

Safety Literature 9th January 2022**A prediction model for falls in community-dwelling older adults in podiatry practices**

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Abstract

INTRODUCTION: Falls are a worldwide health problem among community-dwelling older adults. Emerging evidence suggests that foot problems increase the risk of falling, so the podiatrist may be crucial in detecting foot-related fall risk. However, there is no screening tool available which can be used in podiatry practice. The predictive value of existing tools is limited, and the implementation is poor. The development of risk models for specific clinical populations might increase the prediction accuracy and implementation. Therefore, the aim of this study was to develop and internally validate an easily applicable clinical prediction model (CPM) that can be used in podiatry practice to predict falls in community-dwelling older adults with foot (-related) problems.

METHODS: This was a prospective study including community-dwelling older adults (≥ 65 years) visiting podiatry practices. General fall-risk variables, and foot-related and function-related variables were considered as predictors for the occurrence of falls during the 12-month follow-up. Logistic regression analysis was used for model building, and internal validation was done by bootstrap resampling.

RESULTS: 407 participants were analyzed; the event rate was 33.4%. The final model included fall history in the previous year, unsteady while standing and walking, plantarflexor strength of the lesser toes, and gait speed. The area under the receiver operating characteristic curve was 0.71 (95% CI: 0.66-0.76) in the sample and estimated as 0.65 after shrinkage.

CONCLUSION: A CPM based on fall history in the previous year, feeling unsteady while standing and walking, decreased plantarflexor strength of the lesser toes, and reduced gait speed has acceptable accuracy to predict falls in our sample of podiatry community-dwelling older adults and is easily applicable in this setting. The accuracy of the model in clinical practice should be demonstrated through external validation of the model in a next study.

Language: en

Keywords

Assessment tool; Fall risk; Foot; Podiatrist

Ankle proprioception deficit is the strongest factor predicting balance impairment in patients with chronic stroke

Cho JE, Kim H. Arch. Rehabil. Res. Clin. Transl. 2021; 3(4): e100165.

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Abstract

OBJECTIVE: To determine the main factor that predicts balance impairment in patients with chronic stroke.

DESIGN: Cross-sectional study. **SETTING:** Inpatient rehabilitation hospital and research laboratory. **PARTICIPANTS:** A total of 57 patients (42 men, 15 women; mean age 55.7±12.2 years) with chronic symptoms after stroke. **INTERVENTIONS:** Not applicable. **MAIN OUTCOME MEASURES:** Primary outcomes were ankle functions, including strength, range of motion, and proprioception, and balance, including Berg Balance Scale score and Timed Up and Go test values. Secondary outcomes included gait kinematics, Fugl-Meyer Scale score, and Fall Efficacy Scale score.

RESULTS: According to the cutoff score <46 on the Berg Balance Scale and the Timed Up and Go test ≥13.5 seconds, 21 patients were classified as having a balance impairment (36.8%). Multivariable logistic regressions showed that ankle proprioception (odds ratio = 3.49; 95% confidence interval, 1.17-10.42) was a significant predictor when coupled with step length (odds ratio = 0.00; 95% confidence interval, 0.00-0.22). A cutoff score of 2.59 for the ankle proprioception value predicts balance impairment in patients with stroke (area under the curve 0.784).

CONCLUSION: Ankle proprioception can be used to predict balance impairment in patients with stroke.

Language: en

Keywords

Rehabilitation; Stroke; Balance; Ankle; BBS, Berg Balance Scale; Berg balance scale; DF, dorsiflexion; EV, eversion; FM-L, Fugl-Meyer Lower Extremity; INV, inversion; PF, plantar flexion; Proprioception; ROM, range of motion; TUG, Timed Up and Go

Assessing the scalability of an integrated falls prevention service for community-dwelling older people: a mixed methods study

Calnan S, Lee K, McHugh S. BMC Geriatr. 2022; 22(1): e17.

