

Safety Literature 16th October 2023

Assessment of fall-associated risk factors in the Muslim community-dwelling older adults of Peshawar, Khyber Pakhtunkhwa, Pakistan

Bibi R, Yan Z, Ilyas M, Shaheen M, Singh SN, Zeb A. BMC Geriatr. 2023; 23(1): e623.

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DOI: 10.1186/s12877-023-04322-1 **PMID:** 37794341

Abstract

BACKGROUND: Falls are the third-leading cause of disability among the elderly population worldwide. It is multifactorial, and the occurrence of falls depends on different factors, which can be different from context to context, and individual to individual. Therefore, regular assessment of fall risk factors is required to develop a strategy for fall prevention. The study aimed to identify fall-related risk factors in Pakistani healthy older adults at risk of developing physical disabilities. It also aimed to create a risk-predictive model for fall occurrence, offering evidence for preventive strategies.

METHODS: Data were collected from 140 Muslim older adults from two residential areas of Peshawar, Khyber Pakhtunkhwa, from July 2022 to August 25, 2022, after obtaining permission from the Zhengzhou University Ethical Review Board (ZZUIRB #202,254), and the District Health Department Office (DHO #14,207). Participants were informed, and consent was obtained before data collection. Data were collected using the Time Up and Go Test (TUGT) checklist, the Cognitive Screening Scores (CS-10) checklist, interviews regarding the prayer practice, fall history in the last six months, visual equity questions, and demographic variables.

RESULTS: Factors associated with falls were; age, gender, education, cognitive status, poor walking speed, lack of physical activity, poor vision, and history of falls in the last six months, with a significant P value of ($P < 0.05$) in the Pearson correlation coefficient test. Poor cognition, low visual equity, poor walking speed, and lack of exercise increase the risk of falling in the future, with a prediction value of ($P < 0.005$) in Omnibus, Lemeshow score of (0.77).

CONCLUSION: Hence, our study provides a road map for future risk assessment of falls by adding the four mentioned risk factors in the proposed model to facilitate timely action to prevent fall-related infirmities in Pakistani healthy older adults.

Language: en

Keywords: Pakistan; Falls; Risk factors; Older adults; Community-dwelling

Associations between head injury and subsequent risk of falls: results from the Atherosclerosis Risk in Communities (ARIC) Study

Hunzinger KJ, Law CA, Elser H, Walter AE, Windham BG, Palta P, Juraschek SP, Hicks CW, Gottesman RF, Schneider AL. *Neurology* 2023; ePub(ePub): ePub.

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PMID: 37816634

Abstract

BACKGROUND AND OBJECTIVES: Falls are a leading cause of head injury among older adults, but the risk of fall occurring after a head injury is less well-characterized. We sought to examine the association between head injury and subsequent risk of falls requiring hospital care among community-dwelling older adults.

METHODS: This analysis included 13,081 participants in the Atherosclerosis Risk in Communities (ARIC) Study enrolled in 1987-1989 and followed through 2019. The association of head injury (time-varying exposure; self-reported and/or ICD-9/10 code identified) with risk of subsequent (occurring >1-month after head injury) falls requiring hospital care (ICD-9/10 code defined) was modeled using Cox proportional hazards regression. Secondary analyses included Fine and Gray proportional hazards regression to account for the competing risk of death, analysis of head injury frequency and severity, and formal testing for interaction by age, sex, and race. Models were adjusted for age, sex, race/center, education, military service, alcohol consumption, smoking, diabetes, hypertension, and psychotropic medication use.

RESULTS: Participants' mean age at baseline was 54 years, 58% were female, 28% were Black, and 14% had at least one head injury occurring over the study period. Over a median 23 years of follow-up, 29% of participants had a fall requiring medical care. In adjusted Cox proportional hazards models, individuals with head injury had 2.01 (95%CI=1.85-2.18) times the risk of falls compared to individuals without head injury. Accounting for the competing risk of mortality, individuals with head injury had 1.69 (95%CI=1.57-1.82) times the risk of falls compared to individuals without head injury. We observed stronger associations among men compared to women (men: HR=2.60, 95%CI=2.25-3.00; women: HR=1.80, 95%CI=1.63-1.99, p-interaction<0.001). We observed evidence of a dose-response association for head injury number and severity with fall risk (1 injury: HR=1.68, 95%CI=1.53-1.84; 2+ injuries: HR=2.37, 95%CI=1.92-2.94 and mild: HR=1.97, 95%CI=1.78-2.18; moderate/severe/penetrating: HR=2.50, 95%CI=2.06-3.02).

