Analysis of hospitalizations in a high acuity nursing home population: a quality improvement project. *J Am Med Dir Assoc.* 2014;15 (3):B15.	Ineligible study design
Hasan SS, Thiruchelvam K, Kow CS, Ghori MU, Babar ZU. Economic evaluation of pharmacist-led medication reviews in residential aged care facilities. *Expert Rev Pharmacoecon Outcomes Res.* 2017;17 (5):431-439.	Ineligible intervention
Heijnen RW, Evers SM, van der Weijden TD, Limburg M, Schols JM. The cost effectiveness of an early transition from hospital to nursing home for stroke patients: design of a comparative study. *BMC Public Health.* 2010;10:279.	Ineligible population
Hutton DW, Krein SL, Saint S, et al. Economic evaluation of a catheter-associated urinary tract infection prevention program in nursing homes. *J Am Geriatr Soc.* 2018;66 (4):742-747.	Ineligible intervention
Joseph JW, Kennedy M, Nathanson LA, Wardlow L, Crowley C, Stuck A. Reducing emergency department transfers from skilled nursing facilities through an emergency physician telemedicine service. *West J Emerg Med.* 2020;21 (6):205-209.	Ineligible study design
Kjelle E, Kleven L, Olerud HM, Melberg HO. Cost analysis of mobile radiography services for nursing home residents in Southeast Norway. *J Eval Clin Pract.* 2019;25 (2):275-281.	Ineligible intervention
Kosari S, Koerner J, Naunton M, et al. Integrating pharmacists into aged care facilities to improve the quality use of medicine (PiRACF Study): protocol for a cluster randomised controlled trial. *Trials.* 2021;22 (1):390.	Ineligible intervention
Krause O, Wiese B, Doyle IM, et al. Multidisciplinary intervention to improve medication safety in nursing home residents: protocol of a cluster randomised controlled trial (HIOPP-3-iTBX study). *BMC Geriatr.* 2019;19 (1):24.	Ineligible intervention
Krause O, Wiese B, Doyle IM, et al. Multidisciplinary intervention to improve medication safety in nursing home residents: protocol of a cluster randomised controlled trial (HIOPP-3-iTBX study). *BMC Geriatr.* 2019;19 (1):24.	Duplicate record
Kua CH, Yeo CYY, Tan PC, et al. Association of deprescribing with reduction in mortality and hospitalization: a pragmatic stepped-wedge cluster-randomized controlled trial. *J Am Med Dir Assoc.* 2021;22 (1):82-89e3.	Ineligible intervention
Kuo YF, Raji MA, Goodwin JS. Association between proportion of provider clinical effort in nursing homes and potentially avoidable hospitalizations and medical costs of nursing home residents. *J Am Geriatr Soc.* 2013;61 (10):1750-1757.	Ineligible intervention
Lacny S, Zarrabi M, Martin-Misener R, et al. Cost-effectiveness of a nurse practitioner-family physician model of care in a nursing home: controlled before and after study. *J Adv Nurs.* 2016;72 (9):2138-2152.	Duplicate record
Lamppu PJ, Finne-Soveri H, Kautiainen H, et al. Effects of staff training on nursing home residents' end-of-life care: a randomized controlled trial. *J Am Med Dir Assoc.* 2021;22 (8):1699-1705e1.	Ineligible intervention
Lee SWH, Mak VSL, Tang YW. Pharmacist services in nursing homes: a systematic review and meta-analysis. *Br J Clin Pharmacol.* 2019;85 (12):2668-2688.	Ineligible study design
Leguelinel-Blache G, Castelli C, Rolain J, et al. Impact of pharmacist-led multidisciplinary medication review on the safety and medication cost of the elderly people living in a nursing home: a before-after study. *Expert Rev Pharmacoecon Outcomes Res.* 2020;20 (5):481-490.	Ineligible intervention
Li SE, Hossain M, Gilman B, Forrow LV, Lee KM, Brown R. Effects of a nursing home telehealth program on spending and utilization for Medicare residents. *Health Serv Res.* 2022;57 (5):1191-1200.	Ineligible study design
Logan PA, Horne JC, Gladman JRF, et al. Multifactorial falls prevention programme compared with usual care in UK care homes for older people: multicentre cluster randomised controlled trial with economic evaluation. *BMJ.* 2021;375:e066991.	Ineligible intervention
Low JA, Hui Jin T, Tan Lean Chin L, et al. Cost analysis of implementing a telegeriatrics ecosystem with nursing homes: panel data analysis. *Health Syst (Basingstoke).* 2019;9 (4):285-292.	Ineligible intervention
Stanton MW. Nursing home residents whose primary care providers devote less time to nursing home care are at higher risk for potentially avoidable hospitalizations. AHRQ Research Activities. 2014 (403):15. Accessed May 25, 2024. https://archive.ahrq.gov/news/newsletters/research-activities/14mar/0314RA20.html.	Ineligible study design
Markle-Reid M, McAiney C, Forbes D, et al. An interprofessional nurse-led mental health promotion intervention for older home care clients with depressive symptoms. *BMC Geriatr.* 2014;14:62.	Ineligible intervention
Martinez-Casal X, Rodriguez-Sanchez JL, Otero-Espinar FJ. Budget impact analysis of two pharmaceutical management models in relation to the administration of intravenous anti-infective therapy in a Spanish nursing home. *Eur J Hosp Pharm.* 2021;28 (4):212-216.	Ineligible intervention
Massot Mesquida M, Folkvord F, Seda G, Lupianez-Villanueva F, Toran Monserrat P. Cost-utility analysis of a consensus and evidence-based medication review to optimize and potentially reduce psychotropic drug prescription in institutionalized dementia patients. *BMC Geriatr.* 2021;21 (1):327.	Ineligible intervention
Massot Mesquida M, Folkvord F, Seda G, Lupianez-Villanueva F, Toran Monserrat P. Cost-utility analysis of a consensus and evidence-based medication review to optimize and potentially reduce psychotropic drug prescription in institutionalized dementia patients. *BMC Geriatr.* 2021;21 (1):327.	Duplicate record
McGrath LS, Foote DG, Frith KH, Hall WM. Cost effectiveness of a palliative care program in a rural community hospital. *Nurs Econ.* 2013;31 (4):176-183.	Ineligible population
Meyer H. A new care paradigm slashes hospital use and nursing home stays for the elderly and the physically and mentally disabled. *Health Aff (Millwood).* 2011;30 (3):412-415.	Ineligible study design

