Safety Literature 7th November 2021

Association between a hilly neighborhood environment and falls among rural older adults: a cross-sectional study

Kitayuguchi J, Abe T, Okuyama K, Gomi T, Okada S, Shiwaku K, Mutoh Y. J. Rural Med. 2021; 16(4): 214-221.

DOI 10.2185/jrm.2021-028 **PMID** 34707730

Abstract

OBJECTIVE: Falls in older adults are a major public health issue, and it is unclear whether the neighborhood environment is associated with falls among this group. This cross-sectional study investigated whether hilly neighborhood environmental factors were associated with fall status (falls or fear of falling) in rural Japanese older adults.

MATERIALS AND METHODS: Data obtained from 965 participants aged 65 years and older living in Unnan City, Shimane Prefecture, Japan, in 2017 were analyzed. Fall status was assessed based on the 1-year fall incidence (yes/no) for the past year and fear of falling (yes/no) using a self-report questionnaire. For hilly neighborhood environmental factors, the mean elevation and land slope were assessed using a geographic information system. The logistic regression model examined the odds ratios (OR) and 95% confidence intervals (CIs) of fall status in quartiles for elevation and land slope, respectively, and was adjusted for confounders.

RESULTS: Falls and fear of falling were observed in 16.8% and 43.2% of participants, respectively. Falls were associated with elevation (OR 1.99, 95% CI 1.17-3.37 for Q2 vs. Q1; OR 2.02, 95% CI 1.19-3.44 for Q3 vs. Q1) and land slope (OR 1.74, 95% CI 1.04-2.93 for Q3 vs. Q1; OR 1.74, 95% CI 1.04-2.93 for Q4 vs. Q1). Fear of falling was associated with elevation (OR 1.78, 95% CI 1.19-2.65 for Q3 vs. Q1) and land slope (OR 1.51, 95% CI 1.01-2.25 for Q4 vs. Q1).

CONCLUSION: Our study found that elevation and land slope as hilly neighborhood environment factors were positively associated with falls or fear of falling among older adults living in rural Japan. Prospective observational studies that investigate the effects of region-specific environmental factors on falls among older adults should be conducted.

Language: en

Keywords

falls; community-dwelling older adults; elevation; fear of falling; hilliness

Cholinesterase inhibitor to prevent falls in Parkinson's disease (CHIEF-PD) trial: a phase 3 randomised, double-blind placebo-controlled trial of rivastigmine to prevent falls in Parkinson's disease

Neumann S, Taylor J, Bamford A, Metcalfe C, Gaunt DM, Whone A, Steeds D, Emmett SR, Hollingworth W, Ben-Shlomo Y, Henderson EJ. BMC Neurol. 2021; 21(1): e422.

DOI 10.1186/s12883-021-02430-2 **PMID** 34715821

Abstract

BACKGROUND: Falls are a common complication of Parkinson's disease. There is a need for new therapeutic options to target this debilitating aspect of the disease. Cholinergic deficit has been shown to contribute to both gait and cognitive dysfunction seen in the condition. Potential benefits of using cholinesterase inhibitors were shown during a single centre phase 2 trial. The aim of this trial is to evaluate the effectiveness of a cholinesterase inhibitor on fall rate in people with idiopathic Parkinson's disease.

METHODS: This is a multi-centre, double-blind, randomised placebo-controlled trial in 600 people with idiopathic Parkinson's disease (Hoehn and Yahr stages 1 to 4) with a history of a fall in the past year. Participants will be randomised to two groups, receiving either transdermal rivastigmine or identical placebo for 12 months. The primary outcome is the fall rate over 12 months follow-up. Secondary outcome measures, collected at baseline and 12 months either face-to-face or via remote video/telephone assessments, include gait and balance measures, neuropsychiatric indices, Parkinson's motor and non-motor symptoms, quality of life and cost-effectiveness.

DISCUSSION: This trial will establish whether cholinesterase inhibitor therapy is effective in preventing falls in Parkinson's disease. If cost-effective, it will alter current management guidelines by offering a new therapeutic option in this high-risk population.

TRIAL REGISTRATION: REC reference: 19/SW/0043. EudraCT: 2018-003219-23. ISCRTN: 41639809 (registered 16/04/2019).

ClinicalTrials.gov Identifier: NCT04226248 PROTOCOL AT TIME OF PUBLICATION: Version 7.0, 20th January 2021.

Language: en

Keywords

Accidental falls; Cholinesterase inhibitor; Parkinson disease; Randomized controlled trials; Rivastigmine

Developing self-management application of fall prevention among older adults: a content and usability evaluation

Mazuz K, Biswas S, Lindner U. Front. Digit. Health 2020; 2: e11.

DOI 10.3389/fdgth.2020.00011 **PMID** 34713024

Abstract

This paper presents a research and development project for studying aging and technology in fall prevention. Falls are an important global health problem in an aging global population. Up to 50% of serious falls may be fatal. Falls result from the cumulative effects of cognitive, musculoskeletal and sensory decline on postural control and substantially affect the activities of daily living, leading to a lower quality of life and physical injury. A near-fall, misstep and a prior fall are established risk factors for a more serious fall. The fear of falling may reduce physical activity and further predispose to falling. However, limitations in the reporting and documentation of fall events create "silent events"-events that are neither documented nor acted upon. An "Age-Techcare" Application (App) was designed using open innovation methods with local older adult populations and health care professionals through a mixed-methodology approach. The App comprised a digital diary for the self-reporting of fall events and an exercise video to strengthen balance as a fall-prevention intervention. The older adults recorded four fall events: a near-fall, the fear of falling, a fall, or no-fall. Prompts to watch the video and the number of times the video was watched were also recorded on the App. Reports retrieved from the App were analyzed after a 10-week pilot study among older adults accessing the App on their smartphones (n = 28) and through their smartTV (n = 23). All participants used the App to self-report fall events. Near-falls were the most frequently reported fall event among both smartphone and smartTV groups. The scale of silent falls (including a fear of falling and near falls) is greater than anticipated (according to prevailing literature) and significant, especially among the older cohort of participants who had previously experienced falls and are living alone. The exercise video was regularly accessed within a self-report-fall-prevention feedback loop. Watching a preventive exercise video clip as a preventive intervention is positively associated with self-reporting of all events. We have shown that the utility and effectiveness of an App in the self-management of fall events to raise self-awareness, document risk and prompt preventive action. As we address the health needs of an aging global population, Apps such as this will need to be further developed and interface with health and social care services. The facility for older adults to negotiate ideas and practices of risk and safety-the hallmark of the aging-in-place and healthy aging discourse-is important to them in their acceptance of dynamic and diverse technology.
Language: en

