Safety Literature 5th November 2023

Fall risk stratification of community-living older people. Commentary on the world guidelines for fall prevention and management

Albites-Sanabria J, Greene BR, McManus K, Palmerini L, Palumbo P, Sousa I, van Schooten KS, Weicken E, Wenzel M. Age Ageing 2023; 52(10): afad162.

DOI: 10.1093/ageing/afad162 **PMID:** 37897807

Abstract

The Task Force on Global Guidelines for Falls in Older Adults has put forward a fall risk stratification tool for community-dwelling older adults. This tool takes the form of a flowchart and is based on expert opinion and evidence. It divides the population into three risk categories and recommends specific preventive interventions or treatments for each category. In this commentary, we share our insights on the design, validation, usability and potential impact of this fall risk stratification tool with the aim of guiding future research.

Language: en

Keywords: Risk; Falls; Guidelines; Prediction; Stratification; Older people

The radiology department as a sentinel in fall prevention among Filipino older adult patients

Angcahan DZ, De Guzman AB. J. Med. Imaging Radiat. Sci. 2023; ePub(ePub): ePub.

DOI: 10.1016/j.jmir.2023.10.004 **PMID:** 37903708

Abstract

Accidental falls are a serious yet underreported form of adverse event in hospitals. Falls account for the leading cause of injury and mortality among older adults. The World Health Organization (WHO) in 2021 reported that an estimated 64,000 individuals die annually from falls globally. In the Philippines, about 53.6% of older Filipinos are experiencing falls from a small population-specific setting and they are more likely to experience functional declines than the younger population. The radiology departments and radiologic technologists (RTs) play a vital role in preventing accidental falls among Filipino older adult patients. Despite the existing safety standards promulgated by national health agencies, awareness of healthcare professionals such as radiologic technologists (RTs) in low- and middle-income countries (LMICs) such as the Philippines remains limited. As such, promoting a safety culture is deemed a main strategy for patient safety from adverse occurrences of falls among Filipino older adults. In doing so, there is a need to establish an incident reporting system for sentinel events, develop risk assessment tools, and define the needed competencies of RTs in preventing catastrophic falls involving Filipino older adult patients. To the authors' knowledge, this paper is the first of its kind to better understand the safety and predisposing risks for falling among older adults in the field of radiology in the Philippines.

Language: en

Keywords: Falls; Patient safety; Adverse event; Filipino older adult patients; Radiologic technologist

Lower gastrocnemius muscle stiffness, derived from elastography, is an independent factor for falls in older adults

Baş H, Okyar Baş A, Ceylan S, Güner M, Koca M, Hafızoğlu M, Şahiner Z, Öztürk Y, Balcı C, Dogu BB, Cankurtaran M, Halil MG. Aging Clin. Exp. Res. 2023; ePub(ePub): ePub.

DOI: 10.1007/s40520-023-02605-6 **PMID:** 37907664

Abstract

BACKGROUND AND AIMS: It is well known that components of sarcopenia (i.e., decreased muscle strength and mass) are related to falls in older adults. However, the possible effects of changes in muscle quality on falls have not been identified. This study aimed to evaluate the changes in muscle quality reflected by muscle stiffness derived from shear-wave elastography (SWE) and its association with falls in older adults.

METHODS: A total of 101 geriatric outpatients were included in the study. Assessments of physical performance, muscle strength (handgrip strength), muscle mass (muscle ultrasonography and bioelectrical impedance analysis), and muscle stiffness of the medial head of gastrocnemius (GCM) in relaxation and passive stretching were performed. The history of falls in the previous year was questioned and recorded.

RESULTS: The median (25-75 percentiles) age of participants was 73 (69-77) years, and 66.3% (n = 67) were female. According to fall history, participants were divided into non-fallers and fallers groups, and 72 (71.3%) and 29 (28.7%) participants were in each group, respectively. The median muscle stiffness of (Emean) the GCM in passive stretching was significantly lower in the fallers group ($p < 0.001$), and it was significantly correlated with the number of falls in the previous year (r: - 0.274, p: 0.010). In regression analyses, the Emean value of GCM in passive stretching was significantly associated with falls independent of confounders (OR: 0.944, 95% CI 0.90-0.98, $p = 0.010$).

DISCUSSION AND CONCLUSION: This is the first study to reveal the relationship between falls and SWE-defined lower GCM stiffness independently of muscle mass and strength.

Language: en

Keywords: Older adults; Muscle quality; Sarcopenia; Shear-wave elastography; Ultrasonography

Construction of fall prevention exercise training scheme for elderly discharged patients using self-efficacy theory framework

Cheng H, Shi M, Pu F. Altern. Ther. Health Med. 2023; ePub(ePub): ePub.

DOI: unavailable **PMID:** 37883750

Abstract

OBJECTIVE: We conducted this study to help older discharged patients recover better, reduce the risk of falls, and improve quality of life through self-efficacy intervention and the Otago exercise program. The purpose of this study was to address specific challenges in rehabilitation and quality of life in older patients.

METHODS: 60 elderly patients discharged from January 1 to June 10, 2022, were selected as the study subjects and randomly divided into the experimental group (n = 30) and the controls (n = 30). We studied the impact of a self-efficacy intervention combined with the Otago Exercise Program (OEP) in older discharged patients. We included patients aged 65 and above who understood the study protocol and randomly divided them into two groups: one group received a combined self-efficacy intervention and OEP, and the other group received only OEP treatment. The intervention period is 12 weeks, 3 times a week, 30-45 minutes each time. We focused on the exercise capacity, fall risk, quality of life, and well-being of patients in both groups after the intervention. The aim of the study was to determine whether this combined intervention could improve recovery and quality of life in older discharged patients.

