National Institute for Health and Care Excellence

Draft for consultation

Falls: assessment and prevention in older people and people 50 and over at higher risk (update)

Evidence review H: Falls prevention in residential care settings

NICE guideline <number>

Evidence reviews underpinning recommendations 1.3.18-1.3.21 and recommendations for research in the NICE guideline.

October 2024

Draft for Consultation

This evidence review was developed by NICE

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1. Interventions for prevention of falls in older people in residential care

1.1. Review question

What are the most clinically and cost-effective methods for falls prevention in older people in residential care settings?

1.1.1. Introduction

Older adults in residential care facilities face have an increased risk of falls due to various factors, including advanced age, frailty, comorbidities, and polypharmacy. Falls can significantly impact the physical health of residents and contribute to psychological distress, social isolation, and a loss of independence. Therefore, preventing falls in this vulnerable population is important for improving overall health outcomes and enhancing the quality of life in residential care settings.

Residential care is an integral part of the health and social care system, providing essential support to older adults who require assistance with daily living activities. The provision of healthcare services, including falls prevention interventions, support the well-being of residents.

This evidence review will evaluate falls prevention interventions for older people living within residential care settings.

1.1.2. Summary of the protocol

For full details see the review protocol in Appendix A.

Table 1: PICO characteristics of review question

Population	People in residential care who are: • Aged 65 and over • Aged 50 to 64 who have a condition or conditions that may put them at higher risk of falling
Intervention(s)	Any intervention designed to reduce falls in older people in residential care. Interventions grouped by combination (single, multiple or multifactorial); then by type of intervention (descriptors). Possible descriptors include: • Exercises • Medication: drug target (i.e. withdrawal, dose reduction or increase, substitution, provision, etc). • Surgery • Management of urinary incontinence, fluid or nutrition therapy • Psychological interventions • Environment/ assistive technology • Social environment • Interventions to increase knowledge
Comparison(s)	• Any other intervention • Usual care • Placebo
Outcomes	All outcomes are considered equally important for decision making and therefore have all been rated as critical: • Rate of falls

	• Number of people sustaining one or more falls • Number of participants sustaining fall-related fractures • Adverse events of the interventions (composite of all) • Validated health-related quality of life scores e.g. EQ-5D or similar
Study design	Randomised controlled trials (RCTs). There are enough RCTs identified within the area so we will not be including non-randomised studies. For a systematic review (SR) to be included it must be conducted in line with the methodological processes described in the NICE manual. If sufficient details are provided reviewers will either include the SR fully or use it as the basis for further analyses where possible. If sufficient details are not provided to include a relevant SR, the review will only be used for citation searching. Published NMAs and IPDs will be considered for inclusion.

1.1.3. Methods and process

This evidence review was developed using the methods and process described in Developing NICE guidelines: the manual. Methods specific to this review question are described in the review protocol in appendix A.

This review includes a Cochrane review [13], which matched the protocol for our question. Cameron 2018[13] included older people in residential care and in hospitals, of which we included the residential care population within this review. Please see review G for the hospital population review. We have updated the Cochrane review to include all recent papers, which were identified in the search, that matched the protocol for review I. Extractions for studies included in the Cameron 2018[13] can be found within the Cochrane review, and any studies updating it can be found in the study extractions in this review.

Population

Cameron 2018[13] included studies where the majority of participants were over 65 years, or the mean age was over 65 years and were patients in care facilities. This may not have included the population of under 65 years with conditions that put them at increased risk of falls, however no studies were excluded on this basis.

Cameron 2018 excluded participants post-stroke, as interventions to prevent falls in this population are reviewed in a separate Cochrane Review (Verheyden 2013).[103] Focusing on specific populations was outside of our scope, therefore Verheyden 2013[103] was not included within this review. Cameron 2018[13] excluded trials which were set in places of residence that did not provide residential health-related care or rehabilitative services, such as sheltered housing. We also excluded these settings from this review as they are included in a separate review on the Interventions to prevent falls in the community, review F. Cameron 2018[13] subdivided care facilities into those providing high, intermediate, and mixed level facilities. We also added unspecified level of care if the level of care was not described. The Cameron review also subdivided participants based on levels of cognitive impairment. These were not subgroups within our protocol, but we have described which studies were included under these classifications.

Interventions

The Cameron 2018 review grouped interventions using a fall-prevention classification system according to the Prevention of Falls Network Europe (ProFaNE). Under this system, interventions were further grouped by subtype of intervention, such as for types of exercise. This was completed in order to minimise heterogeneity.

Outcomes

The Cameron 2018[13] review reported the treatment effect for rate of falls as a rate ratio (RaR) and 95% confidence interval. For number of fallers and number of participants sustaining fall-related fractures they reported a risk ratio (RR). We have followed this methodology for any studies added as part of the update of this review.

Rate of falls

The Cameron 2018 review[13] used a rate ratio (incidence rate ratio or hazard ratio) and 95% CI if these were reported in the paper. If adjusted and unadjusted results were given, they used the unadjusted estimate, unless the adjustment was for clustering. If a rate ratio was not reported but appropriate raw data was available, they calculated the rate ratio. They used the reported rate of falls (falls per person year) in each group, and the total number of falls for participants within the study or calculated the rate of falls in each group from the total number of falls and the actual total length of times falls were monitored (person years). Likewise, where rate ratio was not provided, we calculated the rate ratio, using an excel spreadsheet calculator. Cameron 2018[13] reported that where there were no falls in one arm of a study, and a low total number of falls and/or participants, the rate of falls could not be determined and therefore not included in the meta-analyses.

Risk of falling

Cameron 2018[13] states that for number of fallers a risk ratio was used for number of people who fell once or more. They used an estimate of risk (hazard ratio for first fall, risk ratio (relative risk), or odds ratio) and 95% CI, if they were reported. If both adjusted and unadjusted estimates were reported, they used an unadjusted estimate unless the adjustment was for clustering. This differs from NICE methodology, so we used adjusted estimates where they were available in studies.

Missing data

Trials identified in the Cameron 2018[13] review that were determined to have incomplete data are described in Table 2. Eight studies that were determined to be unsuitable for pooling are described in the effectiveness of the evidence section (1.1.4).

Meta-analysis and GRADE

We added studies from the update searches to the Cameron 2018[13] Cochrane review Revman meta-analyses. We completed GRADE ratings for all available evidence. We used the Cochrane review's risk of bias ratings and extractions within GRADE but graded the other components according to NICE methodology. For comparisons where there was two or more trials Cameron 2018[13] applied GRADE differently from when there was one trial, where the quality of evidence was assumed to be very low. NICE methodology does not make this assumption and conducts GRADE on all evidence. The Cameron review selected certain comparisons for presentation in summary of findings tables, whereas for the studies added as part of the update all comparisons are reported in the review.

The Cameron 2018[13] Cochrane review used the generic inverse variance method in Revman. This enabled pooling of the adjusted and unadjusted treatment effect estimates for rate ratios or risk ratios. They report that where the total number of patients, rather than admissions, could not be determined, they did not pool the data with other studies. In order for our results from the new studies added to be integrated with the Cochrane review we followed the generic inverse variance method. However, this meant that absolute effects were not reported for some of the data and where we normally base decisions on clinical

importance (benefit, harm or no difference) on the point estimate of the absolute values we instead used the relative risk/rate ratio point estimate. Where absolute values could be established these were used. Quality of life utility data was not reported in Cameron 2018[13] so the studies identified within it were checked for this data and included in this analysis.

Declarations of interest were recorded according to NICE's conflicts of interest policy.

1.1.4. Effectiveness evidence

1.1.4.1. Included studies

Twenty-five papers (of 22 randomised controlled trials) were included in the review from searches.[1, 3, 7, 14, 19, 27, 37, 42, 43, 46, 54, 55, 57, 59-63, 76-78, 81, 94, 96, 104] Seventy-one studies were identified in the Cameron 2018[13] review. The total number of studies in the current review is ninety-four. Evidence from these studies is summarised in the clinical evidence summary below (Table 3).

See also the study selection flow chart in Appendix C, study evidence tables in Appendix D, forest plots in Appendix E and GRADE tables in Appendix F.

One Cochrane review (Cameron, 2018)[13] was identified in the search.

One systematic review (Dyer, 2023)[29] was identified which was an update of the Cochrane review included (Cameron, 2018).[13] It was used to search for additional RCTs that matched this review protocol. Two studies which were identified[2, 102] did not report data in an extractable format, therefore the data was taken from the systematic review.[29]

The studies identified included the following comparisons:

- Pharmacist-led medication review to usual care.
- High intensity functional exercise to seated attention control activity.
- Assisted home technology to no assisted home technology.
- Compliant flooring to plywood flooring.
- Deprescribing module to usual care.
- Structured medication regimen simplification to usual care.
- Interprofessional intervention to usual care.
- Exercise programme to educational programme.
- Guide to Action for Care Homes (GtACH) programme to usual care.
- Nutritional support through additional milk, yoghurt and cheese to usual care.
- Multicomponent exercise training to multifactorial intervention (dual-task training).
- Twenty-minute rounding observation to usual care.
- Deprescribing intervention to active waiting list.
- Progressive resistance training and balance exercise to usual care.
- Otago exercise programme to walking.
- CONNECT intervention +FALLS programme to FALLS programme alone.
- Function focused care for assisted living using the Evidence Integration Triangle (FFC-AL-EIT) to the function focused care for assisted living using Evidence Only (FFC-AL-EO).
- Exercise once per week for forty-five minutes to exercise for fifteen minutes three times per week to usual care.
- Adaptability treadmill training to conventional treadmill training to usual physical therapy.
- Whole body vibration and strength and balance exercise programme to strength and balance exercise programme alone to upper limb exercises only.
- Deprescribing psychotropic medication intervention to usual care
- Multicomponent exercise programme to usual care.

- Multicomponent exercise group to calisthenics group to usual care.
- Group-based multicomponent exercise to usual care.
- Cycling to usual care.

The included studies focused on adults in residential care settings. However, one study specifically focused on hospitalised patients with diabetes.

1.1.4.2. Excluded studies

See the excluded studies list in Appendix K.

1.1.5. Summary of studies included in the effectiveness evidence

Table 2: Summary of identified studies included in the evidence review

Study	Intervention and comparison	Population	Outcomes	Comments
Almutairi 2023[1] Cluster RCT	Multifaceted psychotropic medication review (n=154) Usual care (n=255) Duration of study: 12 months	Adults in residential aged care facilities (RACF), 65 years and over Mean age (SD): NR Sex: NR Setting: RACFs in Australia and New Zealand	Rate of falls	
Arrieta, 2019[2] RCT (parallel)	Multicomponent exercise programme (n=55) Usual care (n=57) Duration of study: 12 months	Adults in long-term nursing home, 70 years or over Mean age (SG): IG 85.1 (7.6), CG 84.7 (6.1) Sex: IG 73.7% female, CG 67.3% Setting: ten long-term nursing homes in Spain	Rate of falls	Data for study taken from Dyer 2023[29]
Bays-Moneo 2023[3] 3 arm RCT (parallel)	Multicomponent exercise group (n=23) Calisthenics group (n=23) Usual care (n=23) Duration of study: 12 months	Adults in nursing residential home Mean age (SD): IG1: 89.6 (6.6), IG2:90.3 (6.8), CG: 89.2 (7.3) Sex: IG1: 73; IG2: 87%; CG: 56.5% women Setting: Nursing home, Navarra, Spain	Rate of falls	
Beck, 2016[4] Cluster RCT	Multidisciplinary nutrition support (n=9)	Adults in care facilities receiving high level nursing care	Number of falls; adverse events	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
3 residential care homes	Control (n=22) Duration of study: 11 weeks	Mean age (SD): IG 88.1 (9.6); CG 87.8 (7) Sex: 65% women Setting: Denmark		Falls reported as per person years: IG 0, CG 0.43. Not analysed in Cochrane, 'We are uncertain of the effects of multifactorial interventions on the risk of fracture as the quality of evidence has been assessed as very low' (Cameron, 2018)[13]
Becker, 2003[5] Cluster RCT (by facility) 6 long-term care facilities	Multifactorial intervention (staff training; environmental hazards; resident education; group exercise; hip protectors) (n=509) Control (usual care) (n=472) Duration of study: 12 months	Adults in care facilities receiving high level nursing care Mean age (SD): IG: 83.5 (7.5); CG: 84.3 (6.9) Sex: 79% women Setting: Germany	Rate of falls; number of people falling; number of people sustaining a fracture (hip fracture)	Study identified in Cochrane (Cameron, 2018)[13]
Bischoff, 2003[6] RCT (parallel) 2 hospitals with long-stay geriatric care units	Additional Vitamin D supplementation (800 IU oral cholecalciferol (vit D3) plus 1200mg calcium daily for 12 weeks (n=62) Control (1200mg calcium daily for 12 weeks) (n=60) Follow-up: 12 weeks	Adults in care facilities receiving high level nursing care Mean age (SD): IG 85.4 (5.9); CG 84.9 (7.7) Sex: 100% women Setting: Basel, Switzerland	Rate of falls; number of people falling; number of people sustaining a fracture (hip fractures); adverse events	Study identified in Cochrane (Cameron, 2018)[13]
Brett, 2021[7] RCT	Physical exercise for 45 minutes once per week or physical exercise for 15 minutes three times per week (n=36) Control (usual care) (n=19) Duration of the study: 3 months	Nursing home residents with dementia Mean age: 85 years Sex: 66% women Setting: Australia	Rate of falls	

Study	Intervention and comparison	Population	Outcomes	Comments
Broe, 2007[8] RCT (parallel) Single long-term care facility	Additional Vitamin D supplementation (800 IU vitamin D2 daily for 5 months) (n=23) Control (placebo daily for 5 months) (n=25) Duration of the study: 5 months	Adults in care facilities receiving high level nursing care Mean age (SD): 89 (6) Sex: 73% women Setting: USA	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13] 200IU, 400IU, 600IU of vitamin D2 daily were included in the study but not in the review. Secondary data analysis of an RCT.
Buckinx, 2014[9] RCT (parallel) 2 residential care facilities	Whole body vibration (n=31) Control (usual care) (n=31) Duration of the study: 6 months intervention; follow-up to 12 months	Adults in care facilities receiving intermediate level care Mean age (SD): 83.2 (7.9) Sex: 76% women Setting: Belgium	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Buettner, 2002[10] RCT (parallel) 3 nursing care facilities	Supervised group exercises Control (usual care) Total n=27 Duration of study: 2 months	Adults in mixed level residential care setting Mean age (range): 83.3 (60-98) Sex: 44% women Setting: USA	Rate of falls but data incomplete	Study identified in Cochrane (Cameron, 2018)[13]
Cadore, 2014[12] RCT (parallel) Single residential care facility	Multicomponent exercise (n=11) Control (usual care) (n=13) Duration of the study: 12 weeks	Adults in mixed level residential care setting Mean age (SD):91.9 (4.1) Sex: 70% women Setting: Spain	Rate of falls but data incomplete	Study identified in Cochrane (Cameron, 2018)[13]
Cateau, 2021[14] Cluster RCT (by nursing home)	Quality circle session focusing on deprescribing specific drug classes (n=27 nursing homes) Usual care and regular integrated pharmacist services (n=29 nursing homes)	Adults in nursing homes Mean age (SD): NR Sex: NR Setting: Nursing Homes in Switzerland	Rate of falls	Number of falls given as a regression coefficient -0.165 (95% CI: -0.754, 0.424)
Chapuy, 2002[15]	Vitamin D +calcium supplementation	Adults in care facilities receiving	Number of people falling; number of people sustaining	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
RCT (parallel) 55 intermediate nursing care facilities	800IU vitamin D3 + 1200mg calcium carbonate fixed combination daily (n=199) 800IU vitamin D3 + 1200 calcium carbonate separately daily (n=194) Control (placebo) (n=190) Duration of study: 24 months	intermediate level care Mean age (SD): 85.2 (7.1) Sex: 100% women Setting: France	a fracture (hip fracture adverse events	
Chenoweth, 2009[16] Cluster RCT (by unit) 15 residential dementia care units	Person-centred care (n=98) Dementia mapping (n=109) Control (usual care) (n=82) Duration of the study: 8 months	Adults in care facilities receiving high level nursing care Mean age (SD): IG1: 83 (7.6); IG2: 84 (6.4); CG 83 (7.6) Sex: 78% women Setting: Sydney, Australia	Number of people falling	Study identified in Cochrane (Cameron, 2018)[13] Data not analysed, 'However, these interventions were tested in single small studies, or the studies did not report data suitable for further analysis' (Cameron 2018)
Choi, 2005[17] Cluster RCT 2 residential care facilities	Supervised Tai Chi exercise (n=29) Control (usual routine activities) (n=30) Duration of the study: 3 months	Adults in care facilities receiving intermediate level care Mean age (range):77.9 (61 to 91) Sex: 75% women Setting: Korea	Number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Clifton, 2009 (unpublished report, no reference) RCT (parallel) 1 Veterans' skilled nursing facility	Wireless position-monitoring patch Control (usual care) Duration of the study: cross-over after 60 days for second 60-day period (Total n=43)	Adults in care facilities receiving high level nursing care Mean age (SD): 82.2 (SD 7.1) years Sex: 5% women Setting: Washington state, USA	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13] Unpublished report (see Cameron Cochrane review[13] for reference).

Study	Intervention and comparison	Population	Outcomes	Comments
Colon-Emeric, 2013[21] Cluster RCT, pilot study 8 residential care facilities	CONNECT +Falls (n=NR) Control (FALLS alone) (n=NR) Duration of the study: 24 weeks intervention (12 weeks CONNECT/control plus 12 weeks FALLS), 6 months post-intervention follow-up.	Adults in mixed level residential care setting Mean age (SD): NR Sex: NR Setting: USA	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13] Data not analysed 'The rate of falls for these interventions were not pooled due to high clinical and statistical heterogeneity (test for subgroup differences: P = 0.0001, I2 = 85.6%)' (Cameron 2018)[13]
Colon-Emeric, 2017[19] Cluster RCT 24 nursing homes	CONNECT protocols + FALLS protocols (n=12) Control (FALLS protocols alone) (n=12) Duration of the study: 24-week intervention and 6 months post-intervention follow-up	Nursing home residents, 65 years or over Mean age (SD): 81.9 (9.4) years Sex: 53% women Setting: USA	Rate of falls; injurious fall rate	
Cox, 2008[22] Cluster RCT 209 care homes (high and intermediate care)	Staff education on fracture prevention (29 clusters; n=3476) Control (usual care) (29 clusters; n=2753) Duration of the study: 12 months	Adults in mixed level residential care setting Mean age (SD): NR Sex: 77% women Setting: England and Wales	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13]
Crotty, 2004a[24] RCT (parallel) Long-term care facility	General medication review (n=381) Control (usual care) (n=334) Duration of the study: 12 months. Followed up for 8 weeks post discharge.	Adults in care facilities receiving high level nursing care Mean age (SD): 82.7 (6.4) Sex: 61% women Setting: Australia	Number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Crotty, 2004b[23]	General medication review (n=56)	Adults in mixed level residential care setting	Number of people falling	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
Cluster RCT 20 residential care facilities (high- and low-level care)	Control (usual care) (n=54) Duration of the study: 7 months	Mean age (SD): 84.1 (7.8) Sex: 84% women Setting: Adelaide, Australia		
Da Silva Borges, 2014[25] RCT (parallel) Residential care facilities	Ballroom dancing (n=30) Control (no physical activity) (n=29) Duration of the study: 12 weeks	Adults in care facilities receiving intermediate level care Mean age: 68 years Sex: NR Setting: Brazil	Incomplete data	Study identified in Cochrane (Cameron, 2018)[13]
Dhargave, 2020[27] 4 geriatric homes	Exercise program (n=76) Education program (n=77) Duration of the study: 3 months	Patients at geriatric homes, 60 years and above Mean age (SD): 74.6 (8.5) years Sex: 54.9% Setting: Bangalore, India	Rate of falls; number of people falling	
Dyer, 2004[28] Cluster RCT 20 residential care homes	Multifactorial intervention (n=102) Control (usual care) (n=94) Duration of the study: 12 months	Adults in care facilities receiving intermediate level care Mean age (SD): IG: 87.4 (6.9); CG 87.2 (6.9) Sex: 78% women Setting: UK	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Faber, 2006[30] RCT (parallel) 15 long-term care residences high and intermediate level care)	Gait, balance and functional training (n=130) Control (usual care) (n=148) Duration of the study:12 months	Adults in mixed level residential care setting Mean age (range): 84.9 (63 to 98) Sex: 79% women Setting: The Netherlands	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Flicker, 2005[31] RCT (parallel) 60 assisted living facilities and 89 nursing homes	Additional Vitamin D supplementation (n=313) Control (usual care) (n=312) Duration of the study: 24 months	Adults in mixed level residential care setting Mean age (SD): 83.4 (NR) years Sex: 95% women Setting: urban and rural Australia	Rate of falls; number of people falling; adverse events; number of people sustaining a fracture (all fractures)	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
(intermediate and high level)				
Frankenthal, 2014[32] RCT (parallel) 1 residential care facility	General medication review (n=183) Control (usual care) (n=176) Duration of the study: 12 months	Adults in mixed level residential care setting Mean age (SD): 82.7 (8.7) Sex: 67% women (46.8% were 84 or over) Setting: Israel	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13]
Fu, 2015[33] RCT (parallel) 1 residential care facility	Wii balance board (n=30) Otago exercise program (n=30) Duration of the study: 6 weeks	Adults in care facilities receiving high level nursing care Mean age: 82 years Sex: 65% women Setting: China	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13]
Garcia Gollarte, 2014[34] Cluster RCT Residential care facilities	Educational intervention (n=30) Control (n=30) Duration of the study:12 months total, 6 months intervention period.	Adults in mixed level residential care setting Mean age (SD): 84.4 (12.7) Sex: 73% women Setting: Spain	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13] Data not analysed. Cochrane states, 'after adjustment for clustering, the rate of falls (RaR 0.74, 95% CI 0.49 to 1.13) did not provide strong evidence for an effect' (Cameron 2018)[13]
Grieger, 2009[35] RCT (parallel) 1 aged care facility (high and intermediate level care)	Multivitamins (including vitamin D3 and calcium) (n=58) Control (usual care) (n=57) Duration of the study: 6 months	Adults in mixed level residential care setting Mean age (SD): NR Sex: 65% women in analysis Setting: Victoria, Australia	Rate of falls; number of people falling; adverse events	Study identified in Cochrane (Cameron, 2018)[13]
Hewitt, 2018[37] Mak, 2022[63] Cluster RCT 16 Long-term care centres	Progressive resistance + balance training (Sunbeam programme) (8 clusters; n=113) Control (Usual care) (8 clusters; n=108)	Residents of long-term care facilities Mean age: 86 years Sex: IG: 62.8%; 68.2% women Setting: Australia	Rate of falls; number of people falling; number of injurious falls; number of fall-related fractures; quality of life (EQ-5D and SF-36)	Mak, 2022 [63] is a subgroup analysis of data from Hewitt, 2018 [37]; those who had an ACE-R<83 (Addenbrooke's Cognitive Examination-Revised) were included. Mak has no

Study	Intervention and comparison	Population	Outcomes	Comments
	Duration of the study: 12 months			data included in this review.
Houghton, 2014[38]; Desborough, 2020[26] Cluster RCT 31 residential care facilities	General medication review (n=381) Control (usual care) (n=445) Duration of the study: 6 months intervention, follow-up 12 months	Adults in mixed level residential care setting Mean age: 87 years Sex: 76% women Setting: UK	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13] Desborough, 2020[26] was found from searches but both are the CAREMED trial.
Huang, 2016[39] RCT (parallel) 6 residential care facilities	Cognitive behavioural intervention alone Cognitive behavioural intervention plus exercise (n=27) Control (usual care) (n=27) Duration of the study: 8-month trial: 8 weeks intervention, falls monitored over 3 months pre-intervention and 3 months post intervention	Adults in mixed level residential care setting Mean age: 79.4 years Sex: 50% women Setting: Taiwan	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13] Data not analysed, Cochrane states, 'Data were not pooled as falls excluded the intervention period' (Cameron, 2018)[13]
Imaoka, 2016[40] RCT (parallel) Residential care facility	Multifactorial group (n=23) Usual care group (n=23) Duration of the study: 12 months	Adults in care facilities receiving high level nursing care Mean age (SD): 84.8 (8.8) years Sex: 76% women Setting: Japan	Rate of falls but data is incomplete; number of people falling	Study identified in Cochrane (Cameron, 2018)[13] Other arms were nutrition group and reduced exercise group Data not analysed in Cochrane: 'Falls data from Imaoka 2016 excluded the intervention period and thus are not presented in the forest plot.' (Cameron, 2018)[13]
Irez, 2011[41] Parallel RCT	Combination of exercise categories (n=30)	Adults in care facilities receiving intermediate level care	Rate of falls (mean number of falls)	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
1 residential care facility	Control (usual care) (n=30) Duration of the study: 12 weeks	Mean age: 75.4 years Sex: 100% women Setting: Ankara, Turkey		
Iuliano, 2021[42] Cluster RCT 60 residential aged care facilities	Additional yoghurt, cheese, and milk (n=30) Control (Usual menu) (n=30 Duration of the study: 24 months	Adults in residential care Mean age (SD): 86 (8.2) years Sex: 68% women Setting: Australia	Rate of falls; number of people sustaining fractures	
Jahanpeyma, 2021[43] Parallel RCT Single nursing home	Otago exercise program (n=36) Walking (n=36) Duration of the study: 12-week follow-up	Nursing home residents, over 65 years Mean age (SD): IG: 74.6 (5.9); CG 75.8 (4.5) years Sex: IG: 74.3%; CG: 75% female Setting: Izmir, Turkey	Rate of falls	
Jensen, 2002[44] Cluster RCT 9 residential care facilities	Multifactorial intervention (n=82) Control (usual care) (n=109) Duration of the study: 34-week follow-up	Adults in care facilities receiving intermediate level care Mean age (range): IG 83 (65 to 97); CG 84 (65 to 100) Sex: 72% women Setting: Umea, Sweden	Rate of falls; number of people falling; number of people sustaining a fracture (hip fracture)	Study identified in Cochrane (Cameron, 2018)[13]
Junius-Walker, 2021[46] Cluster RCT 44 nursing homes	Interprofessional intervention (23 nursing homes) (cluster 23; n=452) Control (Usual care) (21 nursing homes) (cluster 21; n=410) Duration of the study: 6 months	Nursing home residents, 65 years or over Mean age (SD): 84.3 (7.7) years Sex: 73.8% women Setting: Dusseldorf and Tubingen regions, Germany	Rate of falls; quality of life	
Juola, 2015[47] Cluster RCT	General medication review (n=118)	Adults in mixed level residential care setting	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
20 wards of assisted living facilities	Control (usual care) (n=109) Duration of the study: 12 months	Mean age: 83 years Sex: 71% women Setting: Finland		93% of population had dementia diagnosis at baseline.
Kennedy, 2015[48] Cluster RCT, pilot study 40 residential care facilities	Education on vitamin D +calcium +osteoporosis medications (n=2185) Control (usual care) (n=3293) Duration of study: 12.2 months; final follow-up: 16 months	Adults in mixed level residential care setting Mean age (SD): 84.4 (10.9) years Sex: 71% women Setting: Canada	Rate of falls: number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Kerse, 2004[49] Cluster RCT 14 residential care homes (intermediate and high-level care)	Multifactorial intervention (n=312) Control (usual care) (n=241) Duration of the study: 12 months	Adults in mixed level residential care setting Mean age (SD): 83.2 (10.6) years Sex: 72% women Setting: New Zealand	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Kerse, 2008[50] Cluster RCT 41 low-level dependency residential care homes	Gait, balance and functional training (n=330) Control (usual care) (n=352) Duration of the study: 12 months	Adults in care facilities receiving intermediate level care Mean age (SD): 84.3 (7.2) years Sex: 74% women Setting: New Zealand	Rate of falls; number of people falling; adverse events	Study identified in Cochrane (Cameron, 2018[13] Adverse events not analysed, Cochrane states: 'Kerse 2008 (639 participants) reported no differences in the level of adverse outcomes on negative binomial regression adjusted for clustering (aches and pains at six months exercise 46.7, 95% CI 39.3 to 54.9 versus usual care 51.1, 95% CI 43.8 to 58.4, P = 0.75)' (Cameron 2018)[13]
Klages, 2011[51] RCT (parallel) 1 long-term care home	Multisensory stimulation intervention in Snoezelen room (n=12)	Adults in mixed level residential care setting Mean age (SD):	Rate of falls	Study identified in Cochrane (Cameron, 2018[13] Data not analysed, Cochrane states: 'Klages 2011… reported, without

Study	Intervention and comparison	Population	Outcomes	Comments
(high and intermediate level care)	Control (n=12) Duration of the study: 3 months	Sex: 68% women in the analysis Setting: Ontario, Canada		providing data, that the "Group membership did not alter falls frequency". Adverse-event data were not reported. We are uncertain of the effectiveness of multisensory stimulation as the quality of the evidence is very low.' (Cameron, 2018)[13]
Kovacs, 2013[52] RCT (parallel) 1 residential care facility	Combination of exercise categories (n=43) Control (usual care) (n=43) Duration of the study: 12 months	Adults in mixed level residential care setting Mean age: 77.9 years Sex: 81% women Setting: Hungary	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Kovacs, 2012[53] RCT (parallel), pilot 1 residential care facility, intermediate-level care	Multimodal exercise plus osteoporosis exercise (n=21) Osteoporosis exercise programme (n=20) Duration of study: 6 months	Adults in care facilities receiving intermediate level care Mean age: 69.2 years Sex: 100% women Setting: Hungary	Number of people falling; adverse events	Study identified in Cochrane (Cameron, 2018)[13]
Kua, 2021[54] Stepped wedge cluster RCT 4 nursing homes	Deprescribing intervention (n=153) Active waiting list (n=142) Duration of the study: 6 months	Nursing home residents, 65 years and over Mean age (SD): IG 80.57 (9.42), CG 80.02 (9.58) Sex: IG 58.17% female, CG 52.82% female Setting: Singapore	Rate of falls	
Lam, 2018[55] Parallel RCT	Whole body vibration and strength and balance programme (n=25) Strength and balance	Nursing home residents Mean age (SD): 82.3 (7.3) years Sex: 54.8% women	Number of people falling; adverse events	

Study	Intervention and comparison	Population	Outcomes	Comments
	programme alone (n=24) Upper limb exercise only (n=24) Duration of the study: 12 months	Setting: Hong Kong		
Lapane, 2011[56] Cluster RCT 25 nursing homes (appear to be high- and intermediate-level care)	General medication review (12 clusters, n=1711) Control (usual care) (13 clusters, n=1491) Duration of the study: 12 months	Adults in mixed level residential care setting Mean age (SD): NR Sex: 73% women Setting: Ohio, USA	Number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Lauriks, 2020[57]	Assisted home technology (n=30) Group home without assistive home technology (n=24) Duration of the study: study states 'post-intervention', no other information	Residents in group homes Mean age (SD): IG 84.3 (5.6) years, CG 83.1 (7.1) years Sex: 65% female Setting: Amsterdam, The Netherlands	Rate of falls; quality of life	
Law, 2006[58] Cluster RCT (by unit) 118 homes for elderly people, 223 units (intermediate- and high-level of care)	Additional Vitamin D supplementation (2.5mg oral vitamin D every 3 months) (n=1762) Control (usual care) (no placebo) (n=1955) Duration of the study: median length of follow-up 10 months (IQR 7 to 14)	Adults in mixed level residential care setting Mean age: 85 years Sex: 76% women Setting: UK	Rate of falls; number of people falling; number of people sustaining a fracture (non-vertebral fractures)	Study identified in Cochrane (Cameron, 2018)[13]
Lexow, 2022[59] Parallel RCT 3 long-term care facilities	Pharmacist-led medication review (n=107) Control (usual care) (n=104)	Residents in long-term care facilities, 65 years or over Mean age: 86 years	Rate of falls; number of people falling	

Study	Intervention and comparison	Population	Outcomes	Comments
	Duration of the study: 3 months	Sex: IG: 67%; CG: 72% women Setting: Leipzig, Germany		
Logan, 2021 (FinCH trial)[61] Logan, 2022[60] Cluster RCT 84 care homes	GTACH programme (n=775) Control (Usual care) (n=882) Duration of the study: 12 months	Residents of long-term care homes Mean age (SD): 85 (9.3) years Sex: 77% women Setting: UK	Rate of falls; number of people falling; number of people sustaining a fracture; quality of life	Primary outcome was falls rates at 91-180 days: adjusted for baseline falls: 0.63 (0.52 to 0.78); For number of people falling the adjusted rate at 91-180 days was also used.
Mackey, 2019[62] Cluster RCT (by residential village)	Compliant flooring (n=74) Plywood flooring (n=76) Duration of the study: 4 years	Long-term care residents Mean age (SD): 81.7 (9.5) years Sex: 64.3% women Setting: Canada	Fall-related fracture	
McMurdo, 2000[64] Cluster RCT 9 residential care facilities (intermediate-level care)	Multifactorial intervention (n=77) Control (usual care) (n=56) Duration of study: 12 months: 6 months intervention + 6 months follow-up	Adults in care facilities receiving intermediate level care Mean age (SD): 84 (7) Sex: 81% women Setting: Dundee, Scotland, UK	Rate of falls; number of people falling; number sustaining a fracture (all fractures); adverse events	Study identified in Cochrane (Cameron, 2018)[13]
Meyer, 2009[65] Cluster RCT 58 nursing homes (high-level nursing care)	Risk assessment tool (29 clusters; n=574) Nurses' judgment (29 clusters; n551) Duration of the study: 12 months	Adults in care facilities receiving high level nursing care Mean age (SD): IG: 86 (6); CG: 87 (6) years Sex: 85% women Setting: Hamburg, Germany	Rate of falls; number of people falling; number of people sustaining a fracture (all fractures)	Study identified in Cochrane (Cameron, 2018)[13]
Mulrow, 1994[66] RCT (parallel) 9 nursing homes (high-level nursing care)	Combination of exercise categories (n=97) Control (usual care) (n=97) Duration of the study: 4 months	Adults in care facilities receiving high level nursing care Mean age (SD): IG: 79.7 (8.5); CG: 81.4 (7.9) years	Rate of falls; number of people falling; adverse events	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
		Sex: 71% women Setting: USA		
Neyens, 2009[68] Cluster RCT (by ward) 12 nursing homes, psychogeriatric wards (high-level nursing care)	Multifactorial intervention (including general medical assessment by staff, assessment with fall risk evaluation tool, team decisions about individually tailored fall prevention activities, environmental hazard check, and the option to implement general team fall prevention activities) (n=6) Control (usual care) (n=6) Duration of the study: 12 months	Adults in care facilities receiving high level nursing care Mean age (SD): IG: 82.1 (7.7); CG 83.3 (7.7) years Sex: 68% women Setting: The Netherlands	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13]
Nowalk, 2001[69] RCT (parallel) 2 long-term care facilities (combined high-level nursing care and independent living)	"Fit NB Free" Individually tailored combination exercises (n=37) "Living and Learning/Tai Chi" (n=38) Duration of the study: 24 months	Adults in mixed level residential care setting Mean age: 84 years Sex: 86% women Setting: USA	Number of people falling	Study identified in Cochrane (Cameron, 2018 Data not analysed, Cochrane states: 'data were not suitable for pooling' (Cameron, 2018)[13]
Patterson, 2010[72] Cluster RCT (matched pairs of nursing homes) 22 nursing homes (high and intermediate-level care)	General medication review (n=173) Control (usual care) (n=161) Duration of the study: 12 months	Adults in mixed level residential care setting Mean age (SD): 82.7 (8.4) years Sex: 73% women Setting: Northern Ireland	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
Peyro Saint Paul, 2013[73] RCT (parallel) Hospital acute and residential care facility setting (92% residential care)	Medication review for hyponatraemia (n=9) Control (usual care) (n=10) Duration of the study: 3 months	Adults in mixed level residential care setting Mean age: 89.9 years Sex: 58% women Setting: France	Rate of falls; number of people falling; adverse events	Study identified in Cochrane (Cameron, 2018)[13] Adverse event data not analysed in Cochrane, states: 'We are uncertain of the effects of medication review on adverse events as the quality of the evidence has been assessed as very low' (Cameron, 2018)[13]
Potter, 2016[74] RCT (parallel) 4 care facilities	General medication review (n=47) Control (usual care) (n=48) Duration of study: 12 months	Adults in mixed level residential care setting Mean age (SD): 84.3 (6.9) years Sex: 52% women Setting: rural Australia	Rate of falls; number of people falling; number of serious adverse events; number of people experiencing a fracture	Study identified in Cochrane (Cameron, 2018 Fracture data not analysed: Cochrane states: 'we are uncertain of the effects of medication review on risk of fracture as the quality of the evidence has been assessed as very low.' (Cameron, 2018)[13]
Ray, 1997[75] Cluster RCT 14 nursing homes (high-level nursing care)	Consultation service with individual assessment and recommendations (n=267) Control (usual care) (n=232) Duration of the study: 12 months	Adults in care facilities receiving high level nursing care Mean age: 83 years Sex: 78% women Setting: USA	Number of people having 2 or more falls	Study identified in Cochrane (Cameron, 2018 Not analysed in Cochrane, 'Two studies did not report data suitable for use in the quantitative analysis' (Cameron, 2018)[13]
Resnick, 2021[76]	Function focused care for assisted living, evidence integration triangle (FFC-AL-EIT) (n=440) Function focused care for assisted living, education only (FFC-AL-EO) (n=341)	Assisted living residents Mean age (SD): 89.48 (7.43) years Sex: 71% female Setting: USA	Rate of falls	

Study	Intervention and comparison	Population	Outcomes	Comments
	Duration of study: 12 months			
Rezola-Pardo, 2022[77]	Multicomponent exercise training (n=43) Multifactorial intervention (dual-task training (n=42) Duration of study: 3 months	Long-term nursing home residents Mean age (range): 85.1 (70-96) years Sex: 67.1% female Setting: Spain	Rate of falls	
Roberts, 2020[78]	Twenty-minute rounding intervention (n=20) Control (n=21) Duration: 6 months	Residents of aged care facilities Median age (IQR): 87.0 (81.0-92.5) Sex: 63.4% Setting:	Rate of falls	
Rosendahl, 2008[79] Cluster RCT 9 residential care facilities (intermediate- and high-level nursing care)	Combination of exercise categories (n=91) Control (usual care) (n=100) Duration of the study: 6 months	Adults in mixed level residential care setting Mean age (SD): 84.7 (6.5) years Sex: 73% women Setting: Sweden	Rate of falls; number of people falling; number sustaining a fracture (hip fractures	Study identified in Cochrane (Cameron, 2018)[13]
Rubenstein, 1990[80] RCT (parallel) Long-term care facility (intermediate and high-level nursing care)	Multifactorial intervention (n=79) Control (usual care) (n=81) Duration of the study: 24 months	Adults in mixed level residential care setting Mean age (SD): IG: 86.8 (0.6); CG: 87.9 (0.7) years Sex: 85% women Setting: Los Angeles, USA	Rate of falls; number of people falling; number sustaining a fracture (all fractures)	Study identified in Cochrane (Cameron, 2018)[13] Fracture data not analysed in Cochrane: 'None of these trials were sufficiently similar to allow analysis of subgroups of specific combinations of interventions.' (Cameron, 2018)[13]
Sadaqa, 2024[81] RCT (parallel)	Multicomponent exercise (n=12) Usual care (n=12) Duration: 12 weeks	Adults in nursing home Mean age (SD): IG 78.3 (7), CG 78.5 (7.4) Sex % female: IG 75, CG 66.7	Report of falls	

Study	Intervention and comparison	Population	Outcomes	Comments
Sakamoto, 2006[82] RCT (parallel) Nursing care facilities and rehabilitation outpatient departments (intermediate care)	Gait, balance and functional training (n=315) Control (usual care) (n=212) Duration of the study: 6 months	Adults in care facilities receiving intermediate level care Mean age (SD): 81.6 (9.0) Sex: NR Setting: Japan	Rate of falls; number of people falling; number sustaining a fracture (hip fractures)	Study identified in Cochrane (Cameron, 2018)[13] Fracture outcome not analysed in Cochrane (Cameron, 2018)[13]
Sakamoto, 2012[83] RCT (parallel) 3 nursing homes (intermediate-level care)	Lavender patch (n=26) Control (placebo) (n=36) Duration of the study: 12 months	Adults in care facilities receiving intermediate level care Mean age (SD): IG: 84.2 (7.8); CG: 84.1 (7.7) years Sex: 81% women Setting: Aomori, Japan	Rate of falls; number of people falling; adverse events	Study identified in Cochrane (Cameron, 2018)[13]
Salva, 2016[84] Cluster RCT 16 residential care facilities	Multifactorial intervention (n=193) Control (usual care) (n=137) Duration of the study: 12 months	Adults in mixed level residential care setting Mean age: 84.4 years Sex: 72% women Setting: Spain	Rate of falls; number of people falling; number of people sustaining a fracture	Study identified in Cochrane (Cameron, 2018)[13] 16 clusters randomised: 12 clusters in analysis
Sambrook, 2012[85] Cluster RCT 51 aged care facilities (intermediate care)	Sunlight exposure (17 clusters; n=190) Control (usual care) (17 clusters; n=205) Duration of study: 12 months	Adults in care facilities receiving intermediate level care, 70 years or over Mean age (SD): 86.4 (6.6) years Sex: 71% women Setting: North Sydney, Australia	Rate of falls: number of people falling; number of people sustaining a fracture (all fractures); adverse events	Study identified in Cochrane (Cameron, 2018) Adverse events data not analysed in Cochrane: 'We are uncertain of the effects on adverse events as the quality of the evidence is very low (downgraded one level for each of risk of bias, indirectness and imprecision)' (Cameron, 2018)[13] Another arm included UV exposure + calcium carbonate 600mg daily

Study	Intervention and comparison	Population	Outcomes	Comments
Saravanakumar, 2014[86] RCT (parallel) Single centre	Tai chi (n=9) Flexibility yoga (n=9) Usual care ("Stay Active" program) (n=11) Duration of the study: 14 weeks	Adults in mixed level residential care setting Mean age (SD): 83.8 (7.9) years Sex: 72.7% female Setting: Australia	Number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Schnelle, 2003[87] RCT (parallel) 4 nursing homes (high-level nursing care)	Exercise + management + urinary incontinence + fluid therapy (n=92) Control (usual care) (n=98) Duration of the study: 8 months	Adults in care facilities receiving high level nursing care Mean age (SD): IG: 87.3 (8); CG: 88.6 (6.7) years Sex: 85% women Setting: USA	Rate of falls; number of people falling; number of people sustaining a fracture (all fractures).	Study identified in Cochrane (Cameron, 2018)[13]
Schoenfelder, 2000[88] RCT (parallel) 2 nursing homes	Combination of exercise categories (n=9) Control (usual care) (n=7) Duration of the study: 6 months	Adults in care facilities receiving high level nursing care, 65 and over Mean age (range): 82.8 (66 to 95) Sex: 75% women Setting: USA	Rate of falls; number of people falling; adverse events	Study identified in Cochrane (Cameron, 2018)[13] Cochrane has not analysed data for number of people falling
Serra-Rexach, 2011[89] RCT (parallel) 1 geriatric nursing home	Combination exercises plus usual care physiotherapy (n=20) Usual care physiotherapy (n=20) Duration of the study: 12 weeks (8 weeks intervention and 4 weeks follow-up)	Adults in care facilities receiving intermediate level care Mean age (SD): 92 (2) Sex: 80% women Setting: Madrid, Spain	Rate of falls; adverse events	Study identified in Cochrane (Cameron, 2018)[13] Outcome data not analysed in Cochrane, states: 'data were incomplete and not suitable for pooling with other studies' (Cameron, 2018)
Shaw, 2003[90] RCT (parallel) 2 accident and emergency departments	Multifactorial intervention (n=130) Control (usual care) (n=144)	Adults in mixed level residential care setting Mean age (range): 84 (71 to 97) Sex: 80% women	Number of people falling; number of people sustaining a fracture (hip fractures)	Study identified in Cochrane (Cameron, 2018)[13] 79% of participants lived in high and intermediate nursing care facilities.

Study	Intervention and comparison	Population	Outcomes	Comments
	Duration of the study: 12 months	Setting: Newcastle, UK		
Shimada, 2004[91] RCT (parallel) 1 long-term care facility (intermediate-level care)	Additional gait, balance, and functional training (n=16) Control (usual exercise) (n=16) Duration of the study: 6 months	Adults in mixed level residential care setting Mean age (SD): IG: 81.8 (5.9; CG: 83.1 (6.4) Sex: 78% women Setting: Japan	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Sihvonen, 2004[92] RCT (parallel) 2 residential care homes	Gait, balance and functional training (n=20) Control (usual care) (n=7) Duration of the study: 12 months	Adults in care facilities receiving intermediate level care Mean age (SD): IG: 80.7 (6.1); CG 82.9 (4.2) Sex: 100% women Setting: Finland	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Sitja Rabert, 2015[93] RCT (parallel) 10 residential care facilities	Additional whole-body vibration + exercise (n=81) Control (exercise) (n=78) Duration of the study: 6 weeks, total follow-up 6 months	Adults in mixed level residential care setting Mean age (SD): 82 years Sex: 67.29% women Setting: Spain	Number of people falling; number of people sustaining a fracture; adverse events	Study identified in Cochrane (Cameron, 2018)[13] Adverse events not analysed in the Cochrane, states: 'The most commonly reported adverse events were pain (18%) and soreness (13%) but these data were not reported according to group allocation' (Cameron, 2018)[13]
Sluggett, 2020[94]	Structured medication regimen simplification (n=99) Control (usual care) (n=143) Duration of the study: 12-month follow-up	Residents at long-term care facilities Mean age (SD): IG 85.7 (7.8) years, CG 84.8 (8.8) years Sex: 73% Setting: Australia	Rate of falls; number of people falling	
Streim, 2012[95] RCT (parallel)	Discontinue taking antidepressants Control (continue taking antidepressants)	Adults in mixed level residential care setting Mean age (SD): NR	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13] Data not analysed in Cochrane as they 'did not report falls

Study	Intervention and comparison	Population	Outcomes	Comments
Nursing homes and assisted living facilities	Total n=94 Duration of the study: 12 months	Sex: NR Setting: Philadelphia, USA		data suitable for pooling' (Cameron, 2018)[13] Conference poster abstract.
Toots, 2019[96]	High intensity functional exercise (n=93) Seated attention control activity (n=93) Duration of the study: 12 months	Nursing home residents Mean age (SD): 85.1 (7.1) years Sex: 75.55% female Setting: Sweden	Rate of falls; number of people sustaining a fracture	
Toulotte, 2003[97] RCT (parallel) Nursing care facility	Supervised exercises (n=10) Control (usual care) (n=10) Duration of the study: 4 months follow-up	Adults in mixed level residential care setting Mean age (SD): 81.4 (4.7) Sex: NR Setting: France	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13] Data not analysed in Cochrane as 'reported data were incomplete and not suitable for pooling with other studies' (Cameron, 2018)
Tuunainen, 2013[98] RCT (parallel) Residential care facility	Additional gait, balance, and functional training (n=18) Self-training (n=19) Duration of the study: 13 weeks. Follow-up 3 years.	Adults in mixed level residential care setting Mean age (SD): Intervention 85 (4.2) years, control 86.1 (7.3) yeas Sex: 81.08% female Setting: Finland	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Varela, 2018[102] RCT (parallel) Long-term care institution	Cycling (n=25) Usual care (n=49) Duration: 15 months	Adults from a long-term care institution Mean age (SD): intervention 77.94 (8.79) years, control 83.59 (7.05) years Sex: 39.43% female Setting: Spain	Rate of falls	Rate ratio of falls data taken from Dyer, 2023[29]
Van de Ven, 2014[99] Cluster RCT	Dementia care mapping (n=154)	Adults in care facilities receiving high level nursing care	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
34 units from 11 residential care facilities	Control (usual care) (n=164) Duration of the study: 18 months	Mean age: 84.7 years Sex: 75% women Setting: The Netherlands		
Van Gaal, 2011a[100] Cluster RCT (by ward) 6 nursing homes, 10 wards	Guideline implementation program (10 clusters; n=158) Control (n=150) Duration of the study: 23 months	Adults in care facilities receiving high level nursing care Mean age (SD): IG 78 (9.9); CG 78 (11.7) Sex: 66% women Setting: the Netherlands	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13]
Van het Reve, 2014[101] RCT (parallel) 14 Residential care facilities	Exercise +cognitive training (n=88) Exercise (n=94) Duration of the study: 15 months (12 weeks intervention and 12 months post-intervention follow-up)	Adults in care facilities receiving intermediate level care Mean age (SD): 81.5 (7.3) Sex: 55% women Setting: Switzerland (n=13); German (n=1) facilities	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Walker, 2016[104] Cluster RCT 6 residential care facilities	Multifactorial intervention (n=25) Control (usual care) (n=27) Duration of the study: 6 months	Adults in mixed level residential care setting Mean age: 83 years Sex: 67% women Setting: UK	Rate of falls	Study identified in Cochrane (Cameron, 2018)[13]
Ward, 2010[105] Cluster RCT (by facility) 88 residential aged care facilities	Project nurse facilitating best-practice falls injury prevention strategies (46 clusters; n=2802) Control (usual care) (42 clusters; n=2589) Duration of the study: 17 months	Adults in mixed level residential care setting Median age: 86 years Sex: 73% women Setting: New South Wales, Australia	Number of people sustaining a fracture	Study identified in Cochrane (Cameron, 2018)[13] Rate of falls not analysed in Cameron, 2018[13]
Whitney, 2017[106]	Multifactorial intervention (n=103)	Adults in mixed level residential care setting	Rate of falls; number of people falling; number of people sustaining a fracture	Study identified in Cochrane (Cameron, 2018)[13]

Study	Intervention and comparison	Population	Outcomes	Comments
Cluster RCT (pilot, cross-over study) 4 nursing homes and 5 residential homes	Control (usual care) (n=88) Duration of the study: 6 months	Mean age (SD): 82.5 (8.8) years Sex: 69% women Setting: UK		
Yokoi, 2015[107] Cluster RCT 5 residential care facilities	Gait, balance and functional training (n=51) Control (usual care (Tai Chi)) (n=54) Duration of the study:	Adults in care facilities receiving intermediate level care Mean age: 79.4 years Sex: 60% women Setting: Japan	Number of people falling	Study identified in Cochrane (Cameron, 2018)[13]
Zermansky, 2006[108] RCT (parallel) 65 care homes for the elderly	General medication review (n=331) Control (usual care) (n=330) Duration of the study: 6 months	Adults in mixed level residential care setting Mean age (IQR): 85 (80 to 90) years Sex: 77% women Setting: UK	Rate of falls; number of people falling	Study identified in Cochrane (Cameron, 2018)[13]

1 See Appendix D for full evidence tables.

2 1.1.6. Summary of the effectiveness evidence

3 1.1.6.1. Exercise versus usual care

4 **Table 3: Clinical evidence summary: Exercise versus usual care**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Exercise	
Rate of falls	2738 (16 RCTs)	⨁◯◯◯ Very low[a,b,c]	**Rate ratio** 0.78 (0.61 to 1.00	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MID) **Benefit of exercise**
Number of fallers	2474 (13 RCTs)	⨁◯◯◯ Very low[c,d,e]	**RR 0.90** (0.76 to 1.06)	-	**-**	MID: 0.8 to 1.25 (precision: CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Exercise	
						crosses 1 MID) **No difference**
Falls - Number of falls (continuous)	109 (3 RCTs)	⨁⨁◯◯ Low[l,m]	-	The mean falls - Number of falls (continuous) was **0**	MD **0.29 lower** (0.52 lower to 0.07 lower)	MID: 0.284 **Benefit of exercise**
Number of people sustaining a fracture- Hip fractures	183 (1 RCT)	⨁◯◯◯ Very low[c,f]	**RR 0.16** (0.01 to 2.81)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of exercise**
Number of people sustaining a fracture- All fractures	590 (3 RCTs)	⨁◯◯◯ Very low[c,g,h]	**RR 0.61** (0.27 to 1.33)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of exercise**
Adverse events: aches and pains	582 (1 RCT)	⨁◯◯◯ Very low[c,d,i]	**RR 1.23** (0.61 to 2.48)	45 per 1,000	10 more per 1,000 (17 fewer to 66 more)	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical difference**
Adverse events: aches and pains- Severe soreness	194 (1 RCT)	⨁◯◯◯ Very low[c,d,j]	**RR 0.91** (0.40 to 2.04)	113 per 1,000	10 fewer per 1,000 (68 fewer to 118 more)	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical difference**
Adverse events: aches and pains- Severe bruises	194 (1 RCT)	⨁◯◯◯ Very low[c,k]	**RR 2.00** (0.18 to 21.69)	10 per 1,000	10 more per 1,000 (8 fewer to 213 more)	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Exercise	
						Clinical harm of exercise
Adverse events: aches and pains- Severe fatigue	194 (1 RCT)	⨁◯◯◯ Very low[c,k]	**RR 4.00** (0.46 to 35.14)	10 per 1,000	31 more per 1,000 (6 fewer to 213 more)	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Clinical harm of exercise**
Adverse events - Adverse events	83 (2 RCTs)	⨁⨁◯◯ Low[n]	**RD 0.00** (-0.09 to 0.09)	0 per 1,000	**0 fewer per 1,000** (0 fewer to 0 fewer)	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) No clinical difference
Quality of life (EQ-5D5L-VAS)- score of 0-100 with 0 being the worst health you can imagine and 100 being the best health you can imagine) Progressive resistance and balance training vs usual care	176 (1 RCT)	⨁⨁⨁⨁ High	-	The mean quality of life (EQ-5D5L-VAS)- Progressive resistance and balance training vs usual care was 0.83	MD **0.02 higher** (0.04 lower to 0.08 higher)	MID: 0.5 x baseline SD= 9.15 (precision: CI does not cross MID) **No clinical difference**
Quality of life (SF-36 Total)- Scores range from 0-100 with 100 being a favourable health state.	168 (1 RCT)	⨁⨁⨁⨁ High	-	The mean quality of life (SF-36)- Progressive resistance and balance training vs usual care was 72.43	MD **2.23 higher** (3.08 lower to 7.54 higher)	MID: 0.5 x baseline SD= 9.25 (precision: CI does not cross MID) **No clinical difference**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Exercise	

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, baseline imbalance, and selective reporting.

b. Downgraded by 1 increment for inconsistency due an I^2 value of 85% suggesting considerable variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

d. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, and baseline imbalance.

e. Downgraded by 1 increment for inconsistency due an I^2 value of 53% suggesting substantial variation.

f. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded.

g. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and concerns for intervention adherence

h. Downgraded by 1 increment for inconsistency due to an I^2 value of 44% suggesting moderate variation.

i. Downgraded by 2 increments for inconsistency due to an I^2 value of 86% suggesting considerable variation.

j. Downgraded by 1 increment for inconsistency due to an I^2 value of 55% suggesting substantial variation

k. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and no reported falls definition.

l. Downgraded by 1 increment if confidence intervals crossed 1 MID or downgrade by 2 if both MIDs were crossed.

m. Downgraded by 1 increment for risk of bias due to missingness of participant data at follow-up

n. Downgraded by 2 increments due to concerns with allocation concealment, blinding, outcome assessing, and baseline imbalance

1.1.6.2. Exercise versus usual care (sub-grouped by type of exercise)

Table 4: Clinical evidence summary: Exercise versus usual care (sub-grouped by type of exercise)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: exercise	
Rate of falls – Gait, balance, functional training	1523 (5 RCTs)	⨁◯◯◯ Very low[a,b,c]	**Rate ratio 0.99** (0.79 to 1.24)	-		MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No clinical difference**
Rate of falls- Whole body vibration	62 (1 RCT)	⨁◯◯◯ Very low [c,d]	**Rate Ratio 0.96** (0.58 to 1.60)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: exercise	
						No difference
Rate of falls- Combination of exercise categories	1041 (9 RCTs)	⨁◯◯◯ Very low[c,e,f]	**Rate ratio 0.72** (0.48 to 1.08)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of combination of exercise categories**
Rate of falls - Cycling	39 (1 RCT)	⨁⨁⨁◯ Moderate[n]	**Rate ratio 0.67** (0.37 to 1.21)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No difference**
Number of fallers – Gait, balance, and functional training	1628 (6 RCTs)	⨁◯◯◯ Very low[a,c,g]	**RR 1.01** (0.85 to 1.21)			MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No clinical difference**
Number of fallers – 3D (Tai Chi)	59 (1 RCT)	⨁◯◯◯ Very low [c,h]	**Risk Ratio 0.60** (0.19 to 1.87)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Clinical benefit of 3D (Tai Chi)**
Number of fallers – Whole body vibration vs usual care	62 (1 RCT)	⨁◯◯◯ Very low [c,d]	**Risk Ratio 0.88** (0.54 to 1.43)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No difference**
Number of fallers – Combination	895 (5 RCTs)	⨁◯◯◯ Very low [c,l,j]	**Risk Ratio 0.92**	-	-	MID: 0.8 to 1.25 (precision: CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: exercise	
of exercise categories			(0.72 to 1.19)			crosses 1 MIDs) **No difference**
Quality of life (EQ-5D5L-VAS)-score of 0-100 with 0 being the worst health you can imagine and 100 being the best health you can imagine) Combination of exercise categories	176 (1 RCTs)	⊕⊕⊕⊕ High	-	The mean quality of life (EQ-5D5L-VAS) was 0.83	MD **0.02 higher** (0.04 lower to 0.08 higher)	MID: 0.5 x SMD (no baseline values given): 0.06 (precision: CI crosses one MID) **No clinical benefit**
Quality of life (SF-36-Total)-Scores range from 0-100 with 100 being a favourable health state-Combination of exercise categories	168 (1 RCT)	⊕⊕⊕⊕ High	-	The mean quality of life (SF-36)-Progressive resistance and balance training vs usual care was 72.43	MD 2.23 higher (3.08 lower to 7.54 higher)	MID: 0.5 x baseline SD= 9.25 (precision: CI does not cross MID) **No clinical difference**
Number of people sustaining a fracture-Combination of exercise categories	221 (1 RCT)	⊕⊕◯◯ Low[c]	**Risk Ratio 0.80** (0.25 to 2.53)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical difference**
Number of people sustaining a fracture-Gait, balance, and functional training	176 (1 RCT)	⊕⊕⊕◯ Moderate[a]	**Risk Ratio 0.10** (0.01 to 0.77)	-		MID: 0.8 to 1.25 (precision: CI crosses 0 MIDs) **Clinical benefit of gait, balance,**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: exercise	
						and functional training

a. Downgraded by 1 increment for risk of bias due to concerns regarding intervention adherence, blinding and attrition

b. Downgraded by 1 increment for inconsistency due to an I^2 value of 73% suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, and baseline imbalance.

e. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, inconsistent method for reporting a fall, incomplete outcome data, and baseline imbalance.

f. Downgraded by 1 increment for inconsistency due to an I^2 value of 89% suggesting substantial variation.

g. Downgraded by 1 increment for inconsistency due to an I^2 value of 44% suggesting moderate variation.

h. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, and no allocation concealment.

i. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and incomplete outcome data.

j. Downgraded by 1 increment for inconsistency due to an I^2 value of 59% suggesting moderate variation.

k. Downgraded by 1 increment for inconsistency due to an I^2 value of 67% suggesting substantial variation.

l. Downgraded by 1 increment for inconsistency due to an I^2 value of 86% suggesting substantial variation.

m. Downgraded by 1 increment for inconsistency due to an I^2 value of 45% suggesting moderate variation.

1.1.6.3 Exercise versus usual care (sub-grouped by level of care)

Table 5: Clinical evidence summary: Exercise versus usual care (grouped by level of care)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Exercise	
Rate of falls- High level nursing care facilities	210 (2 RCTs)	⨁◯◯◯ Very low [a,b,c]	**Rate ratio 1.79** (0.89 to 3.60)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of usual care**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Exercise	
Rate of falls- Intermediate level care facilities	1315 (5 RCTs)	⊕◯◯◯ Very low [c,d,e]	**Rate ratio 0.70** (0.47 to 1.04)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Rate of falls- Facilities providing mixed levels of care	698 (4 RCTs)	⊕◯◯◯ Very low [c,f,g]	**Rate ratio 0.76** (0.44 to 1.33)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of exercise**
Rate of falls- Unspecified level care facilities	176 (1 RCTs)	⊕⊕◯◯ Low[h,i]	**Rate ratio 0.98** (0.82 to 1.18)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Number of fallers- High level nursing care facilities	194 (2 RCT)	⊕◯◯◯ Very low [c,l]	**RR 1.15** (0.83 to 1.58)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Clinical benefit of usual care**
Number of fallers- Intermediate level care facilities	1419 (6 RCTs)	⊕◯◯◯ Very low [c,j]	**RR 0.94** (0.75 to 1.17)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MID) **Clinical benefit of exercise**
Number of fallers- Facilities providing mixed levels of care	698 (4 RCTs)	⊕◯◯◯ Very low [c,f,m]	**RR 0.90** (0.62 to 1.30)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Exercise	
						No clinical benefit
Number of fallers- Unspecified level care facilities	176 (1 RCTs)	⊕⊕⊕◯ Moderate [h]	**RR 0.96** (0.78 to 1.18)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical benefit**
Quality of life (EQ-5D5L-VAS)- score of 0-100 with 0 being the worst health you can imagine and 100 being the best health you can imagine) Mixed level care facilities	176 (1 RCT)	⊕⊕⊕⊕ High	**-**	The mean quality of life (EQ-5D5L-VAS) was **0.83**	**MD 0.02** higher (0.04 lower to 0.08 higher)	MID: 0.5 x baseline SD= 9.25 (precision: CI does not cross MID) **No clinical benefit**
Quality of life- SF-36 Total)- Scores range from 0-100 with 100 being a favourable health state- Mixed level care facilities	168 (1 RCT)	⊕⊕⊕⊕ High	-	The mean quality of life (SF-36)- Mixed level care facilities was 72.43	**MD 2.23** higher (3.08 lower to 7.54 higher)	MID: 0.5 x baseline SD= 9.25 (precision: CI does not cross MID) **No clinical benefit**
Number of people sustaining a fracture- Mixed level care facilities	221 (1 RCT)	⊕⊕◯◯ Low[c]	**RR 0.80** (0.18 to 2.53)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical benefit**
Number of people sustaining a	176 (1 RCT)	⊕⊕⊕◯ Moderate [o]	**RR 0.10** (0.01 to 0.77)	-	**-**	MID: 0.8 to 1.25 (precision:

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Exercise	
fracture- Unspecified level care facilities						CI crosses 0 MIDs) **Clinical benefit of exercise**

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, selective reporting of the results and inconsistent method for ascertaining falls.

b. Downgraded by 1 increment for inconsistency due to an I^2 value of 73% suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, and inconsistent method for ascertaining falls.

e. Downgraded by 1 increment for inconsistency due to an I^2 value of 78% suggesting substantial variation.

f. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and imbalances at baseline.

g. Downgraded by 1 increment for inconsistency due to an I^2 value of 92% suggesting substantial variation.

h. Downgraded by 1 increment for risk of bias due to concerns relating to adherence

i. Downgraded by 1 increment for inconsistency due to an I^2 value of 81% suggesting substantial variation.

j. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, inconsistent method for reporting a fall, incomplete outcome data, and baseline imbalance.

k. Downgraded by 1 increment for inconsistency due to an I^2 value of 49% suggesting moderate variation.

l. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and the method of ascertaining falls was unclear.

m. Downgraded by 1 increment for inconsistency due to an I^2 value of 77% suggesting substantial variation.

n. Downgraded by 1 increment for imprecision if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs.

o. Downgraded by 1 increment for risk of bias due to issues regarding allocation concealment and missing outcome data.

p. Downgraded by 1 increment for inconsistency due to an I^2 value of 67% suggesting substantial variation.

q. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, selective reporting of the results, inconsistent method of ascertaining falls, and incomplete outcome data.

r. Downgraded by 1 increment for inconsistency due to an I^2 value of 85% suggesting substantial variation.