DISCUSSION: Among community-dwelling older adults followed over 30 years, head injury was associated with subsequent falls requiring medical care. We observed stronger associations among men and with increasing number and severity of head injuries. Whether older individuals with head injury might benefit from fall prevention measures should be a focus of future research.

Language: en

Circumstances of falls among older adult walker users in long-term care and the associated walker design deficits

Nickerson KA, Diaz K, Muir BC. Assist. Technol. 2023; ePub(ePub): ePub.

(Copyright © 2023, Rehabilitation Engineering and Assistive Technology Society of North America, Publisher Informa - Taylor and Francis Group)

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Abstract

Falls are the leading cause of fatal and non-fatal injuries in older adults. Walkers are often used by and prescribed to this population to reduce fall risk, however, walker users and walker non-users alike experience similar fall incidence rates. The role of walkers in preventing falls is unclear as some studies suggest walkers may be a fall-inciting factor. The purpose of this study was to analyze walker deficits by evaluating the circumstances and causes of falls in older adult walker users residing in long-term care facilities. Videos capturing 34 real-life falls involving wheeled walkers (rollators and two-wheeled walkers) in two retirement facilities were analyzed for 3 themes: walker type, fall direction, and activity at the time of fall. A frequency analysis of these themes was performed to determine common fall mechanisms. The results of this study suggest two-wheeled walker and rollator users most often fall sideways while turning and backward during weight transfer, respectively. Poor maneuverability, lateral stability, and wheel velocity control of the walkers contributed to the falls. Device improvements addressing these areas of deficiency may be necessary to mitigate falls occurring in older adult walker users.

Language: en

Keywords: elderly; Falls; assistive mobility device; fall circumstances; walker design

Correlation of balance posturographic parameters during quiet standing with the Berg balance scale in patients with Parkinson's disease

Bao W, Tan Y, Yang Y, Chen K, Liu J. BMC Neurol. 2023; 23(1): e362.

(Copyright © 2023, Holtzbrinck Springer Nature Publishing Group - BMC)

DOI: 10.1186/s12883-023-03386-1

PMID: 37803250

Abstract

BACKGROUND: Parkinson's disease (PD) is often clinically associated with posture instability and more easily falling. The Berg balance scale is a clinical indicator commonly used to subjectively evaluate a patient's balance ability. Meanwhile, computerized force platforms have been used in research on postural control. The various parameters obtained from posturography are interpreted to assess balance ability. The present study aims to explore the correlations between posturographic variables and the BBS, and furthermore to efficiently evaluate postural instability and fall risk of early and moderate PD patients.

METHODS: A total of 46 PD patients were involved in the experiment. Patients were asked to perform BBS tests and force platform tests under eye open (EO) and eye closed (EC) conditions. The recorded COP signal was analyzed with the time domain statistical method, the frequency domain method of Power Spectral Density (PSD), and structural methods of Stabilogram Diffusion Analysis (SDA), Sway Density Plot (SDP) to retrieve different posturographic variables. The correlation between posturographic variables under EO and EC conditions with BBS was compared statistically. The significantly correlated posturographic parameters were then applied to analyze posturographic differences between different groups: faller vs. non-faller (patients with/without a history of falls in the past 12 months).

RESULTS: Among the different posturographic parameters, the prediction ellipse area, the slope of the regression line at a high-frequency band of PSD in the medial-lateral (ML) direction, the crossover point of the regression lines of SDA in the anterior-posterior (AP) direction, and the distance between successive peaks of SDP had significant correlations with BBS. These selected BBS-related parameters also showed significant differences between faller and non-faller. The selected posturographic parameters can be used as effective indicators to evaluate the balance ability of Parkinson's disease patients.

Language: en

Keywords: Balance control; Berg Balance Scale; Center of pressure (COP); Parkinson's disease (PD); Posturography

Falls at the interface between geriatric and psychiatric patients: a critical review from a psychopharmacological perspective

Wedmann FM, Conca A, Di Gregorio P, Florio V, Toscano M, Giupponi G. Riv. Psichiatr. 2023; 58(5): 195-204.