RESULTS: Comparison of clinical data between the two groups: there were no differences in gender, age, ethnicity, education, residence, family income, complications, and chronic diseases (P >.05). Self-efficacy increased significantly between the two groups after the intervention, but there was no difference before the intervention (P >.05). The self-efficacy of the experimental group was higher than that of the control group on days 15, 30, 45, and 60 (P <.05). Berg balance scale, TUG, PSMS, IADL, ADL, and total fall risk scores were significantly improved, but there was no difference before intervention (P >.05). All indicators of the experimental group were better than those of the control group on days 15, 30, 45, and 60 (P <.05). EAQ scores were significantly improved, but there was no difference between the two groups before intervention (P >.05). The EAQ of the experimental group was higher than that of the control group on days 15, 30, 45, and 60 (P <.05).

CONCLUSIONS: This study found that a self-efficacy-based intervention combined with the Otago Exercise Program (OEP) was of value to older discharged patients. This comprehensive intervention approach can improve patients' self-efficacy, balance, walking speed, daily functioning, reduce fall risk, and improve quality of life. For healthcare providers and institutions, this means that this approach could be considered to improve the care of older discharged patients. By enhancing patients' self-efficacy and physical function,

it can promote better recovery and independent living, reduce the risk of readmissions, and thus reduce the burden on the healthcare system. This study provides important practical guidance for improving the recovery and quality of life of older discharged patients.

Language: en

A machine learning approach to identify important variables for distinguishing between fallers and non-fallers in older women

Gregg E, Beggs C, Bissas A, Nicholson G. PLoS One 2023; 18(10): e0293729.

DOI: 10.1371/journal.pone.0293729 **PMID:** 37906588

Abstract

Falls are a significant ongoing public health concern for older adults. At present, few studies have concurrently explored the influence of multiple measures when seeking to determine which variables are most predictive of fall risks. As such, this cross-sectional study aimed to identify those functional variables (i.e. balance, gait and clinical measures) and physical characteristics (i.e. strength and body composition) that could best distinguish between older female fallers and non-fallers, using a machine learning approach. Overall, 60 community-dwelling older women (≥65 years), retrospectively classified as fallers (n = 21) or non-fallers (n = 39), attended three data collection sessions. Data (281 variables) collected from tests in five separate domains (balance, gait, clinical measures, strength and body composition) were analysed using random forest (RF) and leave-one-variable-out partial least squares correlation analysis (LOVO PLSCA) to assess variable importance. The strongest discriminators from each domain were then aggregated into a multi-domain dataset, and RF, LOVO PLSCA, and logistic regression models were constructed to identify the important variables in distinguishing between fallers and non-fallers. These models were used to classify participants as either fallers or non-fallers, with their performance evaluated using receiver operating characteristic (ROC) analysis. The study found that it is possible to classify fallers and non-fallers with a high degree of accuracy (e.g. logistic regression: sensitivity = 90%; specificity = 87%; AUC = 0.92; leave-one-out cross-validation accuracy = 63%) using a combination of 18 variables from four domains, with the gait and strength domains being particularly informative for screening programmes aimed at assessing falls risk.

Language: en

Measures of attributes of locomotor capacity in older people: a systematic literature review following the COSMIN methodology

Honvo G, Sabico S, Veronese N, Bruyere O, Rizzoli R, Amuthavalli Thiyagarajan J, Mikton C, Diaz T, Cooper C, Reginster JY. Age Ageing 2023; 52(Suppl 4): iv44-iv66.

DOI: 10.1093/ageing/afad139 **PMID:** 37902521 **PMCID:** PMC10615073

Abstract

BACKGROUND: Locomotor capacity (LC) is an important domain of intrinsic capacity and key determinant of functional ability and well-being in older age. The United Nations Decade of Healthy Ageing (2021-2030) calls for strengthening data and research on healthy ageing, including the measurement of older persons' LC. To advance the measurement and monitoring of LC, there is pressing need to identify valid and reliable measures.

OBJECTIVE: To identify all the available tools that were validated for measurement of LC or of its specific attributes in older people and to assess the methodological quality of the studies and measurement properties of the tools.

DESIGN: Systematic review. SETTING: Anywhere (Community-dwelling; long-term care facility; etc.). SUBJECTS: Older people.

METHODS: We used highly sensitive search strategies to search the following databases: Medline, Embase, Scopus, CINAHL and PsycINFO. The study was conducted following the COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN) methodology for systematic review of outcome measurement instruments.

RESULTS: A total of 125 studies were included, which assessed tools for balance (n = 84), muscle power (n = 12), muscle strength (n = 32, including four studies about tools for balance and muscle power) and endurance (n = 1). No studies on tools for muscle function, joint function, or locomotor capacity overall, were retrieved. We identified 69 clinician-report or objective assessment tools for balance, 30 for muscle strength, 12 for muscle power and 1 endurance assessment tool. The GRADE assessment of quality of evidence showed that only a few tools have high quality evidence for both sufficient validity and reliability: The Balance Evaluation Systems Test (BESTest), the Mini-Balance Evaluation Systems Test (Mini-BESTest), the Berg Balance Scale (BBS) and the Timed Up and Go (TUG) test.

CONCLUSIONS: A few tools with high quality evidence for sufficient validity and reliability are currently available for balance assessment in older people that may be recommended for use in clinical and research settings. Further validation studies are required for muscle strength, muscle power and endurance assessment tools.

