

Safety Literature 3rd April 2022

An atypical presentation of orthostatic hypotension and falls in an older adult

Thoburn S, Cremin S, Holland M. Br. Paramed. J. 2022; 6(4): 41-47.

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Abstract

INTRODUCTION: Falls are a significant cause of morbidity and mortality in older adults. Orthostatic hypotension (OH) is very common in this cohort of patients and is a significant risk for falls and associated injuries. We present the case of an 89-year-old female who fell at home, witnessed by her husband. OH was identified during the clinical assessment and considered to be the predominant contributing factor, although the clinical presentation was not associated with classical symptoms. **CASE PRESENTATION:** The patient lost balance while turning away from the kitchen sink; she noted some instability due to a complaint of generalised weakness in both of her legs. No acute medical illness or traumatic injury was identified. A comprehensive history was obtained that identified multiple intrinsic and extrinsic risk factors for falling. The cardiovascular examination was unremarkable except for OH, with a pronounced reduction in systolic blood pressure of 34 mmHg at the three-minute interval and which reproduced some generalised weaknesses in the patient's legs and slight instability. Although classical OH symptoms were not identified, this was considered to be the predominant factor contributing to the fall. A series of recommendations was made to primary and community-based care teams based upon a rapid holistic review; this included a recommendation to review the patient's dual antihypertensive therapy.

CONCLUSION: It is widely known that OH is a significant risk factor for falls, but asymptomatic or atypical presentations can make diagnosis challenging. Using the correct technique to measure a lying and standing blood pressure, as defined by the Royal College of Physicians, is crucial for accurate diagnosis and subsequent management. Ambulance clinicians are ideally placed to undertake this quick and non-invasive assessment to identify OH in patients that have fallen.

Language: en

Keywords

accidental falls; emergency medical technicians; orthostatic hypotension

Economic evaluation of community-based falls prevention interventions for older populations: a systematic methodological overview of systematic reviews

Kwon J, Squires H, Franklin M, Lee Y, Young T. BMC Health Serv. Res. 2022; 22(1): 401.

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Abstract

BACKGROUND: Falls impose significant health and economic burdens on older people. The volume of falls prevention economic evaluations has increased, the findings from which have been synthesised by systematic reviews (SRs). Such SRs can inform commissioning and design of future evaluations; however, their findings can be misleading and incomplete, dependent on their pre-specified criteria. This study aims to conduct a systematic overview (SO) to: (1) systematically identify SRs of community-based falls prevention economic evaluations; (2) describe the methodology and findings of SRs; (3) critically appraise the methodology of SRs; and (4) suggest commissioning recommendations based on SO findings.

METHODS: The SO followed the PRISMA guideline and the Cochrane guideline on SO, covering 12 databases and grey literature for the period 2003-2020. Eligible studies were SRs with 50% or more included studies that were economic evaluations of community-based falls prevention (against any comparator) for older persons (aged 60+) or high-risk individuals aged 50-59. Identified SRs' aims, search strategies and results, extracted data fields, quality assessment methods/results, and commissioning and research recommendations were synthesised. The comprehensiveness of previous SRs' data synthesis was judged against criteria drawn from literature on falls prevention/public health economic evaluation. Outcomes of general population, lifetime decision models were re-analysed to inform commissioning recommendations. The SO protocol is registered in the Prospective Register of Systematic Reviews (CRD42021234379).

RESULTS: Seven SRs were identified, which extracted 8 to 33 data fields from 44 economic evaluations. Four economic evaluation methodological/reporting quality checklists were used; three SRs narratively synthesised methodological features to varying extent and focus. SRs generally did not appraise decision modelling features, including methods for characterising dynamic complexity of falls risk and intervention need. Their commissioning recommendations were based mainly on cost-per-unit ratios (e.g., incremental cost-effectiveness ratios) and neglected aggregate impact. There is model-based evidence of multifactorial and environmental interventions, home assessment and modification and Tai Chi being cost-effective but also the risk that they exacerbate social inequities of health.

CONCLUSIONS: Current SRs of falls prevention economic evaluations do not holistically inform commissioning and evaluation. Accounting for broader decisional factors and methodological nuances of economic evaluations, particularly decision models, is needed.