1.1.6.3. Exercise versus exercise

Table 6: Clinical evidence summary: Exercise versus exercise

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with exercise	Risk difference with Care facilities: Exercise	
Number of falls	117 (2 RCTs)	⊕◯◯◯ Very low[a,b,c]	-	The mean number of falls was **0**	**MD 0.66 lower** (0.98 lower to 0.34 lower)	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit for exercise A**

a. Downgraded by 1 increment for risk of bias due to randomisation concerns

b. Downgraded by 1 increment for inconsistency as the I-squared value is 79%

c. Downgraded by 1 increment as the confidence intervals crossed 1 MID

1.1.6.4. Comparison of different exercise programmes

Table 7: Clinical evidence summary: Comparison of different exercise programmes

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Comparative exercise	Risk difference with Residential care: Exercise programme	
Rate of falls- Additional gait, balance and functional training	56 (2 RCTs)	⊕⊕◯◯ Low [a,b]	**Rate ratio 0.62** (0.40 to 0.96)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Rate of falls- Strength/ resistance vs self-training	34 (1 RCT)	⊕⊕◯◯ Low [a,b]	**Rate ratio 0.74** (0.50 to 1.10)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Rate of falls- Balance and strength vs self-training	32 (1 RCT)	⊕⊕⊕◯ Moderate [a]	**Rate ratio 0.48**	-	-	MID: 0.8 to 1.25 (precision: CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Comparative exercise	Risk difference with Residential care: Exercise programme	
			(0.30 to 0.77)			crosses 0 MIDs) **Benefit of exercise**
Rate of falls-Flexibility (Yoga) vs 'Staying active' programme	20 (1 RCT)	⊕⊕◯◯ Low [b,c]	**Rate ratio 0.47** (0.24 to 0.91)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Rate of falls-3D (Tai Chi) vs 'Staying active' programme	20 (1 RCT)	⊕⊕◯◯ Low [b,c]	**Rate ratio 0.52** (0.28 to 0.98)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Rate of falls-Flexibility (Yoga) vs 3D (Tai Chi)	18 (1 RCT)	⊕◯◯◯ Very low [b,c]	**Rate ratio 1.11** (0.51 to 2.37)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Rate of falls-3D exercises (In-balance) vs Functional balance, strength, and mobility	142 (1 RCT)	⊕⊕◯◯ Low [b,d]	**Rate ratio 0.73** (0.60 to 0.89)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Rate of falls-Wii balance board vs Otago balance program	60 (1 RCT)	⊕⊕⊕◯ Moderate[d]	**Rate ratio 0.35** (0.19 to 0.63)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 0 MIDs) **Benefit of exercise**
Number of fallers-Additional gait, balance	56 (2 RCTs)	⊕◯◯◯ Very low [a,b]	**Risk Ratio 0.79**	-	-	MID: 0.8 to 1.25 (precision: CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Comparative exercise	Risk difference with Residential care: Exercise programme	
and functional training			(0.43 to 1.45)			crosses 2 MIDs) **Benefit of exercise**
Number of fallers- Strength/ resistance vs self-training	34 (1 RCT)	⊕⊕◯◯ Low [a,b]	**Risk Ratio 0.56** (0.30 to 1.03)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Number of fallers- Balance and strength training vs self-training	32 (1 RCT)	⊕⊕◯◯ Low [a,b]	**Risk Ratio 0.55** (0.29 to 1.05)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Number of fallers- Additional whole-body vibration	232 (2 RCTs)	⊕◯◯◯ Very low [b,e]	**Risk Ratio 1.21** (0.72 to 2.03)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of fallers- 3D exercises (In-balance) vs Functional balance, strength, and mobility	142 (1 RCT)	⊕⊕◯◯ Low [b,e]	**Risk Ratio 0.92** (0.70 to 1.21)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of fallers- Comparison of combination exercise programmes	41 (1 RCT)	⊕⊕◯◯ Low [b,f]	**Risk Ratio 0.54** (0.29 to 1.01)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of exercise**
Number of people sustaining a	159 (1 RCT)	⊕◯◯◯ Very low [b,e]	**Risk Ratio 2.89**	-	-	MID: 0.8 to 1.25 (precision: CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Comparative exercise	Risk difference with Residential care: Exercise programme	
fracture- Total fractures			(0.12 to 69.07)			crosses 2 MIDs) **Benefit of comparative exercise**
Adverse events - Adverse events	90 (2 RCT)	⨁⨁◯◯ Low[f]	**RD 0.00** (-0.06 to 0.06)	0 per 1,000	**0 fewer per 1,000** (60 fewer to 60 more)	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No clinical difference**

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, incomplete outcome data, and baseline imbalances.

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

c. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and incomplete outcome data.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded

f. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and selective reporting.

g. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, selective reporting, incomplete outcome data, and baseline imbalances.

1.1.6.5. Medication review versus usual care

Table 8: Clinical evidence summary: Medication review versus usual care

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Medication review	
Rate of falls- General medication review vs usual care	2409 (6 RCTs)	⨁◯◯◯ Very low [a,b,c]	**Rate ratio 0.93** (0.64 to 1.35)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Medication review	
Rate of falls- Medication review for hyponatraemia	9 (1 RCT)	⊕◯◯◯ Very low [c,d]	**Rate ratio 0.63** (0.16 to 2.49)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of medication review**
Rate of falls- Structured medication regimen simplification vs usual care	241 (1 RCT)	⊕⊕⊕◯ Moderate [e]	**Rate ratio 2.31** (1.98 to 2.69)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of usual care**
Rate of falls- Pharmacist-led medication review vs usual care	191 (1 RCT)	⊕◯◯◯ Very low [c,f]	**Rate ratio 0.99** (0.69 to 1.42)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of fallers- General medication review vs usual care	5139 (6 RCTs)	⊕◯◯◯ Very low [c,g,h]	**Risk Ratio 0.93** (0.80 to 1.09)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of fallers- Medication review for hyponatraemia	9 (1 RCT)	⊕◯◯◯ Very low [c,d]	**Risk Ratio 0.42** (0.07 to 2.59)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of medication review**
Number of fallers- Pharmacist-led medication review vs usual care	191 (1 RCT)	⊕⊕◯◯ Low [c,f]	**Risk Ratio 0.99** (0.79 to 1.24)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of fallers-	241 (1 RCT)	⊕⊕◯◯ Low [c,e]	**Risk Ratio**	-	-	MID: 0.8 to 1.25

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Medication review	
Structured medication regimen simplification vs usual care			**1.46** (1.18 to 1.80)			(precision: CI crosses 1 MIDs) **Clinical benefit of usual care**
Number of fallers-Deprescribing intervention vs waitlist control	852 (1 RCT)	⊕⊕◯◯ Low [c]	**Risk Ratio 1.35** (0.74 to 2.46)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of waitlist**
Number of falls	439 (1 RCT)	⊕◯◯◯ Very low [c,n]	**Rate ratio 0.89** (0.48 to 1.65)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of medication review**
Number of people sustaining a fracture-General medication review vs usual care	93 (1 RCT)	⊕◯◯◯ Very low [c,i]	**Risk Ratio 1.60** (0.28 to 9.16)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of usual care**
Serious adverse events-General medication review vs usual care	93 (1 RCT)	⊕◯◯◯ Very low [c,i]	**Risk Ratio 1.07** (0.23 to 5.01)	-	**4 fewer per 1,000 (48 fewer to 251 more)**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical benefit**

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, baseline imbalances, selective outcome reporting, and inconsistent method for ascertaining falls

b. Downgraded by 1 increment for inconsistency due to the I^2 value of 93% suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and incomplete outcome data reported.

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with Residential care: Medication review	

e. Downgraded by 1 increment for risk of bias due to imbalances at baseline.

f. Downgraded by 1 increment for risk of bias due to concerns regarding the randomisation process and no pre-specified protocol.

g. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, baseline imbalances, problems with allocation sequence concealment, and inconsistent method for ascertaining falls

h. Downgraded by 1 increment for inconsistency due to the I^2 value of 48% suggesting moderate variation.

i. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded.

j. Downgraded by 1 increment for inconsistency due to the I^2 value of 87% suggesting substantial variation.

k. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors were not blinded, baseline imbalances, selective outcome reporting, inconsistent method of ascertaining falls, no pre-specified protocol and concerns regarding the randomisation process.

l. Downgraded by 1 increment for inconsistency due to the I^2 value of 96% suggesting substantial variation.

m. Downgraded by 1 increment for inconsistency due to the I^2 value of 62% suggesting substantial variation.

n. Downgraded by 1 increment due to limited baseline information

1.1.6.6. Vitamin D supplements versus no vitamin D supplements

Table 9: Clinical evidence summary: Vitamin D supplements vs. no Vitamin D supplements

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with no Vitamin D supplements	Risk difference with Residential care: Vitamin D supplements	
Rate of falls- Additional vitamin D supplementation	4512 (4 RCTs)	⊕◯◯◯ Very low [a,b,c]	**Rate ratio 0.72** (0.55 to 0.95)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of Vitamin D supplementation**
Rate of falls- Multivitamins (including Vitamin D3	91 (1 RCT)	⊕⊕⊕◯ Moderate [d]	**Rate ratio 0.38** (0.20 to 0.71)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 0 MIDs)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with no Vitamin D supplements	Risk difference with Residential care: Vitamin D supplements	
+ calcium) vs placebo						**Benefit of Vitamin D supplementation**
Rate of falls- Education on Vitamin D + calcium + osteoporosis medication vs usual care	4017 (1 RCT)	⊕◯◯◯ Very low [c,e]	**Rate ratio 1.03** (0.85 to 1.25)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of fallers- Vitamin D supplementation	4512 (4 RCTs)	⊕◯◯◯ Very low [a,b,c,]	**Risk Ratio 0.92** (0.76 to 1.12)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of fallers- Vitamin D supplementation + calcium supplementation vs placebo	583 (1 RCT)	⊕⊕⊕◯ Moderate [f]	**Risk Ratio 1.03** (0.90 to 1.18)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of fallers- Multivitamins (including Vitamin D3 + calcium) vs usual care or placebo	91 (1 RCT)	⊕◯◯◯ Very low [c,g]	**Risk Ratio 0.82** (0.40 to 1.66)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of fallers- Education on Vitamin D + calcium + osteoporosis medication	4017 (1 RCT)	⊕⊕◯◯ Low [e]	**Risk Ratio 1.05** (0.90 to 1.23)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with no Vitamin D supplements	Risk difference with Residential care: Vitamin D supplements	
vs usual care						
Number of people sustaining a fracture-Vitamin D supplementation	4464 (3 RCTs)	⊕◯◯◯ Very low [a,b,c]	**Risk Ratio 1.09** (0.58 to 2.03)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of people sustaining a fracture-Vitamin D3 +calcium vs placebo	583 (1 RCT)	⊕⊕◯◯ Low [c,f]	**Risk Ratio 0.62** (0.36 to 1.07)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of Vitamin D supplementation**
Adverse events-Multivitamins (Vitamin D3 + calcium) vs usual care or placebo	91 (1 RCT)	⊕◯◯◯ Very low [c,d]	**Risk Ratio 0.13** (0.01 to 2.41)	-	**61 fewer per 1,000 (69 fewer to 98 more)**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No clinical benefit**
Adverse events-Vitamin D + calcium supplementation	1166 (1 RCT)	⊕◯◯◯ Very low [c,f]	**Risk Ratio 0.89** (0.50 to 1.59)	-	**5 fewer per 1,000 (21 fewer to 25 more)**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical benefit**
Adverse events-Vitamin D supplementation	747 (2 RCTs)	⊕⊕◯◯ Low [c]	**Risk Ratio 4.84** (0.24 to 98.80)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical benefit**

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and unclear method for ascertaining falls.

b. Downgraded by 1 increment for inconsistency due to the I2 having a value suggesting substantial variation.

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with no Vitamin D supplements	Risk difference with Residential care: Vitamin D supplements	

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 1 increment for risk of bias due to incomplete outcome data, selective reporting, and method of ascertaining falls.

e. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors were not blinded, incomplete outcome data, imbalances at baseline, and method of ascertaining falls.

f. Downgraded by 1 increment for risk of bias due to unclear method of ascertaining falls.

g. Downgraded by 1 increment for risk of bias due to incomplete outcome data and method for ascertaining falls.

h. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors were not blinded, incomplete outcome data, imbalances at baseline, selective reporting, and method of ascertaining falls.

1.1.6.7. Psychological intervention vs. control

Table 10: Clinical evidence summary: Psychological intervention vs. control

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Control	Risk difference with Residential care: Psychological intervention	
Rate of falls- Exercise + cognitive training vs exercise	114 (1 RCT)	⨁◯◯◯ Very low [a,b]	**Rate ratio 1.22** (0.78 to 1.92)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of fallers- Exercise + training vs exercise	114 (1 RCT)	⨁◯◯◯ Very low [a,b]	**Risk Ratio 1.35** (0.23 to 7.88)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of exercise**

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, no allocation concealment, and incomplete outcome data.

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

1.1.6.8. Social environment vs. usual care

Table 11: Clinical evidence summary: Social environment vs. Usual care

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Social environment	
Rate of falls- Staff education on fracture prevention vs usual care	5637 (1 RCT)	⊕⊕◯◯ Low [a,c]	**Rate ratio 1.19** (0.92 to 1.53)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Rate of falls- Guideline implementation programme vs control	392 (1 RCT)	⊕◯◯◯ Very low [d,e]	**Rate ratio 0.63** (0.34 to 1.16)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of social environment**
Rate of falls- Risk assessment tool vs. nurses' judgment	1125 (1 RCT)	⊕⊕◯◯ Low [c,f]	**Rate ratio 0.96** (0.84 to 1.10)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Rate of falls- Dementia care mapping vs usual care	293 (1 RCT)	⊕⊕⊕◯ Moderate [e]	**Rate ratio 1.84** (1.40 to 2.42)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 0 MIDs) **Benefit of usual care**
Number of fallers- Risk assessment tool vs. nurses' judgment	1125 (1 RCT)	⊕⊕◯◯ Low [c,f]	**Risk Ratio 0.99** (0.85 to 1.16)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of people sustaining a fracture- Risk assessment tool vs. nurses' judgment	1125 (1 RCT)	⊕◯◯◯ Very low [c,f]	**Risk Ratio 0.96** (0.57 to 1.63)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Social environment	
Number of people sustaining a fracture- Project nurse facilitating best practice falls injury prevention strategies vs usual care	5391 (1 RCT)	⊕◯◯◯ Very low [a,c]	**Risk Ratio 0.95** (0.63 to 1.44)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, unclear method of ascertaining falls, and baseline imbalances.

b. Downgraded by 1 increment for inconsistency due to an I2 value of 86% suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, unclear method of ascertaining falls, and baseline imbalances.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, allocation concealment was unclear, and incomplete outcome data.

f. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

1.1.6.9. Environmental vs. usual care

Table 12: Clinical evidence summary: Environmental vs. usual care

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Environment	
Rate of falls – Wireless position-monitoring patch vs usual care	72 (1 RCT)	⊕◯◯◯ Very low [b,c]	**Rate ratio 0.65** (0.33 to 1.27)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of environmental**
Rate of falls – Assisted home technology vs no	54 (1 RCT)	⊕⊕⊕◯ Moderate [d]	**Rate ratio 0.52** (0.37 to 0.73)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 0 MIDs)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Environment	
assisted home technology						**Benefit of environmental**
Number of falls- Assisted home technology vs no assisted home technology	54 (1 RCT)	⊕⊕◯◯ Low [c,d]	**Risk Ratio 0.65** (0.40 to 1.07)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of environmental**
Quality of life (Dementia Quality of Life (DQOL) self-rated Total) Score between 30-150, with higher score indicating a better QoL	53 (1 RCT)	⊕⊕⊕◯ Moderate [d]	**-**	The mean quality of life (self-rated total) was 100	**MD 9.67 higher** (3.4 higher to 15.94 higher)	MID: 0.5 x baseline SD: 0.435 precision: CI crosses 0 MID) **Clinical benefit of environmental**
Quality of life (QUALIDEM) - Care relationship- the higher the score, the better the person is identified at that particular domain. (Score of 0-21)	53 (1 RCT)	⊕⊕◯◯ Low [b,d]	**-**	The mean quality of life (QUALIDEM - care relationship) was 13.42	**MD 3.41 higher** (1.04 higher to 5.78 higher)	MID: 0.5 x baseline SD: 1.86 precision: CI crosses 1 MID) **No clinical benefit**
Quality of life (QUALIDEM) - Positive affect- the higher the score, the better the person is identified at that particular	53 (1 RCT)	⊕⊕◯◯ Low [b,d]	-	The mean quality of life (QUALIDEM - positive affect) was 14.29	**MD 0.7 lower** (2.54 lower to 1.14 higher)	MID: 0.5 x baseline SD: 1.65 precision: CI crosses 1 MID) **No clinical benefit**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Environment	
domain. (Score 0-18)						
Quality of life (QUALIDEM) - Negative affect- the higher the score, the better the person is identified at that particular domain. (Score 0-9)	53 (1 RCT)	⊕⊕◯◯ Low [b,d]	-	The mean quality of life (QUALIDEM - negative affect) was 4.88	**MD 0.82 higher** (0.67 lower to 2.31 higher)	MID: 0.5 x baseline SD: 1.06 precision: CI crosses 1 MID) **No clinical benefit**
Quality of life (QUALIDEM) - Restless behaviour- the higher the score, the better the person is identified at that particular domain. (Score 0-9)	53 (1 RCT)	⊕⊕◯◯ Low [b,d]	-	The mean quality of life (QUALIDEM - restless behaviour) was 4.38	**MD 0.93 higher** (0.53 lower to 2.39 higher)	MID: 0.5 x baseline SD: 1.32 precision: CI crosses 1 MID) **No clinical benefit**
Quality of life (QUALIDEM) - Positive self-image - the higher the score, the better the person is identified at that particular domain. (Score 0-9)	53 (1 RCT)	⊕⊕◯◯ Low [b,d]	-	The mean quality of life (QUALIDEM - positive self-image) was 5.92	**MD 0.56 higher** (0.79 lower to 1.91 higher)	MID: 0.5 x baseline SD: 1.12 precision: CI crosses 1 MID) **No clinical benefit**
Quality of life (QUALIDEM) - Social relations- the higher the score, the better the person is identified at that	53 (1 RCT)	⊕⊕◯◯ Low [b,d]	-	The mean quality of life (QUALIDEM - social relations) was 11.75	**MD 0.66 higher** (1.31 lower to 2.63 higher)	MID: 0.5 x baseline SD: 1.82 precision: CI crosses 1 MID) **No clinical benefit**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Environment	
particular domain. (Score 0-18)						
Quality of life (QUALIDEM) - Social isolation- the higher the score, the better the person is identified at that particular domain. (Score 0-9)	53 (1 RCT)	⊕⊕◯◯ Low [b,d]	-	The mean quality of life (QUALIDEM - social isolation) was 5.29	**MD 1.99 higher** (0.81 higher to 3.17 higher)	MID: 0.5 x baseline SD: 1.11 precision: CI crosses 1 MID) **No clinical benefit**
Quality of life (QUALIDEM) - Feeling at home- the higher the score, the better the person is identified at that particular domain. (Score 0-12)	53 (1 RCT)	⊕◯◯◯ Very low [b,d]	-	The mean quality of life (QUALIDEM - feeling at home) was 7.58	**MD 1.45 higher** (0.5 lower to 3.4 higher)	MID: 0.5 x baseline SD: 1.37 precision: CI crosses 2 MID) **No clinical benefit**
Quality of life (QUALIDEM) - Having things to do- the higher the score, the better the person is identified at that particular domain. (Score 0-6)	53 (1 RCT)	⊕⊕◯◯ Low [b,d]	-	The mean quality of life (QUALIDEM - having things to do) was 2.48	**MD 0.56 higher** (0.55 lower to 1.67 higher)	MID: 0.5 x baseline SD: 1.09 precision: CI crosses 1 MID) **No clinical benefit**
Number of people sustaining a fracture	357 (1 RCT)	⊕⊕◯◯ Low [c]	**Risk Ratio 0.75** (0.30 to 1.86)	-	**1 fewer per 1,000 (2 fewer to 0 fewer)**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical benefit**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Environment	

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, unclear randomisation process and no pre-specified protocol

b. Downgraded by 1 increment for risk of bias due to the participants and personnel not being blinded, outcome assessors not being blinded, and incomplete outcome data.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 1 increment for risk of bias due to unclear randomisation process and no pre-specified protocol.

1.1.6.10. Other single interventions vs. control

Table 13: Clinical evidence summary: Other single interventions vs. control

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Control	Risk difference with Residential care: Other single interventions	
Rate of falls - Lavender patch vs placebo	145 (1 RCT)	⊕⊕◯◯ Low [c,d]	**Rate ratio 0.57** (0.32 to 1.01)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of lavender patch**
Rate of falls – sunlight exposure vs usual care	395 (1 RCT)	⊕◯◯◯ Very low [c,e]	**Rate ratio 1.05** (0.71 to 1.56)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Rate of falls – Twenty-minute rounding observation vs usual care	41 (1 RCT)	⊕◯◯◯ Very low [c,f]	**Rate ratio 1.83** (0.36 to 9.26)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of fallers - Lavender patch vs placebo	145 (1 RCT)	⊕⊕◯◯ Low [c,d]	**Risk Ratio 0.67** (0.40 to 1.12)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Control	Risk difference with Residential care: Other single interventions	
						Benefit of lavender patch
Number of fallers - sunlight exposure vs usual care	395 (1 RCT)	⊕◯◯◯ Very low [c,e]	**Risk Ratio 1.09** (0.88 to 1.36)	-	-	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of people sustaining a fracture- sunlight exposure vs usual care	395 (1 RCT)	⊕◯◯◯ Very low [c,e]	**Risk Ratio 1.07** (0.53 to 2.17)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Adverse events - Adverse events	145 (1 RCT)	⊕⊕⊕⊕ High	RD 0.00 (-0.03 to 0.03)	0 per 1,000	**0 fewer per 1,000** (30 fewer to 30 more	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No clinical difference**

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors were not blinded, unclear measurement of the outcome, deviations from the intended intervention, and no specified protocol.

b. Downgraded by 1 increment for inconsistency due to an I2 value suggesting variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded.

f. Downgraded by 1 increment for risk of bias due to deviations from the intended intervention, no specified protocol and measurement of the outcome.

1.1.6.11. Multiple interventions vs usual care

Table 14: Clinical evidence summary: Multiple interventions vs. usual care

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multiple interventions	
Rate of falls-Exercise +management of urinary incontinence + fluid therapy vs usual care	190 (1 RCT)	⊕⊕◯◯ Low [c,d]	**Rate ratio 0.62** (0.38 to 1.01)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of multiple interventions**
Rate of falls-Sunlight exposure +calcium vs usual care	412 (1 RCT)	⊕◯◯◯ Very low [c,e]	**Rate ratio 1.03** (0.85 to 1.25)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Number of fallers-Exercise +management of urinary incontinence + fluid therapy vs usual care	190 (1 RCT)	⊕⊕◯◯ Low [c,d]	**Risk Ratio 0.62** (0.36 to 1.05)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of multiple interventions**
Number of fallers-Sunlight exposure +calcium vs usual care	412 (1 RCT)	⊕⊕◯◯ Low [c,e]	**Risk Ratio 0.96** (0.77 to 1.19)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of people sustaining a fracture-Exercise +management of urinary incontinence + fluid therapy vs usual care	190 (1 RCT)	⊕◯◯◯ Very low [c,d]	**Risk Ratio 4.28** (0.48 to 37.55)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of multiple interventions**
Number of people sustaining a	412 (1 RCT)	⊕◯◯◯ Very low [c,e]	**Risk Ratio 0.78**	-	**-**	MID: 0.8 to 1.25 (precision: CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multiple interventions	
fracture-Sunlight exposure +calcium vs usual care			(0.36 to 1.67)			crosses 2 MIDs) **Benefit of multiple interventions**

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and the method for ascertaining falls.

b. Downgraded by 1 increment for inconsistency due to an I2 value suggesting variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and the method of ascertaining falls.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded.

1.1.6.12. Multifactorial interventions versus usual care

Table 15: Clinical evidence summary: Multifactorial intervention vs. usual care

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
Rate of falls	4781 (11 RCTs)	⊕◯◯◯ Very low [a,b,c]	**Rate ratio 0.85** (0.65 to 1.10)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of fallers	4495 (11 RCTs)	⊕◯◯◯ Very low [a,b,c]	**Risk Ratio 0.91 (0.82 to 1.02)**	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of people sustaining fractures	3445 (6 RCTs)	⊕◯◯◯ Very low [b,c,d,]	**Risk Ratio 0.61**	-	**-**	MID: 0.8 to 1.25 (precision: CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
			(0.30 to 1.24)			crosses 1 MIDs) **Benefit of multifactorial interventions**
Adverse events	240 (1 RCT)	⊕⊕◯◯ Low [c,e]	**Risk Ratio 1.32** (1.06 to 1.65)	-	**159 more per 1,000 (30 more to 322 more)**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Clinical benefit of usual care**
Quality of life (EQ-5D) Values are between 0 to 1 with 1 being perfect health	1987 (2 RCTs)	⊕⊕⊕◯ Moderate [c]	-	The mean quality of life (EQ-5D) was	**MD 0.03 higher** (0 to 0.05 higher)	MID: 0.5 x SMD (due to no baseline measures): precision: 0.045 CI crosses 1 MID) **No clinical benefit**
Quality of life (EQ-5D)- Values are between 0 to 1 with 1 being perfect health- Interprofessional intervention vs usual care	647 (1 RCT)	⊕⊕⊕◯ Moderate [c]	-	The mean quality of life (EQ-5D) was 0.53	**MD 0.01 higher** (0.04 lower to 0.06 higher)	MID: 0.5 x SMD (due to no baseline measures): precision: 0.015 CI crosses 1 MID) **No clinical benefit**
Quality of life (EQ-5D)- Values are between 0 to 1 with 1 being perfect health-	1340 (1 RCT)	⊕⊕⊕◯ Moderate [c]	-	The mean quality of life (EQ-5D) was 0.232	**MD 0.03 higher** (0 to 0.07 higher)	MID: 0.5 x SMD (due to no baseline measures): precision: 0.055 CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
GtACH programme vs usual care						crosses 1 MID) **No clinical benefit**
Quality of life (DEMQOL) Items scored 1 to 4, with higher scores indicating better quality of life.	1319 (1 RCT)	⊕⊕◯◯ Low [c]	-	The mean quality of life (DEMQOL) was 0.581	**MD 0** (0.03 lower to 0.02 higher)	MID: 0.5 x SMD (due to no baseline measures): precision: -- 0.005 CI crosses 2 MID) **No clinical benefit**

a. Downgraded by 1 increment for risk of bias due to participants and personnel were not blinded, incomplete outcome data, and unclear allocation concealment.

b. Downgraded by 1 increment for inconsistency due to an I2 value suggesting variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

d. Downgraded by 1 increment for risk of bias due to participants and personnel were not blinded, selective reporting, baseline imbalance, and unclear allocation sequence concealment.

e. Downgraded by 1 increment for risk of bias due to unclear allocation sequence concealment.

1.1.6.13. Multifactorial interventions versus usual care (grouped by level of care)

Table 16: Clinical evidence summary: Multifactorial interventions vs. Usual care

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
Rate of falls- High level nursing care facilities	1499 (2 RCTs)	⊕⊕◯◯ Low [a]	**Rate ratio 0.59** (0.44 to 0.79)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 0 MIDs)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
						Benefit of multifactorial interventions
Rate of falls- Intermediate level care facilities	670 (3 RCTs)	⊕◯◯◯ Very low [b,c,d]	**Rate ratio 0.64** (0.50 to 0.83)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of multifactorial interventions**
Rate of falls- Mixed level care facilities	1510 (6 RCTs)	⊕◯◯◯ Very low [a,b,c]	**Rate ratio 1.32** (0.96 to 1.82)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of usual care**
Rate of falls- Unspecified level care facilities	1342 (1 RCT)	⊕⊕◯◯ Low [c]	**Rate ratio 0.63** (0.52 to 0.76)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of fallers- High level nursing care facilities	981 (1 RCT)	⊕⊕◯◯ Low [c,e]	**Risk Ratio 0.75** (0.57 to 0.98)	-		MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of multifactorial interventions**
Number of fallers- Intermediate level care facilities	670 (3 RCTs)	⊕⊕◯◯ Low [c,d]	**Risk Ratio 0.75** (0.60 to 0.94)	-		MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of multifactorial interventions**
Number of fallers- Mixed level	1742 (6 RCTs)	⊕◯◯◯ Very low [a,b,c]	**Risk Ratio 1.10**	-		MID: 0.8 to 1.25 (precision: CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
care facilities			(0.93 to 1.30)			crosses 1 MIDs) **No benefit**
Number of fallers- Unspecified level care facilities	1342 (1 RCT)	⊕⊕⊕◯ Moderate [c]	**Risk Ratio 0.87** (0.74 to 1.04)	-		MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of people sustaining fractures- Unspecified level care facilities	1075 (1 RCT)	⊕⊕⊕◯ Moderate [c]	**Risk Ratio 0.40** (0.19 to 0.84)	-		MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of multifactorial interventions**
Adverse events	240 (1 RCT)	⊕⊕◯◯ Low [c,f]	**Risk Ratio 1.32** (1.06 to 1.65)	-	**159 more per 1,000 (30 more to 322 more)**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Clinical benefit of usual care**
Quality of life (EQ-5D)- Values are between 0 to 1 with 1 being perfect health Unspecified level care facilities	1340 (1 RCT)	⊕⊕⊕◯ Moderate [c]	-	The mean quality of life (EQ-5D) was 0.232	**MD 0.03 higher** (0 to 0.07 higher)	MID: 0.5 x SMD (due to no baseline measures): precision: 0.055 CI crosses 1 MID) **No clinical benefit**
Quality of life (DEMQOL)- Items scored 1 to 4, with higher scores indicating	1319 (1 RCT)	⊕⊕◯◯ Low [c]	-	The mean quality of life (DEMQOL) was 0.581	**MD 0** (0.03 lower to 0.02 higher)	MID: 0.5 x SMD (due to no baseline measures): precision: -- 0.005 CI crosses 2 MID)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
better quality of life- Unspecified level care facilities						**No clinical benefit**

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, incomplete outcome data, outcome assessors not being blinded, selective reporting, and baseline imbalance.

b. Downgraded by 1 increment for inconsistency due to an I2 value suggesting variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

f. Downgraded by 1 increment for risk of bias due to no information available regarding a pre-specified protocol and no information about the concealment of the allocations sequence.

1.1.6.14. Multifactorial interventions vs usual care (grouped by level of cognition)

Table 17: Clinical evidence summary: Multifactorial interventions vs usual care (grouped by level of cognition)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
Rate of falls- Participants with cognitive impairment	2781 (6 RCTs)	⨁◯◯◯ Very low [a,b,c]	**Rate ratio 0.90** (0.59 to 1.38)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**
Rate of falls- Participants with no cognitive impairment or mixed sample	1805 (8 RCTs)	⨁◯◯◯ Very low [b,c,d]	**Rate ratio 0.84** (0.62 to 1.13)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
Number of fallers-Participants with cognitive impairment	2537 (6 RCTs)	⊕◯◯◯ Very low [a,b,c]	**Risk Ratio 0.90** (0.71 to 1.13)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of fallers-Participants with no cognitive impairment or mixed sample	1805 (8 RCTs)	⊕◯◯◯ Very low [b,c,d]	**Risk Ratio 0.94** (0.78 to 1.12)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Number of people sustaining a fracture-Participants with no cognitive impairment or mixed sample	1075 (1 RCT)	⊕⊕⊕◯ Moderate [c]	**Risk Ratio 0.40** (0.19 to 0.84)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of multifactorial interventions**
Adverse events-Participants with cognitive impairment	240 (1 RCT)	⊕⊕◯◯ Low [c,e]	**Risk Ratio 1.32** (1.06 to 1.65)	-	159 more per 1,000 (30 more to 322 more)	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Clinical benefit of multifactorial interventions**
Adverse events-Participants with no cognitive impairment	90 (1 RCT)	⊕◯◯◯ Very low [c,f]	**Risk difference 0.00** (0.04 to 0.04)	-	0 fewer per 1,000 (40 fewer to 40 more)	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **No benefit**
Quality of life (DEMQOL)-Items scored 1 to 4, with higher	1319 (1 RCT)	⊕⊕◯◯ Low [c]	**-**	The mean quality of life (DEMQOL) was 0.581	**MD 0** (0.03 lower to 0.02 higher)	MID: 0.5 x SMD (due to no baseline measures): precision: -- 0.005 CI

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Multifactorial interventions	
scores indicating better quality of life- Participants with cognitive impairment						crosses 2 MID) **No clinical benefit**
Quality of life (EQ-5D)- Values are between 0 to 1 with 1 being perfect health- Participants with cognitive impairment	1340 (1 RCT)	⨁⨁⨁◯ Moderate [c]	-	The mean quality of life (EQ-5D) was 0.232	**MD 0.03 higher** (0 to 0.07 higher)	MID: 0.5 x SMD (due to no baseline measures): precision: 0.055 CI crosses 1 MID) **No clinical benefit**

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

b. Downgraded by 1 increment for inconsistency due to the I2 value of 85% suggesting considerable variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and also incomplete outcome data

e. Downgrade by 1 increment for risk of bias due to no information available regarding a pre-specified protocol and no information about the concealment of the allocations sequence.

f. Downgraded by 2 increment for risk of bias due to no details regarding allocation concealment, lack of blinding and incomplete outcome data

1.1.6.15. Nutritional support vs usual care

Table 18: Clinical evidence summary: Nutritional support vs usual care

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Nutritional support	
Rate of falls	7195 (1 RCT)	⨁⨁⨁◯ Moderate [a]	**Rate ratio 0.91** (0.86 to 0.97)	-	**-**	MID: 0.8 to 1.25 (precision:

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Nutritional support	
						CI crosses 1 MIDs) **No benefit**
Number of people sustaining a fracture	7195 (1 RCT)	⊕⊕⊕◯ Moderate [a]	**Risk Ratio 0.70** (0.56 to 0.88)	-	**16 fewer per 1,000 (23 fewer to 6 fewer)**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Clinical benefit of nutritional support**

a. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

1.1.6.16. Education intervention vs usual care

Table 19: Clinical evidence summary: Education intervention vs usual care

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Usual care	Risk difference with Residential care: Education intervention	
Rate of falls	56 (1 RCT)	⊕⊕◯◯ Low [a]	**Rate ratio 1.03** (0.17 to 6.39)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit**

a. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

1.1.6.17. Multifactorial intervention vs education

Table 20:Clinical evidence summary: Multifactorial intervention vs education

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Education	Risk difference with Residential care: Multifactorial intervention	
Number of fallers	163 (1 RCT)	⨁◯◯◯ Very low [a,b]	**Risk Ratio 0.72** (0.39 to 1.32)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **Benefit of multifactorial intervention**

a. Downgrade by 1 increment for risk of bias due to no information available regarding a pre-specified protocol and no information about the concealment of the allocations sequence.

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

1.1.6.18. Multicomponent exercise vs multifactorial intervention (dual-task training)

Table 21: Clinical evidence summary: Multicomponent exercise vs multifactorial intervention (dual-task training)

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Dual-task training	Risk difference with Residential care: Multicomponent exercise	
Rate of falls	87 (1 RCT)	⨁⨁◯◯ Low [a,b]	**Rate ratio 2.59** (1.27 to 5.28)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 1 MIDs) **Benefit of dual-task training**

a. Downgraded by 1 increment for risk of bias due to missing outcome data.

b. Downgraded by 1 increment for indirectness due to the use of a non-standard comparison.

1.1.6.19. Education vs education

Table 22: Clinical evidence summary: Education vs education

Outcomes	№ of participants (studies) Follow up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with Education	Risk difference with Residential care: Education	
Rate of falls	781 (1 RCT)	⨁◯◯◯ Very low [a,b]	**Rate ratio 1.09** (0.82 to 1.44)	-	**-**	MID: 0.8 to 1.25 (precision: CI crosses 2 MIDs) **No benefit of education only**

a. Downgraded by 1 increment for risk of bias due to limited information available regarding the allocation concealment and missing outcome data

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

See Appendix F for full GRADE tables. See Appendix G for included studies with incomplete data.

Cameron, 2018[13] included a subgroup regarding number of fallers, excluding studies with 20 or fewer participants in each arm when focusing on exercise compared to usual care. This was removed for the present review due to this subgroup not being a specified component of the present review protocol.

Four studies identified through searching had results which were reported in a manner that could not be included in the meta-analysis. Junius-Walker, 2021[46] compared a multifactorial intervention, which comprised of a drug review by trained pharmacists, educational sessions for clinicians, a drug safety toolbox, and change management seminars for members of the three participating professions, against usual care. The authors reported the mean number of falls per resident as 0.7 falls for participants in the multifactorial intervention group and 0.5 for those receiving usual care. [46] The authors also noted thirty-nine percent of participants in the multifactorial intervention study arm experienced at least one fall, compared to thirty percent of participants who received usual care. [46] Using the EQ-5D, Junius-Walker, 2021 [46] identified the mean score from the multifactorial intervention group to be 0.54 compared to the usual care group which was 0.53.

Jahanpeyma, 2021[43] compared participants in the Otago exercise group to participants in a walking group. The authors noted a medium of 0 falls in the Otago exercise group compared to 1.39, or a median of 1 fall, for those in the walking group. [43]

Colon-Emeric, 2017[11] compared participants who experienced the CONNECT intervention and FALLS programme compared to those who experienced the FALLS programme alone. The reported median recurrent fall rates were 4.06 for both those in the CONNECT intervention and FALLS programme treatment arm and in the FALLS programme alone treatment arm. [11]

Brett, 2021[7] focused on participants who received a physical exercise intervention for forty-five minutes once per week, participants who received a physical exercise intervention for fifteen minutes three times per week, and participants who received usual care. Both exercise groups reported a median of 0 falls, compared to the participants in the usual care group who reported a median of 1 fall.

Eight studies[4, 16, 20, 34, 39, 51, 75, 95] that were identified in the utilised Cochrane review[13] were not included in any of the quantitative analyses. Beck, 2016[4] and Ray, 1997[75] compared multifactorial interventions to usual care. The multifactorial intervention described by Beck, 2016[4] is a multidisciplinary nutritional support intervention compared to control, whereas the multifactorial intervention in Ray, 1997[75] is a consultation service with individual assessment and recommendations targeting environmental and personal safety, wheelchair use, medication use, transferring, and ambulation. Beck, 2016[4] and Ray, 1997[75] were not included in the analyses as they were determined to be unsuitable for quantitative analyses. Chenoweth, 2009[16] compared a social environment intervention, specifically a service model change, to usual care. However, the study was determined to be unsuitable for pooling. Colon-Emeric, 2013[20] compared a staff training intervention, classified as a social environment intervention, to usual care. However, the study was determined to be not suitable for pooling due to the number of residents not being reported. Garcia Gollarte, 2014[34] and Streim, 2012[95] examined the effect of a medication review compared to usual care. However, both studies were not included in the analyses due to falls not being reported during the intervention period. Huang, 2016[39] compared the effect of a psychological intervention, specifically a cognitive behavioural intervention, to usual care. The study was not included in the analyses due to fall being excluded during the intervention period. Klages, 2011[51] compared the effect of multisensory stimulation in a Snoezelen room, classified as other single interventions, compared to usual care. However, the study data was not sufficiently reported to be analysed.

1.1.7. Economic evidence

1.1.7.1. Included studies

Four health economic studies were included in this review including the following comparators:

- Multi-professional medication review versus usual care (Desborough 2020)[26]
- Multifactorial falls prevention versus usual care (Logan 2021)[61]
- Multifactorial falls prevention versus usual care, vitamin D, hip protectors and medication review (Church 2015)[18]
- SUNBEAM exercise program versus usual care (Hewitt 2018)[37]

These are summarised in the health economic evidence profiles below (**Table 23**, **Table 24 and Table 25)** and the health economic evidence tables in Appendix I.

1.1.7.2. Excluded studies

Two economic study relating to this review question was identified but was excluded due to a combination of limited applicability and methodological limitations.[36, 71] These are listed in Appendix K, with reasons for exclusion given.

See also the health economic study selection flow chart in 0.

1.1.8. Summary of included economic evidence

Table 23: Health economic evidence profile: Multi-professional medication review versus usual care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Desborough 2020[26] (UK)	Partially applicable[(a)]	Potentially serious limitations[(b)]	• Within-RCT analysis based on cluster RCT CAREMED (Same paper) • Cost-effectiveness analysis (fall per person per year) • Population: Adults aged over 65 years in care homes in East England. • Setting: Residential care • Comparators: 1. Usual care 2. Multi-professional medication review (MPMR) at the care home Follow-up:1 year	2−1: £374 [(c)]	2−1: 0.35 additional falls per person per year	2−1: Usual care dominates MPMR (less costly and more effective at reducing falls)	No sensitivity analyses undertaken.

Abbreviations: ICER= incremental cost-effectiveness ratio; QALY= quality-adjusted life years; MPMR = multi-professional medication review; RCT= randomised controlled trial

(a) No QoL and therefore QALYs reported. Authors note that in this cohort, assessing QoL would be challenging given cognitive state of majority of participants.

(b) Based on a single trial which may not represent full body of clinical evidence. High loss to follow up (30%) reported, primarily due to mortality. Baseline differences between groups in number of medicines prescribed and proportion of nursing home residents. No sensitivity analyses undertaken. Unadjusted analysis because authors were unable to collect baseline resource use data in control arm. Short follow-up may not capture all downstream effects of intervention, although given start age this may be less problematic.

(c) 2012 UK pounds. Cost components incorporated: Cost of the intervention (£104 per person) and wider healthcare resource use: primary care, community care (for example: physiotherapy and occupational therapy), secondary care (A&E, outpatients and emergency admissions only) and medications.

Table 24: Health economic evidence profile: Multifactorial falls prevention versus usual care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Logan 2021 [61] (UK)	Directly applicable[a]	Potentially serious limitations[b]	• Within trial analysis (Logan 2021) • Cost utility analysis (QALYs) • Population: People with a mean age of 85 years • Setting: Residential care • Comparators: Usual care (1), Multifactorial intervention (Guide to Action Care Homes, GtACH, Falls prevention Programme) (2) • Follow up: 12 months	2-1: £108[c][d]	2-1: 0.024 QALYs	2-1: £4,544[d]	Probability multifactorial intervention cost effective (£20/£30K threshold): 92%/NR Sensitivity analyses included repeated GtACH and extra mortality costs. The results of these sensitivity analyses were similar to the base case results.

Abbreviations: A&E=Accident and Emergency; Dom=Dominated, one option is less costly and more effective than another option; Ex.Dom= Extendedly dominated, a combination of two interventions is less costly and more effective than the extendedly dominated option; GP=General Practitioner; ICER= incremental cost-effectiveness ratio; PSA=Probabilistic sensitivity analysis; QALY= quality-adjusted life years; RCT= randomised controlled trial UK health care system, EQ-5D-5L.

(a) Based on a single RCT and so may not reflect full body of evidence identified in clinical review. Incremental analysis presented in paper is different to one calculated using the raw numbers (presented here) raising concerns about reporting. Best available source for unit costs but 2017/18 prices. Short follow-up (1 year) may not capture all downstream effects of intervention, although given age of participants may be less of a concern.

(b) 2017/18 UK pounds. Costs components: Staff cost, hospital use and fracture rate, primary care use, drugs, social services

(c) The values here are reported by the paper, when calculating from the mean costs it is a different incremental cost, QALY and ICER however this does not affect the conclusions of which is the preferred option.

Table 25: Health economic evidence profile: Multifactorial falls prevention versus usual care, vitamin D, hip protectors and medication review

<table>
<tr><th>Study</th><th>Applicability</th><th>Limitations</th><th>Other comments</th><th>Incremental cost</th><th>Incremental effects</th><th>Cost effectiveness</th><th>Uncertainty</th></tr>
<tr><td>Church 2015 [18]
(Australia)</td><td>Partially applicable[(a)]</td><td>Potentially serious limitations[(b)]</td><td>• Decision tree and Markov model.
• Cost-utility analysis (QALYs)
• Population: Cohort starting age 65
• Setting: Residential care
• Comparators: Vitamin D (1), Medication review (2), No intervention (3), Hip protectors (4), Multifactorial interventions (5)
• Time horizon: Lifetime
• Cycle length: 1 year</td><td colspan="4">Full incremental analysis (pa):[(c) (d)]
<table>
<tr><th>Int</th><th>Cost (e)</th><th>QALY</th><th>Inc cost</th><th>Inc QALY</th><th>ICER</th><th>% Most CE at £20K[(f)]:</th></tr>
<tr><td>1</td><td>£1,075</td><td>1.260</td><td colspan="3">Baseline</td><td>15%</td></tr>
<tr><td>2</td><td>£1,090</td><td>1.273</td><td>£15</td><td>0.013</td><td>£1,154</td><td>60%</td></tr>
<tr><td>3</td><td>£1,374</td><td>1.225</td><td colspan="3">Dominated by 2</td><td>0%</td></tr>
<tr><td>4</td><td>£1,379</td><td>1.232</td><td colspan="3">Dominated by 2</td><td>0%</td></tr>
<tr><td>5</td><td>£2,344</td><td>1.276</td><td>£1,254</td><td>0.003</td><td>£418,000</td><td>25%</td></tr>
</table>
One way sensitivity analysis shows that “fear of falling” has the biggest impact on cost effectiveness.

Using probabilistic sensitivity analysis, at a willingness to pay threshold under £9,394 vitamin D is the cost-effective option, above that threshold a medication review is the cost-effective option. Multifactorial interventions are unlikely to be cost effective.</td></tr>
</table>

Abbreviations: A&E=Accident and Emergency; Dom=Dominated, one option is less costly and more effective than another option; Ex.Dom= Extendedly dominated, a combination of two interventions is less costly and more effective than the extendedly dominated option; GP=General Practitioner; ICER= incremental cost-effectiveness ratio; PSA=Probabilistic sensitivity analysis; QALY= quality-adjusted life years; RCT= randomised controlled trial

(a) Australian health care system, discounted at 5%.

(b) Clinical data may not reflect full body of clinical evidence as based on 2010 and 2012 systematic reviews and baseline data may not reflect current NHS care as based on older studies (1993/2009). Costs are Australian 2015 costs (using some older costs inflated to 2015) and may not reflect current UK NHS context.

(c) Intervention number in order of least to most costly.

(d) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option.

(e) 2015 Australian Dollars converted to UK pounds [70]. Cost components: Staff cost, classes, surgery, medication, hazard modifications, hip protectors Read from graph where AU$43,000=£20,197 based on 2015 purchasing power parities.

Table 26: Health economic evidence profile: SUNBEAM exercise programme versus usual care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Hewitt 2018 [37] (Australia)	Partially applicable[(a)]	Potentially serious limitations[(b)]	• Within trial analysis • Cost effectiveness analysis (cost per fall avoided) • Population: People with a mean age of 86 years • Setting: Residential care • Comparators: Usual care (1), Exercise programme (SUNBEAM) (2) • Follow up: 12 months	2-1: £13	2-1: 1.3 falls per person avoided	2-1: £10 per fall avoided	Probability multifactorial intervention cost effective (£20/£30K threshold): NR/NR Scenario analyses showed that exercise dominated (less costly and more effective) if the gym was paid up front, injury costs were the same in intervention and usual care groups (due to one participant in the intervention group having a pelvic fracture which is the most expensive fracture and there was a small number of fractures sustained), modelling included acute and long term costs due to falls sometimes changing the long term care needs.

NR – Not reported.
(a) Australian study, 12-month time horizon, EQ-5D data was collected in the trial but not included in the economic study
(b) 2015 Australian dollars, EQ-5D data was collected in the trial but not included in the economic study.

1.1.9. Economic model

Whilst this review question was prioritised for de novo health economic modelling, it was fir a community population not those in residential care.

1.1.10. Evidence statements

1.1.10.1. Effectiveness/Qualitative

1.1.10.2. Economic

One cost-effectiveness analysis found that in adults aged 65 years and over in care homes, usual care dominates multi-professional medication review (less costly and more effective at reducing falls). This analysis was assessed as partially applicable with potentially serious limitations.

One cost-utility analysis found that in adults with a mean age of 85 years in residential care, multifactorial falls prevention was cost effective compared to standard care alone (ICER: £4,544 per QALY gained). This analysis was assessed as directly applicable with potentially serious limitations.

One cost-utility analysis found that in adults aged 65 years and over in residential care, medication review was cost effective compared to vitamin D, standard care, hip protectors and multifactorial falls prevention (ICER: £1,154 per QALY gained for medication review compared to vitamin D; standard care and hip protectors were dominated by medication review; and ICER of multifactorial falls prevention compared to medication review was £418,000 per QALY gained). This analysis was assessed as partially applicable with potentially serious limitations.

One cost effectiveness analysis was found comparing SUNBEAM exercise programme and usual care. If found that SUNBEAM costed £10 per fall avoided. This study was found to be partly applicable with potentially serious limitations.

1.1.11. The committee's discussion and interpretation of the evidence

1.1.11.1. The outcomes that matter most

The committee discussed that all outcomes are considered to be equally important for decision making and therefore agreed that all outcomes are rated as critical. The review on falls prevention in residential settings found evidence for all outcomes in the protocol (rate of falls, number of people sustaining one or more falls, number of participants sustaining fall related fractures, adverse events, and health related quality of life).

1.1.11.2. The quality of the evidence

The quality of the evidence for quantitative outcomes was assessed with GRADE and was rated as very low to low. Findings were downgraded due to risk of bias (for example, lack of blinding, incomplete outcome data, baseline imbalance, no reported falls definition, baseline imbalances and selective reporting). Studies were also downgraded for imprecision as the 95% confidence intervals crossed one or more decision-making thresholds. Some evidence was also downgraded due to inconsistency with unexplained heterogeneity. The evidence was not downgraded for indirectness, as it was directly related to the protocol. See appendix F for full GRADE tables with quality ratings of all outcomes.

1.1.11.3. Benefits and harms

Exercise

The committee discussed the evidence for exercise interventions and agreed the outcomes showed some mixed results. Number of fallers showed no difference and there were some

adverse events such as bruises or severe fatigue, but overall adverse events and quality of life showed no difference. There was a clinical benefit of exercise compared to usual care for rate of falls and number sustaining a fracture. The committee agreed this was significant for this population and enough to make a recommendation.

The committee agreed the evidence comparing one type of exercise with another was not compelling, with no one type of exercise being superior to another. However, the rate of falls outcome overall for combination of exercise did demonstrate effectiveness. The committee questioned the inclusion of studies within an assisted living setting, as this is not the same as care homes, because the population would generally be less frail than those in residential care settings. They discussed whether these studies are more representative of community settings.

The principles of exercise interventions in a community or residential setting would be similar, with emphasis placed on strength, gait and balance. However, it is often difficult to get an adequate dose of exercise within residential care settings, because of the high level of supervision required due to the frailty or cognitive impairment of residents, limiting the number of exercise sessions that can be offered. The committee agreed the importance of tailoring exercise interventions to the individual's ability. This could include seated exercises for people with reduced mobility. The committee discussed using the term "exercise class" can put people off participating and is often an inaccurate description, because for some individuals the focus is on increasing movement and the social aspect of interacting with other people. The committee also noted family members or carers can have an important role in encouraging participation amongst residents.

The committee commented on the breakdown of studies by level of care (high, intermediate, mixed) noting the benefit of interventions for rate of falls seen in the intermediate level. It was agreed this level of care would reflect the majority of people within residential care, as opposed to high level nursing care who are more likely to be frailer. The committee agreed residents who are more mobile are more likely to derive greater benefit from exercise interventions but would also have more exposure to risk of falling.

Medication review

There was no evidence to support medication review in either the clinical or health economic evidence, in fact benefit for control was observed over medication review for many of the outcomes including rate of falls, number of fallers and number of people sustaining a fracture. The committee did acknowledge that most of the outcomes were graded as low or very low and the health economic evidence had limitations and only followed patients up for one year. However, the committee agreed that it would be usual practice would be for a review of medication to be carried out as part of a comprehensive falls management intervention. They also noted the NHS England primary care advice on undertaking structured medication review notes that from October 2020, all PCNs are required to identify patients who would benefit from a structure medication review. It also specifically highlights people in care homes. Therefore, the committee agreed that medication review should be considered for this group.

No evidence was identified on the clinical benefits of a withdrawing psychotropic medication in the residential setting. However, the committee agreed that withdrawal of psychotropic medicines as appropriate should also happen in this setting.

Vitamin D and nutritional support

The committee discussed the benefit of vitamin D supplements on rate of falls and acknowledged this intervention is part of standard care for people known to be deficient in vitamin D. They noted it may be considered as part of a comprehensive falls management intervention.

Another small study showed a benefit in Vitamin D supplementation and calcium multivitamin for rate of falls, and a lower number of people sustaining a fracture. They highlighted another larger study also demonstrated the benefit of calcium on the number of fractures through an increase in dairy products within the diet. However, it is a single study, and more evidence is required to confirm the level of effect on fracture reduction.

The committee noted the National Osteoporosis Society Vitamin D guideline recommends a higher dose of 800 units than the general public health advice of a 400-unit dose. The committee agreed for people who are already identified as having a deficiency or who are at risk of vitamin D deficiency the Osteoporosis guideline should be followed, but for primary prevention a 400-unit dose was appropriate as specified in the BNF.

Environmental interventions

The committee noted that two small studies demonstrated a benefit on rate of falls. The committee discussed monitoring devices and home technologies can be helpful in improving safety within residential care settings and devices such as movement sensitive lights and blinds are in current use. However, the consensus was this type of intervention would be of high cost and the limited evidence did not support a recommendation.

Multifactorial interventions

Multifactorial interventions versus usual care overall showed no benefit for rate and number of fallers, but there were fewer people sustaining fractures. The committee discussed how it was difficult to come to any conclusion as the individual studies included a mixture of different interventions. They did note however that when the studies were grouped by level of care MFI showed a benefit in high and intermediate levels of care facilities. It was suggested this might indicate the interventions were being tailored to the residents within these settings, and this reflected what would happen in current practice because the risk profiles would be different in nursing care (high level) and residential (intermediate level) care. The committee discussed environmental modifications particularly within high level settings such as bed and chair height, lighting levels and floor surfaces. Some modifications would not be high cost, and simple interventions such as the use of colour in buildings to aid movement around residential facilities providing a more dementia friendly environment was given as an example. The committee acknowledged the lack of research that focused on interventions for people with dementia and agreed given this population has an increased risk of falls, a recommendation for further research should be made.

The committee noted all the other interventions included in the review for psychological, social environment, education and multiple interventions were small single studies covering a wide variety of interventions and it was not possible to base any recommendations on such a limited evidence base.

The committee drew on the interventions described within the multifactorial intervention studies when discussing recommendations. They agreed any intervention offered to reduce a person's risk of falling would be based on a comprehensive falls assessment to identify their level of risk, the extent of any impairment and whether an intervention is likely to manage or improve their risk of falling.

1.1.11.4. Cost effectiveness and resource use

Four health economic studies were included for falls prevention in a residential care home setting. One assessed multi-professional medication review versus usual care (Desborough 2020) which was deemed partially applicable with potentially serious limitations. The study found that usual care dominated (less costly and more effective) multi-professional medication review. A second study (Church 2015) assessed multiple interventions including vitamin D, medication review, hip protectors, multifactorial falls prevention and usual care.

This study was found to be partially applicable and had potentially serious limitation. This study found that medication review was cost effective when compared to vitamin D, the incremental cost effectiveness ratio (ICER) was £1,154 per QALY. Usual care and hip protectors were dominated by medication review and multifactorial interventions had an ICER of £418,000 per QALY. As the evidence from these two studies was contradictory, the committee did not feel able to recommend a multi-professional medication review as a stand alone intervention.

Two of the studies assessed multifactorial interventions, the first (Church 2015) as previously discussed was found to be partially applicable with potentially serious limitations. This found that the ICER of multifactorial intervention compared with medication review was £418,000 and therefore not cost effective. The second of these studies compared multifactorial falls prevention versus standard care (Logan 2021). This study was found to be directly applicable with potentially serious limitations. This study reported an ICER of £4,544 per QALY however when it was calculated from the reported numbers it was £581 per QALY. While the economic evidence for multifactorial interventions was contradictory the committee agreed that Logan 2021 was a more reliable analysis. This was because it was more recent, from a UK NHS perespective and used a clinical evidence base that more closely reflected the clinical evidence of this review. The clinical meta analysis found that the rate ratio for overall fallers was 0.94, Logan 2021 used 0.93 whereas Church 2015 used 0.6. As a result they used Logan 2021 to support a recommendation for a multifactorial intervention. The committee noted it was very important to tailor the intervention to the person and acknowledged that not all people would receive all the possible interventions. The committee discussed that adding in a multifactorial intervention recommendation was not a change in practice and therefore would not have a resource impact.

With regards to exercise, the committee considered that the clinical evidence showed that exercise was beneficial in preventing falls and therefore recommended an exercise program that is adapted to the individual's needs. There was one health economic study that showed that exercise was cost effective in preventing falls (Hewitt 2018). Given that residential care homes already support exercise programmes, such as music and movement this is unlikely to have a resource impact. The committee felt that it was important to ensure that some people are able to have 1-2-1 sessions if required. The committee did not envision that everyone would receive these sessions (as it was a consider recommendation) and so while this is likely to have a resource impact the committee did not believe that it is likely to be large. Alongside the exercise program recommendation, the committee added a recommendation to encourage people to remain active, they felt that this was current practice and very important for people's wellbeing. This recommendation may require increase in staff observation but is unlikely to have a significant resource impact.

There were no single health economic studies for vitamin D however, it was included in the Church 2015 study which found that Medication review was more cost effective than vitamin D and the committee felt that there was no evidence to deviate from the NHS guidance and cross referred to the NICE vitamin D guidance. This would not have a resource impact as should already be current practice.

For the other interventions, including nutritional support, psychological evidence and environmental, there was no health economic evidence, and the committee did not feel that there was evidence to make any recommendations on these alone however they may be

included as part of comprehensive falls managment recomendations. Therefore, there will not be any resource impact.

1.1.12. Recommendations supported by this evidence review

This evidence review supports recommendations 1.3.18-1.3.21 and the recommendation for research in the NICE guideline.

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Appendices

Appendix A Review protocols

A.1 Review protocol for *What are the most clinically effective and cost-effective interventions for preventing falls in older people in residential care settings?*

ID	Field	Content
1.	Review title	What are the most clinically effective and cost-effective interventions for preventing falls in older people in residential care settings?
2.	Review question	What are the most clinically and cost-effective methods for falls prevention in older people in residential care settings?
3.	Objective	To update the existing guideline with new evidence of falls prevention in residential care settings.
4.	Searches	The following databases will be searched from the date of the last search of the relevant Cochrane reviews: • Cochrane Central Register of Controlled Trials (CENTRAL) • Cochrane Database of Systematic Reviews (CDSR) • Embase • MEDLINE • Epistemonikos

		Searches will be restricted by: • English language studies • Human studies The searches may be re-run 6 weeks before the final committee meeting and further studies retrieved for inclusion if relevant. The full search strategies will be published in the final review. Medline search strategy to be quality assured using the PRESS evidence-based checklist (see methods chapter for full details).
5.	Condition or domain being studied	Falls in people over 65 years old.
6.	Population	Inclusion: In residential care settings, including: • people aged 65 and over • people aged 50 to 64 who have a condition or conditions that may put them at higher risk of falling. Exclusion: any age group that does not fit the inclusion criteria. Carers and families.
7.	Intervention	Any intervention designed to reduce falls in older people in residential care.

		Interventions grouped by combination (single, multiple or multifactorial); then by type of intervention (descriptors). Possible descriptors: Exercises Medication (drug target, i.e. withdrawal, dose reduction or increase, substitution, provision). Surgery Management of urinary incontinence, fluid or nutrition therapy Psychological interventions Environment/assistive technology Social environment Interventions to increase knowledge
8.	Comparator	Any other intervention Usual care Placebo
9.	Types of study to be included	Randomised controlled trials (RCTs). There are enough RCTs identified within the area so we will not be including non-randomised studies. For a systematic review (SR) to be included it must be conducted in line with the methodological processes described in the NICE manual. If sufficient details are provided, reviewers will either include the SR fully or use it as the basis for further analyses where possible. If sufficient details are not provided to include a relevant SR, the review will only be used for citation searching. Published NMAs and IPDs will be considered for inclusion.

10.	Other exclusion criteria	Non-English language studies Conference abstracts will be excluded as it is expected there will be sufficient full text published studies available.
11.	Context	Residential care setting, other settings are included in other protocols.
12.	Primary outcomes (critical outcomes)	All outcomes are considered equally important for decision making and therefore have all been rated as critical: • Rate of falls • Number of people sustaining one or more falls • Number of participants sustaining fall-related fractures • Adverse events of the interventions (composite of all) • Validated health-related quality of life scores
13.	Data extraction (selection and coding)	EndNote will be used for reference management, sifting, citations and bibliographies. All references identified by the searches and from other sources will be uploaded into EPPI reviewer and de-duplicated.

		10% of the abstracts will be reviewed by two reviewers, with any disagreements resolved by discussion or, if necessary, a third independent reviewer. The full text of potentially eligible studies will be retrieved and will be assessed in line with the criteria outlined above. A standardised form will be used to extract data from studies (see Developing NICE guidelines: the manual section 6.4). 10% of all evidence reviews are quality assured by a senior research fellow. This includes checking: • papers were included /excluded appropriately • a sample of the data extractions • correct methods are used to synthesise data • a sample of the risk of bias assessments Disagreements between the review authors over the risk of bias in particular studies will be resolved by discussion, with involvement of a third review author where necessary. Study investigators may be contacted for missing data where time and resources allow.
14.	Risk of bias (quality) assessment	Risk of bias will be assessed using the appropriate checklist as described in Developing NICE guidelines: the manual. For Intervention reviews • Systematic reviews: Risk of Bias in Systematic Reviews (ROBIS) • Randomised Controlled Trial: Cochrane RoB (2.0) • Nonrandomised study, including cohort studies: Cochrane ROBINS-I

15.	Strategy for data synthesis	Where available, outcome data from new studies will be meta-analysed with corresponding data included in the Cochrane review (Cameron 2018). • Pairwise meta-analyses will be performed using Cochrane Review Manager (RevMan5). Fixed-effects (Mantel-Haenszel) techniques will be used to calculate risk ratios for the binary outcomes where possible. Continuous outcomes will be analysed using an inverse variance method for pooling weighted mean differences. Heterogeneity between the studies in effect measures will be assessed using the I^2 statistic and visually inspected. An I^2 value greater than 50% will be considered indicative of substantial heterogeneity. Sensitivity analyses will be conducted based on pre-specified subgroups using stratified meta-analysis to explore the heterogeneity in effect estimates. If this does not explain the heterogeneity, the results will be presented pooled using random effects. • GRADEpro will be used to assess the quality of evidence for each outcome, taking into account individual study quality and the meta-analysis results. The 4 main quality elements (risk of bias, indirectness, inconsistency and imprecision) will be appraised for each outcome. Publication bias will be considered with the guideline committee, and if suspected will be tested for when there are more than 5 studies for that outcome. • The risk of bias across all available evidence was evaluated for each outcome using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group http://www.gradeworkinggroup.org/ • Where meta-analysis is not possible, data will be presented, and quality assessed individually per outcome. • WinBUGS will be used for network meta-analysis, if possible, given the data identified.

