Overview

• Draft Cochrane systematic review on exercise
• New trials
• Gold bars
• Broader context of fall prevention
Exercise for preventing falls in older people living in the community (Review)

Fall Prevention in a Primary Care Setting.

Siegrist M¹, Freiberger E, Geilhof B, Salb J, Hentschke C, Landendoerfer P, Linde K, Halle M, Blank WA.

Abstract

BACKGROUND: Falls and fall-related injuries are common in community-dwelling elderly people. Effective multifactorial fall prevention programs in the primary care setting may be a promising approach to reduce the incidence rate of falls.

METHODS: In a cluster randomized trial in 33 general practices 378 people living independently and at high risk of falling (65 to 94 years old; 285 women) were allocated to either a 16 week exercise-based fall prevention program including muscle strengthening and challenging balance training exercises, combined with a 12 week home-based exercise program (222 participants), or to usual care (156 participants). The main outcome was number of falls over a period of 12 months. Secondary outcomes were the number of fall-related injuries, physical function (Timed-Up-and-Go-Test, TUG, Chair-Stand-Test, CST, modified Romberg Test), and fear of falling.

RESULTS: In the intervention group (n=222 patients in 17 general practices) 291 falls occurred, compared to 367 falls in the usual care group (n=156 patients in 16 general practices). We observed a lower incidence rate for falls in the intervention group (incidence rate ratio/IRR: 0.54; 95% confidence interval (CI): [0.35; 0.84], p=0.007) and for fall-related injuries (IRR: 0.66; [0.42; 0.94], p=0.033). Additionally, patients in the intervention group showed significant improvements in secondary endpoints (TUG: -2.39 s, [-3.91; -0.87], p=0.014; mRomberg: 1.70 s, [0.35; 3.04], p=0.037; fear of falling: -2.28 points, [-3.87; -0.69], p=0.022) compared to usual care.

CONCLUSION: A complex falls prevention program in a primary care setting was effective in reducing falls and fall-related injuries in community dwelling older adults at risk.
Combined resistance and balance-jumping exercise reduces older women's injurious falls and fractures: 5-year follow-up study.

Karinkanta S¹, Kannus P², Uusi-Rasi K¹, Heinonen A³, Sievänen H¹.

Abstract

BACKGROUND AND OBJECTIVE: previously, a randomised controlled exercise intervention study (RCT) showed that combined resistance and balance-jumping training (COMB) improved physical functioning and bone strength. The purpose of this follow-up study was to assess whether this exercise intervention had long-lasting effects in reducing injurious falls and fractures.

DESIGN: five-year health-care register-based follow-up study after a 1-year, four-arm RCT.

SETTING: community-dwelling older women in Finland.

SUBJECTS: one hundred and forty-five of the original 149 RCT participants; women aged 70-78 years at the beginning.

METHODS: participants' health-care visits were collected from computerised patient register. An injurious fall was defined as an event in which the subject contacted the health-care professionals or was taken to a hospital, due to a fall. The rate of injured fallers was assessed by Cox proportional hazards model (hazard ratio, HR), and the rate of injurious falls and fractures by Poisson regression (risk ratio, RR).

RESULTS: eighty-one injurious falls including 26 fractures occurred during the follow-up. The rate of injured fallers was 62% lower in COMB group compared with the controls (HR 0.38, 95% CI 0.17 to 0.85). In addition, COMB group had 51% less injurious falls (RR 0.49, 95% CI 0.25 to 0.98) and 74% less fractures (RR 0.26, 95% CI 0.07 to 0.97).

CONCLUSIONS: home-dwelling older women who participated in a 12-month intensive multi-component exercise training showed a reduced incidence for injurious falls during 5-year post-intervention period. Reduction in fractures was also evident. These long-term effects need to be confirmed in future studies.
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Pubmed Clinical Queries

Results of searches on this page are limited to specific clinical research areas. For comprehensive searches, use PubMed directly.

Search term: fall prevention

Clinical Study Categories
This column displays citations filtered to a specific clinical study category and scope. These search filters were developed by Heynes RB et al. See more filter information.

Systematic Reviews
This column displays citations for systematic reviews, meta-analyses, reviews of clinical trials, evidence-based medicine, consensus development conferences, and guidelines. See filter information or additional related sources.

Medical Genetics
This column displays citations pertaining to topics in medical genetics. See more filter information.

[Additional content not visible in the image]
## Clinical Study Categories

- **Category:** Therapy
- **Scope:** Broad

## Systematic Reviews

### Results: 5 of 794

1. **Interventions to Prevent Falls in Older Adults:** Updated Evidence Report and Systematic Review for the US Preventive Services Task Force.
   - *Guilgud-Balek JM, Michael YL, Perdue LA, Coppola EL, Bell TL.*

2. **Methods for Evaluating Natural Experiments in Obesity:** Systematic Evidence Review

3. **Resident-to-Resident Mistreatment:** Evaluation of a Staff Training Program in the Reduction of Falls and Injuries.

4. **Efficacy of complex falls prevention interventions in residential aged care settings:** a systematic review.

5. **Evaluation of complex falls prevention interventions in residential aged care settings:** a systematic review.