Language: en

Keywords: Aged; Humans; Aged, 80 and over; older people; balance; systematic review; *Activities of Daily Living; *Healthy Aging; Consensus; endurance; Independent Living; joint function; locomotor capacity; measurement properties; muscle function; muscle power; muscle strength; Reproducibility of Results; screening or assessment tools

Modifiable fall risk factors among older adults with advanced cancer: secondary analysis of a cluster-randomized clinical trial

Jensen-Battaglia M, Mohammed M, Loh KP, Wells M, Tylock R, Ramsdale E, Canin B, Geer J, O'Rourke MA, Liu JJ, Seplaki CL, Mohile SG, Wildes TM. J. Geriatr. Oncol. 2023; 14(8): e101650.

DOI: 10.1016/j.jgo.2023.101650 **PMID:** 37897888

Abstract

INTRODUCTION: Older adults with cancer have unique fall risk factors related to their disease and treatment such as polypharmacy and neurotoxic treatments. In this secondary analysis, we identified modifiable risk factors associated with future falls among older adults with advanced cancers.

MATERIALS AND METHODS: Data were from the COACH study (ClinicalTrials.gov: NCT02107443; PI: Mohile). Patients were age ≥ 70, had stage III/IV solid tumor or lymphoma, ≥1 geriatric assessment impairment, and were receiving palliative intent treatment. Falls were self-reported at baseline (in the past six months), four to six weeks, three months, and six months. We generated inverse probability weights to account for mortality-related loss to follow-up and applied these in generalized linear mixed models to estimate incidence rate ratios.

RESULTS: Of 541 patients (mean age: 77, standard deviation [SD]: 5.27), 140 (26%) reported prior falls at baseline, and 467 (86%) had falls data for ≥1 follow-up timepoint. Of those, 103 (22%) reported at least one fall during the follow-up period, and 112 (24%) had incomplete follow-up due to death. In fully adjusted models, prior falls and impaired Timed Up and Go score were associated with higher incidence of falls over 6 months.

DISCUSSION: We identified several potentially modifiable fall risk factors in older adults with advanced cancers. Future studies should consider ways to integrate fall risk assessment into ongoing cancer care and intervene to reduce falls in this population.

Language: en

Keywords: Falls; Older adult; Geriatric assessment; Geriatric oncology

Minimal important change in the Berg balance scale in older women with vertebral compression fractures: a retrospective multicenter study

Kobayashi S, Miyata K, Tamura S, Takeda R, Iwamoto H. PM R 2023; ePub(ePub): ePub.

DOI: 10.1002/pmrj.13092 **PMID:** 37905358

Abstract

BACKGROUND: Vertebral compression fractures, which are commonly associated with older age and osteoporotic fractures, have an increased risk of re-fracture. Therefore, improving balance function is important to prevent falls. The minimal important change (MIC) has been recommended for interpreting clinically meaningful changes in rating scales. The MIC of the Berg Balance Scale for use in older women with a vertebral compression fracture has not been established.

OBJECTIVE: To identify the MIC of the Berg Balance Scale that can be used in older women with vertebral compression fractures using predictive modeling methods and the receiver operating characteristic (ROC-based) method.

DESIGN: A retrospective longitudinal multicenter study. PATIENTS: Sixty older women (age 84.1 ± 7.0 years) with vertebral compression fractures who were unable to ambulate independently on a level surface.

METHODS: A change of one point in the Functional Ambulation Categories (FAC) was used as an anchor to calculate the MIC of the Berg Balance Scale based on the change between admission and discharge. We calculated the MIC for the women whose FAC score improved by ≥1 point. We used three anchor-based methods to examine the MIC: the ROC-based method (MIC(ROC)), the predictive modeling method (MIC(pred)), and the MIC(pred) -based method adjusted by the rate of improvement and reliability of transition (MIC(adj)).

RESULT: Thirty-nine women comprised the "important change" group based on their FAC score improvement. In this group, the MIC(ROC) (95% CI) value of the Berg Balance Scale was 10.0 points (5.5-15.5) with an area under the curve of 0.71. The MIC(pred) (95% CI) value was 9.7 (8.1-11.0), and the MIC(adj) (95%CI) was 7.0 (5.5-8.5) points.

CONCLUSION: For women with vertebral compression fracture who are unable to ambulate independently, a 7.0-point improvement in the Berg Balance Scale score may be a useful indicator for reducing the amount of assistance required for walking. This article is protected by copyright. All rights reserved.

Language: en

TinyFallNet: a lightweight pre-impact fall detection model

Koo B, Yu X, Lee S, Yang S, Kim D, Xiong S, Kim Y. Sensors (Basel) 2023; 23(20).

DOI: 10.3390/s23208459 **PMID:** 37896552 **PMCID:** PMC10610937

Abstract

Falls represent a significant health concern for the elderly. While studies on deep learning-based preimpact fall detection have been conducted to mitigate fall-related injuries, additional efforts are needed for embedding in microcomputer units (MCUs). In this study, ConvLSTM, the state-of-the-art model, was benchmarked, and we attempted to lightweight it by leveraging features from image-classification models VGGNet and ResNet while maintaining performance for wearable airbags. The models were developed and evaluated using data from young subjects in the KFall public dataset based on an inertial measurement unit (IMU), leading to the proposal of TinyFallNet based on ResNet. Despite exhibiting higher accuracy (97.37% < 98.00%) than the benchmarked ConvLSTM, the proposed model requires lower memory (1.58 MB > 0.70 MB). Additionally, data on the elderly from the fall data of the FARSEEING dataset and activities of daily living (ADLs) data of the KFall dataset were analyzed for algorithm validation. This study demonstrated the applicability of image-classification models to preimpact fall detection using IMU and showed that additional tuning for lightweighting is possible due to the different data types. This research is expected to contribute to the lightweighting of deep learning models based on IMU and the development of applications based on IMU data.