		Equality issues raised: **Disability** - people with mental health problems have limited access to physiotherapy services within inpatient mental health. People with learning disabilities are at risk of falls. Tailored education and information may be required for people with learning disabilities to meet their needs. Sex differences in balance outcomes have been reported within the literature in some populations at risk of falls Other definable characteristics (these are examples): - people in Gypsy, Roma and Traveller communities. - People not registered with a GP or in contact with health and social care services.	
16.	Analysis of sub-groups	Subgroups that will be investigated if heterogeneity is present: none.	
17.	Type and method of review	x	Intervention
		☐	Diagnostic
		☐	Prognostic
		☐	Qualitative
		☐	Epidemiologic
		☐	Service Delivery
		☐	Other (please specify)
18.	Language	English	
19.	Country	England	

20.	Anticipated or actual start date			
21.	Anticipated completion date	21/8/2024		
22.	Stage of review at time of this submission	Review stage	Started	Completed
		Preliminary searches	☑	☑
		Piloting of the study selection process	☑	☑
		Formal screening of search results against eligibility criteria	☑	☑
		Data extraction	☐	☐
		Risk of bias (quality) assessment	☐	☐
		Data analysis	☐	☐
23.	Named contact	5a. Named contact Julie Neilson Centre for Guidelines, NICE 5b Named contact e-mail Guidelines8@nice.org.uk 5e Organisational affiliation of the review National Institute for Health and Care Excellence (NICE)		
24.	Review team members	From NICE: Gill Ritchie [Guideline lead]		

		Julie Neilson [Senior systematic reviewer] Annette Chalker [Systematic reviewer] Sophia Kemmis-Betty [Senior Health economist] Steph Armstrong [Health economist] Joseph Runicles [Information specialist] Tamara Diaz [Project Manager]
25.	Funding sources/sponsor	Development of this systematic review is being funded by NICE.
26.	Conflicts of interest	All guideline committee members and anyone who has direct input into NICE guidelines (including the evidence review team and expert witnesses) must declare any potential conflicts of interest in line with NICE's code of practice for declaring and dealing with conflicts of interest. Any relevant interests, or changes to interests, will also be declared publicly at the start of each guideline committee meeting. Before each meeting, any potential conflicts of interest will be considered by the guideline committee Chair and a senior member of the development team. Any decisions to exclude a person from all or part of a meeting will be documented. Any changes to a 'ember's declaration of interests will be recorded in the minutes of the meeting. Declarations of interests will be published with the final guideline.
27.	Collaborators	Development of this systematic review will be overseen by an advisory committee who will use the review to inform the development of evidence-based recommendations in line with section 3 of Developing NICE guidelines: the manual. Members of the guideline committee are available on the NICE website: [NICE guideline webpage].
28.	Other registration details	N/A
29.	Reference/URL for published protocol	[Give the citation and link for the published protocol, if there is one.]
30.	Dissemination plans	NICE may use a range of different methods to raise awareness of the guideline. These include standard approaches such as:

		• notifying registered stakeholders of publication • publicising the guideline through' NICE's newsletter and alerts • issuing a press release or briefing as appropriate, posting news articles on the NICE website, using social media channels, and publicising the guideline within NICE.	
31.	Keywords		
32.	Details of existing review of same topic by same authors	N/A	
33.	Current review status	☐	Ongoing
		☐	Completed but not published
		☐	Completed and published
		☐	Completed, published and being updated
		☐	Discontinued
34.	Additional information		
35.	Details of final publication	www.nice.org.uk	

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2 ## A.2 Health economic review protocol

Review question	All questions – health economic evidence
Objectives	To identify health economic studies relevant to any of the review questions.
Search criteria	• Populations, interventions and comparators must be as specified in the clinical review protocol above. • Studies must be of a relevant health economic study design (cost–utility analysis, cost-effectiveness analysis, cost–benefit analysis, cost–consequences analysis, comparative cost analysis). • Studies must not be a letter, editorial or commentary, or a review of health economic evaluations. (Recent reviews will be ordered although not reviewed. The bibliographies will be checked for relevant studies, which will then be ordered.) • Unpublished reports will not be considered unless submitted as part of a call for evidence. • Studies must be in English.
Search strategy	A health economic study search will be undertaken using population-specific terms and a health economic study filter – see appendix B below.
Review strategy	Studies not meeting any of the search criteria above will be excluded. Studies published before 2007, abstract-only studies and studies from non-OECD countries or the USA will also be excluded. Studies published after 2007 that were included in the previous guideline(s) will be reassessed for inclusion and may be included or selectively excluded based on their relevance to the questions covered in this update and whether more applicable evidence is also identified. Each remaining study will be assessed for applicability and methodological limitations using the NICE economic evaluation checklist which can be found in appendix H of Developing NICE guidelines: the manual (2014). [67] **Inclusion and exclusion criteria** • If a study is rated as both 'Directly applicable' and with 'Minor limitations', then it will be included in the guideline. A health economic evidence table will be completed, and it will be included in the health economic evidence profile. • If a study is rated as either 'Not applicable' or with 'Very serious limitations', then it will usually be excluded from the guideline. If it is excluded, then a health economic evidence table will not be completed, and it will not be included in the health economic evidence profile. • If a study is rated as 'Partially applicable', with 'Potentially serious limitations' or both then there is discretion over whether it should be included. **Where there is discretion** The health economist will make a decision based on the relative applicability and quality of the available evidence for that question, in discussion with the guideline committee if required. The ultimate aim is to include health economic studies that are helpful for decision-making in the context of the guideline and the current NHS setting. If several studies are considered of sufficiently high applicability and methodological quality that they could all be included, then the health economist, in discussion with the committee if required, may decide to include only the most applicable studies and to selectively exclude the remaining studies. All studies excluded on the basis of applicability or methodological limitations will be listed with explanation in the excluded health economic studies appendix below.

	The health economist will be guided by the following hierarchies. *Setting:* • UK NHS (most applicable). • OECD countries with predominantly public health insurance systems (for example, France, Germany, Sweden). • OECD countries with predominantly private health insurance systems (for example, Switzerland). • Studies set in non-OECD countries or in the USA will be excluded before being assessed for applicability and methodological limitations. *Health economic study type:* • Cost–utility analysis (most applicable). • Other type of full economic evaluation (cost–benefit analysis, cost-effectiveness analysis, cost–consequences analysis). • Comparative cost analysis. • Non-comparative cost analyses including cost-of-illness studies will be excluded before being assessed for applicability and methodological limitations. *Year of analysis:* • The more recent the study, the more applicable it will be. • Studies published in 2007 or later (including any such studies included in the previous guideline(s)) but that depend on unit costs and resource data entirely or predominantly from before 2007 will be rated as 'Not applicable'. • Studies published before 2007 (including any such studies included in the previous guideline(s)) will be excluded before being assessed for applicability and methodological limitations. *Quality and relevance of effectiveness data used in the health economic analysis:* • The more closely the clinical effectiveness data used in the health economic analysis match with the outcomes of the studies included in the clinical review the more useful the analysis will be for decision-making in the guideline.

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Appendix B Literature search strategies

The literature searches for this review are detailed below and complied with the methodology outlined in Developing NICE guidelines: the manual (2014)

For more information, please see the Methodology review published as part of the accompanying documents for this guideline.

B.1.1 Clinical search literature search strategy

Searches were constructed using a PICO framework where population (P) terms were combined with Intervention (I) and in some cases Comparison (C) terms. Outcomes (O) are rarely used in search strategies as these concepts may not be indexed or described in the title or abstract and are therefore difficult to retrieve. Search filters were applied to the search where appropriate.

Table 27: Database parameters, filters and limits applied

Database	Dates searched	Search filter used
Medline ALL (OVID)	**01-08-2017 - 07-05-2024**	Systematic reviews Randomised controlled trials Exclusions (animal studies, letters, comments, editorials, news, historical articles, anecdotes, case studies/reports) English language
Embase (OVID)	**01-08-2017 - 07-05-2024**	Systematic reviews Randomised controlled trials Exclusions (animal studies, letters, comments, editorials, case studies/reports, conference abstracts) English language
The Cochrane Library (Wiley)	Cochrane CDSR to 2024 Issue 5 of 12	
Epistemonikos (The Epistemonikos Foundation)	No date limits applied (searched 07/05/2024)	

Medline (Ovid) search terms

1	Accidental Falls/
2	(fall or falls or falling or faller* or fallen or slip* or trip* or collapse*).ti,ab.
3	or/1-2
4	letter/
5	editorial/

6	news/
7	exp historical article/
8	Anecdotes as Topic/
9	comment/
10	case reports/
11	(letter or comment*).ti.
12	or/4-11
13	randomized controlled trial/ or random*.ti,ab.
14	12 not 13
15	animals/ not humans/
16	exp Animals, Laboratory/
17	exp Animal Experimentation/
18	exp Models, Animal/
19	exp Rodentia/
20	(rat or rats or mouse or mice or rodent*).ti.
21	or/14-20
22	3 not 21
23	limit 22 to english language
24	exp Residential Facilities/
25	Long-Term Care/
26	Institutionalization/
27	Hospitalization/
28	Subacute Care/
29	exp Hospitals/
30	Hospital Units/
31	Rehabilitation Centers/
32	Inpatient/
33	Geriatric Assessment/
34	((long stay or long term or acute or sub-acute or subacute or residential) adj3 (care or ward*1 or hospital*)).ti,ab,kf.
35	(hospital* adj3 (care or ward*1)).ti,ab,kf.
36	(rehabilitation adj2 (ward*1 or hospital* or unit*1 or department*1)).ti,ab,kf.
37	(hostel*1 or nursing home*1 or inpatient* or residen* or institution*).ti,ab,kf.
38	or/24-37

39	exp aged/
40	(senior*1 or elder* or old* or aged or ag?ing or geriatric).ti,ab,kf.
41	or/39-40
42	23 and 38 and 41
43	randomized controlled trial.pt.
44	controlled clinical trial.pt.
45	randomi#ed.ti,ab.
46	placebo.ab.
47	randomly.ti,ab.
48	Clinical Trials as topic.sh.
49	trial.ti.
50	or/43-49
51	Meta-Analysis/
52	exp Meta-Analysis as Topic/
53	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
54	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
55	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
56	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
57	(search* adj4 literature).ab.
58	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
59	cochrane.jw.
60	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
61	or/51-60
62	42 and (50 or 61)
63	limit 62 to dt=20170801-20230331
64	limit 62 to ed=20170801-20230331
65	63 or 64

Embase (Ovid) search terms

1	falling/
2	(falls or falling or faller*1 or fallen).ti,ab.

3	or/1-2
4	letter.pt. or letter/
5	note.pt.
6	editorial.pt.
7	case report/ or case study/
8	(letter or comment*).ti.
9	(conference abstract or conference paper).pt.
10	or/4-9
11	randomized controlled trial/ or random*.ti,ab.
12	10 not 11
13	animal/ not human/
14	nonhuman/
15	exp Animal Experiment/
16	exp Experimental Animal/
17	animal model/
18	exp Rodent/
19	(rat or rats or mouse or mice or rodent*).ti.
20	or/12-19
21	3 not 20
22	limit 21 to english language
23	Residential Home/ or Nursing Home/ or Assisted Living Facility/
24	Hospitalization/
25	Institutional Care/ or Residential Care/ or Home For The Aged/ or Institutionalization/
26	exp Hospital/ or Hospital Patient/
27	Rehabilitation Center/
28	((long stay or long term or acute or sub-acute or subacute or residential) adj3 (care or ward*1 or hospital*)).ti,ab,kf.
29	(hospital* adj3 (care or ward*1)).ti,ab,kf.
30	(rehabilitation adj2 (ward*1 or hospital* or unit*1 or department*1)).ti,ab,kf.
31	(hostel*1 or nursing home*1 or inpatient* or residen* or institution*).ti,ab,kf.
32	or/23-31
33	exp aged/
34	(senior*1 or elder* or old* or aged or ag?ing or geriatric).ti,ab,kf.
35	or/33-34

36	22 and 32 and 35
37	random*.ti,ab.
38	factorial*.ti,ab.
39	(crossover* or cross over*).ti,ab.
40	((doubl* or singl*) adj blind*).ti,ab.
41	(assign* or allocat* or volunteer* or placebo*).ti,ab.
42	crossover procedure/
43	single blind procedure/
44	randomized controlled trial/
45	double blind procedure/
46	or/37-45
47	systematic review/
48	meta-analysis/
49	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
50	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
51	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
52	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
53	(search* adj4 literature).ab.
54	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
55	cochrane.jw.
56	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
57	or/47-56
58	36 and (46 or 57)
59	limit 58 to dc=20170801-20230331

Cochrane CDSR search terms

#1	MeSH descriptor: [Accidental Falls] explode all trees
#2	(fall or falls or falling or faller* or fallen or slip* or trip* or collapse*):ti,ab
#3	#1 or #2
#4	MeSH descriptor: [Aged] explode all trees
#5	(senior*1 or elder* or old* or aged or ag?ing or geriatric):ti,ab

#6	#4 or #5
#7	MeSH descriptor: [Residential Facilities] explode all trees
#8	MeSH descriptor: [Long-Term Care] explode all trees
#9	MeSH descriptor: [Institutionalization] explode all trees
#10	MeSH descriptor: [Hospitalization] explode all trees
#11	MeSH descriptor: [Subacute Care] explode all trees
#12	MeSH descriptor: [Hospitalization] explode all trees
#13	MeSH descriptor: [Hospital Units] explode all trees
#14	MeSH descriptor: [Rehabilitation Centers] explode all trees
#15	MeSH descriptor: [Inpatients] explode all trees
#16	MeSH descriptor: [Geriatric Assessment] explode all trees
#17	((long stay or long term or acute or sub-acute or subacute or residential) near/3 (care or ward*1 or hospital*)):ti,ab
#18	(hospital* near/3 (care or ward*1)):ti,ab
#19	(rehabilitation near/2 (ward*1 or hospital* or unit*1 or department*1)):ti,ab
#20	(hostel*1 or nursing home*1 or inpatient* or residen* or institution*):ti,ab
#21	45-#20
#22	#2 and #6 and #21 with Cochrane Library publication date Between Aug 2017 and Mar 2023, in Cochrane Reviews

Epistemonikos search terms

(title:((fall OR falls OR falling OR faller* OR fallen OR slip* OR trip* OR collapse*)) OR abstract:((fall OR falls OR falling OR faller* OR fallen OR slip* OR trip* OR collapse*))) AND (title:((senior* OR elder* OR old* OR aged OR aging OR ageing OR geriatric)) OR abstract:((senior* OR elder* OR old* OR aged OR aging OR ageing OR geriatric))) AND (title:((title:(((long stay OR long term OR acute OR sub-acute OR subacute OR residential) AND (care OR ward* OR hospital*))) OR abstract:(((long stay OR long term OR acute OR sub-acute OR subacute OR residential) AND (care OR ward* OR hospital*)))) OR (title:((hospital* AND (care OR ward*))) OR abstract:((hospital* AND (care OR ward*)))) OR (title:((rehabilitation adj2 (ward* OR hospital* OR unit* OR department*))) OR abstract:((rehabilitation adj2 (ward* OR hospital* OR unit* OR department*)))) OR (title:((hostel* OR nursing home* OR inpatient* OR residen* OR institution*)) OR abstract:((hostel* OR nursing home* OR inpatient* OR residen* OR institution*)))) OR abstract:((title:(((long stay OR long term OR acute OR sub-acute OR subacute OR residential) AND (care OR ward* OR hospital*))) OR abstract:(((long stay OR long term OR acute OR sub-acute OR subacute OR residential) AND (care OR ward* OR hospital*)))) OR (title:((hospital* AND (care OR ward*))) OR abstract:((hospital* AND (care OR ward*)))) OR (title:((rehabilitation adj2 (ward* OR hospital* OR unit* OR department*))) OR abstract:((rehabilitation adj2 (ward* OR hospital* OR unit* OR department*)))) OR (title:((hostel* OR nursing home* OR inpatient* OR residen* OR institution*)) OR abstract:((hostel* OR nursing home* OR inpatient* OR residen* OR institution*)))))

B.2 Health Economics literature search strategy

Health economic evidence was identified by applying economic evaluation and quality of life filters to the clinical literature search strategy in Medline and Embase. The following databases were also searched: NHS Economic Evaluation Database (NHS EED - this ceased to be updated after 31st March 2015), Health Technology Assessment database (HTA - this ceased to be updated from 31st March 2018) and The International Network of Agencies for Health Technology Assessment (INAHTA)

Table 28: Database parameters, filters and limits applied

Database	Dates searched	Search filters and limits applied
Medline (OVID)	Health Economics 1 January 2014 – 8 May 2024	Health economics studies Quality of Life studies Exclusions (animal studies) English language
	Quality of Life 1 January 2004 to – 8 May 2024	
Embase (OVID)	Health Economics 1 January 2014 – 8 May 2024	Health economics studies Quality of Life studies Exclusions (animal studies) English language
	Quality of Life 1 January 2004 to – 8 May 2024	
NHS Economic Evaluation Database (NHS EED) (Centre for Research and Dissemination - CRD)	Inception – 31 March 2015 (database no longer updated as of this date)	
Health Technology Assessment Database (HTA) (Centre for Research and Dissemination – CRD)	Inception – 31 March 2018 (database no longer updated as of this date)	
The International Network of Agencies for Health Technology Assessment (INAHTA)	Inception - 8 May 2024	English language

Medline (Ovid) search terms

1	Accidental Falls/
2	(fall or falls or falling or faller* or fallen or slip* or trip or trips or tripped or tripping or tumbl*).ti,ab.
3	or/1-2
4	letter/
5	editorial/

6	news/
7	exp historical article/
8	Anecdotes as Topic/
9	comment/
10	case report/
11	(letter or comment*).ti.
12	or/4-11
13	randomized controlled trial/ or random*.ti,ab.
14	12 not 13
15	animals/ not humans/
16	exp Animals, Laboratory/
17	exp Animal Experimentation/
18	exp Models, Animal/
19	exp Rodentia/
20	(rat or rats or mouse or mice or rodent*).ti.
21	or/14-20
22	3 not 21
23	limit 22 to english language
24	limit 23 to yr="2004 -Current"
25	23 and 24
26	Economics/
27	Value of life/
28	exp "Costs and Cost Analysis"/
29	exp Economics, Hospital/
30	exp Economics, Medical/
31	Economics, Nursing/
32	Economics, Pharmaceutical/
33	exp "Fees and Charges"/
34	exp Budgets/
35	budget*.ti,ab.
36	cost*.ti.
37	(economic* or pharmaco?economic*).ti.
38	(price* or pricing*).ti,ab.

39	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
40	(financ* or fee or fees).ti,ab.
41	(value adj2 (money or monetary)).ti,ab.
42	or/26-41
43	quality-adjusted life years/
44	sickness impact profile/
45	(quality adj2 (wellbeing or well being)).ti,ab.
46	sickness impact profile.ti,ab.
47	disability adjusted life.ti,ab.
48	(qal* or qtime* or qwb* or daly*).ti,ab.
49	(euroqol* or eq5d* or eq 5*).ti,ab.
50	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
51	(health utility* or utility score* or disutilit* or utility value*).ti,ab.
52	(hui or hui1 or hui2 or hui3).ti,ab.
53	(health* year* equivalent* or hye or hyes).ti,ab.
54	discrete choice*.ti,ab.
55	rosser.ti,ab.
56	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
57	(sf36* or sf 36* or short form 36* or shortform 36* or shortform36*).ti,ab.
58	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
59	(sf12* or sf 12* or short form 12* or shortform 12* or shortform12*).ti,ab.
60	(sf8* or sf 8* or short form 8* or shortform 8* or shortform8*).ti,ab.
61	(sf6* or sf 6* or short form 6* or shortform 6* or shortform6*).ti,ab.
62	or/43-61
63	25 and 42
64	limit 63 to yr="2014 -Current"
65	25 and 62

Embase (Ovid) search terms

1	falling/
2	(fall or falls or falling or faller* or fallen or slip* or trip or trips or tripped or tripping or tumbl*).ti,ab.
3	or/1-2

4	letter.pt. or letter/
5	note.pt.
6	editorial.pt.
7	case report/ or case study/
8	(letter or comment*).ti.
9	(conference abstract or conference paper).pt.
10	or/4-9
11	randomized controlled trial/ or random*.ti,ab.
12	10 not 11
13	animal/ not human/
14	nonhuman/
15	exp Animal Experiment/
16	exp Experimental Animal/
17	animal model/
18	exp Rodent/
19	(rat or rats or mouse or mice or rodent*).ti.
20	or/12-19
21	3 not 20
22	limit 21 to english language
23	limit 22 to yr="2004 -Current"
24	health economics/
25	exp economic evaluation/
26	exp health care cost/
27	exp fee/
28	budget/
29	funding/
30	budget*.ti,ab.
31	cost*.ti.
32	(economic* or pharmaco?economic*).ti.
33	(price* or pricing*).ti,ab.
34	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
35	(financ* or fee or fees).ti,ab.
36	(value adj2 (money or monetary)).ti,ab.

37	or/24-36
38	quality adjusted life year/
39	"quality of life index"/
40	short form 12/ or short form 20/ or short form 36/ or short form 8/
41	sickness impact profile/
42	(quality adj2 (wellbeing or well being)).ti,ab.
43	sickness impact profile.ti,ab.
44	disability adjusted life.ti,ab.
45	(qal* or qtime* or qwb* or daly*).ti,ab.
46	(euroqol* or eq5d* or eq 5*).ti,ab.
47	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
48	(health utility* or utility score* or disutilit* or utility value*).ti,ab.
49	(hui or hui1 or hui2 or hui3).ti,ab.
50	(health* year* equivalent* or hye or hyes).ti,ab.
51	discrete choice*.ti,ab.
52	rosser.ti,ab.
53	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
54	(sf36* or sf 36* or short form 36* or shortform 36* or shortform36*).ti,ab.
55	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
56	(sf12* or sf 12* or short form 12* or shortform 12* or shortform12*).ti,ab.
57	(sf8* or sf 8* or short form 8* or shortform 8* or shortform8*).ti,ab.
58	(sf6* or sf 6* or short form 6* or shortform 6* or shortform6*).ti,ab.
59	or/38-58
60	23 and 37
61	limit 60 to yr="2014 -Current"
62	23 and 59

NHS EED and HTA (CRD) search terms

1	MeSH DESCRIPTOR Accidental Falls EXPLODE ALL TREES
2	((fall or falls or falling or faller* or fallen or slip* or trip or trips or tripped or tripping or tumbl*))
3	#1 OR #2
4	(#3) IN NHSEED

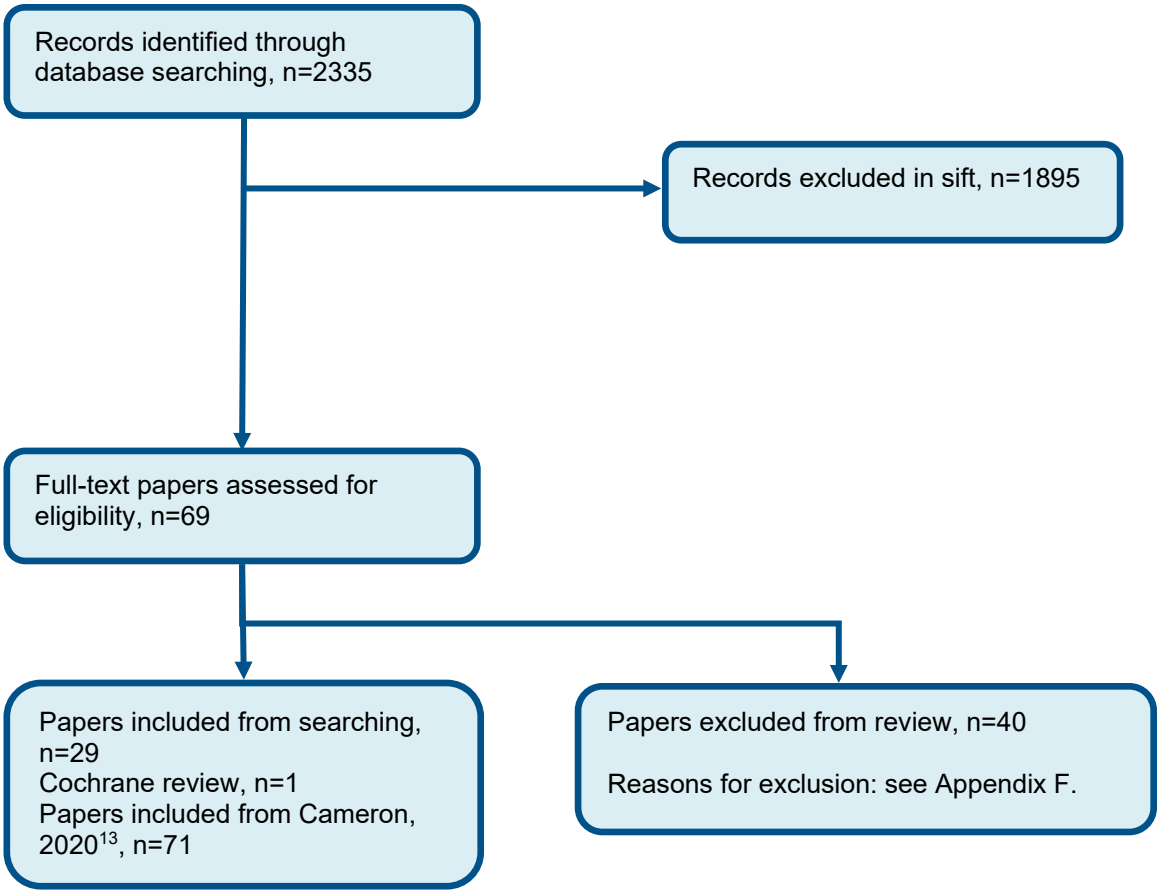
5	(#3) IN HTA

INAHTA search terms

1	("Accidental Falls"[mh]) OR (fall or falls or falling or faller* or fallen or slip* or trip or trips or tripped or tripping or tumbl*)
2	limit to english language
3	2004 - current

Appendix C Effectiveness evidence study selection

Figure 1: Flow chart of clinical study selection for the review of the interventions to prevent falls in people within residential care settings



Appendix D Effectiveness evidence

Almutairi, 2023

Bibliographic Reference	**Almutairi, Hend; Stafford, Andrew; Etherton-Beer, Christopher; Fitzgerald, Patrick; Flicker, Leon; Impact of a Multifaceted, Pharmacist-Led Intervention on Psychotropic Medication Use for Residents of Aged Care Facilities: A Parallel Cluster Randomized Controlled Trial.; Journal of the American Medical Directors Association; 2023; vol. 24 (no. 9); 1311e1-1311e8**

Study details

Trial name / registration number	ACTRN12620000268943
Study type	Cluster randomised controlled trial
Study location	Australia
Study setting	Residential aged care facilities (RACF)
Study dates	Study dates: November 2019 to May 2021, published 2023
Sources of funding	Medical Research Future Fund Next Generation Clinical Researchers Practitioner Fellowship (1155669). Intervention delivered by DTA employed consultants: DTA is a consortium of Australian universities and a key advocacy organization for dementia, funded by the government to develop and deliver dementia-specific training and resources to the dementia care workforce across Australia
Inclusion criteria	Residential care offered for adults ≥65 years and had more than 10 beds. All residents in the eligible RACFs were included as participants. Eligible participants also included health care professionals (nurses and care workers) employed at the RACFs but did not include prescribers (general practitioners or nurse practitioners).
Exclusion criteria	Not stated

Recruitment / selection of participants	Eligible RACFs
Intervention(s)	Medication Management Consultancy: optimise psychotropic use for BPSD among RACF residents with dementia by supporting and training RACF staff and promoting evidence-based strategies, including the use of nonpharmacological interventions and person-cantered care, as first-line management of BPSD.22 The MMC training component focused on antipsychotic medications included an initial 1 hour of online training comprising educational videos, a case study, strategies to reduce psychotropic use, and nonpharmacological approaches. This was followed by regular short meetings with action groups composed of RACF staff who were provided with supportive resources such as posters, flip cards, and reminder stickers. Completion of the MMC required 8 meetings over 3 to 6 months, with the timeline negotiated on a site-by-site basis.
Comparator	Usual care
Number of participants	11 RACFs and total of 409 people
Duration of follow-up	12 months
Indirectness	None

Study arms

Multifaceted psychotropic medication review (N = 154)

Usual care (N = 255)

Outcomes

Study timepoints

12-month

Incidence rate ratio (IRR)

Outcome	Multifaceted psychotropic medication review vs Usual care, 12 month, N2 = 154, N1 = 255
Number of falls (IRR (95% CI)) Mean (95% CI)	0.89 (0.48 to 1.64)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Cluster randomised trials

Incidence rate ratio (IRR)-Number of falls – Mean Nine Five Percent CI - Multifaceted psychotropic medication review-Usual care-t12

SECTION	QUESTION	ANSWER
Overall bias and Directness	Risk of bias judgement	Some concerns *(Limited baseline information)*
Overall bias and Directness	Overall Directness	Directly applicable

Arrieta, 2019

Bibliographic Reference	Arrieta, Haritz; Rezola-Pardo, Chloe; Gil, Susana M; Virgala, Janire; Iturburu, Miren; Anton, Ivan; Gonzalez-Templado, Vanesa; Irazusta, Jon; Rodriguez-Larrad, Ana; Effects of Multicomponent Exercise on Frailty in Long-Term Nursing Homes: A Randomized Controlled Trial.; Journal of the American Geriatrics Society; 2019; vol. 67 (no. 6); 1145-1151

Study details

Other publications associated with this study included in review	Data taken from Dyer 2023 (systematic review) as data in this publication not given in an extractable format
Trial name / registration number	ACTRN12616001044415
Study location	Nursing home
Study setting	Nursing home
Study dates	Study took place between October 2016 to July 2017, published 2019
Sources of funding	Supported by grants from the Basque government (ELKARTEK16/57; ELKARTEK17/61; RIS16/07; SAN17/11) and the Convention between UPV/EHU and the Gipuzkoa Provincial Council (Gipuzkoa Eraikiz). Haritz Arrieta and Chloe Rezola were supported by two fellowships from UPV/EHU.
Inclusion criteria	Recruitment of people from long-term nursing homes ages 70 years or older, who scored 50 or higher on the Barthel Index, 20 or higher on the MEC-35 test (an adapted and validated version of the Mini-Mental State Examination in Spanish), and who were capable of standing up and walking independently for at least 10 m.
Exclusion criteria	If they were clinically unstable according to the clinical judgment of the medical professionals of the reference centre.
Recruitment / selection of participants	As above

Intervention(s)	In addition to routine activities (as the usual care arm), they performed a progressive multicomponent exercise intervention at moderate intensity which consisted of 1-hour supervised group training sessions twice a week for a 6-month period involving individualized strength and balance exercises. All sessions began with a brief warm-up of range-of-motion exercises. Strength training included upper and lower body exercises individualized according to the Brzycki equation that was performed to calculate one repetition maximum (1-RM) and adapt the adequate load progression of arm-curl, knee flexion, and knee extension exercises for every participant at baseline and every 2 months. Chair-stand, hip abduction, and hip adduction exercises were performed without external loads, and intensity was tailored to the capabilities of each participant by adjusting the number of repetitions and velocity. Intensity was progressively increased from 40% at the beginning of the intervention to 70% 1-RM in month 6 of the program. Balance training was also individualized and included exercises progressing in difficulty, starting by decreasing arm support along with decreasing the base of support and increasing complexity of movements to challenge participants' balance as they progressed. Exercises varied through the period: weight transfer from one leg to another, proprioceptive exercises, and stepping practice. Sessions finished with 5 minutes of cooling down by stretching, breathing, and relaxing exercises. All sessions were provided by a professional instructor with a degree in physical activity and sport sciences, specifically trained in guiding adapted physical activity to older adults. In addition, walking recommendations were also individually tailored in duration and intensity based on a baseline 6-minute walk test performance. Recommendations started with paths that lasted 5 minutes per day at the beginning of the intervention, with the goal of completing 140 minutes per week after the 6-month period.
Population subgroups	N/A
Comparator	Usual care: routine low-intensity activities that the nursing homes usually offer to residents: memory workshops, reading, singing, soft gymnastics etc.
Number of participants	112
Duration of follow-up	1
Indirectness	12 months
Additional comments	

Study arms

Multicomponent exercise programme (N = 57)

Usual care (N = 55)

Characteristics

Arm-level characteristics

Characteristic	Multicomponent exercise programme (N = 57)	Usual care (N = 55)
% Female (%) Nominal	73.7	67.3
Mean age (SD) Mean (SD)	85.1 (7.6)	84.7 (6.1)
Comorbidities (%) Nominal	NA	NA
1 comorbidity % Nominal	22.8	30.9
2 comorbidities % Nominal	22.8	22.8
3 or more comorbidities %	36.8	36.8

Characteristic	Multicomponent exercise programme (N = 57)	Usual care (N = 55)
Nominal		

Outcomes

Study timepoints

12-month

Dichotomous outcomes

Outcome	Multicomponent exercise programme, 12-month, N = 43	Usual care, 12-month, N = 38
Rate of falls (log rate ratio (SE)) taken from Dyer 2023 Mean (SE)	-0.21 (0.2)	NA (NA)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Dichotomous outcomes -Rate of falls – Mean SE-Multicomponent exercise programme-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(due to high missingness)*
Overall bias and Directness	Overall Directness	Directly applicable

Bays-Moneo, 2023

Bibliographic Reference	**Bays-Moneo, A B; Izquierdo, M; Anton, M M; Cadore, E L; Cost-Consequences Analysis Following Different Exercise Interventions in Institutionalized Oldest Old: A Pilot Study of a Randomized Clinical Trial.; The journal of nutrition, health & aging; 2023; vol. 27 (no. 11); 1091-1099**

Study details

Secondary publication of another included study- see primary study for details	
Trial name / registration number	Not reported
Study type	Randomised controlled trial (RCT)
Study location	Spain
Study setting	nursing residential home
Study dates	Published 2023
Sources of funding	Not reported
Inclusion criteria	80 years or older, Short Physical Performance Battery (SPPB) score less than 10 points, Barthel Index score greater than 25 points, and ability to ambulate (with or without technical assistance)
Exclusion criteria	No intention to continue living in the nursing home, temporary stays, neurodegenerative diseases, illnesses contraindicating exercise (e.g., uncontrolled arrhythmias, acute myocardial infarction), or unstable medical condition.

Recruitment / selection of participants	Nursing home residents
Intervention(s)	The Multicomponent Group: The program involved twice-weekly progressive resistance training, performed in the leg press exercise at maximal intended velocity (i.e., power training), combined with 3 days a week of balance and gait retraining. The progressive resistance training program was performed 2 days a week, starting with 2 sets of 8-10 repetitions at 20-30% of the 1RM (one-repetition maximum) during the first two weeks and progressing to 2-3 sets of 8-12 repetitions at an intensity of 40-60% of 1RM. Additionally, participants performed 2 sets of 8-10 repetitions of the sit-to-stand exercise at maximal intended velocity. The balance training consisted of several exercise progressions in difficulty, such as semi-tandem-foot standing to tandem-foot standing, heel-toe walking, and standing on one leg. Participants also performed gait retraining, walking from 5-10 minutes during the first 2 weeks, to 15-30 minutes at an intensity of a 5-6 Borg score (scale 0-10 points) during the whole intervention. Calisthenics group: performed five sessions per week in a group of 20-25 patients for 40 minutes each. Each session consisted of a warm-up, resistance training exercises (focused on lower and upper limbs), and flexibility exercises. Resistance training was performed using elastic bands with a resistance of approximately 15 repetitions at an intensity of 5-6 on the Borg scale (a scale of 0-10), carried out in two sets of ten repetitions of the main muscle groups' movements. They also performed gait retraining, walking from 5-10 minutes during the first two weeks, and gradually increasing to 15-30 minutes at an intensity of 5-6 on the Borg scale (a scale of 0-10) during the entire intervention.
Population subgroups	
Comparator	Usual care: received usual care during the intervention period. This included the usual care provided by the nursing home, rehabilitation if necessary, and a recommendation to take daily walks around the centre.
Number of participants	69
Duration of follow-up	12 months

Study arms

Multicomponent exercise group (N = 23)

Usual care group (N = 23)

calisthenics group (N = 23)

Resistance exercise

Characteristics

Arm-level characteristics

Characteristic	Multicomponent exercise group (N = 23)	Usual care group (N = 23)	calisthenics group (N = 23)
% Female % Nominal	73.9	56.5	87
Mean age (SD) Mean (SD)	89.6 (6.6)	89.2 (7.3)	90.3 (6.8)
Comorbidities Total diseases Nominal	67	59	46

Outcomes

Study timepoints

12-month

Continuous outcome

Outcome	Multicomponent exercise group, 12-month, N = 23	Usual care group, 12-month, N = 23	calisthenics group, 12-month, N = 23
Number of falls Mean (95% CI)	0.7 (0.2 to 1.3)	0.4 (0.1 to 0.6)	0.7 (0.2 to 1.1)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Continuousoutcome-Numberoffalls-MeanNineFivePercentCI-Multicomponent exercise group-Usual care group-calisthenics group-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

Brett, 2021

Bibliographic Reference	**Brett, Lindsey; Stapley, Paul; Meedya, Shahla; Traynor, Victoria; Effect of physical exercise on physical performance and fall incidents of individuals living with dementia in nursing homes: a randomized controlled trial.; Physiotherapy theory and practice; 2021; vol. 37 (no. 1); 38-51**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	(12615000662561)
Study location	Australia
Study setting	nursing homes
Study dates	Not specified
Sources of funding	This work was supported by the University of Wollongong [Australian Government Research Training Program].
Inclusion criteria	Diagnosis of dementia as per nursing documentation, living permanently in a nursing home, physically able to participate in physical exercise, and written consent provided by participants or appropriate person on behalf of potential participants.

Exclusion criteria	No diagnosis of dementia, living in nursing homes for respite/ on a temporary basis, physically not able or not medically fit to participate in physical exercise, written consent declined by individuals or appropriate person on their behalf.
Recruitment / selection of participants	All potential participants (individuals living with dementia and their family caregivers) were invited to attend information sessions led by the primary investigator where the study was explained in detail and written information provided.
Intervention(s)	Exercise sessions including warm up, strengthening, balance, aerobic, and cool down. 1 group participated 45 minutes once per week and the other group participated 15 minutes three times per week.
Population subgroups	NA
Comparator	Usual care
Number of participants	199 participants
Duration of follow-up	A follow-up period is mentioned, but not defined.
Indirectness	Indirectness was not a concern with this study.
Additional comments	NA

Study arms

Physical exercise intervention for 45 minutes once a week (N = 20)

Physical exercise intervention for 15 minutes three times a week (N = 20)

Usual care (N = 20)

Characteristics

Study-level characteristics

Characteristic	Study (N = 55)
% Female Sample size	n = 36; % = 66
Intervention group 1 (45 min, once per week) Sample size	n = NR; % = 76
Intervention group 2 (15 minutes, 3 times per week) Sample size	n = NR; % = 68
Usual care Sample size	n = NR; % = 53
Mean age (SD) Mean age Mean (SD)	85 (NR)
Intervention group 1 (45 min, once per week)	86 (NR)

Characteristic	Study (N = 55)
Mean (SD)	
Intervention group 2 (15 minutes, 3 times per week) Mean (SD)	84 (NR)
Usual care Mean (SD)	86 (NR)
Ethnicity Sample size	n = NR; % = NR
Australian- Intervention group 1 Sample size	n = NR; % = 88
Australian- Intervention group 2 Sample size	n = NR; % = 63
Australian- Usual care Sample size	n = NR; % = 63

Outcomes

Falls

Outcome	Physical exercise intervention for 45 minutes once a week, N = 17	Physical exercise intervention for 15 minutes three times a week, N = 19	Usual care, N = 19
Number of falls- Before intervention Median Custom value	0	0	0
Number of falls-After intervention Median Custom value	0	0	1

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls-Number of falls – Before intervention - Physical exercise intervention for 45 minutes once a week-Physical exercise intervention for 15 minutes three times a week-Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to limited information provided regarding the method of analysis)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls-Number of falls -After intervention -Physical exercise intervention for 45 minutes once a week-Physical exercise intervention for 15 minutes three times a week-Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to limited information provided regarding the method of analysis)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	(12615000662561)
Study location	Australia
Study setting	Nursing homes
Study dates	Not specified

Sources of funding	This work was supported by the University of Wollongong [Australian Government Research Training Program].
Inclusion criteria	Diagnosis of dementia as per nursing documentation, living permanently in a nursing home, physically able to participate in physical exercise, and written consent provided by participants or appropriate person on behalf of potential participants.
Exclusion criteria	No diagnosis of dementia, living in nursing homes for respite/ on a temporary basis, physically not able or not medically fit to participate in physical exercise, written consent declined by individuals or appropriate person on their behalf.
Recruitment / selection of participants	All potential participants (individuals living with dementia and their family caregivers) were invited to attend information sessions led by the primary investigator where the study was explained in detail and written information provided.
Intervention(s)	Exercise sessions including warm up, strengthening, balance, aerobic, and cool down. 1 group participated 45 minutes once per week and the other group participated 15 minutes three times per week.
Population subgroups	NA
Comparator	Usual care
Number of participants	199 participants
Duration of follow-up	A follow-up period is mentioned, but not defined.
Indirectness	Indirectness was not a concern with this study.
Additional comments	NA

Study arms

Physical exercise intervention for 45 minutes once a week (N = 20)

Physical exercise intervention for 15 minutes three times a week (N = 20)

Usual care (N = 20)

Characteristics

Study-level characteristics

Characteristic	Study (N =)
% Female Sample size	n = 36; % = 66
Intervention group 1 (45 min, once per week) Sample size	n = NR; % = 76
Intervention group 2 (15 minutes, 3 times per week) Sample size	n = NR; % = 68
Usual Care Sample size	n = NR; % = 53
Mean age (SD) Mean (SD)	85 (NR)
Intervention group 1 (45 min, once per week) Mean (SD)	86 (NR)
Intervention group 2 (15 minutes, 3 times per week) Mean (SD)	84 (NR)

Characteristic	Study (N =)
Usual Care Mean (SD)	86 (NR)
Ethnicity Sample size	n = NR; % = NR

Arm-level characteristics

Characteristic	Physical exercise intervention for 45 minutes once a week (N = 20)	Physical exercise intervention for 15 minutes three times a week (N = 20)	Usual care (N = 20)
Australian Sample size	n = NR; % = 88	n = NR; % = 63	n = NR; % = 63

Outcomes

Study timepoints

Baseline

12-week

Number of falls

Outcome	Physical exercise intervention for 45 minutes once a week, Baseline, N = 20	Physical exercise intervention for 45 minutes once a week, 12-week, N = 20	Physical exercise intervention for 15 minutes three times a week, Baseline, N = 20	Physical exercise intervention for 15 minutes three times a week, 12-week, N = 17	Usual care, Baseline, N = 19	Usual care, 12-week, N = 19
Number of falls No of events	n = NR; % = NR	n = 0; % = 0	n = NR; % = 0	n = 0; % = 0	n = NR; % = 0	n = 1; % = 0

Number of falls - Polarity - Lower values are better

Transform

Number of falls

Outcome	Physical exercise intervention for 45 minutes once a week, Baseline, N = 20	Physical exercise intervention for 45 minutes once a week, 12-week, N = 20	Physical exercise intervention for 15 minutes three times a week, Baseline, N = 20	Physical exercise intervention for 15 minutes three times a week, 12-week, N = 17	Usual care, Baseline, N = 19	Usual care, 12-week, N = 19
Number of falls No of events	n = NR; % = NR	n = 0; % = 0	n = 0; % = 0	n = 0; % = 0	n = 0; % = 0	n = 1; % = 0

Data transformations			No of events calculated from % using a sample size of 20, rounded from 0		No of events calculated from % using a sample size of 19, rounded from 0	

Arm based: Data distribution : Not set

Cateau, 2021

Bibliographic Reference	**Cateau, Damien; Ballabeni, Pierluigi; Niquille, Anne; Effects of an interprofessional Quality Circle-Deprescribing Module (QC-DeMo) in Swiss nursing homes: a randomised controlled trial.; BMC geriatrics; 2021; vol. 21 (no. 1); 289**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	(NCT03688542)
Study type	Randomised controlled trial (RCT)
Study location	Switzerland
Study setting	Nursing home
Study dates	December 2017 to February 2019
Sources of funding	The Swiss National Science Foundation, through the National Research Program 74 “Smarter Health Care” (grant 167509), and by the State of Vaud, through a block grant
Inclusion criteria	Not specified

Exclusion criteria	Not specified
Recruitment / selection of participants	All NHs from the cantons of Fribourg and Vaud caring for a geriatric population and with an integrated pharmacist service (IPS) active for at least 1 year at the time of recruitment were eligible for participation.
Intervention(s)	Quality Circle-Deprescribing Module (QC-DeMo)
Population subgroups	NA
Comparator	Usual care
Number of participants	55 nursing homes
Duration of follow-up	1 year
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention to treat approach

Study arms

Quality Circle-Deprescribing Module (QC-DeMo) (N = 27)

Usual care (N = 29)

Outcomes

Falls

Outcome	Quality Circle-Deprescribing Module (QC-DeMo), N = 27	Usual care, N = 28
Number of falls No of events	n = 2.3; % = NR	n = 2.3; % = NR

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls-Number of falls – No of Events-Quality Circle-Deprescribing Module (QC - DeMo)-Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Colon-Emeric, 2017

Bibliographic Reference	**Colon-Emeric, Cathleen S; Corazzini, Kirsten; McConnell, Eleanor S; Pan, Wei; Toles, Mark; Hall, Rasheeda; Cary, Michael P Jr; Batchelor-Murphy, Melissa; Yap, Tracey; Anderson, Amber L; Burd, Andrew; Amarasekara, Sathya; Anderson, Ruth A; Effect of Promoting High-Quality Staff Interactions on Fall Prevention in Nursing Homes: A Cluster-Randomized Trial.; JAMA internal medicine; 2017; vol. 177 (no. 11); 1634-1641**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	NCT00636675
Study type	Cluster randomised controlled trial
Study location	United States
Study setting	Nursing homes
Study dates	2012 to 2015

Sources of funding	National Institutes of Health grant RO1NR003178. Dr Colón-Emeric's work was also supported by National Institute on Aging grant 2P30AG028716-11 and K24 AG049077-01A1
Inclusion criteria	Participants had to have 1 previous fall
Exclusion criteria	Nursing homes not affiliated with hospitals and inpatient rehabilitation facilities
Recruitment / selection of participants	Residents were selected from participating facilities.
Intervention(s)	CONNECT consisted of 3 main components, which included in-class protocols, relationship map protocols, and unit-based mentoring. Staff attended 2 learning sessions about local interaction strategies found to increase connection, information flow, and cognitive diversity. Department leaders developed "group-to-group maps" depicting actual and desired interaction patterns between departments, ending with agreement on goals for improving cross-department communication. Participants received structured mentoring and feedback during the sessions. Individuals used a standardized instrument to record interactions with co-workers, which were used to provide written feedback. FALLS is comprised of training sessions, a weekly teleconference, case-based modules, academic detailing regarding the staff members' most challenging residents, feedback, and a falls toolbox with modifiable tools to assist in communication and documentation of fall risk
Population subgroups	NA
Comparator	FALLS program alone
Number of participants	1794 participants
Duration of follow-up	Resident follow-up days were calculated censoring for hospital stays, discharge, and death. However, follow-up duration was not directly specified.

Indirectness	Indirectness was not a concern for this study.
Additional comments	Intention-to-treat approach

Study arms

CONNECT intervention and FALLS program (N = 887)

FALLS program (N = 907)

Characteristics

Study-level characteristics

Characteristic	Study (N = 1794)
% Female Sample size	n = NA; % = NA
CONNECT +FALLS Sample size	n = 476; % = 53.7
FALLS alone Sample size	n = 481; % = 53
Mean age (SD) Mean (SD)	NA (NA)
CONNECT +FALLS Mean (SD)	80.9 (9.6)

Characteristic	Study (N = 1794)
FALLS alone Mean (SD)	80.7 (9.1)
Ethnicity Sample size	n = NA; % = NA
White- CONNECT+ FALLS Sample size	n = 634; % = 71.4
WHITE- FALLS alone Sample size	n = 664; % = 73.2
Black- CONNECT +FALLS Sample size	n = 233; % = 26.2
Black- FALLS alone Sample size	n = 216; % = 23.8
Other- CONNECT+ FALLS Sample size	n = 20; % = 2.3
Other- FALLS alone Sample size	n = 27; % = 3
Comorbidities	n = NA; % = NA

Characteristic	Study (N = 1794)
Sample size	
Cognitive impairment- CONNECT +FALLS Sample size	n = 571; % = 64.4
Cognitive impairment- FALLS alone Sample size	n = 583; % = 64.3
Parkinsonism- CONNECT+ FALLS Sample size	n = 82; % = 9.2
Parkinsonism- FALLS alone Sample size	n = 70; % = 7.7
Neuropathy- CONNECT+FALLS Sample size	n = 98; % = 11
Neuropathy- FALLS alone Sample size	n = 125; % = 13.8
Vision impairment- CONNECT+ FALLS Sample size	n = 290; % = 32.7
Vision impairment- Falls alone Sample size	n = 211; % = 23.3

Characteristic	Study (N = 1794)
Stroke- CONNECT+ FALLS Sample size	n = 215; % = 32.7
Stroke- FALLS alone Sample size	n = 308; % = 34

Outcomes

Study timepoints

24-week intervention and 6 months post-intervention follow-up

Fall rates

Outcome	CONNECT intervention and FALLS program, N = 887	FALLS program, N = 907
Recurrent fall rates Median (IQR)	4.06 (2.04 to 8.11)	4.06 (2.03 to 8.11)
Recurrent fall rates Mean (SD)	7.11 (11.14)	6.7 (8.42)
Injurious fall rates Median (IQR)	0 (0 to 2.12)	0 (0 to 2.21)
Injurious fall rates Mean (SD)	2.07 (4.56)	2.25 (5.45)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Fall rates – Recurrent fall rates – Median IQR - CONNECT intervention and FALLS program - FALLS program

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly appliable)*

Fall rates – Recurrent fall rates – Mean SD - CONNECT intervention and FALLS program - FALLS program

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly appliable)*

Fall rates – Injurious fall rates – Median IQR - CONNECT intervention and FALLS program-FALLS program

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly appliable)*

Fall rates – Injurious fall rates – Mean SD - CONNECT intervention and FALLS program - FALLS program

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly appliable)*

Desborough, 2020

Bibliographic Reference	**Desborough, James A; Clark, Allan; Houghton, Julie; Sach, Tracey; Shaw, Val; Kirthisingha, Viveca; Holland, Richard C; Wright, David J; Clinical and cost effectiveness of a multi-professional medication reviews in care homes (CAREMED).; The International journal of pharmacy practice; 2020; vol. 28 (no. 6); 626-634**

Study details

Secondary publication of another included study- see primary study for details	Linked to Houghton, 2014 (from Cameron, 2018)
Other publications associated with this study included in review	Linked to Houghton, 2014 (from Cameron, 2018)
Trial name / registration number	ISRCTN90761620
Study location	United Kingdom (East of England)
Study setting	Care homes
Study dates	April 2011 to April 2012
Sources of funding	This research was supported by funding from the National Institute for Health Research, Research for Patient Benefit (PB-PG-0808-16065). Additional funding for service support costs was obtained from the West Anglia Comprehensive Local Research Network.
Inclusion criteria	Care homes had to include residents with an average age of >65 years

Exclusion criteria	Already received a medication review service from the primary care organisation in the last 6 months, receiving ongoing medication services from a community geriatrician, and subject to investigation of the safeguarding of vulnerable adults.
Recruitment / selection of participants	All residents within the recruited homes received the intervention unless they were self-medicating or registered in the home for respite care.
Intervention(s)	Multi-professional medication review. The team was consisting of a clinical pharmacist, GP, and care home member of staff responsible for medication, with preparation undertaken by a pharmacy technician.
Population subgroups	NA
Comparator	Usual care
Number of participants	826 participants at baseline (953 at allocation)
Duration of follow-up	12 months
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention to treat analysis

Study arms

Multi-professional medication review (N = 381)

Intervention care homes received a multi-professional medication review (MPMR) from a team consisting of a clinical pharmacist, GP and care home member of staff responsible for medication with preparation undertaken by a pharmacy technician.

Usual care (N = 445)

Usual care, which varied from weekly structured visits to the care home to ad hoc visits when patients needed to be seen by the GP.

Characteristics

Study-level characteristics

Characteristic	Study (N = 826)
Mean age (SD) Mean (SD)	NA (NA)
MPMR Mean (SD)	88.4 (6.5)
Usual Care Mean (SD)	86 (8.5)
Comorbidities Sample size	n = NA; % = NA
MPMR- Dementia diagnosis Sample size	n = 175; % = 45.9

Characteristic	Study (N = 826)
Usual care- Dementia diagnosis Sample size	n = 237; % = 53.3

Outcomes

Falls

Outcome	Multi-professional medication review, N = 445	Usual care, N = 381
Fall rate Mean fall rate Mean (SD)	3.35 (8.3)	3 (5.49)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls - Fall rate – Mean SD - Multi-professional medication review - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to the allocation sequence was likely unconcealed)*
Overall bias and Directness	Overall Directness	Directly applicable *(directly applicable)*

Study details

Secondary publication of another included study- see primary study for details	Linked to Houghton, 2014 (from Cameron, 2018)
Other publications associated with this study included in review	Linked to Houghton, 2014 (from Cameron, 2018)
Trial name / registration number	ISRCTN90761620
Study location	United Kingdom (East of England)
Study setting	Care homes
Study dates	April 2011 to April 2012
Sources of funding	This research was supported by funding from the National Institute for Health Research, Research for Patient Benefit (PB-PG-0808-16065). Additional funding for service support costs was obtained from the West Anglia Comprehensive Local Research Network.
Inclusion criteria	Care homes had to include residents with an average age of >65 years
Exclusion criteria	Already received a medication review service from the primary care organisation in the last 6 months, receiving ongoing medication services from a community geriatrician, and subject to investigation of the safeguarding of vulnerable adults.
Recruitment / selection of participants	All residents within the recruited homes received the intervention unless they were self-medicating or registered in the home for respite care.

Intervention(s)	Multi-professional medication review. The team was consisting of a clinical pharmacist, GP, and care home member of staff responsible for medication, with preparation undertaken by a pharmacy technician.
Population subgroups	NA
Comparator	Usual care
Number of participants	826 participants at baseline (953 at allocation)
Duration of follow-up	12 months
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention-to-treat analysis

Study arms

Multi-professional medication review (N = 381)

Intervention care homes received a multi-professional medication review (MPMR) from a team consisting of a clinical pharmacist, GP and care home member of staff responsible for medication with preparation undertaken by a pharmacy technician.

Usual care (N = 445)

Usual care, which varied from weekly structured visits to the care home to ad hoc visits when patients needed to be seen by the GP.

Characteristics

Study-level characteristics

Characteristic	Study (N = 826)
Mean age (SD) Mean (SD)	NA (NA)
MPMR Mean (SD)	88.4 (6.5)
Usual care Mean (SD)	86 (8.5)
Comorbidities Sample size	n = NA; % = NA
MPMR- Dementia diagnosis Sample size	n = 175; % = 45.9

Characteristic	Study (N = 826)
Usual care- Dementia diagnosis Sample size	n = 237; % = 53.3

Outcomes

Falls

Outcome	Multi-professional medication review, N = 445	Usual care, N = 381
Fall rate Mean (SD) Mean (SD)	3.35 (8.3)	3 (5.49)

Dhargave, 2020

Bibliographic Reference	**Dhargave, P.; Sendhilkumar, R.; James, T.T.; Effect of a structured exercise program in reducing falls and improving balance and gait in the elderly population living in long-term care homes - a randomized controlled trial; Aging Medicine and Healthcare; 2020; vol. 11 (no. 2); 53-59**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	Not specified
Study location	India
Study setting	Geriatric homes (elderly care homes/ long term care homes which are run by the government, non-government organisations and private organisations in India)
Study dates	Not specified
Sources of funding	Not specified
Inclusion criteria	Elderly individuals aged 60 years or older, male or female staying at geriatric homes, individuals who are willing to participate in the study and providing signed informed consent, Mini Mental Status Examination (MMSE) scores more than

	18, individuals who are able to move indoors with or without walking aids, and individuals who are not receiving any prior physiotherapy sessions to improve ambulatory efficiency.
Exclusion criteria	Individuals having severe orthopaedic, neurologic or cardiopulmonary conditions in whom independent ambulation was not possible with or without aids.
Recruitment / selection of participants	4 different geriatric homes in Nagpur district of Maharashtra and Bangalore district of Karnataka in India for a 2-year period.
Intervention(s)	Exercise program and educational program. Received home based exercise program at their geriatric home for 3 months. Exercises were taught on the first day and patients received supervised exercise program for the first week. Therapists visited the participant once in every 15 days for 3 months. Each session lasted 30 minutes, once per day. Participants were advised to walk outside the home for 30 minutes in a day. Participants received the same educational program as the control group.
Population subgroups	NA
Comparator	Received an educational program at the beginning of the study regarding awareness and prevention of falls, which included identifying the risk factors of falls, identifying and avoiding environmental hazards, maintain the habit of walking daily at least for 15 minutes, identifying orthostatic hypotension due to sudden changes in position, and understanding the need for consultation with a doctor to alter the medications.
Number of participants	163 participants
Duration of follow-up	3 months
Indirectness	Directness was not a concern for this study
Additional comments	Not specified

Study arms

Structured supervised exercise program and educational program (N = 82)

Educational program alone (N = 81)

Characteristics

Study-level characteristics

Characteristic	Study (N = 163)
% Female Sample size	n = 87; % = 53.3
Exercise and education programs Sample size	n = 45; % = 54.9
Education program alone Sample size	n = 42; % = 51.9
Mean age (SD) Mean (SD)	74.6 (8.5)
Exercise and education programs Mean (SD)	75.3 (8.7)
Education program alone Mean (SD)	73.9 (8.3)

Outcomes

Falls

Outcome	Structured supervised exercise program and educational program, N = 75	Educational program alone, N = 77
Number of participants who experienced at least 1 fall No of events	n = 14; % = 18.7	n = 20; % = 26
Number of falls Custom value	26	37

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls – Number of participants who experienced at least 1 fall – No of Events - Structured supervised exercise program and educational program-educational program alone

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to no pre-specified protocol)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls-Number of falls - Structured supervised exercise program and educational program-educational program alone

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to no pre-specified protocol)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Farhat, 2022

Bibliographic Reference	**Farhat, Akram; Al-Hajje, Amal; Lang, Pierre-Olivier; Csajka, Chantal; Impact of Pharmaceutical Interventions with STOPP/START and PIM-Check in Older Hospitalized Patients: A Randomized Controlled Trial.; Drugs & aging; 2022; vol. 39 (no. 11); 899-910**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	(NCT04028583) and (SNCTP000002784)
Study type	Randomised controlled trial (RCT)
Study location	Switzerland
Study setting	Hospital
Study dates	February 2018 to April 2019
Sources of funding	Open access funding provided by University of Lausanne

Inclusion criteria	Patients aged ≥65 years with at least one geriatric syndrome (i.e. cognitive impairment, malnutrition, urinary incontinence, history of falls, risk of falling, multiple comorbidities and/or polypharmacy), with acute illnesses and/or exacerbated chronic conditions and requiring acute hospitalisation. Same criteria as for admission into the Acute Care for Elders (ACE) unit.
Exclusion criteria	Patients transferred to surgery divisions, intermediate or intensive care units, and patients without informed consent or with a stay <3 days.
Recruitment / selection of participants	Not specified
Intervention(s)	PIM-Check
Comparator	STOPP/START
Number of participants	123 patients
Duration of follow-up	Not specified
Indirectness	PIM-check has been identified as being an inferior comparator against STOPP/START
Additional comments	Not specified

Study arms

STOPP/ START criteria (N = 63)

PIM check (N = 60)

Characteristics

Study-level characteristics

Characteristic	Study (N = 123)
% Female Sample size	n = 92; % = 74.8
PIM-Check Sample size	n = 46; % = 76.7
STOPP/START Sample size	n = 46; % = 73
Mean age (SD) Standardised Mean (SD)	86.25 (6.63)
PIM-Check Standardised Mean (SD)	87.15 (6.44)
STOPP/START Standardised Mean (SD)	85.44 (6.76)
Comorbidities	n = NA; % = NA

Characteristic	Study (N = 123)
Sample size	
PIM-Check Hypertension Sample size	n = 43; % = NA
STOPP/START Hypertension Sample size	n = 43; % = NA
PIM-Check Osteoporosis Sample size	n = 15; % = NA
STOPP/START Osteoporosis Sample size	n = 26; % = NA
PIM-Check Kidney failure Sample size	n = 13; % = NA
STOPP/START Kidney failure Sample size	n = 24; % = NA
PIM-Check Dyslipidaemia Sample size	n = 12; % = NA
STOPP/START Dyslipidaemia Sample size	n = 18; % = NA

Characteristic	Study (N = 123)
PIM-Check Diabetes mellitus (type 2) Sample size	n = 12; % = NA
STOPP/START Diabetes mellitus (type 2) Sample size	n = 10; % = NA
PIM-Check Ischemic heart disease Sample size	n = 10; % = NA
STOPP/START Ischemic heart disease Sample size	n = 11; % = NA
PIM-Check Heart failure Sample size	n = 1; % = NA
STOPP/START Heart failure Sample size	n = 17; % = NA
PIM-Check Hypothyroidism Sample size	n = 7; % = NA
STOPP/START Hypothyroidism Sample size	n = 8; % = NA
PIM-Check Other	n = 76; % = NA

Characteristic	Study (N = 123)
Sample size	
STOPP/START Other Sample size	n = 51; % = NA
PIM-Check Atrial fibrillation Sample size	n = 16; % = NA
STOPP/START Atrial fibrillation Sample size	n = 12; % = NA

Outcomes

Falls

Outcome	STOPP/ START criteria, N = 62	PIM check, N = 60
At least 1 fall during hospitalisation No of events	n = 3; % = 5	n = 3; % = 4.8

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls-Atleast1fallduringhospitalisation-NoOfEvents-STOPP/ START criteria-PIM check

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(High risk of bias due analysis methodology)*
Overall bias and Directness	Overall Directness	Partially applicable *(Partially applicable)*

Hewitt, 2018

Bibliographic Reference	**Hewitt, Jennifer; Goodall, Stephen; Clemson, Lindy; Henwood, Timothy; Refshauge, Kathryn; Progressive Resistance and Balance Training for Falls Prevention in Long-Term Residential Aged Care: A Cluster Randomized Trial of the Sunbeam Program.; Journal of the American Medical Directors Association; 2018; vol. 19 (no. 4); 361-369**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	ACTRN12613000179730
Study location	Australia
Study setting	Long-term residential aged care facilities
Study dates	Not reported
Sources of funding	Not reported
Inclusion criteria	Participants were aged 65 years or older, permanently residing in care, and understood sufficient English to comprehend the participant information statement and complete the consent form.

