Safety Literature 12th November 2023

Utilizing mobile robotics for pelvic perturbations to improve balance and cognitive performance in older adults: a randomized controlled trial

Adeniyi A, Stramel DM, Rahman D, Rahman M, Yadav A, Zhou J, Kim GY, Agrawal SK.
Sci. Rep. 2023; 13(1): e19381.

DOI: 10.1038/s41598-023-46145-5 **PMID:** 37938618

Abstract

Late-life balance disorders remain a severe problem with fatal consequences. Perturbation-based balance training (PBT), a form of rehabilitation that intentionally introduces small, unpredictable disruptions to an individual's gait cycle, can improve balance. The Tethered Pelvic Assist Device (TPAD) is a cable-driven robotic trainer that applies perturbations to the user's pelvis during treadmill walking. Earlier work showcased improved gait stability and the first evidence of increased cognition acutely. The mobile Tethered Pelvic Assist Device (mTPAD), a portable version of the TPAD, applies perturbations to a pelvic belt via a posterior walker during overground gait, as opposed to treadmill walking. Forty healthy older adults were randomly assigned to a control group (CG, n = 20) without mTPAD PBT or an experimental group (EG, n = 20) with mTPAD PBT for a two-day study. Day 1 consisted of baseline anthropometrics, vitals, and functional and cognitive measurements. Day 2 consisted of training with the mTPAD and post-interventional cognitive and functional measurements.

RESULTS revealed that the EG significantly outperformed the CG in several cognitive (SDMT-C and TMT-B) and functional (BBS and 4-Stage Balance: one-foot stand) measurements while showcasing increased confidence in mobility based on FES-I. To our knowledge, our study is the first randomized, large group (n = 40) clinical study exploring new mobile perturbation-based robotic gait training technology.

Language: en

Keywords: Aged; Anthropometry; Humans; Pelvis; *Cognition; *Computers, Handheld; Exercise Therapy

Evaluation of falls in older persons in the emergency department during the early Coronavirus-2019 pandemic and pre-pandemic periods

Arslan T, Saraç ZF, Ersel M, Savas S. Eur. Geriatr. Med. 2023; ePub(ePub): ePub.

DOI: 10.1007/s41999-023-00882-y **PMID:** 37935942

Abstract

PURPOSE: This study aimed to investigate the clinical characteristics, outcomes and healthcare costs of older patients presented to the emergency department (ED) with falls in the periods before and during the Coronavirus disease-2019 (COVID-19) pandemic.

METHODS: Hospital records one year before and after the onset of the COVID-19 pandemic were retrospectively analyzed through "International Statistical Classification of Diseases-10th Revision" codes. Age, gender, falls, triage classification, length of stay (LOS) in the hospital and the ED, COVID-19 status, Glasgow Coma scale, consultations-comorbidities, injury status, outcomes in the ED, and costs were recorded.

RESULTS: The study comprised of 3187 patients aged ≥ 65 years admitted to the ED of a university hospital between March 2019 and 2021. In terms of pre-pandemic and pandemic periods; older patients presenting with falls to the ED, consultations, Charlson Comorbidity Index, and LOS in the ED were lower in the pandemic period, but costs were higher ($p = 0.03$, $p = 0.01$, $p = 0.01$, $p = 0.01$ and $p = 0.02$, respectively). Hospitalization/mortality rates were higher in COVID-19 positive patients (77.2%) than in COVID-19 negative patients (4.6%) within the pandemic period and the patients in the pre-pandemic period (22.8%), and the costs, as well (both $p = 0.01$).

CONCLUSION: Though the number of fall-related presentations of older persons to the ED, comorbidity burden, consultations, and the LOS in the ED was lower, direct costs were higher during the pandemic period, particularly for COVID-19 positive older patients admitted to ED with falls than the pre-pandemic period, and those patients were with poorer outcomes.

Language: en

Keywords: Aged; Falls; Pandemics; Emergency department; SARS-CoV-2; Accidental; COVID-19 virus

A segmented regression analysis of household income and recurrent falls among adults in a national cohort study

Brown J, Hirsch JA, Tabb LP, Judd SE, Bennett A, Rundle A, Lovasi GS. Am. J. Epidemiol. 2023; ePub(ePub): ePub.

DOI: 10.1093/aje/kwad211 **PMID:** 37939143

Abstract

Falls can result in life-altering consequences for older adults, including extended recovery periods and compromised independence. Higher household income may mitigate the risk of falls by providing financial resources for mobility tools, addressing environmental hazards, needed supports, or buffer the impact of an initial fall on subsequent risk through assistance and care. Household income has not had a consistently observed association with falls in older adults however, a segmented association may exist so that associations are attenuated above a certain income threshold. This study utilized segmented negative binomial regression analysis to examine the association between household income and recurrent falls among (N=2,302) REGARDS cohort study participants recruited between 2003-2007. Income-fall association segments separated by changes in slopes were considered. Model results indicated a two-segment association between household income and recurrent falls in the past year. In the range below the breakpoint, household income was negatively associated with the rate of recurrent falls across all age groups examined; in a higher income range ($20,000-$50,000 to >$150,000) the association was attenuated (weaker negative trend) or reversed (positive trend). These findings point to potential benefits of ensuring incomes for lower income adults exceed the threshold to confer a reduced risk of recurrent falls.