(*continued on next page*)

Supplementary Table 2 (*continued*)

Study	Reason for Exclusion
Miller EA, Rosenheck RA, Schneider LS. Caregiver burden, health utilities, and institutional service costs among community-dwelling patients with Alzheimer disease. *Alzheimer Dis Assoc Disord.* 2010;24 (4):380-389.	Ineligible population
Muller D, Borsi L, Stracke C, Stock S, Stollenwerk B. Cost-effectiveness of a multifactorial fracture prevention program for elderly people admitted to nursing homes. *Eur J Health Econ.* 2015;16 (5):517-527.	Ineligible intervention
Nguyen KH, Seaman K, Saunders R, Williams E, Harrup-Gregory J, Comans T. Benefit-cost analysis of an interprofessional education program within a residential aged care facility in Western Australia. *J Interprof Care.* 2019;33 (6):619-627.	Ineligible intervention
Nicholas LH, Bynum JP, Iwashyna TJ, Weir DR, Langa KM. Advance directives and nursing home stays associated with less aggressive end-of-life care for patients with severe dementia. *Health Aff (Millwood).* 2014;33 (4):667-674.	Ineligible population
Nouvenne A, Caminiti C, Diodati F, et al. Implementation of a strategy involving a multidisciplinary mobile unit team to prevent hospital admission in nursing home residents: protocol of a quasi-experimental study (MMU-1 study). *BMJ Open.* 2020;10 (2):e034742.	Ineligible intervention
Obermeyer Z, Makar M, Abujaber S, Dominici F, Block S, Cutler DM. Association between the Medicare hospice benefit and health care utilization and costs for patients with poor-prognosis cancer. *JAMA.* 2014;312 (18):1888-1896.	Ineligible intervention
Oliver GM, Pennington L, Revelle S, Rantz M. Impact of nurse practitioners on health outcomes of Medicare and Medicaid patients. *Nurs Outlook.* 2014;62 (6):440-447.	Ineligible study design
Ouslander JG, Lamb G, Tappen R, et al. Interventions to reduce hospitalizations from nursing homes: evaluation of the INTERACT II collaborative quality improvement project. *J Am Geriatr Soc.* 2011;59 (4):745-753.	Ineligible intervention
Pompili A, Telera S, Villani V, Pace A. Home palliative care and end of life issues in glioblastoma multiforme: results and comments from a homogeneous cohort of patients. *Neurosurg Focus.* 2014; 37 (6):E5.	Ineligible population
Rantz M, Petroski GF, Popejoy LL, et al. Longitudinal impact of APRNs on nursing home quality measures in the Missouri Quality Initiative. *J Nutr Health Aging.* 2021;25 (9):1124-1130.	Ineligible study design
Rantz M, Vogelsmeier A, Popejoy L, et al. Financial and work-flow benefits of reducing avoidable hospitalizations of nursing home residents. *J Nutr Health Aging.* 2021;25 (8):971-978.	Ineligible study design
Ross DM, Ramirez B, Rotarius T, Liberman A. Health care transitions and the aging population: a framework for measuring the value of rapid rehabilitation. *Health Care Manag (Frederick).* 2011;30 (2):96-117.	Ineligible population
Ryskina KL, Yuan Y, Werner RM. Postacute care outcomes and medicare payments for patients treated by physicians and advanced practitioners who specialize in nursing home practice. *Health Serv Res.* 2019;54 (3):564-574.	Ineligible intervention
Shetty KD, Chen AY, Rose AJ, Liu HH. Effect of the ExactCare medication care management model on adherence, health care utilization, and costs. *J Manag Care Spec Pharm.* 2021;27 (5):574-585.	Ineligible intervention