Language: en

Keywords

Economic evaluation; Falls prevention; Systematic overview

High specificity of single inertial sensor-supplemented timed up and go test for assessing fall risk in elderly nursing home residents

Dierick F, Stoffel PL, Schütz G, Buisseret F. *Sensors* (Basel) 2022; 22(6): e2339.

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Abstract

The Timed Up and Go test (TUG) is commonly used to estimate the fall risk in the elderly. Several ways to improve the predictive accuracy of TUG (cameras, multiple sensors, other clinical tests) have already been proposed. Here, we added a single wearable inertial measurement unit (IMU) to capture the residents' body center-of-mass kinematics in view of improving TUG's predictive accuracy. The aim is to find out which kinematic variables and residents' characteristics are relevant for distinguishing faller from non-faller patients. Data were collected in 73 nursing home residents with the IMU placed on the lower back. Acceleration and angular velocity time series were analyzed during different subtasks of the TUG. Multiple logistic regressions showed that total time required, maximum angular velocity at the first half-turn, gender, and use of a walking aid were the parameters leading to the best predictive abilities of fall risk. The predictive accuracy of the proposed new test, called i + TUG, reached a value of 74.0%, with a specificity of 95.9% and a sensitivity of 29.2%. By adding a single wearable IMU to TUG, an accurate and highly specific test is therefore obtained. This method is quick, easy to perform and inexpensive. We recommend to integrate it into daily clinical practice in nursing homes.

Language: en

Keywords

elderly; fall risk; inertial sensor; kinematics; logistic regression; TUG

Improving postural stability in active older adults: Argentine tango dance as an alternative fall-prevention strategy

Purkart B, Bertoneclj B, Podlogar A, Samardzija Pavletic M. *Altern. Ther. Health Med.* 2022; ePub(ePub): ePub.

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Abstract

CONTEXT: Falls and the consequent injuries are a major global public-health issue, and fall prevention is urgently required for an aging population. Postural instability is a critical risk factor for fall prediction.

OBJECTIVE: The study intended to determine the impact of dancing the Argentine tango on postural stability in active older adults.

DESIGN: The research team designed a randomized controlled trial. **SETTING:** The study took place in Ljubljana in Slovenia. The work was performed at two institutions, the Studio BA tango and the Institute of Sports Medicine. **PARTICIPANTS:** Participants were 36 active, healthy individuals aged between 65 and 70 years. **INTERVENTION:** Eighteen dancing couples were randomly divided into two groups, the intervention and the control group. Both groups continued with their regular activities, but the intervention group also attended a 12-week program for 90 minutes twice a week dancing the Argentine tango. The class started with TangoFloorTec, a program that has been adapted for older adults, and continued with BA Tango Biomechanics. Each class ended with improvisational dancing and breathing exercises. **OUTCOME MEASURES:** The research team measured sway path on a force plate during the feet-together stance for 30 seconds and the one-legged stance for 20 seconds.

RESULTS: At baseline, no differences existed between the dancers and non-dancers in age, body mass index, or center of pressure. No falls were reported during the study. Twenty-eight participants, 7 couples in the intervention group and 7 couples in the control group, successfully completed the research protocol. Postintervention after 3 months of dancing, the intervention group had significantly better postural stability compared that of the control group ($P \leq 0.015$). The effect of the intervention was large (η^2 : from 0.22 to 0.44).

CONCLUSIONS: Dancing the Argentine tango can improve postural stability among already active older adults. Improved postural stability diminishes the risk of falling. The practical implication of the present study is that dancing can be more than just a hobby; it can serve as an alternative fall prevention strategy.

Language: en

Risk factors of fall-related emergency department visits by fall location of older adults in the USA

Kelekar U, Das Gupta D, Shepherd JG, Sule AA. West. J. Emerg. Med. 2021; 22(4): 988-999.

(Copyright © 2021, California Chapter of the American Academy of Emergency Medicine)

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Abstract

INTRODUCTION: Prior evidence indicates that predictors of older adult falls vary by indoor-outdoor location of the falls. While a subset of United States' studies reports this finding using primary data from a single geographic area, other secondary analyses of falls across the country do not distinguish between the two fall locations. Consequently, evidence at the national level on risk factors specific to indoor vs outdoor falls is lacking.