(Copyright © 2023, Il Pensiero Scientifico Editore)

DOI: 10.1708/4113.41069

PMID: 37807865

Abstract

Falls in the elderly represent one of the major clinical problems as they are serious events that often result in high residual disability and mortality rates. Knowledge on the subject derives mainly from geriatric and gerontopsychiatric research. However, gerontopsychiatric patients differ from geriatric patients not only for the psychiatric and neurological comorbidities, which are often not sufficiently taken into account in the scientific context, but also for the intake of psychotropic drugs, notoriously described as one of the main risk factors for falls. Such drugs are widely prescribed in this group of patients, often even off-label. Clinicians therefore should pay particular attention to falls, since various comorbidities and polypharmacy as a prescribing issue can have important consequences for clinical management. Falls have not been sufficiently investigated yet in a purely psychiatric context.

Language: en

"Fall risk scoring" in outpatient gait analysis: validation of a new fall risk assessment for nursing home residents

Unger EW, Pohlemann T, Orth M, Rollmann MFR, Menger MM, Herath SC, Histing T, Braun BJ. Z. Orthop. Unfall. 2023; ePub(ePub): ePub.

(Copyright © 2023, Georg Thieme Verlag)

DOI: 10.1055/a-2151-4709

PMID: 37813360

Abstract

Falls in senior home residents are common. Individual preventive training can lower the fall risk. To detect the need for training, a systematic assessment of the individual fall risk is needed. The aim of this study was thus to assess whether a fall risk score based on free field insole measurements can distinguish between an at-risk group of senior home residents and a healthy young control group. A published fall risk score was used in senior home residents over the age of 75 and a young (< 40 years) control group to determine the individual fall risk. In addition, the fall events over 12 months were assessed. Statistical analysis including ROC analysis was performed to determine the ability of the score to detect participants at heightened fall risk. In total, 18 nursing home residents and 9 young control participants were included. Of the nursing home residents, 15 had at least one fall, with a total of 37 falls recorded over 12 months. In the control group, no falls were recorded. The fall risk score was significantly different between nursing home residents and the control group (9.2 ± 3.2 vs. 5.7 ± 2.2). Furthermore, the score significantly differentiated fallers from non-fallers (10.3 ± 1.8 vs. 5.2 ± 2.5), with a cut-off > 7.5 (AUC: 0.95) and a sensitivity of 86.7% (specificity 83.3%). The fall risk score is able to detect the difference between senior nursing home residents and young, healthy controls, as well as between fallers and non-fallers. Its main proof of concept is demonstrated, as based on movement data outside special gait labs, and it can simplify the risk of fall determination in geriatric nursing home residents and can now be used in further, prospective studies.

Language: de

Functional balance assessment for predicting future recurrent falls in non-ambulatory individuals with spinal cord injury: a prospective pilot study

About L, Rice LA. Physiother. Theory Pract. 2023; ePub(ePub): ePub.

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PMID: 37801067

Abstract

BACKGROUND: Functional assessments easy to administer within the clinic to identify non-ambulatory individuals with spinal cord injury at risk of recurrent falls are needed.

PURPOSE: To examine the ability of functional balance and transfer quality to predict recurrent falls.

METHODS: This 6-month prospective study examined remote assessments of transfer quality using the Transfer Assessment Instrument and functional sitting balance with the Function in Sitting Test and the Trunk Control Test. Then, participants prospectively monitored their falls for 6-month using fall diaries. Frequency of falls was categorized as infrequent fallers (≤ 2 falls) and recurrent fallers (> 2 falls). A multivariable logistic regression analysis was conducted. A Receiver Operating Characteristic curve was performed to determine the area under the curve, the sensitivity, and the specificity of the model.

RESULTS: Eighteen non-ambulatory individuals (mean age = 44 ± 16 years, mean time since injury = 7.8 ± 32.6 years) participated in the study. Poor balance (lower Function in Sitting Test score) was associated with higher odds of future recurrent falls (Odds Ratio = 0.70, 95% CI, 0.48 to 1.00, $p = 0.05$), area under the receiving operating curve = 0.87, sensitivity = 88%, and specificity = 70%.