Exclusion criteria	Participants had a diagnosis of a terminal or unstable illness, medical clearance for participation denied, having participated in a similar resistance and balance training program in the previous 12 months, deemed unable to participate safely in a group gym-based exercise program for the following reasons: permanently bed- or wheelchair-bound, advanced Parkinson's disease (where symptoms precluded safe inclusion in gym program), or insufficient cognition.
Recruitment / selection of participants	Recruited facilities were those that housed a mix of high-care residents (who require daily care by, or under the supervision of a registered nurse) and low-care residents (who need some assistance but do not have complex health care needs) and would allocate staff time to assist with recruitment and exercise supervision.
Intervention(s)	Individually prescribed progressive resistance training plus balance exercise performed in a group setting for 50 hours over a 25-week period with a 6-month maintenance period.
Population subgroups	NA
Comparator	Usual care
Number of participants	221 participants
Duration of follow-up	12 months
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention-to-treat

Study arms

Sunbeam program (N = 113)

High level balance and moderate intensity progressive resistance training

Usual care (N = 108)

Characteristics

Study-level characteristics

Characteristic	Study (N = 221)
% Female Sample size	n = NR; % = NR
Exercise program Sample size	n = 71; % = 62.8
Usual care Sample size	n = 73; % = 68.2
Mean age (SD) Range	NR to NR
Mean age (SD) Mean (SD)	NR (NR)
Exercise program Range	65 to 100

Characteristic	Study (N = 221)
Exercise program Mean (SD)	86 (NR)
Usual care Range	65 to 99
Usual care Mean (SD)	86 (NR)
Comorbidities No of events	n = NR; % = NR
Anxiety and depression- Exercise program No of events	n = 56; % = 49.6
Anxiety and depression- Usual care No of events	n = 31; % = 28.7
Cardiac disease- Exercise program No of events	n = 54; % = 47.8
Cardiac disease- Usual care No of events	n = 47; % = 43.5
Cerebrovascular disease/ stroke- Exercise program	n = 21; % = 18.6

Characteristic	Study (N = 221)
No of events	
Cerebrovascular disease/ stroke- Usual care No of events	n = 21; % = 19.4
Cognitive impairment- Exercise program No of events	n = 63; % = 55.8
Cognitive impairment- Usual care No of events	n = 45; % = 41.7
Foot pain- Exercise program No of events	n = 35; % = 31
Foot pain- Usual care No of events	n = 33; % = 31
Hypertension- Exercise program No of events	n = 69; % = 61.1
Hypertension- Usual care No of events	n = 60; % = 55.6
Incontinence- Exercise program No of events	n = 30; % = 26.6

Characteristic	Study (N = 221)
Incontinence- Usual care No of events	n = 17; % = 15.9
Parkinson's disease- Exercise program No of events	n = 3; % = 2.7
Parkinson's disease- Usual care No of events	n = 0; % = 0
Visual impairment- Exercise program No of events	n = 38; % = 33.6
Visual impairment- Usual care No of events	n = 29; % = 27.1

Outcomes

Falls

Outcome	Sunbeam program, N = 113	Usual care, N = 108
Falls rate Falls per person-year Custom value	1.31	2.91
Total number of falls Custom value	142	277
Number of fallers (1 or more falls) Custom value	50	73
Number of injurious falls Custom value	72	157
Number of fall-related fractures Custom value	5	6

SF-36 Total (Baseline)

Outcome	Sunbeam program, N = 108	Usual care, N = 102
SF-36 Total Mean (SD)	65.72 (18.3)	64.96 (16.98)

SF-36 Total (6 months)

Outcome	Sunbeam program, N = 94	Usual care, N = 85
SF-36 Total Mean (SD)	74.52 (17.13)	71.64 (19.09)

SF-36 Total (12 months)

Outcome	Sunbeam program, N = 88	Usual care, N = 80
SF-36 Total Mean (SD)	74.66 (18.51)	72.43 (16.6)

EQ-5D (baseline)

Outcome	Sunbeam program, N = 113	Usual care, N = 105
EQ-5D Mean (SD)	0.7 (0.27)	0.68 (0.3)

EQ-5D (6 months)

Outcome	Sunbeam program, N = 99	Usual care, N = 86
EQ-5D Mean (SD)	0.83 (0.22)	0.84 (0.19)

EQ-5D (12 months)

Outcome	Sunbeam program, N = 94	Usual care, N = 82
EQ-5D Mean (SD)	0.85 (0.18)	0.83 (0.23)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls-Falls rate-Sunbeam program -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls-Total number of falls - Sunbeam program -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls-Number of fallers (1 or more falls) Sunbeam program -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls – Number of injurious falls - Sunbeam program - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls - Number of falls – related fractures - Sunbeam program - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

SF-36 Total (Baseline) – SF – 36 Total – Mean SD - Sunbeam program - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

SF-36 Total (6 months) - SF-36 Total – Mean SD - Sunbeam program - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

SF-36 Total (12months) - SF-36 Total – Mean SD - Sunbeam program - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

EQ-5D (baseline) - EQ-5D – Mean SD - Sunbeam program - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

EQ-5D (6 months) - EQ-5D – Mean SD - Sunbeam program - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

EQ-5D (12 months) - EQ-5D – Mean SD - Sunbeam program - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Iuliano, 2021

Bibliographic Reference	**Iuliano, S; Poon, S; Robbins, J; Bui, M; Wang, X; De Groot, L; Van Loan, M; Zadeh, A Ghasem; Nguyen, T; Seeman, E; Effect of dietary sources of calcium and protein on hip fractures and falls in older adults in residential care: cluster randomised controlled trial.; BMJ (Clinical research ed.); 2021; vol. 375; n2364**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	Australian New Zealand Clinical Trials Registry ACTRN12613000228785
Study type	Cluster randomised controlled trial
Study location	Australia
Study setting	Residential care facility
Study dates	December 2013 to August 2016
Sources of funding	This study was support by grants from Dairy Australia (grant number TP 701722), California Dairy Research Foundation, National Dairy Council, Aarhus University Hospital and Danish Dairy Research Foundation, Fonterra Co-operative Group Ltd, Dutch Dairy Association, Dairy Council of California, Dairy Farmers of Canada, the Centre national interprofessionnel

	de l'economie laitiere, University of Melbourne, Austin Hospital Medical Research Foundation, and Sir Edward Dunlop Medical Research Foundation.
Inclusion criteria	Facilities were required to provide no more than 2 servings of dairy foods daily (assessed from menu audits as this level of provision is associated with dietary intakes of <1 g/kg body weight and 600 mg calcium daily). Participants had to be permanent residents.
Exclusion criteria	Respite residents
Recruitment / selection of participants	60 aged care residential facilities were in metropolitan Melbourne and regional Victoria, Australia
Intervention(s)	Additional servings of milk (250mL), yoghurt (200g), and cheese (40g). Methods used to increase dairy foods included use of milk powder to fortify milk used in recipes and beverages.
Population subgroups	NA
Comparator	Usual food
Number of participants	7195 residents
Duration of follow-up	Follow-up was determined by date of starting the study until event, if event did not occur, then follow-up was until study termination.
Indirectness	Indirectness was not a concern for this study
Additional comments	All but one fracture was the result of a fall. Fracture: 33% risk reduction (hazard ratio 0.67, 95% confidence interval 0.48 to 0.93; P=0.02) Falls: 11% relative risk reduction (hazard ratio 0.89, 0.78 to 0.98; P=0.04).

Study arms

Additional milk, yoghurt, and cheese (N = 3301)

Usual menu (N = 3894)

Characteristics

Study-level characteristics

Characteristic	Study (N = 7195)
% Female Sample size	n = NA; % = NA
Additional dairy servings Sample size	n = 2311; % = 70
Usual food Sample size	n = 2609; % = 67
Mean age (SD) Mean (SD)	NA (NA)
Additional dairy servings Mean (SD)	86 (2.3)
Usual food Mean (SD)	86 (2.2)
Comorbidities	n = NA; % = NA

Characteristic	Study (N = 7195)
Sample size	
Number with cognitive impairment - Additional dairy servings Sample size	n = 189; % = 52
Number with cognitive impairment- Usual food Sample size	n = 237; % = 53
Number with cardiovascular disease- Additional dairy servings Sample size	n = 301; % = 66
Number with cardiovascular disease- Usual food Sample size	n = 309; % = 63
Number malnourished- Additional dairy servings Sample size	n = 70; % = 17
Number malnourished- Usual food Sample size	n = 25; % = 11
Number at risk of malnourishment- Additional dairy servings Sample size	n = 272; % = 66
Number at risk of malnourishment- Usual food Sample size	n = 158; % = 66

Outcomes

Fractures

Outcome	Additional milk, yoghurt, and cheese, N = 3301	Usual menu, N = 3894
Fractures Sample size	n = 121; % = 3.7	n = 203; % = 5.2

Falls

Outcome	Additional milk, yoghurt, and cheese, N = 3301	Usual menu, N = 3894
Falls Incidence No of events	n = 1879; % = 57	n = 2423; % = 62

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls – Falls – No of Events - Additional milk, yoghurt, and cheese - Usual menu

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Jahanpeyma, 2021

Bibliographic Reference	**Jahanpeyma, Parinaz; Kayhan Kocak, Fatma Ozge; Yildirim, Yasemin; Sahin, Sevnaz; Senuzun Aykar, Fisun; Effects of the Otago exercise program on falls, balance, and physical performance in older nursing home residents with high fall risk: a randomized controlled trial.; European geriatric medicine; 2021; vol. 12 (no. 1); 107-115**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	NA
Study location	Turkey
Study setting	Nursing homes
Study dates	September 2016 to June 2017
Sources of funding	N/A
Inclusion criteria	Aged 65 years or older, ability to read and write Turkish, score of 5 or higher on the Katz Index of Independence in Activities of Daily Living (ADL), and score of 5 or higher on the Itaki Fall Risk Scale

Exclusion criteria	Residents in palliative care, sensory impairments (vision, hearing, etc.) that affect communication, previous diagnosis of dementia, hypotension (systolic blood pressure<90 mmHg, diastolic blood pressure<60 mmHg), anaemia (haemoglobin<9 g/dl), any acute metabolic disorder, uncontrolled arrhythmia, uncontrolled hypertension (systolic blood pressure>160 mmHg, diastolic blood pressure>100 mmHg), stable/unstable angina pectoris, uncontrolled metabolic and chronic disease, severe cerebrovascular or peripheral venous insufficiency, history of surgery within the past 6 weeks, physical disability that prevents performing the exercises
Recruitment / selection of participants	Participants were selected from the Narlıdere Nursing Home
Intervention(s)	Otago group- 45-minute exercise program three days per week for 3 months
Comparator	Walking group- 30 minutes of walking, three days per week
Number of participants	71 participants
Duration of follow-up	3 months
Indirectness	Indirectness was not a concern for this study
Additional comments	NA

Study arms

Otago exercise group (N = 35)

Walking group (N = 36)

Characteristics

Study-level characteristics

Characteristic	Study (N = 71)
% Female Sample size	n = NA; % = NA
Otago exercise group Sample size	n = 26; % = 74.3
Walking group Sample size	n = 27; % = 75
Mean age (SD) Mean (SD)	NA (NA)
Otago exercise group Mean (SD)	74.6 (5.9)
Walking group Mean (SD)	75.8 (4.5)
Comorbidities	n = NA; % = NA

Characteristic	Study (N = 71)
Sample size	
Otago exercise group Sample size	n = 24; % = 68.6
Walking group Sample size	n = 31; % = 86.1

Outcomes

Falls

Outcome	Otago exercise group, N = 35	Walking group, N = 36
Number of falls (pre-intervention) Median (min- max) Custom value	2 (0-5)	1 (0-5)
Number of falls (pre-intervention) Median (min- max) Mean (SD)	1.94 (1.19)	1.53 (0.16)
Number of falls (post-intervention) Median (min-max) Custom value	0 (0-2)	1 (0-4)
Number of falls (post-intervention) Median (min-max)	0.54 (0.66)	1.39 (0.87)

Outcome	Otago exercise group, N = 35	Walking group, N = 36
Mean (SD)		

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls – Number of falls (pre-intervention) - Otago exercise group - Walking group

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(Due to concerns for bias regarding the randomisation process and no pre-specified protocol)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Junius-Walker, 2021

Bibliographic Reference	**Junius-Walker, Ulrike; Krause, Olaf; Thurmann, Petra; Bernhard, Simone; Fuchs, Angela; Sparenberg, Lisa; Wollny, Anja; Stolz, Regina; Haumann, Hannah; Freytag, Antje; Kirsch, Claudia; Usacheva, Svetlana; Wilm, Stefan; Wiese, Birgitt; Drug Safety for Nursing-Home Residents-Findings of a Pragmatic, Cluster-Randomized, Controlled Intervention Trialin 44 Nursing Homes.; Deutsches Arzteblatt international; 2021; vol. 118 (no. 42); 705-712**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	(DRKS00013588)
Study type	Cluster randomised controlled trial
Study location	Germany
Study setting	Nursing homes
Study dates	May 2018 to July 2019
Sources of funding	The HIOPP-3-iTBX study was funded by the Innovation Fund of the Joint Federal Committee (Grant No.: 01VSF16017).
Inclusion criteria	Aged 65 years or older

Exclusion criteria	No consent from the resident or their legal guardian, short-term care, and a life expectancy of less than 6 months.
Recruitment / selection of participants	In a first step, four centres (the Institutes for General Practice in Düsseldorf, Hannover, Rostock, and Tübingen) recruited nursing homes with care agreements according to § 72 of Book XI of the German Social Code (SGB). All treating general practitioners and pharmacists in the interested nursing homes were approached. Only if a multi-professional team could be formed from these professionals were the residents of the respective nursing home approached.
Intervention(s)	Multifactorial intervention including a drug review by trained pharmacists, educational sessions for general practitioners and nurses, a drug safety toolbox, and change management seminars for members of the three participating professions.
Population subgroups	NA
Comparator	Usual care
Number of participants	787 participants
Duration of follow-up	6 months
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention-to treat analysis and per protocol analysis

Study arms

Multifactorial intervention (N = 402)

Drug review by trained pharmacists, educational sessions for general practitioners and nurses, a drug safety toolbox, and change management seminars for members of the three participating professions

Usual care (N = 385)

Characteristics

Study-level characteristics

Characteristic	Study (N = 787)
% Female Sample size	n = NA; % = 73.8
Multifactorial intervention Sample size	n = NA; % = 76.4
Usual care Sample size	n = NA; % = 71.2
Mean age (SD) Mean (SD)	84.3 (7.7)
Multifactorial intervention Mean (SD)	84.7 (7.7)
Usual care	83.9 (8.1)

Characteristic	Study (N = 787)
Mean (SD)	

Outcomes

Falls

Outcome	Multifactorial intervention, N = 317	Usual care, N = 330
Average number of falls per resident Mean (SD)	0.7 (2.1)	0.5 (1.6)
Residents who experienced at least 1 fall Custom value	39%	30%

Quality of life

Outcome	Multifactorial intervention, N = 317	Usual care, N = 330
Mean quality of life questionnaire Mean (SD)	0.54 (0.3)	0.53 (0.31)

EQ-5D

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls-Average number of falls per resident – Mean SD-Multifactorial intervention - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls – Residents who experienced at least 1 fall - Multifactorial intervention - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Quality of life – Mean quality of life questionnaire – Mean SD - Multifactorial intervention -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Killington, 2020

Bibliographic Reference	**Killington, Maggie; Davies, Owen; Crotty, Maria; Crane, Rhiannon; Pratt, Naomi; Mills, Kylie; McInnes, Arabella; Kurrle, Susan; Cameron, Ian D; People living in nursing care facilities who are ambulant and fracture their hips: description of usual care and an alternative rehabilitation pathway.; BMC geriatrics; 2020; vol. 20 (no. 1); 128**

Study details

Secondary publication of another included study- see primary study for details	N/A
Other publications associated with this study included in review	N/A
Trial name / registration number	SACRED trial
Study location	South Australia
Study setting	Nursing care facilities (NCF)
Study dates	Not reported
Sources of funding	Funding provided by the National Health and Medical Research Council (NHMRC) Partnership Centre on Dealing with Cognitive and Related Functional Decline in Older People (grant no. GNT9100000).
Inclusion criteria	-Recent hip fracture (proximal femoral fracture) treated surgically. -Aged 70+ years

	-Living in aged care facility (nursing home) within the catchments of the local hospital prior to injury. -Ambulant prior to fracture either without assistance, with aids or with the assistance of one other person. -Medically stable and ready for discharge. (Identified from trial registry ACTRN12612000112864)
Exclusion criteria	-Unable to provide informed consent or gain this from a suitable proxy. -Pathological and peri-prosthetic fractures. -Terminal illness and receiving palliative care. -Hip fracture treated non surgically. -Severe cognitive impairment, unable to follow a one-step command at recruitment. (Identified from trial registry ACTRN12612000112864)
Recruitment / selection of participants	Older people from NCFs who were previously mobile and had fractured their hips and randomly allocated them to receive a 4 week in-reach geriatric rehabilitation program or usual care on discharge.
Intervention(s)	In- reach rehabilitation
Population subgroups	N/A
Comparator	Usual care

Number of participants	240
Duration of follow-up	Not specified
Indirectness	Not applicable
Additional comments	

Study arms

In reach rehabilitation (N = 119)

Received a median of 13 hours of rehabilitation in total over 4 weeks. Nursing care facility residents were seen on the day of discharge or the following day at the nursing home by the in-reach physiotherapist and received a median of 14 visits and 10.75 hours of therapy over 4 weeks.

Usual care (N = 121)

Medical care from a general practitioner and all nursing home sites had contracts with physiotherapists or occupational therapists.

Characteristics

Study-level characteristics

Characteristic	Study (N = 240)
Pre-existing diagnosis of dementia	n = 186; % = 77.5
Sample size	

Outcomes

Falls

Outcome	In reach rehabilitation, N = 119	Usual care, N = 121
Falls No of events	n = 162; % = 62.7	n = 96; % = NA
Number of individuals who reported 1 or more falls Custom value	56	39
1 Fall Custom value	22	19
2 Falls Custom value	15	11
3-4 Falls Custom value	11	5
5-10 Falls Custom value	6	3
>10 Falls Custom value	2	1

Adverse events

Outcome	In reach rehabilitation, N = 119	Usual care, N = 121
Number of people who experienced 1 or more adverse event Custom value	78	60

Transform

Warning: The transform is out of sync with the data extraction details

Falls

Outcome	In reach rehabilitation, N = 119	Usual care, N = 121
Falls No of events	n = 162; % = 62.7	n = 96; % = NA
Number of individuals who reported 1 or more falls Custom value	56	39
1 Fall Custom value	22	19
2 Falls Custom value	15	11
3-4 Falls Custom value	11	5

5-10 Falls Custom value	6	3
>10 Falls Custom value	2	1

Arm based: Data distribution: Not set

Warning: This section is out of sync with the data extraction details

Adverse events

Outcome	In reach rehabilitation, N = 119	Usual care, N = 121

Arm based: Data distribution: Not set

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls – Number of individuals who reported 1 or more falls - In reach rehabilitation - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to no information provided regarding allocation sequence concealment)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls – Falls – No of Events - In reach rehabilitation -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to no information provided regarding allocation sequence concealment)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls – Number of individuals who reported 1 or more falls – 1 Fall – Custom Value 0 - In reach rehabilitation - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to no information provided regarding allocation sequence concealment)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls – Number of individuals who reported 1 or more falls – 2 Falls - In reach rehabilitation - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to no information provided regarding allocation sequence concealment)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls – Number of individuals who reported 1 or more falls – 3 – 4 Falls - In reach rehabilitation - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns (Some concerns for risk of bias due to no information provided regarding allocation sequence concealment)
Overall bias and Directness	Overall Directness	Directly applicable (Directly applicable)

Falls – Number of individuals who reported 1 or more falls – 5 – 10 Falls - In reach rehabilitation - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns (Some concerns for risk of bias due to no information provided regarding allocation sequence concealment)
Overall bias and Directness	Overall Directness	Directly applicable (Directly applicable)

Falls – Number of individuals who reported 1 or more falls - >10 Falls - In reach rehabilitation - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns (Some concerns for risk of bias due to no information provided regarding allocation sequence concealment)
Overall bias and Directness	Overall Directness	Directly applicable (Directly applicable)

Adverse events – Number of people who experienced 1 or more adverse event - In reach rehabilitation - Usual care

SECTION	QUESTION	ANSWER
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to no information provided regarding allocation sequence concealment)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Kua, 2021

Bibliographic Reference	**Kua, Chong-Han; Yeo, Cindy Ying Ying; Tan, Poh Ching; Char, Cheryl Wai Teng; Tan, Cheryl Wei Yan; Mak, Vivienne; Leong, Ian Yi-Onn; Lee, Shaun Wen Huey; Association of Deprescribing with Reduction in Mortality and Hospitalization: A Pragmatic Stepped-Wedge Cluster-Randomized Controlled Trial.; Journal of the American Medical Directors Association; 2021; vol. 22 (no. 1); 82-89e3**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	NCT02863341
Study type	Cluster randomised controlled trial
Study location	Singapore
Study setting	Nursing homes
Study dates	December 2016 to April 2018
Sources of funding	Not reported

Inclusion criteria	65 years or older, were taking 5 or more medications, and provided written informed consent in the study for the use of data through self, or next-of-kin for cognitively impaired residents (unless cognitively impaired with no or uncontactable next of kin).
Exclusion criteria	Less than 65 years old, taking fewer than 5 medications, or had a life expectancy of 6 months or less.
Recruitment / selection of participants	Recruited from 4 nursing homes in Singapore
Intervention(s)	5-step deprescribing process with included a multidisciplinary team-care approach involving pharmacists, physicians, and nurses and was implemented during the routine nursing home review visits conducted by the physicians and pharmacists. The pharmacist initiated the 5 steps which included: 1) Reviewing the necessity of medication using Beers and STOPP criteria to guide the detection and recommendation of potentially inappropriate medication use in older adults. 2) Checking for drug-drug and drug-food interactions to reduce risks of adverse drug events. 3) Discussion with nurses on the feasibility of deprescribing for each resident, with an option to discuss with cognitive-intact residents or family members of cognitively impaired residents. 4) Communication through nurse to physician for reviewing and deprescribing decisions. 5) Documentation made available for all agreed action plans with further follow-up as required.
Population subgroups	NA
Comparator	Waitlist
Number of participants	295 residents

Duration of follow-up	3, 6 and 12-month follow-up
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention to treat approach

Study arms

5-step deprescribing intervention (N = 153)

Waitlist (N = 142)

Characteristics

Study-level characteristics

Characteristic	Study (N = 295)
% Female Sample size	n = NA; % = NA
5-step deprescribing intervention Sample size	n = 89; % = 58.17
Waitlist Sample size	n = 75; % = 52.82
Mean age (SD) Mean (SD)	NA (NA)
5-step deprescribing intervention	80.57 (9.42)

Characteristic	Study (N = 295)
Mean (SD)	
Waitlist Mean (SD)	80.02 (9.58)
Comorbidities Sample size	n = NA; % = NA
Hypertension- 5-step deprescribing intervention Sample size	n = 86; % = 56.21
Hypertension- Waitlist Sample size	n = 88; % = 61.97
Diabetes- 5-step deprescribing intervention Sample size	n = 41; % = 26.8
Diabetes- Waitlist Sample size	n = 37; % = 26.06
Hyperlipidaemia- 5-step deprescribing intervention Sample size	n = 65; % = 42.48
Hyperlipidaemia- Waitlist Sample size	n = 60; % = 42.25

Characteristic	Study (N = 295)
Orthopaedic/ musculoskeletal disorder- 5-step deprescribing intervention Sample size	n = 65; % = 42.48
Orthopaedic/ musculoskeletal disorder- Waitlist Sample size	n = 56; % = 39.44
Dementia- 5-step deprescribing intervention Sample size	n = 41; % = 26.8
Dementia- waitlist Sample size	n = 52; % = 36.62
Depression- 5-step deprescribing intervention Sample size	n = 20; % = 13.07
Depression- Waitlist Sample size	n = 11; % = 7.75
Schizophrenia- 5-step deprescribing intervention Sample size	n = 15; % = 9.8
Schizophrenia- Waitlist Sample size	n = 16; % = 11.27
Bipolar disorder- 5-step deprescribing intervention	n = 1; % = 0.65

Characteristic	Study (N = 295)
Sample size	
Bipolar disorder- Waitlist Sample size	n = 0; % = 0
Psychosis- 5-step deprescribing intervention Sample size	n = 0; % = 0
Psychosis- Waitlist Sample size	n = 1; % = 0.7
Paranoid disorder- 5-step deprescribing intervention Sample size	n = 0; % = 0
Paranoid disorder- Waitlist Sample size	n = 1; % = 0.7
Intellectual disabilities- 5-step deprescribing intervention Sample size	n = 1; % = 0.65
Intellectual disabilities- Waitlist Sample size	n = 5; % = 3.52
Ischemic heart disease- 5-step deprescribing intervention Sample size	n = 37; % = 24.18

Characteristic	Study (N = 295)
Ischemic heart disease- waitlist Sample size	n = 33; % = 23.24
Stroke- 5-step deprescribing intervention Sample size	n = 56; % = 36.6
Stroke- waitlist Sample size	n = 62; % = 43.66

Outcomes

Fall rates

Outcome	5-step deprescribing intervention, N = 415	Waitlist, N = 437
Fall rates Number of fallers within the past 3 months No of events	n = 23; % = 55.4	n = 18; % = 41.1

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Fallrates-Fallrates-NoOfEvents-5-step deprescribing intervention-Waitlist

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Lam, 2018

Bibliographic Reference	**Lam, Freddy Mh; Chan, Philip Fl; Liao, L R; Woo, Jean; Hui, Elsie; Lai, Charles Wk; Kwok, Timothy Cy; Pang, Marco Yc; Effects of whole-body vibration on balance and mobility in institutionalized older adults: a randomized controlled trial.; Clinical rehabilitation; 2018; vol. 32 (no. 4); 462-472**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	NCT01735682
Study location	Hong Kong
Study setting	nursing homes
Study dates	June 2012 to December 2015
Sources of funding	The authors disclosed receipt of the following financial support: A full-time research scholarship by the Hong Kong Polytechnic University, a research grant by the Hong Kong Polytechnic University (G-YJ41).
Inclusion criteria	65 years of age or older, impaired ambulatory function with a Functional Ambulation Category score between 1 and 4, ability to understand and follow simple verbal commands, ability to tolerate intermittent physical activity for at least 45

	minutes in one session, knee flexion >45 degrees, absence of knee flexion contracture, ability to stand with support >1 minute, and provision of informed consent by the participant or his or her caregiver.
Exclusion criteria	Peripheral vascular disease, symptomatic vestibular disorder, contraindications to exercise, such as unstable angina, serious illness that would preclude participation such as cancer and previous lower limb fracture which required metal implant fixation.
Recruitment / selection of participants	Participants were recruited from four nursing homes in Hong Kong.
Intervention(s)	Whole body vibration + exercise group or exercise without whole body vibration. The exercise program consisted of a warmup phase, followed by a combination of mobility, strengthening and balance training exercises, and a cool-down phase. Each training session was typically 1 hour long. Vertical whole-body vibration was delivered using the Fit vibe medical WBV system. Exposure to vibration was provided in 1-minute bouts for a total exposure to WBV of about 4 minutes per training session.
Population subgroups	NA
Comparator	Usual care
Number of participants	73 residents
Duration of follow-up	Not specified
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention-to-treat analysis

Study arms

Strength and balance program combined with whole body vibration (N = 25)

Strength and balance program without whole body vibration (N = 24)

Upper limb exercises only (N = 24)

Characteristics

Study-level characteristics

Characteristic	Study (N = 73)
WBV + exercise Sample size	n = 13; % = NR
Exercise without WBV Sample size	n = 14; % = NR
Upper limb exercise only Sample size	n = 13; % = NR
Mean age (SD) Mean (SD)	NR (NR)
WBV+ exercise Mean (SD)	84 (6.7)
Exercise without WBV Mean (SD)	82.4 (7.6)

Characteristic	Study (N = 73)
Upper limb exercise only Mean (SD)	80.3 (7.3)
Comorbidities Sample size	n = NR; % = NR
Hypertension- WBV + exercise Sample size	n = 21; % = NR
Hypertension- exercise without WBV Sample size	n = 19; % = NR
Hypertension-upper limb exercise only Sample size	n = 19; % = NR
Diabetes- WBV + exercise Sample size	n = 10; % = NR
Diabetes- exercise without WBV Sample size	n = 10; % = NR
Diabetes- upper limb exercises only Sample size	n = 14; % = NR
History of stroke- WBV + exercise	n = 9; % = NR

Characteristic	Study (N = 73)
Sample size	
History of stroke- exercise without WBV Sample size	n = 11; % = NR
History of stroke- upper limb exercise only Sample size	n = 7; % = NR
High cholesterol- WBV + exercise Sample size	n = 5; % = NR
High cholesterol- exercise without WBV Sample size	n = 3; % = NR
High cholesterol- upper limb exercise only Sample size	n = 3; % = NR
Depression- WBV + exercise Sample size	n = 1; % = NR
Depression- Exercise without WBV Sample size	n = 1; % = NR
Depression- upper limb exercise only Sample size	n = 0; % = NR

Characteristic	Study (N = 73)
Heart disease- WBV + exercise Sample size	n = 5; % = NR
Heart disease- Exercise without WBV Sample size	n = 7; % = NR
Heart disease- upper limb exercise only Sample size	n = 4; % = NR

Outcomes

Study timepoints

12-month

Number of fallers

Outcome	Strength and balance program combined with whole body vibration, 12-month, N = 22	Strength and balance program without whole body vibration, 12-month, N = 23	Upper limb exercises only, 12-month, N = 22
Number of fallers Custom value	3	5	4
Adverse events Nominal	0	0	0

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Number of fallers – Number of fallers - Strength and balance program combined with whole body vibration-Strength and balance program without whole body vibration-Upper limb exercises only

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to limited information provided regarding the method of analysis)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Number of fallers – Adverse events – Nominal - Strength and balance program combined with whole body vibration-Strength and balance program without whole body vibration-Upper limb exercises only

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to limited information provided regarding the method of analysis)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Number of fallers – Number of fallers – Custom Value 0 - Strength and balance program combined with whole body vibration - Strength and balance program without whole body vibration-Upper limb exercises only-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to limited information provided regarding the method of analysis)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Number of fallers – Adverse events – Nominal - Strength and balance program combined with whole body vibration - Strength and balance program without whole body vibration-Upper limb exercises only-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to limited information provided regarding the method of analysis)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Lauriks, 2020

Bibliographic Reference	**Lauriks, Steve; Meiland, Franka; Oste, Johan P; Hertogh, Cees; Droes, Rose-Marie; Effects of Assistive Home Technology on quality of life and falls of people with dementia and job satisfaction of caregivers: Results from a pilot randomized controlled trial.; Assistive technology: the official journal of RESNA; 2020; vol. 32 (no. 5); 243-250**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	NA
Study location	The Netherlands
Study setting	Group homes
Study dates	Not specified
Sources of funding	Funded by the Dutch Ministry of Public Health, Welfare and Sport
Inclusion criteria	Residents that had an indication for long-stay psychogeriatric treatment from the National Centre for Health Care indications (CIZ) and were eligible for group housing as assessed by a physician of the care institution
Exclusion criteria	The presence of severe behavioural problems
Recruitment / selection of participants	Participants were recruited from 9 group homes in a residential care facility in Amsterdam

Intervention(s)	Assistive home technology
Population subgroups	NA
Comparator	Control
Number of participants	54
Duration of follow-up	Follow-up period noted, but not specified
Indirectness	Indirectness was not a concern for this study
Additional comments	

Study arms

Group homes with assistive home technology (N = 30)

Group homes without assistive home technology (N = 24)

Characteristics

Study-level characteristics

Characteristic	Study (N = 54)
% Female Sample size	n = NA; % = NA
Assistive home technology Sample size	n = NA; % = 63
Control Sample size	n = NA; % = 67
Mean age (SD) Mean (SD)	NA (NA)
Assistive home technology Mean (SD)	84.3 (5.6)
Control Mean (SD)	83.1 (7.1)
Comorbidities	n = NA; % = NA

Characteristic	Study (N = 54)
Sample size	
Dementia of the Alzheimer's type - AHT Sample size	n = NA; % = 53
Dementia of the Alzheimer's type- Control Sample size	n = NA; % = 33
Dementia due to multiple aetiologies. - AHT Sample size	n = NA; % = 23
Dementia due to multiple aetiologies- Control Sample size	n = NA; % = 29
Vascular dementia- AHT Sample size	n = NA; % = 17
Vascular dementia- Control Sample size	n = NA; % = 17
Dementia not otherwise specified- AHT Sample size	n = NA; % = 7
Dementia not otherwise specified- Control Sample size	n = NA; % = 13

Characteristic	Study (N = 54)
Dementia due to other general medical conditions- AHT Sample size	n = NA; % = 0
Dementia due to other general medical conditions- Control Sample size	n = NA; % = 8

Outcomes

Study timepoints

Study states ‘post-intervention’

Fall incidents

Outcome	Group homes with assistive home technology, N = 30	Group homes without assistive home technology, N = 24
Fall incidents Custom value	54	83
Number of fallers Custom value	13	16

Observed Quality of Life Domains

Outcome	Group homes with assistive home technology, N = 29	Group homes without assistive home technology, N = 24
Care relationship - Baseline Mean (SD)	17.34 (3.73)	14.13 (4.5)
Care relationship- post-test Mean (SD)	16.83 (3.59)	13.42 (4.93)
Positive affect- Baseline Mean (SD)	14.1 (3.3)	14.21 (2.54)
Positive affect- post-test Mean (SD)	13.59 (3.63)	14.29 (3.2)
Negative affect - Baseline Mean (SD)	6.93 (2.12)	4.96 (2.26)
Negative affect- post-test Mean (SD)	5.7 (2.64)	4.88 (2.85)
Restless behaviour- Baseline Mean (SD)	5.28 (2.64)	5.21 (2.67)
Restless behaviour- post-test Mean (SD)	5.31 (2.78)	4.38 (2.62)

Positive self-image- Baseline Mean (SD)	7.03 (2.24)	6.21 (2.47)
Positive self-image- post-test Mean (SD)	6.48 (2.13)	5.92 (2.75)
Social relations- Baseline Mean (SD)	12.59 (3.64)	12.42 (3.55)
Social relations- post-test Mean (SD)	12.41 (3.74)	11.75 (3.55)
Social isolation - Baseline Mean (SD)	7.07 (2.22)	6.21 (2.41)
Social isolation- post-test Mean (SD)	7.28 (2.07)	5.29 (2.27)
Feeling at home- Baseline Mean (SD)	9.66 (2.44)	8.42 (4.15)
Feeling at home- post-test Mean (SD)	9.03 (2.75)	7.58 (4.18)
Having things to do- Baseline Mean (SD)	2.62 (2.19)	2.96 (2.16)

Having things to do- Post-test Mean (SD)	3.14 (2.2)	2.58 (1.93)

QUALIDEM

Self-rated quality of life domains

Outcome	Group homes with assistive home technology, N = 30	Group homes without assistive home technology, N = 24
Aesthetics - Baseline Mean (SD)	17.15 (3.39)	16.71 (2.87)
Aesthetics- Post-test Mean (SD)	17.33 (2.57)	16.67 (2.94)
Feeling at home- Baseline Mean (SD)	8.38 (2.26)	8.86 (1.68)
Feeling at home- post-test Mean (SD)	10.33 (1.67)	9 (1.41)
Negative affect- Baseline Mean (SD)	40.77 (8.31)	41.71 (3.04)
Negative affect- post-test Mean (SD)	43.42 (5.68)	40.33 (7.31)
Positive affect- Baseline	20.77 (3.47)	18.86 (2.73)

Mean (SD)		
Positive affect- post-test Mean (SD)	22.08 (3.23)	18.67 (3.5)
Self-confidence- Baseline Mean (SD)	13 (1.23)	12 (1.63)
Self-confidence- Post-test Mean (SD)	13.5 (1.24)	12.67 (1.63)
Quality of life- Baseline Mean (SD)	2.62 (0.87)	2.43 (0.54)
Quality of life- Post-test Mean (SD)	3 (0.6)	2.67 (0.52)
Total- Baseline Mean (SD)	102.69 (10.63)	100.57 (7.7)
Total- Post-test Mean (SD)	109.67 (7.98)	100 (13.89)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls incidents – Falls incidents - Group homes with assistive home technology -Group homes without assistive home technology

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(High risk of bias regarding the randomisation process and no pre-specified protocol)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Fall incidents – Fall incidents – Number of fallers - Group homes with assistive home technology -Group homes without assistive home technology

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(High risk of bias regarding the randomisation process and no pre-specified protocol)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Lexow, 2022

Bibliographic Reference	**Lexow, M; Wernecke, K; Sultzer, R; Bertsche, T; Schiek, S; Determine the impact of a structured pharmacist-led medication review - a controlled intervention study to optimise medication safety for residents in long-term care facilities.; BMC geriatrics; 2022; vol. 22 (no. 1); 307**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	German Clinical Trials Register, DRKS00026120
Study location	Leipzig, Germany
Study setting	3 long-term care facilities with different ownership (welfare, municipal, and private associations)
Study dates	NA
Sources of funding	Open Access funding enabled and organized by Projekt DEAL. One of the authors was financially supported by the Lesmueller Foundation, Munich, Germany, the German Pharmacist Foundation, Berlin, Germany and the Pharmacist Foundation Westfalen-Lippe, Muenster, Germany.
Inclusion criteria	Aged 65 years or older, 3 or more long-term/ chronic medicines (without counting pro re nata (PRN) medications), multimorbidity with 3 or more conditions, and written informed consent.

Exclusion criteria	If life expectancy was assessed less than 6 months according to the present health information or if participant was declined.
Recruitment / selection of participants	Participants were invited to participate based on those that lived in specific rooms.
Intervention(s)	Pharmacist-led medication review
Population subgroups	NA
Comparator	Usual care
Number of participants	211 participants
Duration of follow-up	T0 to T1 time period= 6 weeks to 3 months T1 to T2= 3 months
Indirectness	Indirectness was not a concern for this study
Additional comments	NA

Study arms

Pharmacist-led medication review (N = 107)

Usual care (N = 104)

Characteristics

Study-level characteristics

Characteristic	Study (N = 211)
% Female Sample size	n = NA; % = NA
Pharmacist-led medication review Sample size	n = 72; % = 67
Usual Care Sample size	n = 75; % = 72
Mean age (SD) Median (IQR)	NA (NA to NA)
Pharmacist-led medication review Median (IQR)	86 (81 to 90)
Usual Care Median (IQR)	86 (78 to 90)
Comorbidities	n = NA; % = NA

Characteristic	Study (N = 211)
Sample size	
Dementia- Pharmacist-led medication review Sample size	n = 69; % = 64
Dementia- Usual care Sample size	n = 69; % = 66
Diabetes- Pharmacist-led medication review Sample size	n = 48; % = 45
Diabetes- Usual care Sample size	n = 41; % = 39
Hypertension- Pharmacist-led medication review Sample size	n = 87; % = 81
Hypertension- Usual care Sample size	n = 82; % = 79
Renal failure- Pharmacist-led medication review Sample size	n = 26; % = 24
Renal failure- Usual care Sample size	n = 24; % = 23

Characteristic	Study (N = 211)
Faecal incontinence- Pharmacist-led medication review Sample size	n = 19; % = 18
Faecal incontinence- Usual care Sample size	n = 16; % = 15
Urinary incontinence- Pharmacist-led medication review Sample size	n = 31; % = 29
Urinary incontinence- Usual care Sample size	n = 39; % = 38

Outcomes

Falls at T1

Outcome	Pharmacist-led medication review, , N = 103	Usual care, N = 103
Number of falls No of events	n = 20; % = 19	n = 17; % = 13
Number of fallers Number of nursing home residents Sample size	n = 20; % = NA	n = 13; % = NA

Falls at T2

Outcome	Pharmacist-led medication review, N = 96	Usual care, N = 95
Number of falls, No of events	n = 59; % = 41	n = 59; % = 35
Number of fallers. Number of nursing home residents. Sample size	n = 39; % = NA	n = 33; % = NA

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls at T1 – Number of falls - No of events – Pharmacist - led medication review -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(The study identified sources of concern for risk of bias with regards to the randomisation process and no pre-specified protocol)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls at T2 – Number of falls – No of events – Pharmacist - led medication review - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(The study identified sources of concern for risk of bias with regards to the randomisation process and no pre-specified protocol)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Logan, 2022

Bibliographic Reference	**Logan, Philippa A; Horne, Jane C; Allen, Frances; Armstrong, Sarah J; Clark, Allan B; Conroy, Simon; Darby, Janet; Fox, Chris; Gladman, John Rf; Godfrey, Maureen; Gordon, Adam L; Irvine, Lisa; Leighton, Paul; McCartney, Karen; Mountain, Gail; Robertson, Kate; Robinson, Katie; Sach, Tracey H; Stirling, Susan; Wilson, Edward Cf; Sims, Erika J; A multidomain decision support tool to prevent falls in older people: the FinCH cluster RCT.; Health technology assessment (Winchester, England); 2022; vol. 26 (no. 9); 1-136**

Study details

Secondary publication of another included study- see primary study for details	Logan, 2021- see for details
Other publications associated with this study included in review	Logan, 2021
Trial name / registration number	ISRCTN34353836.
Study type	Cluster randomised controlled trial
Study location	England
Study setting	Care homes
Inclusion criteria	Residents were included if they were living as a long-term resident in a recruited home and were not in receipt of end-of-life care.
Exclusion criteria	

Recruitment / selection of participants	Adult care homes (with or without nursing) in England were studied.
Population subgroups	NA
Duration of follow-up	12 months

Study arms

GtACH (N = 630)

Usual care (N = 712)

Logan, 2021

Bibliographic Reference	**Logan, Pip A; Horne, Jane C; Gladman, John R F; Gordon, Adam L; Sach, Tracey; Clark, Allan; Robinson, Katie; Armstrong, Sarah; Stirling, Sue; Leighton, Paul; Darby, Janet; Allen, Fran; Irvine, Lisa; Wilson, Ed C F; Fox, Chris; Conroy, Simon; Mountain, Gail; McCartney, Karen; Godfrey, Maureen; Sims, Erika; Multifactorial falls prevention programme compared with usual care in UK care homes for older people: multicentre cluster randomised controlled trial with economic evaluation.; BMJ (Clinical research ed.); 2021; vol. 375; e066991**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	Logan, 2022 HTA (13579003)
Trial name / registration number	FinCH study/ Not specified
Study type	Cluster randomised controlled trial
Study location	United Kingdom
Study setting	Long term care homes
Study dates	November 2016 to January 2018

Sources of funding	This study was funded by the National Institute for Health Research (NIHR) HTA programme (ref 13/115/29). PAL, JCH, JRFG, and ALG are funded in part by the NIHR Applied Research Collaboration East Midlands (ARC-EM). PAL, JRFG, and ALG are funded in part by the NIHR Nottingham Biomedical Research Centre.
Inclusion criteria	Not directly specified
Exclusion criteria	Care home was not prepared to allocate a falls champion, contains an existing falls programme, participated in previous studies, resident with a learning disability, currently under review.
Recruitment / selection of participants	84 care homes were included
Intervention(s)	Guide to Action Care Home (GtACH) programme
Population subgroups	NA
Comparator	Usual care
Number of participants	1657 participants
Duration of follow-up	12 months
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention-to-treat analyses

Study arms

Multifactorial intervention- Guide to Action for Care Homes (GtACH) (N = 775)

Usual care (N = 882)

Characteristics

Study-level characteristics

Characteristic	Study (N = 1657)
Mean age (SD) Mean (SD)	85 (9.3)
GtACH group Mean (SD)	86 (8.6)
Usual Care Mean (SD)	84.2 (9.7)
Comorbidities Sample size	n = NA; % = NA
Dementia- Total Sample size	n = 1109; % = 67
Dementia- GtACH group Sample size	n = 506; % = 65.4
Dementia- Usual care	n = 603; % = 68.4

Characteristic	Study (N = 1657)
Sample size	
Diabetes- Total Sample size	n = 320; % = 19.3
Diabetes- GtACH group Sample size	n = 150; % = 19.4
Diabetes- Usual care Sample size	n = 170; % = 19.3
Stroke- Total Sample size	n = 262; % = 15.8
Stroke- GtACH group Sample size	n = 118; % = 15.2
Stroke- Usual care Sample size	n = 144; % = 16.3
Coronary heart disease- Total Sample size	n = 234; % = 14.1
Coronary heart disease- GtACH group Sample size	n = 118; % = 15.2

Characteristic	Study (N = 1657)
Coronary heart disease- Usual care Sample size	n = 144; % = 16.3

Outcomes

Falls

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 630	Usual care, N = 712
Mean falls per participant 91-180 days Mean (SD)	0.49 (1.13)	0.89 (2.6)
Mean fall rate per 1000 resident days 91-180 days Mean (SD)	6.04 (14.02)	10.38 (29.52)

Fall rates (1-90 days)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 708	Usual care, N = 826
Fall rates 1-90 days Mean (SD)	6.93 (20.56)	10.24 (27.26)

Fall rates (181- 270 days)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 547	Usual care, N = 633
Fall rates 181-270 days Mean (SD)	7.28 (16.67)	9.21 (28.77)

Fall rates (271-360 days)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 502	Usual care, N = 573
Fall rates 271-360 days Mean (SD)	6.22 (12.88)	9.22 (27.36)
IRR (95%CI) Mean (95% CI)	0.93 (0.71 to 1.22)	NA (NA to NA)

Fractures (1 or more)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 775	Usual care, N = 822
Fractures No of events	n = 33; % = 4.3	n = 42; % = 4.8

0-180 days

Fractures (1 or more)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 600	Usual care, N = 685
Fractures No of events	n = 9; % = 1.5	n = 26; % = 3.8

181-360 days

Fallers (1 or more)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 708	Usual care, N = 826
Fallers Sample size	n = 194; % = 27.4	n = 266; % = 32.2

1-90 days

Fallers (1 or more)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 630	Usual care, N = 712
Fallers Sample size	n = 167; % = 26.5	n = 216; % = 30.3

91-180 days

Fallers (1 or more)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 547	Usual care, N = 633
Fallers Sample size	n = 165; % = 30.2	n = 187; % = 29.5

181-270 days)

Falls (1 or more)

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 502	Usual care, N = 573
Fallers Sample size	n = 147; % = 29.3	n = 175; % = 30.5

271-360 days

Quality of life

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 622	Usual care, N = 718
EQ-5D Proxy based QALYs Mean (SD)	0.27 (0.32)	0.23 (0.29)

EQ-5D-5L

Quality of life

Outcome	Multifactorial intervention- Guide to Action for Care Homes (GtACH), N = 611	Usual care, N = 708
DEMQOL Mean (SD)	0.58 (0.24)	0.58 (0.24)

Dementia quality of life utility measures (DEMQOL)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls – Mean falls per participant – Mean SD -Multifactorial intervention- Guide to Action for Care Homes (GtACH) -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls – Mean fall rate per 1000 resident days – Mean SD -Multifactorial intervention- Guide to Action for Care Homes (GtACH) -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Fall rates(1-90days)-Fall rates -Mean SD - Multifactorial intervention - Guide to Action for Care Homes (GtACH) -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Fall rates (181-270 days) – Fall rates – Mean SD - Multifactorial intervention - Guide to Action for Care Homes (GtACH) - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Fall rates (271-360 days) – Fall rates – Mean SD - Multifactorial intervention - Guide to Action for Care Homes (GtACH) - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Fractures (1 or more) – Fractures – No of Events - Multifactorial intervention - Guide to Action for Care Homes (GtACH) - Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Quality of life – DEMQOL – Mean SD - Multifactorial intervention - Guide to Action for Care Homes (GtACH) -Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Quality of life - EQ-5D – Mean SD - Multifactorial intervention - Guide to Action for Care Homes (GtACH)-Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Mackey, 2019

Bibliographic Reference	**Mackey, Dawn C; Lachance, Chantelle C; Wang, Peiwei T; Feldman, Fabio; Laing, Andrew C; Leung, Pet M; Hu, X Joan; Robinovitch, Stephen N; The Flooring for Injury Prevention (FLIP) Study of compliant flooring for the prevention of fall-related injuries in long-term care: A randomized trial.; PLoS medicine; 2019; vol. 16 (no. 6); e1002843**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	NCT01618786
Study type	Randomised controlled trial (RCT)
Study location	Canada
Study setting	Long-term care site
Study dates	September 2013 to August 2017
Sources of funding	The Canadian Institutes of Health Research (grant TIR103945 to SNR) and AGE-WELL, Inc., a Canadian National Centre for Excellence (grant to SNR). Financial and in-kind contributions were provided by partner organizations: 1. Fraser Health Authority; 2. Centre for Hip Health and Mobility; and 3. New Vista Society Care Home. SATECH Inc. provided SmartCells

	flooring, flooring installation materials (e.g., adhesive, tape, and transitions), and labour for flooring installation. DCM was supported by a Michael Smith Foundation for Health Research Scholar Award. CCL was supported by a Canadian Institutes of Health Research Frederick Banting and Charles Best Canada Graduate Scholarship and an AGE-WELL Graduate Student and Postdoctoral Award in Technology and Aging. XJH was supported by a Natural Sciences and Engineering Research Council of Canada Discovery Grant. SNR was supported by a Canada Research Chair Award from 2011-2016.
Inclusion criteria	Not specified
Exclusion criteria	If existing floor could not accommodate the intervention floor or if residents used a wheelchair
Recruitment / selection of participants	Resident rooms located within five residential villages (units)
Intervention(s)	Compliant flooring (Smart Cells)
Population subgroups	NA
Comparator	Plywood flooring
Number of participants	357 participants
Duration of follow-up	4 years
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention to treat

Study arms

Intervention compliant flooring (N = 184)

Control plywood flooring (N = 173)

Characteristics

Study-level characteristics

Characteristic	Study (N = 357)
% Female Sample size	n = 229; % = 64.3
Compliant flooring Sample size	n = 119; % = 64.7
Control flooring Sample size	n = 110; % = 64
Mean age (SD) Mean (SD)	81.7 (9.5)
Compliant flooring Mean (SD)	81.2 (9.9)
Control flooring Mean (SD)	82.1 (9.1)
Comorbidities	n = NA; % = NA

Sample size	
Visual impairment- Total Sample size	n = 106; % = 29.7
Visual impairment- Compliant flooring Sample size	n = 54; % = 29.4
Visual impairment- Control flooring Sample size	n = 52; % = 30.1
CVD- Total Sample size	n = 32; % = 9
CVD- Compliant flooring Sample size	n = 18; % = 9.8
CVD- Control flooring Sample size	n = 14; % = 8.1
Hypertension- Total Sample size	n = 135; % = 37.8
Hypertension- Compliant flooring Sample size	n = 64; % = 34.8
Hypertension- Control flooring	n = 71; % = 41

Sample size	
Stroke or TIA- Total Sample size	n = 32; % = 9
Stroke or TIA- Compliant flooring Sample size	n = 18; % = 9.8
Stroke or TIA- Control flooring Sample size	n = 14; % = 8.1
Arthritis- Total Sample size	n = 83; % = 23.3
Arthritis- Compliant flooring Sample size	n = 39; % = 21.2
Arthritis- Control flooring Sample size	n = 44; % = 25.6
Osteoporosis- Total Sample size	n = 44; % = 12.3
Osteoporosis- Compliant flooring Sample size	n = 23; % = 12.5
Osteoporosis - Control flooring	n = 21; % = 12.1

Sample size	
Alzheimer's disease- Total Sample size	n = 56; % = 15.7
Alzheimer's disease- Compliant flooring Sample size	n = 29; % = 15.8
Alzheimer's disease- control flooring Sample size	n = 27; % = 15.6
Dementia- Total Sample size	n = 196; % = 54.9
Dementia- Compliant flooring Sample size	n = 104; % = 56.5
Dementia- Control flooring Sample size	n = 92; % = 53.2
Depression- Total Sample size	n = 46; % = 12.9
Depression- Compliant flooring Sample size	n = 27; % = 14.7
Depression- Control flooring	n = 19; % = 11

Sample size	
Parkinson's disease- Total Sample size	n = 16; % = 4.5
Parkinson's disease - Compliant flooring Sample size	n = 7; % = 3.8
Parkinson's disease- Control flooring Sample size	n = 9; % = 5.2
Hip fracture (past 180 days)- Total Sample size	n = 5; % = 1.4
Hip fracture (past 180 days)- Compliant flooring Sample size	n = 2; % = 1.1
Hip fracture (past 180 days)- control flooring Sample size	n = 3; % = 1.7

Outcomes

Fall-related fracture

Outcome	Intervention compliant flooring, N = 184	Control plywood flooring, N = 173
Fall-related fractures No of events	n = 8; % = 21.1	n = 10; % = 21.3

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Fall-relatedfracture-Fall-relatedfractures-NoOfEvents-Intervention compliant flooring -Control plywood flooring

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias)*
Overall bias and Directness	Overall Directness	Partially applicable *(Partially applicable)*

Mak, 2022

Bibliographic Reference	Mak, Allison; Delbaere, Kim; Refshauge, Kathryn; Henwood, Timothy; Goodall, Stephen; Clemson, Lindy; Hewitt, Jennifer; Taylor, Morag E; Sunbeam Program Reduces Rate of Falls in Long-Term Care Residents with Mild to Moderate Cognitive Impairment or Dementia: Subgroup Analysis of a Cluster Randomized Controlled Trial.; Journal of the American Medical Directors Association; 2022; vol. 23 (no. 5); 743-749e1

Study details

Secondary publication of another included study- see primary study for details	Hewitt, 2018 (13579131)
Other publications associated with this study included in review	Hewitt, 2018 (13579131)
Trial name / registration number	ACTRN12613000179730
Study type	Cluster randomised controlled trial
Study location	Australia
Study setting	Long-term care residence
Study dates	Not specified
Sources of funding	Not specified

Inclusion criteria	Participants aged 65 years or older, permanently residing in care, understood sufficient English to understand the participant information statement and complete the consent process
Exclusion criteria	They had a diagnosis of terminal or unstable illness, were denied medical clearance for participation, had participated in a similar balance and resistance training program in the 12 months prior, were permanently bed- or wheelchair-bound, had advanced Parkinson disease with symptoms precluding safe inclusion as assessed by a medical professional, or had moderate-severe cognitive impairment
Recruitment / selection of participants	Participants included in the current study were a subgroup from the original study, identified as having a mild to moderate cognitive impairment/dementia.
Intervention(s)	The intervention contained 2 stages. The first stage included an individually prescribed, supervised, and progressive resistance and balance training program performed for 1 hour twice per week for a period of 25 weeks. Each participant completed the exercises in a circuit which included pneumatic resistance training and balance exercise training. Participants exercised in groups of 10 people. Stretching was completed as a cooldown at the end of each session. The second stage consisted of a maintenance program that included resistance, weight-bearing, balance, and functional group exercises that were not progressed in dosage or intensity. Sessions were conducted for 30 minutes twice per week over a period of 6 months by trained residence staff or volunteers.
Population subgroups	Addenbrooke’s Cognitive Examination-Revised (ACE-R) <83
Comparator	Usual care
Duration of follow-up	6 months
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention-to-treat approach

Study arms

Sunbeam program (N = 76)

Usual care (N = 72)

Characteristics

Study-level characteristics

Characteristic	Study (N = 148)
% Female Sample size	n = 94; % = 64
Sunbeam program Sample size	n = 47; % = 62
Usual care Sample size	n = 47; % = 65
Mean age (SD) Mean (95% CI)	86.6 (85.6 to 87.6)
Sunbeam program Mean (95% CI)	86 (84.8 to 87.3)
Usual Care Mean (95% CI)	87.2 (85.7 to 88.7)
Comorbidities	n = NA; % = NA

Sample size	
Anxiety- Total Sample size	n = 34; % = 23
Anxiety- Sunbeam program Sample size	n = 24; % = 32
Anxiety- Usual care Sample size	n = 10; % = 14
Depression- Total Sample size	n = 55; % = 37
Depression- Sunbeam program Sample size	n = 34; % = 45
Depression- Usual care Sample size	n = 21; % = 29
Cardiac disease- Total Sample size	n = 65; % = 44
Cardiac disease- Sunbeam program Sample size	n = 36; % = 47
Cardiac disease- Usual care	n = 29; % = 40

Sample size	
Cerebrovascular disease/stroke- Total Sample size	n = 26; % = 18
Cerebrovascular disease/stroke- Sunbeam program Sample size	n = 16; % = 21
Cerebrovascular disease/stroke- Usual care Sample size	n = 10; % = 14
Hypertension- Total Sample size	n = 87; % = 59
Hypertension- Sunbeam program Sample size	n = 45; % = 59
Hypertension- Usual care Sample size	n = 42; % = 58
Incontinence- Total Sample size	n = 32; % = 22
Incontinence- Sunbeam program Sample size	n = 23; % = 30
Incontinence- Usual care	n = 9; % = 13

Sample size	
Parkinson's disease- Total Sample size	n = 4; % = 3
Parkinson's disease- Sunbeam program Sample size	n = 4; % = 5
Parkinson's disease- Usual care Sample size	n = 0; % = 0
Dementia- Total Sample size	n = 43; % = 29
Dementia- Sunbeam program Sample size	n = 28; % = 37
Dementia- Usual care Sample size	n = 15; % = 21

Outcomes

Falls

Outcome	Sunbeam program, N = 76	Usual care, N = 72
Fall rates per person-year Mean (95% CI)	1.53 (1.27 to 1.84)	2.96 (2.58 to 3.4)
Number of fallers (with 1 or more falls) Sample size	n = 35; % = 46	n = 48; % = 67
Number of multiple fallers (2 or more falls) Sample size	n = 21; % = 28	n = 33; % = 46
Number of injurious fallers Sample size	n = 22; % = 29	n = 37; % = 51
Total number of falls Custom value	111	199
Total number of injurious falls Custom value	51	102

Martinez-Velilla, 2021

Bibliographic Reference	**Martinez-Velilla, Nicolas; Valenzuela, Pedro L; Saez de Asteasu, Mikel L; Zambom-Ferraresi, Fabricio; Ramirez-Velez, Robinson; Garcia-Hermoso, Antonio; Librero-Lopez, Julian; Gorricho, Javier; Perez, Federico Esparza; Lucia, Alejandro; Izquierdo, Mikel; Effects of a Tailored Exercise Intervention in Acutely Hospitalized Oldest Old Diabetic Adults: An Ancillary Analysis.; The Journal of clinical endocrinology and metabolism; 2021; vol. 106 (no. 2); e899-e906**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	NCT02300896)
Study location	Spain
Study setting	Hospital
Study dates	1 February 2015 to 30 August 2017
Sources of funding	Funded by a Gobierno de Navarra project Resolución grant 2186/2014
Inclusion criteria	Aged ≥75 years, Barthel Index score ≥60 points, able to ambulate (with/ without assistance), and to communicate and collaborate with the research team.

Exclusion criteria	The expected length of stay < 6 days, very severe cognitive decline (i.e. Global Deterioration Scale score= 7), terminal illness, uncontrolled arrhythmias, acute pulmonary embolism and myocardial infarction, or extremity bone fracture in the past 3 months.
Recruitment / selection of participants	Acutely hospitalised patients who were randomly assigned to an intervention or control group within the first 48 hours of admission.
Intervention(s)	Tailored exercise intervention- 2 daily 20-minute training sessions (morning and evening). Morning sessions included individualised supervised progressive resistance, balance, and waking exercises. Participants performed 3 exercises involving mainly lower limb muscles (squats rising from a chair, leg press, and bilateral knee extension) and 1 involving upper body musculature (seated bench press). They were instructed to perform the exercises at a high speed to optimize muscle power output. Balance and gait retraining exercises gradually progressed in difficulty and included the following: semi-tandem foot standing, line walking, stepping practice, walking with small obstacles, proprioceptive exercises on unstable surfaces (e.g., foam pad sequence), altering the base of support, and weight transfer from one leg to the other. The evening session consisted of functional unsupervised exercises using light loads (e.g., knee extension and flexion, hip abduction) and walking along the corridor of the ACE unit, with a duration based on the clinical physical exercise guide “Vivifrail.”
Population subgroups	NA
Comparator	Usual care
Number of participants	103 participants
Duration of follow-up	3-month follow-up
Indirectness	Not a concern for this study
Additional comments	Intention-to-treat and per-protocol approaches were used. Sample: Acutely hospitalized elderly diabetic patients

Characteristics: Study-level characteristics

Characteristic	Study (N = 103)
% Female Sample size	n = NA; % = NA
Intervention Sample size	n = 25; % = 46.3
Control Sample size	n = 28; % = 57.1
Mean age (SD) Mean (SD)	NA (NA)
Intervention Mean (SD)	87 (4)
Control Mean (SD)	86 (5)

Outcomes

Falls during hospitalisation (% per group experiencing 1 or more falls)

Outcome	Study, , N = 103
Falls during hospitalisation No of events	n = NA; % = NA
Intervention No of events	n = NR; % = 0
Control No of events	n = NR; % = 0

Quality of Life

Outcome	Study, , N = 103
Quality of life Custom value	NA
Intervention Custom value	14.7 (8.5, 21.0)
Control Custom value	4.6 (-2.0, 11.3)

EuroQol-5D)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls during hospitalisation (% per group experiencing 1 or more falls) – Falls during hospitalisation – No of events

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias throughout)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls during hospitalisation (% per group experiencing 1 or more falls) – Falls during hospitalisation – Intervention – No of events

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias throughout)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls during hospitalisation (% per group experiencing 1 or more falls) – Falls during hospitalisation – Control – No of events

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias throughout)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Quality of Life – Quality of life - Intervention

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias throughout)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Quality of Life – Quality of life - Control

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias throughout)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Resnick, 2021

Bibliographic Reference	**Resnick, Barbara; Boltz, Marie; Galik, Elizabeth; Zhu, Shijun; The Impact of a Randomized Controlled Trial Testing the Implementation of Function-Focused Care in Assisted Living on Resident Falls, Hospitalizations, and Nursing Home Transfers.; Journal of aging and physical activity; 2021; vol. 29 (no. 6); 922-930**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	registration number: 03014570
Study location	United States
Study setting	Assisted living facility
Study dates	Not specified
Sources of funding	Supported by the National Institute for the Aging R01AG050516
Inclusion criteria	65 years or older, able to speak English, living in a participating assisted living setting at the time of recruitment, and able to recall at least one out of three words from the Mini-Cog.