Language: en

Keywords: Income; accidental falls; residence characteristics

Geospatial mapping to target injury prevention for older adult ground-level falls: a feasibility study

Cardozo-Stolberg S, Szydziak E, Angus LDG, Blake R, Marsden D, Venkatesh S, Mon NO. J. Trauma Nurs. 2023; 30(6): 340-345.

DOI: 10.1097/JTN.0000000000000753 **PMID:** 37937875

Abstract

BACKGROUND: Trauma centers target injury prevention efforts based on trauma registry and local epidemiological data. Identifying geographic patterns of injury through geospatial mapping has emerged as a technology to help identify at-risk individuals. Yet, the feasibility of using spatial analysis to target injury prevention efforts remains unknown.

OBJECTIVE: This study aims to demonstrate the use of geospatial mapping of older adult ground-level falls to target injury prevention efforts.

METHODS: This retrospective cohort analysis of ground-level falls among older adults was conducted from 2017 to 2020 at a Level I trauma center and safety net hospital. Trauma admissions, U.S. census median income, Hispanic percentage, and population density by zip codes were combined to create choropleth and heat maps to identify injury hot spots to target fall prevention classes.

RESULTS: A total of 5,629 patients were reviewed, of which 3,002 (53%) were fall cases. Low-level falls (<10 ft) accounted for 2,224 cases; 1,449 were among older adults centered around the study hospital. Ground-level falls accounted for 1,663 patients, of whom 1,182 were older adults clustering around senior housing, assisted living facilities, nursing homes, and rehabilitation centers. As a result, our fall prevention classes are now targeted at these newly identified locations.

CONCLUSION: Geospatial analysis provided powerful visualization of fall injury locations to target our fall prevention efforts. Geospatial analysis is a feasible tool for trauma centers to guide injury prevention strategies that effectively target the populations most in need.

Language: en

Keywords: Aged; Humans; Feasibility Studies; Cohort Studies; Retrospective Studies; *Accidental Falls/prevention & control; *Hospitalization

The influence of assistive technology and home modifications on falls in community-dwelling older adults: a systematic review protocol

Crosby KM, Rodriguez CA, Canas MA, Kim C, Noroozi S, Vis-Dunbar M, Komisar V, Sakakibara BM, Jakobi JM. Syst. Rev. 2023; 12(1): e204.

DOI: 10.1186/s13643-023-02354-7 **PMID:** 37936167 **PMCID:** PMC10629148

Abstract

BACKGROUND: Fall-related injuries can reduce older adults' independence and result in economic burdens. The assistive technologies and home modifications explored in this review are suggested to reduce the risk of falls of community-dwelling older people. However, the location of the in-home assistive technology being used, and the in-home modification likely interact and influence fall reduction and injury prevention of community-dwelling older adults. This interactive effect is poorly understood. A better understanding of the impact of assistive technologies and modifications in the homes of older adults is needed to support the appropriate application of these devices.

OBJECTIVE: The objective of this systematic review is to detail the contribution of assistive technology and home modification on falls, fall frequency, fall severity, and fall location within the homes of community-dwelling older adults.

METHODS: We will source articles from 3 databases (MEDLINE, CINAHL, Web of Science Core Collection) and will assess them using a set of pre-defined inclusion and exclusion criteria. Reporting will be in accordance with PRISMA 2020. Two independent reviewers will screen each study at the title and abstract and full-text level. We are managing citations within the Covidence software. Data extraction and analysis will be reported in a systematic review.

DISCUSSION: The outcome variables of interest are fall frequency, fall location, injury, mortality, and hospitalization. These variables of interest all relate to falls, their severity, and their locations in the home. We are seeking a better understanding of how these outcomes vary with the use of different assistive technologies and home modifications as reported in the literature. This will help us understand where falls occur which may inform how different assistive technologies can be used by community-dwelling older adults to prevent falls and adverse outcomes in different areas of their homes. Our review will provide a basis for more intentional prescription of ambulatory assistive technologies and evidence-based recommendations of home modifications. It may also inform adaptations to existing technologies to foster safer mobility in the homes of community-dwelling older adults. SYSTEMATIC REVIEW REGISTRATION: This protocol has been submitted for registration in PROSPERO CRD42022370172 on October 24, 2022.

Language: en

Keywords: Aged; Humans; Hospitalization; Aging; *Independent Living; *Self-Help Devices; Assistive technologies; Fall prevention; Home modifications; Mobility aids; Review Literature as Topic; Systematic review protocol; Systematic Reviews as Topic

Landing wise program: feasibility study protocol for Parkinson's disease

Fernandes JB, Domingos J, Família C, Santos C, Santana D, Gregório F, Costa I, Afonso J, Matos L, Marques S, Santos T, Fernandes S, Santos I, Sousa N, Ramos C, Godinho C. Front. Med. (Lausanne) 2023; 10: e1247660.