### See all (794)

## Medical Genetics

### Results: 5 of 341

1. **Prevalence and predictors of PTSD among a college sample.**
   - *Clark SA, Hicks TA, Boudreaux JD, Swedin CM, Overstreet CM, Kendall KS, Dick DM, Amatulli AB.*

2. **Evaluation of frailty and influencing factors in old people in hospital institution:** Evidence for a phenotype of frailty.
   - *Yang F, Chen QW.*

3. **Potential for public health success in tackling the hepatitis C virus epidemic.**
   - *Shaw DE.*

4. **Vitamin B_6 and homocysteine levels in carbamazepine treated epilepsy of Khyber Pakhtunkhwa.**
   - *Sheik S, Ali N, Uddin Z, Nazish H, Nabi M.*

5. **Association analysis identifies 65 new breast cancer risk loci.**

### See all (341)

This column displays citations pertaining to topics in medical genetics. See more filter information.
Community
Comparisons of interventions for preventing falls in older adults: a systematic review and meta-analysis [with consumer summary]

JAMA 2017 Nov 7;318(17):1687-1699
A total of 283 RCTs (159,910 participants; mean age, 78.1 years; 74% women) were included after screening of 10,650 titles and abstracts and 1,210 full-text articles. Network meta-analysis (including 44 RCTs, 41,066 participants, 36 interventions plus usual care) suggested that the following interventions, when compared with usual care, were associated with reductions in injurious falls: exercise (odds ratio (OR) 0.51 (95% CI 0.33 to 0.79); absolute risk difference (ARD) -0.67 (95% CI -1.10 to -0.24)); combined exercise, vision assessment and treatment (OR 0.17 (95% CI 0.07 to 0.38); ARD -1.79 (95% CI -2.63 to -0.96)); combined exercise, vision assessment and treatment, and environmental assessment and modification (OR 0.30 (95% CI 0.13 to 0.70); ARD -1.19 (95% CI -2.04 to -0.35)); and combined clinic-level quality improvement strategies (eg, case management), multifactorial assessment and treatment (eg, comprehensive geriatric assessment), calcium supplementation, and vitamin D supplementation (OR 0.12 (95% CI 0.03 to 0.55); ARD -2.08 (95% CI -3.56 to -0.60)). Pairwise meta-analyses for fall-related hospitalizations (2 RCTs; 516 participants) showed no significant association between combined clinic- and patient-level quality improvement strategies and multifactorial assessment and treatment relative to usual care (OR 0.78 (95% CI 0.33 to 1.81)).
Cohort randomised controlled trial of a multifaceted podiatry intervention for the prevention of falls in older people (the REFORM trial)
Cohort randomised controlled trial of a multifaceted podiatry intervention for the prevention of falls in older people (the REFORM trial)


clinical trial

7/10 [Eligibility criteria: Yes; Random allocation: Yes; Concealed allocation: Yes; Baseline comparability: Yes; Blind subjects: No; Blind therapists: No; Blind assessors: No; Adequate follow-up: Yes; Intention-to-treat analysis: Yes; Between-group comparisons: Yes; Point estimates and variability: Yes. Note: Eligibility criteria item does not contribute to total score] *This score has been confirmed*

BACKGROUND. Falls are a major cause of morbidity among older people. A multifaceted podiatry intervention may reduce the risk of falling. This study evaluated such an intervention. DESIGN: Pragmatic cohort randomised controlled trial in England and Ireland. 1,010 participants were randomised (493 to the intervention group and 517 to usual care) to either: a podiatry intervention, including foot and ankle exercises, foot orthoses and, if required, new footwear, and a falls prevention leaflet or usual podiatry treatment plus a falls prevention leaflet. The primary outcome was the incidence rate of self-reported falls per participant in the 12 months following randomisation. Secondary outcomes included: proportion of fallers and those reporting multiple falls, time to first fall, fear of falling, Frenchay Activities Index, Geriatric Depression Scale, foot pain, health related quality of life, and cost-effectiveness. RESULTS: In the primary analysis were 184 (30.2%) intervention and 187 (36.1%) control participants. There was a small non statistically significant reduction in the incidence rate of falls in the intervention group (adjusted incidence rate ratio 0.88, 95% CI 0.73 to 1.05, \( p = 0.16 \)). The proportion of participants experiencing a fall was lower (49.7 versus 54.9%, adjusted odds ratio 0.78, 95% CI 0.60 to 1.00, \( p = 0.05 \)) as was the proportion experiencing two or more falls (27.6% versus 34.6%, adjusted odds ratio 0.69, 95% CI 0.52 to 0.90, \( p = 0.01 \)). There was an increase (\( p = 0.02 \)) in foot pain for the intervention group. There were no statistically significant differences in other outcomes. The intervention was more costly but marginally more beneficial in terms of health-related quality of life (mean quality adjusted life year (QALY) difference 0.0129, 95% CI -0.0050 to 0.0314) and had a 65% probability of being cost-effective at a threshold of 30,000 per QALY gained. CONCLUSION: There was a small reduction in falls. The intervention may be cost-effective. TRIAL REGISTRATION: ISRCTN68240461.
Paramedic Assessment of Older Adults After Falls, Including Community Care Referral Pathway: Cluster Randomized Trial.