Exclusion criteria	Enrolled in hospice
Recruitment / selection of participants	Participants were selected if they were residing at a participating assisted living facility.
Intervention(s)	Function-Focused Care for Assisted Living, Evidence Integration Triangle (FFC-AL-EIT)
Population subgroups	NA
Comparator	Function-Focused Care for Assisted Living, Education Only (FFC-AL-EO)
Number of participants	793 participants
Duration of follow-up	12 months
Indirectness	Indirectness was not a concern for this study
Additional comments	Intent-to-treat analyses

Study arms

FFC-AL-EIT (N = 440)

FFC-AC-EO (N = 341)

Characteristics

Study-level characteristics

Characteristic	Study (N = 794)
% Female Sample size	n = NA; % = NA
FFC-AL-EIT Sample size	n = 312; % = 70
FFC-AL-EO Sample size	n = 249; % = 72
Mean age (SD) Mean (SD)	NA (NA)
FFC-AL-EIT Mean (SD)	89.27 (7.31)
FFC-AL-EO Mean (SD)	89.76 (7.59)
Ethnicity Sample size	n = NA; % = NA
Hispanic or Latino- FFC-AL-EIT Sample size	n = 4; % = 1

Characteristic	Study (N = 794)
Hispanic or Latino- FFC-AL-EO Sample size	n = 3; % = 1
Not Hispanic or Latino- FFC-AL-EIT Sample size	n = 442; % = 99
Not Hispanic or Latino- FFC-AL-EO Sample size	n = 345; % = 99

Outcomes

Study timepoints

12 months

Number of falls

Outcome	FFC-AL-EIT, N = 440	FFC-AC-EO, N = 341
Number of falls Baseline No of events	n = 117; % = 26	n = 83; % = 24
Number of falls 12 months	n = 90; % = 20	n = 86; % = 25

Outcome	FFC-AL-EIT, N = 440	FFC-AC-EO, N = 341
No of events		

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Number of falls – Number of falls – No of Events-FFC-AL-EIT-FFC-AC-EO

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to missing outcome data)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Numberoffalls-Numberoffalls-NoOfEvents-FFC-AL-EIT-FFC-AC-EO-12 months

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to missing outcome data)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Rezola-Pardo, 2022

Bibliographic Reference	Rezola-Pardo, Chloe; Irazusta, Jon; Mugica-Errazquin, Itxaso; Gamio, Ines; Sarquis-Adamson, Yanina; Gil, Susana Maria; Ugartemendia, Maider; Montero-Odasso, Manuel; Rodriguez-Larrad, Ana; Effects of multicomponent and dual-task exercise on falls in nursing homes: The AgeingOn Dual-Task study.; Maturitas; 2022; vol. 164; 15-22

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	AgeingON Dual-Task Study/ ACTRN12618000536268
Study location	Spain
Study setting	Long term nursing homes
Study dates	Not specified
Sources of funding	This work was supported by the Basque Government [RIS316/07; SAN17/11; SAN18/09; SAN19/19, KK-2017/00085, IT922/16; IT1288- 19], the Gipuzkoa Provincial Council [“Etorkizuna Eraikiz”], and the University of the Basque Country (UPV/EHU) [PPG17/34; PPGA18/10; PPGA19/53]. Chloe Rezola was supported by fellowships from the University of the Basque Country (UPV/EHU: PIF15/248; DOCREC20/ 58).

Inclusion criteria	Participants aged 70 years or older, Barthel Index scores 50 or higher, Mini-examen Cognitive scores 20 or higher, and the ability to stand and walk (with or without assistive devices) for at least 10 meters.
Exclusion criteria	Not specified
Recruitment / selection of participants	Participants were recruited from 9 long term nursing homes from Gipuzkoa, Basque Country, Spain.
Intervention(s)	Participants in the dual-task group performed simultaneous cognitive training, which was applied to 4 out of the 8 resistance and balance exercises performed in each session to avoid cognitive fatigue and optimize dual-task training. The resistance exercises dual tasking was applied to included arm curl, leg flexion, standing on tips and heels and leg extension. Balance training exercises that included dual tasking were standing with both feet together, semi-tandem and tandem, stepping and circuit training. The physical exercises to which cognitive training was applied changed throughout the intervention, starting with analytic resistance exercises (arm curl) and progressing to more complex balance exercises (static and dynamic balance) by the end of the intervention.
Population subgroups	NA
Comparator	Multicomponent group underwent a twice-a-week 3-month individualized and progressive resistance and balance training program. Exercise intensity was individualized by estimating 1RM using the Brzycki equation on weeks 2 and 7 and started at low intensity (40 % of 1RM) and progressed to moderate intensity (70 % of 1RM). Balance exercises were also individualized, starting with simple static balance exercises and progressing to more complex exercises. All training sessions started with a 5-minute warm up and ended with 5 min of breathing and relaxation exercises.
Number of participants	85
Duration of follow-up	12 months
Indirectness	Directness is a concern for this study

Additional comments	Intention-to-treat analyses. Participants in the dual-task group experienced a higher monthly fall rate than those in the multicomponent group during the intervention, showing a 3.8 times greater risk of falling. There were no significant differences between groups in fall incidence during the intervention. Kaplan-Meier analysis revealed a lower fall incidence in the multicomponent group compared to the dual-task group, although it was not significant.

Study arms

Multicomponent training (N = 43)

Multicomponent dual task (N = 42)

Characteristics

Study-level characteristics

Characteristic	Study (N = 85)
% Female Sample size	n = NA; % = NA
Multicomponent group Sample size	n = 28; % = 65.1
Dual-task group	n = 29; % = 69.1

Characteristic	Study (N = 85)
Sample size	
Mean age (SD) Mean (SD)	NA (NA)
Multicomponent group Mean (SD)	85.3 (7.1)
Dual-task group Mean (SD)	84.9 (6.7)
Comorbidities Sample size	n = NA; % = NA
Dementia- Multicomponent group Sample size	n = 15; % = 34.9
Dementia- Dual-task group Sample size	n = 11; % = 26.2

Outcomes

Risk of falling

Outcome	Multicomponent training, N = 30	Multicomponent dual-task, N = 32
Risk of falling Custom value	IRR 2.59 (1.27-4.56)	IRR 3.79 (1.12-12.84)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Risk of falling – Risk of falling Multi component training – Multi component dual-task

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to missing outcome data)*
Overall bias and Directness	Overall Directness	Partially applicable *(Partially applicable)*

Roberts, 2020

Bibliographic Reference	**Roberts, Bronwyn; Holloway-Kew, Kara; Pretorius, Tatum; Hosking, Sarah; Kennedy, Alison; Armstrong, Katherine; Does 20-min rounding reduce falls in an aged-care setting? A pilot intervention study.; Geriatric nursing (New York, N.Y.); 2020; vol. 41 (no. 5); 579-584**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	Not specified
Study type	Randomised controlled trial (RCT)
Study location	Australia
Study setting	Aged care facilities
Study dates	December 2016 to June 2017

Sources of funding	The study was funded by the Western Alliance Academic Health Science Centre, a partnership for research collaboration between Deakin University, Federation University and 13 health service providers operating across western Victoria. One of the authors is supported by an Alfred Deakin Postdoctoral Research Fellowship.
Inclusion criteria	Participants aged 66-99 years, high falls risk with some cognitive impairment and had sustained at least one fall in the previous 12 months.
Exclusion criteria	No specific exclusion criteria
Recruitment / selection of participants	Six aged care facilities located in south-eastern Australia were invited to participate. 5 were included.
Intervention(s)	20-minute rounding, which included but was not limited to ensuring resident/ patient safety, asking if they need anything, toileting/ hygiene, ensuring essential items were in reach, pain management, comfort measures such as food, drink, warm/ cool enough, and completing an environmental scan and removing any risks.
Population subgroups	NA
Comparator	Usual care
Number of participants	54 participants
Duration of follow-up	Not specified
Indirectness	Indirectness was not a concern for this study
Additional comments	NA

Study arms

20-minute rounding observations (N = 20)

Control (N = 21)

Characteristics

Study-level characteristics

Characteristic	Study (N = 41)
% Female Sample size	n = 27; % = 63.4
20-minute rounding Sample size	n = 13; % = 65
Usual Care Sample size	n = 13; % = 61.9
Mean age (SD) Mean (SD)	87 (NR)
20-minute rounding Mean (SD)	87 (NR)
Usual Care Mean (SD)	85 (NR)

Outcomes

Study timepoints

6 months

Number of falls

Outcome	20-minute rounding observations, N = 20	Contro, N = 21
Number of falls Mean (95% CI)	4 (2.5 to 5.5)	2.3 (0.8 to 3.7)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Numberoffalls-Numberoffalls-20-minute rounding observations-Control

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(High concerns for bias due to deviations from the intended intervention, no specified protocol, and measurement of the outcome)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Sadaqa, 2024

Bibliographic Reference	**Sadaqa, Munseef; Debes, Wesam A; Nemeth, Zsanett; Bera-Baka, Zsofia; Vachtler-Szepesi, Marianna; Naczine Foldes, Loretta; Premusz, Viktoria; Hock, Marta; Multicomponent Exercise Intervention for Preventing Falls and Improving Physical Functioning in Older Nursing Home Residents: A Single-Blinded Pilot Randomised Controlled Trial.; Journal of clinical medicine; 2024; vol. 13 (no. 6)**

Study details

Trial name / registration number	NCT05835297
Study type	Randomised controlled trial (RCT)
Study location	Hungary
Study setting	Nursing home
Study dates	Published 2024
Sources of funding	Tempus Public Foundation and Stipendium Hungaricum Scholarship
Inclusion criteria	Individuals aged 65 years and over were recruited from a nursing home in Hungary. Following the eligibility assessment: aged 65 years or older, living in the nursing home; physically mobile (capable of ambulating/rising from a chair with or without assistance); not being under simultaneous specific physical activity/exercise investigations in other experimental studies or under other specific exercise rehabilitation programme; ability to follow verbal instructions.
Exclusion criteria	Exclusion criteria included being physically unable or medically unfit to participate in physical exercise after medical consultation and a Mini-Mental State Examination (MMSE) score <18.
Recruitment / selection of participants	Nursing home

Intervention(s)	Group-based multicomponent exercise: Moderate intensity, consisted of strength, balance, and aerobic exercises for older adults living in LTCFs; the exercise programme was designed based on the recommendations of the IAGG-GARN and the IAGG European Region Clinical Section on exercises for older adults living in LTCFs [46]. The programme followed 12 weeks of supervised sessions at the nursing home, conducted twice a week, on non-consecutive days for 45–60 min per session by physiotherapists working at the facility, as proposed by the IAGG-GARN. The exercise session comprised five min of warm-up (e.g., range of motion exercises of upper and lower extremities, followed by light walking), 10 min progressive static and dynamic balance exercises (e.g., semi-tandem, tandem, single-leg stand, reaching forward, walking in a line, tandem walking in a line, walking with changing directions, and walking forward, backward, and sideways along straight line), 15–20 min strength exercises performed through weight-bearing exercises and using free weights (e.g., one or two sets of 13–15 repetitions maximum of chair rises, knee extension and flexion, and heel raises); however, during the first week, low-intensity exercises with repetitions maximum up to 20 were performed with progression in intensity (i.e., increase speed of movement, change to a lower chair, and hold weight in hands), 15–20 min aerobic exercises (e.g., five 3 min bouts of walking between two strengthening exercises and/or between two balance exercises), and five min of cool down exercises of light walking and stretching exercises. Exercise intensity is intended to be moderate. When an individual improves the execution of an exercise, a progression was proposed by increasing exercise difficulty, duration of exercise, the number of repetitions to be performed, or exercise load.
Comparator	Usual care: Participated in routine low intensity activities usually offered to the residents at the nursing home.
Number of participants	24
Duration of follow-up	12-week
Additional comments	Pilot RCT

Study arms

Multicomponent exercise group (N = 12)

Usual care (N = 12)

Characteristics

Arm-level characteristics

Characteristic	Multicomponent exercise group (N = 12)	Usual care (N = 12)
% Female Nominal	75	66.7
Mean age (SD) Mean (SD)	78.3 (7)	78.5 (7.4)

Outcomes

Study timepoints

12-week

Continuous outcome

Outcome	Multicomponent exercise group, 12-week, N = 12	Usual care, 12-week, N = 12
Report of falls Mean (SD)	0.3 (0.9)	0.3 (0.5)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Continuous outcome – Report of falls – Mean SD - Multicomponent exercise group-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

Sluggett, 2020

Bibliographic Reference	**Sluggett, Janet K; Hopkins, Ria E; Chen, Esa Yh; Ilomaki, Jenni; Corlis, Megan; Van Emden, Jan; Hogan, Michelle; Caporale, Tessa; Ooi, Choon Ean; Hilmer, Sarah N; Bell, J Simon; Impact of Medication Regimen Simplification on Medication Administration Times and Health Outcomes in Residential Aged Care: 12 Month Follow Up of the SIMPLER Randomized Controlled Trial.; Journal of clinical medicine; 2020; vol. 9 (no. 4)**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	SIMPLER/ (ACTRN12617001060336)
Study type	Cluster randomised controlled trial
Study location	Australia
Study setting	Long-term care facilities and nursing homes
Study dates	April 2017 to June 2018
Sources of funding	National Health and Medical Research Council (NHMRC) Partnership Centre on Dealing with Cognitive and Related Functional Decline in Older People (Cognitive Decline Partnership Centre or CDPC). The CDPC receives support from the NHMRC and funding partners including Helping Hand Aged Care, Hammond Care, Brightwater and Dementia Australia.

Inclusion criteria	English-speaking permanent residents taking 1 or more medications regularly.
Exclusion criteria	Not specified
Recruitment / selection of participants	Residents from eight residential aged care facilities (RACFs), also known as long-term care facilities or nursing homes, that were operated by a South Australian not-for-profit aged care provider.
Intervention(s)	MRS GRACE- delivered by a clinical pharmacist with the purpose of simplifying patients' medication regimen.
Population subgroups	NA
Comparator	Usual care
Number of participants	241 participants
Duration of follow-up	12 months
Indirectness	Indirectness was not a concern for this study
Additional comments	Intention-to-treat approach

Study arms

Medication Regimen Simplification Guide for Residential Aged CarE (MRS GRACE) (N = 90)

Usual care (N = 143)

Characteristics

Study-level characteristics

Characteristic	Study (N = 241)
% Female Sample size	n = NA; % = NA
MRS GRACE Sample size	n = 67; % = 67.7
Control Sample size	n = 112; % = 78.3
Mean age (SD) Mean (SD)	NA (NA)
MRS GRACE Mean (SD)	85.7 (7.8)
Control Mean (SD)	86.2 (8.3)
Comorbidities	n = NA; % = NA

Characteristic	Study (N = 241)
Sample size	
Dementia- MRS GRACE Sample size	n = 54; % = 54.6
Dementia- Control Sample size	n = 77; % = 53.9

Outcomes

Falls

Outcome	Medication Regimen Simplification Guide for Residential Aged CarE (MRS GRACE), N = 98	Usual care, N = 143
Number of falls before study entry Custom value	300	421
Number of falls at 12-month follow-up Custom value	410	258
Number of residents who experienced a fall before study entry Sample size	n = 57; % = 58.1	n = 88; % = 61.5
Number of residents who experienced a fall at 12 months follow-up	n = 70; % = 71.4	n = 70; % = 48.9

Outcome	Medication Regimen Simplification Guide for Residential Aged CarE (MRS GRACE), N = 98	Usual care, N = 143
Sample size		

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls-Number of falls before study entry - Medication Regimen Simplification Guide for Residential Aged CarE (MRS GRACE)-Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to baseline differences of the groups)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls-Numberoffallsat12monthfollow-up-Medication Regimen Simplification Guide for Residential Aged CarE (MRS GRACE)-Usual care

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to baseline differences of the groups)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Toots, 2019

Bibliographic Reference	**Toots, Annika; Wiklund, Robert; Littbrand, Hakan; Nordin, Ellinor; Nordstrom, Peter; Lundin-Olsson, Lillemor; Gustafson, Yngve; Rosendahl, Erik; The Effects of Exercise on Falls in Older People with Dementia Living in Nursing Homes: A Randomized Controlled Trial.; Journal of the American Medical Directors Association; 2019; vol. 20 (no. 7); 835-842e1**

Study details

Secondary publication of another included study- see primary study for details	NA
Other publications associated with this study included in review	NA
Trial name / registration number	ISRCTN31767087
Study type	Cluster randomised controlled trial
Study location	Sweden
Study setting	Nursing home
Study dates	Not reported

Sources of funding	This work was supported by the Swedish Research Council (grant numbers K2009-69P-21298-01-4, K2009-69X-21299-01-1, K2009-69P-21298-04-4, K2014- 99X-22610-01-6); Forte e Swedish Research Council for Health, Working Life and Welfare (formerly FAS - Swedish Council for Working Life and Social Research); the Vårdal Foundation; the Swedish Dementia Association; the Promobilia Foundation; the Swedish Society of Medicine; the Swedish Alzheimer Foundation; the King Gustav V and Queen Victoria's Foundation of Freemasons; the European Union Bothnia-Atlantica Program; the County Council of Västerbotten, the Umeå University Foundation for Medical Research; the Ragnhild and Einar Lundström's Memorial Foundation; and the Erik and Anne-Marie Detlof's Foundation.
Inclusion criteria	Nursing home residents who had a Mini Mental State Examination (MMSE) score of at least 10, aged 65 years or older, dependent on assistance in at least one personal activities of daily living (ADL) (according to the Katz index), had the ability to stand up from a chair with armrests with assistance from no more than 1 person, and had the ability to hear and understand spoken Swedish sufficiently to participate.
Exclusion criteria	Younger than 65 years, independent in ADLs, require more than 1 person for help to stand, severely impaired hearing, not fluent in Swedish, MMSE score below 10, no dementia diagnosis, medical consent denied.
Recruitment / selection of participants	Participants with dementia who were part of the Umeå Dementia and Exercise Study (UMDEX) study.
Intervention(s)	High-intensity functional exercise program
Population subgroups	NA
Comparator	Seated attention control activity
Number of participants	186
Duration of follow-up	12 months
Indirectness	Indirectness was not a concern for this study

Additional comments	Intention-to-treat approach

Study arms

High intensity functional exercise program (N = 93)

Seated attention control activity (N = 93)

Characteristics

Study-level characteristics

Characteristic	Study (N = 186)
% Female Sample size	n = 141; % = 75.8
Exercise Sample size	n = 70; % = 75.3
Control Sample size	n = 71; % = 76.3
Mean age (SD) Mean (SD)	85.1 (7.1)
Exercise Mean (SD)	84.4 (6.2)
Control	85.9 (7.8)

Characteristic	Study (N = 186)
Mean (SD)	
Comorbidities Sample size	n = NA; % = NA
Depressive disorders- Total Sample size	n = 107; % = 57.5
Depressive disorders- Exercise Sample size	n = 53; % = 57
Depressive disorders- Control Sample size	n = 54; % = 58.1
Delirium in the previous week- Total Sample size	n = 102; % = 54.8
Delirium in the previous week- Exercise Sample size	n = 48; % = 51.6
Delirium in the previous week- Control Sample size	n = 54; % = 58.1
Previous stroke- Total Sample size	n = 57; % = 30.6

Characteristic	Study (N = 186)
Previous stroke- Exercise Sample size	n = 33; % = 35.5
Previous stroke- Control Sample size	n = 24; % = 25.8
Heart failure- Total Sample size	n = 56; % = 30.1
Heart Failure- Exercise Sample size	n = 24; % = 25.8
Heart Failure- Control Sample size	n = 32; % = 34.4
Myocardial infarction- Total Sample size	n = 37 ; % = 19.9
Myocardial infarction- Exercise Sample size	n = 19; % = 20.4
Myocardial infarction- Control Sample size	n = 18; % = 19.4
Previous hip fracture- Total	n = 53; % = 28.5

Characteristic	Study (N = 186)
Sample size	
Previous hip fracture- Exercise Sample size	n = 28; % = 30.1
Previous hip fracture- Control Sample size	n = 25; % = 26.9
Angina pectoris- Total Sample size	n = 49; % = 26.3
Angina pectoris- Exercise Sample size	n = 21; % = 22.6
Angina pectoris- Control Sample size	n = 28; % = 30.1
Diabetes mellitus- Total Sample size	n = 29; % = 15.6
Diabetes mellitus- Exercise Sample size	n = 18; % = 19.4
Diabetes mellitus- Control Sample size	n = 11; % = 11.8

Outcomes

Falls at 6 months

Outcome	High intensity functional exercise program, N = 87	Seated attention control activity, N = 89
1 or more falls No of events	n = 45; % = 52	n = 42; % = 47
Total falls Custom value	111	113
IR Custom value	2.7	2.8
IRR (95%CI) Custom value	0.9 (0.5-0.7)	NA

Falls at 12 months

Outcome	High intensity functional exercise program, N = 87	Seated attention control activity, N = 89
1 or more falls No of events	n = 57; % = 66	n = 61; % = 69
Total falls Custom value	232	241

Outcome	High intensity functional exercise program, N = 87	Seated attention control activity, N = 89
IR Custom value	3.0	3.2
IRR (95%CI) Custom value	0.9 (0.5, 1.6)	NA

Falls resulting in fractures

Outcome	High intensity functional exercise program, N = 93	Seated attention control activity, N = 93
Falls resulting in fractures (moderate injury) Custom value	1	10
Falls resulting in severe injury Custom value	4	4

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

Falls at 6 months-1 or more falls-No of Events-High intensity functional exercise program-Seated attention control activity

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to intervention adherence)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls at 6 months -Total falls-High intensity functional exercise program-Seated attention control activity

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to intervention adherence)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls at 12 months-1 or more falls -No of Events-High intensity functional exercise program-Seated attention control activity

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to intervention adherence)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls at 12 months-Total Falls-High intensity functional exercise program-Seated attention control activity

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to intervention adherence)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls resulting in fractures-Falls resulting in fractures (moderate injury)-High intensity functional exercise program-Seated attention control activity

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to intervention adherence)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Falls resulting in fractures- Falls resulting in severe injury-High intensity functional exercise program-Seated attention control activity

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for risk of bias due to intervention adherence)*
Overall bias and Directness	Overall Directness	Directly applicable *(Directly applicable)*

Varela, 2018

Bibliographic Reference	**Varela, Silvia; Cancela, Jose M; Seijo-Martinez, Manuel; Ayan, Carlos; Self-Paced Cycling Improves Cognition on Institutionalized Older Adults Without Known Cognitive Impairment: A 15-Month Randomized Controlled Trial.; Journal of aging and physical activity; 2018; vol. 26 (no. 4); 614-623**

Study details

Study type	Randomised controlled trial (RCT)
Study location	Spain
Study setting	Long-term care institution
Study dates	Published 2018
Sources of funding	This work was supported by the program ‘‘INCITE’’ Consellería de Industria Xunta de Galicia, Spain (grant no. 09SEC001374PR)
Inclusion criteria	Individuals with the following criteria were included: (a) age over 65 years (b) absence of clinical diagnosis of dementia (c) Mini-Examen Cognoscitivo (MEC) score > 24 (Lobo et al., 1999) (d) ability to stand and walk for at least 30 meters without shortness of breath (e) able to walk safely and independently without aid, and (f) resident in geriatric long-term care home facility in XX (Northwest Spain)
Exclusion criteria	Excluded were individuals with a clinical diagnosis of dementia or other medical conditions that hindered or prevented a full and complete participation in the evaluation tests.
Recruitment / selection of participants	This study analyzed data from the Geriatric and Fitness (GER-FIT) Study, a multicenter longitudinal intervention study of cognitive function, aging and exercise, in older persons living in long-term home care institutions. Participants in this study were recruited through a collaboration agreement between the University of XX (Spain) and “XX S.A”, a company for the management of residential care homes for the older adults.
Intervention(s)	Cycling: encouraged to cycle continuously in a recumbent bike at their self-selected intensity at least for 15 minutes every day for 15 months. A physiotherapist monitored the sessions and registered the amount of time that each patient exercised

	daily as well as his/her adherence to the program. The participants who did not complete a minimum of 70% of the total sessions each were excluded from the data analysis.
Comparator	usual care: usual routine activities offered by the residential-care institutions to the attendees including simple exercises of joint mobility, reading and morning visits, watching television, brief walks and afternoon visits, etc. This routine included one daily hour of recreational activities of the individual's choice (playing cards, playing board games, doing crossword puzzles, crafts, etc) performed freely and without supervision.

Study arms

Cycling (N = 25)

Usual care (N = 49)

Characteristics

Arm-level characteristics

Characteristic	Cycling (N = 25)	Usual care (N = 49)
% Female Nominal	47.05	31.81
Mean age (SD) Mean (SD)	77.94 (8.79)	83.59 (7.05)

Outcomes

Study timepoints

15-month

Contrast outcomes

Outcome	Cycling, 15-month, N = 17	Usual care, 15-month, N = 24
Rate of falls Log Rate ratio (SE)	-0.4 (0.3)	

Continuous outcomes

Outcome	Cycling, 15-month, N = 17	Usual care, 15-month, N = 24
Falls Mean (SD)	1 (0.35)	1.5 (0.51)

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

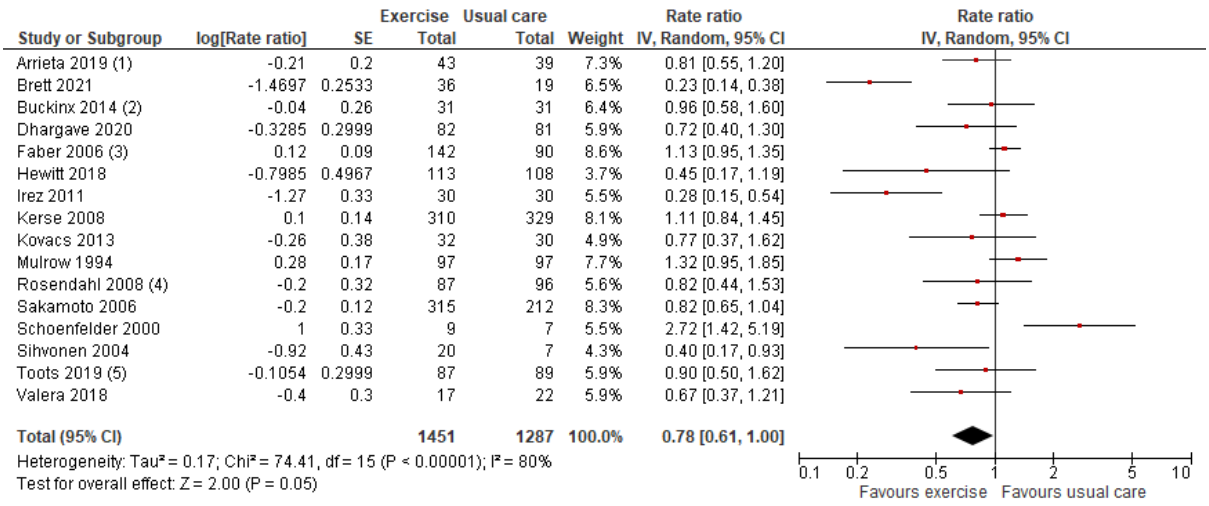
Continuous outcomes-Falls-Mean SD-Cycling-Usual care-t15

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(Missingness of data, differential between arms)*
Overall bias and Directness	Overall Directness	Directly applicable

Appendix E Forest plots

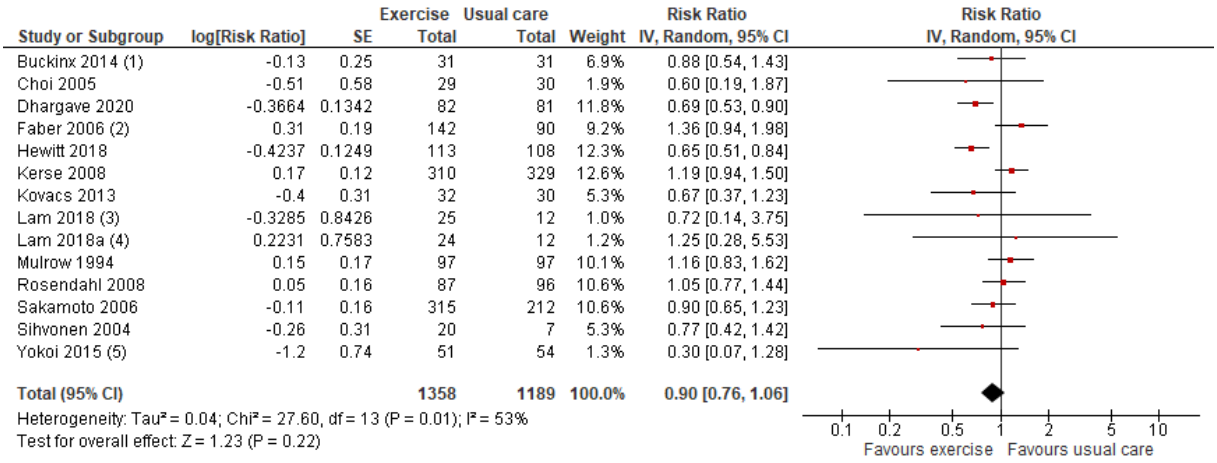
E.1 Interventions to prevent falls in residential care settings

Figure 2: Exercise versus usual care: rate of falls



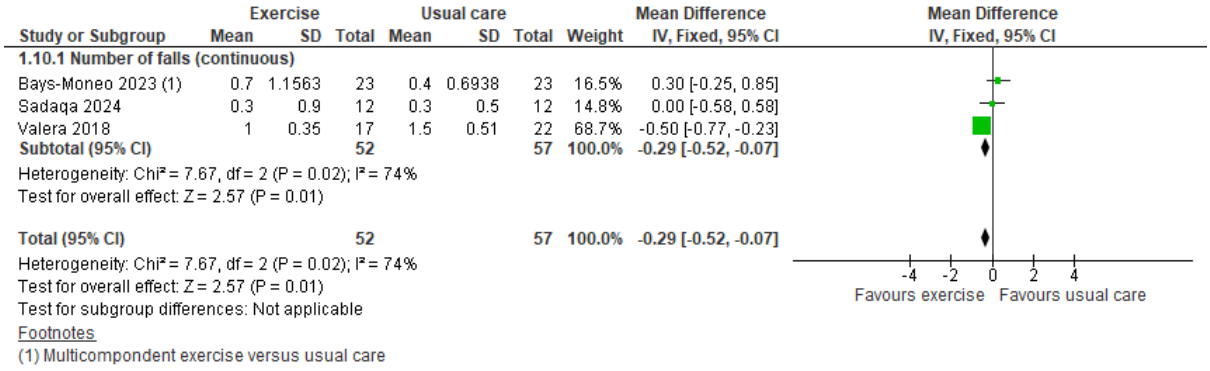
Footnotes
(1) Data taken from the systematic review Dyer 2023
(2) 12 months follow-up
(3) Functional Walking (FW) and In Balance groups (IB) combined vs control
(4) Functional exercise programme vs seated activities
(5) Adjusted for age, sex, antidepressants and cluster

Figure 3: Exercise versus usual care: number of fallers



Footnotes
(1) 12 months follow-up
(2) Functional Walking (FW) and In Balance (IB) groups combined vs control
(3) whole body vibration+exercise programme
(4) exercise programe (without whole body vibration)
(5) 12 month outcomes

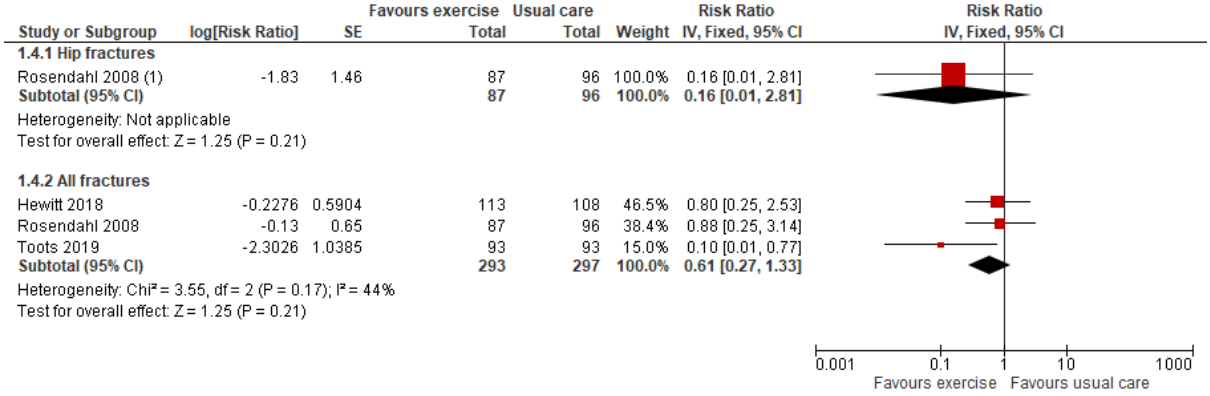
Figure 4: Exercise versus usual care: mean number of falls



Footnotes

(1) Multicompondent exercise versus usual care

Figure 5: Exercise versus usual care: number of people sustaining a fracture



Footnotes

(1) Functional exercise programme vs seated activities; mixed levels of care

Figure 6: Exercise versus usual care: adverse events

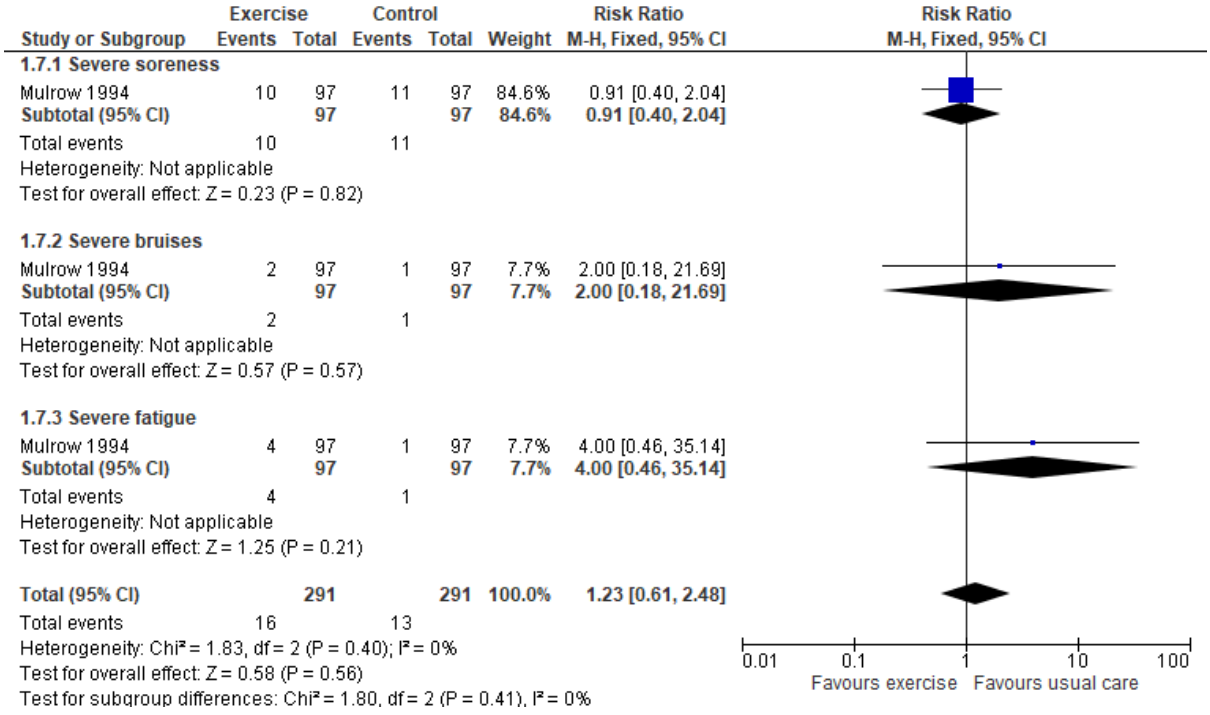


Figure 7: Exercise versus usual care: adverse events

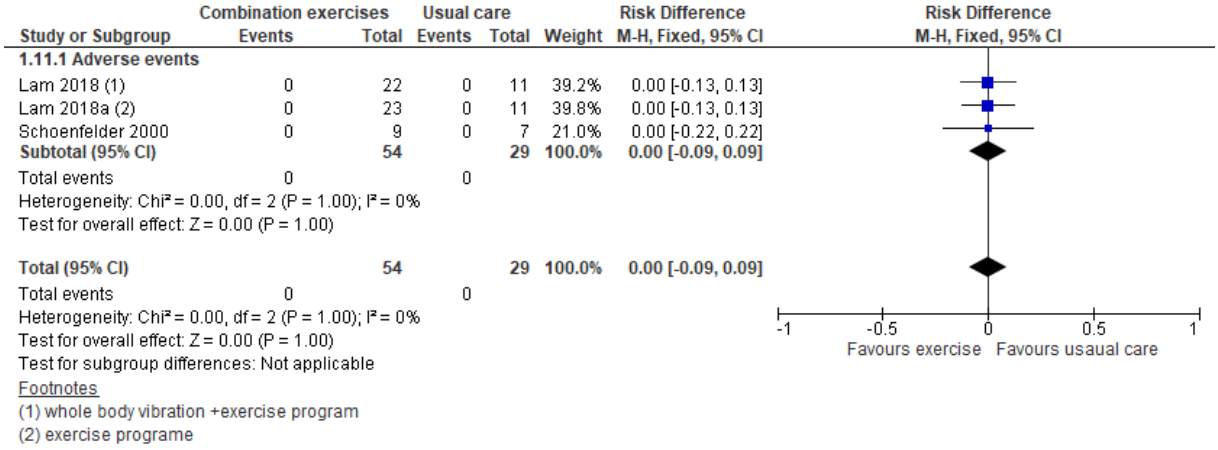


Figure 8: Exercise versus usual care: quality of life (EQ-5D5L-VAS) score of 0-100 with 0 being the worst health you can imagine and 100 being the best health you can imagine)

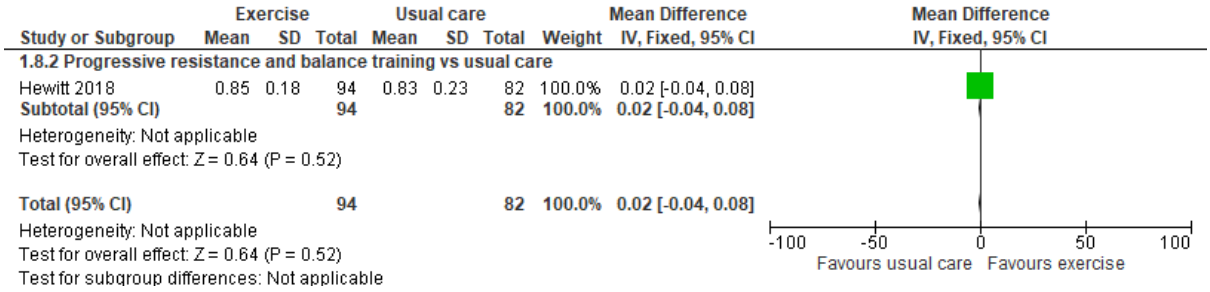


Figure 9: Exercise versus usual care: quality of life (SF-36 Total) (Scores range from 0-100 with 100 being a favourable health state)

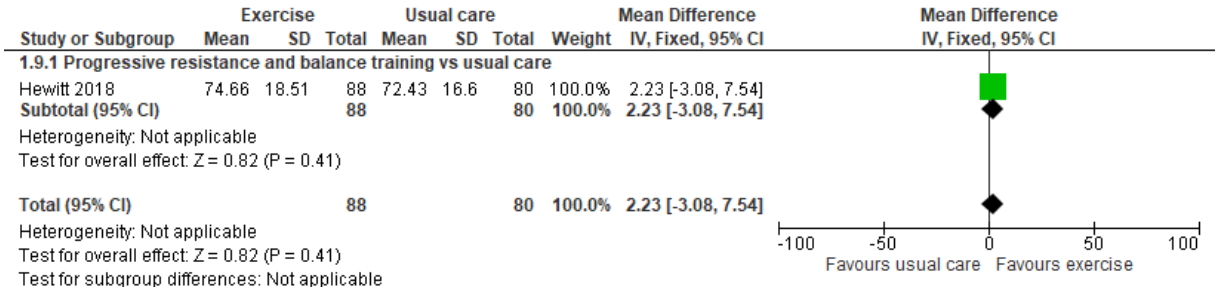
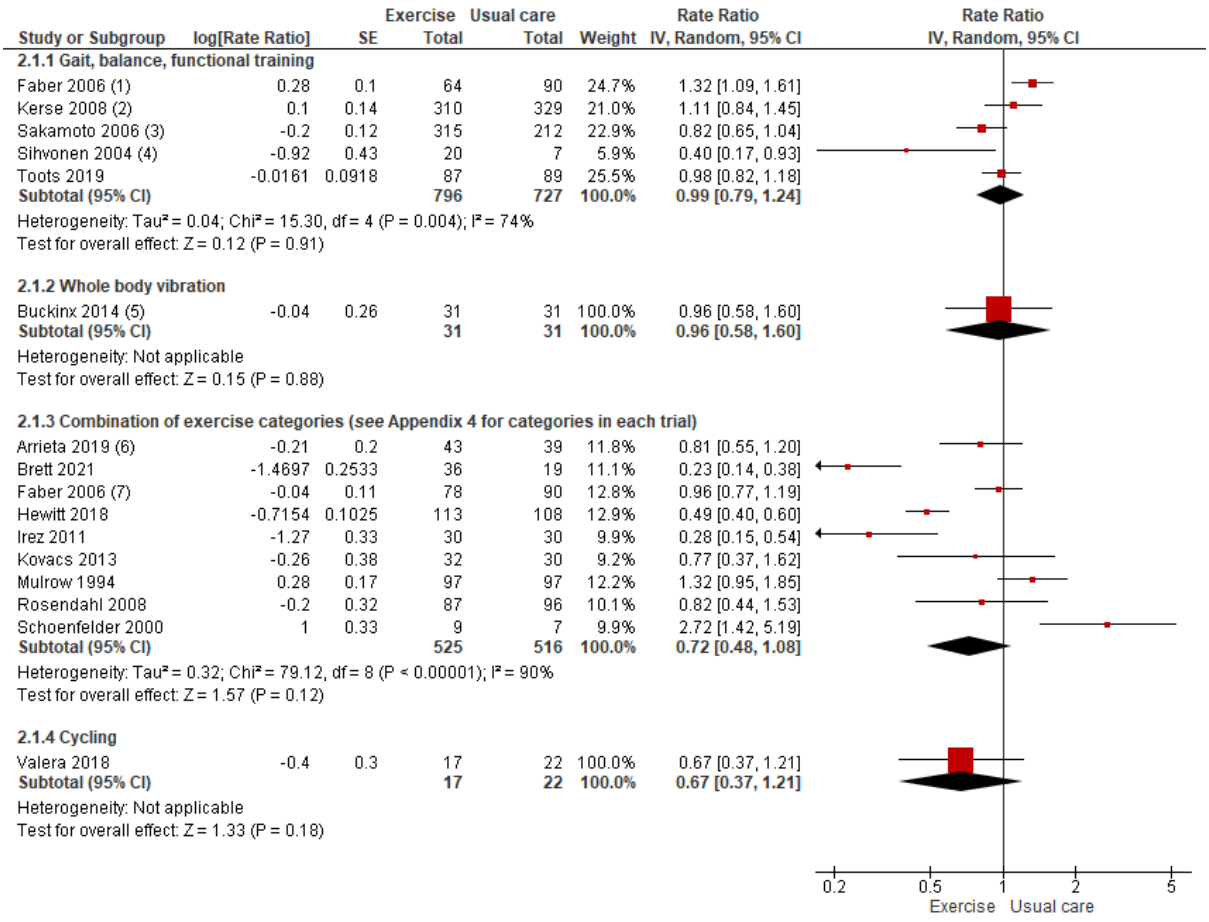
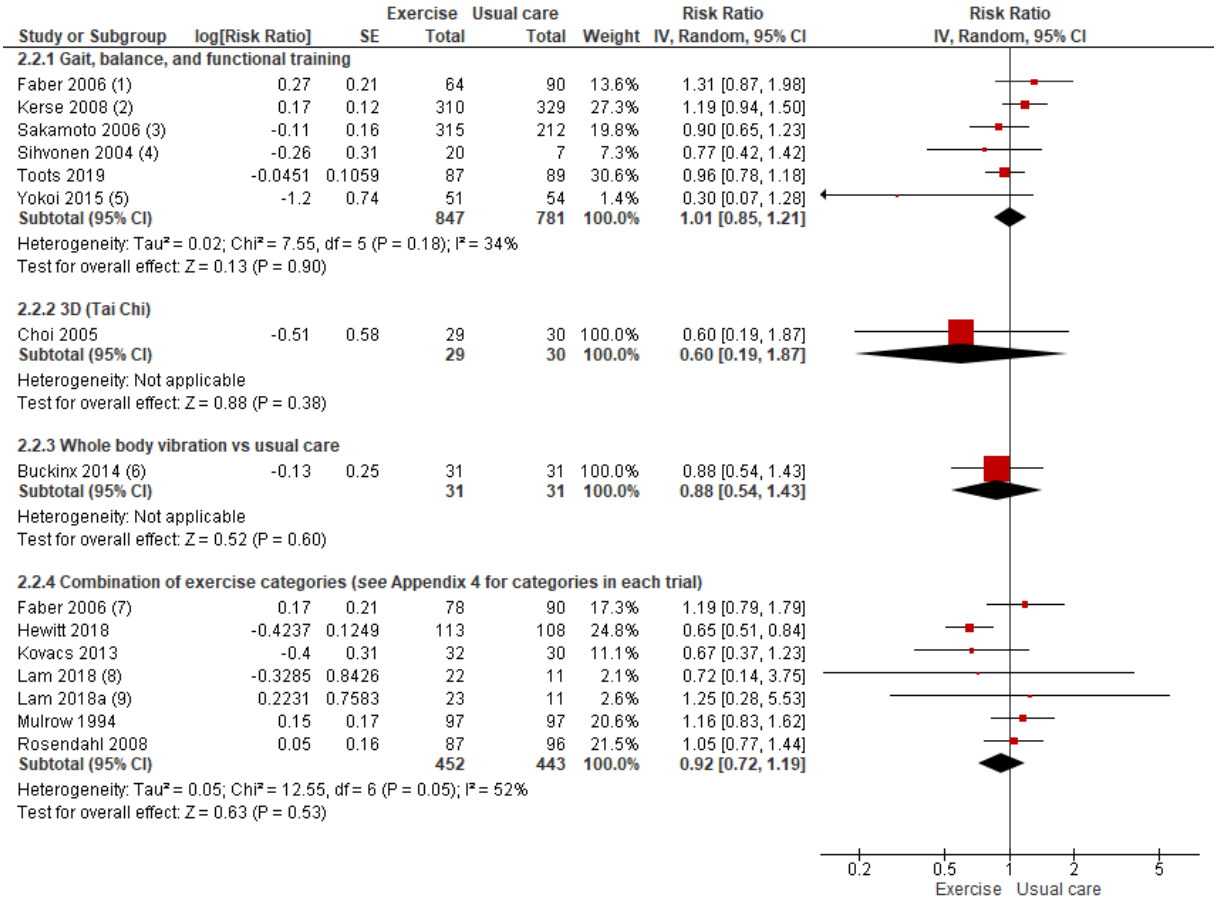


Figure 10: Exercises versus usual care (grouped by type of exercise): rate of falls



Footnotes
(1) Functional Walking (FW) group vs control
(2) goal-setting physical activity programme
(3) balance training: one-leg standing
(4) balance training: mechanical apparatus
(5) Whole body vibration vs usual care (12 months)
(6) Data taken from the systematic review Dyer 2023
(7) In Balance (IB) group vs control

Figure 11: Exercises versus usual care (grouped by type of exercise): number of fallers



Footnotes
(1) Functional Walking (FW) group vs control
(2) goal-setting physical activity programme
(3) balance training: one-leg standing
(4) balance training: mechanical apparatus
(5) short stick exercises, 12 month outcomes
(6) Whole body vibration vs usual care (12 months)
(7) In Balance (IB) group vs control
(8) whole body vibration+exercise programme
(9) exercise programe (without whole body vibration)

Figure 12: Exercises versus usual care (grouped by type of exercise): quality of life (EQ-5D5L-VAS) score of 0-100 with 0 being the worst health you can imagine and 100 being the best health you can imagine)

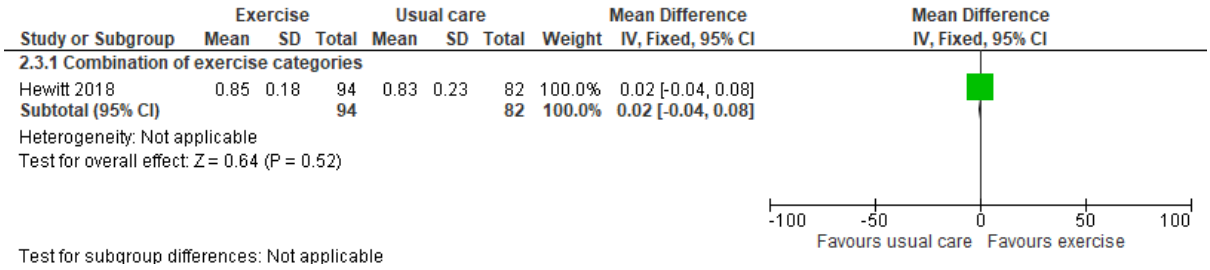


Figure 13: Exercises versus usual care (grouped by type of exercise): quality of life (SF-36 Total) (Scores range from 0-100 with 100 being a favourable health state)

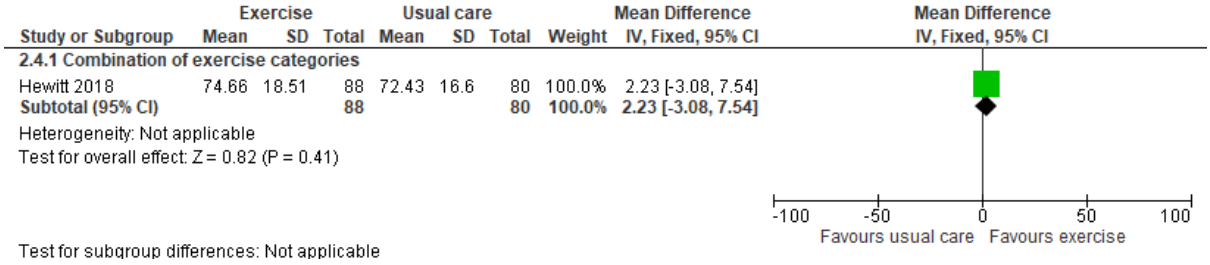


Figure 14: Exercises versus usual care (grouped by type of exercise): number of people sustaining a fracture

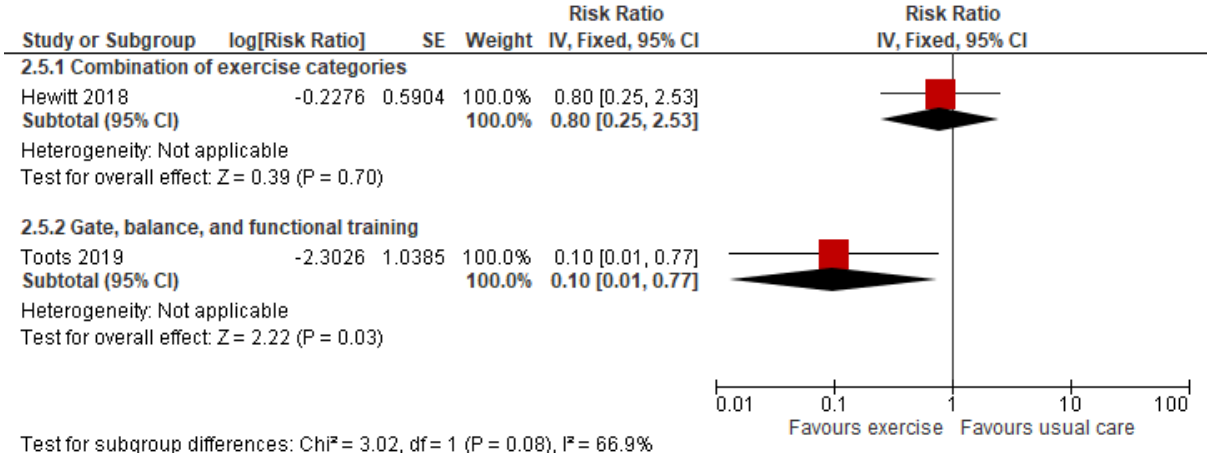
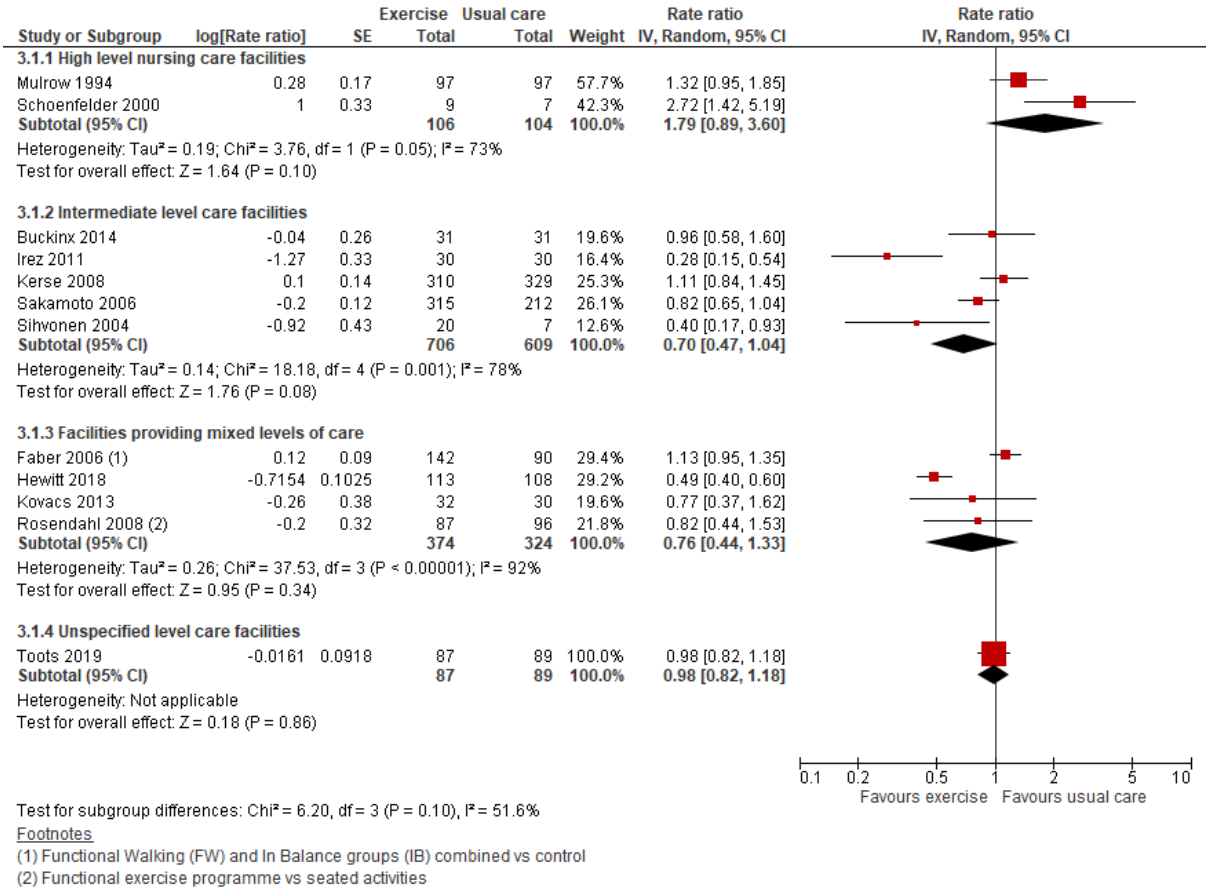


Figure 15: Exercises versus usual care (grouped by level of care): rate of falls



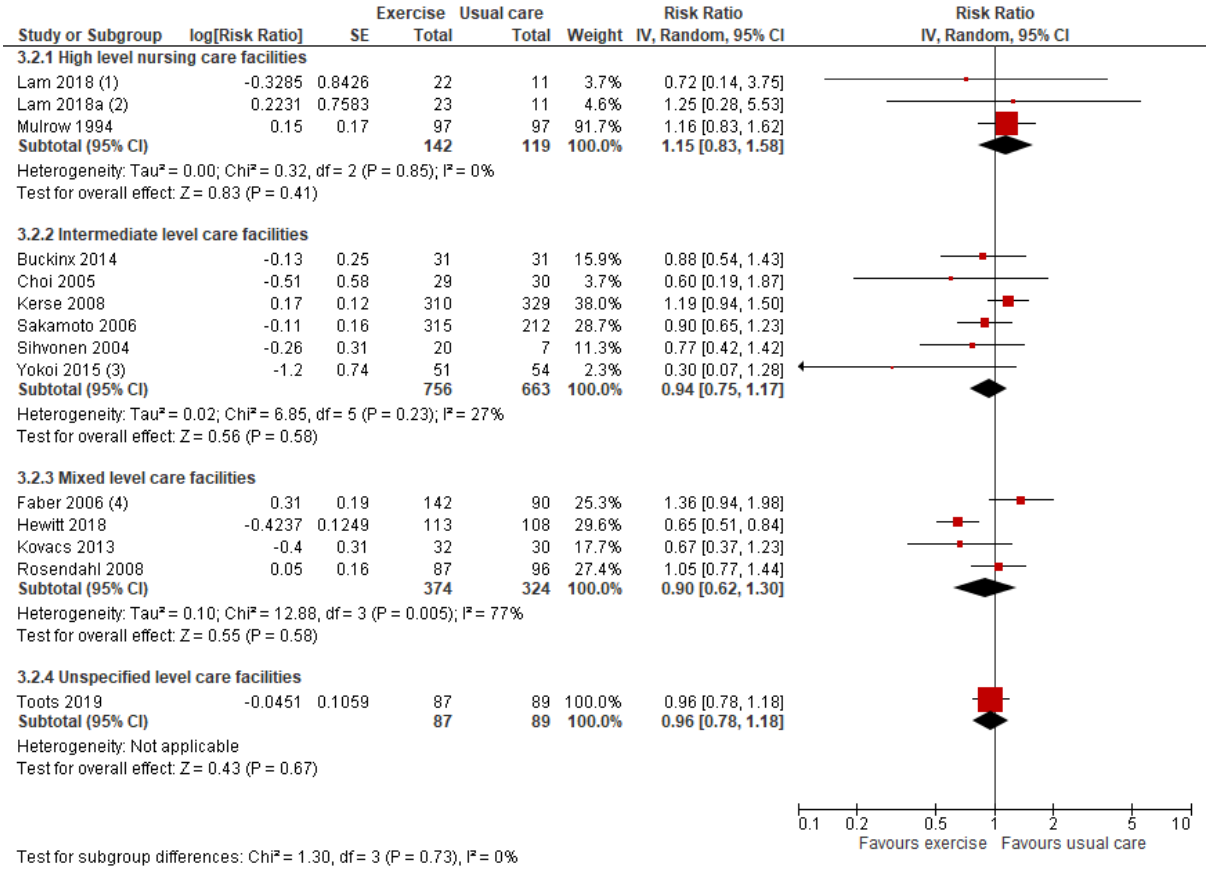
Test for subgroup differences: Chi² = 6.20, df = 3 (P = 0.10), I² = 51.6%

Footnotes

(1) Functional Walking (FW) and In Balance groups (IB) combined vs control

(2) Functional exercise programme vs seated activities

Figure 16: Exercises versus usual care (grouped by level of care): number of fallers



Test for subgroup differences: Chi² = 1.30, df = 3 (P = 0.73), I² = 0%

Footnotes

(1) whole body vibration+exercise programme
(2) exercise programe (without whole body vibration)
(3) 12 month outcomes
(4) Functional Walking (FW) and In Balance (IB) groups combined vs control

Figure 17: Exercises versus usual care (grouped by level of care): quality of life (EQ-5D5L-VAS) score of 0-100 with 0 being the worst health you can imagine and 100 being the best health you can imagine)

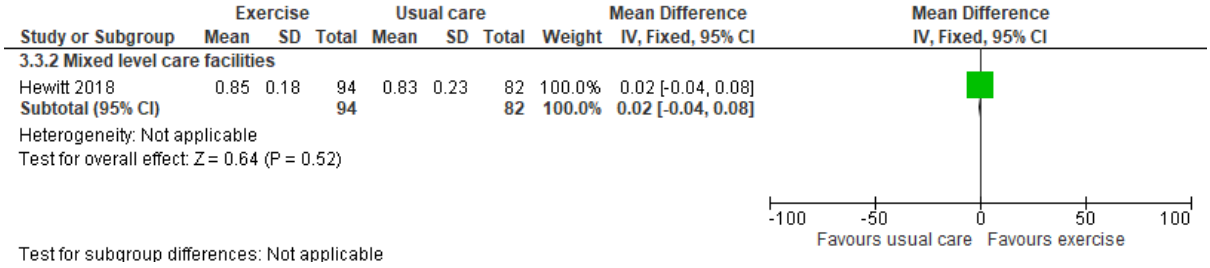


Figure 18: Exercises versus usual care (grouped by level of care): number of people sustaining a fracture

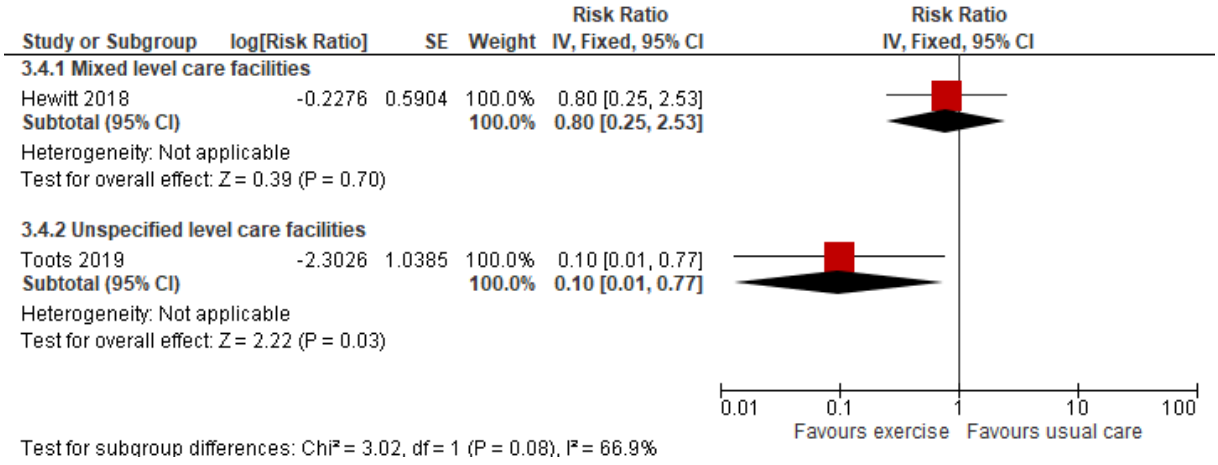


Figure 19: Exercises versus usual care (grouped by level of care): quality of life (SF-36 Total) (Scores range from 0-100 with 100 being a favourable health state)

