

Safety Literature 27th February 2022

A digital health service for elderly people with balance disorders and risk of falling: a design science approach

Gaspar AGM, Lapão LV. *Int. J. Environ. Res. Public Health* 2022; 19(3): e1855.

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DOI 10.3390/ijerph19031855 **PMID** 35162877

Abstract

In this study, a design science research methodology was used aiming at designing, implementing and evaluating a digital health service to complement the provision of healthcare for elderly people with balance disorders and risk of falling. An explanatory sequential mixed methods study allowed to identify and explore the dissatisfaction with electronic medical records and the opportunity for using digital health solutions. The suggested recommendations helped to elaborate and develop "BALANCE", a digital service implemented on the METHIS platform, which was recently validated for remote monitoring of chronic patients in primary healthcare. "BALANCE" provides clinical and interactive data, questionnaire pre and post-balance rehabilitation, tutorial videos with balance exercises and patient-recorded videos of the exercises. This digital service was demonstrated, including five elderly patients with clinical recommendations for balance rehabilitation at home. Finally, the authors conducted two focus groups with the participants and their caregivers as well as with physicians. The focus groups aimed at exploring their satisfaction level, needs of adjustment in the "BALANCE" service and strategies for applicability. The digital healthcare service evaluation revealed a significant potential for clinical applicability of this digital solution for elderly people with balance disorders and risk of falling.

Language: en

Keywords

eHealth; falls; balance disorders; digital health; elderly care; healthy ageing

A theoretical framework for addressing fear of falling avoidance behavior in Parkinson's disease

Landers MR, Nilsson MH. *Physiother. Theory Pract.* 2022; ePub(ePub): ePub.

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DOI 10.1080/09593985.2022.2029655 **PMID** 35180834

Abstract

Postural instability in Parkinson's disease (PD) is associated with several downstream consequences that ultimately lead to a greater risk of falling. Among the prominent downstream consequences is fear of falling (FOF), which is both common and problematic in PD. It can lead to a vicious cycle of FOF avoidance behavior that results in more sedentary behavior, physical deconditioning, and weakening of already impaired balance systems. This, in turn, may make the person with PD more susceptible to a future fall even with benign daily tasks. While FOF activity avoidance can be adaptive (appropriate), it can also be maladaptive (inappropriate or exaggerated). When this adaptive and maladaptive FOF avoidance behavior is contextualized to gait/balance performance, it provides a theoretical framework that can be used by clinicians to match patterns of behavior to a concordant treatment approach. In the theoretical framework proposed in this perspective, four different patterns related to FOF avoidance behavior and gait/balance performance are suggested: appropriate avoiders, appropriate non-avoiders, inappropriate avoiders, and inappropriate non-avoiders. For each of the four FOF avoidance behavior patterns, this paper also provides suggested treatment focuses, approaches and recommendations.

Language: en

Keywords

falls; balance; gait; Parkinson's disease; neurorehabilitation; physiotherapy

Association between physical activity and falls among older adults in rural China: are there gender and age related differences?

Yuan Y, Li J, Fu P, Jing Z, Wang Y, Zhou C. BMC Public Health 2022; 22(1): e356.

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DOI 10.1186/s12889-022-12773-1 PMID 35183149

Abstract

BACKGROUND: The relationship between physical activity (PA) and falls among older adults is inconsistent, and little is known about the gender-specific association between falls and PA. Moreover, age may modify this relationship. This study aimed to test the association between PA and falls and to investigate the gender and age differences in the association among rural older adults.

METHODS: This cross-sectional data were derived from the baseline survey of Shandong Rural Elderly Health Cohort (SREHC). In total, 3,242 rural older adults aged 60 years and above were included in the analysis. PA was measured by the International Physical Activity Questionnaire Short Form (IPAQ-S). PA levels were classified as low, moderate, elevated and high according to quartiles. Volume of moderate-to-vigorous physical activity (MVPA) was categorized into low, moderate, elevated, and high level based on global recommendations. Information on falls was determined from in-person interviews. Falling was defined to participants as ending up on the floor or ground because they were unable to stop themselves. Logistic regression analysis was employed to explore the association between falls and PA.