DOI: 10.3389/fmed.2023.1247660 **PMID:** 37915322 **PMCID:** PMC10616464

Abstract

Regardless of the benefits of fall prevention programs, people with Parkinson's disease (PD) will still fall. Therefore, it is crucial to explore novel therapeutic approaches that are well-accepted and effective for addressing fall risk and the fear of falls among this population. The present study aims to assess the feasibility of the Landing Wise program as a therapeutic intervention for reducing the fear of falling in people with PD. A mixed-methods study will be conducted using convenience sampling to recruit 20 people with PD with a moderate concern of falling from a Parkinson's Patients Association. In addition to usual care, participants will attend 2 days per week, 90 min group sessions for 8 weeks. The intervention combines group cognitive behavioral intervention with the training of safe landing strategies. Feasibility will be assessed by six key domains (recruitment strategy and rates, enrollment, retention, acceptability, reasons for decline/withdrawal, and adverse events). Quantitative data will be analyzed using descriptive statistics to characterize the sample, followed by inferential statistics to evaluate differences in the Short Falls Efficacy Scale-International Scale, Movement Disorder Society Unified Parkinson's Disease Rating Scale, Timed Up Go, 6-Minutes Walking Distance, and fall frequency and severity scores between baseline and final assessment. Qualitative data will be analyzed using an inductive thematic analysis process. There is a growing interest in developing new effective therapeutic approaches for people with PD. If proven program feasibility, this study precedes a randomized controlled trial to establish the effectiveness of the Landing Wise program.

Language: en

Keywords: accident prevention; rehabilitation; accidental falls; physiotherapy; cognitive behavioral therapy; Parkinson’s disease; exercise movement techniques; safe landing

Baclofen and the risk of fall and fracture in older adults: a real-world cohort study

Hwang YJ, Chang AR, Brotman DJ, Inker LA, Grams ME, Shin JI. J. Am. Geriatr. Soc. 2023; ePub(ePub): ePub.

DOI: 10.1111/jgs.18665 **PMID:** 37933734

Abstract

BACKGROUND: The growth of oral muscle relaxant prescriptions among older adults in the United States is concerning due to the drugs' adverse sedative effects. Baclofen is a gamma-aminobutyric acid agonist muscle relaxant that is associated with encephalopathy. We characterized the risk of fall and fracture associated with oral baclofen against other muscle relaxants (tizanidine or cyclobenzaprine) in older adults.

METHODS: We designed a new-user, active-comparator study using tertiary health system data from Geisinger Health, Pennsylvania (January 2005 through December 2018). Older adults (aged ≥65 years) newly treated with baclofen, tizanidine, or cyclobenzaprine were included. Propensity score-based inverse probability of treatment weighting (IPTW) was used to balance the treatment groups on 58 baseline characteristics. Fine-Gray competing risk regression was used to estimate the risk of fall and fracture.

RESULTS: The study cohort comprised of 2205 new baclofen users, 1103 new tizanidine users, and 9708 new cyclobenzaprine users. During a median follow-up of 100 days, baclofen was associated with a higher risk of fall compared to tizanidine (IPTW incidence rate, 108.4 vs. 61.9 per 1000 person-years; subdistribution hazard ratio [SHR], 1.68 [95% CI, 1.20-2.36]). The risk of fall associated with baclofen was comparable to cyclobenzaprine (SHR, 1.17 [95% CI, 0.93-1.47]) with a median follow-up of 106 days. The risk of fracture was similar among patients treated with baclofen versus tizanidine (SHR, 0.85 [95% CI, 0.63-1.14]) or cyclobenzaprine (SHR, 0.85 [95% CI, 0.67-1.07]).

CONCLUSIONS: The risk of fall associated with baclofen was greater than tizanidine, but not compared to cyclobenzaprine in older adults. The risk of fracture was comparable among the older users of baclofen, tizanidine, and cyclobenzaprine. Our findings may inform risk-benefit considerations in the increasingly common clinical encounters where oral muscle relaxants are prescribed.

Language: en

Keywords: fall; baclofen; fracture; muscle relaxant

Impact of a decision support system on fall-prevention nursing practices

Jung H, Park HA, Lee HY. J. Patient Saf. 2023; ePub(ePub): ePub.

DOI: 10.1097/PTS.0000000000001168 **PMID:** 37922246

Abstract

OBJECTIVES: The aim of this study was to develop a computerized decision support system (CDSS) that could automatically calculate the risk of falls using electronic medical record data and provide evidence-based fall-prevention recommendations based on risk factors. Furthermore, we analyzed the usability and effect of the system on fall-prevention nursing practices.

METHODS: A computerized fall-prevention system was developed according to the system development life cycle, and implemented between March and August 2019 in a single medical unit with a high prevalence of falls. The usability was evaluated 1 month after CDSS implementation. In terms of time and frequency, changes in fall-prevention nursing practices were analyzed using survey data and nursing documentation, respectively. Finally, the incidence of falls before and after system implementation was compared to examine the clinical effectiveness of the CDSS.

RESULTS: According to the usability test, the average ease of learning score (5.083 of 7) was the highest among 4 dimensions. The time spent engaged in fall-prevention nursing care per patient per shift increased, particularly for nursing diagnoses and planning. Moreover, the mean frequency of daily documented fall-prevention interventions per patient also increased. Particularly, nursing statements related to nonspecific interventions such as environmental modifications increased. However, the incidence of falls did not decrease after implementation of the CDSS.