Keywords

aging; mHealth; fall prevention; care services; open innovation; self-management App; usability

Development of a Parkinson's disease specific falls questionnaire

Harris DM, Duckham RL, Daly RM, Abbott G, Johnson L, Rantalainen T, Teo WP. BMC Geriatr. 2021; 21(1): e614.

DOI 10.1186/s12877-021-02555-6 **PMID** 34717574

Abstract

BACKGROUND: Falls are a major health burden for older adults with Parkinson's disease (PD), but there is currently no reliable questionnaire to capture the circumstances and consequences of falls in older adults with PD. This study aimed to develop a PD-specific falls questionnaire and to evaluate its test-retest reliability in older adults with PD.

METHODS: A novel PD-specific falls questionnaire (PDF-Q) was developed in two modes (online and paper-based version) and used to assess falls and near-falls events over the past 12-months. Questions were agreed upon by an expert group, with the domains based on previous falls-related questionnaires. The questions included the number and circumstances (activities, location and direction) of falls and near-falls, and consequences (injuries and medical treatment) of falls. The PDF-Q was distributed to 46 older adults with PD (online n = 30, paper n = 16), who completed the questionnaire twice, 4 weeks apart. Kappa (κ) statistics were used to establish test-retest reliability of the questionnaire items.

RESULTS: Pooled results from both questionnaires for all participants were used to assess the overall test-retest reliability of the questionnaire. Questions assessing the number of falls (κ = 0.41) and the number of near-falls (κ = 0.51) in the previous 12-months demonstrated weak agreement, while questions on the location of falls (κ = 0.89) and near-falls (κ = 1.0) demonstrated strong to almost perfect agreement. Questions on the number of indoor (κ = 0.86) and outdoor (κ = 0.75) falls demonstrated moderate to strong agreement, though questions related to the number of indoor (κ = 0.47) and outdoor (κ = 0.56) near-falls demonstrated weak agreement. Moderate to strong agreement scores were observed for the most recent fall and near-fall in terms of the direction (indoor fall κ = 0.80; outdoor fall κ = 0.81; near-fall κ = 0.54), activity (indoor fall κ = 0.70; outdoor fall κ = 0.82; near-fall κ = 0.65) and cause (indoor fall κ = 0.75; outdoor fall κ = 0.62; near-fall κ = 0.56).

CONCLUSIONS: The new PDF-Q developed in this study was found to be reliable for capturing the circumstances and consequences of recent falls and near-falls in older adults with PD.

Language: en

Keywords

Falls; Questionnaire; Reliability; Parkinson’s disease; Near-falls

Development of a Victorian falls and balance service directory

Levinger P, Parker A, Barry J, Tan E, Batchelor F, Catrice A. Australas. J. Ageing 2021; ePub(ePub): ePub.

DOI 10.1111/ajag.13004 **PMID** 34708893

Abstract

OBJECTIVES: Falls and fall-related injuries amongst older people continue to be a long-term public health issue. Access to specialist services that target fall prevention has been shown to improve outcomes. This project aimed to develop an online directory of public outpatient and ambulatory falls and balance clinics and programs in Victoria.

METHOD: Environmental scan of existing services and survey of service providers between January and August 2020.

RESULTS: Forty-seven community-based and 53 hospital-based falls and balance services across metropolitan (46%) and regional (54%) Victoria registered. The majority of services were programs (70%) targeting exercise and/or education, as opposed to clinics (30%), which focus on diagnosis and developing management plans. Survey responses were collated to develop an online service directory: https://www.nari.net.au/victorian-falls-directory
CONCLUSION: The Victorian Falls and Balance Service Directory provides a centralised and accessible reference for clinicians and community members regarding available outpatient and ambulatory services that target fall prevention.

Language: en

Keywords

aged; fall prevention; accidental falls; directory; health services

Differentiating dementia with Lewy bodies from Alzheimer's disease using the fall risk evaluation questionnaire

Tsujimoto M, Suzuki K, Takeda A, Saji N, Sakurai T, Washimi Y. Intern. Med. 2021; ePub(ePub): ePub.

DOI 10.2169/internalmedicine.8383-21 **PMID** 34707050

Abstract

OBJECTIVE Dementia with Lewy bodies (DLB) is the second-most common form of neurodegenerative dementia after Alzheimer's disease (AD). Falls are a vital prognostic factor in patients with dementia and are a characteristic feature of DLB. This study investigated the screening potential of the fall risk evaluation for DLB and compared it with that of AD to facilitate an accurate diagnosis.

METHODS We enrolled patients diagnosed with DLB (n = 410) and AD (n = 2,683) and categorized the participants into 3 groups depending on their physical ability, age, cognitive function, and fall events. Using the Fall Risk Index-21 (FRI-21) questionnaire, we evaluated and comparatively analyzed the fall risk between DLB and AD patients in three defined groups of participants.

RESULTS The FRI-21 score was significantly higher in DLB patients than in AD patients in every group. Using this score, we were able to distinguish between DLB and AD patients in each group. Among the three groups, the group with a young age, relatively mild cognitive dysfunction, and no fall events exhibited the best specificity for DLB (0.895).