RESULTS: Of 3,242 rural older adults, the incidence of falls was 13.1%. In older adults, high levels of PA [odds ratio (OR) = 0.65, 95% confidence interval (CI): 0.47-0.90] or MVPA (OR = 0.68, 95% CI: 0.50-0.94) were related to falls. Moderate (OR = 4.84, 95% CI: 1.68-13.94) or high (OR = 0.54, 95% CI: 0.30-0.99) levels of MVPA were associated with falls in older men. But elevated levels of PA were associated with falls (OR = 0.60, 95% CI: 0.42-0.87) in older women. Among older people younger than 75 years, elevated (OR = 0.54, 95% CI: 0.37-0.79) or high (OR = 0.68, 95% CI: 0.48-0.98) levels of PA were associated with falls.

CONCLUSIONS: Among Chinese rural older adults, PA and MVPA are associated with falls, and there are gender and age differences. To prevent falls, measures need to account for individuals' gender and age to encourage rural older adults to participate more actively in PA. We will conduct longitudinal studies to clarify the causal relationship between PA and fall.

Language: en

Keywords

Gender; Physical activity; Falls; Age; Older adults; Differences; Moderate-to-vigorous physical activity

Effectiveness of a tailored fall-prevention program for discharged older patients: a multicenter, preliminary, randomized controlled trial

Ueda T, Higuchi Y, Hattori G, Nomura H, Yamanaka G, Hosaka A, Sakuma M, Fukuda T, Fukumoto T, Nemoto T. *Int. J. Environ. Res. Public Health* 2022; 19(3): e1585.

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DOI 10.3390/ijerph19031585 **PMID** 35162608

Abstract

This multicenter, preliminary, randomized controlled trial investigated the effect of a tailored fall-prevention program using home floor plans for discharged orthopedic patients aged ≥ 65 years who experienced ≥ 1 fall(s) in the past year ($n = 72$) at five acute-care hospitals. The control group received standard care (exercise to prevent recurrent falls), whereas the intervention group received a tailored fall-prevention program in addition to usual care. A physical therapist conducted the tailored education program using each patient's home floor plans before discharge. A follow-up survey of falls and near-falls at home was performed using a monthly fall calendar for the 1-month period after discharge. Data on 81.5% of participants remained for the final analyses. No falls occurred in the intervention group; however, 4.3% of those in the control group experienced a fall. Near-falls were reported by 3.7% and 26.9% of the participants in the intervention and control groups, respectively. The proportion of participants who did not experience near-falls in the 1st month after discharge was lower in the intervention than in the control group ($p = 0.018$). In conclusion, the tailored fall-prevention program using home floor plans in multiple acute-care hospitals was effective in reducing falls and near-falls in discharged orthopedic patients.

Language: en

Keywords

intervention study; acute-care hospital; discharged patients; fall prevention; home floor plans; multicenter

Effects of long-term Tai-Chi Chuan practice on whole-body balance control during obstacle-crossing in the elderly

Kuo CC, Chen SC, Chen TY, Ho TJ, Lin JG, Lu TW. *Sci. Rep.* 2022; 12(1): e2660.

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DOI 10.1038/s41598-022-06631-8 PMID 35177707

Abstract

Older people are subject to an increased risk of falling compared to the young, especially during obstacle negotiation. This study aimed to quantify the effects of long-term Tai-Chi Chuan (TCC) practice on the balance control during obstacle-crossing in older people in terms of the inclination angles (IA) of the body's centre of mass (COM) relative to the centre of pressure (COP), and the rate of change of IA (RCIA). Fifteen healthy older adults who had practised TCC for at least 13 years and 15 healthy controls without any experience in TCC performed obstacle-crossing in a gait laboratory. The TCC group showed significantly greater leading and trailing toe-obstacle clearances but smaller trailing stride lengths when compared to controls. In the sagittal plane, the TCC group showed significantly smaller average anterior IA when the COM was anterior to the COP but greater average posterior IA when the COM was posterior to the COP, with significantly smaller average and peak RCIA over the crossing cycle. Long-term TCC practitioners showed an obstacle-crossing technique for less risk of tripping and better balance control, as indicated respectively by significantly increased toe-obstacle clearances and more posterior COM position relative to the COP with smaller anterior IA and RCIA during leading crossing and greater posterior IA and frontal RCIA at trailing-toe crossing. These benefits appeared to be related to the main features of TCC movements that emphasized maintaining balance during single-leg support and keeping the body weight on the trailing limb during the slow weight-shifting of double-limb support.