Language: en

Keywords: ConvLSTM; lightweight; pre-impact fall detection; TinyFallNet

A systematic review of the long-term effects of using smartphone- and tablet-based rehabilitation technology for balance and gait training and exercise programs

Lee C, Ahn J, Lee BC. Bioengineering (Basel) 2023; 10(10).

DOI: 10.3390/bioengineering10101142 **PMID:** 37892872 **PMCID:** PMC10604191

Abstract

Recent advances in wearable motion sensors, mobile devices, the Internet of Things, and telecommunications have created new potential for telerehabilitation. Recognizing that there is no systematic review of smartphone- or tablet-based balance and gait telerehabilitation technology for long-term use (i.e., four weeks or more), this systematic review summarizes the effects of smartphone- or tablet-based rehabilitation technology on balance and gait exercise and training in balance and gait disorders. The review examined studies written in English published from 2013 to 2023 in Web of Science, Pubmed, Scopus, and Google Scholar. Of the 806 studies identified, 14 were selected, and the National Institutes of Health Quality Assessment Tool for Observational Cohort and Cross-sectional Studies was applied to evaluate methodological quality. The systematic review concluded that all 14 studies found balance and gait performance improvement after four weeks or more of balance and gait telerehabilitation. Ten of the 14 studies found that carry-over effects (improved functional movements, muscle strength, motor capacity, cognition, and reduced fear of falling and anxiety levels) were maintained for weeks to months. The results of the systematic review have positive technical and clinical implications for the next-generation design of rehabilitation technology in balance and gait training and exercise programs.

Language: en

Keywords: gait; balance; carry-over effects; in-home use; long-term exercise; smartphone; tablet; telerehabilitation

Prognosis in elderly patients with falls treated in emergency departments: the EDEN-3 study

Llorens P, Guillén Bobe A, Gallardo Vizcaíno P, Ponte Márquez P, Llauger L, Canete M, Ruescas E, Espinosa B. J. Healthc. Qual. Res. 2023; ePub(ePub): ePub.

Vernacular Title

Pronóstico en pacientes ancianos con caídas atendidos en servicios de urgencias: estudio EDEN-3

DOI: 10.1016/j.jhqr.2023.10.003 **PMID:** 37914589

Abstract

OBJECTIVE: To investigate whether falls in people ≥65 years old are a prognostic factor for adverse events compared to the rest of older patients who consult emergency departments, and identify factors related to a worse long-term evolution.

METHOD: EDEN cohort that included patients ≥65 years old. Those patients who consulted for fall and the rest were distinguished. Twelve variables were collected. For comparison: two groups matched by fall propensity score. We compared mortality at one year and combined adverse event post-discharge at one year. In patients with falls, variables independently related to evolution were identified.

RESULTS: Two thousand seven hundred and forty-five patients treated for falls and 22,920 for other reasons. Mortality at one year was 14.4% (9.5% vs. 15.0%, respectively, P<.001) and the combined post-discharge adverse event at one year was 60.6% (52.2% vs. 61.7%, respectively, P<.001). In 4748 patients matched by fall propensity score (2372 in each group), the inverse association between consultation for fall and mortality (HR: 0.705, 95% CI: 0.5880.846) and post-discharge combined adverse event (0.758, 0.701-0.820) remained significant. Factors associated with mortality in patients with falls were ≥80 years (2.097, 1.521-2.891) and comorbidity (2.393, 1.574-3.636) while being female was a protective factor (0.758, 0.584-0.985). Between the factors associated with post-discharge combined adverse hospitalization in the index event was a protective factor (0.804, 0.685-0.943).

CONCLUSIONS: Patients over 65 years of age treated in the emergency room for falls have a better prognosis. Hospitalization was a protective factor of combined postdischarge adverse event.

Language: es

Keywords: Hospitalization; Mortality; Falls; Emergencies; Prognosis; Mortalidad; Caídas; Hospitalización; Pronóstico; Urgencias

Adaptation and validation of the Falls Efficacy Scale-International (FES-I) in community-dwelling older Mexican adults

Medina-Jiménez EA, Acosta-Quiroz CO, García-Flores R. Gerontol. Geriatr. Med. 2023; 9: e23337214231208528.

DOI: 10.1177/23337214231208528 **PMID:** 37885897 **PMCID:** PMC10599116

Abstract

The objective of this study was to evaluate the reliability and validity of the FES-I scale in community-dwelling older Mexican adults. Participants were 222 older adults, with a mean age of 70 years; 75% were women who completed a sociodemographic data sheet, a Spanish version of the FES-I scale, intended to explore measures of depression, quality of life, and instrumental activities of daily living. Discriminant validity was demonstrated for all items on the FES-I scale and when groups of older adults were compared according to age. Evidence of internal consistency was found in all the items of the FES-I scale ($\alpha = .91$) and convergent and divergent validity of the FES-I scale with measures of depression and quality of life, except instrumental activities of daily living. The Confirmatory Factor Analysis shows that the FES-I scale partially retains its two-factor measurement properties since five items were removed from the model to fit the data. The FES-I scale is a valid and reliable measure for clinical evaluations of fear of falls in older Mexican adults in the community.

Language: en

Keywords: older adults; falls; depression; quality of life; instrumental activities

Psychometric evaluation of the Protection Motivation Theory scale in assessing fall protection motivation among older adults to reduce fall risk

Ong MF, Soh KL, Saimon R, Tiong IK, Saidi HI, Mortell M. BMC Geriatr. 2023; 23(1): e703.