CONCLUSIONS: A comprehensive sitting balance assessment that includes the static, proactive, and reactive components of balance with the integration of sensorial functions as evaluated within the Function in Sitting Test may be useful for predicting recurrent falls among non-ambulatory individuals with spinal cord injury. Replication of the findings in a larger sample is warranted.

Language: en

Keywords: Accidental falls; balance; spinal cord injuries; postural control; wheelchairs

Impact of occlusal proprioception on static postural balance

Giraudeau A, Nicol C, Macchi R, Coyle T, Mesure S, Berdha K, Orthlieb JD, Barthélemy J. *Heliyon* 2023; 9(10): e20309.

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PMCID: PMC10550569

Abstract

Conflicting results on the effects of occlusal proprioceptive information on standing sway have been reported in the literature, partly due to the heterogeneity of the occlusal criterion studied and the experimental protocol used. In this study, occlusal functions, different mandibular positions and visual conditions were used to investigate the involvement of occlusal proprioception information in static postural balance. Postural adjustments of 26 healthy young adults, divided into Class I malocclusion and Class I normocclusion groups, were studied in upright position, in five mandibular positions (1 free, 2 centric and 2 eccentric), with and without vision. Due to different reported test durations, postural parameters were examined for the first and last halves of the 51.2 s acquisition time. A permutation ANOVA with 4 factors was used: group, mandibular position, vision, time window. Mean length of CoP displacement was shorter with vision ($ES = 0.30$) and more affected by vision loss in the free than in the intercuspal mandibular position ($ES = 0.76$ vs. 0.39), which has more tooth contacts. The malocclusion group was more affected by vision loss ($ES = 0.64$). Unexpectedly, with vision, the mean length was smaller in one eccentric occlusion side compared to the other ($ES = 0.51$), but independent of the left or right side, and more affected by vision loss ($ES = 1.04$ vs. $ES = 0.71$). The first-time window of the acquisition time, i.e. 25.6 s, was sufficient to demonstrate the impact of dental occlusion, except for the sway area. Comparison of the two visual conditions was informative. With vision, the weight of occlusal proprioception was not strictly related to occlusal characteristics (number of teeth in contact; centered or eccentric mandibular position), and it was asymmetrical. Without vision, the lack of difference between groups and mandibular positions suggested a sensory reweighting, probably to limit postural disturbance.

Language: en

Keywords: Vision; Dental occlusion; Mandibular positions; Postural balance; Proprioception

Investigating the emotional content of older adults engaging in a fall prevention exercise program integrated with dance movement therapy: a preliminary study

Pitluk Barash M, Elboim-Gabyzon M, Shuper Engelhard E. *Front. Psychol.* 2023; 14: e1260299.

(Copyright © 2023, Frontiers Research Foundation)

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PMID: 37790228

PMCI: DPMC10543662

Abstract

Fall prevention interventions for older adults have primarily focused on the physical aspects, overlooking the emotional aspects inherent in falls. This qualitative study presents a novel fall prevention intervention that integrates physical therapy exercise (PTE) based on the Otago Exercise Program with Dance Movement Therapy (DMT) to address the emotional experience during PTE. The aim of this study is to explore the emotional content expressed by older adults during balance-focused exercises and the unique emotional content expressions following the PTE + DMT intervention compared to the PTE intervention. Eleven older adults (aged 81-91 years) from a day center were randomly assigned to either the PTE + DMT group (n = 6) or the PTE group (n = 5). Interpretative phenomenological analysis of the instructors' observations and process diary identified three themes that emerged during the sessions: (1) self-image and self-worth, (2) the individual in relation to others, and (3) past memories. These themes highlight both similarities and differences between the groups. These findings provide valuable insights into the emotional experiences encountered by older adults, particularly in the context of falls prevention practices. Recognizing, understanding, and facilitating the expression of these experiences can enhance the effectiveness of fall prevention interventions and contribute to the overall health of older adults.

Language: en

Keywords: older adults; fall; physical therapy; dance movement therapy; fall prevention intervention

Older adults and unintentional injury

Hill L, Moran R. Med. Clin. North Am. 2023; 107(6): 1001-1010.