Language: en

Factors of balance determining the risk of falls in physically active women aged over 50 years

Bednarczuk G, Rutkowska I. PeerJ 2022; 10: e12952.

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DOI 10.7717/peerj.12952 PMID 35186507

Abstract

BACKGROUND: Balance disorders are believed to be one of the main reasons for falls in older adults. They are related to natural processes of ageing, resulting in deterioration of information integration and processing from the vestibular, somatosensory and visual systems. The consequence is an increased number of postural sways, which are some of balance factors. Balance control in static and dynamic activities is an essential element of daily functioning of older citizens. It seems that balance assessment is essential to determine the risk of falls, as well as to determine which factors of balance have greatest impact on the risk of falls.

METHODS: The study involved physically active female students ($n = 36$, mean age $67,11 \pm 5,35$) of a University of the Third Age. We used the Balance System SD platform to assess their balance in four tests with eyes open and with eyes closed and to determine the risk of falls. We assessed the relationships between individual balance indices (overall stability index, anterior/posterior stability index, medial/lateral stability index) and the falls risk index. We also determined those factors which predicted the risk of falls the most.

RESULTS: The studied subjects had low risk of falls for their age category. In most measurements there were relationships between the risk of falls and the size of sways in the coronal plane and the overall stability index. We also found that the overall stability index calculated in measurements with eyes closed predicted the risk of falls of the studied physically active females most accurately ($R(2) 0.391 F(1.34)=23.475; <0.000$). The subjects were physically active and their falls risk index was low - this allowed us to presume that there was a relationship between these two factors. Preventive programmes should include exercise performed with eyes closed, and tests conducted with eyes closed seem to be most sensitive in determining balance disorders in physically active women.

Language: en

Keywords

Balance; Elderly; Risk of falls

Falls prevention and osteoarthritis: time for awareness and action

Ackerman IN, Barker A, Soh SE. *Disabil. Rehabil.* 2022; ePub(ePub): ePub.

(Copyright © 2022, Informa - Taylor and Francis Group)

DOI 10.1080/09638288.2022.2040617 **PMID** 35191810

Abstract

Osteoarthritis (OA) and falls both commonly affect older people. While high-level evidence exists to prevent falls in older people, falls prevention is rarely considered within contemporary OA management. OA care and falls prevention have for too long been considered as separate clinical constructs. In the context of ageing populations and growing numbers of people with OA, the time to raise awareness and enact appropriate action is now. This Perspectives on Rehabilitation article draws on the findings from a comprehensive mixed-methods falls and OA research program (which uniquely spanned population, clinician, and consumer perspectives) to better understand existing evidence-practice gaps and identify key opportunities for improvements in clinical care. **IMPLICATIONS FOR REHABILITATION** While high-level evidence exists to prevent falls in older people, falls prevention is rarely considered within contemporary OA management and this represents a concerning knowledge-to-practice gap. Given ageing populations and growth in the number of people with OA, it is time for falls prevention to be incorporated within routine OA care for older people. To achieve this, we need to re-shape current messaging around falls prevention and develop targeted resources to optimise clinician knowledge and skills in this area.

Language: en

Keywords

Falls; ageing; evidence-based practice; falls prevention; osteoarthritis

Feasibility of performance-based and self-reported outcomes in self-managed falls prevention exercise interventions for independent older adults living in the community

Mansson L, Pettersson B, Rosendahl E, Skelton DA, Lundin-Olsson L, Sandlund M. *BMC Geriatr.* 2022; 22(1): e147.

(Copyright © 2022, Holtzbrinck Springer Nature Publishing Group - BMC)

DOI 10.1186/s12877-022-02851-9 **PMID** 35193495

Abstract

BACKGROUND: Little is known about associations between performance-based measurements and self-reported scales, nor about ceiling effects or sensitivity to change to evaluate effects in the target population for self-managed exercise interventions. This study aimed to explore the feasibility of using performance-based outcomes for gait speed, functional leg strength and balance, and self-reported outcomes of falls-efficacy and functional ability in two self-managed falls prevention exercise interventions for community dwelling older adults.