DOI: 10.1186/s12877-023-04372-5 **PMID:** 37904086 **PMCID:** PMC10617071

Abstract

BACKGROUND: Protection Motivation Theory could be another potential and good framework that addresses essential elements in a behavioural change leading to positive fall protective behaviours. The positive behavioural change could reduce the risk of falls and improve the quality of life of the older community. The study aims to evaluate the reliability and validity of the culturally adapted Protection Motivation Theory scale for older adults' fall protection motivation or protective behaviours to reduce fall risk.

METHODS: A cross-sectional study was conducted to establish a psychometric instrument validation. A total of 389 participants aged 55 years and above were included. The study was conducted in Sarawak, Malaysia, from November 2021 to January 2022 in two phases, translation of the PMT Scale, cross-cultural adaptation, face validation and pre-testing of the PMT Scale. The participants were selected using multistage random sampling in a primary healthcare clinic. Data entry and statistical analysis were performed using IBM SPSS version 26 for exploratory factor analysis and SmartPLS version 3.3.7 for confirmatory factor analysis using partial least square structural equation modelling.

RESULTS: The Kaiser-Meyer-Olkin value was 0.760, Bartlett's sphericity test was significant and the total variance explained was 61%. It identified 31 items within eight dimensions of the Protection Motivation Theory scale. The Higher Order Constructs' measurement model indicates that the convergent and discriminant validity were established (Cronbach's alpha and composite reliability: ≥ 0.740; average variance extracted: 0.619 to 0.935 and Henseler's Heterotrait-Monotrait criterion for all constructs' discriminant validity: < 0.9). Test-retest for the intraclass correlation coefficient was 0.745. The model's coefficient of determination demonstrated $R(2) = 0.375$.

CONCLUSION: Overall, the Protection Motivation Theory Scale has established its reliability and validity for assisting older adults in the community. The Protection Motivation Theory Scale could be used in fall prevention interventions by promoting fall protective behaviours to reduce fall risk among community-dwelling older adults. The scale could assist healthcare providers in assessing the intention of older adults to use fall protective behaviours to reduce fall risk and serve as an alternative reference in developing fall prevention education in a fall prevention strategy.

Language: en

Keywords: Aged; Humans; Cross-Sectional Studies; Surveys and Questionnaires; Older adults; Psychometrics; Fall prevention; Psychometric evaluation; Behavioural change; Reproducibility of Results; *Motivation; *Quality of Life; Community older adults; Fall protection motivation; Fall risk; Healthcare providers; Protection Motivation Theory scale; Reliability and validity

The role of plasma concentrations and drug characteristics of beta-blockers in fall risk of older persons

Ploegmakers KJ, van Poelgeest EP, Seppala LJ, van Dijk SC, de Groot LCPGM, Oliai Araghi S, van Schoor NM, Stricker B, Swart KMA, Uitterlinden AG, Mathôt RAA, van der Velde N. Pharmacol. Res. Perspect. 2023; 11(6): e01126.

DOI: 10.1002/prp2.1126 **PMID:** 37885367

Abstract

Beta-blocker usage is inconsistently associated with increased fall risk in the literature. However, due to age-related changes and interindividual heterogeneity in pharmacokinetics and dynamics, it is difficult to predict which older adults are more at risk for falls. Therefore, we wanted to explore whether elevated plasma concentrations of selective and nonselective beta-blockers are associated with an increased risk of falls in older beta-blocker users. To answer our research question, we analyzed samples of selective (metoprolol, n = 316) and nonselective beta-blockers (sotalol, timolol, propranolol, and carvedilol, n = 179) users from the B-PROOF cohort. The associations between the beta-blocker concentration and time to first fall were assessed using Cox proportional hazard models. Change of concentration over time in relation to fall risk was assessed with logistic regression models. Models were adjusted for potential confounders. Our results showed that above the median concentration of metoprolol was associated with an increased fall risk (HR 1.55 [1.11-2.16], p = .01). No association was found for nonselective beta-blocker concentrations. Also, changes in concentration over time were not associated with increased fall risk. To conclude, metoprolol plasma concentrations were associated with an increased risk of falls in metoprolol users while no associations were found for nonselective beta-blockers users. This might be caused by a decreased β1-selectivity in high plasma concentrations. In the future, beta-blocker concentrations could potentially help clinicians estimate fall risk in older beta-blockers users and personalize treatment.

Language: en

Keywords: risk assessment; accidental falls; adrenergic beta-antagonists; metoprolol

Benefits of a dual-task training on motor and cognitive functions in community-dwelling older adults: a controlled clinical trial

Scarmagnan GS, Lino TB, Pimentel DE, Borges Silva AV, da Silva Ramos IM, Christofoletti G. Am. J. Phys. Med. Rehabil. 2023; ePub(ePub): ePub.

DOI: 10.1097/PHM.0000000000002352 **PMID:** 37903601

Abstract

OBJECTIVE: To verify the effects of a 3-month dual-task training on motor and cognitive functions in community-dwelling older adults.

DESIGN: In this prospective, single-blinded, controlled clinical trial, a total of forty participants were allocated to either the experimental or the control (no-exercise) group. The intervention program consisted of a combination of motor and cognitive exercises conducted twice a week on nonconsecutive days. The main outcome measures were postural stability, mobility, fear of falling, and cognitive functions. Multiple analyses of variance were used to assess the impact of the dual-task training. Effect sizes (η2p) were reported. Significance was set at 5%.