CONCLUSIONS: Although adoption of the computerized system increased the time spent and number of records created in terms of fall-prevention practices in nurses, no improvement in clinical outcomes was observed, particularly in terms of fall rate reduction.

Language: en

Fear of falling: scoping review and topic analysis using natural language processing

Kolpashnikova K, Harris LR, Desai S. PLoS One 2023; 18(10): e0293554.

DOI: 10.1371/journal.pone.0293554 **PMID:** 37906616

Abstract

Fear of falling (FoF) is a major concern among older adults and is associated with negative outcomes, such as decreased quality of life and increased risk of falls. Despite several systematic reviews conducted on various specific domains of FoF and its related interventions, the research area has only been minimally covered by scoping reviews, and a comprehensive scoping review mapping the range and scope of the research area is still lacking. This review aims to provide such a comprehensive investigation of the existing literature and identify main topics, gaps in the literature, and potential opportunities for bridging different strains of research. Using the PRISMA-ScR guidelines, we searched the Cochrane Database of Systematic Reviews, CINAHL, Embase, MEDLINE, PsycInfo, Scopus, and Web of Science databases. Following the screening process, 969 titles and abstracts were chosen for the review. Pre-processing steps included stop word removal, stemming, and term frequency-inverse document frequency vectorization. Using the Non-negative Matrix Factorization algorithm, we identified seven main topics and created a conceptual mapping of FoF research. The analysis also revealed that most studies focused on physical health-related factors, particularly balance and gait, with less attention paid to cognitive, psychological, social, and environmental factors. Moreover, more research could be done on demographic factors beyond gender and age with an interdisciplinary collaboration with social sciences. The review highlights the need for more nuanced and comprehensive understanding of FoF and calls for more research on less studied areas.

Language: en

Associations between osteosarcopenia and falls, fractures, and frailty in older adults: results from the Canadian Longitudinal Study on Aging (CLSA)

Lee A, McArthur C, Ioannidis G, Duque G, Adachi JD, Griffith LE, Thabane L, Papaioannou A. J. Am. Med. Dir. Assoc. 2023; ePub(ePub): ePub.

DOI: 10.1016/j.jamda.2023.09.027 **PMID:** 37925161

Abstract

OBJECTIVE: To explore if older adults with osteosarcopenia are at a greater risk of falls, fractures, frailty, and worsening life satisfaction and activities of daily living (ADL) compared to those with normal bone mineral density (BMD) and without sarcopenia.

DESIGN: The baseline and 3-year follow-up of a longitudinal study. SETTING AND PARTICIPANTS: Community-dwelling people aged 65 years or older in Canada.

METHODS: Caucasian participants 65 years or older that completed the Canadian Longitudinal Study on Aging (CLSA) 2015 baseline interview, physical measurements and 3-year follow-up were included. Osteopenia/osteoporosis was defined as BMD T score below -1 SD according to the World Health Organization, and sarcopenia was defined as low grip strength and/or low gait speed according to the Sarcopenia Definition Outcomes Consortium. Osteosarcopenia was defined as the coexistence of osteopenia/osteoporosis and sarcopenia. Self-reported incident falls and fractures in the last 12 months before the 3-year follow-up were measured. Frailty was assessed through the Rockwood Frailty Index (FI); life satisfaction through the Satisfaction With Life Scale (SWLS); and ADL through the Older American Resources and Services modules. Multivariable logistic and linear regression, including subgroup analyses by sex, were conducted.

RESULTS: The sample of 8888 participants (49.1% females) had a mean age (SD) of 72.7 (5.6) years. At baseline, neither osteopenia/osteoporosis nor sarcopenia (reference group) was present in 30.1%, sarcopenia only in 18.4%, osteopenia/osteoporosis only in 29.2%, and osteosarcopenia in 22.3%. Osteosarcopenia was significantly associated with incident falls and fractures in males [adjusted odds ratio (aOR), 1.90, 95% CI 1.15, 3.14, and aOR 2.60, 95% CI 1.14, 5.91, respectively] compared to males without osteopenia/osteoporosis or sarcopenia. Participants with osteosarcopenia had worsening ADL of 0.110 (estimated β coefficient 0.110, 95% CI 0.029, 0.192) and a decrease in their SWLS by 0.660 (estimated β coefficient -0.660, 95% CI -1.133, -0.187), compared to those without. Osteosarcopenia was not associated with frailty for both males and females.

CONCLUSIONS AND IMPLICATIONS: Osteosarcopenia was associated with self-reported incident falls and fractures in males and worse life satisfaction and ADL for all participants. Assessing and identifying osteosarcopenia is essential for preventing falls and fractures. Furthermore, it improves life satisfaction and ADL.

Language: en

Keywords: falls; CLSA; fractures; osteoporosis; Osteosarcopenia; sarcopenia

Association between falls and nonmotor symptoms in patients with Parkinson's disease

Li Z, Jiang X, Yang M, Pan Y. J. Clin. Neurosci. 2023; 118: 143-146.