Snooks HA\textsuperscript{1}, Anthony R\textsuperscript{2}, Chatters R\textsuperscript{3}, Dale J\textsuperscript{4}, Fothergill RT\textsuperscript{5}, Gaze S\textsuperscript{2}, Halter M\textsuperscript{6}, Humphreys I\textsuperscript{7}, Koniotou M\textsuperscript{2}, Logan P\textsuperscript{8}, Lyons RA\textsuperscript{9}, Mason S\textsuperscript{3}, Nicholl J\textsuperscript{3}, Peconi J\textsuperscript{2}, Phillips C\textsuperscript{7}, Porter A\textsuperscript{2}, Siriwardena AN\textsuperscript{10}, Wani M\textsuperscript{11}, Watkins A\textsuperscript{2}, Wilson L\textsuperscript{2}, Russell IT\textsuperscript{2}.
Paramedic Assessment of Older Adults After Falls, Including Community Care Referral Pathway: Cluster Randomized Trial.

Snooks HA¹, Anthony R², Chatters R³, Dale J⁴, Fothergill RT⁵, Gaze S², Halter M⁶, Humphreys I⁷, Koniotou M², Logan P⁸, Lyons RA⁹, Mason S³, Nicholl J³, Peconi J², Phillips C⁷, Porter A², Siriwardena AN¹⁰, Wani M¹¹, Watkins A², Wilson L², Russell IT².

Abstract

STUDY OBJECTIVE: We aim to determine clinical and cost-effectiveness of a paramedic protocol for the care of older people who fall.

METHODS: We undertook a cluster randomized trial in 3 UK ambulance services between March 2011 and June 2012. We included patients aged 65 years or older after an emergency call for a fall, attended by paramedics based at trial stations. Intervention paramedics could refer the patient to a community-based falls service instead of transporting the patient to the emergency department. Control paramedics provided care as usual. The primary outcome was subsequent emergency contacts or death.

RESULTS: One hundred five paramedics based at 14 intervention stations attended 3,073 eligible patients; 110 paramedics based at 11 control stations attended 2,841 eligible patients. We analyzed primary outcomes for 2,391 intervention and 2,264 control patients. One third of patients made further emergency contacts or died within 1 month, and two thirds within 6 months, with no difference between groups. Subsequent 999 call rates within 6 months were lower in the intervention arm (0.0125 versus 0.0172; adjusted difference -0.0045; 95% confidence interval -0.0073 to -0.0017). Intervention paramedics referred 8% of patients (204/2,420) to falls services and left fewer patients at the scene without any ongoing care. Intervention patients reported higher satisfaction with interpersonal aspects of care. There were no other differences between groups. Mean intervention cost was $23 per patient, with no difference in overall resource use between groups at 1 or 6 months.

CONCLUSION: A clinical protocol for paramedics reduced emergency ambulance calls for patients attended for a fall safely and at modest cost.

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Feasibility of Virtual Tablet-Based Group Exercise Among Older Adults in Siberia: Findings From Two Pilot Trials.

Nikiina S#1,2, Didino D#1,3, Bagz M#1,2, Casati F#1,2.
Feasibility of Virtual Tablet-Based Group Exercise Among Older Adults in Siberia: Findings From Two Pilot Trials.

Nikitina S1,2, Didino D1,3, Baez M1,2, Casali F1,2.

© Author information

Abstract

BACKGROUND: Regular physical activity has a positive effect on physical health, well-being, and life satisfaction of older adults. However, engaging in regular physical activity can be challenging for the elderly population because of reduced mobility, low motivation, or lack of the proper infrastructures in their communities.

OBJECTIVE: The objective of this paper was to study the feasibility of home-based online group training — under different group cohesion settings and its effects on adherence and well-being among Russian older adults. We focused particularly on the technology usability and usage and on the adherence to the training (in light of premeasures of social support, enjoyment of physical activity, and leg muscle strength). As a secondary objective, we also explored the effects of the technology-supported intervention on subjective well-being and loneliness.

METHODS: Two pilot trials were carried out exploring two different group cohesion settings (weak cohesion and strong cohesion) in the period from 2015 to 2016 in Tomsk, Russian Federation. A total of 44 older adults (59-83 years) participated in the two pilots and followed a strength and balance training program (Ctago) for 8 weeks with the help of a tablet-based virtual gym app. Participants in each pilot were assigned to an interaction condition, representing the online group exercising, and an individual condition, representing a home-based individual training. Both conditions featured persuasion strategies but differed in the ability to socialize and train together.

RESULTS: Both interaction and individual groups reported a high usability of the technology. Trainees showed a high level of technology acceptance and, particularly, a high score in intention to future use (4.2-5.0 on a 5-point Likert scale). Private texting (short service message [SMS]) was used more than public texting, and the strong cohesion condition resulted in more messages per user. Joint participation in training sessions (copresence) were higher for the social group with higher cohesion. The overall adherence to the training was 74% (SD 27%). Higher levels of social support at baseline were associated with higher adherence in the low cohesion condition (F(1,18)=5.23, P = .03), whereas in the high cohesion, such association was not found. Overall improvement in the satisfaction with life scale was observed between pre and post measures (F(1,31)=5.85, P = .02), but no decrease in loneliness.

CONCLUSIONS: Online group exercising was proven feasible among healthy independently living older adults in Russia. The pilots suggest that a physical training performed in a virtual environment positively affect the life satisfaction of the trainees, but it does not provide support for a decrease in loneliness. High cohesion groups are preferable for group exercising, especially to mitigate effects of low social support on adherence. Further research in motivating group interactions in training settings is needed.

Efficacy of a Student-Led, Community-Based, Multifactorial Fall Prevention Program: Stay in Balance.

