



Universität
Basel

Medizinische Fakultät
Departement Public Health

Scuola universitaria professionale
della Svizzera italiana

SUPSI


La Source.
Institut et Haute
Ecole de la Santé

Interventions to improve care quality in long-term care facilities for older adults: An umbrella review protocol

Authors

Emmanuelle Poncin¹, Véronique de Goumoëns^{1,2}, Blanche Kiszio^{1,2}, Bastiaan Van Grootven³, Claudia Ortoleva Bucher¹, Delphine Roulet Schwab¹, Nereide Alhena Curreri⁴, Magdalena Osińska³, Laurie Corna⁴, Franziska Zúñiga³, Nathalie IH Wellens¹ on behalf of the NIP-Q-UPGRADE consortium

1. La Source School of Nursing, HES-SO, University of Applied Sciences and Arts, Western Switzerland, Lausanne
2. Bureau d'Echange des Savoirs pour des praTiques exemplaires de soins BEST a JBI Center of Excellence
3. Institute of Nursing Science, Faculty of Medicine, University of Basel, Basel, Switzerland
4. Centre of Competence on Ageing, Department of Business Economics, Health & Social Care, University of Applied Sciences & Arts of Southern Switzerland, Manno, Switzerland

Corresponding author: Emmanuelle Poncin, PhD, Senior Researcher, La Source School of Nursing, HES-SO, University of Applied Sciences and Arts, Western Switzerland, Lausanne, e.poncin@ecolelasource.ch; ORCID: 0000-0003-1517-6909

Abstract

Background: As part of sustained efforts to improve the quality of care and meet the challenges associated with ageing, Swiss long-term care facilities for older people are under a legal obligation to report quality indicators to the federal authorities. Whilst a vast amount of literature focuses on individual quality indicator areas, knowledge is scattered and not readily actionable, which makes it difficult for policymakers and practitioners in long-term care facilities to improve current practices based on the best available evidence. Against this backdrop, this umbrella review will identify and describe effective interventions to:

- a) improve monitoring, assessment, care, raise awareness, and/or reduce the prevalence of malnutrition, pain, or pressure ulcers in older adults residing in long-term care facilities;
- b) improve care practices by reducing polypharmacy or the use of physical restraints or by improving the coverage and effects of advance care planning or medication reviews in long-term care facilities for older adults.

Methods: We will follow the Joanna Briggs Institute (JBI) guidelines for umbrella reviews. We will include systematic reviews and meta-analyses based on empirical evidence published between 2013 and 2023. We will search the following databases: Medline (Ovid), CINHAL (EBSCO), PsycINFO (Ovid), Emcare (Ovid), Embase (Elsevier), Cochrane Library, JBI EBP Database (Ovid), Web of Science, Epistemonikos, and Google scholar as a supplementary resource; and Dissertations and Theses (Proquest) and MedNar for grey literature. Two independent reviewers will screen titles and abstracts then full texts of selected reviews, using inclusion criteria based on a Population–Interventions–Context–Outcomes (PICO) framework. We will assess methodological quality to include only high-quality reviews and use the standardised JBI tool to extract relevant data. A descriptive narrative summary will present main findings in relation to effective interventions in the areas of malnutrition, pain, pressure ulcers, polypharmacy, physical restraints, advance care planning, and medication reviews in long-term care facilities for older adults.

Discussion: Our findings will present a synthesis of the literature on key quality indicators areas, which will be helpful in guiding policymakers and practitioners in the development, implementation, and sustainment of evidence-based care quality improvement initiatives.

Review registration: The present protocol was registered on Zenodo on 26 May 2023.

Keywords: quality of health care; long-term care; aged; malnutrition; pain; pressure ulcer; polypharmacy; restraint, physical; advance care planning; medication review; umbrella review

Introduction

Background

Population ageing has been identified by the World Health Organization (WHO) as “the most important medical and social demographic problem worldwide” today (1), posing unprecedented challenges to healthcare systems across the world. Indeed, the fast growth of the population aged 60 and over, which is predicted to double to reach 2.1 billion by 2050 (2), brings about sharp rises in cognitive impairment, malnutrition, pain, frailty, and chronic inflammation, amongst other common geriatric conditions (2,3). Older adults living in long-term care facilities are particularly likely to experience advanced frailty, functional dependency, and multimorbidity (4–6). In Switzerland, about 80,000 or 5% of adults aged 65 or older and 14% of adults aged 80 or older are living in long-term care facilities (7), with an average admission age of 85 (8) and average length of stay of 2.4 years (9). The advanced age at admission is characterised by particularly complex health needs (10,11).