DOI: 10.1016/j.jocn.2023.10.013 **PMID:** 37939511

Abstract

INTRODUCTION: Parkinson's disease (PD) is a chronic neurodegenerative disorder. Falls are common in patients with PD and can lead to disability, bedridden status, and death. The mechanisms of falls induced by symptoms of PD have not been fully clarified. We investigated the association between falls and nonmotor symptoms in PD patients.

METHODS: A total of 361 patients with Parkinson's disease were included. Whether the patients had fallen in the past half a year was recorded. Nonmotor symptoms were assessed by 30 items from the nonmotor symptom questionnaire (NMS Quest), Parkinson's Disease Sleep Scale (PDSS), Hamilton Depression Scale (HAMD), Hamilton Anxiety Scale (HAMA), and Montreal Cognitive Assessment Scale (MOCA).

RESULTS: A total of 63 patients experienced falls in the past six months, with an incidence of 17.5%. The patients with falls were elderly, had severe motor symptoms and disease severity, and the proportion of diabetic patients who experienced falls was higher. Adjusted for the above factors, the results showed that patients with falls had higher PD-NMS, HAMD and HAMA scores, but there was no significant difference in the total score and subscores of the MoCA scale between the two groups. The risk factors related to falling included age, history of diabetes, depression (HAMD), HAMD cognitive impairment, NMS urinary tract and NMS postural hypotension.

CONCLUSIONS: Falls were a common symptom in patients with PD and were not only related to motor symptoms but also closely related to nonmotor symptoms. urinary tract symptoms, postural hypotension, depression and HAMD cognitive impairment were risk factors related to falling in patients with PD.

Language: en

Keywords: Falls; Parkinson's disease; Motor symptoms; Nonmotor symptoms

A cross-sectional study on fall direction and lower limb loading in response to a perturbation on laterally inclined platform

Mathunny JJ, Srinivasan HK, Kumar A, Karthik V. Appl. Bionics Biomech. 2023; 2023: e7385119.

DOI: 10.1155/2023/7385119 **PMID:** 37928743 **PMCID:** PMC10624552

Abstract

Perturbation-based balance training (PBT) improves reactive stepping in older adults and people with neurological disorders. Slip-induced falls are a threat to older adults, leading to hip fractures. Fall-prone individuals must be trained to regain balance during a fall in the posterolateral direction. This study aims to analyze the characteristics of the reactive step induced by a laterally inclined platform. This cross-sectional study included 46 healthy participants who performed a "lean and release" backward fall using a platform with two inclined angles on each side. Kinovea software was used to analyze the step width. Reactive steps, characterized by crossover or medial foot placement, are preventive measures against posterolateral falls. The first objective was on the narrowed step width that was subjected to analysis using analysis of variance (ANOVA) and Tukey's post hoc assessment, indicating a tendency toward posterolateral falls. As part of our second objective, the inclined platform resulted in uneven loading between the legs, with a preference for the unloaded leg as the reactive leg ($p < 0.001$), as determined by Fisher's exact test and Cramer's V. These characteristics align closely with those observed in modified constraint-induced movement therapy (mCIMT). The angled platform had a significant effect on selecting the reactive leg, particularly at higher angles ($p < 0.001$). Thus, the study suggested that the device is capable of inducing posterolateral falls and exhibited mCIMT characteristics.

Language: en

Severe hypoglycemia and falls in older adults with diabetes: the Diabetes & Aging Study

Moffet HH, Huang ES, Liu JY, Parker MM, Lipska KJ, Laiteerapong N, Grant RW, Lee AK, Karter AJ. Diabet. Epidemiol. Manag. 2023; 12: e100162.

DOI: 10.1016/j.deman.2023.100162 **PMID:** 37920602 **PMCID:** PMC10621321

Abstract

OBJECTIVE: To estimate rates of severe hypoglycemia and falls among older adults with diabetes and evaluate their association. RESEARCH DESIGN AND METHODS: Survey in an age-stratified, random sample adults with diabetes age 65-100 years; respondents were asked about severe hypoglycemia (requiring assistance) and falls in the past 12 months. Prevalence ratios (adjusted for age, sex, race/ethnicity) estimated the increased risk of falls associated with severe hypoglycemia.

RESULTS: Among 2,158 survey respondents, 79 (3.7%) reported severe hypoglycemia, of whom 68 (86.1%) had no ED visit or hospitalization for hypoglycemia. Falls were reported by 847 (39.2%), of whom 745 (88.0%) had no fall documented in outpatient or inpatient records. Severe hypoglycemia was associated with a 70% greater prevalence of falls (adjusted prevalence ratio = 1.7 (95% CI, 1.3-2.2)).

CONCLUSION: While clinical documentation of events likely reflects severity or care-seeking behavior, severe hypoglycemia and falls are common, under-reported life-threatening events.

Language: en

Keywords: survey; aging; falls; diabetes mellitus; patient-reported outcomes

A pilot observational study of gait changes over time before and after an unplanned hospital visit in long-term care residents with dementia

Nabavi H, Mehdizadeh S, Shum LC, Flint AJ, Mansfield A, Taati B, Iaboni A. BMC Geriatr. 2023; 23(1): e723.