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Abstract

BACKGROUND: There is growing acknowledgement of the need for a phased approach to scaling up health interventions, beginning with an assessment of 'scalability', that is, the capacity of an individual intervention to be scaled up. This study aims to assess the scalability of a multi-component integrated falls prevention service for community-dwelling older people and to examine the applicability of the Intervention Scalability Assessment Tool (ISAT). The ISAT consists of 10 domains for consideration when determining the scalability of an intervention, and each domain comprises a series of questions aimed at examining readiness for scale-up.

METHODS: Multiple methods were used sequentially as recommended by the ISAT: a review of policy documents, results from a service evaluation and falls-related literature; one-to-one interviews (n = 11) with key stakeholders involved in management and oversight of the service; and a follow-up online questionnaire (n = 10) with stakeholders to rate scalability and provide further feedback on reasons for their scores.

RESULTS: Three of the ISAT domains were rated highly by the participants. Analysis of the qualitative feedback and documents indicated that the issue of falls prevention among older people was of sufficient priority to warrant scale-up of the service and that the service aligned with national health policy priorities. Some participants also noted that benefits of the service could potentially outweigh costs through reduced hospital admissions and serious injuries such as hip fracture. The remaining domains received a moderate score from participants, however, indicating considerable barriers to scale-up. In the qualitative feedback, barriers identified included the perceived need for more healthcare staff to deliver components of the service, for additional infrastructure such as adequate room space, and for an integrated electronic patient management system linking primary and secondary care and to prevent duplication of services.

CONCLUSIONS: Plans to scale up the service are currently under review given the practical barriers that need to be addressed. The ISAT provides a systematic and structured framework for examining the scalability of this multi-component falls prevention intervention, although the iterative nature of the process and detailed and technical nature of its questions require considerable time and knowledge of the service to complete.

Language: en

Keywords

Falls prevention; Integrated care; Older people; Scalability; Scaling up

Classification of older and fall-experienced subjects by postural sway data using mass spring damper model

Tawaki Y, Nishimura T, Murakami T. IEEE Trans. Neural Syst. Rehabil. Eng. 2021; ePub(ePub): ePub.

(Copyright © 2021, IEEE (Institute of Electrical and Electronics Engineers))

DOI 10.1109/TNSRE.2021.3139966 **PMID** 34971535

Abstract

The quiet standing test is used to detect diseases of the postural control system. The descriptive statistics of the center of pressure (COP) of older people during the test tend to be larger than those of healthy young people, but they cannot indicate structural problems in postural control. COP trajectories can be mathematically modeled with structural parameters such as viscosity, stiffness, and stochastic terms; however, the classification accuracy of older and fall-experienced people using such parameters has not been sufficiently verified. In this study, six structural parameters of a mass-spring-damper (MSD) model were estimated using two datasets, in which a total of 212 subjects performed quiet standing tests under four conditions. The estimated parameters were used for classification with a random forest algorithm to examine the differences in classification accuracy compared to seven conventional descriptive statistics methods. For the classification of older subjects, the classification accuracy of the MSD parameter method was the highest in foam condition, with positive likelihood ratios approximately 8.0. For the classification of fall-experienced subjects, the positive likelihood ratio of the MSD parameter method was 5.0, which is better than conventional descriptive statistics. Various MSD parameters revealed that aging and changing the floor surface and visual conditions cause oscillations in the COP behavior. While the MSD parameters were confirmed to help classify older subjects more accurately than the conventional descriptive statistics, there was room for further improvement in the classification accuracy of fall-experienced subjects.

Language: en

Collaborative care when older adults fall: the benefits of geriatric consultation for trauma patients aged 75 years and older

Roberts ARA, Falank CR, Ontengco JB, Carter EL, Hallen SAM. J. Am. Geriatr. Soc. 2022; ePub(ePub): ePub.