METHODS: Using the 2017 Nationwide Emergency Department Sample (NEDS) data, we conducted a multivariable analysis of fall-related emergency department (ED) visits disaggregated by indoor vs outdoor fall locations of adults 65 years and older (N = 6,720,937) in the US.

RESULTS: Results are compatible with findings from previous primary studies. While women (relative risk [RR] = 1.43, 95% confidence interval [CI], 1.42-1.44) were more likely to report indoor falls, men were more likely to present with an outdoor fall. Visits for indoor falls were highest among those 85 years and older (RR = 2.35, 95% CI, 2.33-2.37) with outdoor fall visits highest among those 84 years and younger. Additionally, the probabilities associated with an indoor fall in the presence of chronic conditions were consistently much higher when compared to an outdoor fall. We also found that residence in metropolitan areas increased the likelihood of an indoor elderly fall compared to higher outdoor fall visits from seniors in non-core rural areas, but both indoor and outdoor fall visits were higher among older adults in higher income ZIP codes.

CONCLUSION: Our findings highlight the contrasting risk profile for elderly ED patients who report indoor vs outdoor falls when compared to the elderly reporting no falls. In conjunction, we highlight implications from three perspectives: a population health standpoint for EDs working with their primary care and community care colleagues; an ED administrative vantage point; and from an individual emergency clinician's point of view.

Language: en

Somatosensory impairments, falls history and fear of falling in glaucoma - a survey study approach

O'Connell C, Wollstein G, Conner IP, Redfern MS, Chan KC, Whitney SL, Cham R. Proc. Hum. Factors Ergon. Soc. Annu. Meet. 2021; 65(1): 11-15.

(Copyright © 2021, Human Factors and Ergonomics Society, Publisher SAGE Publishing)

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Abstract

The primary aim was to determine if somatosensory impairments alter the association between falls history and glaucoma severity. A secondary aim was to identify the activities of daily living that cause increased concern related to falling in glaucoma and their association with glaucoma severity. Established questionnaires about falls and fear of falling (FoF) were mailed to participants diagnosed with glaucoma. Ninety-eight participants responded. Self-reported feet numbness and tingling symptoms were used to determine the presence of somatosensory impairments. Self-reported falls in glaucoma are associated with visual field deficits in both eyes, particularly in the presence of somatosensory impairments. In addition, increased FoF levels are linked with worse visual field deficits in both eyes, especially when performing challenging walking tasks. Somatosensory impairments alter the relationship between falls risk and visual field deficits in glaucoma. This information may be helpful in identifying older workers at an increased risk of falling.

Language: en

Using low-resolution non-invasive infrared sensors to classify activities and falls in older adults

Márquez G, Veloz A, Minonzio JG, Reyes C, Calvo E, Taramasco C. *Sensors (Basel)* 2022; 22(6): e2321.

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DOI 10.3390/s22062321 **PMID** 35336493

Abstract

The population is aging worldwide, creating new challenges to the quality of life of older adults and their families. Falls are an increasing, but not inevitable, threat to older adults. Information technologies provide several solutions to address falls, but smart homes and the most available solutions require expensive and invasive infrastructures. In this study, we propose a novel approach to classify and detect falls of older adults in their homes through low-resolution infrared sensors that are affordable, non-intrusive, do not disturb privacy, and are more acceptable to older adults. Using data collected between 2019 and 2020 with the eHomeseniors platform, we determine activity scores of older adults moving across two rooms in a house and represent an older adult fall through skeletonization. We find that our twofold approach effectively detects activity patterns and precisely identifies falls. Our study provides insights to physicians about the daily activities of their older adults and could potentially help them make decisions in case of abnormal behavior.

Language: en

Keywords

older adult; fall; infrared sensor

Biomechanical correlates of falls risk in gait impaired stroke survivors

Nagano H, Said CM, James L, Sparrow WA, Begg R. *Front. Physiol.* 2022; 13: e833417.