METHODS: Independent living, community-dwelling older adults ($n = 67$) exercised with one of two self-managed falls prevention exercise programmes, a digital programme (DP) or a paper booklet (PB) in a 4-month participant preference trial. Pre- and post-assessments, by blinded assessors, included Short Physical Performance Battery (SPPB) and 30s Chair stand test (30s CST). Participants completed self-reported questionnaires: Activities-specific and Balance Confidence scale (ABC), Iconographical Falls Efficacy Scale (Icon-FES), Late-Life Function and Disability Instrument Function Component (LLFDI-FC). In addition, improvement in balance and leg strength was also self-rated at post-assessment. Participants' mean age was 76 ± 4 years and 72% were women.

RESULTS: Ceiling effects were evident for the balance sub-component of the SPPB, and also indicated for ABC and Icon-FES in this high functioning population. In SPPB, gait speed, 30s CST, and LLFDI-FC, 21-56% of participants did not change their scores beyond the Minimal Clinically Important Difference (MCID). At pre-assessment all performance-based tests correlated significantly with the self-reported scales, however, no such significant correlations were seen with change-scores. Improvement of performance-based functional leg strength with substantial effect sizes and significant correlations with self-reported exercise time was shown. There were no differences in outcomes between the exercise programmes except that DP users reported improved change of leg strength to a higher degree than PB users.

CONCLUSION: The LLFDI-FC and sit-to-stand tests were feasible and sensitive to change in this specific population. The balance sub-component of SPPB and self-reported measures ABC and Icon-FES indicated ceiling effects and might not be suitable as outcome measures for use in a high functioning older population. Development and evaluation of new outcome measures are needed for self-managed fall-preventive interventions with high functioning community-dwelling older adults.

Language: en

Keywords

Aged; Falls prevention; Patient outcome assessment; Self-managed

Feet/footwear-related fall risk screening tool for older adults: development and content validation

Wingood M, Peterson E, Neville C, Vincenzo JL. *Front. Public Health* 2021; 9: e807019.

(Copyright © 2021, Frontiers Editorial Office)

DOI 10.3389/fpubh.2021.807019 **PMID** 35186877

Abstract

BACKGROUND AND PURPOSE: Screening for feet- and footwear-related influences on fall risk is an important component of multifactorial fall risk screenings, yet few evidence-based tools are available for this purpose. We developed the Screening Tool for Feet/Footwear-Related Influences on Fall Risk to support interprofessional health care providers in their efforts to screen for feet/footwear-related influences on fall risk among community-dwelling older adults identified at risk for falling.

MATERIALS AND METHODS: The study consisted of two phases. During Phase 1, results of a systematic review of lower-limb factors associated with balance and falls informed tool development. The tool's initial draft was evaluated by an external group of nine interprofessional content experts. After incorporating changes recommended by Phase 1 participants, Phase 2 was initiated. During Phase 2, eight new interprofessional experts (19.3 average years of experience) completed the three rounds of a modified Delphi study.

RESULTS: Phase 1 experts recommended modifying eight items and rated the tool's clarity, appeal and clinical feasibility as 81.2/100, 79.1/100, and 76.1/100, respectively. Phase 2 participants suggested combining items with similar recommended actions, adding a question about orthoses, and increasing the specificity of nine items. The refinements resulted in a 20-item screening tool. Each item was approved by the Phase 2 participants with > 80% agreement after two rounds of consensus voting, reflecting the tool's high face and content validity.

CONCLUSION: The new screening tool has high face and content validity and supports identification of feet- and footwear-related influences on fall risk among community-dwelling older adults. The tool can be used by interprofessional healthcare providers completing a multifactorial fall risk screening on community-dwelling adults identified as being at risk for falling.

Language: en

Keywords

injury prevention; older adults; falls; balance; STEADI

Identifying appropriate nursing home resources to reduce fall-related emergency department transfers

Guerbaai RA, Kressig RW, Zeller A, Tröger M, Nickel CH, Benkert B, Wellens NIH, Osińska M, Simon M, Zúñiga F. J. Am. Med. Dir. Assoc. 2022; ePub(ePub): ePub.