As part of sustained efforts to monitor, evaluate, and ultimately improve the quality of care and meet the challenges associated with ageing, Swiss long-term care facilities for older people are under a legal obligation to report medical quality indicators to the federal authorities (12). Since 2019, the following indicators must be reported: malnutrition (measured through recent weight loss), physical restraints (i.e., bedrails or trunk fixation/seating that prevents residents from rising), polypharmacy (defined as taking at least nine different active substances), and pain (both self-reported and observed by an assessor). Additional quality indicators will be introduced in the next few years, namely pressure ulcers, advance care planning, and medication reviews. As such, Swiss quality indicators cover common geriatric conditions (malnutrition, pain, and pressure ulcers) and care practices (physical restraints, polypharmacy, advance care planning, and medication reviews).

Interventions of interest

The umbrella review will identify and describe effective interventions and potential knowledge gaps pertaining to the thematic areas covered by the Swiss quality indicators. More specifically, it will focus on interventions seeking to:

- a. improve monitoring, assessment, care, raise awareness, and/or reduce the prevalence of malnutrition, pain, or pressure ulcers;
- b. improve care practices by reducing polypharmacy or the use of physical restraints (without inappropriate chemical restraints) or by improving the coverage and effects of advance care planning or medication reviews in long-term care facilities for older adults.

Justification of review design and relevance

We will conduct an umbrella review following the Joanna Briggs Institute (JBI) guidelines (13). Umbrella review results can assist policymakers and practitioners in gaining a better understanding of complex thematic areas and support their decision making (14,15). This echoes the broad aim of the present work, which is conducted as part of a large participatory programme aiming to guide Swiss long-term care facilities in improving care quality based on data (National Implementation Programme – Strengthening quality of care in partnership with residential long-term care facilities for older people 2022–2026, NIP-Q-UPGRADE). By presenting a unified synthesis of the latest evidence available, this umbrella review will offer an avenue to support policymakers and practitioners in long-term care facilities in making informed decisions on how to improve care quality.

Moreover, the umbrella review design is recommended when multiple up-to-date systematic reviews and meta-analyses (collectively refer to as “reviews” hereafter) are available (16). A preliminary literature search, detailed below, confirmed that a suitable number of recent reviews is available. An initial search for existing umbrella reviews on our topics of interest on Ovid MEDLINE, JBI EBP Database, EPPI, Epistemonikos and PROSPERO further confirms the need for and originality of the present work – as it yielded two relevant umbrella reviews on two single care quality areas: malnutrition (17) and medication review (18).

A preliminary search for reviews published within the last 10 years on Ovid Medline yielded 264 results (as detailed in Annex 1). Through preliminary title and abstract screening, we pre-identified a broad range of potentially relevant interventions. For instance, reviews identify different types of interventions that positively impact **nutrition**, including communal dining, dining room enhancement (19), and supplements and food-based nutrition interventions (20–22). Effective **pain reduction and management** strategies include analgesics (23), staff education, supervision, and mentoring (24), and group-based cognitive behaviour therapy (25). Reviews also highlight that prevention programmes using advanced mattresses and overlays or protein and energy supplements are effective in reducing **pressure ulcers** (26); and that whilst repositioning is widely recommended and used, it lacks a firm evidence-base (27).

Reviews on **physical restraints** present contrasting conclusions regarding staff educational interventions, considered as promising but inconclusive by some (28,29), and as effective and delivering improvements overtime when sustained through ongoing education or support by others (24,30). Regarding **polypharmacy**, reviews identify a vast array of effective interprofessional interventions involving pharmacists or pharmacist-led interventions including medication review, staff education, and medication simplification (31–34); and interventions to

optimise prescribing, such as multidisciplinary case-conferencing and clinical decision support technology (35–37).

Two reviews identify staff training, train-the-trainer approaches, and the provision of decision aids to carers as effective in increasing **advance care planning** practice (38,39). By contrast, a third finds limited evidence for the effectiveness of staff training (40). Lastly, several reviews discuss the clinical outcomes of **medication review**, presented for instance as an effective strategy to enhance medication safety (18).

Overall, whilst a vast amount of literature focuses on individual areas of interest, knowledge is scattered and not readily actionable, which makes it difficult for policymakers and practitioners in long-term care facilities to improve current practices based on the best available evidence. Moreover, across all areas, several reviews point out that variety in study designs and heterogeneity in data quality prevent robust conclusions to be drawn. Therefore, a synthesis of the literature on all areas of interest would be particularly relevant and helpful in guiding policymakers and practitioners in the development, implementation, and sustainment of evidence-based care quality improvement initiatives (4,5).

