

Safety Literature 15th January 2023

"It's all about the money": an interpretive description of embedding physical therapy-led falls prevention group exercise in long-term care

Binns E, Bright F, Parsons J, Peri K, Taylor L, Kerse N, Taylor D. BMC Geriatr. 2023; 23(1): e14.

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DOI 10.1186/s12877-022-03722-z **PMID** 36631743

Abstract

BACKGROUND: Falls prevention interventions are effective for community dwelling older adults however, the same cannot be said for older adults living in long-term care (LTC). The Staying UpRight (SUp) randomized controlled trial was designed to test the effectiveness of a progressive strength and balance group exercise program delivered to LTC residents. This paper explores the factors impacting LTC providers' decisions to continue the program on completion of the funded trial period.

METHODS: A qualitative study using an Interpretive Description approach. Semi-structured interviews and focus groups were conducted with 15 LTC staff involved in the randomized controlled trial. Data were analysed using conventional content analysis.

RESULTS: Practice change occurred following participation in the trial with some facilities starting exercise groups, some increasing the number of exercise groups offered and physical therapists selecting elements of the program to adopt into their practice. Decisions about continuing with SUp as designed were constrained by organizational decisions regarding funding and resources. Three factors were identified which informed decision-making: business models and philosophies, requirements for evidence, and valuing physical therapy.

CONCLUSIONS: Managers and facilitators adapted SUp by selecting and delivering components of the program in response to the changes they had observed in participating residents. However, our findings highlight that while SUp was valued, the tight financial environment created by the current funding model in New Zealand did not support funding physical therapist delivered falls prevention exercise programs in LTC. This study may provide policy makers with important information on changes needed to support falls prevention service delivery in LTC. **TRIAL REGISTRATION:** This study is a sub-study of a randomized controlled trial which was registered to the Australian New Zealand Clinical Trials Registry ACTRN12618001827224 on 09/11/2018. Universal trial number U1111-1217-7148.

Language: en

Keywords

Older adults; Qualitative research; Falls prevention; Long-term care

A perspective on using virtual reality to incorporate the affective context of everyday falls into fall prevention

Raffegau TE, Young WR, Fino PC, Williams AM. JMIR Aging 2023; 6: e36325.

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Abstract

Virtual reality (VR) is a promising and cost-effective tool that has the potential to reduce the prevalence of falls and locomotor impairments in older adults. However, we believe that existing VR-based approaches to prevent falls do not mimic the full breadth of perceptual, cognitive, and motor demands that older adults encounter in daily life. Researchers have not yet fully leveraged VR to address affective factors related to fall risk, and how stressors such as anxiety influence older adult balance and real-world falls. In this perspective paper, we propose developing VR-based tools that replicate the affective demands of real-world falls (eg, crossing the street) to enhance fall prevention diagnostics and interventions by capturing the underlying processes that influence everyday mobility. An effort to replicate realistic scenarios that precipitate falls in VR environments will inform evidence-based diagnostics and individualize interventions in a way that could reduce falls in older adults in daily life.

Language: en

Keywords

aging; anxiety; balance; locomotion; cognition; exergame; perturbation

A validity study to consult on a protocol of a home hazard management program for falls prevention among community dwelling stroke survivors

Ahmad Ainuddin H, Romli MH, S F Salim M, Hamid TA, Mackenzie L. PLoS One 2023; 18(1): e0279657.

(Copyright © 2023, Public Library of Science)

DOI 10.1371/journal.pone.0279657 **PMID** 36630460

Abstract

OBJECTIVE: A fall after a stroke is common but the consequences can be devastating not only for the stroke survivors, but also for caregivers, healthcare, and the society. However, research on falls prevention among the stroke population are limited, particularly on home hazards assessment and home modifications, demanding for a study to be conducted. The aim of the study is to validate the protocol and content of a home hazard management program guided by the Person-Environment-Occupation (PEO) Model for falls prevention among community dwelling stroke survivors.

METHOD: Researchers developed their own questionnaire for content validation which consist of 23 items that covers two domains, namely justification for telehealth home hazard management practice and the protocol's overall methodology. Occupational therapists with at least one year of experience in conducting a home hazard assessment were consulted for the content validation of a two-group clinical controlled trial protocol utilizing a home hazard assessment, home modifications and education over the usual care. Written consent was obtained prior to the study. The occupational therapists were given a Google Form link to review the protocol and intervention based on the questionnaire and rated each item using a four-point Likert scale for relevance and feasibility. Open-ended feedback was also recorded on the google form. Content Validity Index (CVI), Modified Kappa Index and Cronbach's Alpha was calculated for the content validity and reliability analysis.

RESULTS: A total of sixteen occupational therapists participated in the study. 43.7% of participants had a master's degree, 93.7% worked in the government sector and 56.2% had six years and more experience on conducting home hazard assessments. Content validity of the protocol is satisfactory for relevancy and feasibility (CVI = 0.84, ranging from 0.5 to 1.00), and for the reliability ($\alpha = 0.94$ (relevance) and $\alpha = 0.97$ (feasibility)), respectively. The Modified Kappa ranged from 0.38 to 1.00 for all items. Feedback was also received regarding the design and procedure of the study protocol which included participant's selection criteria, sample size, equipment provided, cost, location, and care for the participants during the intervention.

CONCLUSIONS: Introducing a home hazard management program to prevent falls among the stroke population is viewed relevant and feasible. Practical suggestions from the consultation panel were adopted, and minor adjustments were required to strengthen the protocol's overall methodology. This study established a rigorous and robust experimental protocol for future undertaking.

Language: en

Are falls a manifestation of brain failure? Revisited 40 years later [editorial]

Montero-Odasso M. Age Ageing 2023; 52(1): afac321.

(Copyright © 2023, Oxford University Press)

DOI 10.1093/ageing/afac321 **PMID** 36626324

Abstract

More than four decades ago, Professor Bernard Isaacs postulated in this journal that to attribute falls in older individuals only to muscular-articular and sensory impairments and their effect on gait and balance was overly simplistic [1]. Rather, a failure of our sophisticated system of brain motor control plays a capital role in triggering falls [2].

Since his seminal article, clinical and research evidence have established that brain motor control of gait arises from specific cortical and subcortical brain areas and networks that share complex cognitive functions, such as executive function (Figure 1). Due to their particular watershed vascularisation (border-zone regions in the brain supplied by the major cerebral arteries where blood supply is decreased), these shared brain networks are highly susceptible to microvascular ischemia and the effects of hypertension that, when damaged, may lead to both gait impairments and falls and to severe cognitive decline [3]. Thus, white matter hyperintensities (WMH) may impair gait performance directly, by disrupting motor-related networks, or indirectly, by disrupting networks responsible for executive function that is fundamental for high-attentional motor control of gait.