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Abstract

Increased falls risk is prevalent among stroke survivors with gait impairments. Tripping is the leading cause of falls and it is highly associated with mid-swing Minimum Foot Clearance (MFC), when the foot's vertical margin from the walking surface is minimal. The current study investigated MFC characteristics of post-stroke individuals ($n = 40$) and healthy senior controls ($n = 21$) during preferred speed treadmill walking, using an Optotrak 3D motion capture system to record foot-ground clearance. In addition to MFC, bi-lateral spatio-temporal gait parameters, including step length, step width and double support time, were obtained for the post-stroke group's Unaffected and Affected limb and the control group's Dominant and Non-dominant limbs. Statistical analysis of MFC included central tendency (mean, median), step-to-step variability (standard deviation and interquartile range) and distribution (skewness and kurtosis). In addition, the first percentile, that is the lowest 1% of MFC values (MFC 1%) were computed to identify very high-risk foot trajectory control. Spatio-temporal parameters were described using the mean and standard deviation with a 2×2 (Group \times Limb) Multivariate Analysis of Variance applied to determine significant Group and Limb effects. Pearson's correlations were used to reveal any interdependence between gait variables and MFC control. The main finding of the current research was that post-stroke group's affected limb demonstrated lower MFC 1% with higher variability and lower kurtosis. Post-stroke gait was also characterised by shorter step length, larger step width and increased double support time. Gait retraining methods, such as using real-time biofeedback, would, therefore, be recommended for post-stroke individuals, allowing them to acquire optimum swing foot control and reduce their tripping risk by elevating the swing foot and improving step-to-step consistency in gait control.

Language: en

Keywords

stroke; falls prevention; gait retraining; minimum foot clearance; tripping prevent

Comparisons of fall prevention activities using electronic nursing records: a case-control study

Jung H, Park HA, Lee HY. *J. Patient Saf.* 2022; 18(3): 145-151.

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DOI 10.1097/PTS.0000000000000930 **PMID** 35344975

Abstract

OBJECTIVE: The aim of this study was to compare the current fall prevention nursing practices with the evidence-based practices recommended in clinical practice guidelines according to the risk of falling and specific risk factors.

METHODS: The standardized nursing statements of 12,277 patients were extracted from electronic nursing records and classified into groups according to the risk of falling and individual patients' specific risk factors. The mean frequencies of the fall prevention practices in 10 categories derived from clinical practice guidelines were compared among the groups. We additionally analyzed the differences in the mean frequencies of tailored fall prevention practices according to individual patients' specific risk factors.

RESULTS: The nurses documented more fall prevention practices for patients at a high risk of falling and nonfallers than for patients at a low risk of falling and fallers. Specifically, the difference in nursing practices related to environmental modifications was largest between patients at a high risk of falling and those at a low risk of falling. There were also large differences in the nursing practices related to mental status, dizziness/vertigo, and mobility limitations between fallers and nonfallers. There was more documentation of tailored fall prevention practices related to mobility limitations for patient with mild lower limb weakness than for those with good power and balance. In contrast, patients with severe lower limb weakness had received fewer fall prevention practices related to mobility limitations.

CONCLUSIONS: The present findings emphasize that individual risk-specific nursing interventions in addition to universal precautions are crucial for preventing falls among patients.

Language: en

Development and initial validation of the falls health literacy scale

Lim ML, van Schooten KS, Radford KA, Delbaere K. *Maturitas* 2022; 159: 40-45.

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DOI 10.1016/j.maturitas.2021.12.002 PMID 35337611

Abstract

OBJECTIVES: (i) To develop the Falls Health Literacy Scale (FHLS), a health literacy tool specific to falls, (ii) to evaluate the FHLS's construct validity towards differentiating individuals with different fall-related health literacy, and (iii) to determine its reliability, construct validity and structure in an older population.

METHODS: The initial FHLS, developed based on Sørensen et al.'s health literacy model, was first administered to 144 participants aged ≥ 18 years for feedback and scale improvement and preliminary analysis to determine the FHLS's construct validity in identifying individuals with different fall-related health literacy. After scale refinement, the FHLS was validated in 227 community-living people aged ≥ 65 years.