CONCLUSIONS The FRI-21 is a useful tool for screening for DLB and differentiating it from AD. This questionnaire can be used at a relatively early stage of the disease in young patients with mild cognitive dysfunction and no history of falling. These preliminary results need to be validated in an interventional study to evaluate the effectiveness of rehabilitative measures and daily environmental changes carried out to prevent falls using this tool.

Language: en

Keywords

falls; Alzheimer's disease; Lewy body disease

Falls in older persons with type 2 diabetes in the Malaysian Elders Longitudinal Research (MELoR) study

Ong WF, Kamaruzzaman SB, Tan MP. Int. J. Clin. Pract. 2021; ePub(ePub): ePub.

DOI 10.1111/ijcp.14999 **PMID** 34714589

Abstract

INTRODUCTION: Older persons with diabetes are at an increased risk of falls leading to fractures, head injuries and disability.

OBJECTIVE: To evaluate the potential relationship between falls and diabetes in older persons and identify differences in risk factors for falls among older persons with and without diabetes using the first wave dataset of the Malaysian Elders Longitudinal Research (MELoR) study.

METHODOLOGY: Community dwelling adults aged ≥ 55 years were selected through stratified random sampling from three parliamentary constituencies in greater Kuala Lumpur. Baseline data was obtained through computer-assisted, home-based interviews. Presence of falls was established by enquiring about falls in the preceding 12 months. Diabetes was defined as self-reported, physician-diagnosed diabetes, diabetes medication use and a HbA1c of ≥ 6.3%.

RESULTS: Diabetes was present in 44.4% of the overall 1610 participants. The prevalence for fall among older diabetics was 25.6%. Recurrent falls (odds ratio (OR) 1.65; 95% confidence interval (CI) 1.06 - 2.57) was more common among diabetics. Following adjustment for potential confounders, osteoporosis (OR 2.58; 95% CI 1.31 - 5.08) and dizziness (OR 1.50; 95% CI 1.01 - 2.23) were independent risk factors for falls. Better instrumental activities of daily living scores were protective against falls (OR 0.75; 95% CI 0.58 - 0.97).

CONCLUSION: The presence of osteoporosis and dizziness was associated with increased risk of falls among older diabetics. These findings will need to be confirmed in future prospective follow-up of this cohort.

Language: en

Methods and strategies for reconditioning motor output and postural balance in frail older subjects prone to falls

Paillard T. Front. Physiol. 2021; 12: e700723.

DOI 10.3389/fphys.2021.700723 **PMID** 34712145

Abstract

In frail older subjects, the motor output of the antigravity muscles is fundamental in resisting falls. These muscles undergo accelerated involutions when they are inactive and the risk of falling increases during leisure and domestic physical activity. In order to reduce their risk of falling, frail older subjects limit their physical activities/exercises. The problem is that the less they exercise, the less they are able to exercise and the greater the risk in exercising. Hence, a vicious circle sets up and the antigravity muscles inevitably continue to deteriorate. This vicious circle must be broken by starting a reconditioning program based on developing the strength of antigravity muscles (especially lower-limb muscles). To begin with, for each increase in muscle strength, postural balance is improved. Once this increase reaches the threshold beyond which postural balance no longer improves, it seems appropriate to implement exercises aimed at concomitantly improving motor output and postural balance in order to counteract or even reverse the involution process of the postural balance system.

METHODS and strategies toward this end are proposed in this present communication. However, the transfer effects between strength increase and postural balance ability are not yet totally known and future research should evaluate the relationship between muscle strength and postural balance throughout rehabilitation programs (i.e., program follow-ups) in frail older subjects in order to advance knowledge of this relationship.

Language: en

Keywords

elderly; fall; balance; postural control; muscle power; muscle strength; older; postural balance

Post-hospital falls incidence and risk factors among older adults: a systematic review and meta-analysis

Qian XX, Chen Z, Fong DYT, Ho M, Chau PH. Age Ageing 2021; ePub(ePub): ePub.

DOI 10.1093/ageing/afab209 **PMID** 34718373

Abstract

BACKGROUND: Post-hospital falls constitute a significant health concern for older adults who have been recently discharged from the hospital.

OBJECTIVES: To systematically summarise existing evidence on the incidence and risk factors for post-hospital falls among older adults.

METHODS: A systematic review and meta-analysis was conducted. Six electronic databases were searched to identify cohort studies investigating the incidence and risk factors for post-hospital falls in older adults. The incidence and risk factors for post-hospital falls were extracted. The meta-analysis was used to calculate pooled incidences and 95% confidence intervals (CI). The meta-regression and subgroup meta-analysis were conducted to explore sources of heterogeneity in incidence proportions across the eligible studies. A qualitative synthesis was performed for the post-hospital falls risk factors.

RESULTS: Eighteen studies from eight countries (n = 9,080,568) were included. The pooled incidence proportion of any and recurrent post-hospital falls was 14% (95% CI: 13%-15%) and 10% (95% CI: 5%-14%), respectively. Follow-up period, study quality, study country, setting, percentage of female subjects, percentage of subjects with previous falls and the primary data collection method for falls significantly contributed to the 64.8% of the heterogeneity in incidence proportions. Twenty-six risk factors for post-hospital falls were identified in the eligible studies, where biological factors were the most commonly identified factors. The highest risks were reported for previous falls, previous fractures, delirium and neurological diseases.

CONCLUSION: The findings of this study suggested future post-hospital falls prevention should prioritise the needs of older adults with the dominant risk factors. Further investigations into the period-specific incidence and socioeconomic and environmental risk factors for post-hospital falls are also required.

Language: en

Keywords

risk factors; incidence; meta-analysis; older population; post-hospital Falls

Postadychute-ag, detection, and prevention of the risk of falling among elderly people in nursing homes: protocol of a multicentre and prospective intervention study

Quijoux F, Bertin-Hugault F, Zawieja P, Lefèvre M, Vidal PP, Ricard D. Front. Digit. Health 2020; 2: e604552.