Review question

What are effective interventions to:

- (a) improve monitoring, assessment, care, raise awareness, and/or reduce the prevalence of malnutrition, pain, or pressure ulcers in older adults residing in long-term care facilities;
- (b) improve care practices by reducing polypharmacy or the use of physical restraints or by improving the coverage and effects of advance care planning or medication reviews in long-term care facilities for older adults?

Inclusion Criteria

Population

This review will focus on older people living in long-term care facilities. We define long-term care facilities following the WHO, as “establishments primarily engaged in providing residential long-term care that combines nursing, supervisory or other types of care as required by the residents” (41). These are sometimes referred to as “care homes,” “nursing homes,” “residential homes,” “residential facilities,” “homes for the aged,” “institutional care facilities,” or “skilled nursing facilities,” amongst other terms.

Reviews will be excluded if they focus on community settings or other care settings (e.g., inpatient, ambulatory, assisted living, short-stay, respite care). Reviews that focus on long-term care facilities that are not primarily for older adults (e.g., for people with a mental health condition) will also be excluded. Reviews focusing on mixed settings will be included if findings pertaining to long-term care facilities are presented separately.

We will apply age filters of 65 + to our search, as this is a widely used cut-off in scientific literature databases. Reviews that consider mixed age groups will be included if findings pertaining to older people (i.e., 65+) are presented separately. We will also include reviews focusing on specific populations or problematics (e.g., older people with dementia or with palliative care).

Interventions of interest

We will consider interventions seeking to

a. improve monitoring, assessment, care, raise awareness, and/or reduce the prevalence of:

1. malnutrition
2. pain
3. pressure ulcers

b. improve care practices by:

4. reducing polypharmacy
5. reducing the use of physical restraints
6. improving the coverage and effects of advance care planning
7. improving the coverage and effects of medication reviews

We will not restrict our search to specific definitions of the above concepts but will consider all definitions reported in reviews.

We will include reviews reporting on interventions as well as perceptions of a problematic of interest (e.g., healthcare professionals' perceptions of polypharmacy), and on the cost-effectiveness or economic aspects of specific interventions. We will also include reviews that evaluate or describe one of the quality indicator areas of interest (i.e., based on non-interventional studies) if they are aligned with our research question.

Moreover, the literature has shown that the relational dimension of care is key to understanding how long-term care facilities may deliver high-quality care for their residents, and is a main determinant to residents' quality of life, meaning in life, and will to live (42–45). As such, we will pay careful attention to this dimension in our review, reporting how it may be addressed through specific intervention components for instance.

Context

We will not apply geographical restrictions. We will consider reviews published in English, French, German, Italian, Spanish, Dutch, Portuguese, and Polish for inclusion, based on the language skills of the research team.

Outcomes

All outcomes reported in the included reviews will be considered, including, but not limited to:

1. malnutrition: body weight, body mass index, protein and energy intake, mid arm or calf circumference
2. pain: prevalence of pain, pain scale ratings, healthcare professionals' perceptions of pain, pain assessment and monitoring instruments
3. pressure ulcers: pressure ulcer incidence, prevalence, healing time
4. polypharmacy: prevalence of polypharmacy, irrespective of the definition of polypharmacy applied
5. physical restraints: prevalence of restraint use, especially bedrails, trunk fixation, and seating not allowing the resident to rise; healthcare professionals' perceptions of restraints use
6. advance care planning: prevalence of advance care planning, effects of advance care planning
7. medication reviews: prevalence of medication reviews, effects of medication reviews

For each outcome area, adverse outcomes such as serious adverse events will systematically be reported.

Types of publications

Systematic reviews and meta-analyses based on empirical evidence will be included – whether they include primary studies based on quantitative, qualitative, or mixed methodologies.

We will exclude reviews focusing on primary studies based on non-empirical evidence such as opinion papers or theoretical studies.

We will focus on reviews published within the past 10 years, namely 2013-2023, to yield the most recent available evidence with our search.

Search strategy

Our information specialist (BK) will develop specific search strategies for each database, with input from the research team (co-authors). Keywords will include (but will not be limited to): “long-term care,” “nursing homes,” “pain,” “pain management,” “restraint, physical”, “malnutrition,” “polypharmacy,” “pressure ulcer,” “advance care planning,” “medication review,” “systematic review,” and “meta analysis.” We will also apply the inclusion criteria stated above. An example for the search algorithm developed for Ovid Medline can be found in Annex 1.