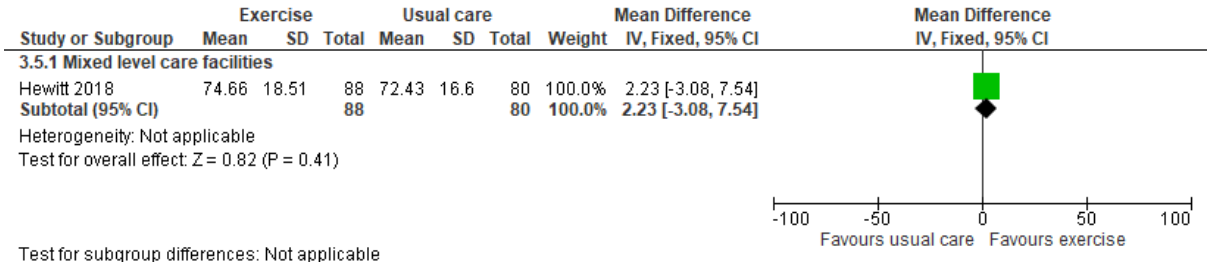
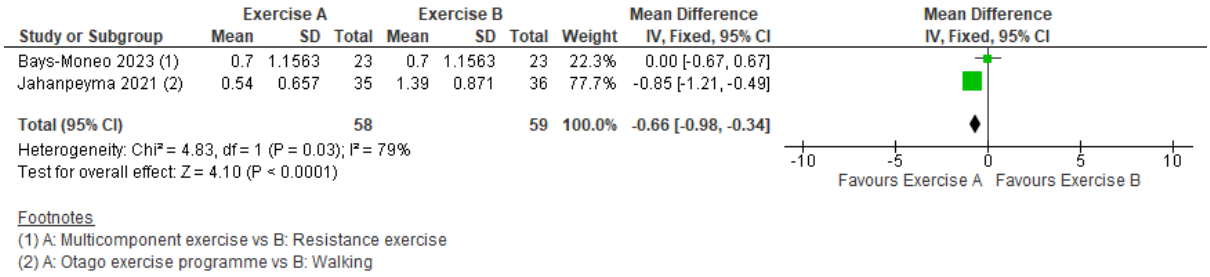
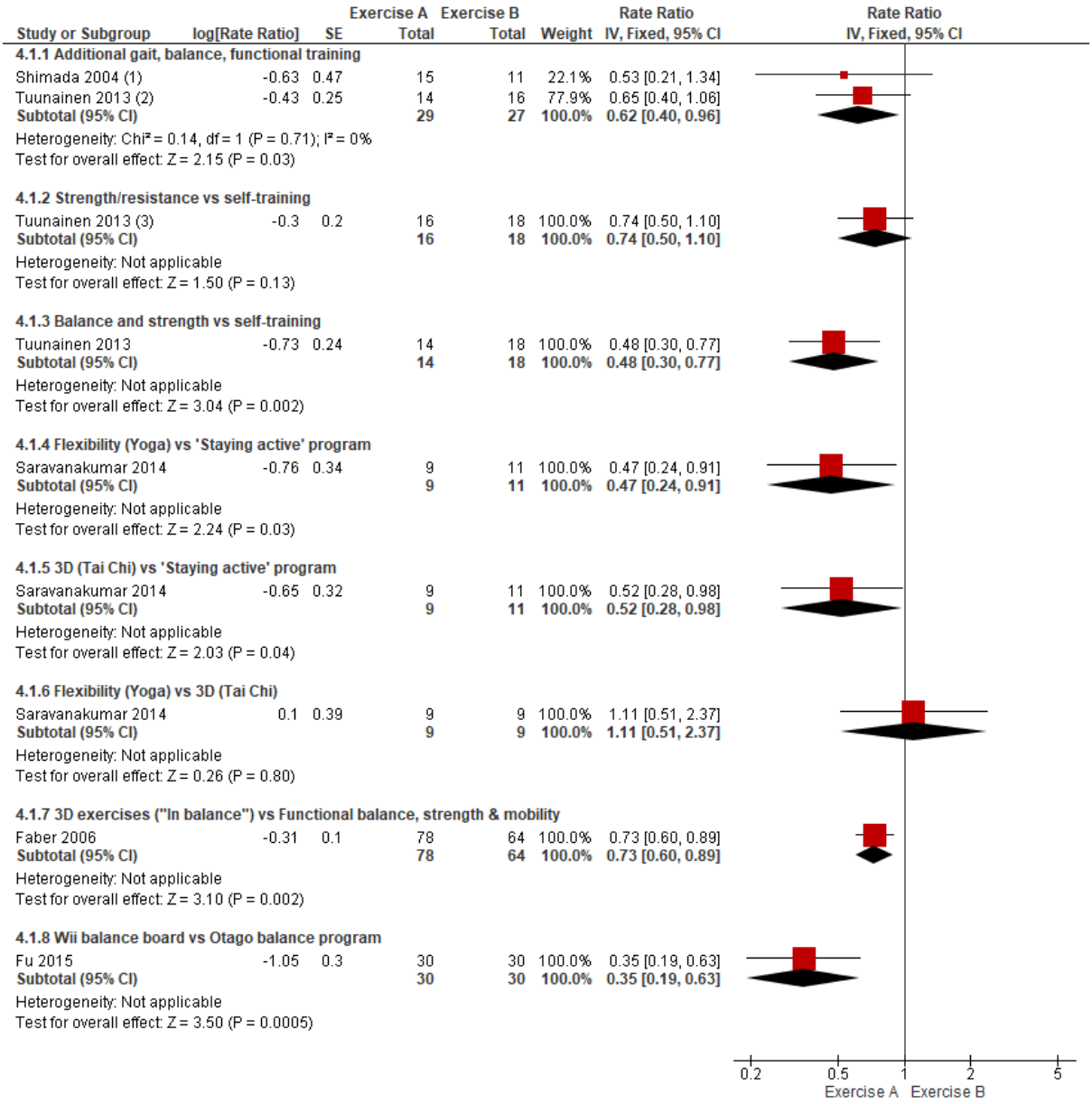


Figure 20: Exercise versus exercise: number of falls



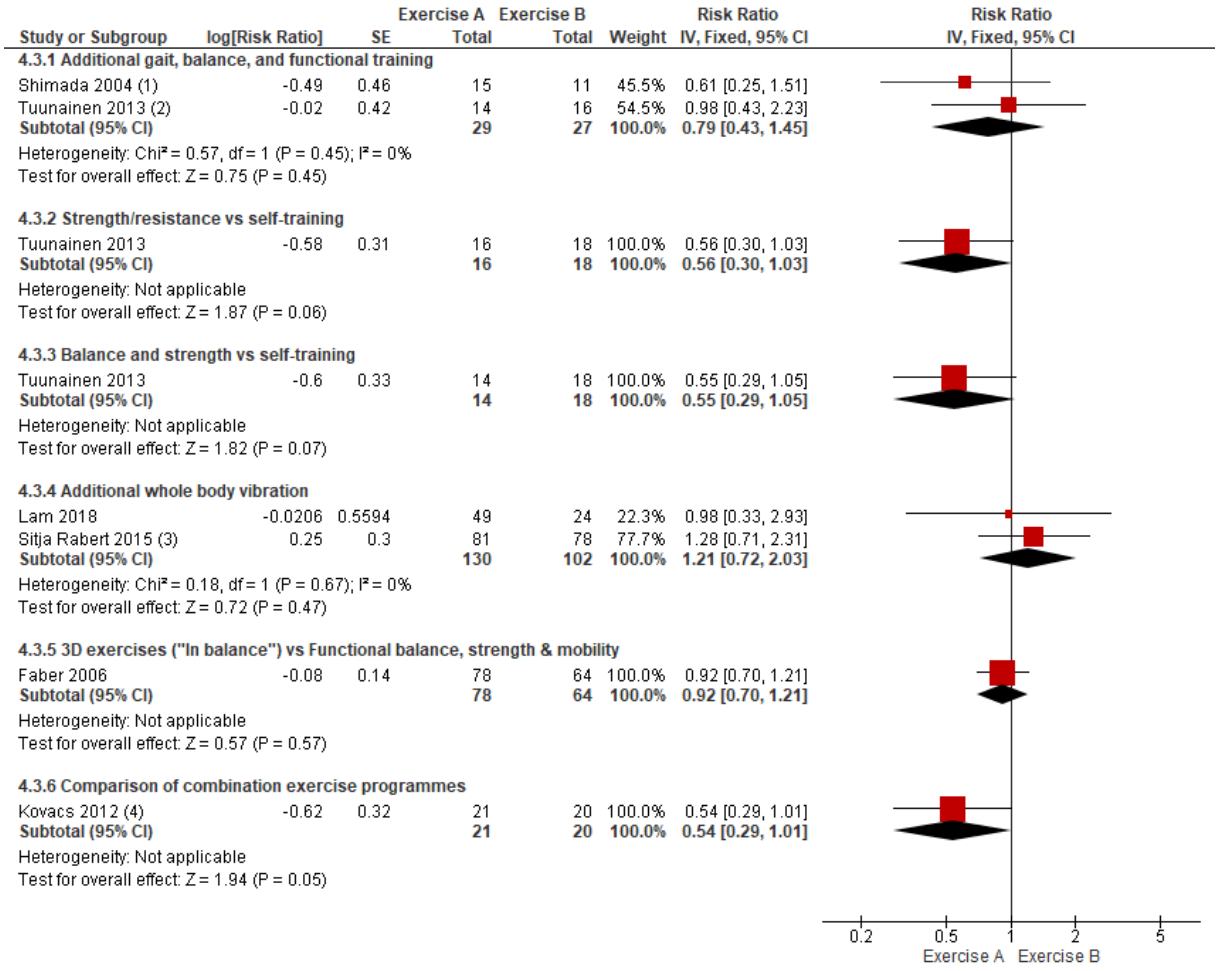
Footnotes
(1) A: Multicomponent exercise vs B: Resistance exercise
(2) A: Otago exercise programme vs B: Walking

Figure 21: Comparisons of different exercise programs: rate of falls



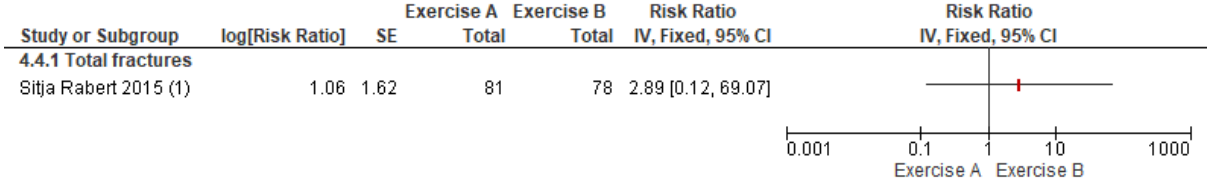
Footnotes
(1) balance training: mechanical apparatus + combination exercises vs combination exercises
(2) Balance and strength training vs strength training
(3) Progressive resistance group training vs self-training

Figure 22: Comparisons of different exercise programs: number of fallers



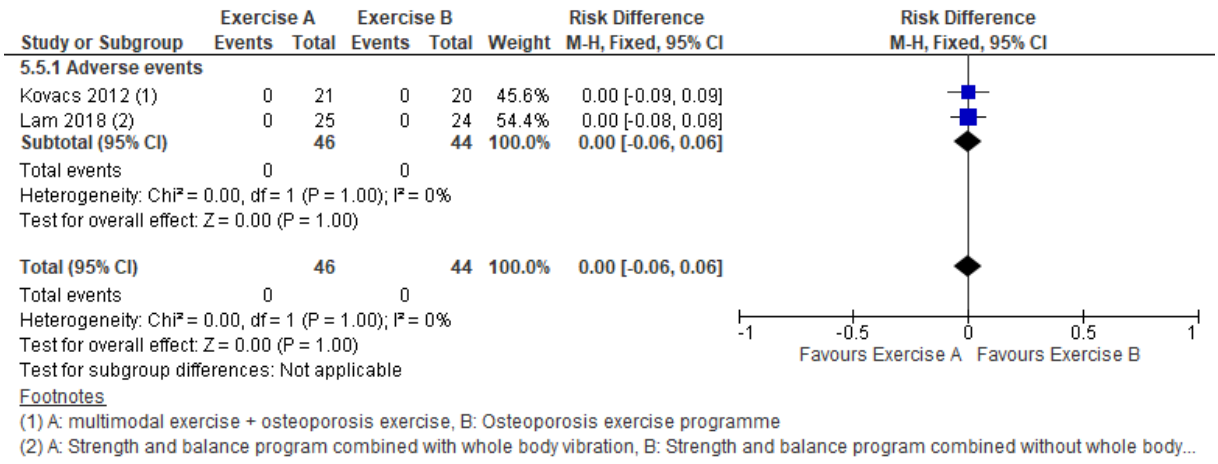
Footnotes
(1) balance training: mechanical apparatus + combination exercises vs combination exercises
(2) Balance and strength training vs strength training
(3) Whole body vibration balance & strength training vs balance & strength training
(4) Multimodel exercise programme based on Otago plus oesteoporosis exercises vs osteoporosis exercises

Figure 23: Comparisons of different exercise programs: number of people sustaining a fracture



Footnotes
(1) Whole body vibration balance & strength training vs balance & strength training

Figure 24: Comparisons of different exercise programs: adverse events

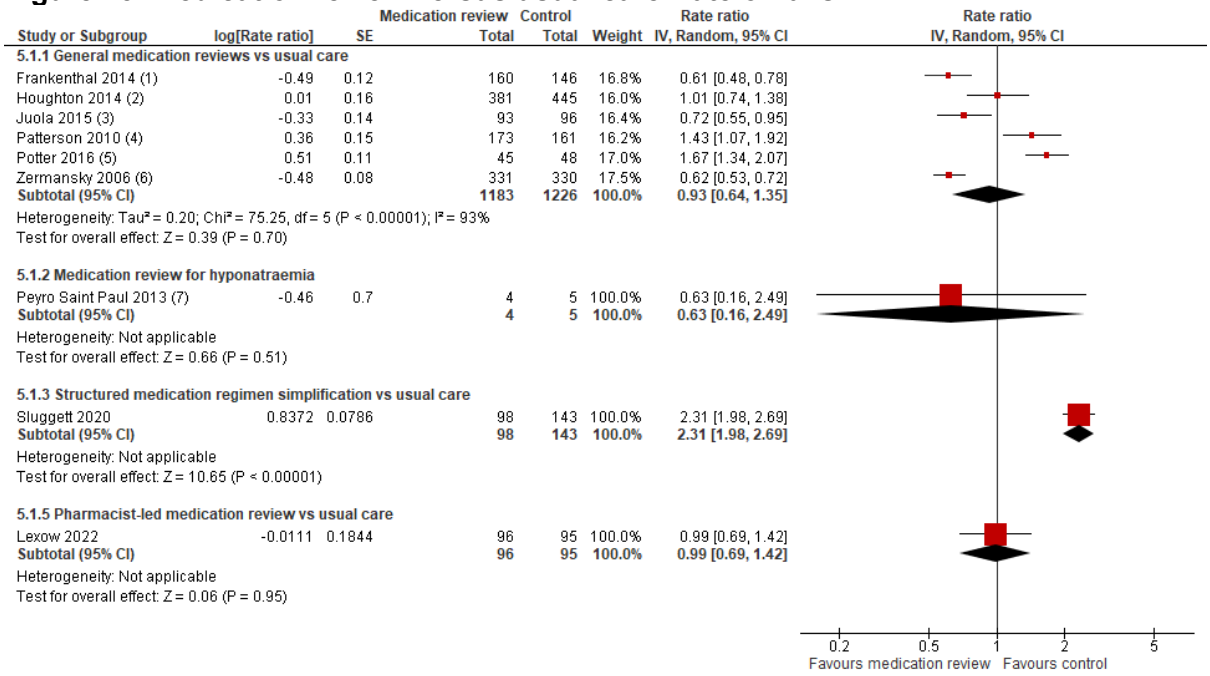


Footnotes

(1) A: multimodal exercise + osteoporosis exercise, B: Osteoporosis exercise programme

(2) A: Strength and balance program combined with whole body vibration, B: Strength and balance program combined without whole body...

Figure 25: Medication review versus usual care: rate of falls



Footnotes

(1) Medication review with recommendations to chief physician based on STOPP/START criteria

(2) Medication review meeting involving a meeting involving clinical pharmacist, pharmacy technician, care home staff and GP(s)

(3) Nurse education on harmful medications in older people, adjusted for age, sex, comorbidities

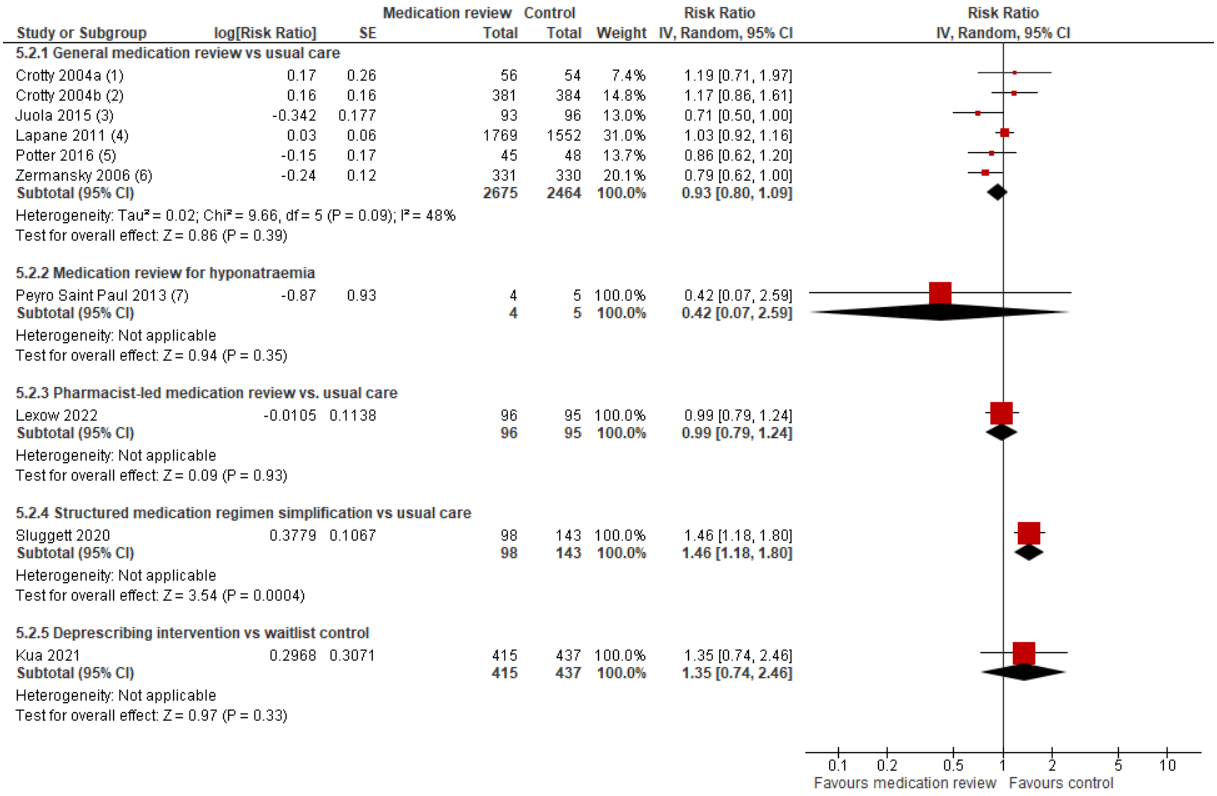
(4) Monthly review targeting psychoactive medication prescribing for 12 months

(5) Medication review with desprescribing vs medication review without deprescribing

(6) One review of GP record + consultation with patient and carer

(7) Pharmacist review of medications of patients identified with hyponatremia

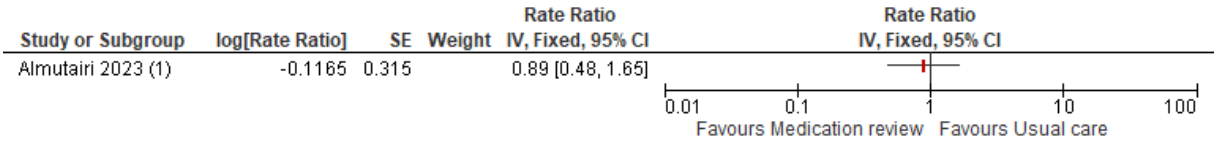
Figure 26: Medication review versus usual care: number of fallers



Footnotes

(1) Pharmacist transition coordinator for patients discharged from hospital to nursing care facilities for the first time
(2) Pharmacist-led outreach programme (audit + feedback + education of staff regarding medications and falls risk)
(3) Nurse education on harmful medications in older people
(4) GRAM software for decision support for prescribing practices vs monthly medication review
(5) A GP and a geriatrician/pharmacologist independently identified deprescribing targets using a list of potentially inappropriate medicines
(6) One review of GP record + consultation with patient and carer
(7) Pharmacist review of medications of patients identified with hyponatremia

Figure 27: Medication review versus usual care: number of falls



Footnotes

(1) Pharmacist-led multifaceted psychotropic medication management

Figure 28: Medication review versus usual care: number of people sustaining a fracture

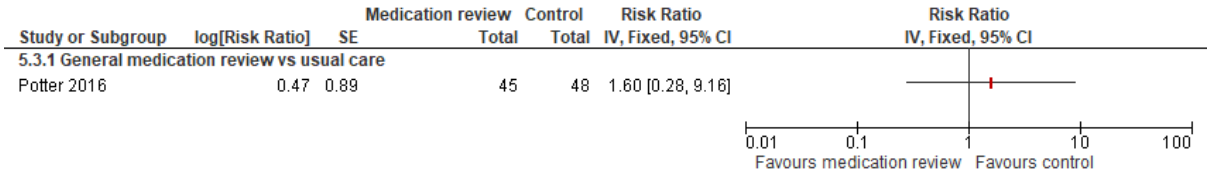


Figure 29: Medication review versus usual care: serious adverse events

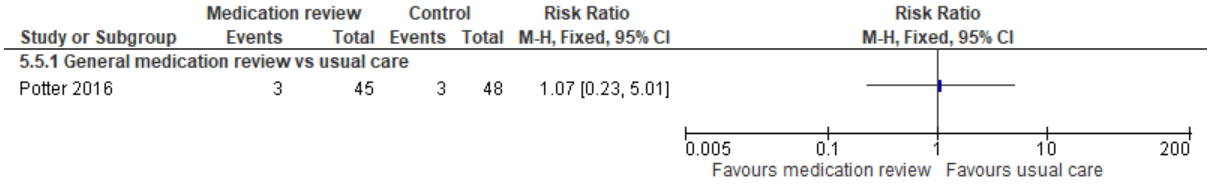
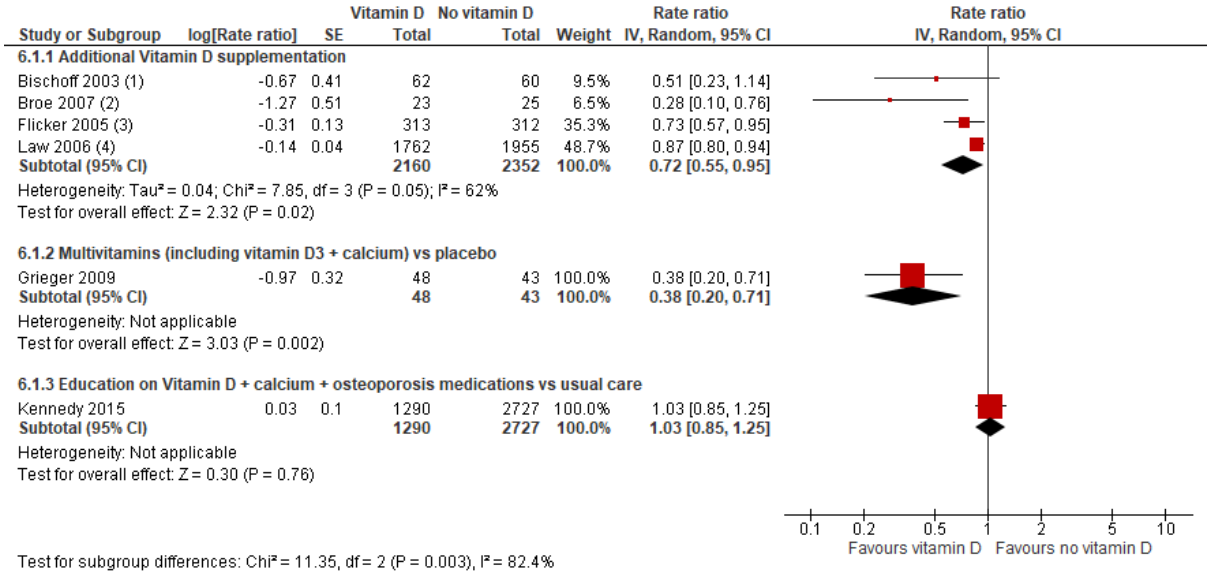


Figure 30: Vitamin D supplementation versus no vitamin D supplementation: rate of falls

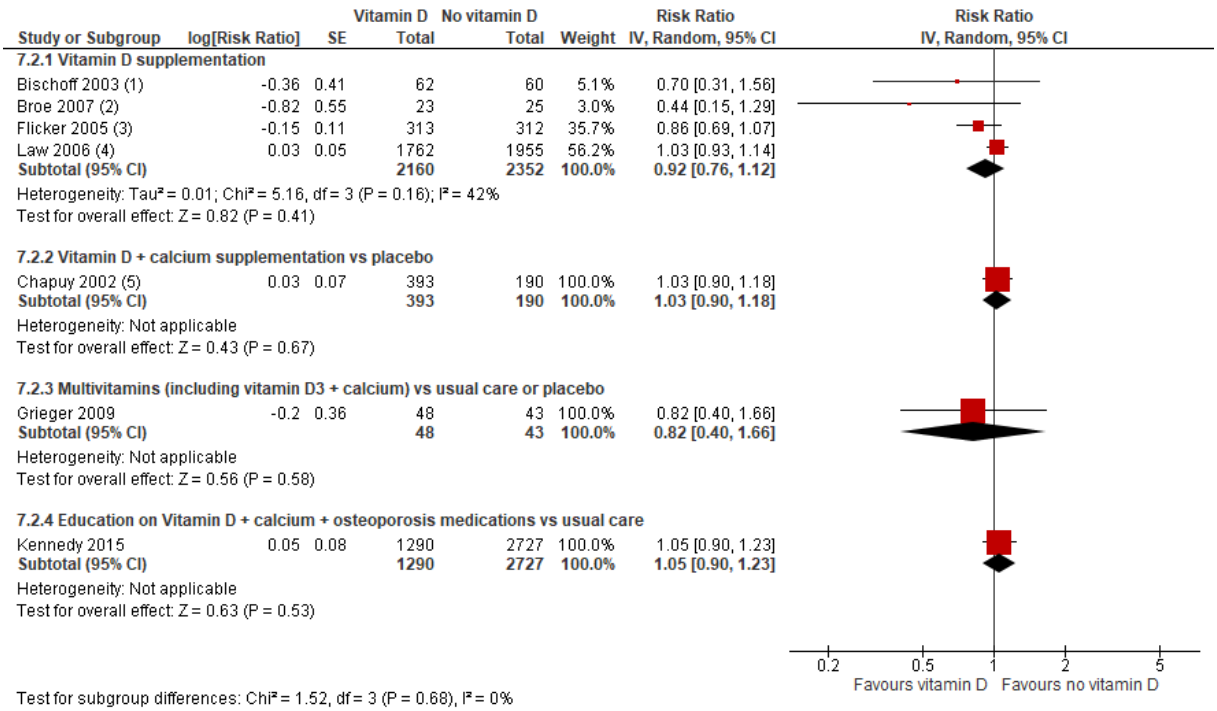


Test for subgroup differences: Chi² = 11.35, df = 2 (P = 0.003), I² = 82.4%

Footnotes

(1) Vitamin D3 + calcium vs calcium
(2) 800 IU vitamin D group only vs placebo
(3) Vitamin D3 + calcium vs calcium
(4) Vitamin D2 vs usual care

Figure 31: Vitamin D supplementation versus no vitamin D supplementation: number of fallers

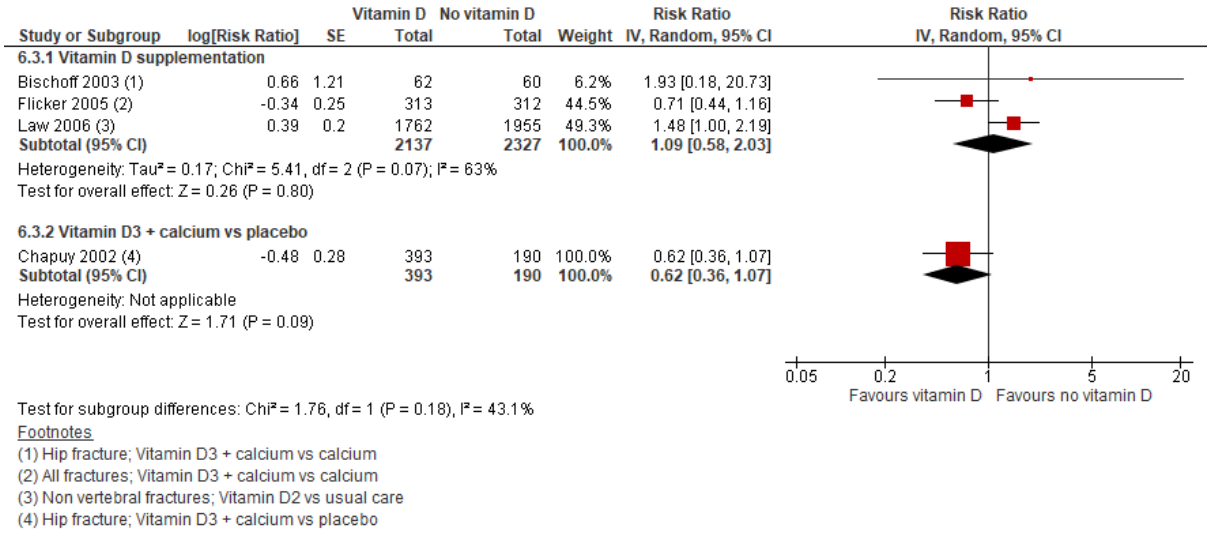


Test for subgroup differences: Chi² = 1.52, df = 3 (P = 0.68), I² = 0%

Footnotes

(1) Vitamin D3 + calcium vs calcium
(2) 800 IU vitamin D group only vs placebo
(3) Vitamin D3 + calcium vs calcium
(4) Vitamin D2 vs usual care
(5) Vitamin D3 + calcium vs placebo

Figure 32: Vitamin D supplementation versus no vitamin D supplementation: number of people sustaining a fracture

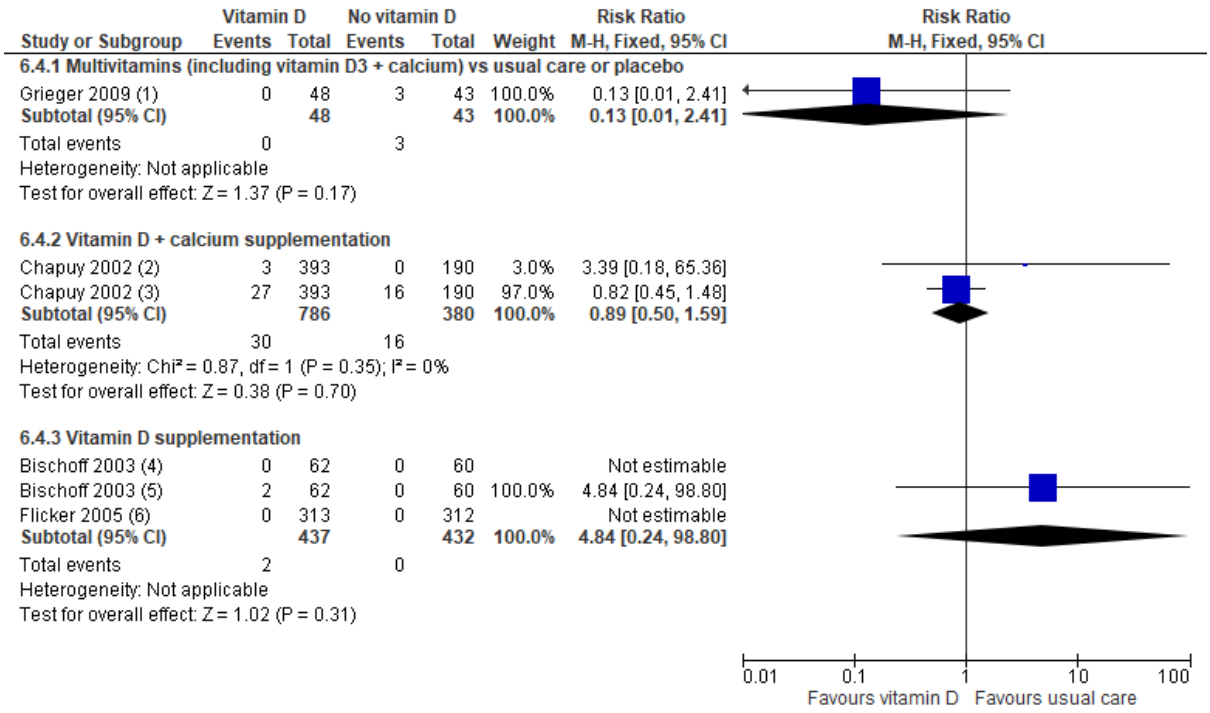


Test for subgroup differences: Chi² = 1.76, df = 1 (P = 0.18), I² = 43.1%

Footnotes

(1) Hip fracture; Vitamin D3 + calcium vs calcium
(2) All fractures; Vitamin D3 + calcium vs calcium
(3) Non vertebral fractures; Vitamin D2 vs usual care
(4) Hip fracture; Vitamin D3 + calcium vs placebo

Figure 33: Vitamin D supplementation versus no vitamin D supplementation: adverse events



Footnotes
(1) rash/vertigo, behavioural issues, indigestion
(2) Hypercalcaemia
(3) Gastrointestinal disorders
(4) Hypercalcaemia
(5) constipation
(6) No adverse events

Figure 34: Psychological interventions versus control: rate of falls

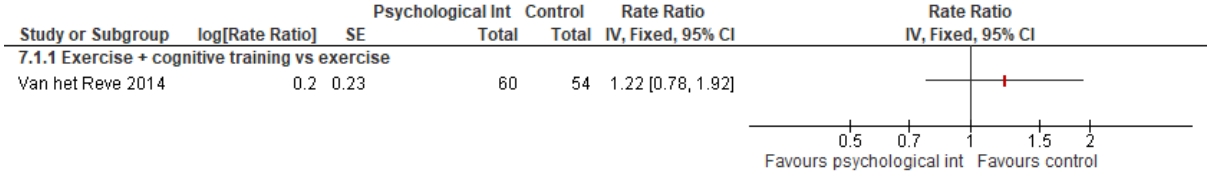


Figure 35: Psychological interventions versus control: number of fallers

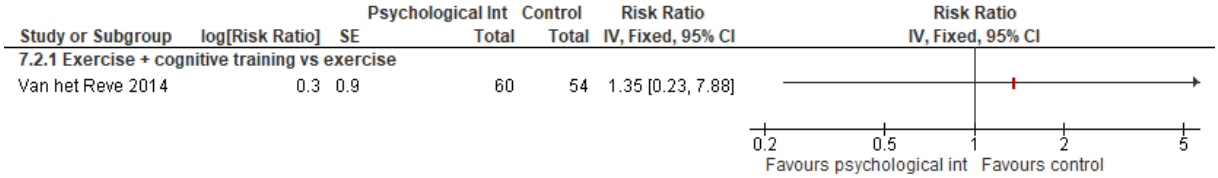


Figure 36: Social environment versus usual care: rate of falls

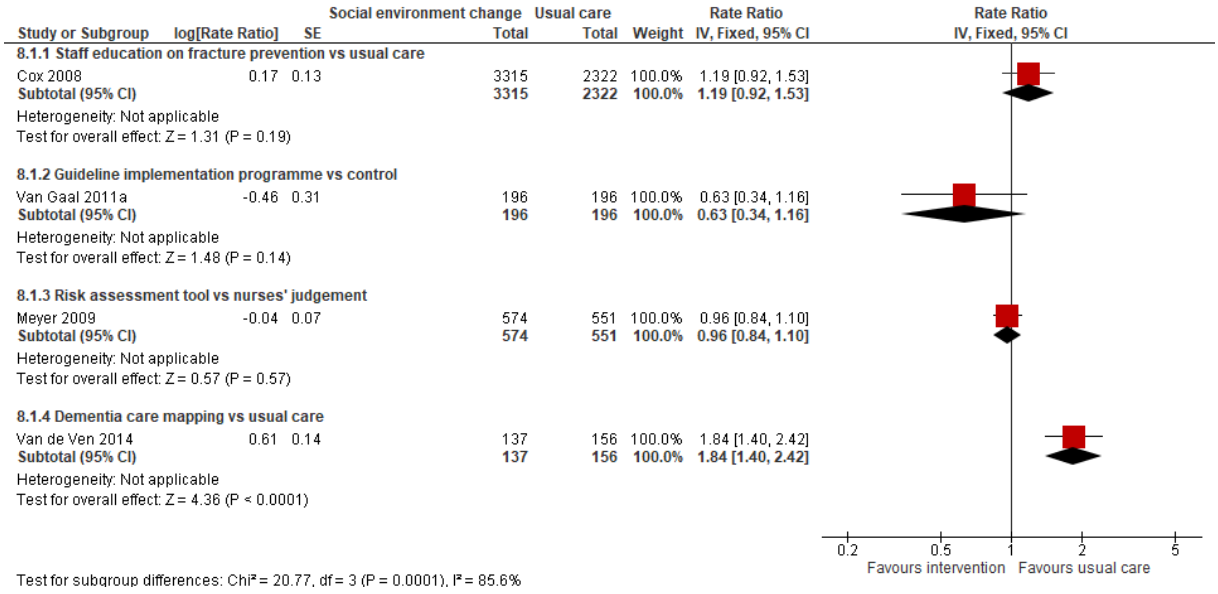


Figure 37: Social environment versus usual care: number of fallers

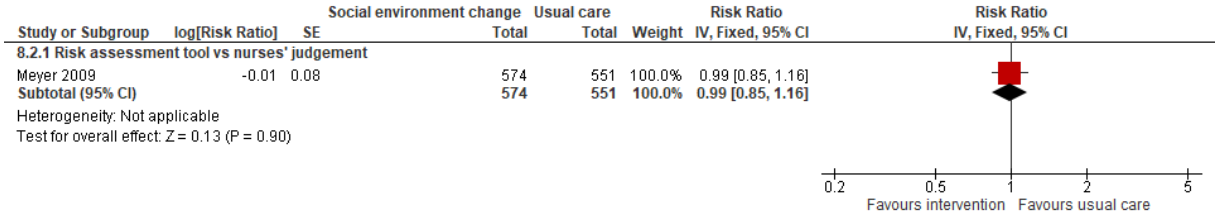
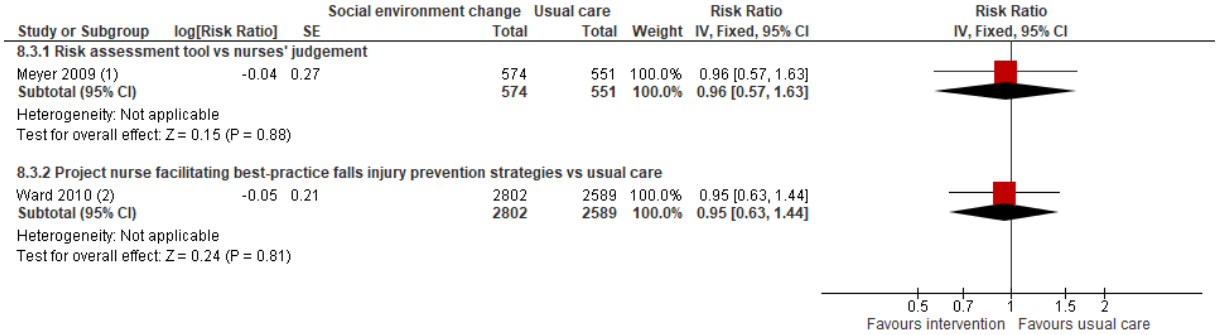


Figure 38: Social environment versus usual care: number of people sustaining a fracture



Footnotes
(1) All fractures
(2) Hip fracture

Figure 39: Environmental interventions versus usual care: rate of falls

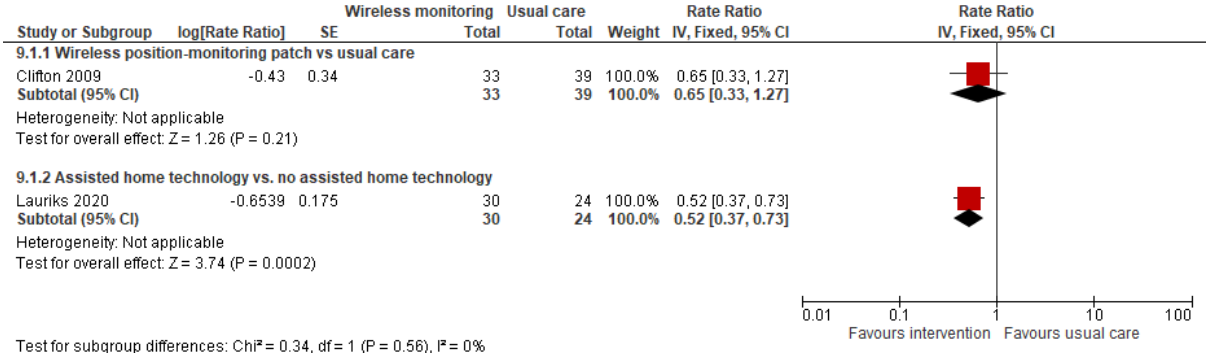


Figure 40: Environmental interventions versus usual care: number of fallers

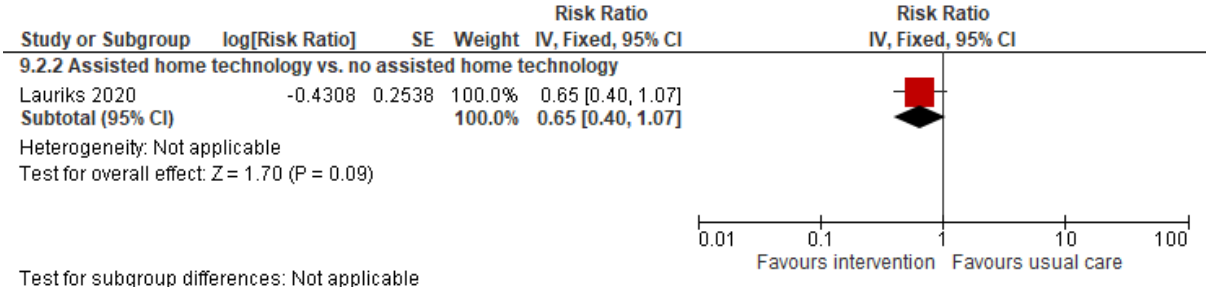


Figure 41: Environmental interventions versus usual care: quality of life (self-rated total) (Score between 30-150, with higher score indicating a better QoL)

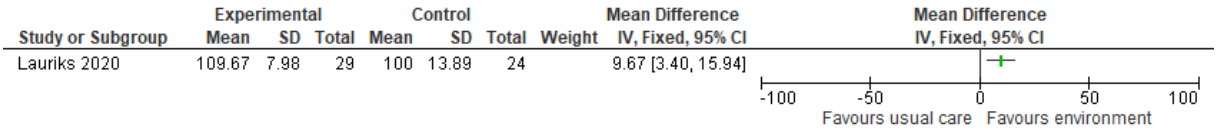


Figure 42: Environmental interventions versus usual care: quality of life (QUALIDEM-care relationship) (The higher the score, the better the person is identified at that particular domain) (Scoring 0-21)

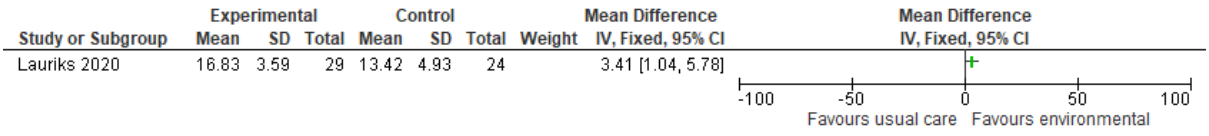


Figure 43: Environmental interventions versus usual care: quality of life (QUALIDEM-positive affect) (The higher the score, the better the person is identified at that particular domain) (Score 0-18)

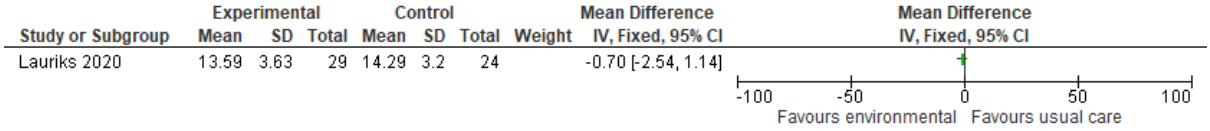


Figure 44: Environmental interventions versus usual care: quality of life (QUALIDEM-negative affect) (The higher the score, the better the person is identified at that particular domain) (Score 0-9)

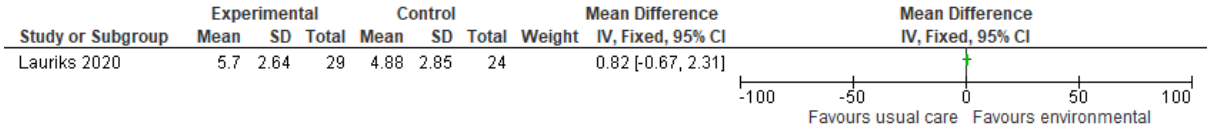


Figure 45: Environmental interventions versus usual care: quality of life (QUALIDEM-restless behaviour) (The higher the score, the better the person is identified at that particular domain) (Score 0-9)

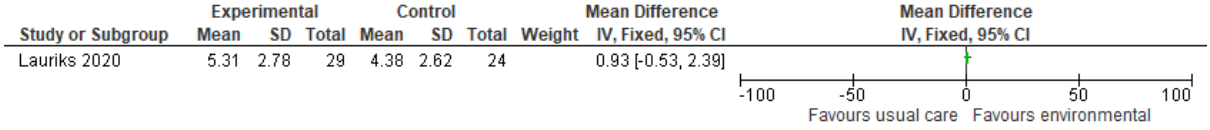


Figure 46: Environmental interventions versus usual care: quality of life (QUALIDEM-positive self-image) (The higher the score, the better the person is identified at that particular domain) (Score 0-9)

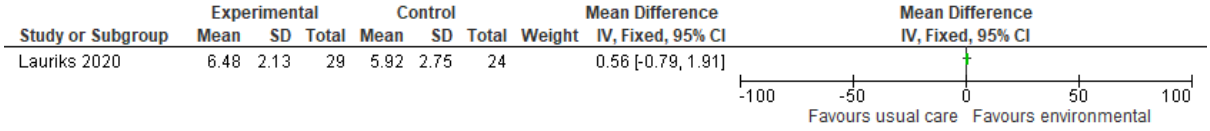


Figure 47: Environmental interventions versus usual care: quality of life (QUALIDEM-social relations) (The higher the score, the better the person is identified at that particular domain) (Score 0-18)

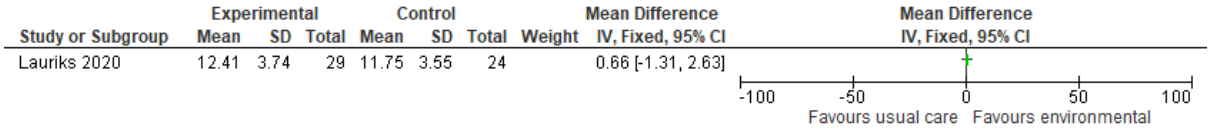


Figure 48: Environmental interventions versus usual care: quality of life (QUALIDEM-social isolation) (The higher the score, the better the person is identified at that particular domain) (Score 0-9)

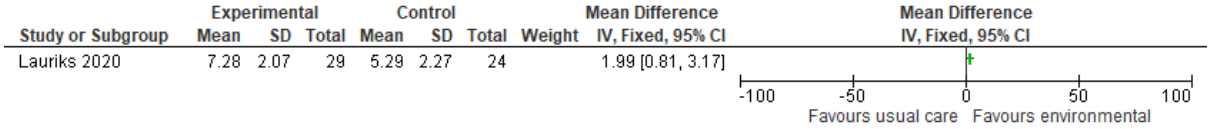


Figure 49: Environmental interventions versus usual care: quality of life (QUALIDEM-feeling at home) (The higher the score, the better the person is identified at that particular domain) (Score 0-12)

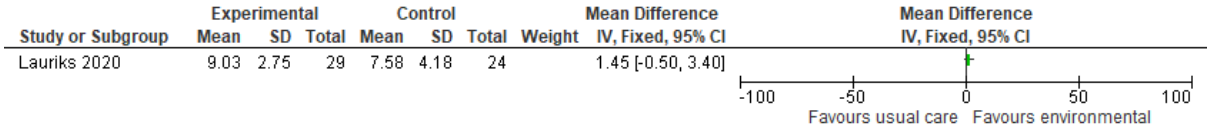


Figure 50: Environmental interventions versus usual care: quality of life (QUALIDEM-having things to do) (The higher the score, the better the person is identified at that particular domain) (Score 0-6)

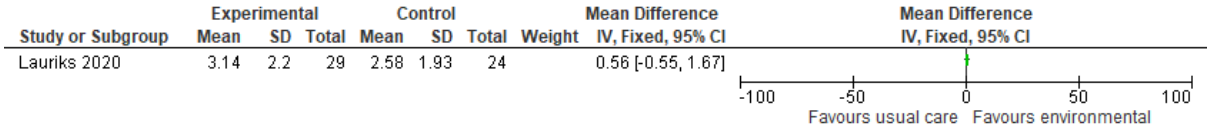


Figure 51: Environmental interventions versus usual care: quality of life (QUALIDEM-number of people sustaining a fracture)

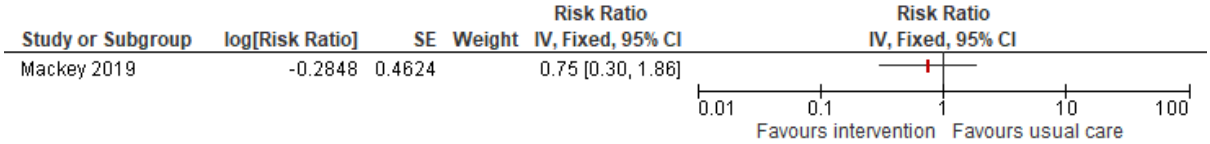


Figure 52: Other single interventions versus control: rate of falls

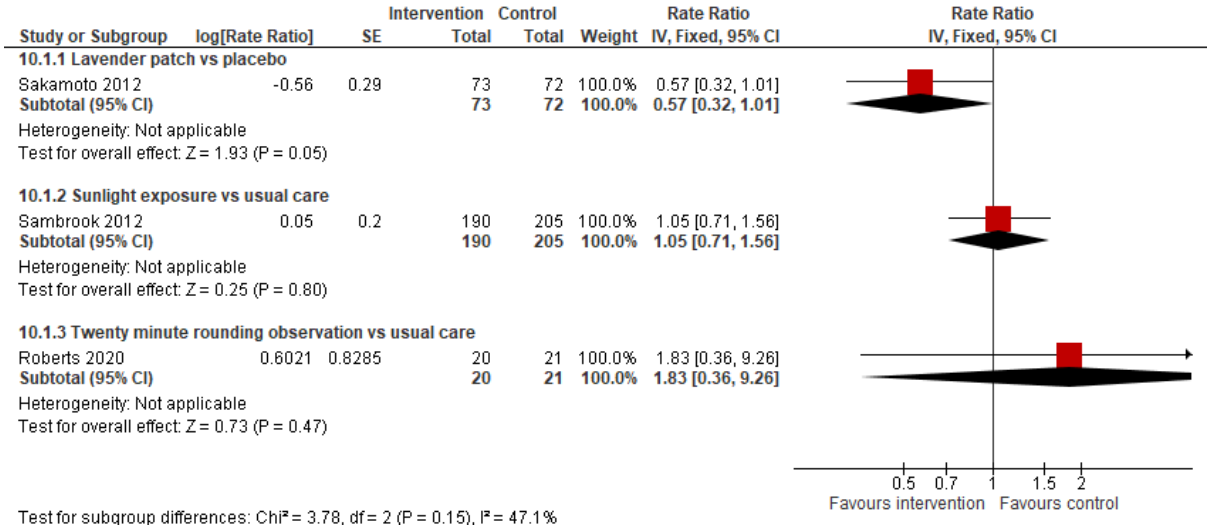


Figure 53: Other single interventions versus control: number of fallers

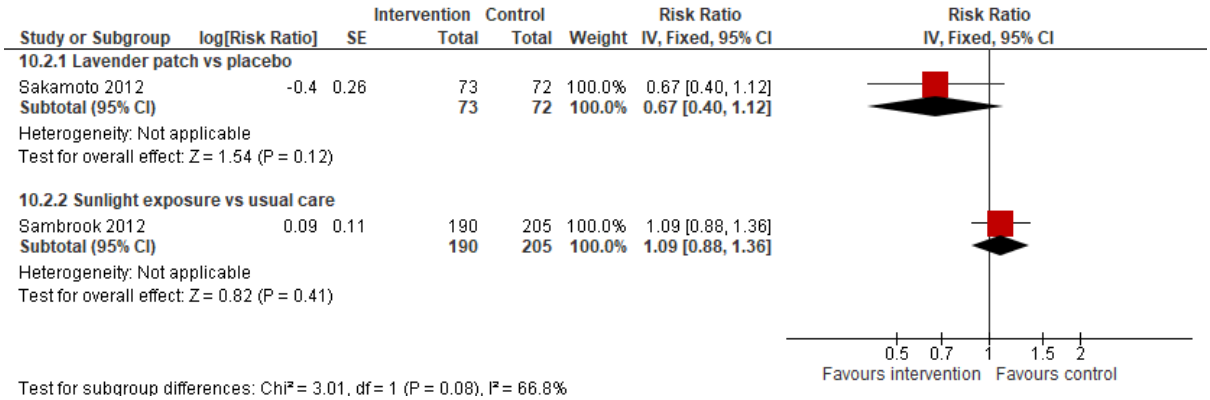


Figure 54: Other single interventions versus control: number of people sustaining a fracture

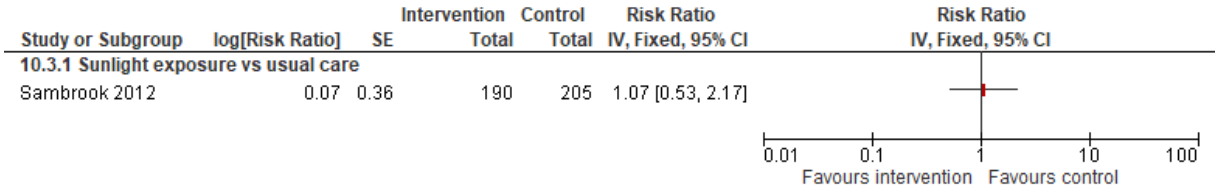


Figure 55: Other single interventions versus control: adverse events

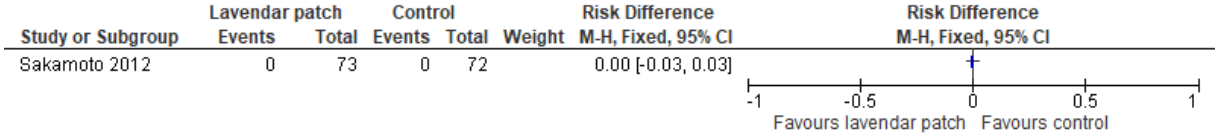


Figure 56: Multiple interventions versus usual care: rate of falls

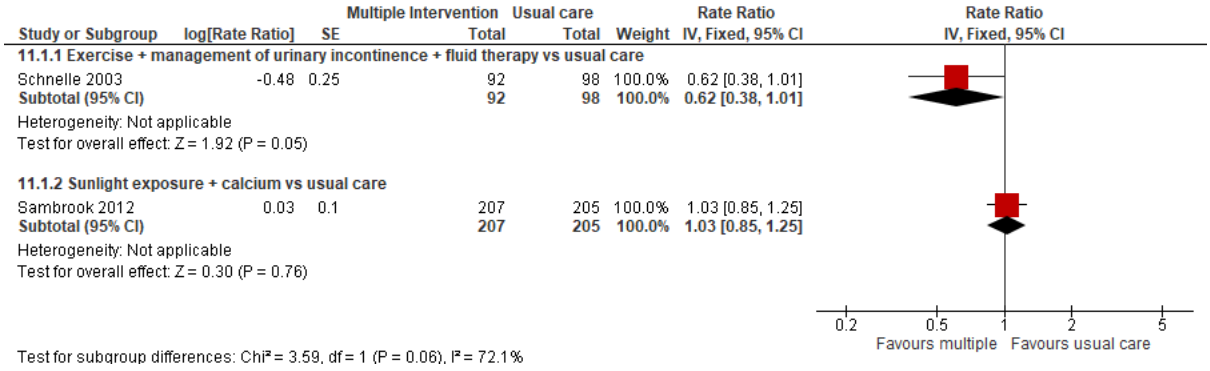


Figure 57: Multiple interventions versus usual care: number of fallers

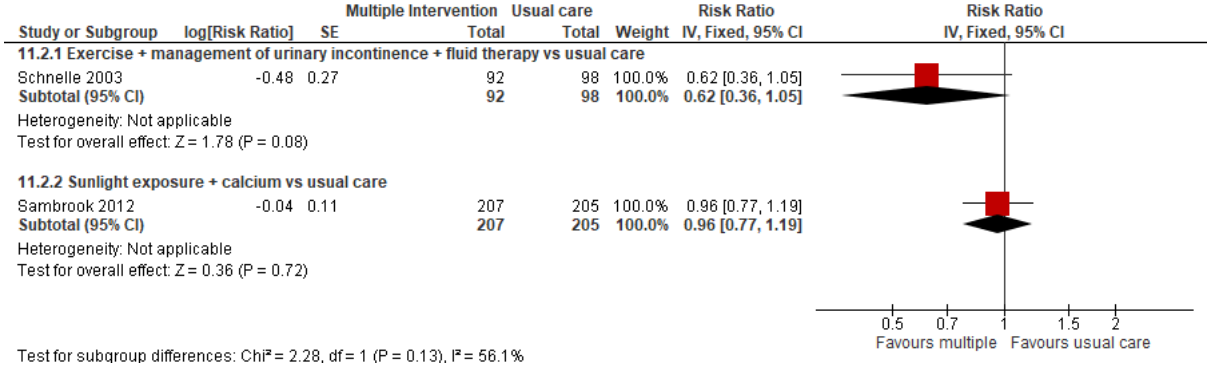


Figure 58: Multiple interventions versus usual care: number of people sustaining a fracture