DOI 10.3389/fdgth.2020.604552 **PMID** 34713067

Abstract

INTRODUCTION: While falls among the elderly is a public health issue, because of the social, medical, and economic burden they represent, the tools to predict falls are limited. Posturography has been developed to distinguish fallers from non-fallers, however, there is too little data to show how predictions change as older adults' physical abilities improve. The Postadychute-AG clinical trial aims to evaluate the evolution of posturographic parameters in relation to the improvement of balance through adapted physical activity (APA) programs.

METHODS: In this prospective, multicentre clinical trial, institutionalized seniors over 65 years of age will be followed for a period of 6 months through computer-assisted posturography and automatic gait analysis. During the entire duration of the follow-up, they will benefit from a monthly measurement of their postural and locomotion capacities through a recording of their static balance and gait thanks to a software developed for this purpose. The data gathered will be correlated with the daily record of falls in the institution. Static and dynamic balance measurements aim to extract biomechanical markers and compare them with functional assessments of motor skills (Berg Balance Scale and Mini Motor Test), expecting their superiority in predicting the number of falls. Participants will be followed for 3 months without APA and 3 months with APA in homogeneous group exercises. An analysis of variance will evaluate the variability of monthly measures of balance in order to record the minimum clinically detectable change (MDC) as participants improve their physical condition through APA.

DISCUSSION: Previous studies have stated the MDC through repeated measurements of balance but, to our knowledge, none appear to have implemented monthly measurements of balance and gait. Combined with a reliable measure of the number of falls per person, motor capacities and other precipitating factors, this study aims to provide biomechanical markers predictive of fall risk with their sensitivity to improvement in clinical status over the medium term. This trial could provide the basis for posturographic and gait variable values for these elderly people and provide a solution to distinguish those most at risk to be implemented in current practice in nursing homes. Trial Registration: ID-RCB 2017-A02545-48. Protocol Version: Version 4.2 dated January 8, 2020.
Language: en

Keywords

prediction; physical activity; fall; balance quantification; elderly people

Risk factors related to falling in patients after stroke

Djurovic O, Mihaljevic O, Radovanović S, Kostic S, Vukicevic M, Brkic BG, Stankovic S, Radulovic D, Vukomanovic IS, Radevic SR. Iran. J. Public Health 2021; 50(9): 1832-1841.

DOI 10.18502/ijph.v50i9.7056 **PMID** 34722379

Abstract

BACKGROUND: The aim of this study was to identify the risk factors associated with falling in post stroke patients.

METHODS: This retrospective case-control study included 561 neurology patients hospitalized for a stroke and divided into two groups: falling patients and non-falling patients. They referred to the Special Hospital for Cerebrovascular Diseases "Sveti Sava" in Belgrade, Serbia, from 2018-2019. Logistic regression analysis was applied to examine socio-economic factors associated with predictors of unmet healthcare needs.

RESULTS: A significant difference was seen in the length of hospitalization of falling patients compared to the non-falling (P<0.001). We established statistically significant differences in mental status (P<0.001), sensibility (P=0.016), depressed mood (P<0.001), early (P=0.001) and medium insomnia (P=0.042), psychomotor slowness (P=0.030), somatic anxiety (P=0.044) and memory (P<0.001).

CONCLUSION: Cerebrovascular disease distribution and the degree of neurological deficit primarily altered mental status, which could be recognized as one of the more important predictors for falling after stroke. The identification of risk factors may be a first step toward the design of intervention programs for preventing a future fall among hospitalized stroke patients.

Language: en

Keywords

Hospitalization; Falls; Risk factors; Stroke patients

The Frail'BESTest: an adaptation of the "balance evaluation system test" for frail older adults; concurrent validity, responsiveness, validity for fall prediction and detection of slower walkers

Kubicki A, Laroche D, Coquisart L, Basile G, Brika M, Mourey F. Eur. Rev. Aging Phys. Activ. 2021; 18(1): e22.

DOI 10.1186/s11556-021-00276-8 **PMID** 34711173

Abstract

BACKGROUND: The Frail'BESTest was developed in order to include frail older adults when they are using the BESTest. Recently, psychometrics properties (internal coherence, systems usefulness, complementarity and inter-rater reliability) of the Frail'BESTest were tested. To complete these analyses, this study will aim the assessment of its concurrent validity, responsiveness, predictive validity on falls occurrence, and slower walkers detection.

METHODS: The correlation between the Frail'BESTest and the Gait Speed Test permitted to assess concurrent validity. The variation between the initial test score and the score obtained after the completion of a rehabilitation program was used to evaluate responsiveness with MANOVA analysis and standard response mean (SRM) calculation. Predictive validity was assessed with receiver-operating characteristic curves and area under the curve (AUC) analysis regarding falls occurrence. Slower walkers detection thresholds were computed by receiver-operating characteristic curves for the Frail'BESTest and the Tinetti test.

RESULTS: The concurrent validity of the test was good ($r = 0.74$; $p < 0.001$). The Standard Error of measurement was at 2.81 points and the Minimal Detectable Change at 7.79 points for the total score of the Frail'BESTest. The SRM was at 0.41 for the Tinetti test and 0.56 for the Frail'BESTest. The AUC, computed according to fall occurrence, was at 0.71 for the Gait Speed test, 0.673 for the Tinetti test and 0.693 for the Frail'BESTest. Both the Tinetti (AUC = 0.87) and the Frail'BESTest (AUC = 0.88) were found suitable for tracking slower walkers.

CONCLUSION: Concurrent validity and responsiveness of the Frail'BESTest were good. As for the Tinetti and the Frail'BESTest, they were unable to predict efficiently falls occurrence in the tested sample. The Frail'BESTest seems enough sensitive to spot the slower walkers efficiently, using a 15/20 threshold method. The Frail'BESTest was found to be a valid and responsive clinical test, therefore it can be recommended as an outcome measure in clinical practice.

Language: en

Keywords

Balance; Rehabilitation; Frail older adults; Systemic assessment

The risk of delirium and falls or fractures with the use of overactive bladder anticholinergic medications

Welk B, Etaby K, McArthur E, Chou Q. Neurourol. Urodyn. 2021; ePub(ePub): ePub.