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Abstract

Clinicians play an important role in the prevention of unintentional injuries. Falls and motor vehicle crashes (MVC) have predictable and overlapping antecedents. Systematic screening for and management of vision impairment, frailty, cognitive impairment, polypharmacy, and inappropriate medications will reduce both falls and MVC risks. Fall-prevention measures, such as strength training, need to be more widely prescribed by physicians and implemented by older adults. Technologically tailored approaches are needed to leverage fall-reduction programs at home, as well as education of older adults regarding home hazards.

Language: en

Keywords: Unintentional injury; Fall prevention; Driving safety; Older drivers

Older adult falls in emergency medicine, 2023 update

Shankar KN, Li A. Clin. Geriatr. Med. 2023; 39(4): 503-518.

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DOI: 10.1016/j.cger.2023.05.010

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Abstract

Of 4 older adults, 1 will fall each year in the United States. Based on 2020 data from the Centers of Disease Control, about 36 million older adults fall each year, resulting in 32,000 deaths. Emergency departments see about 3 million older adults for fall-related injuries with falls having the ability to cause serious injury such as catastrophic head injuries and hip fractures. One-third of older fall patients discharged from the ED experience one of these outcomes at 3 months.

Language: en

Keywords: Trauma; Implementation; Emergency medical services; Technology; Emergency medicine; Falls prevention; Accidental fall; Geriatric

Optimizing a technology-based body and mind intervention to prevent falls and reduce health disparities in low-income populations: protocol for a clustered randomized controlled trial

Thiamwong L, Xie R, Park JH, Lighthall N, Loerzel V, Stout J. JMIR Res. Protoc. 2023; 12: e51899.

(Copyright © 2023, JMIR)

DOI: 10.2196/51899

PMID: 37788049

Abstract

BACKGROUND: The lack of health care coverage, low education, low motivation, and inconvenience remain barriers to participating in fall prevention programs, especially among low-income older adults. Low-income status also contributes to negative aging self-perceptions and is associated with a high perceived barrier to care. Existing fall prevention intervention technologies do not enable participants and practitioners to interact and collaborate, even with technologies that bring viable strategies to maintain independence, prevent disability, and increase access to quality care. Research is also limited on the use of technology to enhance motivation and help individuals align their perception with physiological fall risk. We developed a novel, 8-week Physio-Feedback Exercise Program (PEER), which includes (1) technology-based physio-feedback using a real-time portable innovative technology-the BTrackS Balance Tracking System, which is reliable and affordable, allows for home testing, and provides feedback and tracks balance progression; (2) cognitive reframing using the fall risk appraisal matrix; and (3) peer-led exercises focusing on balance, strength training, and incorporating exercises into daily activities.

OBJECTIVE: This study consists of 3 aims. Aim 1 is to examine the effects of the technology-based PEER intervention on fall risk, dynamic balance, and accelerometer-based physical activity (PA). Aim 2 is to examine the effects of the PEER intervention on fall risk appraisal shifting and negative self-perceptions of aging. Aim 3 is to explore participants' experiences with the PEER intervention and potential barriers to accessing and adopting the technology-based PEER intervention to inform future research.

METHODS: This is an intention-to-treat, single-blinded, parallel, 2-arm clustered randomized controlled trial study. We will collect data from 340 low-income older adults at baseline (T1) and measure outcomes after program completion (T2) and follow-up at 3 months (T3) and 6 months (T4). Participants will be enrolled if they meet all the following inclusion criteria: aged ≥ 60 years, cognitively intact, and able to stand without assistance. Exclusion criteria were as follows: a medical condition precluding exercise or PA, currently receiving treatment from a rehabilitation facility, plan to move within 1 year, hospitalized >3 times in the past 12 months, and does not speak English or Spanish.

RESULTS: As of August 2023, the enrollment of participants is ongoing.

CONCLUSIONS: This study addresses the public health problem by optimizing a customized, technology-driven approach that can operate in low-resource environments with unlimited users to prevent falls and reduce health disparities in low-income older adults. The PEER is a novel intervention that combines concepts of physio-feedback, cognitive reframing, and peer-led exercise by motivating a shift in self-estimation of fall risk to align with physiological fall risk to improve balance, PA, and negative aging self-perception.