Key Points

Editorial to accompany: Gait and falls in cerebral small vessel disease: a systematic review and meta-analysis [5].

Vascular brain burden, evaluated as white matter hyperintensities (WMH), is associated with gait disorders and falls in older adults.

Intensive hypertension management can reverse WMH, opening an opportunity for preventing 'brain failure' in older adults.

Gait disorders and falls in older adults may be prevented by treating covert cerebrovascular disease and hypertension.

Language: en

Keywords

older adults; falls; gait; cerebral small vessel disease; neuroimaging

Association between mild cognitive impairment and falls among Chinese older adults: the mediating roles of balance capacity and depressive symptoms

Liang H, Yue Z, Liu Y, Yan Z, Wang B, Xiang N, Liu E. *Inj. Prev.* 2022; ePub(ePub): ePub.

(Copyright © 2022, BMJ Publishing Group)

DOI 10.1136/ip-2022-044743 **PMID** 36600524

Abstract

BACKGROUND: This study aimed to examine the association between mild cognitive impairment (MCI) and the follow-up risk of falls among Chinese older adults, exploring the mediating roles of balance capacity and depressive symptoms in the association between MCI and falls.

METHODS: A total of 5482 adults aged 60 years and above from waves 2015 and 2018 of the China Health and Retirement Longitudinal Study were included for analysis. Cognition was assessed by a global cognition score, which included three tests: episodic memory, figure drawing and Telephone Interview of Cognitive Status. Depressive symptoms were assessed with the Centre for Epidemiological Studies Depression Scale. Logistic regression models were used to estimate the association between MCI and falls. Mediation analysis was employed to explore the potential mediating roles of balance capacity and depressive symptoms in the association between MCI and falls.

RESULTS: MCI was significantly associated with the risk of falls (OR 1.259, 95% CI 1.080 to 1.467). Balance capacity and depressive symptoms played parallel mediating roles in the association between MCI and falls, and the mediating effects were 0.004 (95% CI 0.003 to 0.024) and 0.010 (95% CI 0.004 to 0.016), respectively.

CONCLUSIONS: It is necessary to screen for and recognise MCI in order to prevent falls among older adults. More efforts should be made to improve balance capacity and relieve depressive symptoms to reduce the risk of falls among older adults with MCI.

Language: en

Keywords

Longitudinal; Disability; Fall; Behavior Change; Hip Fracture; Older People

Cost-effectiveness of exercise versus multimodal interventions that include exercise to prevent falls among community-dwelling older adults: a systematic review and meta-analysis

Adjetei C, Karnon B, Falck RS, Balasubramaniam H, Buschert K, Davis JC. *Maturitas* 2023; 169: 16-31.

(Copyright © 2023, Elsevier Publishing)

DOI 10.1016/j.maturitas.2022.12.003 **PMID** 36630860

Abstract

OBJECTIVE: To compare the cost-effectiveness of exercise as a unimodal intervention versus multimodal interventions that included exercise in conjunction with other falls prevention strategies to prevent falls among community-dwelling older adults.

DESIGN: Systematic review and meta-analysis. **DATA SOURCES:** MEDLINE, EMBASE, NHS EED, and CINAHL (1 January 1946 to June 2022). **ELIGIBILITY CRITERIA:** Economic evaluations of fall prevention strategies that included exercise delivered as a unimodal intervention or a multimodal intervention that included exercise in conjunction with other falls prevention strategies among community-dwelling adults aged 60 years and over.

RESULTS: Eighteen studies were included in this review: 9 unimodal, 6 multimodal, and 3 that included exercise delivered as both a unimodal and a multimodal intervention. In the cost-effectiveness analyses, 61.5 % ($n = 8/13$) of exercise-only unimodal interventions demonstrated cost-effectiveness, compared with 33.3 % ($n = 2/6$) of multimodal interventions. In the cost-utility analyses, 60 % ($n = 6/10$) of unimodal interventions compared with zero multimodal interventions ($n = 0/4$) demonstrated cost-effectiveness. Sixteen studies (25,017 participants) were included in our meta-analysis. Incremental costs were \$128 [-\$661, \$1644] (2021 US dollars) for exercise-only unimodal interventions and \$786 [-\$72, \$1644] for multimodal interventions. Estimated incremental quality-adjusted life-years was 0.09 [-0.37, 0.55] for exercise-only unimodal interventions and 0.00 [-0.04, 0.04] for multimodal interventions. Both exercise-only and multimodal interventions had an estimated 28 % reduction in falls versus the control, with incidence rate ratios for exercise-only unimodal interventions of 0.72 [0.62, 0.83] and for multimodal interventions of 0.72 [0.25, 2.09].

CONCLUSION: Exercise delivered as a unimodal intervention, particularly resistance training, provided the best value for money for fall prevention. Multimodal interventions that included exercise did not demonstrate additional benefits in terms of costs, quality of life, or fall prevention compared with exercise-only unimodal interventions. This finding may be due to the smaller number of multimodal interventions available. **REVIEW REGISTRATION:** PROSPERO CRD42022295561. **REGISTRATION TITLE:** Comparing the cost-effectiveness of multimodal versus unimodal interventions that include exercise to prevent falls among community-dwelling older adults: A systematic review.

Language: en

Keywords Falls; Systematic review; Exercise; Older adults; Multimodal; Cost-effectiveness; Unimodal

Deep neural network for the detections of fall and physical activities using foot pressures and inertial sensing

Chan HL, Ouyang Y, Chen RS, Lai YH, Kuo CC, Liao GS, Hsu WY, Chang YJ. *Sensors* (Basel) 2023; 23(1): e495.

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DOI 10.3390/s23010495 **PMID** 36617087

Abstract

Fall detection and physical activity (PA) classification are important health maintenance issues for the elderly and people with mobility dysfunctions. The literature review showed that most studies concerning fall detection and PA classification addressed these issues individually, and many were based on inertial sensing from the trunk and upper extremities. While shoes are common footwear in daily off-bed activities, most of the aforementioned studies did not focus much on shoe-based measurements. In this paper, we propose a novel footwear approach to detect falls and classify various types of PAs based on a convolutional neural network and recurrent neural network hybrid. The footwear-based detections using deep-learning technology were demonstrated to be efficient based on the data collected from 32 participants, each performing simulated falls and various types of PAs: fall detection with inertial measures had a higher F1-score than detection using foot pressures; the detections of dynamic PAs (jump, jog, walks) had higher F1-scores while using inertial measures, whereas the detections of static PAs (sit, stand) had higher F1-scores while using foot pressures; the combination of foot pressures and inertial measures was most efficient in detecting fall, static, and dynamic PAs.