DOI 10.1002/nau.24827 **PMID** 34719044

Abstract

OBJECTIVE: To determine if OAB anticholinergics have an increased risk of delirium or falls/fractures relative to OAB beta-3 agonist medications.

METHODS: This was a retrospective, cohort study using linked administrative data from the universal healthcare system of Ontario, Canada. Participants were all residents >66 years of age who newly initiated an OAB medication between January 2016 and March 2020. Coprimary outcomes were evidence of a hospital visit with delirium, or for a fall/fracture. We used matching weights to make the three exposure groups (beta-3 agonist, oxybutynin, or newer OAB anticholinergics) comparable across 82 baseline characteristics. We examined both the risk during the first 30 days (logistic regression) and the risk during continuous usage (proportional hazards).

RESULTS: We identified 103 024 older adults who started OAB medications. With matching weights, all measured variables were similar. The 30-day incidence of delirium was 0.31%, and fall/fracture was 1.07%; there was no significantly increased risk of either delirium (oxybutynin users OR 1.28 [95% CI 0.84-1.96], newer OAB anticholinergic users OR 0.92 [95% CI 0.58-1.46]) or falls/fractures (oxybutynin users OR 1.19 [95% CI 0.95-1.49], newer OAB anticholinergic users OR 1.14 [95% CI 0.91-1.43]) compared to beta-3 agonist users. With continuous usage, there was an increased HR of delirium among users of newer anticholinergics (HR 1.13, 95% CI 1.02-1.26) and an increased HR for fall/fracture among oxybutynin users (HR 1.13, 95% CI 1.02-1.24).

CONCLUSIONS: Compared to beta-3 agonists, the continuous use of oxybutynin is associated with a significantly increased risk of fall/fracture, and newer OAB anticholinergics are associated with a significantly increased risk of delirium.

Language: en

Keywords

elderly; falls; anticholinergics; delirium; overactive bladder

The Stepping Threshold Test for reactive balance: validation of two observer-based evaluation strategies to assess stepping behavior in fall-prone older adults

Adams M, Brüll L, Lohkamp M, Schwenk M. Front. Sports Act. Living 2021; 3: e715392.

DOI 10.3389/fspor.2021.715392 **PMID** 34708198

Abstract
INTRODUCTION: Measurement of reactive balance is critical for fall prevention but is severely underrepresented in the clinical setting due to the lack of valid assessments. The Stepping Threshold Test (STT) is a newly developed instrumented test for reactive balance on a movable platform, however, it has not yet been validated for fall-prone older adults. Furthermore, different schemes of observer-based evaluation seem possible. The aim of this study was to investigate validity with respect to fall risk, interpretability, and feasibility of the STT using two different evaluation strategies.

METHODS: This study involved 71 fall-prone older adults (aged ≥ 65) who underwent progressively increasing perturbations in four directions for the STT. Single and multiple-step thresholds for each perturbation direction were determined via two observer-based evaluation schemes, which are the 1) consideration of all steps (all-step-count evaluation, ACE) and 2) consideration of those steps that extend the base of support in the direction of perturbation (direction-sensitive evaluation, DSE). Established balance measures including global (Brief Balance Evaluations Systems Test, BriefBEST), proactive (Timed Up and Go, TUG), and static balance (8-level balance scale, 8LBS), as well as fear of falling (Short Falls Efficacy Scale-International, FES-I) and fall occurrence in the past year, served as reference measurements.

RESULTS: The sum scores of STT correlated moderately with the BriefBEST (ACE: r = 0.413; DSE: r = 0.388) and TUG (ACE: r = -0.379; DSE: r = -0.435) and low with the 8LBS (ACE: r = 0.173; DSE: r = 0.246) and Short FES-I (ACE: r = -0.108; DSE: r = -0.104). The sum scores did not distinguish between fallers and non-fallers. No floor/ceiling effects occurred for the STT sum score, but these effects occurred for specific STT thresholds for both ACE (mean floor effect = 13.04%, SD = 19.35%; mean ceiling effect = 4.29%, SD = 7.75%) and DSE (mean floor effect = 7.86%, SD = 15.23%; mean ceiling effect = 21.07%, SD = 26.08). No severe adverse events occurred.

DISCUSSION: Correlations between the STT and other balance tests were in the expected magnitude, indicating convergent validity. However, the STT could not distinguish between fallers and non-fallers, referring to a need for further studies and prospective surveys of falls to validate the STT. Current results did not allow a definitive judgment on the advantage of using ACE or DSE. Study results represented a step toward a reactive balance assessment application in a clinical setting.
Language: en

Keywords
assessment; validity; fall prevention; fallers; perturbation; reactive balance; step threshold

Visual-related training to improve balance and walking ability in older adults: a systematic review

Mak TCT, Wong TWL, Ng SSM. Exp. Gerontol. 2021; ePub(ePub): ePub.

DOI 10.1016/j.exger.2021.111612 **PMID** 34718089

Abstract

Evidence has emerged about the use of visual-related training as an intervention to improve mobility that could implicate fall prevention in the older population. The objective of this systematic review was to investigate whether visual-related interventions are effective in improving balance and walking ability in healthy older adults. An electronic database search was conducted using Pubmed, Embase, CINAHL Plus, Web of Science, PsycINFO, and SportDiscus. Seventeen studies out of a total of 3297 studies were identified in this review that met the inclusion criteria of (1) adopting a longitudinal design with at least one control comparison group, (2) targeting healthy older adults (age 60 or above), (3) primary focus targeting visual element, and (4) the primary outcome(s) are measures indicating walking and/or balance ability. Our results indicated that visual-related training generally led to improvements in balance and walking ability in healthy older adults. It seems necessary that visual-related training should at least involve mobility-related movement component(s), or form a part of a multi-component training to achieve a beneficial effect on balance and walking. The effectiveness and feasibility of these visual-related training in clinical practice for rehabilitation has been discussed and needs to be investigated in future studies. (197/200).