DOI: 10.1186/s12877-023-04385-0 **PMID:** 37940854

Abstract

BACKGROUND: Older adults with dementia living in long-term care (LTC) have high rates of hospitalization. Two common causes of unplanned hospital visits for LTC residents are deterioration in health status and falls. Early detection of health deterioration or increasing falls risk may present an opportunity to intervene and prevent hospitalization. There is some evidence that impairments in older adults' gait, such as reduced gait speed, increased variability, and poor balance may be associated with hospitalization. However, it is not clear whether changes in gait are observable and measurable before an unplanned hospital visit and whether these changes persist after the acute medical issue has been resolved. The objective of this study was to examine gait changes before and after an unplanned acute care hospital visit in people with dementia.

METHODS: We performed a secondary analysis of quantitative gait measures extracted from videos of natural gait captured over time on a dementia care unit and collected information about unplanned hospitalization from health records.

RESULTS: Gait changes in study participants before hospital visits were characterized by decreasing stability and step length, and increasing step variability, although these changes were also observed in participants without hospital visits. In an age and sex-adjusted mixed effects model, gait speed and step length declined more quickly in those with a hospital visit compared to those without.

CONCLUSIONS: These results provide preliminary evidence that clinically meaningful longitudinal gait changes may be captured by repeated non-invasive gait monitoring, although a larger study is needed to identify changes specific to future medical events.

Language: en

Keywords: Hospitalization; Falls; Computer vision; Longitudinal analysis; Nursing homes; Walking patterns

Detecting differences in limb load asymmetry during walking between older adult fallers and non-fallers using in-shoe sensors

Nakanowatari T, Hoshi M, Sone T, Kamide N, Sakamoto M, Shiba Y. Gait Posture 2023; ePub(ePub): ePub.

DOI: 10.1016/j.gaitpost.2023.10.022 **PMID:** 37919177

Abstract

BACKGROUND: Previous studies have reported that clinical walk tests could not detect differences between fallers and non-fallers in older adults. With advancements in wearable technology, it may be possible to assess differences in loading parameters in clinical settings using portable data collection methods. RESEARCH QUESTION: The purpose of this study was to determine if wearable sensors (loadsol®) are reliable for assessing asymmetry of contact time, peak force, loading rate (LR), and impulse in older adults and determine if the insole can detect differences in these parameters between fallers and non-fallers during walking.

METHODS: Fifty-five older adults (74.1 ± 6.1 years) walked at their maximum speed on a flat floor. Force data were collected from insoles (100 Hz) during a 10-m walk test. To assess reliability, an intraclass correlation coefficient [ICC(2,k)] was generated for each asymmetry variable. To determine differences between fallers and non-fallers, analysis of covariance (ANCOVA; covariate: body mass index) was completed for each variable.

RESULTS: The ICC of peak force asymmetry (PFA) was 0.942, but other ICCs were less than 0.75. The ANCOVA results indicate that the loadsol® can detect differences in PFA between fallers and non-fallers. The PFA was significantly greater in fallers than in non-fallers. SIGNIFICANCE: The ability to collect force data while walking using loadsol® has the potential to broaden the research questions investigated, explore clinical applications, and increase generalizability.

Language: en

Keywords: Gait; Fall; Asymmetry; Wearable devices

Can medication increase the risk of falls? The importance of medication review

Nazarko L. Br. J. Community Nurs. 2023; 28(11): 534-540.

DOI: 10.12968/bjcn.2023.28.11.534 **PMID:** 37930860

Abstract

Falls are the second leading cause of unintentional injury deaths worldwide and are a major health issue for older people. One of the factors that can increase the risk of falls is medication. This article examines how medication can affect fall risk and how medication review can reduce the risk of falls.

Language: en

Keywords: falls; Ageing; medication

Implementation of fall sensors in long-term care : an interview study to identify promoting and inhibiting factors from the perspective of professional caregivers

Redlich MC, Fischer F. Z. Gerontol. 2023; ePub(ePub): ePub.

DOI: 10.1007/s00391-023-02255-3 **PMID:** 37940726

Abstract

BACKGROUND AND OBJECTIVE: Digital support systems are becoming increasingly more important in long-term inpatient care facilities. Welfare technologies have the potential to make a valuable contribution to maintaining independence in advanced age. At the same time the technologies can support professional caregivers. The aim of the study was to describe the expectations and experiences with a new technology, using the example of a fall sensor system, from the perspective of professional caregivers.

METHOD: We used a qualitative design with semistructured interviews in two long-term inpatient care facilities. In one facility, three individual interviews took place, while in the other long-term care facility, a group interview with three nursing professionals was conducted. Additionally, one individual interview was conducted with a person in a leadership role in each facility. The time from implementation of the fall sensors to the interviews was between 1 and 3 months. Data were analyzed using qualitative content analysis in MAXQDA.

RESULTS AND DISCUSSION: The study demonstrated that there was a correspondence between expectations of and retrospective experiences with the new technology among professional nurses. The main facilitating factors of the implementation that were identified were timely information about the risk of falling or a fall that has occurred, maintenance of residents' autonomy and freedom of movement as well as the enhancement of the sense of security among nursing professionals and the associated psychological relief effect. The inhibiting factors of the implementation were compulsory presetting, false alarms and faulty handling of the technology due to missing knowledge.