Language: en

Keywords

physical activity; deep learning; deep neural network; fall; foot pressures; inertial sensing

Development and pilot testing of a booklet concerning medications that can increase the risk of falls in older people

Shaari MS, Wahab MSA, Abdul Halim Zaki I, Alias R, Zulkifli MH, Ali AA, Zulkifli NW, Ismail FF, Hasan MH, Meilina R, Ming LC, Tan CS. *Int. J. Environ. Res. Public Health* 2022; 20(1): e404.

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DOI 10.3390/ijerph20010404 **PMID** 36612725

Abstract

BACKGROUND: A common contributory factor to falls is the use of medicines, especially those commonly known as "fall-risk increasing drugs" (FRIDs). The use of FRIDs is common among older people (OP). However, OP and their family caregivers (FCGs) are largely unaware of FRIDs and their risks in increasing the risk of falls (ROF).

METHODS: A booklet which aims to provide information on topics related to FRIDs was developed. The booklet was reviewed by a panel of 14 reviewers, and the content validity index (CVI) for each subsection of the booklet was computed. Pilot testing of the booklet utilized a pre-post intervention study design and included 50 OP and 50 FCGs as study participants. Perceived knowledge of the participants was assessed prior to and after completing the booklet. Participants' opinions on the usefulness and usability of the booklet were also obtained.

RESULTS: The booklet contained eight sections and each subsection of the booklet had a CVI ranging from 0.93 to 1.00. Completing the booklet resulted in improved perceived knowledge scores for each perceived knowledge item among both the OP and FCG groups (all items: p -value < 0.001). The participants perceived the booklet as useful and usable, as evidenced by almost all the perceived usefulness and usability items having a score of over 4.0.

CONCLUSIONS: The FRIDs booklet developed in this study had good content validity and was widely accepted by the OP and FCGs. The positive effect on the participants' knowledge of topics related to FRIDs means that the booklet could be useful as a patient education tool to enhance FRIDs knowledge and awareness among OP and FCGs.

Language: en

Keywords

falls; older people; fall-risk increasing drugs; family caregivers; medication use

Effectiveness of Nintendo Wii on balance in people with Parkinson's disease: a systematic review

Shahhar AZM, Qasheesh M, Shaphe MA. J. Lifestyle Med. 2022; 12(3): 105-112.

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DOI 10.15280/jlm.2022.12.3.105 **PMID** 36628175

Abstract

The use of exergaming exercises is increasingly becoming accepted as an alternative to surgical and medical therapies for Parkinson's disease (PD). Although the area has attracted some results, there is still no conclusive evidence on the benefit of exergaming exercises in improving PD patients' body balance. The current study is a systematic review aiming at examining the effectiveness of the Nintendo Wii Fit ("Wii Fit") game on improving the balance in people with Parkinson's disease. A total of 200 articles were selected online after conducting an extensive search on PubMed, Cochrane, PEDro, CAPES Periodic, ResearchGate, Web of Science, and ProQuest. Upon reviewing the identified sources, ten articles were included, of which four were randomized control trials. The results show that at least five weeks of Wii Fit exercises effectively enhance PD patients' body balance and life outcomes. However, better results occur when patients combine Wii Fit with other conventional exercises.

Language: en

Keywords

Rehabilitation; Parkinson's disease; Physical therapy; Exergaming; Nintendo Wii Fit; Video games

Effects of home-based exercise programs on mobility, muscle strength, balance, and gait in community-dwelling older adults: a systematic review and meta-analysis

Costa SN, Ferreira LHB, Bento PCB. J. Aging Phys. Act. 2023; ePub(ePub): ePub.

(Copyright © 2023, Human Kinetics Publishers)

DOI 10.1123/japa.2022-0221 PMID 36623512

Abstract

OBJECTIVE: Individual unsupervised home-based exercise programs can enhance muscle strength, physical function, gait, and balance in older adults. However, the effectiveness of such programs may be limited by the lack of supervision. This study aims to verify the effectiveness of individual unsupervised home-based programs, compare the effects of individual unsupervised home-based to supervised programs, and verify the influence of supervision over individual unsupervised home-based programs on the physical function of older adults.

METHODS: A systematic literature search was performed in four electronic databases, and the trials involved randomized controlled comparing the home-based programs to supervised, control groups, or home-based + supervised evaluating the muscle strength, physical function, gait, and balance in older adults.

RESULTS: Eleven studies met the inclusion criteria. The meta-analysis revealed no differences between home-based program versus supervised program in gait, mobility, and balance, revealing a trend of significance to supervised program on strength (standardized mean difference [SMD] = 0.27, $p = .05$). The analysis revealed effects in mobility (SMD = 0.40, $p = .003$), balance (SMD = 0.58, $p = .0002$), and muscle strength (SMD = 0.36, $p = .02$) favoring home-based program versus control group. Significant effects between home-based program versus home-based + supervised program were observed in balance (SMD = 0.74, $p = .002$) and muscle strength (SMD = 0.58, $p = .01$) in favor of home-based + supervised program.

CONCLUSION: Home-based programs effectively improve older adults' physical function compared with control groups. However, supervised programs were more effective for muscle strength.

Language: en

Keywords

function; supervised exercise; unsupervised exercise

Effects of single-task, dual-task and analogy training during gait rehabilitation of older adults at risk of falling: a randomized controlled trial

Mak TCT, Capio CM, Wong TWL. *Int. J. Environ. Res. Public Health* 2022; 20(1): e315.

(Copyright © 2022, MDPI: Multidisciplinary Digital Publishing Institute)

DOI 10.3390/ijerph20010315 **PMID** 36612638

Abstract

It has been suggested that implicit motor learning via dual-task or analogy training during gait rehabilitation may yield better outcomes in older adults by reducing the propensity for the conscious processing of movements (movement-specific reinvestment). The current study investigated the immediate effects of single-task, dual-task, and analogy training on reinvestment propensity and fall-related rehabilitation outcomes among older adults at risk of falling. Seventy-one older adults were randomly allocated to the single-task (ST), dual-task (DT), or analogy (AG) training conditions and received 12 training sessions. We assessed the reinvestment propensity, functional gait and balance, functional mobility, balance ability, single-task and dual-task walking abilities, and fear of falling at baseline (before training) and immediately after training. Our findings revealed a lack of training effect on reinvestment propensity for all groups. However, all groups displayed significant improvements in functional gait and balance ($p < 0.001$), functional mobility ($p = 0.02$), and balance ability ($p = 0.01$) after training. AG appeared to be superior to DT and ST, as it was the only condition that resulted in significant improvements in both single-task and dual-task walking abilities ($p < 0.001$). Implementing movement analogies could be a feasible and useful gait rehabilitation strategy for fall prevention and wellbeing promotion among older adults.