Der Ananian CA¹, Mitros M², Buman MP¹.

Efficacy of a Student-Led, Community-Based, Multifactorial Fall Prevention Program: Stay in Balance.

Der Ananian CA¹, Mitros M², Buman MP¹.

Author information

Abstract

BACKGROUND: Falls are a major public health concern in older adults. Recent fall prevention guidelines recommend the use of multifactorial fall prevention programs (FPPs) that include exercise for community-dwelling older adults; however, the availability of sustainable, community-based FPPs is limited.

METHODS: We conducted a 34-week quasi-experimental study to evaluate the efficacy of a community-based, multifactorial FPP [Stay in Balance (SIB)] on dynamic and functional balance and muscular strength. The SIB program was delivered by allied health students and included a health education program focused on fall risk factors and a progressive exercise program emphasizing lower-extremity strength and balance. All participants initially received the 12-week SIB program, and participants were non-randomly assigned at baseline to either continue the SIB exercise program at home or as a center-based program for an additional 12 weeks. Adults aged 60 and older (n = 69) who were at-risk of falling (fall history or 2+ fall risk factors) were recruited to participate. Mixed effects repeated measures using Statistical Application Software Proc Mixed were used to examine group, time, and group-by-time effects on dynamic balance (8-Foot Up and Go), functional balance (Berg Balance Scale), and muscular strength (30 s chair stands and 30 s arm curls). Non-normally distributed outcome variables were log-transformed.

RESULTS: After adjusting for age, gender, and body mass index, 8-Foot Up and Go scores, improved significantly over time \[F(2,173) = 8.92, p = 0.0; T0 - T2 diff = 1.2 (1.0)\]. Berg Balance Scores \[F(2,173) = 29.0, p < 0.0001; T0 - T2 diff = 4.96 (0.72)\], chair stands \[F(2,171) = 10.17, p < 0.0001; T0 - T2 diff = 3.1 (0.7)\], and arm curls \[F(2,171) = 12.7, p < 0.02; T0 - T2 diff = 2.7 (0.6)\] also all improved significantly over time. There were no significant group-by-time effects observed for any of the outcomes.

CONCLUSION: The SIB program improved dynamic and functional balance and muscular strength in older adults at-risk for falling. Our findings indicate continuing home-based strength and balance exercises at home after completion of a center-based FPP program may be an effective and feasible way to maintain improvements in balance and strength parameters.
Slackline Training (Balancing Over Narrow Nylon Ribbons) and Balance Performance: A Meta-Analytical Review.

Donath L¹, Roth R², Zahner L², Faude O².
Slackline Training (Balancing Over Narrow Nylon Ribbons) and Balance Performance: A Meta-Analytical Review.

Donath L1, Roth I2, Zahnert L2, Faude O2

Abstract

BACKGROUND: Adequate static and dynamic balance performance is an important prerequisite during daily and sporting life. Various traditional and innovative balance training concepts have been suggested to improve postural control or neuromuscular fail risk profiles over recent years. Whether slackline training (balancing over narrow nylon ribbons) serves as an appropriate training strategy to improve static and dynamic balance performance is as yet unclear.

OBJECTIVE: The aim was to examine the occurrence and magnitude of effects of slackline training compared with an inactive control condition on static and dynamic balance performance parameters in children, adults and seniors.

DATA SOURCES: Five biomedical and psychological databases (CINAH, EMBASE, ISI Web of Knowledge, PubMed, SPORTDiscus) were screened using the following search terms with Boolean conjunctions: (slacklin* OR slack-lin* OR tight rop* OR tightrop* OR Slackline-based OR line-based OR slackrop* OR slack-rope* OR floppy wi* OR rop* balan* OR ropedanc* OR rope-danc*) STUDY SELECTION: Randomized and non-randomized controlled trials that applied slackline training as an exercise intervention compared with an inactive control condition focusing on static and dynamic balance performance (perturbed and non-perturbed single leg stance) in healthy children, adults and seniors were screened for eligibility.

DATA EXTRACTION: Eligibility and study quality [Physiotherapy Evidence Database (PEDro) scale] were independently assessed by two researchers. Standardized mean differences (SMDs) calculated as weighted Hedges’ g served as main outcomes in order to compare slackline training versus inactive control on slackline standing as well as dynamic and static balance performance parameters. Statistical analyses were conducted using a random-effects, inverse-variance model.

RESULTS: Eight trials (mean PEDro score 6.5 ± 0.9) with 204 healthy participants were included. Of the included subjects, 35% were children or adolescents, 39% were adults and 26% were seniors. Slackline training varied from 4 to 6 weeks with 16 ± 7 training sessions on average, ranging from 8 to 28 sessions. Mean overall slackline training covered 380 ± 128 min. Very large task-specific effects in favor of slackline training compared with the inactive control condition were found for slackline standing time (SMD 4.63 [95% confidence interval (CI) 3.67-5.59], p < 0.001). Small and moderate pooled transfer effects were observed for dynamic [SMD 0.52 (95% CI 0.08-0.96), p = 0.02] and static [SMD 0.30 (95% CI -0.03 to 0.64), p = 0.07] standing balance performance, respectively.