Language: de

Keywords: Fall prevention; Digitalization; Elderly care; Fall detection; Long-term inpatient care

COVID-19 pandemic effects on clinical outcomes of hip fractures among pediatric and adult patients

Roskam JS, Hauser KM, Difazio LT, Rolandelli RH, Nemecz AK, Németh ZH. J. Trauma Nurs. 2023; 30(6): 334-339.

DOI: 10.1097/JTN.0000000000000752 **PMID:** 37937874

Abstract

BACKGROUND: Little is known about the distribution and outcomes of hip fractures in pediatric patients during the COVID-19 pandemic.

OBJECTIVE: To study the clinical outcomes of both pediatric and adult patients who underwent hip fracture surgeries and determine the effects of changes surrounding the COVID-19 pandemic.

METHODS: Both pediatric and adult surgical hip fracture cases were analyzed from the pandemic year (2020) and the control year (2019) using the American College of Surgeons National Surgical Quality Improvement Program database.

RESULTS: Between the prepandemic (control) and pandemic years, a total of 2,438 pediatric and 28,180 adult cases were compared. Pediatric patients had similar perioperative characteristics and outcomes between the two years. Significantly fewer hip fractures were reported among adults during the pandemic ($p < .001$). Preoperatively, more adult patients had ventilator dependence ($p = .020$), transfusions ($p = .029$), and systemic inflammatory response syndrome ($p < .001$) in 2020. Adult operations were more likely to be emergent in 2020 ($p < .001$) and adults had more severe disease states. Length of stay ($p < .001$) and the time from operation to discharge ($p < .001$) were significantly longer for the adult cohort in 2020. Mortality was also higher for adults during the first year of the pandemic ($p = .003$), and superficial surgical site infections became more common ($p = .036$).

CONCLUSION: Pediatric hip fracture patients had similar clinical outcomes between 2019 and 2020. Adults with hip fractures presented in more serious clinical conditions, which resulted in higher mortality in 2020. Further studies could better clarify the reasons as to why adult hip fracture patients had markedly worse clinical course during the COVID year than pediatric patients.

Language: en

Keywords: Adult; Child; Humans; Length of Stay; Retrospective Studies; Pandemics; *COVID-19; *Hip Fractures/epidemiology/surgery

Correction: A methodology for the public health surveillance and epidemiologic analysis of outdoor falls that require an emergency medical services response

Rundle AG, Crowe RP, Wang HE, Lo AX. Inj. Epidemiol. 2023; 10(1): e56.

DOI: 10.1186/s40621-023-00469-y **PMID:** 37924138 **PMCID:** PMC10625182

Abstract

Correction: Injury Epidemiology (2023) 10:4 https://doi.org/10.1186/s40621-023-00414-z

Following publication of the original article (Rundle et al. 2023), the authors identified an error in the Funding section which lacked that Alexander X. Lo was supported by a grant from the Davee Foundation (Excellence in Emergency Medicine Grant).

Language: en

Imminent fall risk after fracture

Schene MR, Wyers CE, Driessen AMH, Souverein PC, Gemmeke M, van den Bergh JP, Willems HC. Age Ageing 2023; 52(10): afad201.

DOI: 10.1093/ageing/afad201 **PMID:** 37930741

Abstract

RATIONALE: Adults with a recent fracture have a high imminent risk of a subsequent fracture. We hypothesise that, like subsequent fracture risk, fall risk is also highest immediately after a fracture. This study aims to assess if fall risk is time-dependent in subjects with a recent fracture compared to subjects without a fracture.

METHODS: This retrospective matched cohort study used data from the UK Clinical Practice Research Datalink GOLD. All subjects ≥50 years with a fracture between 1993 and 2015 were identified and matched one-to-one to fracture-free controls based on year of birth, sex and practice. The cumulative incidence and relative risk (RR) of a first fall was calculated at various time intervals, with mortality as competing risk. Subsequently, analyses were stratified according to age, sex and type of index fracture.

RESULTS: A total of 624,460 subjects were included; 312,230 subjects with an index fracture, matched to 312,230 fracture-free controls (71% females, mean age 70 ± 12, mean follow-up 6.5 ± 5 years). The RR of falls was highest in the first year after fracture compared to fracture-free controls; males had a 3-fold and females a 2-fold higher risk. This imminent fall risk was present in all age and fracture types and declined over time. A concurrent imminent fracture and mortality risk were confirmed.

CONCLUSION/DISCUSSION: This study demonstrates an imminent fall risk in the first years after a fracture in all age and fracture types. This underlines the need for early fall risk assessment and prevention strategies in 50+ adults with a recent fracture.

Language: en

Keywords: Aged; Humans; Female; Male; Aged, 80 and over; Risk Assessment; Seasons; Cohort Studies; Retrospective Studies; risk; *Fractures, Bone/epidemiology; accidental falls; clinical practice research datalink; imminent fall risk; imminent fracture risk; older people

Hip fractures in patients with dementia: an emerging orthopedic concern

Sioutis S, Zikopoulos A, Karampikas V, Mitsiokapa E, Tsatsaragkou A, Katsanos S, Mastrokalos D, Koulalis D, Mavrogenis AF. J. Long Term Eff. Med. Implants 2024; 34(1): 85-93.