Si L, Robinson A, Haines TP, Tierney P, Palmer AJ. Cost analysis of employing general practitioners within residential aged care facilities based on a prospective, stepped-wedge, cluster randomised trial. *BMC Health Serv Res.* 2022;22 (1):374.	Ineligible intervention
Sloane PD, Zimmerman S, Ward K, et al. A 2-year pragmatic trial of antibiotic stewardship in 27 community nursing homes. *J Am Geriatr Soc.* 2020;68 (1):46-54.	Ineligible study design
Stark M, Tietz R, Gattinger H, Hantikainen V, Ott S. Effects of a mobility monitoring system on the cost of care in relation to reimbursement at Swiss nursing homes: learnings from a randomized controlled trial. *Health Econ Rev.* 2017;7(1):43.	Ineligible intervention
Stern A, Mitsakakis N, Paulden M, et al. Pressure ulcer multidisciplinary teams via telemedicine: a pragmatic cluster randomized stepped wedge trial in long term care. *BMC Health Serv Res.* 2014;14:83.	Ineligible intervention
Tchouaket E, Kilpatrick K, Jabbour M. Effectiveness for introducing nurse practitioners in six long-term care facilities in Quebec, Canada: a cost-savings analysis. *Nurs Outlook.* 2020;68 (5):611-625.	Ineligible outcome
Testa L, Hardy JE, Jepson T, Braithwaite J, Mitchell RJ. Health service utilisation and health outcomes of residential aged care residents referred to a hospital avoidance program: a multi-site retrospective quasi-experimental study. *Australas J Ageing.* 2021;40 (3):e244-e253.	Ineligible study design
Uchida-Nakakoji M, Stone PW, Schmitt S, Phibbs C, Wang YC. Economic evaluation of registered nurse tenure on nursing home resident outcomes. *Appl Nurs Res.* 2016;29:89-95.	Ineligible intervention
Unroe KT, Sachs GA, Dennis ME, et al. Effect of hospice use on costs of care for long-stay nursing home decedents. *J Am Geriatr Soc.* 2016;64 (4):723-730.	Ineligible study design
Utens CM, Goossens LM, Smeenk FW, et al. Effectiveness and cost-effectiveness of early assisted discharge for chronic obstructive pulmonary disease exacerbations: the design of a randomised controlled trial. *BMC Public Health.* 2010;10:618.	Ineligible population
van de Ven G, Draskovic I, van Herpen E, et al. The economics of dementia-care mapping in nursing homes: a cluster-randomised controlled trial. *PLoS One.* 2014;9 (1):e86662.	Ineligible intervention
Vowden K, Vowden P. A pilot study on the potential of remote support to enhance wound care for nursing-home patients. *J Wound Care.* 2013; 22 (9):481-8.	Ineligible study design
Wichmann AB, Adang EMM, Vissers KCP, et al. Decreased costs and retained QoL due to the 'PACE Steps to Success' intervention in LTCFs: cost-effectiveness analysis of a randomized controlled trial. *BMC Med.* 2020;18 (1):258.	Duplicate record
Wouters H, Quik EH, Boersma F, et al. Discontinuing inappropriate medication in nursing home residents (DIM-NHR Study): protocol of a cluster randomised controlled trial. *BMJ Open.* 2014;4 (10):e006082.	Ineligible intervention
Yoo JW, Jabeen S, Bajwa T Jr, et al. Hospital readmission of skilled nursing facility residents: a systematic review. *Res Gerontol Nurs.* 2015;8 (3):148-156.	Ineligible study design
Zheng NT, Mukamel DB, Friedman B, Caprio TV, Temkin-Greener H. The effect of hospice on hospitalizations of nursing home residents. *J Am Med Dir Assoc.* 2015;16 (2):155-159.	Ineligible study design
Zuniga F, De Geest S, Guerbaai RA, et al. Strengthening geriatric expertise in swiss nursing homes: INTERCARE implementation study protocol. *J Am Geriatr Soc.* 2019;67 (10):2145-2150.	Ineligible study design