(Copyright © 2022, John Wiley and Sons)

DOI 10.1111/jgs.17637 **PMID** 34982468

Abstract

Traumatic injury in adults older than 65 is associated with high morbidity and mortality. There are conflicting data regarding the benefit of incorporating a geriatrician into routine care of trauma patients with some evidence showing that mandatory geriatric consultation does not change patients' mortality or hospital length of stay (LOS).¹ Other research has demonstrated decreased rates of delirium,² increased adherence to quality guidelines,³ improved functional recovery,⁴ and a significant impact on mortality rate.⁵

We initiated a quality improvement (QI) protocol at Maine Medical Center's (MMC) Level 1 trauma center in which all patients aged 75 years and older admitted to the trauma service received a geriatric consultation with a primary focus on falls, cognition, and polypharmacy. We evaluated the protocol's impact on clinical outcomes in older fall-related trauma patients when compared to a pre-implementation sample retrospectively...

Language: en

Effects of multicomponent exercise on the muscle strength, muscle endurance and balance of frail older adults: a meta-analysis of randomised controlled trials

Li Y, Gao Y, Hu S, Chen H, Zhang M, Yang Y, Liu Y. *J. Clin. Nurs.* 2022; ePub(ePub): ePub.

(Copyright © 2022, John Wiley and Sons)

DOI 10.1111/jocn.16196 **PMID** 34989056

Abstract

OBJECTIVES: This study aims to evaluate the effects of multicomponent exercise on the muscle strength, muscle endurance and balance of frail older adults living in the community and provide the latest evidence from published randomised controlled trials (RCTs).

BACKGROUND: The number of frail older adults is rapidly increasing. Previous studies have reported that multicomponent exercise is one of the best types of intervention for increasing muscle strength, muscle endurance and balance for frail older adults. However, due to the small sample size and lack of evidential support, a meta-analysis of RCTs remains necessary.

METHODS: RCTs reporting the effects of multicomponent exercise on the muscle strength, muscle endurance and balance of frail older adults, published in English, were retrieved from five electronic databases: PubMed, CINAHL, Web of Science, Embase and Cochrane Library available from their inception up to January 2021. RevMan5.3 software was adopted for statistical analysis. This study followed the PRSIMA checklist.

RESULTS: A total of 10 articles and 667 patients were included in this study. Meta-analysis showed that multicomponent exercise could improve the muscle strength [MD = 2.46, $p = .007$], muscle endurance [MD = 2.16, $p = .03$] and balance [MD = .39, $p = .03$] of frail older adults, and subgroup analysis showed the muscle endurance of frail older adults was significantly improved as the intervention lasted for >12 weeks.

CONCLUSIONS: RCTs provided in this study show the latest evidence that multicomponent exercise can improve the muscle strength, endurance and balance of frail older adults and that long-duration (>12weeks) multicomponent exercise is more effective for improving muscle endurance. **RELEVANCE TO CLINICAL PRACTICE:** Multicomponent exercise contributes to improving the muscle strength, muscle endurance and balance of frail older adults, so it can be considered as a complement to the physical function management programme for frail older adults.

Language: en

Keywords

meta-analysis; balance; frail older adults; multicomponent exercise; muscle endurance; muscle strength

Increasing health professional awareness about the link between sleep and falls in older adults

Kakazu VA, Morelhão PK, Dokkedal-Silva V, Tufik S, Andersen ML. *Geriatr. Gerontol. Int.* 2022; ePub(ePub): ePub.

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DOI 10.1111/ggi.14338 **PMID** 34981611

Abstract

[The publisher has not provided an abstract for this article.]

Language: en

Managing fall prevention through exercise in older adults afflicted by cognitive and strength impairment

Senderovich H, Bayeva N, Montagnese B, Yendamuri A. *Dement. Geriatr. Cogn. Disord.* 2021; ePub(ePub): ePub.

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Abstract

INTRODUCTION: A growing trend in medicine is older adults and increased need for geriatric services. Falls contribute heavily to hospitalizations and worsening of overall health in this frail demographic. There are numerous biological and physical culprits which, if targeted, can prevent falls. The objective was to review benefits of different types of exercises for fall prevention for older persons who are community-dwelling or living in long-term care facilities.

METHODS: A systematic review was conducted to determine the different types of exercises for fall prevention. Data extraction via a standardized protocol was performed to assess study design, outcomes, limitations, and author's conclusions. Corroborative themes were identified and the authors responsible for the contributing research were cited as they came up. Nineteen randomized controlled trials were identified, between 1990 and 2018, using MEDLINE, PubMed, Cochrane, CINAHL, and Web of Science databases. Studies involving adults greater than age 60 in high-risk community or nursing home populations in the English language with a duration longer than or equal to 6 weeks with focuses on either low-risk balance, strength, or combination of both and whole-body vibration.