CONCLUSIONS: Slackline training mainly revealed meaningful task-specific training effects in balance performance tasks that are closely related to the training content, such as slackline standing time and dynamic standing balance. Transfer effects to static and dynamic standing balance performance tasks are limited. As a consequence, slackline devices should be embedded into a challenging and multimodal balance training program and not used as the sole form of training.
Community

– Confirmed importance of exercise, podiatry and multiple interventions for fall prevention
– Promising ambulance service interventions
– Promising exercise delivery with telehealth and students
– Confirmed task-related improvement in balance with challenging exercise
Hospitals
Identification and team-based interprofessional management of hospitalized vulnerable older adults.

Borenstein JE¹, Aronow HU², Bolton LB³, Dimalanta MI³, Chan E⁴, Palmer K⁵, Zhang X⁶, Rosen B¹, Braunstein GD¹.
Identification and team-based interprofessional management of hospitalized vulnerable older adults.

Borenstein JE\(^1\), Aronow HU\(^2\), Bolton LB\(^3\), Dimalanta MI\(^3\), Chan E\(^4\), Palmer K\(^5\), Zhang X\(^6\), Rosen B\(^1\), Braunstein GD\(^1\).

Author information

Abstract

BACKGROUND: Extended hospital stays and complications are common among older adults and may lead to morbidity and loss of independence. Specialized geriatric units have been shown to improve outcomes but, with the growing numbers of older adults, may be difficult to scale to meet needs.

PURPOSE: The purpose was to evaluate a quality improvement initiative that redesigned unit-based workflow and trained interprofessional teams on general medical/surgical units to create care plans for vulnerable older adults using principles of comprehensive geriatric assessment and team management.

METHOD: The evaluation included a cluster randomized controlled trial of 10 medical/surgical units and intention-to-treat analysis of all patients meeting risk screening criteria.

RESULTS: N = 1,384, median age = 80.9 years, and 53.5% female. Mean difference in observed vs. expected length of stay was 1.03 days shorter (p = .006); incidence of complications (odds ratio [OR] = 0.45; 95% confidence interval [CI] = 0.21-0.98) and transfer to intensive care (OR = 0.45; 95% CI = 0.25-0.79) lower among patients admitted to intervention units; incidence of discharge to institutional care was higher (OR = 1.43; 95% CI = 1.06-1.93). Mortality during hospitalization (OR = 0.64; 95% CI = 0.37-1.11) did not differ between groups.

CONCLUSION: Reorganizing general medical/surgical units to provide team-based interprofessional care can improve outcomes among hospitalized older adults.
Abstract
OBJECTIVE: The aim of this article is to describe the Systems Addressing Frail Elder (SAFE) Care model, features of the interprofessional team and reengineered workflow, and details of the intervention.

BACKGROUND: Older inpatients are vulnerable to adverse events related to frailty. SAFE Care, an interprofessional team-based program, was developed and evaluated in a cluster randomized controlled trial (C-RCT). Results found reduced length of stay and complications. The purpose of this article is to support and encourage the replication of this innovation or to help facilitate implementation of a similar process of organizational change.

METHODS: This was a review of model features and intervention data abstracted from electronic health records.

RESULTS: Salient features of team composition, training, and workflow are presented. The C-RCT intention-to-treat sample included 792 patients, of whom 307 received the SAFE Care huddle intervention. The most frequent problem was mobility (85.7%), and most frequent recommendation was fall precautions protocol (83.1%).

CONCLUSIONS: The SAFE Care model may provide a standardized framework to approach, assess, and address the risks of hospitalized older adults.
An Occupational Therapy Fall Reduction Home Visit Program for Community-Dwelling Older Adults in Hong Kong After an Emergency Department Visit for a Fall.

Chu MM\textsuperscript{1}, Fong KN\textsuperscript{2}, Lit AC\textsuperscript{3}, Rainer TH\textsuperscript{4}, Cheng SW\textsuperscript{5}, Au FL\textsuperscript{6}, Fung HK\textsuperscript{1}, Wong CM\textsuperscript{7}, Tong HK\textsuperscript{8}.
An Occupational Therapy Fall Reduction Home Visit Program for Community-Dwelling Older Adults in Hong Kong After an Emergency Department Visit for a Fall.

Chu MM¹, Fong KN², Lit AG³, Rainer TH⁴, Cheng SW⁵, Au FL⁶, Fung HK⁷, Wong CM⁷, Tong HK⁸.

Abstract

OBJECTIVES: To investigate the effects of an occupational therapy fall reduction home visit program for older adults admitted to the emergency department (ED) for a fall and discharged directly home.

DESIGN: Single-blind, multicenter, randomized, controlled trial.

SETTINGS: EDs in three acute care hospitals in Hong Kong.

PARTICIPANTS: Individuals aged 65 and older who had fallen (N = 311).

INTERVENTIONS: After screening for eligibility, 204 consenting individuals were randomly assigned to an intervention group (IG) and received a single home visit from an occupational therapist (OT) within 2 weeks after discharge from the hospital or a control group (CG) and received a well-wishing visit from a research assistant not trained in fall prevention.

MEASUREMENTS: Both groups were followed for 12 months through telephone calls made every 2 weeks by blinded assessors with a focus on the frequency of falls. Another blinded assessor followed up on their status with telephone calls 4, 8, and 12 months after ED discharge. Prospective fall records on hospital admissions were retrieved from electronic databases; 198 individuals were followed for 1 year on an intention-to-treat basis.