Supplementary Table 3
Critical Appraisal of Included Studies

Critical Appraisal of Full Economic Evaluations (Drummond & Jefferson 1996)[3]			
Items	Bartakova (2022)[24]	Lacny (2016)[25]	Wichmann (2020)[26]
1. Was the research question stated?	Yes	Yes	Yes
2. Was the economic importance of the research question stated?	Yes	Yes	Yes
3. Was/were the viewpoint(s) of the analysis clearly stated and justified?	Yes	Yes	Yes
4. Was a rationale reported for the choice of the alternative programs or interventions compared?	Yes	Yes	Yes
5. Were the alternatives being compared clearly described?	No	Yes	Yes
6. Was the form of economic evaluation stated?	Yes	Yes	Yes
7. Was the choice of form of economic evaluation justified in relation to the questions addressed?	No	Yes	No
8. Was/were the source(s) of effectiveness estimates used stated?	Yes	Yes	Yes
9. Were details of the design and results of the effectiveness study given (if based on a single study)?	No	Yes	No
10. Were details of the methods of synthesis or meta-analysis of estimates given (if based on an overview of a number of effectiveness studies)?	NA	NA	NA
11. Were the primary outcome measure(s) for the economic evaluation clearly stated?	Yes	Yes	Yes
12. Were the methods used to value health states and other benefits stated?	Yes	Yes	Yes
13. Were the details of the subjects from whom valuations were obtained given?	No	Yes	Yes
14. Were productivity changes (if included) reported separately?	NA	NA	NA
15. Was the relevance of productivity changes to the study question discussed?	NA	NA	NA
16. Were quantities of resources reported separately from their unit cost?	Yes	No	No
17. Were the methods for the estimation of quantities and unit costs described?	Yes	No	No
18. Were currency and price data recorded?	Yes	No	Yes
19. Were details of price adjustments for inflation or currency conversion given?	No	No	Yes
20. Were details of any model used given?	NA	NA	NA
21. Was there a justification for the choice of model used and the key parameters on which it was based?	NA	NA	NA
22. Was the time horizon of cost and benefits stated?	No	Yes	Yes
23. Was the discount rate stated?	Yes	No	No
24. Was the choice of rate justified?	No	No	No
25. Was an explanation given if cost or benefits were not discounted?	Yes	No	No
26. Were the details of statistical test(s) and confidence intervals given for stochastic data?	No	No	NA
27. Was the approach to sensitivity analysis described?	Yes	Yes	Yes
28. Was the choice of variables for sensitivity analysis justified?	No	No	Yes
29. Were the ranges over which the parameters were varied stated?	NA	No	No
30. Were relevant alternatives compared?	Yes	Yes	Yes
31. Was an incremental analysis reported?	Yes	Yes	No
32. Were major outcomes presented in a disaggregated as well as aggregated form?	Yes	No	No
33. Was the answer to the study question given?	Yes	Yes	Yes
34. Did conclusions follow from the data reported?	Yes	Yes	Yes
35. Were conclusions accompanied by the appropriate caveats?	Yes	Yes	Yes
36. Were generalizability issues addressed?	Yes	Yes	Yes