RESULTS: Compared with the control group, participants who underwent the dual-task training showed positive outcomes in terms of postural stability (η2p = 0.298; P = 0.020), mobility (η2p = 0.285; P = 0.003), and cognitive functions (η2p = 0.536; P = 0.001). No significant differences were observed between the groups in terms of the fear of falling (P = 0.566).

CONCLUSIONS: Three-month dual-task training was beneficial for postural control, mobility, and cognitive functions in community-dwelling older adults. Based on the present findings, healthcare professionals should consider incorporating dual-task training into clinical practice.

Language: en

Associations of intrinsic capacity, fall risk and frailty in old inpatients

Shen S, Xie Y, Zeng X, Chen L, Guan H, Yang Y, Wu X, Chen X. Front. Public Health 2023; 11: e1177812.

DOI: 10.3389/fpubh.2023.1177812 **PMID:** 37886051 **PMCID:** PMC10598390

Abstract

INTRODUCTION: This study explored the associations of intrinsic capacity (IC), fall risk, and frailty in geriatric inpatients.

METHODS: A total of 703 hospitalized patients aged 75 years or older were recruited for this retrospective observational study from Zhejiang Hospital using a comprehensive geriatric assessment. The IC composite score was constructed from the scores of the Chinese version of the Mini-Mental State Examination, Short Physical Performance Battery, Short Form Mini Nutritional Assessment, 15-item Geriatric Depression Scale, and self-reported hearing and vision impairment. Adverse outcomes were recorded as the fall risk and frailty using the Morse Fall Scale and the Clinical Frailty Scale. Spearman's correlation coefficient analyses and multivariate logistic regression models were used to explore the associations between IC, high fall risk, and frailty.

RESULTS: Declined IC composite scores were associated with increased risks of falls [odds ratio (OR) = 0.64, 95% confidence interval (CI): 0.57-0.72] and frailty (OR = 0.45, 95%CI: 0.37-0.54) among older hospitalized patients after adjusting for the related potential confounders. In addition, decreased cognitive, vitality, locomotion, and psychological scores were associated with increased adverse health conditions, with ORs ranging from 0.26 to 0.70. Vision impairment was observed to increase the risk of frailty (OR = 0.42, 95%CI: 0.23-0.76) after adjusting for the related potential confounders.

DISCUSSION: This study indicated that declined IC was associated with fall risk and frailty in older inpatients. Further prospective studies are needed to explore the longitudinal associations between baseline IC and subsequent risk of falls and frailty.

Language: en

Keywords: older adults; frailty; fall; hospitalized; intrinsic capacity

Lack of patient and primary care physician follow-up in geriatric emergency department patients with head trauma from a fall

Shih RD, Solano JJ, Engström G, Khazem M, Clayton LM, Wells M, Hughes PG, Posaw L, Goldstein L, Hennekens CH, Ouslander JG, Alter SM. Am. J. Emerg. Med. 2023; 75: 29-32.

DOI: 10.1016/j.ajem.2023.10.021 **PMID:** 37897917

Abstract

STUDY OBJECTIVE: Falls are the leading cause of injuries in the US for older adults. Follow-up after an ED-related fall visit is essential to initiate preventive strategies in these patients who are at very high risk for recurrent falls. It is currently unclear how frequently follow-up occurs and whether preventive strategies are implemented. Our objective is to determine the rate of follow-up by older adults who sustain a fall related head injury resulting in an ED visit, the rate and type of risk assessment and adoption of preventive strategies.

METHODS: This 1-year prospective observational study was conducted at two South Florida hospitals. All older ED patients with an acute head injury due to a fall were identified. Telephone surveys were conducted 14 days after ED presentation asking about PCP follow-up and adoption of fall prevention strategies. Clinical and demographic characteristics were compared between patients with and without follow up.

RESULTS: Of 4951 patients with a head injury from a fall, 1527 met inclusion criteria. 905 reported follow-up with their PCP. Of these, 72% reported receiving a fall assessment and 56% adopted a fall prevention strategy. Participants with PCP follow-up were significantly more likely to have a history of cancer or hypertension.

CONCLUSION: Only 60% of ED patients with fall-related head injury follow-up with their PCP. Further, 72% received a fall assessment and only 56% adopted a fall prevention strategy. These data indicate an urgent need to promote PCP fall assessment and adoption of prevention strategies in these patients.

Language: en

Keywords: Falls; Fall prevention; Follow-up; Geriatric emergency medicine; Geriatric falls; Geriatric head trauma

Factors affecting home environmental safety management for fall prevention for older adults in northern Thailand

Songthap A, Suphunnakul P, Rakprasit J. BMC Geriatr. 2023; 23(1): e704.

DOI: 10.1186/s12877-023-04419-7 **PMID:** 37907861 **PMCID:** PMC10617202

Abstract

BACKGROUND: Falls among older adults affect physical and mental health, disability, death, and quality of life. Home environmental safety management helps to reduce the risk of falls among older adults. This analytical cross-sectional study aimed to determine factors affecting home environmental safety management for fall prevention for older adults in northern Thailand.

METHODS: The study sample included 328 relatives who looked after older adults in their families in Phitsanulok Province, northern Thailand. They were randomly selected by a multistage sampling technique. Data were collected by a self-administered questionnaire consisting of 7 parts: (1) sociodemographic characteristics, (2) knowledge about home environmental safety management, (3) perceived susceptibility of falls, (4) perceived severity of falls among older adults, (5) perceived self-efficacy of home environmental safety management, (6) perceived outcome of home environmental safety management, and (7) home environmental safety management. Frequencies, percentages, means, standard deviations, and multiple regression analysis were employed for data analysis.