Sources/databases

We will search the following databases: Medline (Ovid), CINHAL (EBSCO), PsycINFO (Ovid), Emcare (Ovid), Embase (Elsevier), Cochrane Library, JBI EBP Database (Ovid), Web of Science, Epistemonikos, and Google scholar as a supplementary resource (46). For Google scholar, our search will focus on the first few relevant result pages. We will also search for grey literature in Dissertations and Theses (Proquest) and MedNar. The reference lists of all included reviews will be searched for additional reviews. Cross-referencing will be processed in Google scholar to select additional reviews.

Study selection

Our search results will be exported to the Covidence software. Duplicates will be removed. We will develop a selection grid with the above-discussed inclusion and exclusion criteria. We will pilot our screening process based on titles and abstracts on 2.5% of our references (15), selected randomly, and adjust as necessary. Two independent reviewers (hereafter: VdG and EP for English and French results; other co-authors for additional languages) will screen titles and abstracts. Disagreements will be solved by consensus. If some doubts persist and cannot be fully addressed through discussion between the two initial reviewers, they will be transferred to and solved by a third reviewer (hereafter: NW, FZ, LC, COB, or other co-author, depending on language knowledge and availability).

We will retrieve the full text of all pre-selected articles and add their PDF version to a Zotero library dedicated to the review. If full text cannot be retrieved electronically, we will contact our team of librarians, then contact corresponding authors to attempt to find all selected articles. We will examine all full texts against our inclusion and exclusion criteria. This process will be performed by two independent reviewers, who will each decide whether an article should be included or not and select the most relevant exclusion criterion. Reasons for exclusion will be recorded and reported. Agreement needs to be reached on the main exclusion criterion. As in the titles and abstracts screening phase, disagreements will be solved by consensus or referred to a third reviewers if no consensus can be reached.

The search and study selection process will be presented in a Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram (47).

Assessment of methodological quality

We will assess the methodological quality of all selected reviews to include only high-quality work. We will use the JBI critical appraisal checklist for systematic reviews and research synthesis to do so. Prior to starting the critical appraisal process, the review team will discuss how to use the tool (e.g., whether we assign different weights to individual items, which cut-off to adopt to decide whether a study should be included or excluded).

Two reviewers will critically appraise each selected review independently and compare their results once the article has been fully appraised by both. As in previous steps, potential disagreements will first be discussed in view of reaching a consensus. If consensus cannot be reached, a third reviewer will be contacted.

Data collection

We will use the standardised JBI data extraction tool to extract relevant data from our selected reviews, pertaining to authors, publication year, review objectives, participants, settings, description of interventions, search details and sources, number and type of studies included, appraisal, analysis, outcomes, findings, and significance, amongst other criteria.

The extraction tool and process will be piloted by two reviewers on 5% of selected reviews (15), randomly selected, which may lead to adaptations of the data extraction tool if relevant. Extraction will be conducted independently by two reviewers. Potential disagreements will be solved through discussion and consultation with a third reviewer whenever necessary.

Data summary

We will present the results of included reviews in tabular form. A descriptive narrative summary will further present main findings in relation to effective interventions in the areas of malnutrition, pain, pressure ulcers, polypharmacy, physical restraints, advance care planning, and medication reviews in long-term care facilities for older adults.

Funding

This work is conducted and funded as part of the National Implementation Programme – Strengthening quality of care in partnership with residential long-term care facilities for older people 2022–2026 (NIP-Q-UPGRADE), commissioned by the Swiss Federal Quality Commission (FQC) to ARTISET with the industry association CURAVIVA and senesuisse. It is implemented in collaboration with the Institut für Pflegewissenschaft (INS), Universität Basel, Institut et Haute Ecole de la Santé La Source (La Source), Lausanne, and Scuola universitaria professionale della Svizzera italiana (SUPSI), Manno.

Conflict of interest

There is no conflict of interest to report.

Dissemination

Upon completion, this umbrella review will be submitted for publication to a scientific, peer-reviewed journal.

This review's main findings will also inform a programme of quality improvement interventions in long-term care facilities for older people.