RESULTS: Balance exercise training increased balance at 6 and 12-month intervals involving balance, strength, and cognitive training.

DISCUSSION: Insignificant results were seen in whole-body vibration and differing results existed for Tai Chi. It is important to recognize that although exercises help reduce the risk of falling and play a significant role in improving mobility safely, there will always be a risk of falls.

Language: en

Keywords

Prevention; Physical activity; Risk assessment; Exercise; Rehabilitation; Geriatrics

Occupational therapy and the IMPACT Act: part 1. a systematic review of evidence for fall prevention and reduction, community discharge and reintegration, and readmission prevention interventions

Lucas Molitor W, Feldhacker DR, Lohman H, Lampe AM, Jensen L. Am. J. Occup. Ther. 2022; 76(1): e49044.

(Copyright © 2022, American Occupational Therapy Association)

DOI 10.5014/ajot.2022.049044 PMID 34967846

Abstract

IMPORTANCE: Interventions that prevent falls, facilitate discharge after hospitalization, and reduce hospital readmissions assist occupational therapy practitioners in demonstrating professional value, improving quality, and reducing costs.

OBJECTIVE: In this systematic review, we address three outcome areas of the Improving Medicare Post-Acute Care Transformation (IMPACT) Act of 2014: prevention and reduction of falls, facilitation of community discharge and reintegration, and prevention of hospital readmission. **DATA SOURCES:** We conducted a search of the literature published between 2009 and 2019. **Study Selection and Data Collection:** We developed operational definitions to help us identify articles that answered the search question for each outcome area. This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

FINDINGS: We found 53 articles that address the three outcome areas. Regarding the prevention and reduction of falls, low strength of evidence is available for interventions focusing on a single fall risk and for customized interventions addressing multiple risks. Moderate strength of evidence supports structured community fall risk prevention interventions. Low strength of evidence was found for community discharge and reintegration interventions that include physical activity and educational programming. Low to moderate strength of evidence was found for readmission prevention interventions for patients with four types of condition.

CONCLUSION and Relevance: Several intervention themes in the three outcome areas of interest are supported by few studies or by studies with a moderate risk of bias. Additional research is needed that supports the value of occupational therapy interventions in these outcome areas. **What This Article Adds:** Our study provides important insights into the state of the evidence related to occupational therapy interventions to address three outcome areas of the IMPACT Act.

Language: en

The effect of group-based Otago exercise program on fear of falling and physical function among older adults living in nursing homes: a pilot trial

Zou Z, Chen Z, Ni Z, Hou Y, Zhang Q. *Geriatr. Nurs.* 2021; 43: 288-292.

(Copyright © 2021, Elsevier Publishing)

DOI 10.1016/j.gerinurse.2021.12.011 PMID 34974397

Abstract

This pilot trial explored the feasibility of group-based Otago exercise program (OEP) and its impact on fear of falling (FOF) and physical function among Chinese older adults living in nursing homes. The intervention group received group-based OEP for 12 weeks, while the control group received routine care. The modified Survey of Activities and Fear of Falling in the Elderly (mSAFFE), timed Up and Go test (TUG), four-stage Balance test (FSBT), and 30 seconds sit-to-stand test (30s-SST) were used. After twelve weeks, we found that the intervention group had better outcomes than the control group in mSAFFE, TUG, FSBT and 30s-SST ($p < 0.05$). Also, we compared the pretest-posttest results within the two groups, respectively. We found that, within the intervention group, the outcomes of mSAFFE, TUG, FSBT, and 30s-SST become significantly better after twelve weeks, but within the control group, the outcomes of TUG, FSBT, and 30s-SST become significantly worse. Our findings demonstrated that a group-based OEP was feasible and acceptability among Chinese older adults living in nursing homes and the group-based OEP could improve FOF and physical function among those older adults.