RESULTS: The percentage of fallers over 1 year was 13.7% in the IG (n = 95) and 20.4% in the CG (n = 103). There were significant differences in the number of fallers (P = .03) and the number of falls (P = .02) between the two groups over 6 months. Significant differences were found in survival analysis for first fall at 6 months (log-rank test 5.052, P = .02) but not 9 or 12 months.

CONCLUSION: One OT visit after a fall was more effective than a well-wishing visit at reducing future falls at 6 months. A booster OT visit at 6 months is suggested.
Randomized controlled trial of screening, risk modification, and physical therapy to prevent falls among the elderly recently discharged from the emergency department to the community: the steps to avoid falls in the elderly study

Matchar DB, Duncan PW, Lien CT, Ong MEH, Lee M, Gao F, Sim R, Eom K

Archives of Physical Medicine and Rehabilitation 2017 Jun;98(6):1086-1096
Randomized controlled trial of screening, risk modification, and physical therapy to prevent falls among the elderly recently discharged from the emergency department to the community: the steps to avoid falls in the elderly study

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clinical trial

7/10 [Eligibility criteria: Yes; Random allocation: Yes; Concealed allocation: No; Baseline comparability: Yes; Blind subjects: No; Blind therapists: No; Blind assessors: Yes; Adequate follow-up: Yes; Intention-to-treat analysis: Yes; Between-group comparisons: Yes; Point estimates and variability: Yes. Note: Eligibility criteria item does not contribute to total score] *This score has been confirmed*

OBJECTIVE: To evaluate the effectiveness of a multifactorial, tailored program of physical therapy to reduce the occurrence of falls among a heterogeneous group of high-risk elderly Singaporeans recently discharged from the emergency department (ED). DESIGN: Randomized controlled trial. SETTING: Communities. PARTICIPANTS: Adults (N = 354) aged > 65 years who were seen in the ED for a fall or fall-related injuries and discharged home. Interventions: The intervention primarily consisted of a tailored program of physical therapy focused on progressive training in strength, balance, and gait for a period of 3 months. Participants in the intervention group also received screening and follow-up for vision, polypharmacy, and environmental hazards. Participants in the control group received usual care prescribed by a physician and educational materials on falls prevention. MAIN OUTCOME MEASURES: The primary outcome measure was experiencing at least 1 fall during the 9-month study period (a 3-mo active intervention phase and a 6-mo maintenance phase). Secondary outcome measures were the occurrence of at least 1 injurious fall during the study period and a change in the Short Physical Performance Battery (SPPB) score. Participants were assessed both after 3 and 9 months.

RESULTS: During the 9-month study period, 37.8% of the control group and 30.5% of the intervention group fell at least once, which was not statistically significantly different (odds ratio (OR) 0.72; 95% confidence interval (CI) 0.46 to 1.12; p = 0.146). The intervention group had statistically significantly fewer individuals with injurious falls (OR 0.56; 95% CI 0.32 to 0.98; p = 0.041) and less deterioration in physical performance, reflected by a mean difference of 0.6 in SPPB scores (p = 0.029). Multivariate analyses indicated a strong interaction effect between the intervention and the presence of 2 or more major comorbidities, after accounting for this effect, the intervention program reduced the number of people experiencing at least 1 fall (OR 0.34; 95% CI 0.17 to 0.67; p = 0.002). CONCLUSIONS: We observed that in this heterogeneous population, the proportion of participants experiencing at least 1 fall during the study period was not statistically significantly lower in the intervention group compared with the control group. Secondary analyses strongly suggest that individuals with 2 or more major comorbidities do not benefit from a tailored physical therapy program; however, individuals with less comorbidity may substantially benefit.
Controlled clinical trial exploring the impact of a brief intervention for prevention of falls in an emergency department.

Harper KJ¹, Barton AD¹, Arendts G², Edwards DG¹, Petta AC³, Celenza A².
Controlled clinical trial exploring the impact of a brief intervention for prevention of falls in an emergency department.

Harper KJ¹, Barton AD¹, Arendts G², Edwards DG¹, Petta AC³, Celenza A².

Abstract

OBJECTIVE: To establish the effectiveness of a brief intervention to prevent falls in older patients presenting to the ED post-discharge.

METHODS: The present study is a prospective single-centre, quasi-randomised controlled clinical trial of a brief targeted educational intervention to prevent falls. The intervention group received brief scripted education and were advised of their percentage probability of falling in the next 6 months. The key message was to reinforce the importance of falls prevention strategies and the seriousness of falls.

RESULTS: A total of 412 over 65 years old were recruited; 63 (32.1%) patients in the intervention group and 67 (36.8%) in the control group reported falls in the 6 month follow up period (OR 0.81, 95% confidence interval [CI] 0.53-1.25, P = 0.34). No significant differences were noted for mortalities (P = 0.54), ED representations (P = 0.15) and medication changes (P = 0.17). Patients receiving intervention had less hospital admissions (P = 0.002) after adjustment for confounding variables. Intervention patients who presented with a fall had significant (P = 0.007) improvement in function at 6 months, whereas those not presenting with a fall experienced functional decline.

CONCLUSION: A brief intervention was associated with maintenance of function in fallers and reduced hospital admissions, without preventing falls post-discharge.
Hospitals

- Better care of frail older people in hospital prevented complications
- OT home visit after ED prevented falls
- Multifaceted program including exercise after ED prevented falls
- Promising brief intervention in ED
Residential care
Effectiveness of complex falls prevention interventions in residential aged care settings: a systematic review.