Critical Appraisal of Cost Analyses: Pre-Post Study	
Item from NIH pre-post tool	O'Sullivan (2016)[27]
Was the study question or objective clearly stated?	Yes
Were eligibility/selection criteria for the study population prespecified and clearly described?	Yes
Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	Yes
Were all eligible participants that met the prespecified entry criteria enrolled?	Yes
Was the sample size sufficiently large to provide confidence in the findings?	Yes
Was the test/service/intervention clearly described and delivered consistently across the study population?	Yes
Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?	Yes
Were the people assessing the outcomes blinded to the participants' exposures/interventions?	No
Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	Yes
Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided *P* values for the pre-to-post changes?	Yes
Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (ie, did they use an interrupted time-series design)?	No
If the intervention was conducted at a group level (eg, a whole hospital, a community, etc) did the statistical analysis take into account the use of individual-level data to determine effects at the group level?	Not applicable
Items 5-11 from cost analysis tool	
Is the costing approach reported (eg, top-down, bottom-up)?	Unclear
Is the data collection process reported (eg, prospective, retrospective)?	No
Are all components of resource use identified that are relevant to the condition/disease, population, intervention, study objectives, and study perspective?	Yes
If not, is a justification provided for excluding relevant components for resource use?	Not applicable
Are all identified and included components of resource use measured?	Yes
If not, is a justification provided for not measuring certain components of resource use?	Not applicable
Are all included components of resource use valued in monetary terms?	Yes
If not, is a justification provided for not valuing certain components of resource use?	Not applicable
Is the chosen time horizon specified?	Yes
If so, is the chosen time horizon justified?	Yes
Are future costs discounted?	No
If so, is a justification provided for the discount rate?	Not applicable