TRIAL REGISTRATION: ClinicalTrials.gov NCT05778604;

<https://www.clinicaltrials.gov/ct2/show/study/NCT05778604>. **INTERNATIONAL REGISTERED REPORT IDENTIFIER (IRRID):** DERR1-10.2196/51899.

Language: en

Keywords: older adults; technology; fall prevention; exercise; fear of falling; low income

Position: A study protocol for the prevention of fall injuries in French Special Forces selection courses using a body-centered intervention

Obligi L, Bertrand M, Boivent M, Corcostegui SP, Coz PE, Derkenne C, des Robert V, Hurpin V, Hus J, L'Hermitte B, Lely L, Patey E, Romary E, Saint-Jean L, Trente A, Turpin M, Vertu N, Verdonk C, Duffaud AM. PLoS One 2023; 18(10): e0290241.

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PMCID: PMC10550174

Abstract

INTRODUCTION: The Military Physical and Sports Training program was developed by the French Army in order to train, optimize, and maintain individual readiness. Although the health benefits of sport practice do not need to be demonstrated, such activities can cause acute musculoskeletal injuries that need to be addressed. The prevalence of lower limb injury is rather high in the French military population and, in particular, ranges from 15 to 45% during Special Forces selection courses. Thus, this project aims to investigate the efficiency of a body-centered program designed to enhance body awareness. The program seeks to train the mind to actively pay attention to body information, while the latter is viewed as a protective factor against fall injuries. We assume: (i) that postural control can be improved by enhancing the level of body awareness; and (ii) that greater postural awareness could be beneficial in reducing the risk of fall injuries. The body-centered prevention program is based on the Optimization of the Resources of the Armed Forces (ORAF) intervention, which focuses on mental preparation and recovery, and has been deployed in the French Army for many years.

METHOD AND ANALYSES: The study focuses on five French Special Forces selection courses (400 soldiers/ participants). It is divided into two stages (year 1, year 2). The first year is dedicated to data collection from the control group (200 participants), while in the second year the ORAF intervention will be deployed. In both year, participants will be subjected to the same enrollment schedule (Fig 3). The main objective is to evaluate the effectiveness of the ORAF intervention in reducing the rate of fall injuries during military selection, based on a multidisciplinary method that captures demographic, biological, biometric, clinical, and para-clinical measures. **TRIAL REGISTRATION:** Registration number: IDRCB number 2021-A02108-33, Clinical Trial: NCT05451394.

Proximal hip fractures in 71,920 elderly patients: incidence, epidemiology, mortality and costs from a retrospective observational study

Viganò M, Pennestrì F, Listorti E, Banfi G. BMC Public Health 2023; 23(1): e1963.

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DOI: 10.1186/s12889-023-16776-4

PMID: 37817094

Abstract

BACKGROUND: The risk of proximal femoral fractures increases with aging, causing significant morbidity, disability, mortality and socioeconomic pressure. The aims of the present work are (1) to investigate the epidemiology and incidence of these fractures among the elderly in the Region of Lombardy; (2) to identify the factors influencing survival; (3) to identify the factors influencing hospitalization and post-operative costs.

METHODS: The Region of Lombardy provided anonymized datasets on hospitalized patients with a femoral neck fracture between 2011 and 2016, and anonymized datasets on extra-hospital treatments to track the patient history between 2008 and 2019. Statistical evaluations included descriptive statistics, survival analysis, Cox regression and multiple linear models.

RESULTS: 71,920 older adults suffered a femoral fracture in Lombardy between 2011 and 2016. 76.3% of patients were females and the median age was 84. The raw incidence of fractures was stable from year 2011 to year 2016, while the age-adjusted incidence diminished. Pertrochanteric fractures were more spread than transcervical fractures. In patients treated with surgery, receiving treatment within 48 h reduced the hazard of death within the next 24 months. Combined surgical procedures led to increased hazard in comparison with arthroplasty alone, while no differences were observed between different arthroplasties and reduction or fixation. In patients treated conservatively, age and male gender were associated with higher hazard of death. All patients considered, the type of surgery was the main factor determining primary hospitalization costs. A higher number of surgeries performed by the index hospital in the previous year was associated with financial savings. The early intervention significantly correlated with minor costs.