Language: en

Keywords

Walking; Older adults; Balance; Visual training

A new balance assessment tool for quantifying balance impairment in patients with motor incomplete spinal cord injury: pilot study

Park TS, Shin MJ, Shin YB, Kim SH. J. Spinal Cord Med. 2021; ePub(ePub): ePub.

DOI 10.1080/10790268.2021.1992592 **PMID** 34723782

Abstract

OBJECTIVE: This study aimed to quantitatively and objectively evaluate the balance impairment in patients with motor incomplete spinal cord injury (SCI) using a new evaluation tool for balance and to assess its role in comprehensive balance assessment.

DESIGN: Retrospective pilot study. SETTING: Rehabilitation hospital. PARTICIPANTS: 14 patients with motor incomplete spinal cord injury. INTERVENTIONS: None. OUTCOME MEASURES: We retrospectively compared and analyzed the results of 14 patients with motor incomplete SCI who underwent various balance assessments, including the FRA510S test, using correlation.

RESULTS: The agreement between the FRA510S and existing balance assessment was confirmed through Bland-Altman plots; moreover, high degree of agreement was observed in Berg Balance Scale in the eye closed state and in Five Times Sit-to-Stand Test in the eye open state.

CONCLUSIONS: It was confirmed that the FRA510S equipment provides quantitative values for balance function. Balance assessment using the FRA510S, along with neurological, electrophysiological, and clinical tests, may provide comprehensive additional information related to falls and gait rehabilitation in patients with SCI.

Language: en

Keywords

Rehabilitation; Postural balance; Spinal cord injury

Effect of lower limb muscle fatigue on fall risk for transfemoral amputee: a pilot study

Mohd Safee MK, Abu Osman NA. Occup. Ther. Int. 2021; 2021: e4357473.

DOI 10.1155/2021/4357473 **PMID** 34707468

Abstract

Muscle fatigue is a decline in muscle maximum force during contraction and can influence the fall risk among people. This study is aimed at identifying the effect of fatigue on prospective fall risk in transfemoral amputees (TFA). Fourteen subjects were involved in this study with TFA (34.7 ± 8.1 yrs, n = 7) and normal subjects (31.1 ± 7.4 yrs, n = 7). Fatigue of lower limb muscles was induced with the fatigue protocol. Subjects were tested prefatigue and postfatigue using the standardized fall risk assessment. All results were calculated and compared between pre- and postfatigue to identify fatigue's effect on both groups of subjects. The results showed that the fall risk increased significantly during pre- and postfatigue for TFA ($p = 0.018$), while there were no significant differences in normal subjects ($p = 0.149$). Meanwhile, the fall risk between TFA and normal subjects for prefatigue ($p = 0.082$) and postfatigue ($p = 0.084$) also showed no significant differences. The percentage (%) of increased fall risk for TFA was 19.2% compared to normal subjects only 16.7%. However, 61.4% increased of % fall risk in TFA after fatigue by using the baseline of the normal subject as the normalized % of fall risk. The increasing fall risks for TFA after fatigue are three times higher than the potential fall risk in normal subjects. The result indicates that they need to perform more precautions while prolonging lower limb activities. These results showed the implications of fatigue that can increase the fall risk due to muscle fatigue from repetitive and prolonged activities. Therefore, rehabilitation programs can be done very safely and precisely so that therapists can pursue fitness without aggravating existing injuries.

Language: en

Keywords

Humans; Prospective Studies; Pilot Projects; *Amputees; *Occupational Therapy; Biomechanical Phenomena; Lower Extremity; Muscle Fatigue

Evaluating the performance of balance physiotherapy exercises using a sensory platform: the basis for a persuasive balance rehabilitation virtual coaching system

Tsakanikas VD, Gatsios D, Dimopoulos D, Pardalis A, Pavlou M, Liston MB, Fotiadis DI. Front. Digit. Health 2020; 2: e545885.

DOI 10.3389/fdgth.2020.545885 **PMID** 34713032

Abstract

Rehabilitation programs play an important role in improving the quality of life of patients with balance disorders. Such programs are usually executed in a home environment, due to lack of resources. This procedure usually results in poorly performed exercises or even complete drop outs from the programs, as the patients lack guidance and motivation. This paper introduces a novel system for managing balance disorders in a home environment using a virtual coach for guidance, instruction, and inducement. The proposed system comprises sensing devices, augmented reality technology, and intelligent inference agents, which capture, recognize, and evaluate a patient's performance during the execution of exercises. More specifically, this work presents a home-based motion capture and assessment module, which utilizes a sensory platform to recognize an exercise performed by a patient and assess it. The sensory platform comprises IMU sensors (Mbientlab MMR(©) 9axis), pressure insoles (Moticon(©)), and a depth RGB camera (Intel D415(©)). This module is designed to deliver messages both during the performance of the exercise, delivering personalized notifications and alerts to the patient, and after the end of the exercise, scoring the overall performance of the patient. A set of proof of concept validation studies has been deployed, aiming to assess the accuracy of the different components for the sub-modules of the motion capture and assessment module. More specifically, Euler angle calculation algorithm in 2D (R (2) = 0.99) and in 3D (R (2) = 0.82 in yaw plane and R (2) = 0.91 for the pitch plane), as well as head turns speed (R (2) = 0.96), showed good correlation between the calculated and ground truth values provided by experts' annotations. The posture assessment algorithm resulted to accuracy = 0.83, while the gait metrics were validated against two well-established gait analysis systems (R (2) = 0.78 for double support, R (2) = 0.71 for single support, R (2) = 0.80 for step time, R (2) = 0.75 for stride time (WinTrack(©)), R (2) = 0.82 for cadence, and R (2) = 0.79 for stride time (RehaGait(©)). Validation results provided evidence that the proposed system can accurately capture and assess a physiotherapy exercise within the balance disorders context, thus providing a robust basis for the virtual coaching ecosystem and thereby improve a patient's commitment to rehabilitation programs while enhancing the quality of the performed exercises. In summary, virtual coaching can improve the quality of the home-based rehabilitation programs as long as it is combined with accurate motion capture and assessment modules, which provides to the virtual coach the capacity to tailor the interaction with the patient and deliver personalized experience.
Language: en

Keywords

motion capture; balance disorders; gait analytics; IMU sensors; motor score; persuasive technology; physiotherapy exercises; virtual coach

Evaluation of the balance function before and after total knee arthroplasty using Berg balance scale

Kiyohara M, Hamai S, Okazaki K, Fujiyoshi D, Mizu-Uchi H, Nakashima Y. Arch. Orthop. Trauma Surg. 2021; ePub(ePub): ePub.