Critical Appraisal of Cost Analyses: Controlled, Randomized Study	
Item from NIH controlled randomized tool	Shireman (2019)[29]
Was the study described as randomized, a randomized trial, or an RCT?	Yes
Was the method of randomization adequate (ie, use of randomly generated assignment?)	NR
Was the treatment allocation concealed (so that assignments could not be predicted)?	NR
Were study participants and providers blinded to treatment group assignment?	Cannot determine
Were the people assessing the outcomes blinded to the participants' group assignments?	NR
Were the groups similar at baseline on important characteristics that could affect outcomes (eg, demographics, risk factors, comorbid conditions)?	Yes
Was the overall dropout rate from the study at endpoint 20% or lower of the number allocated to treatment?	Yes
Was the differential dropout rate (between treatment groups) at endpoint 15 percentage points or lower?	Yes
Was there high adherence to the intervention protocols for each treatment group?	Cannot determine
Were other interventions avoided or similar in the groups (eg, similar background treatments)?	NR
Were outcomes assessed using valid and reliable measures, implemented consistently across all study participants?	NR
Did the authors report that the sample size was sufficiently large to be able to detect a difference in the main outcome between groups with at least 80% power?	Yes
Were outcomes reported or subgroups analyzed prespecified (ie, identified before analyses were conducted)?	NR
Were all randomized participants analyzed in the group to which they were originally assigned, ie, did they use an intention-to-treat analysis?	Yes
Items 5-11 from cost analysis tool	
Is the costing approach reported (eg, top-down, bottom-up)?	Yes
Is the data collection process reported (eg, prospective, retrospective)?	Yes
Are all components of resource use identified that are relevant to the condition/disease, population, intervention, study objectives, and study perspective?	Yes
If not, is a justification provided for excluding relevant components for resource use?	Not applicable
Are all identified and included components of resource use measured?	Yes
If not, is a justification provided for not measuring certain components of resource use?	Not applicable
Are all included components of resource use valued in monetary terms?	Yes
If not, is a justification provided for not valuing certain components of resource use?	Not applicable
Is the chosen time horizon specified?	Yes
If so, is the chosen time horizon justified?	Yes
Are future costs discounted?	No
If so, is a justification provided for the discount rate?	NR
Critical Appraisal of Cost Analyses: Case Control Study	
Item from NIH case-Control tool	Teo (2014)[28]
Was the research question or objective in this paper clearly stated and appropriate?	Yes
Was the study population clearly specified and defined?	Yes
Did the authors include a sample size justification?	No
Were controls selected or recruited from the same or similar population that gave rise to the cases (including the same timeframe)?	Yes
Were the definitions, inclusion and exclusion criteria, algorithms or processes used to identify or select cases and controls valid, reliable, and implemented consistently across all study participants?	Yes
Were the cases clearly defined and differentiated from the controls?	Yes
If less than 100% of eligible cases and/or controls were selected for the study, were the cases and/or controls randomly selected from those eligible?	No
Was there use of concurrent controls?	No
Were the investigators able to confirm that the exposure/risk occurred prior to the development of the condition or event that defined a participant as a case?	Yes
Were the measures of exposure/risk clearly defined, valid, reliable, and implemented consistently (including the same time period) across all study participants?	Yes
Were the assessors of exposure/risk blinded to the case or control status of participants?	No
Were key potential confounding variables measured and adjusted statistically in the analyses? If matching was used, did the investigators account for matching during study analysis?	No
Items 5-11 from cost analysis tool	
Is the costing approach reported (eg, top-down, bottom-up)?	No
Is the data collection process reported (eg, prospective, retrospective)?	Yes
Are all components of resource use identified that are relevant to the condition/disease, population, intervention, study objectives, and study perspective?	Yes
If not, is a justification provided for excluding relevant components for resource use?	Not applicable
Are all identified and included components of resource use measured?	Yes
If not, is a justification provided for not measuring certain components of resource use?	Not applicable
Are all included components of resource use valued in monetary terms?	Yes
If not, is a justification provided for not valuing certain components of resource use?	Not applicable
Is the chosen time horizon specified?	Yes
If so, is the chosen time horizon justified?	No
Are future costs discounted?	No
If so, is a justification provided for the discount rate?	Not applicable

NR, not reported.

Supplementary Table 4
ICERs and Hospital Admission–Related Results of Included Economic Evaluations

Study	Impact on Hospital Admissions	Other Costs Data Reported
Bartakova et al (2022)[22]	Average hospitalization rate Before intervention: 1.27 ± 1.07 per 1000 nursing days During intervention: 1.14 ± 0.93 per 1000 nursing days	Cost of implementation Average total implementation cost (range): 685 CHF (110-1591 CHF) Average total implementation time per bed: 9.35 h (2.05-17.16 h) Most cost- and time-intensive personnel resources: administration and internal coordination; internal training and information events Intervention costs Yearly intervention costs, ie, nurse salary (range): 939 CHF (259-1513 CHF) NH losses and savings due to hospitalization Average daily loss of revenue per resident due to a hospitalization 2017 to 2020 (range): 160 CHF (120-201 CHF) Each absence amounts to 100% loss on NH nursing service revenues 11% average of hotel services 52% average loss on all associated revenues No savings for NHs
Lacny et al (2016)[23]	ED transfer rates intervention group (NP-FP): Before: 0.0202 After: 0.0446 ED transfer rate, person-month: 0.0247	No additional costs reported
Wichmann et al (2020)[24]	Hospitalizations Difference between the intervention and control group before and after intervention: 2.9 nights Quality of end of life (care) in the last month of life (QOD-LTC): 3.19 (1.72-4.65), $P < .001$	Postintervention mean costs resource use (unadjusted MD): Control (n = 558): €1962.64 Intervention (n = 425): €1410.35

CAD, Canadian dollars; CHF, Swiss francs; ED, emergency department; ICER, incremental cost-effectiveness ratio; NP-FP, nurse practitioner–family physician; QOD-LTC, quality of life long-term care.