RESULTS: Adult participants with more fall prevention knowledge scored higher on the initial FHLS than those with less fall prevention knowledge ($p \leq 0.001$). The final FHLS includes a 25-item subjective and a 14-item objective scale. Older people with ≥ 1 fall in the past year reported lower FHLS-subjective scores than those who had no falls (Cohen's $d = 0.29$, confidence interval [CI]: 0.03-0.56, $p = 0.03$). Older people with lower levels of education had lower FHLS-objective scores than their more educated counterparts ($d = 0.51$, CI: 0.38-1.43, $p \leq 0.001$). Factor analysis of the FHLS-subjective generated six subscales, with CFA showing adequate model fit (RMSEA=0.077, CFI=0.883 and $\chi^2/df = 2.35$). FHLS-subjective (25-item) showed good reliability, with Cronbach's alpha=0.93, mean inter-item correlation=0.34 (range -0.03-0.81) and intra-class coefficient =0.86 (95% CI: 0.69-0.93).

CONCLUSION: The novel, context-specific FHLS displayed good construct validity and reliability. The FHLS holds promise as a screening tool to differentiate individuals with different degrees of fall-related health literacy, which may help guide fall prevention interventions.

Language: en

Keywords

Aged; Accidental falls; Psychometrics; Health promotion; Health behavior

Polypharmacy is associated with falls in women with and without HIV

Psomas CK, Hoover DR, Shi Q, Brown TT, Vance DE, Holman S, Plankey MW, Tien PC, Weber KM, Floris-Moore M, Bolivar HH, Golub ET, McDonnell Holstad M, Radtke KK, Tamraz B, Erlandson KM, Rubin LH, Sharma A. J. Acquir. Immune Defic. Syndr. (LWW) 2022; ePub(ePub): ePub.

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Abstract

BACKGROUND: Aging in people with HIV is associated with increased risk of developing synergistic conditions such as neurocognitive impairment, polypharmacy, and falls. We assessed associations between polypharmacy (use of 5 or more non-ART medications), use of neurocognitive-adverse effects (NCAE) medications, and odds of falls in women with HIV (WWH) and without HIV (HIV-).

METHODS: Self-reported falls and medication use data were contributed semiannually by 1872 (1315 WWH, 557 HIV-) Women's Interagency HIV Study (WIHS) participants between 2014 and 2016. Polypharmacy and NCAE medication use were evaluated separately and jointly in multivariable models to assess their independent contributions to single and multiple falls risk.

RESULTS: The proportion of women who reported any fall was similar by HIV status (19%). WWH reported both greater polypharmacy (51 % vs 41%; $p<0.001$) and NCAE medication use (44% vs 37%; $p=0.01$) than HIV- women. Polypharmacy conferred elevated odds of single fall (adjusted odds ratio (aOR) 1.67, 95% CI: 1.36-2.06; $p<0.001$) and multiple falls (aOR 2.31, 95% CI: 1.83-2.93; $p<0.001$); results for NCAE medications and falls were similar. Both polypharmacy and number of NCAE medications remained strongly and independently associated with falls in multivariable models adjusted for HIV serostatus, study site, sociodemographics, clinical characteristics, and substance use.

CONCLUSIONS: Polypharmacy and NCAE medication use was greater among WWH compared to HIV- and both were independently and incrementally related to falls. De-prescribing and avoidance of medications with NCAEs may be an important consideration for reducing fall risk among WWH and sociodemographically similar women without HIV.

Language: en

Psychometric properties of the European Portuguese version of the Memorial Emergency Department Fall Risk Assessment Tool

Dixe MDACR, Querido A, Mendonça S, Sousa P, Monteiro H, Carvalho D, Lopes P, Rodrigues P. *Healthcare (Basel)* 2022; 10(3): e452.

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DOI 10.3390/healthcare10030452 **PMID** 35326930

Abstract

Falls are a public health problem that cause serious damage to people's health and health systems. This study aims to estimate the validity and reliability of the Memorial Emergency Department Fall Risk Assessment Tool for the European Portuguese population. The sample included 186 adults from an emergency department of a District Hospital in Portugal. Reliability and precision (inter-rater reliability) are assessed by two independent raters. The relationship between MEDFRAT and the Morse Fall Risk Scale is evaluated. All items presented a high Kappa index. The MEDFRAT showed a high and significant correlation with the Morse Fall Risk Scale. The influence of sociodemographic and clinical data was also checked. The MEDFRAT is adequate, valid and reliable for the European Portuguese population to assess the risk of falling of emergency department patients.

Language: en

Keywords

accidental falls; adult; hospital emergency service; validation study