References

1. Rudnicka E, Napierała P, Podfigurna A, Męczekalski B, Smolarczyk R, Grymowicz M. The World Health Organization (WHO) approach to healthy ageing. *Maturitas*. 2020 Sep 1;139:6–11.
2. Ageing and health [Internet]. [cited 2023 Mar 30]. Available from: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
3. Wang SY, Shamliyan TA, Talley KMC, Ramakrishnan R, Kane RL. Not just specific diseases: Systematic review of the association of geriatric syndromes with hospitalization or nursing home admission. *Arch Gerontol Geriatr*. 2013 Jul 1;57(1):16–26.
4. Chadborn NH, Devi R, Hinsliff-Smith K, Banerjee J, Gordon AL. Quality improvement in long-term care settings: a scoping review of effective strategies used in care homes. *Eur Geriatr Med*. 2021;12(1):17–26.
5. Kalideen L, Govender P, van Wyk JM. Standards and quality of care for older persons in long term care facilities: a scoping review. *BMC Geriatr*. 2022 Mar 19;22(1):226.
6. Banerjee S. Multimorbidity—older adults need health care that can count past one. *The Lancet*. 2015 Feb 14;385(9968):587–9.
7. Taux de recours aux EMS et maisons pour personnes âgées | Obsan [Internet]. [cited 2023 May 2]. Available from: <https://ind.obsan.admin.ch/fr/indicator/obsan/taux-de-recours-aux-ems-et-maisons-pour-personnes-agees>
8. Âge à l'entrée en EMS | Obsan [Internet]. [cited 2023 May 2]. Available from: <https://ind.obsan.admin.ch/fr/indicator/obsan/age-a-lentree-en-ems>
9. Andreani T. Indicateurs des établissements médico- sociaux, 2019-2021 [Internet]. Neuchâtel: Office fédéral de la statistique; 2023 [cited 2023 May 23]. Available from: <http://www.statistique.ch>
10. Marengoni A, Angleman S, Melis R, Mangialasche F, Karp A, Garmen A, et al. Aging with multimorbidity: A systematic review of the literature. *Ageing Res Rev*. 2011 Sep 1;10(4):430–9.
11. Rockwood K, Song X, Mitnitski A. Changes in relative fitness and frailty across the adult lifespan: evidence from the Canadian National Population Health Survey. *CMAJ Can Med Assoc J*. 2011 May 17;183(8):E487–94.
12. RS 832.10 - Loi fédérale du 18 mars 1994 sur l'assurance-maladie (LAMal) [Internet]. [cited 2023 May 2]. Available from: https://www.fedlex.admin.ch/eli/cc/1995/1328_1328_1328/fr
13. Aromataris E, Fernandez R, Godfrey C, Holly C, Khalil H, Tungpunkom P. Chapter 10: Umbrella Reviews. In: Aromataris E, Munn Z, editor. *JBIM Manual for Evidence Synthesis* [Internet]. 2020. Available from: <https://doi.org/10.46658/JBIMES-20-11>
14. Aromataris E, Fernandez R, Godfrey CM, Holly C, Khalil H, Tungpunkom P. Summarizing systematic reviews: methodological development, conduct and reporting of an umbrella review approach. *Int J Evid Based Healthc*. 2015 Sep;13(3):132–40.