Supplementary Table 5
Hospital Admission–Related Results of Included Cost Analyses

Study	Impact on Hospital Admissions	Costs/Savings Relating to Hospital Admissions	Other Costs Data Reported
O'Sullivan et al (2016)[27]	Hospitalizations per year Before: 80 After: 44 Hospitalization rate (based on hospitalization incidents) Before: 27.9% After: 14.6%, $z = 3.96$, $P < .001$ Average LOS per stay Before: 7.02 After: 9.07 Average LOS for same period in reference hospital site among those transferred from nursing homes Before: 9.89 After: 8.58 Hospital bed days (per month) Before: 1403 (46.8) After: 798 (33.3) Hospitalization rate (based on hospital days) Before: 0.54% After: 0.36%, z = 8.85, $P < .001$	Episode of care €4081/episode Before: €37,487,265 After: €19,686,419 Length of stay €491/d diagnosis related group (DRG) Before: €31,630,876 After: €21,472,704 Difference: €17,800,847 (cost savings) Ambulance transfers: €97/transfer Before: €891,761 After: €468,308	Sensitivity analysis (average € millions, 95% CI) Length of stay, reference hospital data: €491/d Before: €44.69 (25.84-70.51) After: €20.30 (13.75-28.31) Difference: €24.39 (6.05-48.55) Length of stay, LMD-ACD data: €857/d Before: €56.71 (34.61-87.58) After: €38.11 (22.48-60.20) Difference: €18.60 (−10.87 to 52.14) Length of stay, reference hospital data €857/d Before: €77.98 (47.24-118.78) After: € 35.43 (25.59-47.01) Difference: €42.55 (10.72-83.16) Probabilistic scenario analysis Baseline: €4081/episode of hospitalization Before: €37.82 (2.65 to 119.34) After: €19.87 (1.37 to 64.10) Difference: €17.95 (1.15 to 58.90) Baseline: LMD-ACP length of stay and €491/d Before: €32.49 (18.96-52.34) After: €21.83 (12.46-35.40) Difference: €10.67 (−6.10 to 30.69) Ambulance transfers Before: 0.89 (0.55-1.34) After: 0.47 (0.27-0.73) Difference: 0.42 (0.19-0.73)
Shireman et al (2019)[29]	No explicit data reported	Emergency department/observation High-dose: USD 133 (95% CI 248 to 427) Standard dose: USD 135 (95% CI 123 to 148)	Per-participant direct medical costs: mean Acute inpatient High-dose: USD 3043 (95% CI USD 2773 to USD 3313) Standard dose: USD 3255 (95% CI USD 2998 to USD 3512) Other inpatient High-dose: USD 338 (95% CI USD 248 to USD 427) Standard dose: USD 419 (95% CI USD 324 to USD 513) Adjusted differences (MD) in per-participant direct medical costs Acute inpatient: USD 262 (95% CI USD −0.06 to USD 524) Other inpatient: USD 85 (95% CI USD 2 to USD 168) Emergency department/observation: USD 6 (95% CI USD -7 to USD 18)
Teo et al (2014)[28]	Doctor visits Last 3 mo in life mean utilization (SD): 2.8 (6.4) Final month in life mean utilization (SD): 1.5 (3.5) Transport Last 3 mo in life mean utilization (SD): 3.7 (8.8) Final month in life mean utilization (SD): 2.0 (4.9)	Doctor visits Last 3 mo in life median cost per resident (10-90th PR): SGD 0 (0-520) Final month in life median cost per resident (10-90th PR): SGD 0 (0-325) Transport Last 3 mo in life median cost per resident (10-90th PR): SGD 0 (0-58) Final month in life median cost per resident (10-90th PR): SGD 0 (0-35)	Fixed cost Median cost per resident Last 3 mo in life: SGD 583 Final month in life: SGD 583 Overall median cost per resident (10-90th PR) Last 3 mo in life: SGD 583 (583-1323) Final month in life: SGD 0 (583-1088)

LOS, length of stay; PR, per resident; SGD, Singapore dollar; USD, United States dollar.