Language: en

Keywords

older adults; analogy; dual-task; physical wellbeing; single-task

Elasticity of leg muscles and incidence of falls in older adults: a prospective cohort analysis

Cavusoglu C, Sendur HN, Cerit MN, Candemir B, Ileri I, Borazan FY, Dogrul RT, Göker B. Eur. Geriatr. Med. 2023; ePub(ePub): ePub.

(Copyright © 2023, Elsevier Publishing)

DOI 10.1007/s41999-022-00738-x PMID 36607520

Abstract

PURPOSE: Aging impacts muscle strength and elasticity, which in turn influence dynamic balance, walking speed, and physical performance. We aimed to evaluate the relationship between the elasticity of leg muscles and incidence of falls in older adults.

METHODS: We conducted a prospective cohort analysis with outpatients from a geriatric clinic. Any history of falls in the past year was recorded. Timed up and go test, muscle thickness, and handgrip strength tests were performed. Elasticities of the gastrocnemius medialis (GM) and rectus femoris (RF) muscles were evaluated using shear wave elastography. Patients self-recorded their falls, and additional phone calls were made to them each month for 6 months.

RESULTS: The median age of the patients ($n = 55$) was 72 years (66-86); and 72% were women. The GM showed significantly lower elasticity in patients with history of falls in the past year than in those without it (8.08 kPa [3.90-16.17] vs. 9.70 kPa [4.99-20.95]; $p = 0.028$). A similar negative correlation between GM and fall incidence was noted among those with additional falls during the follow-up period (6.96 kPa [3.90-12.41] vs. 9.13 kPa [4.99-20.95]; $p = 0.019$). GM elasticity was significantly correlated with the timed up and go test score ($r = -0.612$, $p < 0.001$), handgrip strength ($r = 0.384$, $p = 0.015$), and muscle thickness ($r = 0.232$, $p = 0.049$). No such associations were observed for the RF muscles.

CONCLUSION: GM muscle elasticity is associated with alterations in muscle structure that may lead to falls in older adults. Therefore, muscle elasticity may be a fall predictor in older adults.

Language: en

Keywords

Fall prediction; Gastrocnemius medialis; Muscle elasticity; Rectus femoris

Fall detection algorithm based on inertial sensor and hierarchical decision

Zheng L, Zhao J, Dong F, Huang Z, Zhong D. *Sensors (Basel)* 2022; 23(1): e107.

(Copyright © 2022, MDPI: Multidisciplinary Digital Publishing Institute)

DOI 10.3390/s23010107 PMID 36616703

Abstract

With the aging of the human body and the reduction in its physiological capacities, falls have become a huge threat to individuals' physical and mental health, leading to serious bodily damage to the elderly and financial pressure on their families. As a result, it is vital to design a fall detection algorithm that monitors the state of human activity. This work designs a human fall detection algorithm based on hierarchical decision making. First, this work proposes a dimensionality reduction approach based on feature importance analysis (FIA), which optimizes the feature space via feature importance. This procedure reduces the dimension of features greatly and reduces the time spent by the model in the training phase. Second, this work proposes a hierarchical decision-making algorithm with an XGBoost model. The algorithm is divided into three levels. The first level uses the threshold approach to make a preliminary assessment of the data and only transfers the fall type data to the next level. The second level is an XGBoost-based classification algorithm to analyze again the type of data which remained from the first level. The third level employs a comparison method to determine the direction of the falling. Finally, the fall detection algorithm proposed in this paper has an accuracy of 98.19%, a sensitivity of 97.50%, and a specificity of 98.63%. The classification accuracy of the fall direction reaches 93.44%, and the algorithm can efficiently determine the fall direction.

Language: en

Keywords

XGBoost; fall detection; feature dimensionality reduction

Feasibility of combining disease-specific and balance-related measures as risk predictors of future falls in patients with Parkinson's disease

Tsai CL, Lai YR, Lien CY, Huang CC, Chiu WC, Chen YS, Yu CC, Cheng BC, Chiang YF, Chang HW, Lu CH. *J. Clin. Med.* 2022; 12(1): e127.

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DOI 10.3390/jcm12010127 PMID 36614927

Abstract

Evidence supports the view that postural sway in a quiet stance increases with clinical disease severity and dopaminergic therapy in idiopathic Parkinson's disease (PD), which, in turn, increases the risk of falling. This study evaluated the feasibility of combining disease-specific and balance-related measures as risk predictors for future falls in patients with PD. The patients with PD underwent postural sway measurements (area, length, and velocity traveled by the excursion of the center of pressure) and clinical functional scores (Parkinson's Disease Rating Scale [UPDRS] and Tinetti balance and gait score assessment) in both the on- and off-states of dopaminergic therapy. The outcome was defined as the development of a new fall. The sway area, velocity, and length increased after the medication administration. The Cox proportional hazards model showed that only previous fall history, Tinetti balance and gait score (on-state), and levodopa equivalent daily dose (LEDD) were associated with the development of future falls. The cumulative risk of fall development showed that the sway length and velocity were associated with future falls after more than six months. The combined LEDD, Tinetti balance and gait score (on-state), and velocity and length of postural sway (on-state) had the highest diagnostic accuracy (area under the curve = 0.9, $p < 0.0001$). Dopaminergic therapy can improve clinical functional scores but worsen balance-related measures. Increased sway length and velocity during the medication state are hallmarks of future falls, particularly in advanced PD. Combining disease-specific and balance-related measures can serve as an auxiliary diagnosis as risk predictors for future falls.

Language: en

Keywords

Parkinson's disease; center of pressure; future falls; levodopa equivalent daily dose; postural sway; Tinetti balance and gait score

Impact of a public open-access community-based physical activity and fall prevention program on physical performance in older adults

Sanchez M, Vidal JS, Bichon A, Mairesse C, Flouquet C, Hanon O, Raynaud-Simon A. Eur. J. Public Health 2023; ePub(ePub): ePub.

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DOI 10.1093/eurpub/ckac186 **PMID** 36594685

Abstract

BACKGROUND: In older adults, physical activity (PA) is important in maintaining physical performance. Data on the effectiveness of public open-access community-based programs on physical performance and fall prevention are scarce.

METHODS: Prospective observational controlled study in community centers providing an open-access public prevention program. Retirees aged ≥ 60 years who chose to participate in weekly PA workshops for 3 months were compared to those who chose the cognitive stimulation (CS) workshops. Collected data: handgrip strength, five times sit-to-stand, single-leg stance, Timed Up and Go tests, gait speed, short physical performance battery (SPPB) and frailty status at baseline (M0) and at 3 months (M3). The proportion of participants reporting a history of falls was assessed at baseline and using follow-up telephone interviews (F-Up).