15. Légaré F, Plourde KV, Charif AB, Gogovor A, Brundisini FK, McLean RKD, et al. Evidence on scaling in health and social care: protocol for a living umbrella review. *Syst Rev*. 2021 Sep 30;10(1):261.
16. Belbasis L, Bellou V, Ioannidis JPA. Conducting umbrella reviews. *BMJ Med*. 2022 Nov;1(1):e000071.
17. Brunner S, Mayer H, Qin H, Breidert M, Dietrich M, Müller Staub M. Interventions to optimise nutrition in older people in hospitals and long-term care: Umbrella review. *Scand J Caring Sci*. 2022;36(3):579–98.
18. Alrutha S, Bowman P, Tariq A, Hinchcliff R. Interventions to Enhance Medication Safety in Residential Aged-care Settings: An Umbrella Review. *Br J Clin Pharmacol*. 2022;88(4):1630–43.
19. McLaren-Hedwards T, D’cunha K, Elder-Robinson E, Smith C, Jennings C, Marsh A, et al. Effect of communal dining and dining room enhancement interventions on nutritional, clinical and functional outcomes of patients in acute and sub-acute hospital, rehabilitation and aged-care settings: A systematic review. *Nutr Diet J Dietit Assoc Aust*. 2022 Feb;79(1):140–68.
20. Hugo C, Isenring E, Miller M, Marshall S. Cost-effectiveness of food, supplement and environmental interventions to address malnutrition in residential aged care: a systematic review. *Age Ageing*. 2018 May 1;47(3):356–66.
21. Donaldson AIC, Smith TO, Alder S, Johnstone AM, De Roos B, Aucott LS, et al. Effect of nonmeat, high-protein supplementation on quality of life and clinical outcomes in older residents of care homes: a systematic review and meta-analysis. *Nutr Rev*. 2019 Feb 1;77(2):116–27.
22. Heelan M, Prieto J, Roberts H, Gallant N, Barnes C, Green S. The use of finger foods in care settings: an integrative review. *J Hum Nutr Diet*. 2020;33(2):187–97.
23. Knopp-Sihota JA, Patel P, Estabrooks CA. Interventions for the Treatment of Pain in Nursing Home Residents: A Systematic Review and Meta-Analysis. *J Am Med Dir Assoc*. 2016 Dec 1;17(12):1163.e19-1163.e28.
24. Bird M, Anderson K, MacPherson S, Blair A. Do interventions with staff in long-term residential facilities improve quality of care or quality of life people with dementia? A systematic review of the evidence. *Int Psychogeriatr*. 2016 Dec;28(12):1937–63.
25. Smith TO, Purdy R, Latham SK, Kingsbury SR, Mulley G, Conaghan PG. The prevalence, impact and management of musculoskeletal disorders in older people living in care homes: a systematic review. *Rheumatol Int*. 2016 Jan 1;36(1):55–64.
26. Mäki-Turja-Rostedt S, Stolt M, Leino-Kilpi H, Haavisto E. Preventive interventions for pressure ulcers in long-term older people care facilities: A systematic review. *J Clin Nurs*. 2019 Jul;28(13–14):2420–42.
27. Gillespie BM, Chaboyer WP, McInnes E, Kent B, Whitty JA, Thalib L. Repositioning for pressure ulcer prevention in adults. *Cochrane Database Syst Rev*. 2014 Apr 3;2014(4):CD009958.
28. Pu L, Moyle W. Restraint use in residents with dementia living in residential aged care facilities: A scoping review. *J Clin Nurs*. 2022 Jul;31(13–14):2008–23.

29. Brugnolli A, Canzan F, Mortari L, Saiani L, Ambrosi E, Debiassi M. The Effectiveness of Educational Training or Multicomponent Programs to Prevent the Use of Physical Restraints in Nursing Home Settings: A Systematic Review and Meta-Analysis of Experimental Studies. *Int J Environ Res Public Health*. 2020 Sep;17(18):6738.
30. Lan SH, Lu LC, Lan SJ, Chen JC, Wu WJ, Chang SP, et al. Educational intervention on physical restraint use in long-term care facilities – Systematic review and meta-analysis. *Kaohsiung J Med Sci*. 2017;33(8):411–21.
31. Sadeq A, Strugaru M, Almutairi M, Stewart D, Ryan C, Grimes T. Interprofessional Interventions Involving Pharmacists and Targeting the Medicines Management Process Provided to Older People Residing in Nursing Homes: A Systematic Review and Meta-Analysis of Randomised Controlled Trials. *Drugs Aging*. 2022 Oct;39(10):773–94.
32. Sadowski CA, Charrois TL, Sehn E, Chatterley T, Kim S. The role and impact of the pharmacist in long-term care settings: A systematic review. *J Am Pharm Assoc*. 2020 May 1;60(3):516-524.e2.
33. McDerby N, Kosari S, Bail K, Shield A, Peterson G, Naunton M. Pharmacist-led medication reviews in aged care residents with dementia: A systematic review. *Australas J Ageing*. 2020 Dec;39(4):e478–89.
34. Thiruchelvam K, Hasan SS, Wong PS, Kairuz T. Residential Aged Care Medication Review to Improve the Quality of Medication Use: A Systematic Review. *J Am Med Dir Assoc*. 2017 Jan 1;18(1):87.e1-87.e14.
35. Alldred DP, Kennedy MC, Hughes C, Chen TF, Miller P. Interventions to optimise prescribing for older people in care homes. *Cochrane Database Syst Rev*. 2016 Feb 12;2(2):CD009095.
36. Almutairi H, Stafford A, Etherton-Beer C, Flicker L. Optimisation of medications used in residential aged care facilities: a systematic review and meta-analysis of randomised controlled trials. *BMC Geriatr*. 2020 Jul 8;20(1):236.
37. Kua CH, Mak VSL, Huey Lee SW. Health Outcomes of Deprescribing Interventions Among Older Residents in Nursing Homes: A Systematic Review and Meta-analysis. *J Am Med Dir Assoc*. 2019 Mar;20(3):362-372.e11.
38. Ng AYM, Takemura N, Xu X, Smith R, Kwok JYY, Cheung DST, et al. The effects of advance care planning intervention on nursing home residents: A systematic review and meta-analysis of randomised controlled trials. *Int J Nurs Stud*. 2022 Aug;132:104276.
39. Kelly AJ, Lockett T, Clayton JM, Gabb L, Kochovska S, Agar M. Advance care planning in different settings for people with dementia: A systematic review and narrative synthesis. *Palliat Support Care*. 2019 Dec;17(6):707–19.
40. Gleeson A, Noble S, Mann M. Advance care planning for home health staff: a systematic review. *BMJ Support Palliat Care*. 2021 Jun;11(2):209–16.
41. Indicator Metadata Registry Details [Internet]. [cited 2023 Mar 28]. Available from: <https://www.who.int/data/gho/indicator-metadata-registry/imr-details/5124>
42. Haugan G. The relationship between nurse–patient interaction and meaning-in-life in cognitively intact nursing home patients. *J Adv Nurs*. 2014;70(1):107–20.