Francis-Coad J¹, Etherton-Beer C², Burton E³, Naseri C⁴, Hill AM⁴.
Effectiveness of complex falls prevention interventions in residential aged care settings: a systematic review.

Francis-Coad J\textsuperscript{1}, Etherton-Beer C\textsuperscript{2}, Burton E\textsuperscript{3}, Naseri C\textsuperscript{3,4}, Hill AM\textsuperscript{3,4}.

Abstract

OBJECTIVE: The objective of this review was to synthesize the best available evidence for the effectiveness of complex falls prevention interventions delivered at two or more of the following levels: resident, facility or organization, on fall rates in the residential aged care (RAC) population.

INTRODUCTION: Preventing falls in the high risk RAC population is a common global goal with acknowledged complexity. Previous meta-analyses have not specifically addressed complexity, described as falls prevention intervention delivery at multiple levels of a RAC organization, to determine its effect on fall outcomes.

INCLUSION CRITERIA: The current review considered studies that included participants who were aged 65 years and over residing in long-term care settings providing 24-hour supervision and/or care assistance. Studies that evaluated complex falls prevention interventions delivered by single discipline or multidisciplinary teams across at least two or all of the following levels: residents, RAC facility and RAC organization were eligible. Experimental study designs including randomized controlled trials, controlled clinical trials and quasi-experimental trials that reported on measures related to fall incidence were considered, namely, rate of falls (expressed as the number of falls per 1000 occupied bed days), the number of participants who became fallers (expressed as the number of participants who fell once or more) and the rate of injurious falls (expressed as the number of falls with injury per 1000 occupied bed days).

METHODS: A three-step search strategy was undertaken, commencing with an initial scoping search of MEDLINE and CINAHL databases prior to an extensive search of all relevant published literature, clinical trial registries and gray literature. Two independent reviewers assessed selected studies for methodological validity using the standardized critical appraisal instrument from the Joanna Briggs Institute System for the Unified Management, Assessment and Review of Information (JBI SUMARI). Data were extracted from the selected studies using the standardized data extraction tool from JBI SUMARI. Quantitative data were pooled in statistical meta-analysis for rate of falls, the number of participants who became fallers and the rate of injurious falls. Meta-analysis was conducted using a random-effect model with heterogeneity assessed using the standard Chi-squared and I index. Where statistical pooling was not possible, study findings were presented in narrative form.

RESULTS: Twelve studies were included in this review with seven being eligible for meta-analysis. Complex falls prevention interventions delivered at multiple levels in RAC populations did not show a significant effect in reducing fall rates (MD = -1.29; 95% CI [-3.01, 0.43]), or the proportion of residents who fell (OR = 0.76; 95% CI [0.42, 1.38]). However, a sensitivity analysis suggested complex falls prevention interventions delivered with additional resources at multiple levels had a significant positive effect in reducing fall rates (MD = -2.26; 95% CI [-3.72, -0.80]).
 Progressive Resistance and Balance Training for Falls Prevention in Long-Term Residential Aged Care: A Cluster Randomized Trial of the Sunbeam Program.

Hewitt J1, Goodall S2, Clemson L3, Henwood T4, Refshauge K3.
Progressive Resistance and Balance Training for Falls Prevention in Long-Term Residential Aged Care: A Cluster Randomized Trial of the Sunbeam Program.

Hewitt J, Goodall S, Clemson L, Henwood T, Rafshauge K.

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Abstract

BACKGROUND: Falls prevention is an international priority, and residents of long-term aged care fall approximately 3 times more often than community dwellers. There is a relative scarcity of published trials in this setting.

OBJECTIVES: Our objective was to undertake a randomized controlled trial to test the effect of published best practice exercise in long-term residential aged care. The trial was designed to determine if combined high level balance and moderate intensity progressive resistance training (the Sunbeam Program) is effective in reducing the rate of falls in residents of aged care facilities.

METHOD: A cluster randomized controlled trial of 16 residential aged care facilities and 221 participants was conducted. The broad inclusion criterion was permanent residents of aged care. Exclusions were diagnosed terminal illness, no medical clearance, permanent bed- or wheelchair-bound status, advanced Parkinson’s disease, or insufficient cognition to participate in group exercise. Assessments were taken at baseline, after intervention, and at 12 months. Randomization was performed by computer-generated sequence to receive either the Sunbeam program or usual care. A cluster refers to an aged care facility.

INTERVENTION: The program consisted of individually prescribed progressive resistance training plus balance exercise performed in a group setting for 50 hours over a 25-week period, followed by a maintenance period for 6 months.

OUTCOME MEASURES: The primary outcome measure was the rate of falls (number of falls and days followed up). Secondary outcomes included physical performance (Short Physical Performance Battery), quality of life (36-item Short-Form Health Survey), functional mobility (University of Alabama Life Space Assessment), fear of falling (Falls Efficacy Scale International), and cognition (Addenbrooke’s Cognitive Evaluation-revised).

RESULTS: The rate of falls was reduced by 55% in the exercise group (incidence rate ratio = 0.45, 95% confidence interval 0.17-0.74); an improvement was also seen in physical performance (P = .02). There were no serious adverse events.