DOI 10.1007/s00402-021-04233-z **PMID** 34716485

Abstract

INTRODUCTION: The purpose of this study was to evaluate balance function before and after total knee arthroplasty (TKA) using Berg balance scale (BBS). The study also aimed to identify factors associated with balance impairment.

MATERIALS AND METHODS: Ninety-three knees in 90 patients were prospectively evaluated using their BBS scores, passive knee extension/flexion angles, Visual analogue scale for pain scores, hip-knee-ankle angles, and knee extensor/flexor muscle strengths before and after TKA. A total BBS score of less than 45 indicates an enhanced risk of multiple falls. Multivariate logistic regression models were performed to elucidate factors associated with post-operative BBS score.

RESULTS: A significant difference in mean pre- and post-operative BBS scores were noted (49.3 ± 6.4 vs. 52.2 ± 4.7) ($p < 0.05$). The percentage of pre- and post-operative BBS scores less than 45 were 20% and 10% ($p < 0.05$). Rheumatoid Arthritis (RA), lower pre-operative BBS score, and larger post-operative knee flexion contracture were significantly associated with lower post-operative BBS score ($p < 0.01$). The post-operative knee flexion contracture greater than 10° was significantly associated with substantially high odds of post-operative BBS scores less than 45 (Odds ratio 7.6; 95% confidential interval 1.69-34.17).

CONCLUSIONS: While TKA significantly improved BBS scores, 10% of the patients remained at a risk for multiple falls. RA, lower pre-operative BBS score, and post-operative knee flexion contracture greater than 10° retained balance impairment even after TKA.

Language: en

Keywords

Balance impairment; Berg balance scale; Knee flexion contracture; Total knee arthroplasty

Falls and fractures in patients with Parkinson's disease-related psychosis treated with pimavanserin vs atypical antipsychotics: a cohort study

Layton JB, Forns J, Turner ME, Dempsey C, Bartsch JL, Anthony MS, Danysh HE, Ritchey ME, Demos G. Drugs Real World Outcomes 2021; ePub(ePub): ePub.

DOI 10.1007/s40801-021-00284-1 **PMID** 34718963

Abstract

BACKGROUND: Parkinson's disease-related psychosis increases patients' risk of falls. Pimavanserin is an atypical antipsychotic approved in the USA in 2016 for the treatment of hallucinations and delusions associated with Parkinson's disease-related psychosis.

OBJECTIVE: We aimed to compare the risk of falls/fractures among patients with Parkinson's disease-related psychosis treated with pimavanserin vs other atypical antipsychotics.

PATIENTS AND METHODS: We identified a cohort of patients with Parkinson's disease-related psychosis aged ≥ 40 years initiating either pimavanserin or a comparator antipsychotic (clozapine, quetiapine, risperidone, olanzapine, aripiprazole, brexpiprazole) in US commercial insurance and supplementary Medicare claims (2015-2019). Comparators were propensity score matched 2:1 with pimavanserin initiators; incidence rates of falls/fractures were compared using incidence rate ratios (IRRs) and 95% confidence intervals (CIs).

RESULTS: We identified 112 eligible pimavanserin initiators and 982 comparators. Pimavanserin initiators were younger and had fewer severe comorbidities, indicators of impairment, and healthcare encounters, though they had higher Parkinson's disease medication use. The crude incidence rates [cases/100 person-years] (95% CI) for composite falls/fractures were 17.8 (7.7-35.0) for pimavanserin and 40.8 (35.0-47.4) for comparators. Matching retained 108 pimavanserin initiators and 216 comparators-all characteristics were well balanced after matching-with a matched IRR (pimavanserin vs comparator) of 0.71 (95% CI 0.27-1.67). Sensitivity analysis IRR estimates were consistently below 1.00, with a sensitivity analysis not requiring a diagnosis of psychosis resulting in an IRR estimate of 0.55 (95% CI 0.34-0.86).

CONCLUSIONS: The results of this study do not suggest an increase in the risk of falls or fractures associated with pimavanserin compared with other antipsychotics in patients with Parkinson's disease-related psychosis. Sensitivity analyses suggest a decreased risk.

Language: en

Is kinesiophobia related to fear of falling, dizziness disability, and migraine disability in patients with migraine?

Pinheiro CF, Bevilaqua-Grossi D, Florencio LL, Bragatto MM, Benatto MT, Dach F, Bigal ME, Carvalho GF. Physiother. Theory Pract. 2021; ePub(ePub): ePub.

DOI 10.1080/09593985.2021.1996496 **PMID** 34704520

Abstract

INTRODUCTION: Kinesiophobia is a common symptom associated with high disability, and has been observed in patients with migraine. However, the association between kinesiophobia and clinical factors in this population is unknown.

OBJECTIVE: To assess the fear of falling, dizziness disability, and migraine disability in patients with migraine, considering the presence of kinesiophobia.

METHODS: Eighty patients with migraine completed the Tampa Scale for Kinesiophobia and were divided into two groups according to the questionnaire cutoff point: migraine without kinesiophobia (MoK, n = 39) and migraine with kinesiophobia (MK, n = 41). Fear of falling, dizziness disability, and migraine disability were assessed in both groups using validated questionnaires.