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DOI 10.1016/j.jamda.2022.01.063 PMID 35192846

Abstract

OBJECTIVES: To describe potentially avoidable fall-related transfers to the emergency department (ED), and to identify infrastructure, training needs, and resources deemed appropriate for implementation in nursing homes (NHs) to decrease fall-related transfers to EDs.

DESIGN: A multi-method design, including (1) in-depth case review by an expert panel, (2) structured discussion with NH stakeholders, and (3) appropriateness rating. **SETTING AND PARTICIPANTS:** Fall-related transfers were identified from the prospective reporting of every unplanned hospital transfer occurring within 21 months, collected during the

INTERCARE study in 11 Swiss NHs.

METHODS: Eighty-one fall-related transfers were rated for avoidability by a 2-round expert panel. NH stakeholders were consulted to discuss key implementable resources for NHs to mitigate potentially avoidable fall-related transfers. A questionnaire composed of 21 contextually adapted resources was sent to a larger group of stakeholders, to rate the appropriateness for implementation in NHs. χ^2 tests were used to assess whether avoidability was associated with an ED visit and to describe transfers. The RAND/UCLA method for appropriateness was used to determine appropriate resources.

RESULTS: One of 4 fall-related transfers were rated as potentially avoidable. A positive association was found between an ED visit and a rating of avoidability (χ^2 (1, N = 81) = 18.0, P < .001). Fourteen resources, including developing partnerships with outpatient clinics to access imaging services and strengthening geriatric expertise in nursing homes through clinical training and advanced nurse practitioners, were rated as appropriate by NH stakeholders for NH implementation to reduce potentially avoidable fall-related ED transfers.

CONCLUSIONS AND IMPLICATIONS: Access to diagnostic equipment, geriatric expertise, and clinical training is essential to reduce fall-related potentially avoidable transfers from NHs. Implementing and supporting advanced practice nurses or nurses in extended roles provides NH directors, policymakers, and health care institutions with the possibility of re-engineering resources to limit unnecessary transfers, which are detrimental for resident quality of care and costly for the health system.

Language: en

Keywords

falls; nursing homes; Emergency department transfers; hospitalizations; long-term care; potentially avoidable transfers

Identifying profiles of people aged 65 and over who fall at home and associated falling-induced injuries: the French ChuPADom study

Torres MJ, Pédrone G, Rigou A, Carcaillon-Bentata L, Beltzer N. Injury 2022; ePub(ePub): ePub.

(Copyright © 2022, Elsevier Publishing)

DOI 10.1016/j.injury.2022.02.021 PMID 35184820

Abstract

BACKGROUND: Falls in older people are a major public health problem due to associated morbidity and mortality. Their origin is most often multifactorial.

OBJECTIVE, DESIGN AND SUBJECTS: The objective of the present study, called ChuPaDom, was to identify patterns or profiles of home fallers (HF) - understood here as people who fall in their place of residence - among a sample of persons aged 65 and over who were hospitalized after a fall, and to study their association with falling-induced injuries using data from the ChuPADom study.

METHODS: Multiple correspondence analysis and Hierarchical Clustering on Principal Components were performed. Multivariate logistic regression was used to test for associations between HF profiles and injuries.

RESULTS: The sample comprised 1467 patients (69% female, average age = 84.5 years). Five profiles were identified: youngest seniors who took risks and fell from a raised height, youngest seniors with specific health problems who fell down a stairs, autonomous seniors who fell because they lost their balance or fell from their own height, dependent seniors who fell during low-intensity activities, very old seniors for whom missing data were frequent. Fractures were more frequent among the first profile than the last two profiles constituted with more dependent individuals ($p < 0.001$).

CONCLUSION: These results highlight the heterogeneity of the circumstances in which older people fall. A greater understanding of these circumstances is needed to implement targeted prevention actions.

Language: en

Keywords

Injuries; Falls; Older adults; Home; Profiles of fallers

Lower limb muscle activation in response to balance-perturbed tasks during walking in older adults: a systematic review

Kim HK, Chou LS. *Gait Posture* 2022; 93: 166-176.