DOI: 10.1615/JLongTermEffMedImplants.2023046658 **PMID:** 37938210

Abstract

Hip fractures are a very common injury in the elderly population associated with an increased mortality rate. Currently, more and more elderly patients are diagnosed with dementia. Demented patients are more prone to falls and hip fractures compared to the general population because of conditions related to their disease such as instability, osteoporosis, poor muscle control and weakness. The coexistence of dementia and hip fractures is a difficult situation for both the patients and the treating physicians because of postoperative complications in this frail subgroup of patients and their inability to stand up and walk. To enhance the literature, we reviewed published studies of hip fracture patients suffering from dementia to discuss why they have more frequent hip fractures, to review their associated in-hospital complications, and to emphasize on their postoperative management to be able to reach the pre-injury activity level and optimal quality of life.

Language: en

Keywords: Aged; Humans; *Dementia/complications; *Hip Fractures/complications/surgery; *Orthopedics; *Osteoporosis; Quality of Life

The combination of locomotive syndrome and poor sleep quality is a risk factor of falls among community-dwelling middle-aged and older women: a cross-sectional study

Takagi D, Kato M, Ozaki E, Kurita Y, Nakano W, Matsui D, Koyama T. Geriatr. Gerontol. Int. 2023; ePub(ePub): ePub.

DOI: 10.1111/ggi.14710 **PMID:** 37932124

Abstract

AIM: The combination of locomotive syndrome (LS) and poor sleep quality (PSQ) has not yet been shown to result in falls, and the combination of locomotive syndrome (LS) and poor sleep quality (PSQ) has not yet been shown to affect bone conditions in old age and middle age.

METHODS: This cross-sectional study enrolled 2233 community-dwelling middle-aged to older Japanese women. LS and PSQ were assessed by the stand-up test, two-step test, the 25-question Geriatric Locomotive Function Scale, and the Pittsburgh Sleep Quality Index (PSQI). Participants with both LS 1-3 (any) and a PSQI score ≥6 were classified as belonging to the LS(+)/PSQ(+) group. The incidence of falls in the previous month was collected using a self-administered questionnaire. Bone conditions were evaluated using an ultrasonic bone densitometer.

RESULTS: The LS(+)/PSQ(+) group independently had a higher risk of falls after adjusting for confounding factors than the LS(-)/PSQ(-) group using multiple logistic regression analysis (odds ratio 1.92, 95% confidence interval 1.01-3.65, $P < 0.05$) LS(-)/PSQ(+) and LS(+)/PSQ(-) groups did not. Our study showed no relationships between LS(-)/PSQ(+) and LS(+)/PSQ(-) and the incidences of fall. The LS(+)/PSQ(+) group had lower trabecular bone density and cortical bone thickness than the LS(-)/PSQ(-) group ($P < 0.05$).

CONCLUSION: The combination of LS and PSQ is an independent risk factor of falls, indicating that assessing both LS and PSQ could be useful in detecting middle-aged and older women with low bone density and thickness who fall easily at an early stage. Geriatr Gerontol Int 2023; ••: ••-••.

Language: en

Keywords: women; fall; locomotive syndrome; middle-aged and older; sleep quality

Localizing EEG recordings associated with a balance threat during unexpected postural translations in young and elderly adults

Wang Z, Graci V, Seacrist T, Guez A, Keshner EA. IEEE Trans. Neural Syst. Rehabil. Eng. 2023; ePub(ePub): ePub.

DOI: 10.1109/TNSRE.2023.3331211 **PMID:** 37938961

Abstract

Balance perturbations are accompanied by global cortical activation that increases in magnitude when postural perturbations are unexpected, potentially due to the addition of a startle response. A specific site for best recording the response to unexpected destabilization has not been identified. We hypothesize that a single sensor located near to subcortical brainstem mechanisms could serve as a marker for the response to unpredictable postural events. Twenty healthy young (20.8 ± 2.9 yrs) and 20 healthy elder (71.7 ± 4.2 yrs) adults stood upright on a dynamic platform with eyes open. Platform translations (20 cm at 100 cm/s) were delivered in the posterior (29 trials) and anterior (5 catch trials) directions. Active EEG electrodes were located at Fz and Cz and bilaterally on the mastoids. Following platform acceleration onset, 300 ms of EEG activity from each trial was detrended, baseline-corrected, and normalized to the first trial. Average Root-Mean-Square (RMS) values across "unpredictable" and "predictable" events were computed for each channel. EEG RMS responses were significantly greater with unpredictable than predictable disturbances: Cz ($p<0.001$), Fz ($p<0.003$), and mastoid ($p<0.0001$). EEG RMS responses were also significantly greater in elderly than young adults at Cz ($p<0.02$) and mastoid ($p<0.04$). A significant effect of sex in the responses at the mastoid sensors ($p<0.04$) revealed that elderly male adults were principally responsible for the age effect. These results confirm that the cortical activity resulting from an unexpected postural disturbance could be portrayed by a single sensor located over the mastoid bone in both young and elderly adults.

Language: en