RESULTS: Two hundred eighty-eight participants (age 73.8 years, 87% women) were included. The sit-to-stand test, single-leg stance and SPPB scores improved significantly between M0 and M3 in both groups. A greater SPPB increase was observed in the PA than in the CS group (+0.39 vs. +0.32 points, $P = 0.02$) after adjustment for age, sex, number of sessions attended, fall history and SPPB at baseline. During F-Up (median 22 months), the proportion of participants reporting at least one fall decreased from 55% to 31% ($P = 0.01$) in the PA group and from 27% to 19% ($P = 0.12$) in the CS group.

CONCLUSION: In a public open-access community-based program participants improved physical performance and reduced fall incidence when participating in the PA or the CS workshops. Older adults may benefit most from multifaceted prevention programs.

Language: en

Is fear of falling key to identifying gait and balance abnormalities in community-dwelling older adults? Protocol of a mixed-methods approach

McColl L, McMeekin P, Poole M, Parry SW. BMJ Open 2022; 12(12): e067040.

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DOI 10.1136/bmjopen-2022-067040 **PMID** 36600387

Abstract

INTRODUCTION: The ageing population poses an increasing burden to public health systems, particularly as a result of falls. Falls have been associated with poor gait and balance, as measured by commonly used clinical tests for poor gait and balance. Falls in older adults have the potential to lead to long-term issues with mobility and a fear of falling (FoF). FoF is measured by a variety of instruments; the Falls Efficacy Scale International (FES-I) version is widely used within clinical and research arenas. The ability of the FoF, as measured by the FES-I to predict gait and balance abnormalities (GABAb) has not previously been measured; this study aims to be the first to investigate this prospective relationship.

METHODS AND ANALYSES: To investigate the ability of the FES-I to predict GABAb a mixed-methods approach will be used, including quantitative, qualitative and health economics approaches. Initially the ability of the FES-I to identify poor gait and balance will be investigated, along with whether the measure is able to assess change in gait and balance in response to exercise training. The ability of an online FES-I tool to assess poor gait and balance in an alternative pre-existing online strength and balance programme will also be investigated. Interviews will be carried out to investigate participant experiences and motivations of those that are offered Age UK Strength and Balance Training, along with the views of healthcare professionals and Age UK staff involved within the process.

ETHICS AND DISSEMINATION: NHS REC Approval has been granted (IRAS ID 314705). Study participation is voluntary; participants will be provided with all necessary information within the participant information sheet, with written consent being sought. Study findings will be disseminated through manuscripts in peer-reviewed journals, at scientific conferences and in a short report to participants and the funding body.

Language: en

Keywords

PUBLIC HEALTH; GERIATRIC MEDICINE; HEALTH ECONOMICS

Mediation of pain in the association of sleep problems with falls among older adults in India

Muhammad T, Maurya P, Selvamani Y, Kelekar U. Sci. Rep. 2023; 13(1): e221.

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DOI 10.1038/s41598-022-27010-3 PMID 36604470

Abstract

Body pain, sleep problems and falls are commonly reported among the elderly population. This study aimed to explore the mediating role of pain in the association of sleep problems with fall-outcomes (falls, fall-injury, and multiple falls) among older adults. Cross-sectional data from the baseline survey of Longitudinal Aging Study in India (LASI), 2017-18 were used. The total sample size for the study was 28,285 older adults aged 60 years and above. Falls and fall-related injuries among older adults in the last two years were self-reported. The Jenkins Sleep Scale (JSS-4) was used to assess sleep problems while pain was assessed using questions on whether respondents reported that they were troubled by pain and they required some form of medication or treatment for the relief of pain. Multivariable logistic regression and mediation analyses were conducted to fulfill the study objectives. While 13% older adults suffered from sleep problems, 38.83% were troubled with pain. Additionally, 12.63%, 5.64% and 5.76% older adults reported falls, fall-injury and multiple falls respectively. Older adults who suffered from sleep problems had higher odds of falls [adjusted odds ratio (aOR): 1.43, confidence interval (CI): 1.30-1.58], fall-injuries, [aOR:1.50, CI:1.30-1.73] and multiple falls [aOR:1.41, CI:1.24-1.62]. Similarly, older adults who were troubled with pain were more likely to report falls [aOR:1.80, CI:1.67-1.95], fall-injuries [aOR:1.66, CI:1.48-1.87] and multiple falls [aOR:1.90, CI:1.69-2.12]. The percent of the mediated effect of pain when examining the association between sleep problems and fall outcomes were reported to be 17.10%, 13.56% and 18.78% in case of falls, fall-injuries and multiple falls respectively. The current study finds evidence that pain mediates the association of sleep problems and falls, fall-injuries, and multiple falls among older Indian adults. Both sleep problems and pain are modifiable risk factors that need attention for fall prevention strategies.

Language: en

Prevalence and determinants of falls in community-dwelling older adults in Türkiye: a population-based cross-sectional study conducted between 2014-2015

Catikkas NM, Erdogan TO, Reginster JY, Oren MM, Aydin CO, Sacar DE, Ozkok S, Kilic C, Karan MA, Bahat G. Curr. Aging Sci. 2023; ePub(ePub): ePub.

(Copyright © 2023, Bentham Science Publishers)

DOI 10.2174/1874609816666230109153424 **PMID** 36624652

Abstract

PURPOSE: Falls are a common public health problem in older adults regarding increased morbidity, mortality, and healthcare costs. Determining the factors associated with falls is of utmost importance for detecting at-risk people. We present a field study conducted to examine the prevalence of falls and the associated factors among community-dwelling older adults.

METHODS: In this population-based cross-sectional study, we included adults aged >60 years living in the Fatih District of the Istanbul Province between November 2014-May 2015, through a simple random sampling method. We noted age, sex, falls, fear of falling, number of diseases and medications, the presence of diabetes, hypertension, dyslipidemia, urinary and fecal incontinence, and chronic pain. Frailty was assessed with the FRAIL questionnaire. Functional capacity was evaluated by Katz's 6-item ADL and Lawton Brody's 8-item IADL scales. The European quality-5 dimension (EQ-5D) questionnaire was used for the quality of life assessment. The cognitive status screening was conducted with a Mini-cog test. Depressive mood was evaluated with the Geriatric Depression scale short form (GDS-SF). Malnutrition screening was conducted by the mini-nutritional assessment short form. Handgrip strength (HGS) was measured with a hand dynamometer. Body composition was assessed through a bioimpedance analysis. The 4-meter usual gait speed was recorded. The European Working Group on Sarcopenia in Older People2 (EWSGOP2) criteria was used for the sarcopenia definition. The Romberg and the postural instability tests were evaluated for balance and gait. Continuous variables were expressed as mean±standard deviation or median and interquartile range for descriptive statistics, while categorical variables were expressed as the number and percentages. The differences between groups were determined through an independent sample t-test or Mann-Whitney U test when required. Chi-square and Fisher's exact tests were applied for categorical variables. A multivariate logistic regression analysis was used to determine the independent factors associated with falls among the factors identified as significant in univariate analyses.