CONCLUSION: The Sunbeam Program significantly reduced the rate of falls and improved physical performance in residents of aged care. This finding is important as prior work in this setting has returned inconsistent outcomes, resulting in best practice guidelines being cautious about recommending exercise in this setting. This work provides an opportunity to improve clinical practice and health outcomes for long-term care residents.
HUR Devices
1. Hip abduction/adduction a
2. Leg press b
3. Triceps dip
4. Leg extension/curl b
5. Abdomen/ back

Replacement exercise (if participant unable to use gym equipment)
a = Seated abduction/adduction with resistance bands
b = Sit to stand

Initial resistance
- Level for each exercise ascertained at first gym session by physiotherapist in consultation with participant
- Level set at 2 sets of 10 repetitions at a resistance described by participant as "moderate intensity" (Borg Scale of Perceived Exertion) 18

Initial Progression
- TRIGGER FOR PROGRESSION: Participant reported perceived exertion was "somewhat light." 18 Participants questioned at each visit over first 2 weeks.
- PROGRESSION APPLIED: Sets and repetitions upgraded to 3 x 10. Resistance unchanged.

Progression protocol
- TRIGGER FOR PROGRESSION: Participant reported perceived exertion was "somewhat light." 18 Participants questioned fortnightly.
- Repetitions remained at 3 x 10 and resistance increased at a level described by the participant as "moderate intensity." 18

Fig. 1. Resistance exercises and progression schedule used in stage 1.
Fig. 2. Balance exercises and progression schedule used in stage 1.

Static standing balance
1. Bicep curl (with resistance bands) (3 x 10)
2. Shoulder retraction (with resistance bands) (3 x 10)
3. Standing feet together (progress to semi-tandem then tandem) 3 x 30 seconds

Dynamic standing balance
4. Heel raises (2 x 6)
5. Toes raises (2 x 6)
6. Recovery steps (1 x 10 each side and behind)
7. Reaching outside base of support (10 x each side)
8. Grapevine steps (holding groups leaders’ hands)

INSTRUCTION: “Step out quickly as if catching yourself from falling, slowly step back to neutral”

Progression of hand support for all balance exercises
• Holding back of chair/ table with 2 hands
• Holding back of chair/ table with 1 hand
• Not holding on
  • TRIGGER FOR PROGRESSION: Participant reported perceived exertion was “somewhat easy”

Other progressions of for static exercises
• Eyes open
• Eyes closed
• Count backwards from 50 by intervals of 5
  • Increase heel/toes raise exercises to 2 x 10
  • TRIGGER FOR PROGRESSION: Participant reported perceived exertion was “somewhat easy”

Progression for dynamic exercises
• Increase speed of recovery steps and grapevine
• Increase repetition
  • TRIGGER FOR PROGRESSION: Participant reported perceived exertion was “somewhat easy”
Residential care

- Interventions more effective when additional resources are allocated
- Balance and strength training prescribed and monitored by a physiotherapist prevented falls
Gold bar evidence scale (from Prof Stephen Lord)

- One good quality RCT
- At least two good quality RCTs – little inconsistency
- Multiple RCTs and/or systematic reviews – little inconsistency
Falls prevention – what works: community

- High level balance exercise in group or home settings (functional balance exercises, Otago, Tai Chi)
- Occupational therapy interventions (home safety modifications in association with transfer training and education) in high risk populations
- Expedited first eye cataract surgery
- Restriction of multifocal glasses use in older people who take part in regular outdoor activity
- Pharmacist-led education and GP medication review
- **Podiatry intervention in people with disabling foot pain**
Falls prevention – what works: community 2

- Withdrawal of psychoactive medications
- Intensive multidisciplinary assessment of high risk populations
Falls prevention – what works: hospital

- Intensive interventions in hospitals
- OT home visit after ED
- Physio exercise after ED
Falls prevention – what works:
residential care

- Comprehensive geriatric assessment in residential aged care
- Vitamin D supplementation in residential aged care
- Medication review in residential aged care
- **Physio exercise in residential aged care**
- Likely greater effects with more resources
Integrated care for older people
Guidelines on community-level interventions to manage declines in intrinsic capacity

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Intrinsic capacity and functional ability

WHO defines intrinsic capacity (IC) as the combination of the individual’s physical and mental, including psychological, capacities; and functional ability (FA) as the combination and interaction of IC with the environment a person inhabits.
Intrinsic capacity and functional ability do not remain constant but decline with age as a result of underlying diseases and the ageing process.
Fig. 4. Decline in physical functioning with age, by baseline level of physical activity
Taking a systems approach to prevention
**Capability:** Capacity of the individual to engage in the behaviour—physical and psychological

**Opportunity:** Factors outside of individual—physical and social

**Motivation:** Brain processes directing the behaviour—reflective and automatic
Older people’s perspectives on participation in physical activity: a systematic review and thematic synthesis of qualitative literature

Marcia R Franco, Allison Tong, Kirsten Howard, Catherine Sherrington, Paulo H Ferreira, Rafael Z Pinto, Manuela L Ferreira

Themes identified in 132 studies, n=5987


Capability
- physical limitations

Opportunity
- competing priorities
- access difficulties

Motivation
- perceived benefits of physical activity
- motivation and beliefs
- social influences
Economic modelling of a public health programme for fall prevention

Markov model costs and benefits of widespread rollout of a fall prevention program

incremental cost-effectiveness ratio (ICER) of $A28,931 per QALY gained assuming program cost of $700 per person and at a fall prevention risk ratio of 0.75

cost-effective at a threshold value of $A50,000 per QALY gained
Thanks to

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