CONCLUSIONS: The number of proximal femoral fractures is increasing even if the age-adjusted incidence is decreasing. This is possibly due to prevention policies focused on the oldest cohort of the population. Two policies proved to be significantly beneficial in clinical and financial terms: the centralization of patients in high-volume hospitals and a time limit of 48 h from fracture to surgery. **TRIAL REGISTRATION:** Non applicable.

Language: en

Keywords: Prevention; Mortality; Social determinants of health; Elderly; Healthcare policy; Lombardy; Osteoporosis; Proximal femoral fracture; Value-based care

Risky movement: assessing fall risk in people with multiple sclerosis with wearable sensors and beacon-based smart-home monitoring

Kushner T, Mosquera-Lopez C, Hildebrand A, Cameron MH, Jacobs PG. *Mult. Scler. Relat. Disord.* 2023; 79: e105019.

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PMID: 37801954

Abstract

BACKGROUND: People with multiple sclerosis (PwMS) fall frequently causing injury, social isolation, and decreased quality of life. Identifying locations and behaviors associated with high fall risk could help direct fall prevention interventions. Here we describe a smart-home system for assessing how mobility metrics relate to real-world fall risk in PwMS.

METHODS: We performed a secondary analysis of a dataset of real-world falls collected from PwMS to identify patterns associated with increased fall risk. Thirty-four individuals were tracked over eight weeks with an inertial sensor comprising a triaxial accelerometer and time-of-flight radio transmitter, which communicated with beacons positioned throughout the home. We evaluated associations between locations in the home and movement behaviors prior to a fall compared with time periods when no falls occurred using metrics including gait initiation, time-spent-moving, movement length, and an entropy-based metric that quantifies movement complexity using transitions between rooms in the home. We also explored how fall risk may be related to the percent of times that a participant paused while walking (pauses-while-walking).

RESULTS: Seventeen of the participants monitored sustained a total of 105 falls that were recorded. More falls occurred while walking (52%) than when stationary despite participants being largely sedentary, only walking $1.5 \pm 3.3\%$ (median \pm IQR) of the time that they were in their home. A total of 28% of falls occurred within one second of gait initiation. As the percentage of pauses-while-walking increased from 20 to 60%, the likelihood of a fall increased by nearly 3 times from 0.06 to 0.16%. Movement complexity, which was quantified using the entropy of room transitions, was significantly higher in the 10 min preceding falls compared with other 10-min time segments not preceding falls (1.15 ± 0.47 vs. 0.96 ± 0.24 , $P = 0.02$). Path length was significantly longer (151.3 ± 156.1 m vs. 95.0 ± 157.2 m, $P = 0.003$) in the ten minutes preceding a fall compared with non-fall periods. Fall risk also varied among rooms but not consistently across participants.

CONCLUSIONS: Movement metrics derived from wearable sensors and smart-home tracking systems are associated with fall risk in PwMS. More pauses-while-walking, and more complex, longer movement trajectories are associated with increased fall risk.

FUNDING: Department of Veterans Affairs (RX001831-01A1). National Science Foundation (#2030859).

Language: en

Keywords: Accidental falls; Multiple sclerosis; Fall risk; Movement complexity

The Belgian physiotherapy reimbursement criteria for fall prevention fails in screening appropriately fall-prone community-dwelling older adults

Rommers E, Petrovic M, de Pauw R, Van Bladel A, Cambier D. Acta Clin. Belg. 2023; ePub(ePub): ePub.

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Abstract

OBJECTIVES: The incidence of falling in older adults has remained unchanged over the past decades, despite evidence-based prevention initiatives. Therefore, it is appropriate to reflect on the current screening approach for preventive initiatives. The objective of this study was to determine whether the multifactorial algorithm proposed by Lusardi et al. (2017) exhibits superior predictive validity compared to the currently employed algorithm by the Belgian National Institute for Health and Disability Insurance (NIHDI).

METHODS: The current study includes a secondary analysis of data collected from a falls-related study in the Department of Rehabilitation Sciences at Ghent University to compare the predictive validity of the two algorithms. Sensitivity, specificity, positive and negative predictive value and area under the curve (AUC) were calculated to ascertain which algorithm is more accurate.