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DOI 10.1016/j.gaitpost.2022.02.014 PMID 35180685

Abstract

BACKGROUND: Declines in muscular function may hinder our ability to properly respond to balance perturbations during walking. Examining age-related differences in muscle activation during balance-perturbed walking could be an important summary of literature to guide future clinical or scientific research. **RESEARCH QUESTION:** Are there differences in lower limb muscle activation between young and older adults when responding to balance perturbations during walking? **METHODS:** A literature search was conducted in October 2020 to identify relevant articles using Pubmed, Scopus, Web of Science, Ovid EMBASE, and CINAHL. Inclusion criteria were defined to identify studies investigating lower limb muscle activation in healthy older adults during balance-perturbed walking. Data extraction was independently performed by both authors. Outcome measures included key findings of lower limb muscle activations during walking and balance-related tasks (e.g. multidirectional perturbations, different speeds, cognitive tasks, slippery/slopes, and obstacles).

RESULTS: This article reviewed fourteen studies including 230 older adults (age: 70 ± 4.5 , females: 124 [53.9%]) and 230 young adults (age: 23 ± 2.0 , females: 113 [49.1%]). The overall quality of included studies was fair, with a mean score of 76%. Twelve lower limb muscles were assessed during balance-perturbed walking. All studies reported electromyographic measurements, including magnitude, timing, co-contraction indices, and variability of activation. **SIGNIFICANCE:** Compared to young adults, older adults demonstrated different adaptations in lower limb muscle activation during balance-perturbed walking. Co-contraction of ankle and knee joint muscles had more conclusive results, with the majority reporting an increased co-contraction in older adults, especially when balance is perturbed by a physical task. These data suggest that coordination between agonist and antagonist muscles is important to provide necessary stabilization during balance-perturbed walking.

Language: en

Keywords

Walking; Older adults; Balance perturbation; Co-contraction; Muscle activation

Physical therapists and physical therapist assistants' knowledge and use of the STEADI for falls risk screening of older adults in physical therapy practice in the United States

Vincenzo JL, Schrodtt LA, Hergott C, Perera S, Tripken J, Shubert TE, Brach JS. *Int. J. Environ. Res. Public Health* 2022; 19(3): e1354.

(Copyright © 2022, MDPI: Multidisciplinary Digital Publishing Institute)

DOI 10.3390/ijerph19031354 PMID 35162377

Abstract

Fall-risk screening and prevention is within the scope of physical-therapy practice. Prior research indicates United States-based physical therapists (PTs) and physical-therapist assistants (PTAs) use the Centers for Disease Control and Prevention's STEADI (Stopping Elderly Accidents, Deaths, and Injuries) toolkit for community-based fall-risk screenings of older adults. However, clinically based fall-risk screenings and knowledge and use of the STEADI by PTs and PTAs is unknown. We conducted a cross-sectional survey distributed to a convenience sample of PTs and PTAs in the United States through email blasts and social media. PTs and PTAs (N = 425) who responded to the survey and worked in clinical settings with older adults were included. Eighty-nine percent of respondents reported conducting clinical fall-risk screening. Approximately 51% were 'familiar' to 'very familiar' with the STEADI, and 21.7% of the overall sample were not familiar at all. Only 26.1% utilize the STEADI for clinical fall-risk screening. Of the respondents who were 'very familiar' with the STEADI (n = 132, 31.1%), 84.1% (n = 111) reported using the STEADI in clinical practice. Seventy-six percent of respondents who use the STEADI implemented it by choice even though the majority (52.1%, n = 63) did not have it embedded in their documentation/workflow. Some PTs/PTAs can and do manage falls using the STEADI, but there is a gap in knowledge and use of the STEADI for falls management among PTs and PTAs in the United States. Further research is needed to identify the tools PTs use for multifactorial-fall screening and management and the impact of PTs' use of the STEADI on patient outcomes.

Language: en

Keywords

injury prevention; rehabilitation; accidental injury; evidence-based practice; health services; preventive healthcare

Polypharmacy in Polish older adult population-a cross-sectional study: results of the PolSenior Project

Neumann-Podczaska A, Tobis S, Antimisiaris D, Mossakowska M, Puzianowska-Kuznicka M, Chudek J, Wierucki L, Merks P, Wizner B, Sobieszczanska M, Niemi ZI, Kaczmarek B, Wieczorowska-Tobis K. *Int. J. Environ. Res. Public Health* 2022; 19(3): e1030.