RESULTS: The majority of participants (60.4%) had high scores for home environmental safety management for fall prevention for older adults (scores of 14-20). Factors that significantly affected home environmental safety management included perceived severity of falls among older adults ($\beta = 0.323$), perceived self-efficacy of home environmental safety management ($\beta = 0.311$), the elderly family member having fallen in the past year ($\beta = 0.217$), being a grandchild of an older adult ($\beta = -0.143$), perceived outcome of home environmental safety management ($\beta = 0.142$), and being widowed, divorced or separated ($\beta = -0.096$). These 6 factors explained 35.1% of home environmental safety management for fall prevention for older adults.

CONCLUSION: Relatives who look after older adults should be educated about the perceived severity of falls among older adults, perceived self-efficacy, and perceived outcome of home environmental safety management. The focus should be on grandchildren of older adults and those who are widowed, divorced or separated to understand how home environmental safety management is important to prevent falls and their consequences among older adults.

Language: en

Keywords: Aged; Humans; Prevention; Cross-Sectional Studies; Older adults; Fall; *Quality of Life; *Safety Management; Home environmental safety management; Thailand/epidemiology

Prevalence and trends of slow gait speed in the United States

Stover E, Andrew S, Batesole J, Berntson M, Carling C, FitzSimmons S, Hoang T, Nauer J, McGrath R. Geriatrics (Basel) 2023; 8(5): e95.

DOI: 10.3390/geriatrics8050095 **PMID:** 37887968

Abstract

Gait speed is a simple, effective indicator of age-related disease and disability. We sought to examine the prevalence and trends of slow gait speed in older Americans. Our unweighted analytic sample included 12,427 adults aged ≥ 65 years from the 2006-2016 waves of the Health and Retirement Study. Gait speed was measured in participant residences. Persons with gait speed < 0.8 or <0.6 m/s were slow. Sample weights were used to generate nationally representative estimates. The overall estimated prevalence of slow gait speed with the <0.8 m/s cut-point was 48.6% (95% confidence interval (CI): 47.4-49.8) in the 2006-2008 waves yet was 45.7% (CI: 44.3-47.1) in the 2014-2016 waves, but this downward trend was not statistically significant (p = 0.06). The estimated prevalence of slowness with the <0.6 m/s cut-point was 21.3% (CI: 20.4-22.3) for the 2006-2008 waves, 18.5% (CI: 17.5-19.4) for the 2010-2012 waves, and 19.2% (CI: 18.2-20.2) for the 2014-2016 waves, but there were again no significant trends (p = 0.61). Our findings showed that the estimated prevalence of slow gait speed in older Americans is pronounced, and different cut-points largely inform how slowness is categorized. Continued surveillance of slowness over time will help guide screening for disablement and identify sub-populations at greatest risk for targeted interventions.

Language: en

Keywords: geriatrics; population surveillance; walking; physical functional performance

Impact of adapted taekwondo vs. multicomponent training on health status in independent older women: a randomized controlled trial

Valdés-Badilla P, Guzman-Muñoz E, Herrera-Valenzuela T, Branco BHM, Hernandez-Martinez J, Nobari H. Front. Public Health 2023; 11: e1236402.

DOI: 10.3389/fpubh.2023.1236402 **PMID:** 37886049 **PMCID:** PMC10598459

Abstract

This study, called the TKD and Aging Project, aimed to analyze and compare the effects of an adapted taekwondo program concerning multicomponent training on blood pressure, morphological variables, food consumption frequency, health-related quality of life (HRQoL), physical fitness, handgrip strength, and postural balance in independent older women. A randomized controlled trial study was conducted with parallel groups for 8 weeks (24 sessions of 60 min each), employing a double-blind design and incorporating repeated measures. Twenty-eight older women initially participated in the intervention. Three participants were excluded because they did not participate in the re-assessments. Thus, 14 older women from the adapted taekwondo group (TKD; age: 62.86 ± 2.38 years) and 11 from the multicomponent training group (MCT; age: 63.18 ± 1.94 years) participated in the final analysis. A two-factor mixed analysis of variance (ANOVA) model with repeated measures was performed to measure the time × group effect. The TKD showed significant improvements in the mental health ($p = 0.024$; ES = 0.91) and general health ($p < 0.001$; ES = 0.75) dimensions of the HRQoL, as well as in the chair stand ($p = 0.001$; ES = 1.18), arm curl ($p < 0.001$; ES = 2.10), 2-min step ($p < 0.001$; ES = 1.73), and chair sit-and-reach ($p = 0.001$; ES = 0.91) tests. Additionally, it showed a significant reduction in postural balance for the eyes-closed condition in the center of the pressure area ($p = 0.021$; ES = 0.89), mean velocity ($p = 0.004$; ES = 0.79), and mediolateral velocity ($p < 0.001$; ES = 1.26). However, the MCT showed significant increases in the general health ($p = 0.013$; ES = 0.95) dimension of the HRQoL and a significant reduction ($p = 0.039$; ES = 0.28) in the mediolateral velocity of postural balance for the eyes-closed condition. Multiple comparisons showed that the TKD scored significantly higher in the chair stand ($p = 0.017$; ES = 1.79), arm curl ($p = 0.003$; ES = 1.77), and 2-min step ($p = 0.018$; ES = 0.91) tests than the MCT. Compared to multicomponent training, taekwondo improves postural balance and provides better benefits in terms of physical fitness and HRQoL for older women. Therefore, it is possible to recommend it as a safe physical activity strategy, as long as it is well-dosed, since it showed high adherence to intervention in older women.

Language: en

Keywords: older adults; aging; exercise; combat sports; healthy aging; resistance training

Optimizing the role of other patient's families in injury prevention in fall risk patients

Wahyono MH, Ririanti M. Health and technology journal 2023; 1(3): 280-286.