43. Lawrence V, Fossey J, Ballard C, Moniz-Cook E, Murray J. Improving quality of life for people with dementia in care homes: making psychosocial interventions work. *Br J Psychiatry*. 2012 Nov;201(5):344–51.
44. Nakrem S. Understanding organizational and cultural premises for quality of care in nursing homes: an ethnographic study. *BMC Health Serv Res*. 2015 Nov 13;15(1):508.
45. Bornet MA, Jones L, Jox RJ, Bernard M, Ruedin S, Borasio GD, et al. “Life goes on”: Perspectives on the will to live from residents of Swiss long-term care facilities. *Palliat Support Care*. 2023 Feb 10;1–6.
46. Gusenbauer M, Haddaway NR. Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Res Synth Methods*. 2020;11(2):181–217.
47. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021 Mar 29;372:n71.

Annex 1: Search Algorithm

Database: Ovid MEDLINE(R)

Malnutrition

1	exp Nursing Homes/ or Homes for the Aged/ or Long-Term Care/	71940
2	("long-term care" or "home* for the aged" or "nursing home*" or "residential home*" or "residential facilit*" or "nursing facility*" or "institutional care" or "skilled nursing facilit*" or "care home*" or "residential care" or "residential aged care" or "aged care" or "institutional elderly care").mp.	109724
3	1 or 2	110090
4	exp Malnutrition/	134565
5	("malnutrition" or "nutritional deficienc*" or "undernutrition" or "malnourishment" or "protein intake*" or "protein deficienc*" or "caloric intake*" or "caloric deficienc*").mp.	92269
6	4 or 5	192224
7	3 and 6	1923
8	exp "Systematic Review"/ or exp exp "Systematic Review"/ or exp Meta-Analysis/ or "systematic review".mp. or "meta-analysis".mp. or review.ti. or ("systematic review" or "meta-analysis").pt.	865093
9	7 and 8	136
10	limit 9 to ("all aged (65 and over)" and last 10 years)	56

Pain

1	exp Nursing Homes/ or Homes for the Aged/ or Long-Term Care/	71940
2	("long-term care" or "home* for the aged" or "nursing	109724

	home*" or "residential home*" or "residential facilit*" or "nursing facility*" or "institutional care" or "skilled nursing facilit*" or "care home*" or "residential care" or "residential aged care" or "aged care" or "institutional elderly care").mp.	
3	1 or 2	110090
4	exp Pain/ or Pain Management/ or exp Analgesia/	494826
5	("pain" or "pain management" or analgesia*).mp.	887413
6	4 or 5	979729
7	3 and 6	3639
8	exp "Systematic Review"/ or exp Meta-Analysis/ or "systematic review".mp. or "meta-analysis".mp. or review.ti. or ("systematic review" or "meta-analysis").pt.	865093
9	7 and 8	185
10	limit 9 to ("all aged (65 and over)" and last 10 years)	49

Pressure ulcers

1	exp Nursing Homes/ or Homes for the Aged/ or Long-Term Care/	71940
2	("long-term care" or "home* for the aged" or "nursing home*" or "residential home*" or "residential facilit*" or "nursing facility*" or "institutional care" or "skilled nursing facilit*" or "care home*" or "residential care" or "residential aged care" or "aged care" or "institutional elderly care").mp.	109724
3	1 or 2	110090
4	exp Pressure Ulcer/	13815