RESULTS: The prevalence of falls was 28.5% [mean age: 75.4±7.3 (range: 61-101 years), 53.6% female], and a significant association was identified between falls and the number of diseases and medications, diabetes, chronic pain, frailty, ADL, IADL, and EQ-5D scores, dementia, GDS-SF score and level of ambulation in univariate analyses ($p=0.001$, 0.030, 0.030, 0.010, 0.004, 0.040, 0.007, 0.003, 0.030 and 0.007, respectively). In the multivariate analysis, positive dementia (OR=3.66, 95% CI=1.40-9.53; $p=0.010$) and frailty screenings (OR =1.47, 95% CI=1.05-2.06; $p=0.020$) were identified as associates of falls.

CONCLUSION: Falls were independently associated with positive dementia and frailty screening. These results will help develop specific and tailored precautions for at-risk groups to prevent the negative outcomes of falls.

Language: en

Keywords

Prevalence; Community; Falls; Frailty; Older adults; Dementia; Population-based

Probability of new falls and factors associated with them in aged patients treated in emergency departments after falling: data from the FALL-ER registry

García-Martínez A, Gil-Rodrigo A, Placer A, Alemany X, Aguiló S, Torres-Machado V, Jacob J, Herrero P, Llorens P, Martín-Sánchez FJ, Miró. *Emergencias* 2022; 34(6): 444-451.

(Copyright © 2022, SEMES - Sociedad Española de Medicina de Urgencias y Emergencias)

DOI unavailable PMID 36625694

Abstract

OBJECTIVES: To identify characteristics associated with a new fall in a patient who received emergency department care after an accidental fall and to develop a risk model to predict repeated falls. **MATERIAL AND METHODS:** The FALL-ER registry included accidental falls in patients over the age of 65 years treated in 5 Spanish emergency departments. Independent variables analyzed were patient characteristics at baseline, fall characteristics, immediate consequences, and functional status on discharge. Patients were followed with telephone interviews for 6 months to record the occurrence of new falls. Multivariate regression analysis was used to identify variables associated with falling again and to develop a risk model. We identified 3 levels of risk for new falls (low, intermediate, and high).

RESULTS: A total of 1313 patients were studied; 147 patients (11.2%) reported having another fall. Variables associated with risk of falling again were having had a fall in the 12 months before the index fall, neurological disease, anemia, use of non-opioid analgesics, falling at home, falling at night, head injury on falling, and need for help when rising from a chair. The probability of falling again was 3.5%, 10.5%, and 23.3%, respectively, in patients at low, intermediate, and high risk. The model's ability to discriminate was moderate: the area under the receiver operating characteristic curve was 0.688 (95% CI, 0.640-0.736).

CONCLUSION: One in 9 older adults treated in an emergency department for an accidental fall will fall again within 6 months. It is possible to identify patients at higher risk for whom preventive measures should be implemented.

Language: en

Keywords

Accidental falls.; Aged.; Ancianos.; Caída.; Emergency department.; Urgencias.

Recurrent falls over three years among older adults age 70+: associations with physical and mental health status, exercise, and hospital stay

Choi NG, Marti CN, Choi BY, Kunik MM. J. Appl. Gerontol. 2023; ePub(ePub): ePub.

(Copyright © 2023, SAGE Publishing)

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Abstract

We used the 2019-2021 U.S. National Health and Aging Trend Study (N = 3,063, age 70+) and multinomial logistic regression and generalized linear models with Poisson and log link to identify correlates of (1) recurrent falls (2 + falls) over 3 years (2019-2021); and (2) any subsequent fall among those who had a fall in 2019. We also examined the associations between falls and hospitalization in 2021.

RESULTS show that those with recurrent falls had greater physical/functional and psychological health problems in 2019, while single fallers over the 3 years were not significantly different from those without a fall. Exercise was associated with a lower likelihood of a subsequent fall among those who fell in 2019. Both a single fall and recurrent falls over the 3 years were associated with a higher risk of hospitalization in 2021. Multifactorial fall preventions including exercise and depression/anxiety treatment are needed to mitigate recurrent fall risks.

Language: en

Keywords

falls; exercise; balance/coordination; depression/anxiety; recurrent falls

Responsiveness of daily life gait quality characteristics over one year in older adults who experienced a fall or engaged in balance exercise

Schootemeijer S, Weijer RHA, Hoozemans MJM, Delbaere K, Pijnappels M, van Schooten KS. *Sensors* (Basel) 2022; 23(1): e101.

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DOI 10.3390/s23010101 **PMID** 36616698

Abstract

Gait quality characteristics obtained from daily-life accelerometry are clinically relevant for fall risk in older adults but it is unknown whether these characteristics are responsive to changes in gait quality. We aimed to test whether accelerometry-based daily-life gait quality characteristics are reliable and responsive to changes over one year in older adults who experienced a fall or an exercise intervention. One-week trunk acceleration data were collected from 522 participants (65–97 years), at baseline and after one year. We calculated median values of walking speed, regularity (sample entropy), stability (logarithmic rate of divergence per stride), and a gait quality composite score, across all 10-s gait epochs derived from one-week gait episodes. Intraclass correlation coefficients (ICC) and limits of agreement (LOA) were determined for 198 participants who did not fall nor participated in an exercise intervention during follow-up. For responsiveness to change, we determined the number of participants who fell ($n = 209$) or participated in an exercise intervention ($n = 115$) that showed a change beyond the LOA. ICCs for agreement between baseline and follow-up exceeded 0.70 for all gait quality characteristics except for vertical gait stability (ICC = 0.69, 95% CI [0.62, 0.75]) and walking speed (ICC = 0.68, 95% CI [0.62, 0.74]). Only walking speed, vertical and mediolateral gait stability changed significantly in the exercisers over one year but effect sizes were below 0.2. The characteristic associated with most fallers beyond the LOA was mediolateral sample entropy (4.8% of fallers). For the exercisers, this was gait stability in three directions and the gait quality composite score (2.6% of exercisers). The gait quality characteristics obtained by median values over one week of trunk accelerometry were not responsive to presumed changes in gait quality after a fall or an exercise intervention in older people. This is likely due to large (within subjects) differences in gait behaviour that participants show in daily life.

Language: en

Keywords

aged; accidental falls; mobility; exercise; locomotion; accelerometry; activity monitoring; wearable devices

Trunk range of motion: a wearable sensor-based test protocol and indicator of fall risk in older people

Yu X, Park S, Xiong S. Appl. Ergon. 2023; 108: e103963.