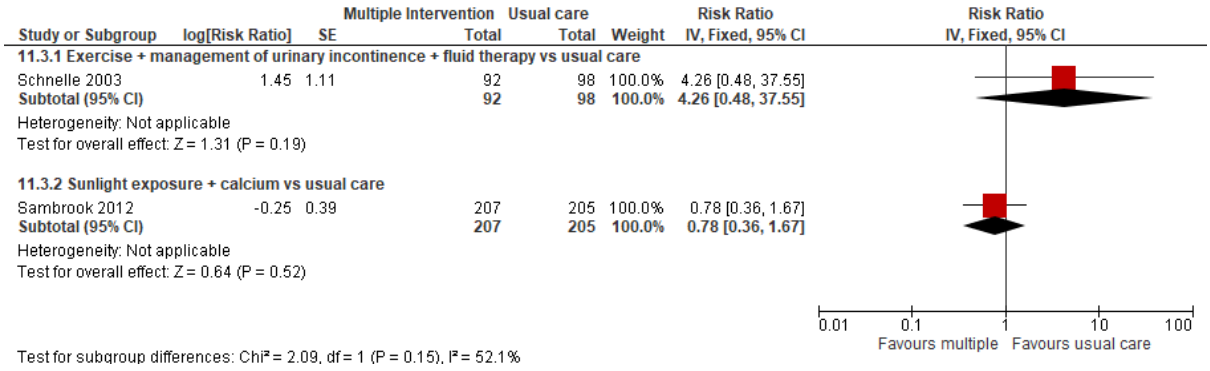


Figure 59: Multifactorial interventions versus usual care: rate of falls

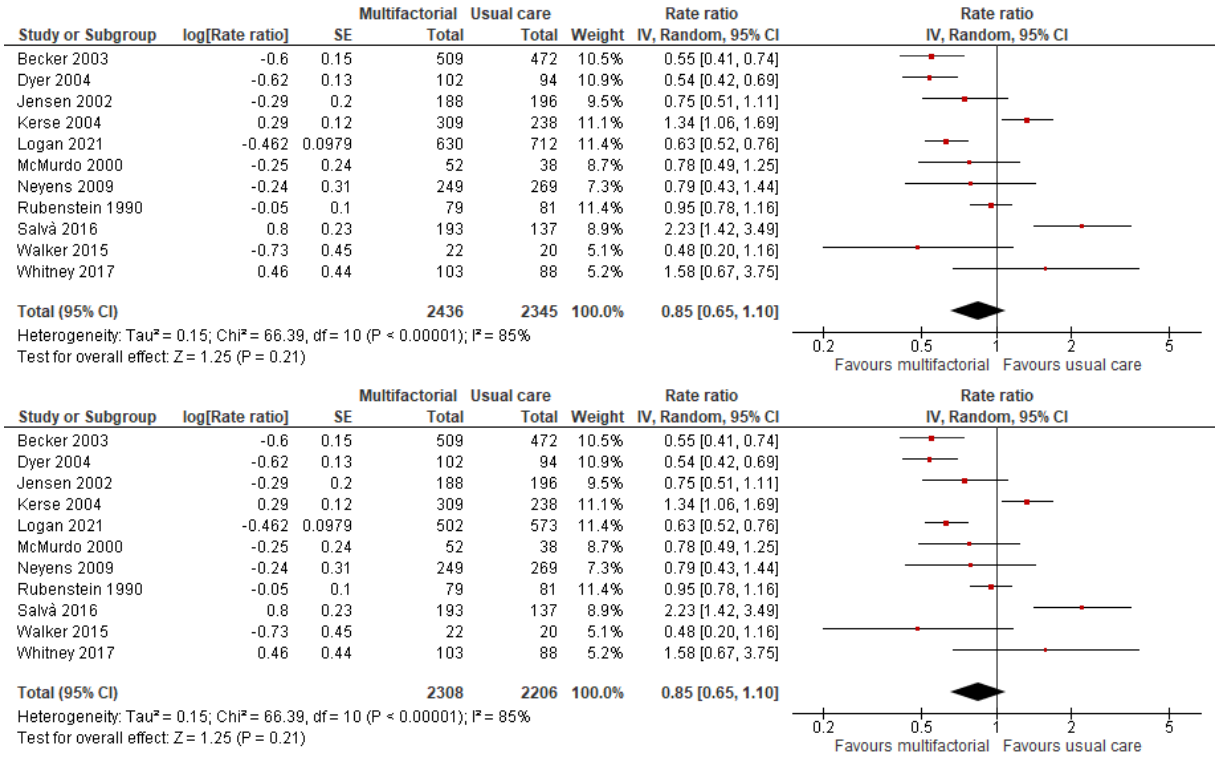


Figure 60: Multifactorial interventions versus usual care: number of fallers

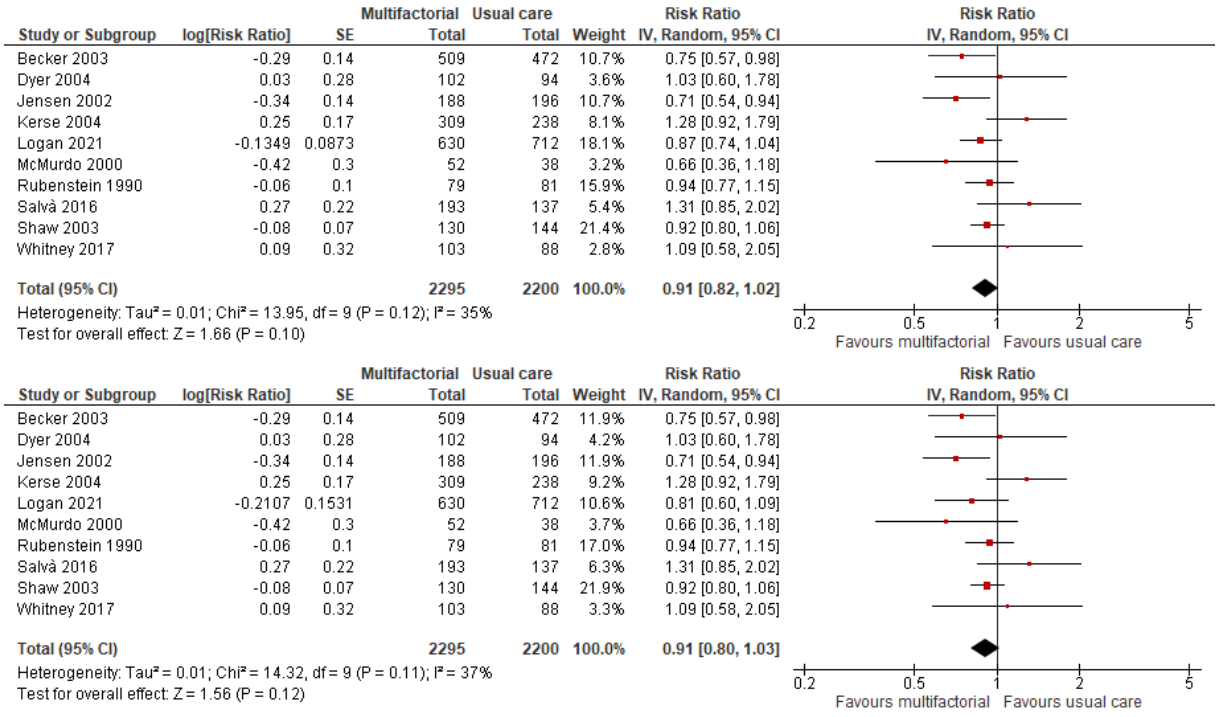
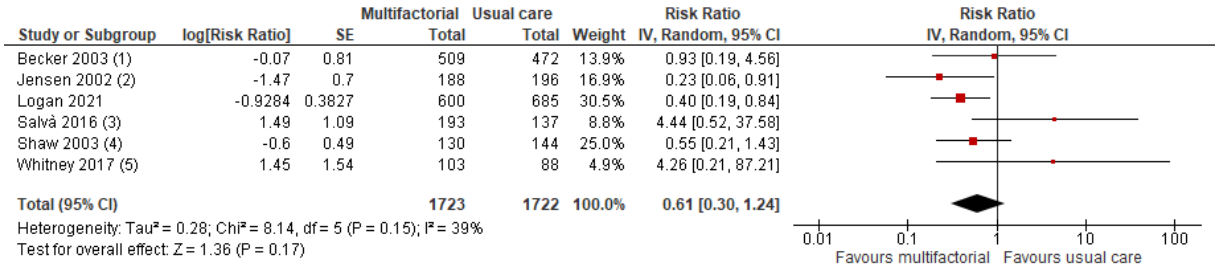


Figure 61: Multifactorial interventions versus usual care: number of people sustaining a fracture



Footnotes
(1) Hip fracture
(2) Hip fracture
(3) Total fractures
(4) Hip fracture
(5) Total fractures

Figure 62: Multifactorial interventions versus usual care: quality of life (EQ-5D) (Values are between 0 to 1 with 1 being perfect health)

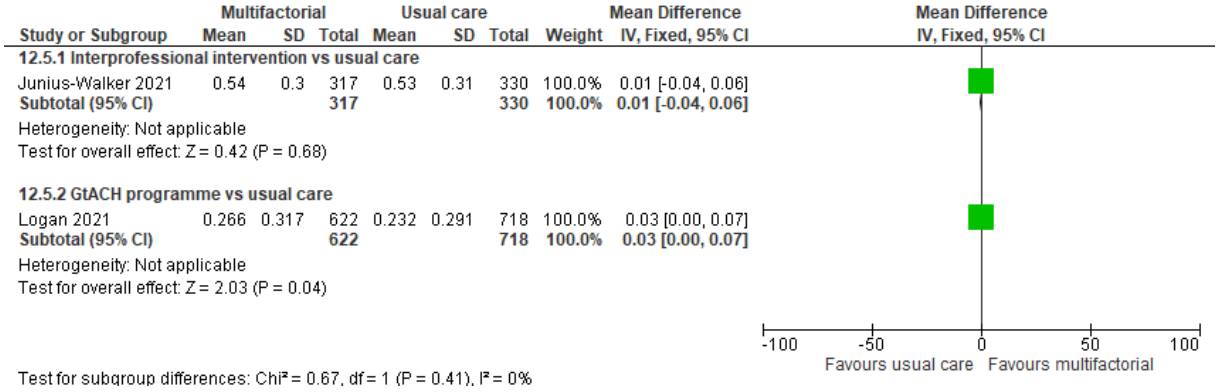


Figure 63: Multifactorial interventions versus usual care: quality of life (DEMQOL) (Items scored 1 to 4, with higher scores indicating better quality of life)

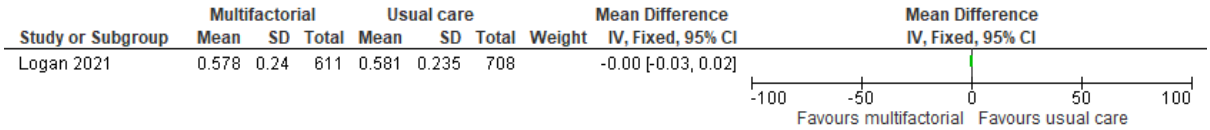


Figure 64: Multifactorial interventions versus usual care (grouped by level of care): rate of falls

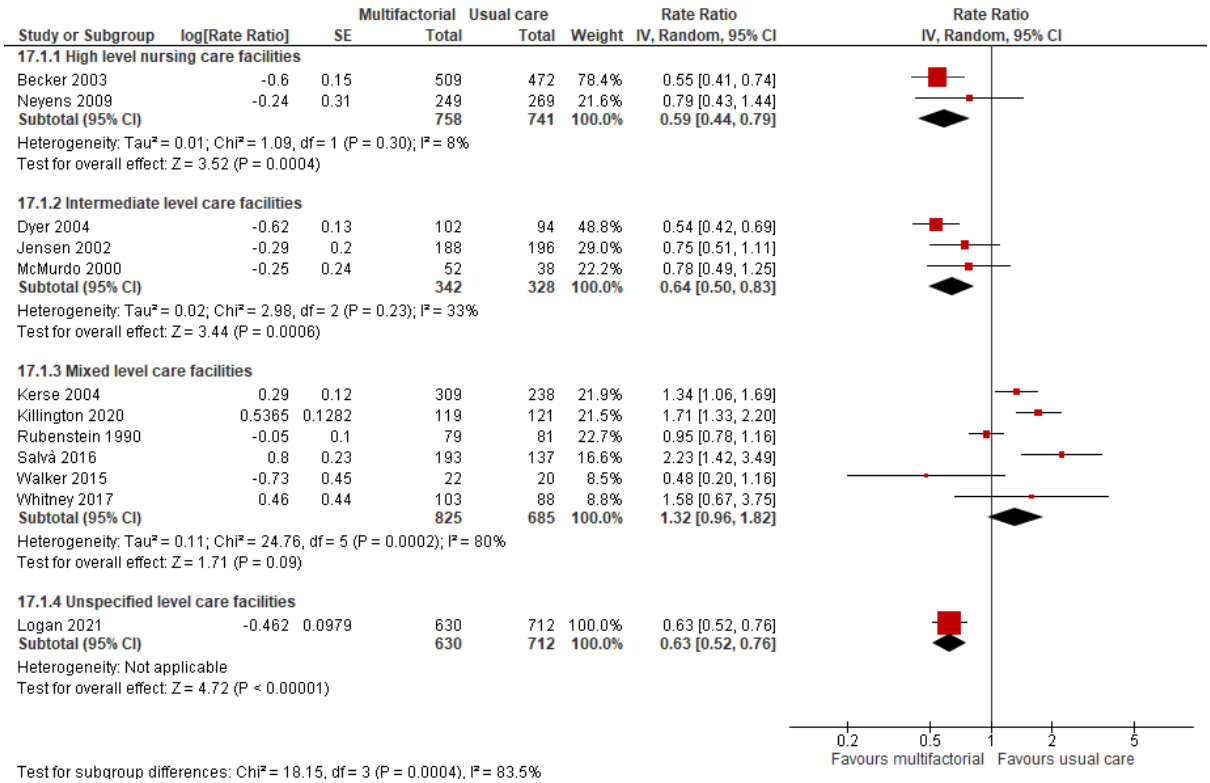
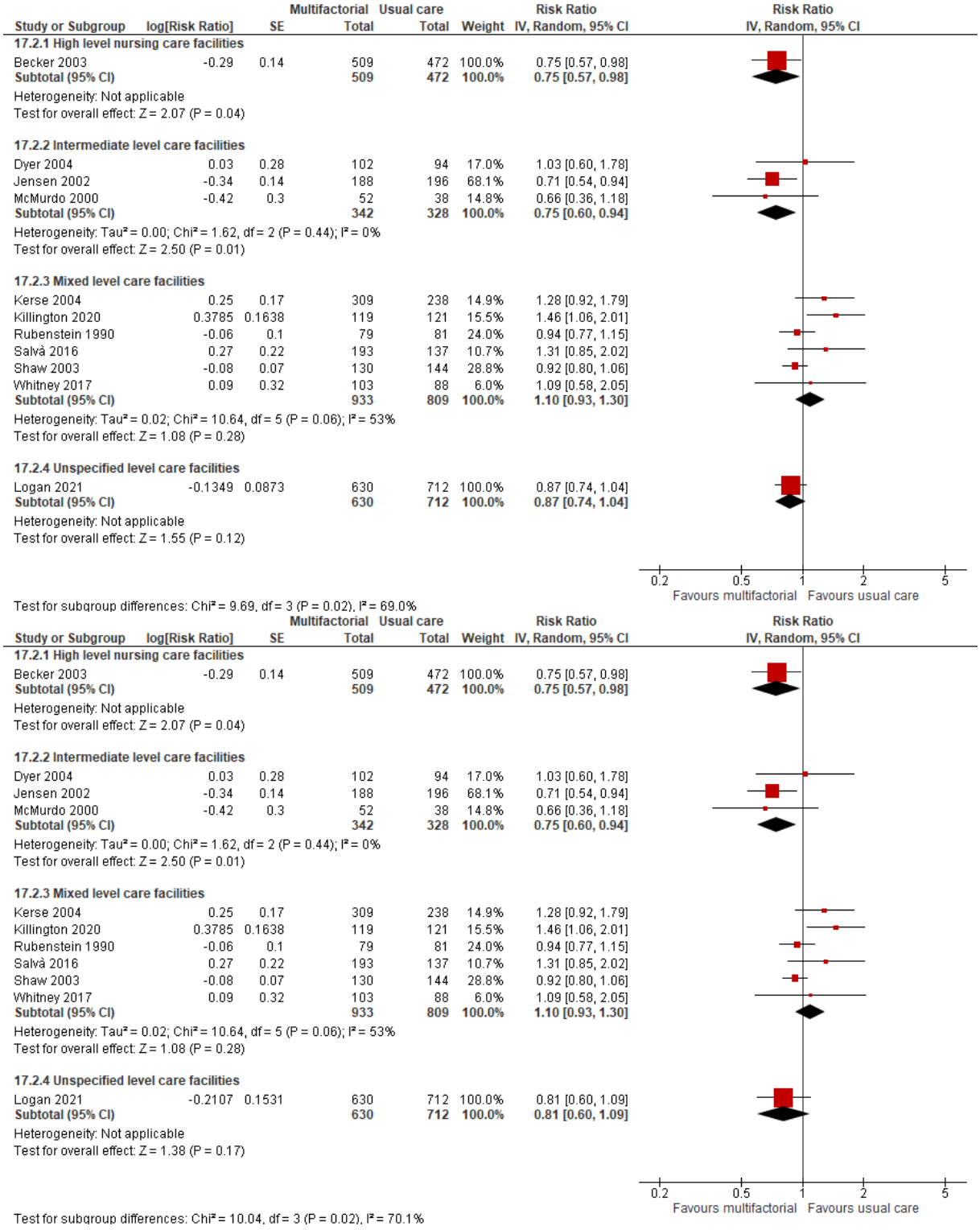
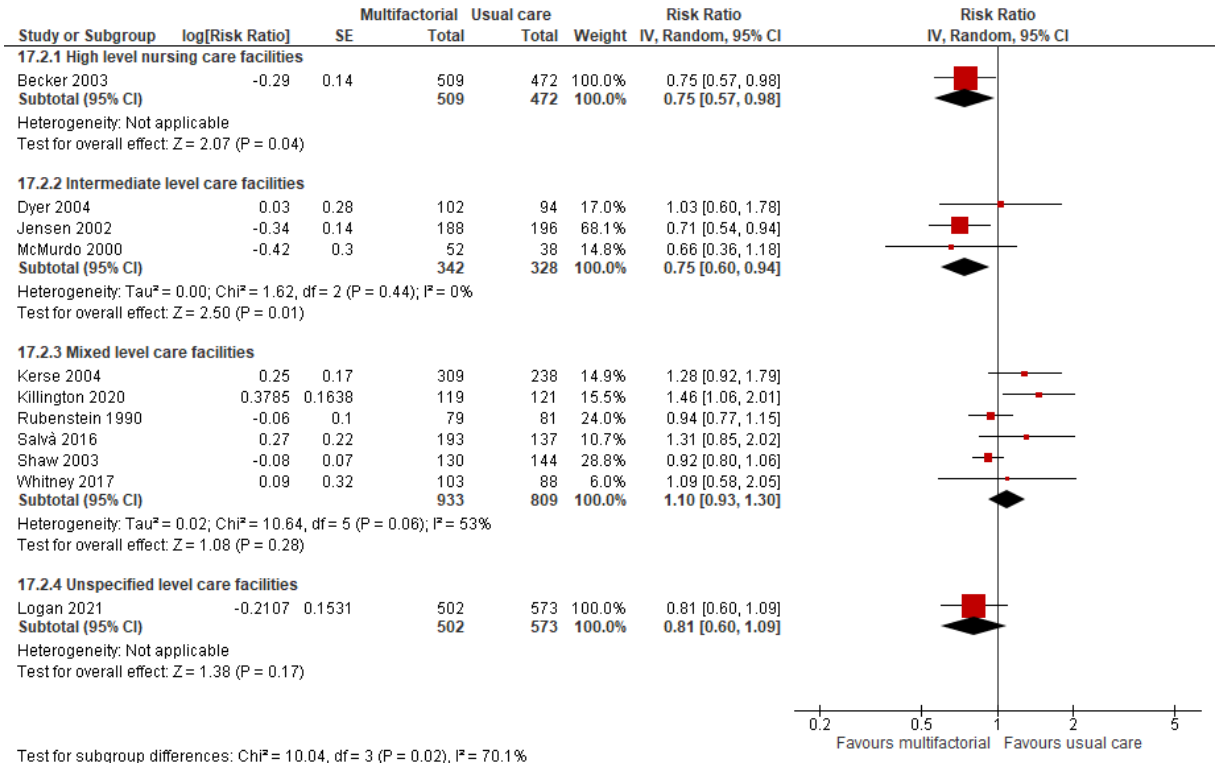
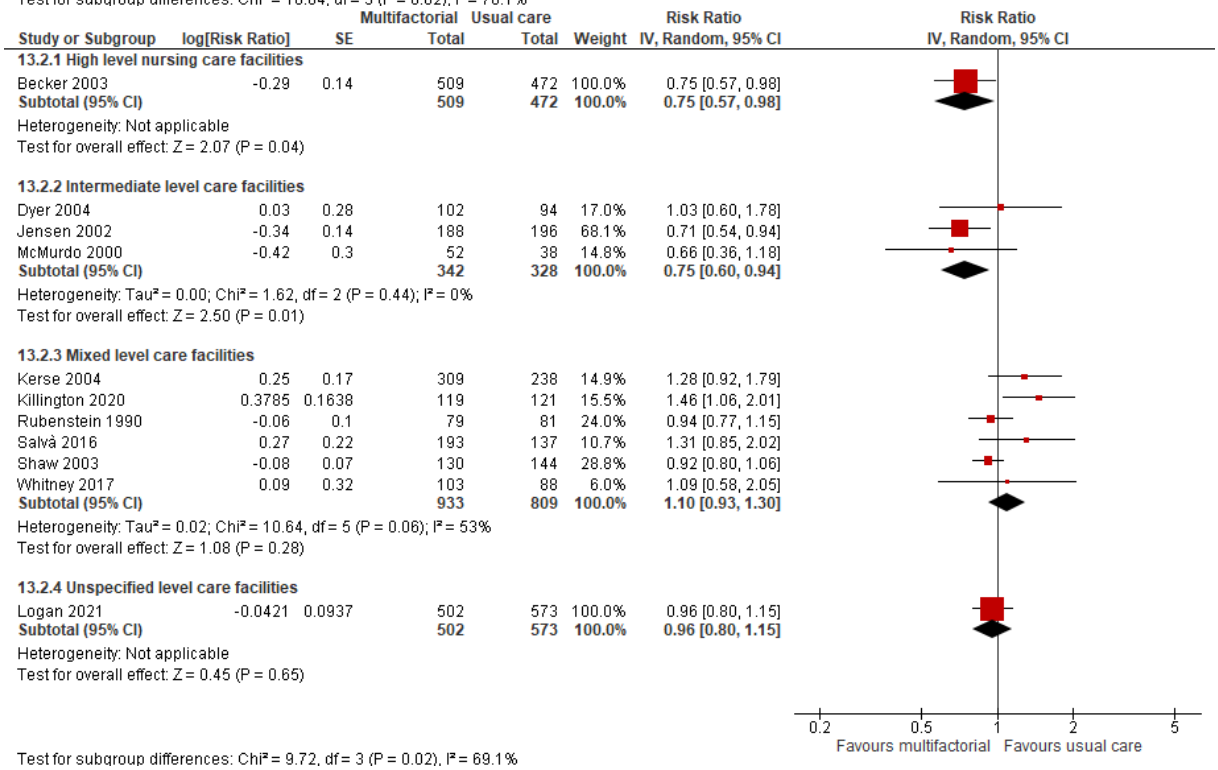


Figure 65: Multifactorial interventions versus usual care (grouped by level of care): number of fallers





Test for subgroup differences: Chi² = 10.04, df = 3 (P = 0.02), I² = 70.1%



Test for subgroup differences: Chi² = 9.72, df = 3 (P = 0.02), I² = 69.1%

Figure 66: Multifactorial interventions versus usual care (grouped by level of care): number of people sustaining a fracture

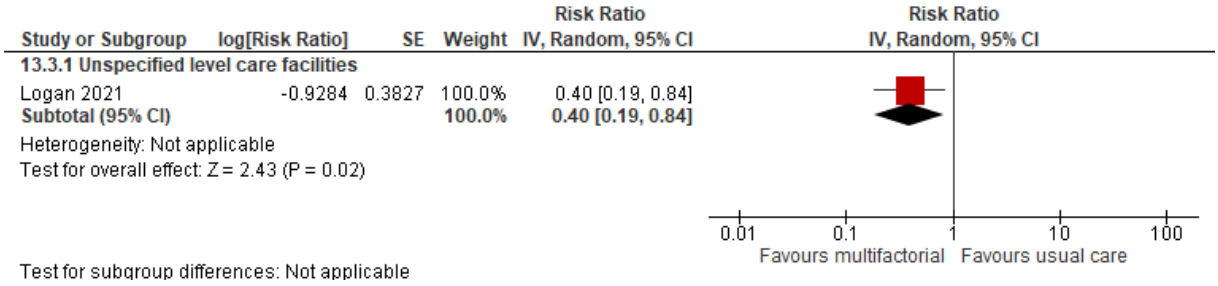


Figure 67: Multifactorial interventions versus usual care (grouped by level of care): quality of life (EQ-5D)(Values are between 0 to 1 with 1 being perfect health)

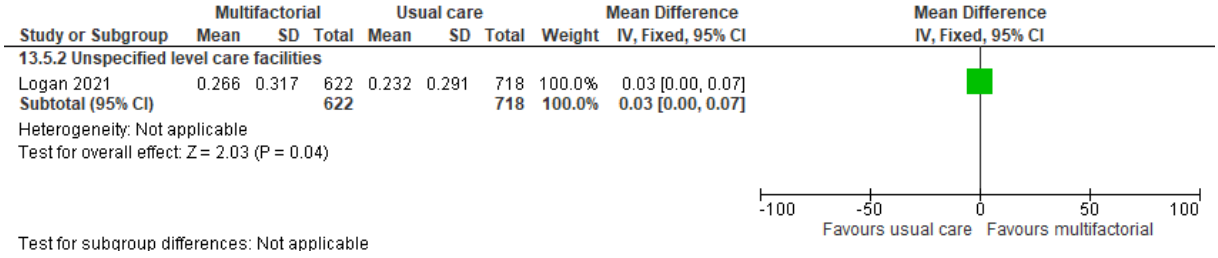


Figure 68: Multifactorial interventions versus usual care (grouped by level of care): quality of life (DEMQOL)(Items scored 1 to 4, with higher scores indicating better quality of life)

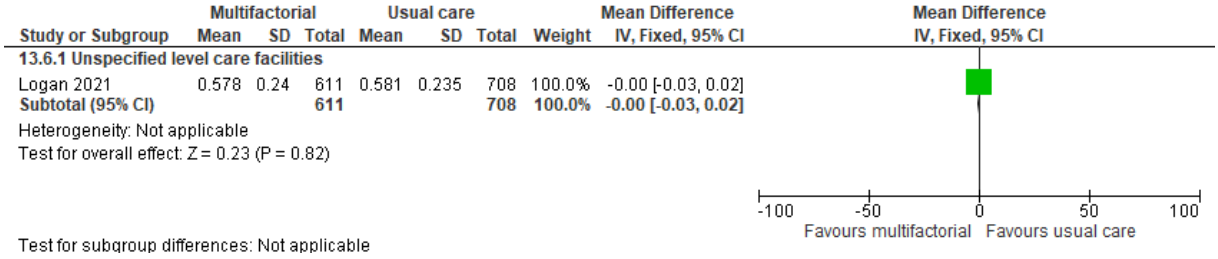
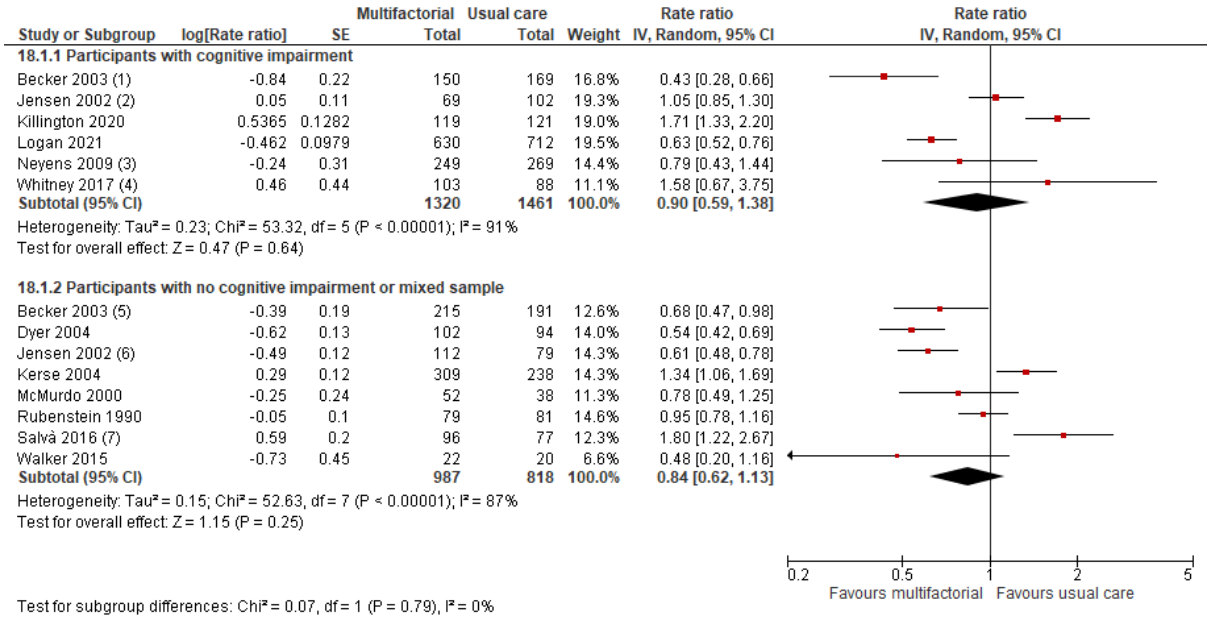


Figure 69: Multifactorial interventions versus usual care (grouped by level of cognition): rate of falls

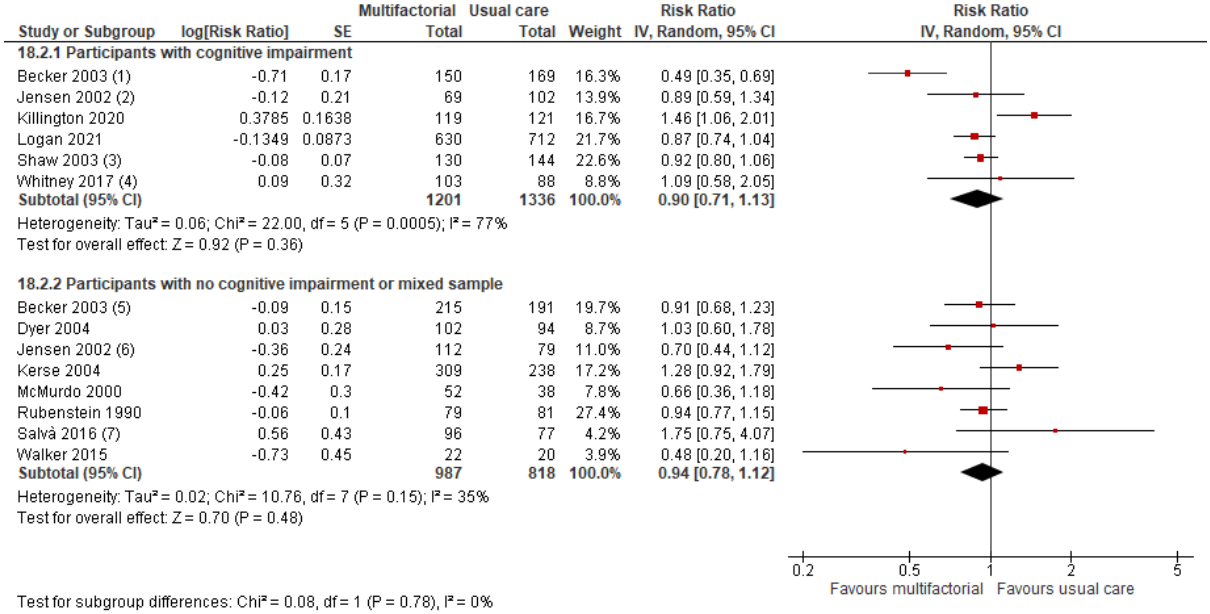


Test for subgroup differences: Chi² = 0.07, df = 1 (P = 0.79), I² = 0%

Footnotes

(1) At least one sign of cognitive impairment or depression based on Minimum Data Set of the Resident Assessment Instrument (MDS RAI 2.0)
(2) Subgroup with MMSE score <19
(3) Psychogeriatric patients
(4) 97% Addenbrooke's Cognitive Examination (ACE-R) score <80
(5) No sign of cognitive impairment or depression based on Minimum Data Set of the Resident Assessment Instrument (MDS RAI 2.0)
(6) Subgroup with MMSE score ≥19
(7) Higher cognition subgroup (excluding those with dementia)

Figure 70: Multifactorial interventions versus usual care (grouped by level of cognition): number of fallers



Test for subgroup differences: Chi² = 0.08, df = 1 (P = 0.78), I² = 0%

Footnotes

(1) At least one sign of cognitive impairment or depression based on Minimum Data Set of the Resident Assessment Instrument (MDS RAI 2.0)
(2) Subgroup with MMSE score <19
(3) All participants had an MMSE score <24
(4) 97% Addenbrooke's Cognitive Examination (ACE-R) score <80
(5) No sign of cognitive impairment or depression based on Minimum Data Set of the Resident Assessment Instrument (MDS RAI 2.0)
(6) Subgroup with MMSE score ≥19
(7) Higher cognition subgroup (excluding those with dementia)

Figure 71: Multifactorial interventions versus usual care (grouped by level of cognition): number of people sustaining a fracture

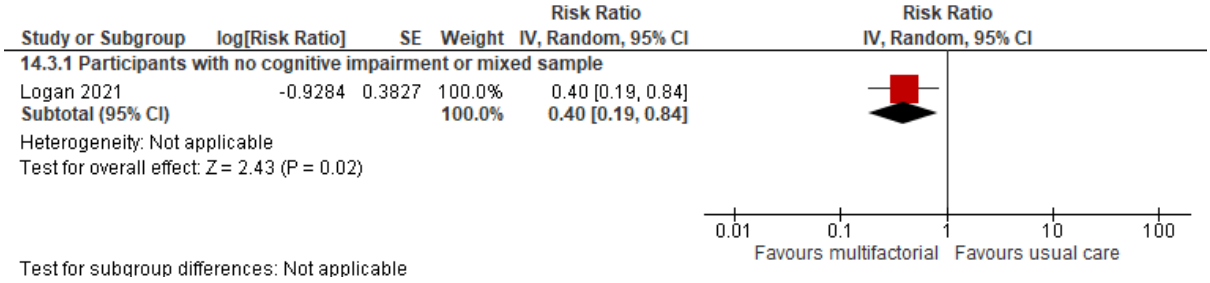


Figure 72: Multifactorial interventions versus usual care (grouped by level of cognition): adverse events

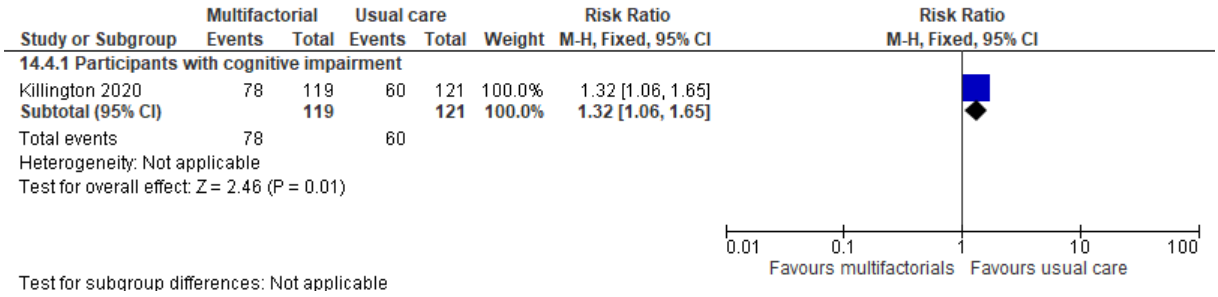


Figure 73: Multifactorial interventions versus usual care (grouped by level of cognition): adverse events

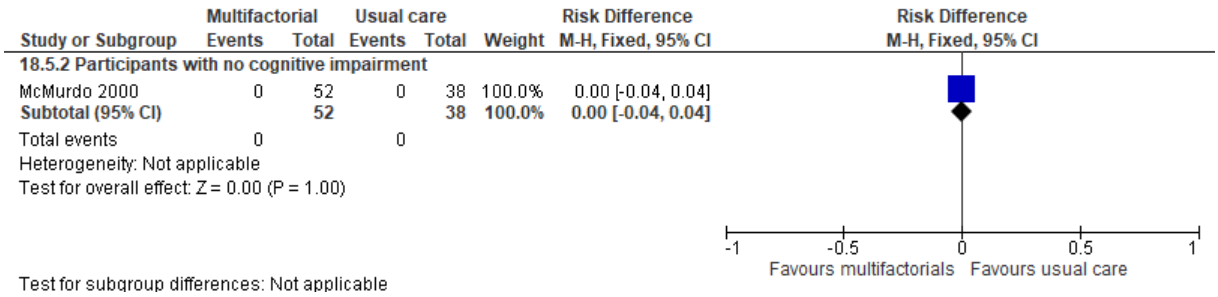


Figure 74: Multifactorial interventions versus usual care (grouped by level of cognition): quality of life (EQ-5D) (Values are between 0 to 1 with 1 being perfect health)

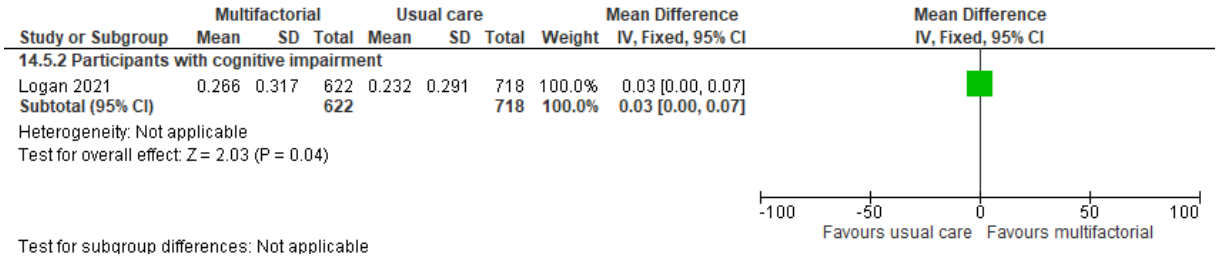


Figure 75: Multifactorial interventions versus usual care (grouped by level of cognition): quality of life (DEMQOL) (Items scored 1 to 4, with higher scores indicating better quality of life)

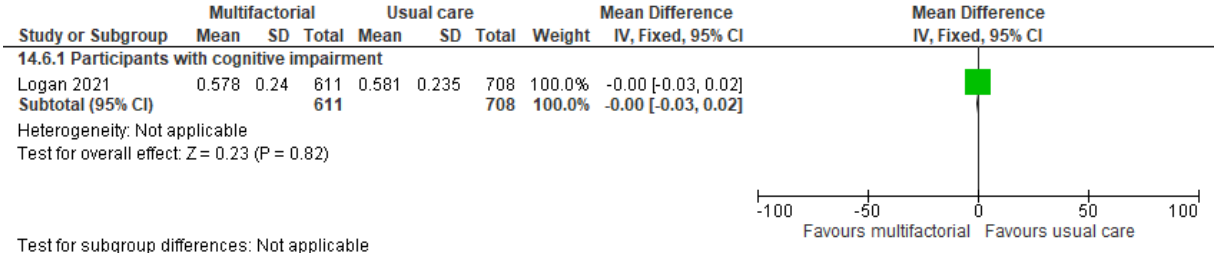


Figure 76: Nutritional support versus usual care: rate of falls

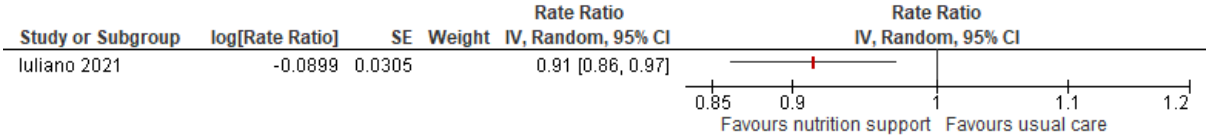


Figure 77: Nutritional support versus usual care: number of people sustaining a fracture

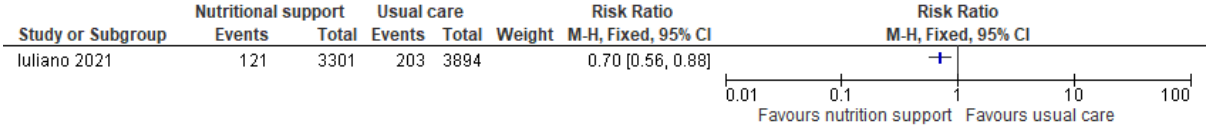


Figure 78: Educational interventions versus usual care: rate of falls

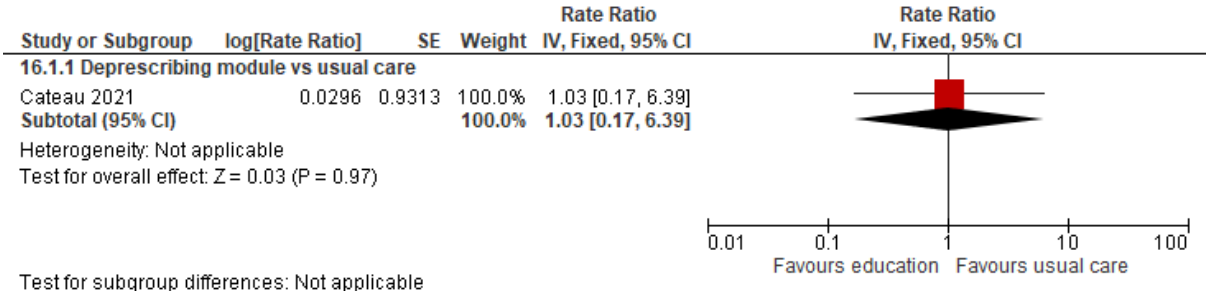


Figure 79: Multifactorial intervention versus education: number of fallers

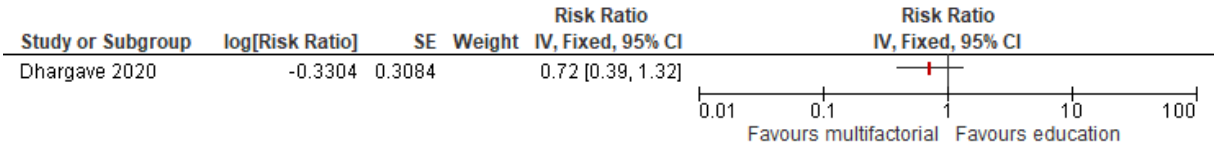


Figure 80: Multifactorial intervention versus education: rate of falls

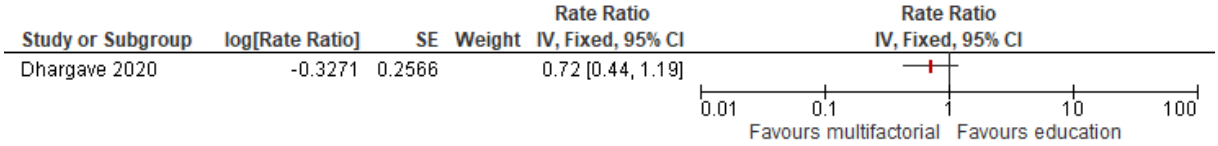


Figure 81: Multicomponent exercise versus multifactorial intervention (dual-task training): rate of falls

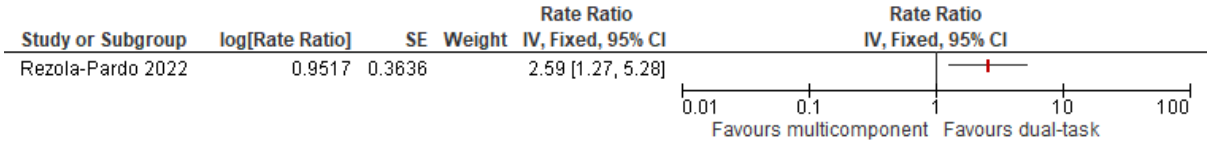
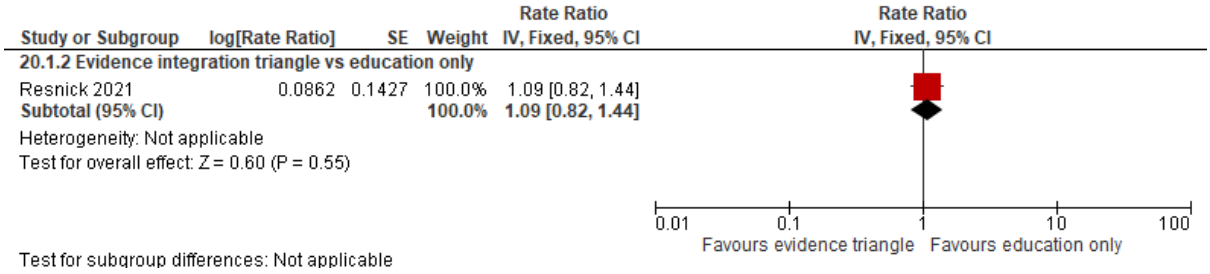


Figure 82: Education versus education: rate of falls



Appendix F GRADE tables

Table 29: Clinical evidence profile: Exercise vs. usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Exercise	usual care	Relative (95% CI)	Absolute (95% CI)		
Rate of falls												
16	randomised trials	very serious[a]	serious[b]	not serious	serious[c]	none	1451	1287	**Rate ratio 0.78** (0.61 to 1.00)	-	⨁◯◯◯ Very low	
Number of fallers												
12	randomised trials	very serious[d]	serious[e]	not serious	serious[c]	none	-/1309	-/1165	**RR 0.90** (0.75 to 1.07)	-	⨁◯◯◯ Very low	
Falls - Number of falls (continuous)												
3	randomised trials	serious[m]	not serious	not serious	serious[l]	none	52	57	-	MD **0.29 lower** (0.52 lower to 0.07 lower)	⨁⨁◯◯ Low	
Number of people sustaining a fracture - Hip fractures												
1	randomised trials	serious[f]	not serious	not serious	very serious[c]	none	-/87	-/96	**RR 0.16** (0.01 to 2.81)	**0 fewer per 1,000** (from 0 fewer to 0 fewer)	⨁◯◯◯ Very low	
Number of people sustaining a fracture - All fractures												
3	randomised trials	serious[g]	serious[h]	not serious	very serious[c]	none	-/293	-/297	**RR 0.61** (0.27 to 1.33)	**0 fewer per 1,000** (from 0 fewer to 0 fewer)	⨁◯◯◯ Very low	
Adverse events: aches and pains												
1	randomised trials	serious[k]	not serious	not serious	very serious[c]	none	16/291 (5.5%)	13/291 (4.5%)	**RR 1.23** (0.61 to 2.48)	**10 more per 1,000** (from 17 fewer to 66 more)	⨁◯◯◯ Very low	
Adverse events: aches and pains - Severe soreness												
1	randomised trials	serious[k]	not serious	not serious	very serious[c]	none	10/97 (10.3%)	11/97 (11.3%)	**RR 0.91** (0.40 to 2.04)	**10 fewer per 1,000** (from 68 fewer to 118 more)	⨁◯◯◯ Very low	
Adverse events: aches and pains - Severe bruises												
1	randomised trials	serious[k]	not serious	not serious	very serious[c]	none	2/97 (2.1%)	1/97 (1.0%)	**RR 2.00** (0.18 to 21.69)	**10 more per 1,000** (from 8 fewer to 213 more)	⨁◯◯◯ Very low	

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Exercise	usual care	Relative (95% CI)	Absolute (95% CI)		
Adverse events: aches and pains - Severe fatigue												
1	randomised trials	serious[k]	not serious	not serious	very serious[c]	none	4/97 (4.1%)	1/97 (1.0%)	**RR 4.00** (0.46 to 35.14)	**31 more per 1,000** (from 6 fewer to 352 more)	⨁◯◯◯ Very low	
Adverse events - Adverse events												
2	randomised trials	very serious[n]	not serious	not serious	not serious	none	0/54 (0.0%)	0/29 (0.0%)	**RD 0.00** (-0.09 to 0.09)	**0 fewer per 1,000** (from 90 fewer to 90 more)	⨁⨁◯◯ Low	
Quality of life (EQ-5D5L-VAS)												
2	randomised trials	not serious	not serious	not serious	serious[i]	none	150	132	-	MD **0.02 higher** (0.04 lower to 0.08 higher)	⨁⨁⨁◯ Moderate	
Quality of life (EQ-5D5L-VAS) - Progressive resistance and balance training vs usual care												
1	randomised trials	not serious	not serious	not serious	not serious	none	94	82	-	MD **0.02 higher** (0.04 lower to 0.08 higher)	⨁⨁⨁⨁ High	
Quality of life (SF-36 Total) - Progressive resistance and balance training vs usual care												
1	randomised trials	not serious	not serious	not serious	not serious	none	88	80	-	MD **2.23 higher** (3.08 lower to 7.54 higher)	⨁⨁⨁⨁ High	

CI: confidence interval; **MD:** mean difference; **RR:** risk ratio

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, baseline imbalance, and selective reporting.

b. Downgraded by 1 increment for inconsistency due an I2 value of 85% suggesting considerable variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

d. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, and baseline imbalance.

e. Downgraded by 1 increment for inconsistency due an I2 value of 53% suggesting substantial variation.

f. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded,.

g. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and concerns for intervention adherence

h. Downgraded by 1 increment for inconsistency due to an I2 value of 44% suggesting moderate variation.

i. Downgraded by 1 increment for inconsistency due to an I2 value of 86% suggesting considerable variation.

j. Downgraded by 1 increment for inconsistency due to an I2 value of 55% suggesting substantial variation

k. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and no reported falls definition.

l. Downgraded by 1 increment if confidence intervals crossed 1 MID or downgrade by 2 if both MIDs were crossed.

m. Downgraded by 1 increment for risk of bias due to missingness of participant data at follow-up

n. Downgraded by 2 increments due to concerns with allocation concealment, blinding, outcome assessing, and baseline imbalance

Table 30: Clinical evidence profile: Exercise vs. usual care (grouped by type of exercise)

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Exercises	usual care (grouped by type of exercise)	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - Gait, balance, functional training												
5	randomised trials	serious[a]	serious[b]	not serious	serious[c]	none	796	727	**Rate ratio 0.99** (0.79 to 1.24)	-	⨁◯◯◯ Very low	
Rate of falls - Whole body vibration												
1	randomised trials	serious[d]	not serious	not serious	very serious[c]	none	31	31	**Rate ratio 0.96** (0.58 to 1.60)	-	⨁◯◯◯ Very low	
Rate of falls - Combination of exercise categories (see Appendix 4 for categories in each trial)												
9	randomised trials	very serious[e]	serious[f]	not serious	serious[c]	none	525	516	**Rate ratio 0.72** (0.48 to 1.08)	-	⨁◯◯◯ Very low	
Rate of falls - Cycling												
1	randomised trials	serious[k]	not serious	not serious	not serious	none	17	22	**Rate ratio 0.67** (0.37 to 1.21)	-	⨁⨁⨁◯ Moderate	
Number of fallers - Gait, balance, and functional training												
6	randomised trials	serious[a]	serious[g]	not serious	serious[c]	none	847	781	**RR 1.01** (0.85 to 1.21)	-	⨁◯◯◯ Very low	
Number of fallers - 3D (Tai Chi)												
1	randomised trials	serious[h]	not serious	not serious	very serious[c]	none	29	30	**RR 0.60** (0.19 to 1.87)	-	⨁◯◯◯ Very low	
Number of fallers - Whole body vibration vs usual care												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Exercises	usual care (grouped by type of exercise)	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	serious[d]	not serious	not serious	very serious[e]	none	31	31	**RR 0.88** (0.54 to 1.43)	-	⨁◯◯◯ Very low	

Number of fallers - Combination of exercise categories (see Appendix 4 for categories in each trial)

6	randomised trials	serious[i]	serious[i]	not serious	serious[e]	none	443	452	**RR 0.92** (0.72 to 1.19)	-	⨁◯◯◯ Very low	

Quality of life (EQ-5D5L-VAS) - Combination of exercise categories

1	randomised trials	not serious	not serious	not serious	not serious	none	94	82	-	MD **0.02 higher** (0.04 lower to 0.08 higher)	⨁⨁⨁⨁ High	

Quality of life (SF-36 Total) - Combination of exercise categories

1	randomised trials	not serious	not serious	not serious	not serious	none	88	80	-	MD **2.23 higher** (3.08 lower to 7.54 higher)	⨁⨁⨁⨁ High	

Number of people sustaining a fracture - Combination of exercise categories

1	randomised trials	not serious	not serious	not serious	very serious[e]	none	113	108	**RR 0.80** (0.25 to 2.53)	**1 fewer per 1,000** (from 3 fewer to 0 fewer)	⨁⨁◯◯ Low	

Number of people sustaining a fracture - Gate, balance, and functional training

1	randomised trials	serious[a]	not serious	not serious	not serious	none	93	93	**RR 0.10** (0.01 to 0.77)	**0 fewer per 1,000** (from 1 fewer to 0 fewer)	⨁⨁⨁◯ Moderate	

CI: confidence interval; **MD:** mean difference; **RR:** risk ratio

a. Downgraded by 1 increment for risk of bias due to concerns regarding intervention adherence, blinding and attrition

b. Downgraded by 1 increment for inconsistency due to an I2 value of 73% suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, and baseline imbalance.

e. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, inconsistent method for reporting a fall, incomplete outcome data, and baseline imbalance.

f. Downgraded by 1 increment for inconsistency due to an I2 value of 89% suggesting substantial variation.

g. Downgraded by 1 increment for inconsistency due to an I2 value of 44% suggesting moderate variation.

h. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, and no allocation concealment.

i. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and incomplete outcome data.

j. Downgraded by 1 increment for inconsistency due to an I2 value of 59% suggesting moderate variation.

k. Downgraded by 1 increment due to attrition and differential numbers of missing data per arm

Table 31:Clinical evidence profile: Exercise vs. usual care (grouped by level of care)

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Exercise	usual care (grouped by level of care)	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - High level nursing care facilities												
2	randomised trials	serious[a]	serious[b]	not serious	very serious[c]	none	106	104	**Rate ratio 1.79** (0.89 to 3.60)	-	⨁◯◯◯ Very low	
Rate of falls - Intermediate level care facilities												
5	randomised trials	serious[d]	serious[e]	not serious	serious[c]	none	706	609	**Rate ratio 0.70** (0.47 to 1.04)	-	⨁◯◯◯ Very low	
Rate of falls - Facilities providing mixed levels of care												
4	randomised trials	serious[f]	serious[g]	not serious	very serious[c]	none	374	324	**Rate ratio 0.76** (0.44 to 1.33)	-	⨁◯◯◯ Very low	
Rate of falls - Unspecified level care facilities												
1	randomised trials	serious[h]	serious[i]	not serious	not serious	none	87	89	**Rate ratio 0.98** (0.82 to 1.62)	-	⨁⨁◯◯ Low	
Number of fallers - High level nursing care facilities												
2	randomised trials	serious[i]	not serious	not serious	very serious[c]	none	142	119	**RR 1.15** (0.83 to 1.58)	-	⨁◯◯◯ Very low	
Number of fallers - Intermediate level care facilities												
6	randomised trials	very serious[i]	not serious	not serious	serious[c]	none	756	663	**RR 0.94** (0.75 to 1.17)	-	⨁◯◯◯ Very low	
Number of fallers - Mixed level care facilities												
4	randomised trials	serious[f]	serious[m]	not serious	very serious[c]	none	374	324	**RR 0.90** (0.62 to 1.30)	-	⨁◯◯◯ Very low	

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Exercise	usual care (grouped by level of care)	Relative (95% CI)	Absolute (95% CI)		
Number of fallers - Unspecified level care facilities												
1	randomised trials	serious[h]	not serious	not serious	not serious	none	143	139	**RR 0.94** (0.77 to 1.15)	-	⨁⨁⨁◯ Moderate	
Quality of life (EQ-5D5L-VAS) - Mixed level care facilities												
1	randomised trials	not serious	not serious	not serious	not serious	none	94	82	-	MD **0.02 higher** (0.04 lower to 0.08 higher)	⨁⨁⨁⨁ High	
Quality of life (SF-36 Total) - Mixed level care facilities												
1	randomised trials	not serious	not serious	not serious	not serious	none	88	80	-	MD **2.23 higher** (3.08 lower to 7.54 higher)	⨁⨁⨁⨁ High	
Number of people sustaining a fracture - Mixed level care facilities												
1	randomised trials	not serious	not serious	not serious	very serious[c]	none	113	108	**RR 0.80** (0.25 to 2.53)	**1 fewer per 1,000** (from 3 fewer to 0 fewer)	⨁⨁◯◯ Low	
Number of people sustaining a fracture - Unspecified level care facilities												
1	randomised trials	serious[o]	not serious	not serious	not serious	none	93	93	**RR 0.10** (0.01 to 0.77)	**0 fewer per 1,000** (from 1 fewer to 0 fewer)	⨁⨁⨁◯ Moderate	

CI: confidence interval; **MD:** mean difference; **RR:** risk ratio

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, selective reporting of the results and inconsistent method for ascertaining falls.

b. Downgraded by 1 increment for inconsistency due to an I2 value of 73% suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, and inconsistent method for ascertaining falls.

e. Downgraded by 1 increment for inconsistency due to an I2 value of 78% suggesting substantial variation.

f. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and imbalances at baseline.

g. Downgraded by 1 increment for inconsistency due to an I2 value of 92% suggesting substantial variation.

h. Downgraded by 1 increment for risk of bias due to concerns relating to adherence

i. Downgraded by 1 increment for inconsistency due to an I2 value of 81% suggesting substantial variation.

j. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, inconsistent method for reporting a fall, incomplete outcome data, and baseline imbalance.

k. Downgraded by 1 increment for inconsistency due to an I2 value of 49% suggesting moderate variation.

l. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and the method of ascertaining falls was unclear.

m. Downgraded by 1 increment for inconsistency due to an I2 value of 77% suggesting substantial variation.

n. Downgraded by 1 increment for imprecision if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs.

o. Downgraded by 1 increment for risk of bias due to issues regarding allocation concealment and missing outcome data.

p. Downgraded by 1 increment for inconsistency due to an I2 value of 67% suggesting substantial variation.

q. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, selective reporting of the results, inconsistent method of ascertaining falls, and incomplete outcome data.

r. Downgraded by 1 increment for inconsistency due to an I2 value of 85% suggesting substantial variation.

Table 32: Clinical evidence profile: Comparison of different exercise programmes

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Exercise	exercise	Relative (95% CI)	Absolute (95% CI)		
Number of falls												
2	randomised trials	serious[a]	serious[b]	not serious	serious[c]	none	58	59	-	MD **0.66 lower** (0.98 lower to 0.34 lower)	⨁◯◯◯ Very low	

a. Downgraded by 1 increment for risk of bias due to randomisation concerns

b. Downgraded by 1 increments for inconsistency as the I-squared value is 79%

c. Downgraded by 1 increment as the confidence intervals crossed 1 MID

Table 33: Clinical evidence profile: Comparison of different exercise programmes

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Comparisons of different exercise programs (see Appendix 4 for details)	placebo	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - Additional gait, balance, functional training												
2	randomised trials	serious[a]	not serious	not serious	serious[b]	none	29	27	**Rate ratio 0.62** (0.40 to 0.96)	-	⨁⨁◯◯ Low	
Rate of falls - Strength/resistance vs self-training												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Comparisons of different exercise programs (see Appendix 4 for details)	placebo	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	serious[a]	not serious	not serious	serious[b]	none	16	18	**Rate ratio 0.74** (0.50 to 1.10)	-	⨁⨁◯◯ Low	

Rate of falls - Balance and strength vs self-training

1	randomised trials	serious[a]	not serious	not serious	not serious	none	14	18	**Rate ratio 0.48** (0.30 to 0.77)	-	⨁⨁⨁◯ Moderate	

Rate of falls - Flexibility (Yoga) vs 'Staying active' program

1	randomised trials	serious[c]	not serious	not serious	serious[b]	none	9	11	**Rate ratio 0.47** (0.24 to 0.91)	-	⨁⨁◯◯ Low	

Rate of falls - 3D (Tai Ch‘) vs 'Staying active' program

1	randomised trials	serious[c]	not serious	not serious	serious[b]	none	9	11	**Rate ratio 0.52** (0.28 to 0.98)	-	⨁⨁◯◯ Low	

Rate of falls - Flexibility (Yoga) vs 3D (Tai Chi)

1	randomised trials	serious[c]	not serious	not serious	very serious[b]	none	9	9	**Rate ratio 1.11** (0.51 to 2.37)	-	⨁◯◯◯ Very low	

Rate of falls - 3D exercises ("In balance") vs Functional balance, strength & mobility

1	randomised trials	serious[d]	not serious	not serious	serious[b]	none	78	64	**Rate ratio 0.73** (0.60 to 0.89)	--	⨁⨁◯◯ Low	

Rate of falls - Wii balance board vs Otago balance program

1	randomised trials	serious[d]	not serious	not serious	not serious	none	30	30	**Rate ratio 0.35** (0.19 to 0.63)	-	⨁⨁⨁◯ Moderate	

Number of fallers - Additional gait, balance, and functional training

2	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	29	27	**RR 0.79** (0.43 to 1.45)	-	⨁◯◯◯ Very low	

Number of fallers - Strength/resistance vs self-training

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Comparisons of different exercise programs (see Appendix 4 for details)	placebo	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	serious[a]	not serious	not serious	serious[b]	none	16	18	**RR 0.56** (0.30 to 1.03)	-	⨁⨁◯◯ Low	
Number of fallers - Balance and strength vs self-training												
1	randomised trials	serious[a]	not serious	not serious	serious[b]	none	14	18	**RR 0.55** (0.29 to 1.05)	-	⨁⨁◯◯ Low	
Number of fallers - Additional whole body vibration												
2	randomised trials	serious[e]	not serious	not serious	very serious[b]	none	130	102	**RR 1.21** (0.72 to 2.03)	-	⨁◯◯◯ Very low	
Number of fallers - 3D exercises ("In balance") vs Functional balance, strength & mobility												
1	randomised trials	serious[e]	not serious	not serious	serious[b]	none	78	64	**RR 0.92** (0.70 to 1.21)	-	⨁⨁◯◯ Low	
Number of fallers - Comparison of combination exercise programmes												
1	randomised trials	serious[f]	not serious	not serious	serious[b]	none	21	20	**RR 0.54** (0.29 to 1.01)	-	⨁⨁◯◯ Low	
Number of people sustaining a fracture - Total fractures												
1	randomised trials	serious[e]	not serious	not serious	very serious[b]	none	81	78	**RR 2.89** (0.12 to 69.07)	-	⨁◯◯◯ Very low	
Adverse events - Adverse events												
2	randomised trials	very serious[f]	not serious	not serious	not serious	none	0/46 (0.0%)	0/44 (0.0%)	RD 0.00 (-0.06 to 0.06)	**0 fewer per 1,000** (from 60 fewer to 60 more)	⨁⨁◯◯ Low	

CI: confidence interval; **RR:** risk ratio

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, incomplete outcome data, and baseline imbalances.

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

c. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and incomplete outcome data .

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded

f. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and selective reporting.

g. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, selective reporting, incomplete outcome data, and baseline imbalances.

Table 34: Clinical evidence profile: Medication review vs. usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Medication review	usual care	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - General medication reviews vs usual care												
6	randomised trials	very serious[a]	serious[b]	not serious	very serious[c]	none	1183	1226	**Rate ratio 0.93** (0.64 to 1.35)	-	⨁◯◯◯ Very low	
Rate of falls - Medication review for hyponatraemia												
1	randomised trials	serious[d]	not serious	not serious	very serious[c]	none	4	5	**Rate ratio 0.63** (0.16 to 2.49)	-	⨁◯◯◯ Very low	
Rate of falls - Structured medication regimen simplification vs usual care												
1	randomised trials	serious[e]	not serious	not serious	not serious	none	98	143	**Rate ratio 2.31** (1.98 to 2.69)	-	⨁⨁⨁◯ Moderate	
Rate of falls - Pharmacist-led medication review vs usual care												
1	randomised trials	serious[f]	not serious	not serious	very serious[c]	none	96	95	**Rate ratio 0.99** (0.69 to 1.42)	-	⨁◯◯◯ Very low	
Number of fallers - General medication review vs usual care												
6	randomised trials	very serious[g]	serious[h]	not serious	serious[c]	none	2675	2464	**RR 0.93** (0.80 to 1.09)	-	⨁◯◯◯ Very low	
Number of fallers - Medication review for hyponatraemia												
1	randomised trials	serious[d]	not serious	not serious	very serious[c]	none	4	5	**RR 0.42** (0.07 to 2.59)	-	⨁◯◯◯ Very low	
Number of fallers - Pharmacist-led medication review vs. usual care												
1	randomised trials	serious[f]	not serious	not serious	serious[c]	none	96	95	**RR 0.99** (0.79 to 1.24)	-	⨁⨁◯◯ Low	
Number of fallers - Structured medication regimen simplification vs usual care												
1	randomised trials	serious[e]	not serious	not serious	serious[c]	none	98	143	**RR 1.46** (1.18 to 1.80)	-	⨁⨁◯◯ Low	
Number of fallers - Deprescribing intervention vs waitlist control												
1	randomised trials	not serious	not serious	not serious	very serious[c]	none	415	437	**RR 1.35** (0.74 to 2.46)	-	⨁⨁◯◯ Low	
Number of people sustaining a fracture - General medication review vs usual care												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Medication review	usual care	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	serious[i]	not serious	not serious	very serious[c]	none	45	48	**RR 1.60** (0.28 to 9.16)	-	⨁◯◯◯ Very low	

Serious adverse events

1	randomised trials	serious[i]	not serious	not serious	very serious[c]	none	3/45 (6.7%)	3/48 (6.3%)	**RR 1.07** (0.23 to 5.01)	**4 more per 1,000** (from 48 fewer to 251 more)	⨁◯◯◯ Very low	

Serious adverse events - General medication review vs usual care

1	randomised trials	serious[i]	not serious	not serious	very serious[c]	none	3/45 (6.7%)	3/48 (6.3%)	**RR 1.07** (0.23 to 5.01)	**4 more per 1,000** (from 48 fewer to 251 more)	⨁◯◯◯ Very low	

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, baseline imbalances, selective outcome reporting, and inconsistent method for ascertaining falls

b. Downgraded by 1 increment for inconsistency due to the I2 value suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and incomplete outcome data reported.

e. Downgraded by 1 increment for risk of bias due to imbalances at baseline.

f. Downgraded by 1 increment for risk of bias due to concerns regarding the randomisation process and no pre-specified protocol.

g. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, baseline imbalances, problems with allocation sequence concealment, and inconsistent method for ascertaining falls

h. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded.

i. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors were not blinded, baseline imbalances, selective outcome reporting, inconsistent method of ascertaining falls, no pre-specified protocol and concerns regarding the randomisation process.