5	("pressure ulcer*" or "bedsore*" or "pressure sore*" or decubitus).mp.	22143
6	4 or 5	22143
7	3 and 6	1801
8	exp "Systematic Review"/ or exp exp "Systematic Review"/ or exp Meta-Analysis/ or "systematic review".mp. or "meta-analysis".mp. or review.ti. or ("systematic review" or "meta-analysis").pt.	865093
9	7 and 8	101
10	limit 9 to ("all aged (65 and over)" and last 10 years)	30

Polypharmacy

1	exp Nursing Homes/ or Homes for the Aged/ or Long-Term Care/	71940
2	("long-term care" or "home* for the aged" or "nursing home*" or "residential home*" or "residential facilit*" or "nursing facility*" or "institutional care" or "skilled nursing facilit*" or "care home*" or "residential care" or "residential aged care" or "aged care" or "institutional elderly care").mp.	109724
3	1 or 2	110090
4	exp Polypharmacy/	6597
5	("polypharmacy or polymedication" or "multiple medication*" or "multiple medicine*" or "multiple drug*" or "many medication*" or "many medicine*" or "many drug*").mp.	18864
6	4 or 5	24890
7	3 and 6	698
8	exp "Systematic Review"/ or exp exp "Systematic Review"/ or exp Meta-Analysis/ or "systematic review".mp. or "meta-analysis".mp. or review.ti. or ("systematic review" or "meta-analysis").pt.	865093

9	7 and 8	69
10	limit 9 to ("all aged (65 and over)" and last 10 years)	33

Physical restraints

1	exp Nursing Homes/ or Homes for the Aged/ or Long-Term Care/	71940
2	("long-term care" or "home* for the aged" or "nursing home*" or "residential home*" or "residential facilit*" or "nursing facility*" or "institutional care" or "skilled nursing facilit*" or "care home*" or "residential care" or "residential aged care" or "aged care" or "institutional elderly care").mp.	109724
3	1 or 2	110090
4	Restraint, Physical/	12597
5	("physical restraint" or "bed barrier*" or "bedrail*" or "bed rail*" or belt* or fixat*).mp.	280996
6	4 or 5	292392
7	3 and 6	995
8	exp "Systematic Review"/ or exp exp "Systematic Review"/ or exp Meta-Analysis/ or "systematic review".mp. or "meta-analysis".mp. or review.ti. or ("systematic review" or "meta-analysis").pt.	865093
9	7 and 8	49
10	limit 9 to ("all aged (65 and over)" and last 10 years)	13

Advance care planning

1	exp Nursing Homes/ or Homes for the Aged/ or Long-Term Care/	71940
2	("long-term care" or "home* for the aged" or "nursing home*" or "residential home*" or "residential facilit*" or "nursing facility*" or "institutional care" or "skilled nursing facilit*" or "care	109724

	home*" or "residential care" or "residential aged care" or "aged care" or "institutional elderly care").mp.	
3	1 or 2	110090
4	exp Advance Care Planning/	11094
5	("advance care planning" or "advance health care planning" or "advance directive" or "goals of care" or POLST or "physician order for life-sustaining treatment").mp.	9857
6	4 or 5	15507
7	3 and 6	1413
8	exp "Systematic Review"/ or exp exp "Systematic Review"/ or exp Meta-Analysis/ or "systematic review".mp. or "meta-analysis".mp. or review.ti. or ("systematic review" or "meta-analysis").pt.	865093
9	7 and 8	69
10	limit 9 to ("all aged (65 and over)" and last 10 years)	16

Medication review

1	exp Nursing Homes/ or Homes for the Aged/ or Long-Term Care/	71940
2	("long-term care" or "home* for the aged" or "nursing home*" or "residential home*" or "residential facilit*" or "nursing facility*" or "institutional care" or "skilled nursing facilit*" or "care home*" or "residential care" or "residential aged care" or "aged care" or "institutional elderly care").mp.	109724
3	1 or 2	110090
4	exp Medication Review/ or Deprescriptions/ or Medication Therapy Management/	3808

5	("medication review*" or "deprescription*" or deprescribing or "potentially inappropriate medication*" or "medication therapy management").mp.	7100
6	4 or 5	7100
7	3 and 6	684
8	exp "Systematic Review"/ or exp Meta-Analysis/ or "systematic review".mp. or "meta-analysis".mp. or review.ti. or ("systematic review" or "meta-analysis").pt.	865093
9	7 and 8	149
10	limit 9 to ("all aged (65 and over)" and last 10 years)	67