RESULTS: The MK group presented higher scores on dizziness disability, fear of falling, and migraine disability compared to the MoK ($p < .05$). Kinesiophobia can explain 29% of the variance in dizziness disability and 18% of migraine disability. Both kinesiophobia and the presence of dizziness can explain 14% of fear of falling variability. Also, kinesiophobia is associated with the risk of presenting fear of falling (Prevalence Ratio = 2.4, $p = .012$), and migraine disability (Prevalence Ratio = 2.6, $p = .01$).

CONCLUSION: The presence of kinesiophobia should be considered in clinical practice when evaluating migraine, as it is associated with increased levels of fear of falling, dizziness disability, and migraine disability.

Language: en

Keywords

disability; falls; dizziness; Fear-avoidance; headache

Parents' perception of fall risk and incidence of falls in the pediatric ambulatory environment

Gordon MD, Walden M, Braun C, Hagan J, Lovenstein A. J. Pediatr. Nurs. 2021; 61: 424-432.

DOI 10.1016/j.pedn.2021.09.028 **PMID** 34710660

Abstract

PURPOSE: To identify the parents' perspective of fall incidence and risks in the pediatric ambulatory environment. DESIGN AND METHODS: A prospective descriptive correlational study was conducted in two large quaternary pediatric hospitals. Parents who accompanied their children to the clinic appointment were surveyed about falls their child experienced while at the clinic. Parent reported falls were compared to those reported in adverse event reporting systems (AERS) for the same period.

RESULTS: Data from 2327 completed parent surveys were analyzed. Parents reported 48 children fell and 139 falls. Only three falls were recorded in the AERS. Stepwise logistic regression was used to identify predictors of falls and a nomogram was created from the final model to facilitate patient fall risk screening. Three predictors of falls were identified: children under the age of five, children described by their parents as falling more at home than other children of the same age, and children who had a medical condition that impacts their ability to walk. A nomogram is provided to estimate the probability of falling for patients under 18 years of age in the ambulatory environment.

CONCLUSIONS: Parents may provide more reliable data regarding the incidence and risk factors for falls in the ambulatory environment than AERS, and it is possible to predict the probability of a fall given information from the parents. PRACTICE IMPLICATIONS: Knowing who is at risk for falls creates opportunities for organizations to modify clinic procedures, train staff, and create physical environments that promote increased patient safety.

Language: en

Keywords

Pediatric; Ambulatory environment; Fall incidence; Fall prevention; Fall risks

Physical therapist clinical reasoning in home care for walking assistive device prescription: a description of practice

O'Brien SR, Barry M, Davidson E, Porzi L, Spink M, Weatherbee D. Physiother. Theory Pract. 2021; ePub(ePub): ePub.

DOI 10.1080/09593985.2021.1996495 **PMID** 34706615

Abstract

BACKGROUND: Home care in the United States (US) provides rehabilitative care to people who are homebound after acute hospitalization. Patients with stroke and brain injury (BI) are commonly seen by physical therapists (PTs/PTAs), who often address the loss of walking independence. Clinical reasoning (CR) is required for walking assistive device (WAD) prescription within the home. There has never been a description of the home care PT CR process, which could inform entry-level training and health policy.

PURPOSE: To describe the homecare CR process by identifying factors used for prescription of WADs in patients with stroke and BI. Secondly, to describe any practice issues associated with WADs.

METHODS: Directors of 7 agencies affiliated with Nazareth College DPT program were recruited to identify PTs/PTAs to complete an online survey between March - July 2017. Quantitative and qualitative data were collected, and analyzed for frequencies or for common themes.

RESULTS: A total of 334 PTs/PTAs were enrolled from all agencies and 72 responses were analyzed. The CR process did not differ between stroke and BI. Safety was the primary factor, which was assessed by patient query, observation skills, and objective measures. PTs/PTAs also measured balance, strength, function, cognition, and patient preferences within the context of the home. WADs obtained prior to initiation of home care often weren't used.

CONCLUSION: A complex CR process has been described for WAD prescription in home care for patients with stroke and BI. Entry-level training and health policy implications are described.

Language: en

Keywords

physical therapy; brain injury; Clinical reasoning; stroke; walking assistive device

The influence of probable rapid eye movement sleep behavior disorder and sleep insufficiency on fall risk in a community-dwelling elderly population

Han C, An J, Chan P. BMC Geriatr. 2021; 21(1): e606.

DOI 10.1186/s12877-021-02513-2 **PMID** 34702166

Abstract

BACKGROUND: The objective was to investigate the individual effect and potential interactions of probable rapid eye movement sleep behavior disorder (pRBD) and sleep insufficiency on fall risk among a Chinese elderly population.

METHODS: Community-dwelling population aged 55 years or above were recruited from the Beijing Longitudinal Study on Aging II cohort from 2010 to 2011. Odds ratio (ORs) and 95% confidence intervals (CIs) were estimated using multivariate logistic regression models. Multiplicative and additive interactions between pRBD and sleep insufficiency were examined using likelihood ratio tests and relative excess risk due to interaction (RERI), respectively.

RESULTS: Among 6891 included participants, 479 experienced at least once fall. pRBD and sleep insufficiency were both independently associated with elevated fall risk. Compared to the elderly without pRBD or sleep insufficiency, pRBD and sleep insufficiency was each associated with a 2.57-fold (OR = 2.57, 95%CI: 1.46-4.31) and 1.45-fold (OR = 1.45, 95%CI: 1.11-1.88) risk of falls individually, while their coexistence was associated with a less-than-additive 17% (OR = 1.17, 95%CI: 0.43-2.63) increased risk of falls. The combination of these two factors demonstrated evidence of a negative interaction on both multiplicative (ratio of ORs = 0.31, 95%CI: 0.10, 0.86) and additive (RERI = - 1.85, 95%CI: - 3.61, - 0.09) scale.

CONCLUSIONS: Our study has provided robust evidence for the adverse effect of pRBD and sleep insufficiency, as well as their negative interaction on increasing fall risk in a Chinese elderly population.

Language: en

Keywords

Elderly; Fall; Interaction; Probable rapid eye movement sleep behavior disorder; Sleep insufficiency