DOI: 10.53713/htechj.v1i3.78 **PMID:** unavailable

Abstract

There are still incidents of patients falling while undergoing treatment at health facilities, requiring us as officers to look for various prevention efforts, improve patient safety support facilities, and involve all patient caretakers' families to jointly care for patients around them who are at risk of falling. This study aims to see efforts to optimize the role of other families in preventing the risk of falling. This type of research is qualitative, involving eight main informants from the head of the room and eight additional informants from the families of waiting for patients at RSUD Dr. H. Koesnadi Bondowoso. This research was conducted from 26 February to 24 March 2023 by collecting data through unstructured interviews, in-depth observation, and documentation studies. The data obtained was verified by triangulation of sources and techniques. The conclusion shows that efforts to prevent the risk of falling by optimizing the role of the patient's family are very effective because the patient's family feels happy by paying attention to the presence of patients around them, especially those wearing yellow marker bracelets so that the presence of the waiting family besides paying attention to the patient's family can also take a role by paying attention to other patients surrounding.

Language: en

Keywords: fall risk; family role; farmers patient safety

Implementation of the UMove mobility program to promote safe patient mobility and reduce falls in the hospital setting

Wells CL, Resnick B, McPherson R, Frampton K. Res. Gerontol. Nurs. 2023; ePub(ePub): ePub.

DOI: 10.3928/19404921-20231013-01 **PMID:** 37878599

Abstract

The purpose of the current quality improvement (QI) project was to implement the UMove Early Mobility Program to engage patients in safe out of bed (OOB) activities and reduce falls, specifically focusing on toileting-related falls, during the hospital stay. Eight nursing units implemented the UMove program, including the UMove Mobility Screen (UMove MS), to select strategies to reduce toileting-related falls while increasing mobility. De-identified, unit-based data were collected from hospital reports. Nursing had a 95% documentation compliance rate for the UMove MS, and OOB activities and ambulation were documented at 50% and 57%, respectively. There was no statistical difference found in reducing toileting-related falls or sustaining increased OOB activities across the 15-month QI project. Toileting-related falls approached significance with a rate reduction from 1.77 pre-implementation to 0.23 at 6 months and no toileting-related falls at 12 months. Despite no significant findings, there is evidence that clinical changes occurred with nurses assessing and promoting mobility, while implementing strategies to reduce toileting-related falls. [Research in Gerontological Nursing, xx(x), xx-xx.].

Language: en

Towards environment-aware fall risk assessment: classifying walking surface conditions using IMU-based gait data and deep learning

Yıldız A. Brain Sci. 2023; 13(10).

DOI: 10.3390/brainsci13101428 **PMID:** 37891797 **PMCID:** PMC10605788

Abstract

Fall risk assessment (FRA) helps clinicians make decisions about the best preventative measures to lower the risk of falls by identifying the different risks that are specific to an individual. With the development of wearable technologies such as inertial measurement units (IMUs), several free-living FRA methods based on fall predictors derived from IMU-based data have been introduced. The performance of such methods could be improved by increasing awareness of the individuals' walking environment. This study aims to introduce and analyze a 25-layer convolutional neural network model for classifying nine walking surface conditions using IMU-based gait data, providing a basis for environment-aware FRAs. A database containing data collected from thirty participants who wore six IMU sensors while walking on nine surface conditions was employed. A systematic analysis was conducted to determine the effects of gait signals (acceleration, magnetic field, and rate of turn), sensor placement, and signal segment size on the method's performance. Accuracies of 0.935 and 0.969 were achieved using a single and dual sensor, respectively, reaching an accuracy of 0.971 in the best-case scenario with optimal settings. The findings and analysis can help to develop more reliable and interpretable fall predictors, eventually leading to environment-aware FRA methods.

Language: en

Keywords: convolutional neural networks; fall risk analysis; inertial measurement units; irregular walking surfaces; walking surface detection

Developing smart buildings to reduce indoor risks for safety and health of the elderly: a systematic and bibliometric analysis

Zhang F, Chan APC, Li D. Safety Sci. 2023; 168: e106310.

DOI: 10.1016/j.ssci.2023.106310 **PMID:** unavailable

Abstract

As aging problem gets severe, more elderly people require better residences to support their later lives. Considering complicated safety and health risks the elderly would encounter indoors, such as falls and sudden diseases, researchers have tried to implement smart buildings to reduce indoor risks for the elderly. Fortunately, residential buildings have benefited from rapid development of smart techniques. It is meaningful to look back on how smart buildings deal with indoor risks of the elderly. This article adopts approaches of systematic literature review to identify 92 eligible articles which proposed smart buildings for the elderly. Then the time trend, publication journals, co-authorship and co-occurrence of these eligible articles are revealed by the bibliometric analysis. Five critical targets of these smart building solutions are summarized, including fall detection, activity recognition, disease prediction, health monitoring, and emotional care. Previous smart buildings mostly adopted Support Vector Machine (SVM), classifier comparison, neural network, Hidden Markov Model (HMM) and robotics as main smart techniques. Furthermore, these different smart building techniques are generally developed for different sub-targets or integrated for one main target, that are regarded as two correlation modes between techniques and targets. Current challenges and future direction of the development of smart buildings are pointed out. This review helps to know what kinds of indoor risks of the elderly were focused by smart buildings and which smart techniques were widely applied to develop smart buildings, then provides suggestions for future research to promote smart buildings to be more safe and healthy for the elderly.

Language: en

Keywords: Bibliometric analysis; Elderly; Indoor risk; Smart building; Systematic literature review