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DOI 10.1016/j.apergo.2023.103963 **PMID** 36623400

Abstract

Conventionally, trunk range of motion (TROM) requires manual measurement by an external health professional with a general-purpose goniometer. This study aims to propose a convenient test protocol to assess TROM based on a single wearable sensor and to further investigate the relationship between TROM and fall risk of older people. We first explored the optimal sensor position by comparing TROMs from four representative locations (T1, T12, L5 and sternum) and optical motion capture system (golden reference). A follow-up experiment was conducted to evaluate the relationship between TROM and fall risk. The results showed that T12 achieved the minimum root mean square error ($3.8 \pm 2.2^\circ$) against the golden reference and the non-faller group had significantly higher TROMs than the faller group. These findings suggest that the newly proposed protocol is convenient yet valid and TROM can be a promising indicator of fall risk in older people.

Language: en

Keywords

Fall risk; Range of motion; Wearable sensor

An active retirement programme, a randomized controlled trial of a sensorimotor training programme for older adults: a study protocol

Cabo CA, Fernandes O, Mendoza-Muñoz M, Barrios-Fernandez S, Muñoz-Bermejo L, Gómez-Galán R, Parraca JA. Healthcare (Basel) 2022; 11(1): e86.

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DOI 10.3390/healthcare11010086 **PMID** 36611545

Abstract

Research shows that exercise training programmes lead to several improvements in older adults' health-related quality of life (HRQoL) and well-being. This study will examine the effects of an active retirement programme on Portuguese older adults, investigating its effects on body composition, physical fitness, HRQoL, and physical activity level (PAL). Therefore, a parallel-group randomised controlled trial will be conducted, including body composition (height and body weight), physical fitness (strength, flexibility, agility, postural control, and gait), HRQoL, and PAL assessments before and after the application of the programme. The programme will be carried out for six months, two days per week (45 min), plus a year of follow-up. The programme will consist of six circuits with eight physical exercises each. The circuits will change at the end of the four weeks (one monthly circuit). The exercises' difficulty will increase throughout the programme, with alternatives for all the participants. If the effectiveness of the programme is demonstrated, implementation in different services and municipalities could be advised, as the actors involved in health and social services should promote the well-being of their citizens through, among others, health-related physical activity and the prevention of diseases associated with inactivity.

Language: en

Keywords

elderly; falls; quality of life; exercise; gait; postural control

Dynapenic abdominal obesity as a risk factor for falls

Dowling L, McCloskey E, Cuthbertson DJ, Walsh JS. J. Frailty Aging 2023; 12(1): 37-42.

(Copyright © 2023, Journal of frailty and aging)

DOI 10.14283/jfa.2022.18 **PMID** 36629082

Abstract

BACKGROUND: Obesity and low muscle strength (dynapenia) are independently associated with greater falls risk. It remains unclear whether dynapenia and obesity have an additive effect on falls risk, greater than either phenotype alone.

OBJECTIVES: To determine whether a combination of abdominal obesity with dynapenia, dynapenic abdominal obesity (DAO), confers a greater risk of falls than either obesity or dynapenia alone in both men and women.

DESIGN: An observational cohort study was conducted. **SETTING AND PARTICIPANTS:** Data from English adults (n=4239, 60-87 years) who took part in the English Longitudinal Study of Ageing were included. **MEASUREMENTS:** Dynapenia, was defined as hand-grip strength <20kg (female), <30kg (male). Abdominal obesity was defined as waist circumference >88cm (female), >102cm (male). Data on falls and fall-related injuries over a 2-year follow-up were collected. Multiple logistic regression analyses were performed adjusting for age and sex, with results expressed as odds ratios (OR) and areas under the receiver operating characteristic curve (AUC).

RESULTS: Falls occurred in 1049 participants, with 284 reporting a related injury during follow-up. DAO was associated with greater OR of falls in men (OR 2.1, 95% Confidence Intervals (CI) 1.3-3.2). Dynapenia rather than obesity was associated with falls in women, with greatest OR observed in those with low hand-grip strength (OR 1.4, 95% CI 1.1-1.7). Individual discrimination was low for measures of obesity or dynapenia either alone or in combination (AUC 0.51-0.58). There was no relationship between fall-related injuries and obesity or dynapenia.

CONCLUSION: Our findings suggest a synergistic effect of obesity with dynapenia on falls risk in men but not women.

Language: en

Keywords

Humans; Female; Male; Risk Factors; ageing; falls; obesity; Longitudinal Studies; *Accidental Falls; *Obesity, Abdominal/epidemiology/complications; Dynapenia; Hand Strength/physiology; Muscle Strength/physiology; Obesity/epidemiology/complications

Exploring hospital inpatients' awareness of their falls risk: a qualitative exploratory study

Dabkowski E, Cooper SJ, Duncan JR, Missen K. *Int. J. Environ. Res. Public Health* 2022; 20(1): e454.

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DOI 10.3390/ijerph20010454 **PMID** 36612780

Abstract

Patient falls in hospital may lead to physical, psychological, social and financial impacts. Understanding patients' perceptions of their fall risk will help to direct fall prevention strategies and understand patient behaviours. The aim of this study was to explore the perceptions and experiences that influence a patient's understanding of their fall risk in regional Australian hospitals. Semi-structured, individual interviews were conducted in wards across three Australian hospitals. Participants were aged 40 years and over, able to communicate in English and were mobile prior to hospital admission. Participants were excluded from the study if they returned a Standardised Mini-Mental State Examination (SMMSE) score of less than 18 when assessed by the researcher. A total of 18 participants with an average age of 69.8 years ($SD \pm 12.7$, range 41 to 84 years) from three regional Victorian hospitals were interviewed for this study. Data were analysed using a reflexive thematic analysis identifying three major themes; (1) Environment (extrinsic) (2) Individual (intrinsic), and (3) Outcomes, as well as eight minor themes. Participants recognised the hazardous nature of a hospital and their personal responsibilities in staying safe. Falls education needs to be consistently delivered, with the focus on empowering the patient to help them adjust to changes in their clinical condition, whether temporary or permanent.

Language: en

Keywords

falls; fall prevention; adult; patient; perception; regional; rural

Protocol for a single group, mixed methods study investigating the efficacy of photovoice to improve self-efficacy related to balance and falls for spinal cord injury

Sessford JD, Chan K, Kaiser A, Singh H, Munce S, Alavinia M, Musselman KE. *BMJ Open* 2022; 12(12): e065684.

(Copyright © 2022, BMJ Publishing Group)

DOI 10.1136/bmjopen-2022-065684 **PMID** 36600385

Abstract

INTRODUCTION: Many individuals living with spinal cord injury (SCI) experience falls and a fear of falling, both of which can impact participation in daily activities and quality of life. A single group, convergent mixed methods study will be conducted to examine the effects of a photovoice intervention on falls self-efficacy among individuals living with chronic SCI. Secondary objectives include examining the effects of photovoice on fear of falling, participation and quality of life and exploring participants' experiences and perceptions of the photovoice intervention through qualitative interviews.