Table 35: Clinical evidence profile: Vitamin D supplements vs. no Vitamin D supplements

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Vitamin D supplementation	no vitamin D supplementation	Relative (95% CI)	Absolute (95% CI)		

Rate of falls - Additional Vitamin D supplementation

4	randomised trials	serious[a]	serious[b]	not serious	serious[c]	none	2160	2352	**Rate ratio 0.72** (0.55 to 0.95)	-	⨁◯◯◯ Very low	

Rate of falls - Multivitamins (including vitamin D3 + calcium) vs placebo

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Vitamin D supplementation	no vitamin D supplementation	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	serious[d]	not serious	not serious	not serious	none	48	43	**Rate ratio 0.38** (0.20 to 0.71)	-	⨁⨁⨁◯ Moderate	

Rate of falls - Education on Vitamin D + calcium + osteoporosis medications vs usual care

1	randomised trials	very serious[e]	not serious	not serious	very serious[c]	none	1290	2727	**Rate ratio 1.03** (0.85 to 1.25)	-	⨁◯◯◯ Very low	

Number of fallers - Vitamin D supplementation

4	randomised trials	serious[a]	serious[f]	not serious	serious[c]	none	2160	2352	**RR 0.92** (0.76 to 1.12)	-	⨁◯◯◯ Very low	

Number of fallers - Vitamin D + calcium supplementation vs placebo

1	randomised trials	serious[g]	not serious	not serious	not serious	none	393	190	**RR 1.03** (0.90 to 1.18)	-	⨁⨁⨁◯ Moderate	

Number of fallers - Multivitamins (including vitamin D3 + calcium) vs usual care or placebo

1	randomised trials	serious[h]	not serious	not serious	very serious[c]	none	48	43	**RR 0.82** (0.40 to 1.66)	-	⨁◯◯◯ Very low	

Number of fallers - Education on Vitamin D + calcium + osteoporosis medications vs usual care

1	randomised trials	very serious[e]	not serious	not serious	not serious	none	1290	2727	**RR 1.05** (0.90 to 1.23)	-	⨁⨁◯◯ Low	

Number of people sustaining a fracture - Vitamin D supplementation

3	randomised trials	serious[a]	serious[i]	not serious	very serious[c]	none	2137	2327	**RR 1.09** (0.58 to 2.03)	-	⨁◯◯◯ Very low	

Number of people sustaining a fracture - Vitamin D3 + calcium vs placebo

1	randomised trials	serious[g]	not serious	not serious	serious[c]	none	393	190	**RR 0.62** (0.36 to 1.07)	-	⨁⨁◯◯ Low	

Adverse events - Multivitamins (including vitamin D3 + calcium) vs usual care or placebo

1	randomised trials	serious[d]	not serious	not serious	very serious[c]	none	0/48 (0.0%)	3/43 (7.0%)	**RR 0.13** (0.01 to 2.41)	**61 fewer per 1,000** (from 69 fewer to 98 more)	⨁◯◯◯ Very low	

Adverse events - Vitamin D + calcium supplementation

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Vitamin D supplementation	no vitamin D supplementation	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	serious[g]	not serious	not serious	very serious[c]	none	30/786 (3.8%)	16/380 (4.2%)	**RR 0.89** (0.50 to 1.59)	**5 fewer per 1,000** (from 21 fewer to 25 more)	⨁◯◯◯ Very low	

Adverse events - Vitamin D supplementation

2	randomised trials	not serious	not serious	not serious	very serious[c]	none	2/437 (0.5%)	0/432 (0.0%)	not pooled	-	⨁⨁◯◯ Low	

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and unclear method for ascertaining falls.

b. Downgraded by 1 increment for inconsistency due to the I2 having a value suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 1 increment for risk of bias due to incomplete outcome data, selective reporting, and method of ascertaining falls.

e. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors were not blinded, incomplete outcome data, imbalances at baseline, and method of ascertaining falls.

f. Downgraded by 1 increment for risk of bias due to unclear method of ascertaining falls.

g. Downgraded by 1 increment for risk of bias due to incomplete outcome data and method for ascertaining falls.

h. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors were not blinded, incomplete outcome data, imbalances at baseline, selective reporting, and method of ascertaining falls.

Table 36: Clinical evidence profile: Psychological intervention vs control

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Psychological interventions	control	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - Exercise + cognitive training vs exercise												
1	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	60	54	**Rate ratio 1.22** (0.78 to 1.92)	-	⨁◯◯◯ Very low	
Number of fallers - Exercise + cognitive training vs exercise												
1	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	60	54	**RR 1.35** (0.23 to 7.88)	-	⨁◯◯◯ Very low	

CI: confidence interval; **MD:** mean difference; **RR:** risk ratio

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, no allocation concealment, and incomplete outcome data.

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

Table 37: Clinical evidence profile: Social environment vs. usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Social environment	usual care	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - Staff education on fracture prevention vs usual care												
1	randomised trials	serious[a]	not serious	not serious	serious[c]	none	3315	2322	**Rate ratio 1.19** (0.92 to 1.53)	-	⨁⨁◯◯ Low	
Rate of falls - Guideline implementation programme vs control												
1	randomised trials	very serious[d]	not serious	not serious	serious[e]	none	196	196	**Rate ratio 0.63** (0.34 to 1.16)	-	⨁◯◯◯ Very low	
Rate of falls - Risk assessment tool vs 'nurses' judgement												
1	randomised trials	serious[f]	not serious	not serious	serious[c]	none	574	551	**Rate ratio 0.96** (0.84 to 1.10)	-	⨁⨁◯◯ Low	
Rate of falls - Dementia care mapping vs usual care												
1	randomised trials	serious[e]	not serious	not serious	not serious	none	137	156	**Rate ratio 1.84** (1.40 to 2.42)	-	⨁⨁⨁◯ Moderate	
Number of fallers - Risk assessment tool vs 'nurses' judgement												
1	randomised trials	serious[f]	not serious	not serious	serious[c]	none	574	551	**RR 0.99** (0.85 to 1.16)	-	⨁⨁◯◯ Low	
Number of people sustaining a fracture - Risk assessment tool vs 'nurses' judgement												
1	randomised trials	serious[f]	not serious	not serious	very serious[c]	none	574	551	**RR 0.96** (0.57 to 1.63)	-	⨁◯◯◯ Very low	
Number of people sustaining a fracture - Project nurse facilitating best-practice falls injury prevention strategies vs usual care												
1	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	2802	2589	**RR 0.95** (0.63 to 1.44)	-	⨁◯◯◯ Very low	

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, unclear method of ascertaining falls, and baseline imbalances.

b. Downgraded by 1 increment for inconsistency due to an I2 value of 86% suggesting substantial variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, unclear method of ascertaining falls, and baseline imbalances.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, allocation concealment was unclear, and incomplete outcome data.

f. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

Table 38: Clinical evidence profile: Environmental interventions vs. usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Environmental interventions	usual care	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - Wireless position-monitoring patch vs usual care												
1	randomised trials	serious[b]	not serious	not serious	very serious[c]	none	33	39	**Rate ratio 0.65** (0.33 to 1.27)	-	⨁◯◯◯ Very low	
Rate of falls - Assisted home technology vs. no assisted home technology												
1	randomised trials	serious[d]	not serious	not serious	not serious	none	30	24	**Rate ratio 0.52** (0.37 to 0.73)	-	⨁⨁⨁◯ Moderate	
Number of fallers - Assisted home technology vs. no assisted home technology												
1	randomised trials	serious[d]	not serious	not serious	serious[c]	none	30	24	**RR 0.65** (0.40 to 1.07)	-	⨁⨁◯◯ Low	
Quality of life (self-rated- Total)												
1	randomised trials	serious[d]	not serious	not serious	not serious	none	29	24	-	MD **9.67 higher** (3.4 higher to 15.94 higher)	⨁⨁⨁◯ Moderate	
Quality of life (QUALIDEM)- Care relationship												
1	randomised trials	serious[d]	not serious	not serious	serious[e]	none	29	24	-	MD **3.41 higher** (1.04 higher to 5.78 higher)	⨁⨁◯◯ Low	
Quality of life (QUALIDEM)- Positive affect												
1	randomised trials	serious[d]	not serious	not serious	serious[e]	none	29	24	-	MD **0.7 lower** (2.54 lower to 1.14 higher)	⨁⨁◯◯ Low	
Quality of life (QUALIDEM)- Negative affect												
1	randomised trials	serious[d]	not serious	not serious	serious[e]	none	29	24	-	MD **0.82 higher** (0.67 lower to 2.31 higher)	⨁⨁◯◯ Low	
Quality of life (QUALIDEM)- Restless behaviour												
1	randomised trials	serious[d]	not serious	not serious	serious[e]	none	29	24	-	MD **0.93 higher** (0.53 lower to 2.39 higher)	⨁⨁◯◯ Low	

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Environmental interventions	usual care	Relative (95% CI)	Absolute (95% CI)		
Quality of life (QUALIDEM)- Positive self-image												
1	randomised trials	serious[d]	not serious	not serious	serious[e]	none	29	24	-	MD **0.56 higher** (0.79 lower to 1.91 higher)	⨁⨁◯◯ Low	
Quality of life (QUALIDEM)- Social relations												
1	randomised trials	serious[d]	not serious	not serious		none	29	24	-	MD **0.66 higher** (1.31 lower to 2.63 higher)	-	
Quality of life (QUALIDEM)- Social isolation												
1	randomised trials	serious[d]	not serious	not serious	serious[e]	none	29	24	-	MD **1.99 higher** (0.81 higher to 3.17 higher)	⨁⨁◯◯ Low	
Quality of life (QUALIDEM)- Feeling at home												
1	randomised trials	serious[d]	not serious	not serious	very serious[e]	none	29	24	-	MD **1.45 higher** (0.5 lower to 3.4 higher)	⨁◯◯◯ Very low	
Quality of life (QUALIDEM)- Having things to do												
1	randomised trials	serious[d]	not serious	not serious	serious[e]	none	29	24	-	MD **0.56 higher** (0.55 lower to 1.67 higher)	⨁⨁◯◯ Low	
Number of people sustaining a fracture												
1	randomised trials	not serious	not serious	not serious	very serious[c]	none	74	76	**RR 0.75** (0.30 to 1.86)	**1 fewer per 1,000** (from 2 fewer to 0 fewer)	⨁⨁◯◯ Low	

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, incomplete outcome data, unclear randomisation process and no pre-specified protocol

b. Downgraded by 1 increment for risk of bias due to the participants and personnel not being blinded, outcome assessors not being blinded, and incomplete outcome data.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 1 increment for risk of bias due to unclear randomisation process and no pre-specified protocol.

Table 39: Clinical evidence profile: Other single interventions vs control

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Other single interventions	control	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - Lavender patch vs placebo												
1	randomised trials	serious[d]	not serious	not serious	serious[c]	none	73	72	**Rate ratio 0.57** (0.32 to 1.01)	-	⨁⨁◯◯ Low	
Rate of falls - Sunlight exposure vs usual care												
1	randomised trials	serious[e]	not serious	not serious	very serious[c]	none	190	205	**Rate ratio 1.05** (0.71 to 1.56)	-	⨁◯◯◯ Very low	
Rate of falls - Twenty minute rounding observation vs usual care												
1	randomised trials	serious[f]	not serious	not serious	very serious[c]	none	20	21	**Rate ratio 1.83** (0.36 to 9.26)	-	⨁◯◯◯ Very low	
Number of fallers - Lavender patch vs placebo												
1	randomised trials	serious[d]	not serious	not serious	serious[c]	none	73	72	**RR 0.67** (0.40 to 1.12)	-	⨁⨁◯◯ Low	
Number of fallers - Sunlight exposure vs usual care												
1	randomised trials	serious[e]	not serious	not serious	very serious[c]	none	190	205	**RR 1.09** (0.88 to 1.36)	-	⨁◯◯◯ Very low	
Number of people sustaining a fracture - Sunlight exposure vs usual care												
1	randomised trials	serious[e]	not serious	not serious	very serious[c]	none	190	205	**RR 1.07** (0.53 to 2.17)	-	⨁◯◯◯ Very low	
Adverse events - Adverse events												
1	randomised trials	not serious	not serious	not serious	not serious	none	0/73 (0.0%)	0/72 (0.0%)	**RD 0.00** (0.03 to 0.03)	**0 fewer per 1,000** (from 30 fewer to 30 more)	⨁⨁⨁⨁ High	

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, outcome assessors were not blinded, unclear measurement of the outcome, deviations from the intended intervention, and no specified protocol.

b. Downgraded by 1 increment for inconsistency due to an I2 value of 47% suggesting moderate variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded .

f. Downgraded by 1 increment for risk of bias due to deviations from the intended intervention, no specified protocol and measurement of the outcome.

g. Downgraded by 1 increment for inconsistency due to an I2 value of 67% suggesting substantial variation.

Table 40: Clinical evidence profile: Multiple interventions vs usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Multiple interventions	usual care	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - Exercise + management of urinary incontinence + fluid therapy vs usual care												
1	randomised trials	serious[d]	not serious	not serious	serious[c]	none	92	98	**Rate ratio 0.62** (0.38 to 1.01)	-	⨁⨁◯◯ Low	
Rate of falls - Sunlight exposure + calcium vs usual care												
1	randomised trials	serious[e]	not serious	not serious	very serious[c]	none	207	205	**Rate ratio 1.03** (0.85 to 1.25)	-	⨁◯◯◯ Very low	
Number of fallers - Exercise + management of urinary incontinence + fluid therapy vs usual care												
1	randomised trials	serious[d]	not serious	not serious	serious[c]	none	92	98	**RR 0.62** (0.36 to 1.05)	-	⨁⨁◯◯ Low	
Number of fallers - Sunlight exposure + calcium vs usual care												
1	randomised trials	serious[e]	not serious	not serious	serious[c]	none	207	205	**RR 0.96** (0.77 to 1.19)	-	⨁⨁◯◯ Low	
Number of people sustaining a fracture - Exercise + management of urinary incontinence + fluid therapy vs usual care												
1	randomised trials	serious[d]	not serious	not serious	very serious[c]	none	92	98	**RR 4.26** (0.48 to 37.55)	-	⨁◯◯◯ Very low	
Number of people sustaining a fracture - Sunlight exposure + calcium vs usual care												
1	randomised trials	serious[e]	not serious	not serious	very serious[c]	none	207	205	**RR 0.78** (0.36 to 1.67)	-	⨁◯◯◯ Very low	

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded, outcome assessors not being blinded, and the method for ascertaining falls.

b. Downgraded by 1 increment for inconsistency due to an I2 value suggesting variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes.

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and the method of ascertaining falls.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded.

Table 41: Clinical evidence profile: Multifactorial interventions vs usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Multifactorial interventions	usual care	Relative (95% CI)	Absolute (95% CI)		
Rate of falls												
12	randomised trials	serious[a]	serious[b]	not serious	very serious[c]	none	2436	2345	**Rate ratio 0.85 (0.65 to 1.10)**	-	⨁◯◯◯ Very low	
Number of fallers												
11	randomised trials	serious[a]	serious[d]	not serious	serious[c]	none	2295	2200	**RR** 0.91 (0.82 to 1.02)	-	⨁◯◯◯ Very low	
Number of people sustaining a fracture												
6	randomised trials	serious[e]	serious[f]	not serious	very serious[c]	none	1723	1722	**RR 0.61** (0.30 to 1.24)	-	⨁◯◯◯ Very low	
Adverse events												
1	randomised trials	serious[g]	not serious	not serious	serious[c]	none	78/119 (65.5%)	60/121 (49.6%)	**RR 1.32** (1.06 to 1.65)	**159 more per 1,000** (from 30 more to 322 more)	⨁⨁◯◯ Low	
Quality of life (EQ-5D)												
2	randomised trials	not serious	not serious	not serious	serious[h]	none	939	1048	-	MD **0.03 higher** (0 to 0.05 higher)	⨁⨁⨁◯ Moderate	
Quality of life (DEMQOL)												
1	randomised trials	not serious	not serious	not serious	very serious[h]	none	611	708	-	MD **0** (0.03 lower to 0.02 higher)	⨁⨁◯◯ Low	

a. Downgraded by 1 increment for risk of bias due to participants and personnel were not blinded, incomplete outcome data, and unclear allocation concealment.

b. Downgraded by 1 increment for inconsistency due to an I^2 value suggesting variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

d. Downgraded by 1 increment for risk of bias due to participants and personnel were not blinded, selective reporting, baseline imbalance, and unclear allocation sequence concealment.

e. Downgraded by 1 increment for risk of bias due to unclear allocation sequence concealment.

Table 42: Clinical evidence profile: Multifactorial intervention vs. usual care (grouped by level of care)

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Multifactorial interventions	usual care (grouped by level of care)	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - High level nursing care facilities												
2	randomised trials	very serious[a]	not serious	not serious	not serious	none	758	741	**Rate ratio 0.59** (0.44 to 0.79)	-	⨁⨁◯◯ Low	
Rate of falls - Intermediate level care facilities												
3	randomised trials	serious[d]	serious[e]	not serious	serious[c]	none	342	328	**Rate ratio 0.64** (0.50 to 0.83)	-	⨁◯◯◯ Very low	
Rate of falls - Mixed level care facilities												
6	randomised trials	very serious[a]	serious[f]	not serious	serious[c]	none	825	685	**Rate ratio 1.32** (0.96 to 1.82)	-	⨁◯◯◯ Very low	
Rate of falls - Unspecified level care facilities												
1	randomised trials	not serious	not serious	not serious	very serious[c]	none	630	712	**Rate ratio 0.63 (0.52 to 0.76)**	-	⨁⨁◯◯ Low	
Number of fallers - High level nursing care facilities												
1	randomised trials	serious[g]	not serious	not serious	serious[c]	none	509	472	**RR 0.75** (0.57 to 0.98)	-	⨁⨁◯◯ Low	
Number of fallers - Intermediate level care facilities												
3	randomised trials	serious[d]	not serious	not serious	serious[c]	none	342	328	**RR 0.75** (0.60 to 0.94)	-	⨁⨁◯◯ Low	
Number of fallers - Mixed level care facilities												
6	randomised trials	very serious[a]	serious[h]	not serious	serious[c]	none	933	809	**RR 1.10** (0.93 to 1.30)	-	⨁◯◯◯ Very low	
Number of fallers - Unspecified level care facilities												
1	randomised trials	not serious	not serious	not serious	serious[c]	none	630	712	**RR 0.87 (0.74 to 1.04)**	-	⨁⨁⨁◯ Moderate	
Number of people sustaining a fracture - Unspecified level care facilities												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Multifactorial interventions	usual care (grouped by level of care)	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	not serious	not serious	not serious	serious[c]	none	600	685	**RR 0.40** (0.19 to 0.84)	-	⨁⨁⨁◯ Moderate	

Adverse events - Mixed level care facilities

1	randomised trials	serious[i]	not serious	not serious	serious[c]	none	78/119 (65.5%)	60/121 (49.6%)	**RR 1.32** (1.06 to 1.65)	**159 more per 1,000** (from 30 more to 322 more)	⨁⨁◯◯ Low	

Quality of life (EQ-5D) - Unspecified level care facilities

1	randomised trials	not serious	not serious	not serious	serious[i]	none	622	718	-	MD **0.03 higher** (0 to 0.07 higher)	⨁⨁⨁◯ Moderate	

Quality of life (DEMQOL) - Unspecified level care facilities

1	randomised trials	not serious	not serious	not serious	very serious[i]	none	611	708	-	MD **0** (0.03 lower to 0.02 higher)	⨁⨁◯◯ Low	

a. Downgraded by 2 increments for risk of bias due to participants and personnel not being blinded, incomplete outcome data, outcome assessors not being blinded, selective reporting, and baseline imbalance.

b. Downgraded by 1 increment for inconsistency due to an I2 value suggesting variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and outcome assessors not being blinded.

e. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

f. Downgraded by 1 increment for risk of bias due to no information available regarding a pre-specified protocol and no information about the concealment of the allocations sequence.

Table 43: Clinical evidence profile: Multifactorial intervention vs. usual care (grouped by level of cognition)

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Multifactorial interventions	usual care (grouped by level of cognition)	Relative (95% CI)	Absolute (95% CI)		

Rate of falls - Participants with cognitive impairment

6	randomised trials	serious[a]	serious[b]	not serious	very serious[c]	none	1320	1461	**Rate ratio 0.90** (0.59 to 1.38)	-	⨁◯◯◯ Very low	

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Multifactorial interventions	usual care (grouped by level of cognition)	Relative (95% CI)	Absolute (95% CI)		
Rate of falls - Participants with no cognitive impairment or mixed sample												
8	randomised trials	serious[d]	serious[e]	not serious	serious[c]	none	987	818	**Rate ratio 0.84** (0.62 to 1.13)	-	⨁◯◯◯ Very low	
Number of fallers - Participants with cognitive impairment												
6	randomised trials	serious[a]	serious[f]	not serious	serious[c]	none	1073	1197	**RR 0.90 (0.71, 1.13)**	-	⨁◯◯◯ Very low	
Number of fallers - Participants with no cognitive impairment or mixed sample												
8	randomised trials	serious[d]	serious[g]	not serious	serious[c]	none	987	818	**RR 0.94** (0.78 to 1.12)	-	⨁◯◯◯ Very low	
Number of people sustaining a fracture												
1	randomised trials	not serious	not serious	not serious	serious[c]	none	600	685	**RR 0.40** (0.19 to 0.84)	-	⨁⨁⨁◯ Moderate	
Adverse events - Participants with cognitive impairment												
1	randomised trials	serious[h]	not serious	not serious	serious[c]	none	78/119 (65.5%)	60/121 (49.6%)	**RR 1.32** (1.06 to 1.65)	**159 more per 1,000** (from 30 more to 322 more)	⨁⨁◯◯ Low	
Adverse events - Participants with no cognitive impairment												
1	randomised trials	Serious[f]	not serious	not serious	serious[c]	none	0/53 (0%)	0/38 (0%)	**RD 0.00** (0.04 to 0.04)	**0 more per 1,000** (from 40 fewer to 40 more)	⨁◯◯◯ Very low	
Quality of life (EQ-5D) - Participants with cognitive impairment												
1	randomised trials	not serious	not serious	not serious	serious[i]	none	622	718	-	MD **0.03 higher** (0 to 0.07 higher)	⨁⨁⨁◯ Moderate	
Quality of life (DEMQOL) - Participants with cognitive impairment												
1	randomised trials	not serious	not serious	not serious	very serious[i]	none	611	708	-	MD **0** (0.03 lower to 0.02 higher)	⨁⨁◯◯ Low	

a. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded.

b. Downgraded by 1 increment for inconsistency due to the I2 value of 85% suggesting considerable variation.

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

d. Downgraded by 1 increment for risk of bias due to participants and personnel not being blinded and also incomplete outcome data

e. Downgraded by 1 increment for risk of bias due to no information available regarding a pre-specified protocol and no information about the concealment of the allocations sequence.

f. Downgraded by 2 increment for risk of bias due to no details regarding allocation concealment, lack of blinding and incomplete outcome data

Table 44: Clinical evidence profile: Nutritional support vs usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Nutritional support	usual care	Relative (95% CI)	Absolute (95% CI)		
Number of people sustaining a fracture												
1	randomised trials	not serious	not serious	not serious	serious[a]	none	121/3301 (3.7%)	203/3894 (5.2%)	**RR 0.70** (0.56 to 0.88)	**16 fewer per 1,000** (from 23 fewer to 6 fewer)	⨁⨁⨁◯ Moderate	
Rate of falls												
1	randomised trials	not serious	not serious	not serious	serious[a]	none	3301	3894	**Rate ratio 0.91** (0.86 to 0.97)	-	⨁⨁⨁◯ Moderate	

a. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

Table 45: Clinical evidence profile: Education intervention vs. usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Education intervention	usual care	Relative (95% CI)	Absolute (95% CI)		
Rate of falls												
1	randomised trials	not serious	not serious	not serious	very serious[a]	none	27	29	**Rate ratio 1.03** (0.17 to 6.39)	-	⨁⨁◯◯ Low	

a. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

Table 46: Clinical evidence profile: Multifactorial intervention vs education

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Multifactorial intervention	education	Relative (95% CI)	Absolute (95% CI)		
Number of fallers												
1	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	76	77	**RR 0.72** (0.39 to 1.32)	-	⨁◯◯◯ Very low	
Rate of falls												
1	randomised trials	serious[a]	not serious	not serious	serious[b]	none	76	77	**Rate ratio 0.72** (0.44 to 1.19)	-	⨁⨁◯◯ Low	

a. Downgrade by 1 increment for risk of bias due to no information available regarding a pre-specified protocol and no information about the concealment of the allocations sequence.

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

Table 47: Multicomponent exercise vs multifactorial intervention (dual-task training)

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: Multicomponent exercise	dual-task training	Relative (95% CI)	Absolute (95% CI)		
Rate of falls												
1	randomised trials	serious[a]	not serious	serious[b]	not serious	none	43	42	**Rate ratio 2.59** (1.27 to 5.28)	-	⨁⨁◯◯ Low	

a. Downgraded by 1 increment for risk of bias due to missing outcome data.

b. Downgraded by 1 increment for indirectness due to the use of a non-standard comparison.

Table 48: Clinical evidence profile: Education vs education

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Care facilities: education	education	Relative (95% CI)	Absolute (95% CI)		
Rate of falls												
1	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	440	341	**Rate ratio 1.09** (0.82 to 1.44)	-	⨁◯◯◯ Very low	

a. Downgraded by 1 increment for risk of bias due to limited information available regarding the allocation concealment and missing outcome data

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs. The MIDs were 0.8 to 1.25 for dichotomous outcomes or 0.5 x median baseline SD (or 0.5 x SMD where no baseline values given) for continuous outcomes

Appendix G Trials with incomplete data

Table 49: **Exercise versus usual care: rate of fallers (trials with incomplete data)[a]**

Study ID	Intervention	Comparator	Participants (N)	Study findings
Buettner, 2002[10]	Exercise: supervised group exercises combination exercises	Usual care	27	Rate of falls: Falls were reduced but the treatment effect estimate and confidence interval were not reported in the published study or research monograph. Risk of falling: NR
Cadore, 2014[12]	Exercise: multicomponent exercise programme including gait/balance and strength/resistance training	Usual care including mobility exercises	24	Rate of falls: Over 12 weeks there were no falls in the multicomponent arm in comparison to a rate of falls of 0.8 falls per patient per month in the mobility exercises arm of the study (P < 0.001). Participants were aged ≥ 85 years. Risk of falling: NR
Da Silva Borges, 2014[25]	Exercise: ballroom dancing (3D exercises; EG)	No regular physical activity (CG)	59	Rate of falls: The authors reported " fewer falls in the EG

Study ID	Intervention	Comparator	Participants (N)	Study findings
				post-test compared to the CG post-test (p<0.”001)." Risk of falling: NR
Nowalk, 2001[69]	Exercise: 1. “Fit NB Free” Individually tailored combination exercises. 2. “Living and Learning/ Tai Chi”	Usual routine activities	110	Rate of falls: NR Risk of falling: No significant difference in risk of falling (time to first fall) between either intervention group and the usual care group (P = 0.29).
Toulotte, 2003[97]	Exercise: Supervised exercises, combination exercises.	Usual care	20	Rate of falls: The authors reported that falls were reduced but a falls rate could not be determined from the published data. Risk of falling: NR

[a] This data is reported in Sherrington (2019).

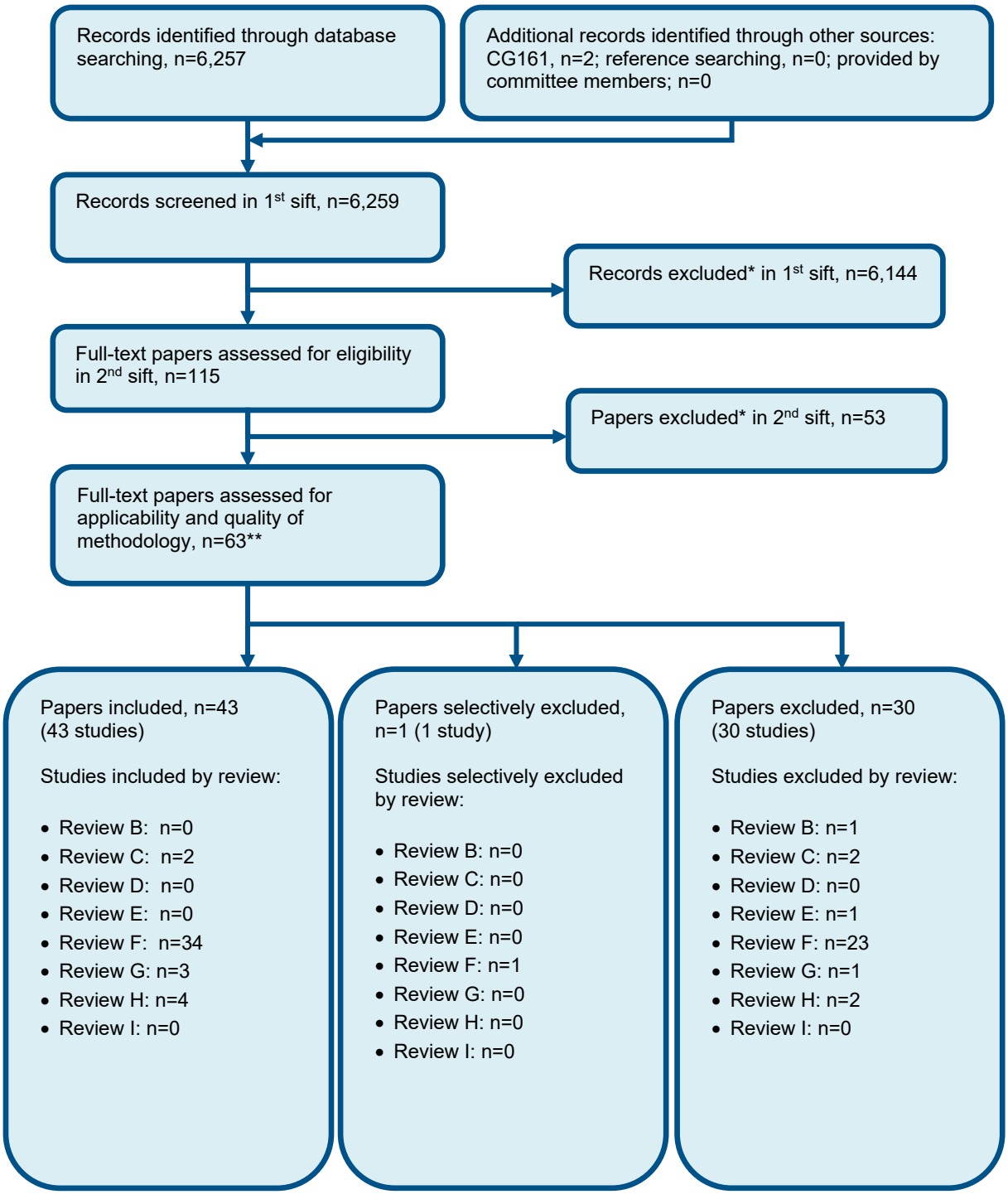
Table 50: Exercise versus usual care: rate of fallers (trials with incomplete data)[a]

Study ID	Intervention	Comparator	Participants (N)	Study findings
Imaoka, 2016[40]	Exercise: Additional group exercise (described by author as "Usual” care": combination group exercises plus	Individualised exercise (described by author as "reduced exercise")	39	Rate of falls: Not reported Risk of falling: No strong evidence for a reduction in the risk of falling in the post-

Study ID	Intervention	Comparator	Participants (N)	Study findings
	individualised exercise)			intervention period with additional group exercise (RR 0.48, 95% CI 0.17 to 1.3). The falls data are not presented in the forest plot as they exclude the intervention period.
Serra-Rexach, 2011[89]	Exercise: Training sessions (combination exercises) plus usual care physiotherapy	Usual care physiotherapy (40-45 min / day 5 x weekly)	40	Rate of falls: "The mean number of falls per participant recorded over the study period was 1.2 fewer in the intervention group than in the control group (95% CI = 0.0–3.0, P ”.03)." Risk of falling: not reported

[a] This data is reported in Sherrington (2019).

Appendix H Economic evidence study selection



* Non-relevant population, intervention, comparison, design or setting; non-English language
**One paper included in two reviews

Appendix I Economic evidence tables

Study	Desborough 2020[26], CAREMED trial			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: CEA (health outcome: fall per person) **Study design:** Within trial analysis (cluster RCT) **Approach to analysis:** Within trial analysis capturing mean costs and mean fall rate for intervention and comparator group at baseline and 1 year follow up. Based on RCT with randomisation undertaken at the care home level. **Perspective:** UK NHS **Follow-up:** 1 year **Treatment effect duration:**[(a)] n/a **Discounting:** Costs: n/a; Outcomes: n/a	**Population:** Care home residents aged over 65 years of age from East of England. **Cohort settings:** Start age: Int 1: 86 years Int 2: 88.4 years Male: Int 1: 27.2% Int 2: 20.5% **Intervention 1:** Usual care (varied between weekly structured visits and ad hoc visits when patients needed to see GP). **Intervention 2:** A multi-professional medication review (MPMR) at the care home, from a team consisting of a clinical pharmacist, GP and care	**Total costs (mean per patient):** Intervention 1: £1,940.47 Intervention 2: £2,314.73 Incremental (2−1): £374.36 (95% CI:-£37.29 to £711.24; p=NR) **Currency & cost year:** 2012 UK pounds **Cost components incorporated:** Cost of the intervention (£104 per person) and wider healthcare resource use: primary care, community care (for example: physiotherapy and occupational therapy), secondary care (A&E, outpatients and emergency admissions only) and medications.	**Falls (mean per patient per year):** Intervention 1: 3.00 Intervention 2: 3.35 Incremental (2−1): 0.35 (95% CI: NR; p=NR)	**ICER (Intervention 2 versus Intervention 1):** Usual care dominates MPMR (less costly and more effective at reducing falls) **Analysis of uncertainty:** None undertaken.

	home member of staff responsible for medication, with preparation undertaken by a pharmacy technician (two reviews).			
Data sources				
Health outcomes: Within trial analysis with falls data taken from RCT CAREMED (same paper). **Quality-of-life weights**: n/a. **Cost sources:** All health care resource use was recorded the care home, HES data and GP records. Unit cost sources include: PSSRU and NHS reference costs.				
Comments				
Source of funding: NIHR. **Limitations:** No QoL and therefore QALYs reported. Authors note that in this cohort, assessing QoL would be challenging given cognitive state of majority of participants. Based on a single trial which may not represent full body of clinical evidence. High loss to follow up (30%) reported, primarily due to mortality. Baseline differences between groups in number of medicines prescribed and proportion of nursing home residents. No sensitivity analyses undertaken. Unadjusted analysis because authors were unable to collect baseline resource use data in control arm. Short follow-up may not capture all downstream effects of intervention, although given start age this may be less problematic. **Other:**				
Overall applicability:[(b)] Partially applicable **Overall quality:**[(c)] Potentially serious limitations				

Abbreviations: CEA= cost-effectiveness analysis; 95% CI= 95% confidence interval; CUA= cost–utility analysis; da= deterministic analysis; EQ-5D= Euroqol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ICER= incremental cost-effectiveness ratio; MPRM= multi-professional medication review; NR= not reported; RCT= randomised controlled trial.

(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.

(b) Directly applicable / Partially applicable / Not applicable

(c) Minor limitations / Potentially serious limitations / Very serious limitations

Study	**Logan et al 2021**			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: Cost utility analysis, CUA (health outcome: QALYs)	**Population:** People with an average age of 85 years living in residential care.	**Total costs (mean per patient):** Intervention 1: £3,936 Intervention 2: £3,955	**QALYs (mean per patient):** Intervention 1: 0.232 Intervention 2: 0.266	**ICER (per QALY gained):** Reported: £4,544 Calculated: £581

Study design: Within trial economic evaluation including multiple imputation. **Approach to analysis:** Within trial analysis using area under the curve method, adjusted for baseline utility. Healthcare resource use and QoL data collected within trial. Based on RCT with randomisation undertaken at the care home level. **Perspective:** UK NHS **Follow up:** 12 months **Treatment effect duration:**[(a)] N/A **Discounting:** Costs: N/A; Outcomes: N/A	**Cohort settings:** Start age: 85 years Male: 32% N=1,603 **Intervention 1:** Usual care. **Intervention 2:** Multifactorial intervention (GtACH), it assesses the patient's risk of falling and implements patient-centred fall prevention changes.	Incremental (reported) (2−1): £108 (95% CI: -271, 488; p=NR) Incremental (calculated) (2−1): £20 **Currency & cost year:** 2017/18 UK pounds **Cost components incorporated:** Staff cost, hospital use and fracture rate, primary care use, drugs, social services	Incremental (reported) (2−1): 0.024 (95% CI: 0.004, 0.044; p=NR) Incremental (calculated) (2−1): 0.034	Probability Intervention 2 cost effective (£20K/30K threshold): 92%/NR **Analysis of uncertainty:** Sensitivity analyses included repeated GtACH and extra mortality costs. The results of these sensitivity analyses were similar to the base case results.
Data sources				
Health outcomes: Within trial analysis using Logan 2021 (cluster RCT), the primary outcome was fall rate at 91-180 days after randomisation, secondary outcomes were falls at 1-90, 181-270 and 271-360 days after randomisation. Adverse events were not recorded during the trial as it was assessed as a low risk intervention **Quality-of-life weights:** EQ-5D-5L using UK tariff, mapped to 3L using van Hout 2012 in accordance with NICE's position statement. The study did use the proxy version of the EQ-5D-5L if the patient was unable to complete it themselves. **Cost sources:** Hospital Episode Statistics 2011/12 to 2015/16 were used for hospital use and fracture rate. Health resource use and baseline costs including primary care, community health, drugs, social services and death were obtained from the care home records. Unit costs in GDP for 2017/18				
Comments				
Source of funding: NIHR. **Limitations**: Based on a single RCT and so may not reflect full body of evidence identified in clinical review. Incremental analysis presented in paper is different to one calculated using the raw numbers (presented here) raising concerns about reporting. Best available source				

for unit costs but 2017/18 prices. Short follow-up (1 year) may not capture all downstream effects of intervention, although given age of participants may be less of a concern. **Other:** N/A

Overall applicability: Directly applicable(b) **Overall quality: Potentially serious limitations**(c)

Abbreviations: 95% CI= 95% confidence interval; CUA= cost–utility analysis; EQ-5D-5L= Euroqol 5 dimensions 5 levels (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ICER= incremental cost-effectiveness ratio; NIHR = National Institute for Health Research, NR= not reported; pa= probabilistic analysis; PSSRU= Personal Social Services Resource Use; QoL = quality of life; QALYs= quality-adjusted life years

(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.

(b) Directly applicable/partially applicable/not applicable

(c) Minor Limitations/Potentially serious limitations/Very serious limitations

Study	**Church et al 2015**			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**(a)
Economic analysis: Cost utility analysis, CUA (health outcome: QALYs) **Study design:** Decision analytic model **Approach to analysis:** Decision tree and Markov model.. The model included four health states: Low risk (never fallen), medium risk (fallen but no injury), high risk (fallen with injury) and death. Individuals	**Population:** People over 65 years of age living in residential care. **Cohort settings:** Start age: 65 years Male: NR **Intervention 1:** Vitamin D **Intervention 2:** Medication review **Intervention 3:** No intervention	**Total costs (mean per patient):** Intervention 1: £1,075 Intervention 2: £1,090 Intervention 3: £1,374 Intervention 4: £1,379 Intervention 5: £2,344 *For incremental analysis see cost effectiveness column* **Currency & cost year:** 2015 Australian Dollars (presented here as 2015 UK pounds(b))	**QALYs (mean per patient):** Intervention 1: 1.260 Intervention 2: 1.273 Intervention 3: 1.225 Intervention 4: 1.232 Intervention 5: 1.276 *For incremental analysis see cost effectiveness column*	**Full incremental analysis (pa):**(c)(d) **Analysis of uncertainty:** One way sensitivity analysis shows that "fear of falling" has the biggest impact on cost effectiveness.

Int	Cost (d)	QALY	Inc cost	Inc QALY	ICER	% most CE at £20K(e):
1	£1,075	1.260	Baseline			15%
2	£1,090	1.273	£15	0.013	£1,154	60%
3	£1,374	1.225	Dominated by 2			0%
4	£1,379	1.232	Dominated by 2			0%
5	£2,344	1.276	£1,254	0.003	£418,000	25%

moved between health states following a multiple event decision tree. Cycle length 1 year. **Perspective:** Australian healthcare system **Time horizon:** Lifetime **Treatment effect duration:**[(a)] N/A **Discounting:** Costs: 5%; Outcomes: 5%	**Intervention 4:** Hip protectors **Intervention 5:** Multifactorial interventions	**Cost components incorporated:** Staff cost, classes, surgery, medication, hazard modifications, hip protectors		Using probabilistic sensitivity analysis, at a willingness to pay threshold under £9,394 vitamin D is the cost effective option, above that threshold a medication review is the cost effective option. Multifactorial interventions are unlikely to be cost effective.
Data sources				
Health outcomes: Effectiveness data based on two systematic reviews by Cochrane, Cameron 2012 and Gillespie 2010. Distribution between risk groups and baseline transition probabilities of falling were derived from Lord 1993 and expert opinion (Professor Lord). The transition probabilities to the emergency department, other medical services, hospital, residential care, respite care or death were obtained from Watson 2009. **Quality-of-life weights:** EQ-5D, Australian tariff. Fear of falling was captured using an utility decrement. **Cost sources:** Most healthcare costs, including emergency department attendance, admission to hospital, and other medical attendances were taken from Watson et al (2009). Intervention costs were taken from Medicare Benefits Schedule (MBS), Pharmaceutical Benefits Scheme (PBS), Department of Veterans' Affairs, New South Wales (NSW) nurse wage rates and other publicly available online price lists uprated to 2015				
Comments				
Source of funding: NR. **Limitations:** Discounting at 5% rather than 3.5% as required by NICE reference case. Clinical data may not reflect full body of clinical evidence as based on 2010 and 2012 systematic reviews and baseline data may not reflect current NHS care as based on older studies (1993/2009). Costs are Australian 2015 costs (using some older costs inflated to 2015) and may not reflect current UK NHS context. **Other:** N/A				
Overall applicability: Partially applicable[(f)] **Overall quality: Potentially serious limitations**[(g)]				

Abbreviations: 95% CI= 95% confidence interval; CUA= cost–utility analysis; Dom=Dominated, one option is less costly and more effective than another option; Ex.Dom= Extendedly dominated, a combination of two interventions is less costly and more effective than the extendedly dominated option EQ-5D-3L= Euroqol 5 dimensions 3 levels (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ICER= incremental cost-effectiveness ratio; NR= not reported; pa= probabilistic analysis; QoL = quality of life; QALYs= quality-adjusted life years

(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.

(b) Converted using 2015 purchasing power parities[70]

(c) Intervention number in order of least to most costly

(d) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the

most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option

(e) Read from graph where AU$43,000=£20,197 based on 2015 purchasing power parities.

(f) Directly applicable/partially applicable/not applicable

(g) Minor Limitations/Potentially serious limitations/Very serious limitations

Study	**Hewitt et al 2018**			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: Cost effectiveness analysis, CEA (health outcome: falls avoided) **Study design:** Within trial economic evaluation **Approach to analysis:** Within trial analysis based on RCT with randomisation undertaken at the care home level. **Perspective:** Australian NHS **Follow up:** 12 months **Treatment effect duration:**[(a)] N/A **Discounting:** Costs: N/A; Outcomes: N/A	**Population:** People with an average age of 86 years living in residential care. **Cohort settings:** Average age: 86 years Male: 34.4% N=221 **Intervention 1:** Usual care. **Intervention 2:** SUNBEAM exercise programme, first 25 weeks is a progressive resistance training and high level balance, final 27 weeks is maintenance, 2 days a week for 30 minutes	**Total costs (mean per patient):** Intervention 1: £461 Intervention 2: £474 Incremental (reported) (2−1): £13 (95% CI: NR; p=NR) **Currency & cost year:** 2015 Australian dollars **Cost components incorporated:** Staff cost, hospital use and fracture rate, gym costs	**Number of falls (mean per patient):** Intervention 1: 2.56 Intervention 2: 1.26 Incremental (reported) (2−1): 1.3 (95% CI: NR; p=NR)	**ICER:** Reported: £10 per QALY gained Probability Intervention 2 cost effective (£20K/30K threshold): NR/NR **Analysis of uncertainty:** Scenario analyses showed that exercise dominated (less costly and more effective) if the gym was paid up front, injury costs were the same in intervention and usual care groups (due to one participant in the intervention group having a pelvic fracture which is the most expensive fracture and there was a small number of fractures sustained), modelling included acute and long term costs due to falls sometimes changing the long term care needs.
Data sources				

Health outcomes: Within trial analysis using Hewitt 2018 (cluster RCT), the primary outcome was falls avoided. Adverse events were not recorded during the trial as it was assessed as a low risk intervention **Quality-of-life weights:** N/A **Cost sources:** Costs were taken from New South Wales State award, the Medical Benefit Scheme, Australian-Related Diagnosis Resource Group and costs used in the trial. Unit costs in AUD for 2015
Comments
Source of funding: NIHR. **Limitations**: Based on a single RCT and so may not reflect full body of evidence identified in clinical review . SF-36 data was collected in the trial but not used in the economics. Best available source for unit costs but 2015 prices. Short follow-up (1 year) may not capture all downstream effects of intervention, although given age of participants may be less of a concern. **Other:** N/A
Overall applicability: Partly applicable(b) **Overall quality: Potentially serious limitations**(c)

Abbreviations: 95% CI= 95% confidence interval; CUA= cost–utility analysis; EQ-5D-5L= Euroqol 5 dimensions 5 levels (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ICER= incremental cost-effectiveness ratio; NIHR = National Institute for Health Research, NR= not reported; pa= probabilistic analysis; PSSRU= Personal Social Services Resource Use; QoL = quality of life; QALYs= quality-adjusted life years

(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.

(b) Directly applicable/partially applicable/not applicable

(c) Minor Limitations/Potentially serious limitations/Very serious limitations

Appendix J Health economic model

Whilst this review question was prioritised for de novo health economic modelling, it was for a community population not those in residential care.

Appendix K Excluded studies

K.1 Clinical studies

Table 51: Studies excluded from the clinical review

Study	Code [Reason]
Agbangla, Nounagnon Frutueux, Seba, Marie-Philippine, Bunlon, Frederique et al. (2023) Effects of Physical Activity on Physical and Mental Health of Older Adults Living in Care Settings: A Systematic Review of Meta-Analyses. International journal of environmental research and public health 20(13)	- Systematic review used as source of primary studies
Ailabouni, Nagham; Mangin, Dee; Nishtala, Prasad S (2019) DEFEAT-polypharmacy: deprescribing anticholinergic and sedative medicines feasibility trial in residential aged care facilities. International journal of clinical pharmacy 41(1): 167-178	- Study design not relevant to this review protocol
Appel, L., Appel, E., Kisonas, E. et al. (2022) VRCT: Randomized Controlled Trial Evaluating the Impact of Virtual Reality Therapy on BPSD and QoL of Acute Care In-Patients With Dementia. Alzheimer's and Dementia 18(s8): e062209	- Data not reported in an extractable format or a format that can be analysed
Bernocchi, Palmira, Giordano, Alessandro, Pintavalle, Giuseppe et al. (2019) Feasibility and Clinical Efficacy of a Multidisciplinary Home-Telehealth Program to Prevent Falls in Older Adults: A Randomized Controlled Trial. Journal of the American Medical Directors Association 20(3): 340-346	- Population not relevant to this review protocol
Birimoglu Okuyan, Canan and Deveci, Ebru (2021) The effectiveness of Tai Chi Chuan on fear of movement, prevention of falls, physical activity, and cognitive status in older adults with mild cognitive impairment: A randomized controlled trial. Perspectives in psychiatric care 57(3): 1273-1281	- Data not reported in an extractable format or a format that can be analysed
Burleigh, E; Potter, J; McColl, J (2006) Does vitamin D stop hospital inpatients falling? A randomised controlled trial. Internal medicine journal 36: a165	- Duplicate reference
Colon-Emeric, CS, McConnell, E, Pinheiro, S et al. (2013) CONNECT for fall prevention: a randomized controlled pilot study. Journal of the American Geriatrics Society 61: 1	- Conference abstract
de Souto Barreto, Philipe, Maltais, Mathieu, Rosendahl, Erik et al. (2021) Exercise Effects on Falls, Fractures, Hospitalizations, and Mortality in Older Adults With Dementia: An Individual-Level Patient Data Meta-analysis. The journals of gerontology. Series A, Biological sciences and medical sciences 76(9): e203-e212	- Systematic review used as source of primary studies - Systematic review on exercise which is covered by Cochrane review.
de Souto Barreto, Philipe, Rolland, Yves, Vellas, Bruno et al. (2019) Association of Long-term Exercise Training With Risk of Falls, Fractures, Hospitalizations, and Mortality in Older Adults: A Systematic Review and Meta-analysis. JAMA internal medicine 179(3): 394-405	- Systematic review on exercise which is covered by Cochrane review. - Systematic review used as source of primary studies

Study	Code [Reason]
Di Gennaro, Gianfranco, Chamitava, Liliya, Pertile, Paolo et al. (2024) A stepped-wedge randomised controlled trial to assess efficacy and cost-effectiveness of a care-bundle to prevent falls in older hospitalised patients. Age and ageing 53(1)	- Study design not relevant to this review protocol
E, Jian-Yu, Li, Tianjing, McInally, Lianne et al. (2020) Environmental and behavioural interventions for reducing physical activity limitation and preventing falls in older people with visual impairment. The Cochrane database of systematic reviews 9: cd009233	- Population not relevant to this review protocol
Franzel, Katja, Koschate, Jessica, Freiberger, Ellen et al. (2024) Square-stepping exercise in older inpatients in early geriatric rehabilitation. A randomized controlled pilot study. BMC geriatrics 24(1): 326	- Trial does not contain any relevant outcomes to this review protocol
Gallibois, Molly, Handrigan, Grant, Caissie, Linda et al. (2023) The Effect of a Standing Intervention on Falls in Long Term Care: a Secondary Analysis of a Randomized Controlled Trial. Canadian geriatrics journal : CGJ 26(2): 247-252	- Trial does not contain any relevant outcomes to this review protocol
Gazineo, Domenica, Godino, Lea, Decaro, Roberta et al. (2021) Assisted Walking Program on Walking Ability in In-Hospital Geriatric Patients: A Randomized Trial. Journal of the American Geriatrics Society 69(3): 637-643	- Data not reported in an extractable format or a format that can be analysed
Gulka, Heidi J, Patel, Vaidehi, Arora, Twinkle et al. (2020) Efficacy and Generalizability of Falls Prevention Interventions in Nursing Homes: A Systematic Review and Meta-analysis. Journal of the American Medical Directors Association 21(8): 1024-1035e4	- Systematic review on exercise which is covered by Cochrane review.
Hartley, Peter, Keating, Jennifer L, Jeffs, Kimberley J et al. (2022) Exercise for acutely hospitalised older medical patients. The Cochrane database of systematic reviews 11: cd005955	- Systematic review on exercise which is covered by Cochrane review. - Systematic review used as source of primary studies
Hastings, Susan N, Stechuchak, Karen M, Choate, Ashley et al. (2023) Effects of Implementation of a Supervised Walking Program in Veterans Affairs Hospitals : A Stepped-Wedge, Cluster Randomized Trial. Annals of internal medicine 176(6): 743-750	- Study design not relevant to this review protocol
Keller, M.S., Qureshi, N., Mays, A.M. et al. (2024) Cumulative Update of a Systematic Overview Evaluating Interventions Addressing Polypharmacy. JAMA Network Open 7(1): e2350963	- Systematic review used as source of primary studies
Klaiber, Ulla, Stephan-Paulsen, Lisa M, Bruckner, Thomas et al. (2018) Impact of preoperative patient education on the prevention of postoperative complications after major visceral surgery: the cluster randomized controlled PEDUCAT trial. Trials 19(1): 288	- Population not relevant to this review protocol
Kong, Lingyu, Zhang, Xinwen, Zhu, Xinrui et al. (2023) Effects of Otago Exercise Program on postural control ability in elders living in the nursing home: A systematic review and meta-analysis. Medicine 102(11): e33300	- Systematic review used as source of primary studies
Lewis, Sharon R, McGarrigle, Lisa, Pritchard, Michael W et al. (2024) Population-based interventions for preventing falls and fall-related	- Incorrect setting for the review protocol

Study	Code [Reason]
injuries in older people. The Cochrane database of systematic reviews 1: cd013789	
Lo, B. (2021) A multidisciplinary ED-based fall prevention intervention reduced subsequent ED visits in older adults. Annals of internal medicine	- Data not reported in an extractable format or a format that can be analysed
Martinez-Velilla, N., Valenzuela, P.L., Saez de Asteasu, M.L. et al. (2020) Effects of a tailored exercise intervention in acutely hospitalized diabetic oldest old adults: an ancillary analysis. The Journal of clinical endocrinology and metabolism	- Duplicate reference
Marumoto, Kohei, Yokoyama, Kazumasa, Inoue, Tomomi et al. (2019) Inpatient Enhanced Multidisciplinary Care Effects on the Quality of Life for Parkinson Disease: A Quasi-Randomized Controlled Trial. Journal of geriatric psychiatry and neurology 32(4): 186-194	- Quasi-randomised trial
Mohler, Ralph, Richter, Tanja, Kopke, Sascha et al. (2023) Interventions for preventing and reducing the use of physical restraints for older people in all long-term care settings. The Cochrane database of systematic reviews 7: cd007546	- Systematic review used as source of primary studies
Nguyen, Natalie, Thalhammer, Regina, Meyer, Gabriele et al. (2023) Effectiveness of an individually tailored complex intervention to improve activities and participation in nursing home residents with joint contractures (JointConEval): a multicentre pragmatic cluster-randomised controlled trial. BMJ open 13(10): e073363	- Trial does not contain any relevant outcomes to this review protocol
Patel, J S, Norman, D, Brennan, M et al. (2013) First Report of Elm Canker Caused by Pestalotiopsis mangiferae in the United States. Plant disease 97(3): 426	- Study does not contain an intervention relevant to this review protocol
Pollock, Y.Y., Smith, M.R., Saad, F. et al. (2022) Clinical characteristics associated with falls in patients with non-metastatic castration-resistant prostate cancer treated with apalutamide. Prostate Cancer and Prostatic Diseases	- Population not relevant to this review protocol
Prithiani, Sham Lal, Kumar, Ratan, Mirani, Shahid H et al. (2021) Effect of Monthly 100,000 IU Vitamin D Supplementation on Falls and Non-Vertebral Fractures. Cureus 13(1): e12445	- Population not relevant to this review protocol
Rantz, Marilyn, Phillips, Lorraine J, Galambos, Colleen et al. (2017) Randomized Trial of Intelligent Sensor System for Early Illness Alerts in Senior Housing. Journal of the American Medical Directors Association 18(10): 860-870	- Data not reported in an extractable format or a format that can be analysed
Reeve, Emily, Jordan, Vanessa, Thompson, Wade et al. (2020) Withdrawal of antihypertensive drugs in older people. The Cochrane database of systematic reviews 6: cd012572	- Population not relevant to this review protocol
Rossi-Izquierdo, Marcos, Gayoso-Diz, Pilar, Santos-Perez, Sofia et al. (2017) Short-term effectiveness of vestibular rehabilitation in elderly patients with postural instability: a randomized clinical trial. European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery 274(6): 2395-2403	- Population not relevant to this review protocol
Seppala, Lotta J, Kamkar, Nellie, van Poelgeest, Eveline P et al. (2022) Medication reviews and deprescribing as a single intervention	- Systematic review on exercise which is covered by Cochrane review.

Study	Code [Reason]
in falls prevention: a systematic review and meta-analysis. Age and ageing 51(9)	
Taylor, Lynne M, Parsons, John, Moyes, Simon A et al. (2024) Effects of an Exercise Program to Reduce Falls in Older People Living in Long-Term Care: A Randomized Controlled Trial. Journal of the American Medical Directors Association 25(2): 201-208e6	- Comparator in study does not match that specified in this review protocol
Taylor-Rowan, M., Alharthi, A.A., Noel-Storr, A.H. et al. (2022) Anticholinergic deprescribing interventions for reducing risk of cognitive decline or dementia in older adults with and without prior cognitive impairment. Cochrane Database of Systematic Reviews 2022(12): cd015405	- Systematic review on exercise which is covered by Cochrane review.
Tricco, Andrea C, Thomas, Sonia M, Veroniki, Areti Angeliki et al. (2017) Comparisons of Interventions for Preventing Falls in Older Adults: A Systematic Review and Meta-analysis. JAMA 318(17): 1687-1699	- Systematic review used as source of primary studies
Uusi-Rasi, Kirsti, Patil, Radhika, Karinkanta, Saija et al. (2017) A 2-Year Follow-Up After a 2-Year RCT with Vitamin D and Exercise: Effects on Falls, Injurious Falls and Physical Functioning Among Older Women. The journals of gerontology. Series A, Biological sciences and medical sciences 72(9): 1239-1245	- Population not relevant to this review protocol
van Ooijen, M.W., Roerdink, M., Trekop, M. et al. (2016) The efficacy of treadmill training with and without projected visual context for improving walking ability and reducing fall incidence and fear of falling in older adults with fall-related hip fracture: a randomized controlled trial. BMC geriatrics 16(1): 215	- Wrong setting. Exclusion details from Cameron, 2018 (Cochrane review): Intervention delivered in hospital, author confirmed falls recorded post dischage and the majority of participants were in the community
Wang, Fang and Tian, Bailing (2022) The effectiveness of physical exercise type and length to prevent falls in nursing homes: A systematic review and meta-analysis. Journal of clinical nursing 31(12): 32-42	- Systematic review on exercise which is covered by Cochrane review.
Wen, G.J.; Singh, D.K.A.; Shahar, S. (2020) Effectiveness of falls prevention education on its prevention behavior among older adults: A systematic review. Indian Journal of Public Health Research and Development 11(1): 1119-1124	- Systematic review on exercise which is covered by Cochrane review. - Systematic review used as source of primary studies

K.2 Health Economic studies

Published health economic studies that met the inclusion criteria (relevant population, comparators, economic study design, published 2007 or later and not from non-OECD country or USA) but that were excluded following appraisal of applicability and methodological quality are listed below. See the health economic protocol for more details.

Table 52: Studies excluded from the health economic review

Reference	Reason for exclusion
Heinrich, S., Rapp, K., Stuhldreher, N. et al. (2013) Cost-effectiveness of a multifactorial fall prevention program in nursing homes. Osteoporosis International 24(4): 1215-1223	Cost effectiveness study (cost per resident) comparing a fall prevention program versus usual care. Excluded as rated not applicable due to using a societal perspective with the healthcare costs not extractable
Panneman, M. J. M., Sterke, C. S., Eilering, M. J. et al. (2021) Costs and benefits of multifactorial falls prevention in nursing homes in the Netherlands. Experimental Gerontology 143: 111173	Cost benefit study comparing a multifactorial falls prevention versus usual care. This study was rated as not applicable due it being a cost benefit study based in The Netherlands that does not use QALYs.

Appendix L Recommendation for research

L.1 What interventions that address behavioural and psychological symptoms of dementia are most effective in reducing the risk of falls in care home residents with dementia.

L.1.1 Why this is important

Cognitive impairment caused by dementia is common in residential care settings affecting up to 80% of residents. Individuals with cognitive impairment have double the risk of falling and a threefold increased risk of hip fracture. The reason for this increased risk of falls is multifactorial. For example, people with cognitive impairment are more likely to have gait and balance impairments and be taking falls risk increasing drugs. Additionally, impairments in different aspects of cognition such as attention and visuospatial function lead to higher risk of falls. Behavioural and psychological symptoms common in dementia such as restlessness, agitation, impulsivity and anxiety are also associated with a greater risk of falling. Interventions that address such symptoms could play a role in reducing the risk of falling in this population.

L.1.2 Rationale for the recommendation for research

Importance to ‘patients’ or the population	There is limited evidence as to which interventions are most effective at reducing the risk of falls in residential care settings. Interventions addressing behavioural and psychological symptoms of dementia, which are significant risk factors for falls in older people living in care homes, improve wellbeing in this population. Such interventions could also reduce the risk of falling.

Relevance to NICE guidance	Fall prevention interventions were considered independently for residential care home settings for the first time in this guidance. No studies were identified that evaluated specific pharmacological or non-pharmacological interventions targeting behavioural and psychological symptoms related to dementia. This research would improve understanding of how to provide tailored interventions to address some of the most common fall risk factors in older people living in residential care.
Relevance to the NHS	Residents in care homes are more likely to experience falls and fall-related injuries which require urgent NHS care, hospital admission and rehabilitation. People with behavioural and psychological symptoms of dementia have poorer outcomes when they fall. They are more likely to be admitted to hospital, have a longer length of stay, have a greater risk of hospital associated harm and will be less likely to make a full recovery[a]. This has an impact on resource use across the health and social care sector.
National priorities	Reducing risk of falls is included in the NHS Long term plan and comes under the remit of the Enhanced Care in Care Home Framework.
Current evidence base	While there have been a range of studies undertaken to investigate interventions to address the behavioural and psychological symptoms of dementia in residential care settings, few studies have been of high quality or measured the effect on falls. Non-pharmacological interventions are challenging to implement.
Equality considerations	None known

L.1.3 Modified PICO table

Population	People aged over 65 with dementia living in residential care.
Intervention	Pharmacological or non-pharmacological interventions to address behavioural and

[a] Fogg C, Griffiths P, Meredith P, Bridges J. Hospital outcomes of older people with cognitive impairment: An integrative review. Int J Geriatr Psychiatry. 2018 Jun 26;33(9):1177–97.

	psychological symptoms (BPSD) of dementia with the aim of reducing risk of falls.
Comparator	Usual care which would be some form of multifactorial fall risk assessment and intervention in the residential care setting.
Outcome	Rate of falls and number of people who fell, number of fractures, health-related quality of life, prevalence and severity of BPSD. Evidence regarding implementation such as process evaluation and effect on staff stress/wellbeing. 6-12 months falls follow-up
Study design	Cluster randomised controlled trial, stepped wedge trial.
Timeframe	Medium term – before next guidelines update.
Additional information	None