RESULTS: The database included a total of 94 community-dwelling older adults (mean age 76 years \pm 7.4, 35% male). Thirty-nine participants experienced at least one fall in the 8 month follow up. Lusardi's approach has a higher sensitivity score (89.7% compared to 10.3%) and negative predictive value (89.9% compared to 61.1%), but a lower specificity score (61.8% compared to 100%) and positive predictive value (62.2% compared to 100%) than the NIHDI approach. The AUC is 0.76 for Lusardi's approach and 0.55 for the NIHDI approach.

CONCLUSION: The use of the multifactorial algorithm proposed by Lusardi et al. may be significant and more accurate in identifying adults at risk to falls. Further research is needed particularly with a larger, more heterogenous group of older adults.

Language: en

Keywords: prediction; falls; Older adults; falls risk; physiotherapy

Theoretical framework of concerns about falling in older people: the role of health literacy

Lim ML, van Schooten KS, Radford KA, Hadjistavropoulos T, Everett B, Zijlstra R, Delbaere K. Health Promot. Int. 2023; 38(5): daad122.

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Abstract

Adherence and participation can be improved in health programs for older people with concerns about falling. While health literacy empowers older people to have greater control over their health, little is known about the extent to which health literacy influences health behaviours associated with concerns about falling in older people. This study aimed to synthesise current findings on health literacy, concerns about falling and falls to propose a multicomponent theoretical model on health literacy and concerns about falling. The model was developed based on a review of the literature, existing frameworks and models on health literacy and concerns about falling. Existing evidence on the relationship between health literacy and concerns about falling in older people is limited. Evidence from other research areas, however, shows that health literacy is closely related to many of the determinants of concerns about falling. More research is needed to clarify the impact of health literacy on intervention adherence and decision-making processes of older people with concerns about falling. Our model offers a novel perspective on the role of health literacy in health behaviours associated with concerns about falling, suggesting new research directions and providing insights for clinicians to consider health literacy when managing older patients with concerns about falling.

Language: en

Keywords: physical activity; falls; fear of falling; balance confidence; falls efficacy

Trends and risk factors among adults admitted to the emergency department with fall-related eye injuries

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Abstract

BACKGROUND/PURPOSE: Eye injuries can happen to people of any age and for many reasons; among these is a fall. The aims of this study were to: (1) examine trends among fall-related eye injuries in working-age and older adults admitted to the emergency department (ED) from 2012 to 2021; and (2) investigate and compare the risk factors associated with fall-related eye injuries between working-age adults and older adults.

DESIGN: We examined a retrospective cohort in the 2012-2021 National Electronic Injury Surveillance System (NEISS) databases. We used the Cochran-Armitage test for trend to determine the fall-related eye injury trend from 2012 to 2021. The associations among fall-related eye injuries, demographics, accident-related environments, and disposition, were analyzed using multivariable logistic regression analysis.

RESULTS: Among the total of 1,290,205 adults with eye injuries from 2012 to 2021, the incidence rate of fall-related eye injuries was higher in older adults (ranged from 9.0% to 17.4%) than in working-age adults (ranged from 3.7% to 7.1%). Over consecutive years, the number and annual incident rate of both working-age and older adults experiencing fall-related eye injuries increased significantly (all $p \leq 0.001$). Patients who were female (odds ratio [OR] = 1.60, 95% confidence interval [CI] = 1.39-1.83), Black/African American (OR = 1.76, 95% CI = 1.47-2.10) had significantly higher odds of fall-related eye injuries. The highest odds ratios found among all of the reported product categories for the fall-related eye injuries were an accident with home structures such as doors (OR = 12.65, 95% CI = 10.00-16.01) and an accident with home furnishings (OR = 11.65, 95% CI = 9.18-14.78) compared to an accident with workshop equipment. Patients who experienced fall-related eye injuries were more likely to be hospitalized/ have an inpatient stay (OR = 7.41, 95% CI = 5.78-9.52) after the ED treatment than those who treated and released after ED visit.

CONCLUSION: Among Americans treated in the ED for injury, fall-related eye injuries are increasingly common, especially among older adults, and associated with a need for inpatient care. Therefore, these findings suggest opportunities to investigate fall prevention and eye protection interventions, especially in the home setting.

Language: en

Keywords: Falls; Eye trauma; Emergency department; Fall-related eye injury