Language: en

Keywords

Mobility; Balance; Older adults; Fear of falling; Lower limb muscle strength; Nursing home; Otago exercise program

Abnormal gait movements prior to a near fall in individuals after stroke

Osada Y, Motojima N, Kobayashi Y, Yamamoto S. Arch. Rehabil. Res. Clin. Transl. 2021; 3(4): e100156.

(Copyright © 2021, Elsevier Publishing)

DOI 10.1016/j.arrct.2021.100156 **PMID** 34977538

Abstract

OBJECTIVE: To investigate the abnormal kinematic and kinetic movements in the last gait cycle before a near fall in individuals poststroke, where a near fall is defined as a physical therapist feeling the need to stabilize a patient.

DESIGN: Retrospective study. **SETTING:** A rehabilitation center. **PARTICIPANTS:** Twenty-five adults (22 men, 3 women; N=25) with an average age of 66.3 years and mean duration from stroke of 4 months who required manual assistance for a sudden imbalance during routine 3-dimensional motion analysis. **INTERVENTIONS:** Not applicable. **MAIN OUTCOME MEASURES:** We compared the averaged usual gait cycle and the last cycle before the near-falling gait cycle (pre-near-falling gait cycle). We obtained the following spatiotemporal parameters: gait velocity, gait cycle duration, mediolateral center of mass displacement, step length, step width, joint moments, and angular displacement of the trunk in a cycle. Peak values of joint moments and trunk angle displacement were calculated.

RESULTS: Etiology for near falls included toe trip, mediolateral perturbation, and knee collapse. We found the following significant differences in the pre-near-falling gait cycle compared with the usual gait cycle: decreased gait velocity, prolonged total cycle time, and excessive mediolateral center of mass displacement.

CONCLUSIONS: Decreased gait velocity, prolonged cycle time, and excessive mediolateral center of mass displacement may be a sign of an impending fall in people with impaired gait after stroke.

Language: en

Keywords

Rehabilitation; Stroke; Postural balance; 3D, 3-dimensional; Accidental falls; COM, center of mass; Gait analysis

Falls among people with bilateral vestibulopathy: a review of causes, incidence, injuries, and methods

Herssens N, How D, van de Berg R, McCrum C. JAMA Otolaryngol. Head Neck Surg. 2022; ePub(ePub): ePub.

(Copyright © 2022, American Medical Association)

DOI 10.1001/jamaoto.2021.3673 PMID 34989780

Abstract

IMPORTANCE: People with bilateral vestibulopathy experience severe balance and mobility issues. Fear and anxiety are associated with reduced activity, which can further affect balance and fall risk. Understanding and intervening on falls in this population is essential. The aims of this narrative review are to provide an overview of the current knowledge and applied methods on fall incidence, causes, and injuries in bilateral vestibulopathy.

OBSERVATIONS: Eleven articles reporting falls incidence in people with bilateral vestibulopathy were deemed eligible, including 3 prospective and 8 retrospective studies, with a total of 359 participants, of whom 149 (42%) fell during the assessed period. When reported, the most common perceived causes of falls were loss of balance, darkness, and uneven ground. Information on sustained injuries was limited, with bruises and scrapes being the most common, and only 4 fractures were reported. As most studies included falls as a secondary, descriptive outcome measure, fall data obtained using best practice guidelines were lacking. Only 6 studies reported their definition of a fall, of which 2 studies explicitly reported the way participants were asked about their fall status. Only 3 studies performed a prospective daily fall assessment using monthly fall diaries (a recommended practice), whereas the remaining studies retrospectively collected fall-related data through questionnaires or interviews. While most studies reported the number of people who did and did not fall, the number of total falls in individual studies was lacking.

CONCLUSIONS AND RELEVANCE: The findings from this review suggest that falls in people with bilateral vestibulopathy are common but remain an understudied consequence of the disease. Larger prospective studies that follow best practice guidelines for fall data collection with the aim of obtaining and reporting fall data are required to improve current fall risk assessments and interventions in bilateral vestibulopathy.