METHODS AND ANALYSIS: Adults with SCI (n=40) will be divided into groups according to their mobility status (ie, those who ambulate and those who primarily use a wheelchair). The study will be conducted virtually over three consecutive phases, totalling 30 weeks. Each group will self-report falls for 12 weeks prior to and following the intervention (phases 1 and 3, respectively). The 6-week photovoice intervention (phase 2) will be comprised of two photo assignments, two individual interviews with a researcher and a peer mentor, and four group meetings. Participants will discuss these photos at the interviews and group meetings. Standardised questionnaires of falls self-efficacy, fear of falling, participation and life satisfaction will be administered at four time points (ie, beginning of each phase and the end of phase 3). Questionnaire scores will be examined over time using repeated-measures analysis of variance. A semistructured interview will be completed at the end of phase 3 to gain feedback on the photovoice intervention. Qualitative data will be analysed using reflexive thematic analysis. **ETHICS AND DISSEMINATION:** Ethics approval was obtained prior to study enrolment.

FINDINGS will be shared through peer-reviewed scientific publications and participant-directed knowledge translation activities. **TRIAL REGISTRATION NUMBER:** NCT04864262.

Language: en

Keywords

Adult neurology; Clinical trials; REHABILITATION MEDICINE

Risk of bleeding after ground-level falls in elderly patients with atrial fibrillation and warfarin therapy

Bezák B, Vachalcová MB, Kíssová V, Michálek P, Stevlik J, Jackuliak P, Stevove M, Uher T, Bohm A. Bratisl. Lek. Listy. 2023; ePub(ePub): ePub.

(Copyright © 2023, Comenius University, School of Medicine)

DOI 10.4149/BLL_2023_020 **PMID** 36598300

Abstract

OBJECTIVES: The aim of this study was to investigate bleeding risk in patients treated with VKAs after ground-level falls, considering the type and severity of bleeding.

METHODS: The study was designed as a retrospective cohort study and included a total of 204 elderly patients aged > 65 years treated for AF continuously with warfarin for more than 3 years. Data were obtained from hospital registries in Bratislava, Slovakia. A 5-year assessment of death/survival was performed to determine mortality.

RESULTS: There was no statistically significant difference in severe bleeding (2.13 % with falls vs 2.55 % without, $p = 1$) and 5-year mortality (45 % and 38 % respectively, $p = 0.3987$) based on the presence of falls. Multivariate analysis, after adjustment for age, CHA₂DS₂VASc, HASBLED, stroke history, labile INR and number of falls showed that only HASBLED score was a statistically significant contributor (CI: 1.0245 - 1.0919, $p = 0.0007$) to severe bleeding. There was statistically significant difference in severe bleeding (18 % vs 0 %, $p = 0.0132$) between patients suffering from spontaneous and bleeding after falls and also when comparing individual bleeding episodes (12 % vs 1 %, $p < 0.0001$). There was no statistically significant difference in 5-year mortality between the two groups (43 % vs 42 % respectively, $p = 0.3931$).

CONCLUSIONS: Our results show that occurrence of falls in AF patients treated with VKAs have no significant impact on the incidence of severe bleeding and 5-year mortality and that spontaneous bleeding was associated with a significantly higher risk of severe bleeding compared to bleeding after falling (Tab. 4, Ref. 30).

Language: en

Keywords

atrial fibrillation; bleeding; elderly patients falling.; vitamin K antagonists

Summative usability of an interoperable computerized clinical decision support tool for fall risk management in primary care

Shear K, Rice H, Garabedian PM, Bjarnadottir RI, Latham NK, Horgas A, Harle CA, Dykes P, Lucero RJ. Appl. Clin. Inform. 2023; ePub(ePub): ePub.

(Copyright © 2023, Schattauer)

DOI 10.1055/a-2006-4936 PMID 36599446

Abstract

BACKGROUND: Falls are a widespread and persistent problem for community-dwelling older-adults. Use of fall prevention guidelines in the primary care setting has been suboptimal. Interoperable computerized clinical decision support systems have the potential to increase engagement with fall risk management at scale. To support fall risk management across organizations our team developed the ASPIRE tool for use in differing primary care clinics using interoperable standards.

OBJECTIVES: Usability testing of ASPIRE was conducted to measure, ease of access, overall usability, learnability, and acceptability prior to pilot.

METHODS: Participants were recruited using purposive sampling from two sites with different electronic health records and different clinical organizations. Formative testing rooted in user-centered design was followed by summative testing using a simulation approach. During summative testing participants used ASPIRE across two clinical scenarios and were randomized to determine which scenario they saw first. Single ease question and system usability scale were used in addition to analysis of recorded sessions in NVivo.

RESULTS: All 14 participants rated the usability of ASPIRE as above average based on usability benchmarks for the system usability scale metric. Time on task decreased significantly between the first and second scenarios indicating good learnability. However, acceptability data was more mixed with some recommendations being consistently accepted while others were adopted less frequently.

CONCLUSIONS: This study described the usability testing of the ASPIRE system within two different organizations using different electronic health records. Overall, the system was rated well, and further pilot testing should be done to validate that these positive results translate into clinical practice. Due to its interoperable design ASPIRE could be integrated into diverse organizations allowing a tailored implementation without the need to build a new system for each organization. This distinction makes ASPIRE well positioned to impact the challenge of falls at scale.

Language: en

Upright trunk and lateral or slight anterior rotation of the pelvis cause the highest proximal femur forces during sideways falls

Kleiven S, Sahandifar P. Front. Bioeng. Biotechnol. 2022; 10: e1065548.

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Abstract

Whole-body models are historically developed for traffic injury prevention, and they are positioned accordingly in the standing or sitting configuration representing pedestrian or occupant postures. Those configurations are appropriate for vehicle accidents or pedestrian-vehicle accidents; however, they are uncommon body posture during a fall accident to the ground. This study aims to investigate the influence of trunk and pelvis angles on the proximal femur forces during sideways falls. For this purpose, a previously developed whole-body model was positioned into different fall configurations varying the trunk and pelvis angles. The trunk angle was varied in steps of 10° from 10 to 80°, and the pelvis rotation was changed every 5° from -20° (rotation toward posterior) to +20° (rotation toward anterior). The simulations were performed on a medium-size male (177 cm, 76 kg) and a small-size female (156 cm, 55 kg), representative for elderly men and women, respectively. The results demonstrated that the highest proximal femur force measured on the femoral head was reached when either male or female model had a 10-degree trunk angle and +10° anterior pelvis rotation.

Language: en

Keywords

body posture; femur forces; pelvis angle; sideways falls; trunk angle