Language: en

Quantifying the risk of falls and injuries for amputees beyond annual fall rates-a longitudinal cohort analysis based on person-step exposure over time

Chihuri ST, Youdan GAJ, Wong CK. *Prev. Med. Rep.* 2021; 24: e101626.

(Copyright © 2021, Elsevier Publishing)

DOI 10.1016/j.pmedr.2021.101626 PMID 34976679

Abstract

People with lower-limb loss (PLL) have high annual fall and injury rates. People with transtibial amputations have better walking function than those with transfemoral amputations but paradoxically incur more fall-related injuries. Risk exposure, however, has not been previously considered. This study examined whether all-cause fall and injury incidence per person-step exposure over time varied in PLL of different walking abilities. The prospective cohort design, conducted at a major medical center, included five assessments 1-month apart. Walking ability level was categorized by Houghton Scale scores: ≥ 9 indicating community walking and ≤ 8 indicating limited community-household walking. Accelerometer-measured daily step counts were collected via StepWatch4 monitors. The main outcome measures, self-reported all-cause falls and injuries were assessed using the standard National Health Injury Survey. Generalized estimating equations, using Poisson distributions and log of step count as an offset, determined fall and injury incidence rate ratio [IRR] according to walking ability level. Ten people, aged 33-63 years with amputations of different causes and levels, were assessed monthly over five months. The community walking group ($n = 6$) had six falls and seven injuries; the limited community walking group ($n = 4$) had four falls and three injuries. For PLL, limited community walking ability was associated with higher incidence of falls (IRR = 6.10, 95%CI = 1.12-33.33, $p = 0.037$) and injuries (IRR = 8.56, 95%CI = 1.73-42.40, $p = 0.009$) when accounting for person-steps. Considering per person-step exposure over time added precision to fall and injury risk assessment that clarified the risks: PLL with limited community walking ability have higher fall and injury risks.

Language: en

Keywords

Injuries; Physical activity; Falls; Amputation; CI, Confidence Intervals; Daily steps; GEEs, Generalized Estimating Equations; IRR, Incidence Rate Ratios; PLL, People with Lower-limb Loss; Prostheses; TFA, Transfemoral Amputation; TTA, Transtibial Amputations

Recalled number of falls in the past year-combined with perceived mobility-predicts the incidence of future falls in unilateral lower limb prosthesis users

Tobaigy M, Hafner BJ, Sawers A. Phys. Ther. 2021; ePub(ePub): ePub.

(Copyright © 2021, American Physical Therapy Association)

DOI 10.1093/ptj/pzab267 PMID 34971384

Abstract

OBJECTIVE: Falls are a frequent and costly concern for lower limb prosthesis (LLP) users. At present, there are no models that clinicians can use to predict the incidence of future falls in LLP users. Assessing who is at risk for falls, therefore, remains a challenge. The purpose of this study was to test whether easily accessible clinical attributes and measurements predict the incidence of future falls in LLP users.

METHODS: In this prospective observational study, a secondary analysis of data from 60 LLP users was conducted. LLP users reported the number of falls that they recalled over the past year before prospectively reporting falls over a 6-month observation period via monthly telephone calls. Additional candidate predictor variables were recorded at baseline. Negative binomial regression was used to develop a model intended to predict the incidence of future falls.

RESULTS: The final model, which included the number of recalled falls (incidence rate ratio [IRR] = 1.13; 95% CI = 1.01-1.28) and Prosthetic Limb Users Survey of Mobility (PLUS-M) T-scores (IRR = 0.949; 95% CI = 0.90-1.01), was significantly better than a null model at predicting the number of falls over the next 6 months ($\chi^2_{22} = 9.76$) and fit the observed prospective fall count data ($\chi^2_{256} = 54.78$).

CONCLUSION: The number of recalled falls and Prosthetic Limb Users Survey of Mobility T-scores predicted the incidence of falls over the next 6 months in established, unilateral LLP users. The success and simplicity of the final model suggests that it may serve as a screening tool for clinicians to use for assessing risk of falls. Additional research to validate the proposed model in an independent sample of LLP users is needed.

Language: en