(Copyright © 2022, MDPI: Multidisciplinary Digital Publishing Institute)

DOI 10.3390/ijerph19031030 **PMID** 35162054

Abstract

Polypharmacy is a challenging issue in geriatrics. The aim of the study was to characterize correlates of polypharmacy in the PolSenior project. The PolSenior project, was a comprehensive survey in a large and longitudinal representative sample of the Polish older population. The project was conducted by the International Institute of Molecular and Cell Biology in Warsaw between 2008 and 2011. All medications consumed during the week preceding the survey were evaluated for each participant (n = 4793, including 2314 females (48.3%)). Thereafter, the percentage of those with polypharmacy (at least 5 medications) and excessive polypharmacy (at least 10 medications) was calculated, and their correlates were determined. The average number of medications used by participants was 5.1 ± 3.6 , and was higher in females than in males (5.5 ± 3.5 vs. 4.8 ± 3.5 ; $p < 0.001$). Polypharmacy characterized 2650 participants (55.3%) and excessive polypharmacy-532 of them (11.1%). The independent correlates associated with polypharmacy were: age over 70 years, female sex, higher than primary education, living in an urban area, comorbidities, any hospitalization during past five years, and visiting general practitioners at least yearly. As for correlates with excessive polypharmacy, they were: age 80-84 years, female sex, living in an urban area, diagnosis of at least four chronic diseases, and at least two hospitalizations in the last five years. This study serves as a starting place to understand patient characteristics associated with polypharmacy, excessive polypharmacy, and identify targeted interventions.

Language: en

Keywords

older adults; polypharmacy; correlates; excessive polypharmacy; PolSenior

Quantifying fear of falling by utilizing objective body sway measures: a 360° virtual video study

Gui C, Venema DM, Chien JH, Cochran TM, Siu KC. *Gait Posture* 2022; 93: 160-165.

(Copyright © 2022, Elsevier Publishing)

DOI 10.1016/j.gaitpost.2022.02.006 **PMID** 35180684

Abstract

BACKGROUND: Fear of falling (FOF) is a psychological condition that can lead to increased morbidity and mortality in the elderly population. However, the subjective and multidimensional nature of FOF results in limitations of existing FOF measurement tools, which could influence the generalization of the findings from various studies. An objective measure of FOF could address those limitations. The present study aimed to identify the feasibility of using center of pressure (COP) parameters to quantify FOF. **RESEARCH QUESTION:** (1) Are 360° roller coaster videos effective to induce FOF? And (2) Which COP parameter(s) is/are feasible to quantify FOF? **METHODS:** Nineteen young, healthy adults (24 ± 2.47 years) were recruited in the present study. Subjects were required to watch three 360° videos: one control video and two roller coaster videos, through virtual reality goggles during standing and sitting. Six trials (3 during standing and 3 during sitting) with video were performed. Subjects were required to rate their FOF on a visual analogue scale after watching each video. COP mean power frequency, COP root mean square, and COP range were measured. The Friedman test was used to assess differences in COP parameters under different video conditions, and Spearman's correlation analysis was used to assess the relationship between FOF and COP parameters.

RESULTS: Similar COP changes were observed in sitting and standing conditions. With increased FOF, participants demonstrated decreased COP mean power frequency and increased COP root mean square in the medial-lateral direction during both sitting and standing. **SIGNIFICANCE:** Our study provided evidence that 360° roller coaster videos are effective tools to induce FOF and change in COP parameters. The relationship between FOF and COP parameters suggests that the measurement of body sway may be an objective way to quantify FOF. More research are needed to solidify the evidence.

Language: en

Keywords

Fear of falling; Body sway; Center of pressure; Objective measurement

Sunbeam program reduces rate of falls in long-term care residents with mild to moderate cognitive impairment or dementia: subgroup analysis of a cluster randomized controlled trial

Mak A, Delbaere K, Refshauge K, Henwood T, Goodall S, Clemson L, Hewitt J, Taylor ME. J. Am. Med. Dir. Assoc. 2022; ePub(ePub): ePub.

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DOI 10.1016/j.jamda.2022.01.064 PMID 35196481

Abstract

OBJECTIVES: The Sunbeam trial significantly reduced falls in long-term aged care (LTC) residents. The current study's primary objective was to undertake subgroup analysis of the Sunbeam trial, to determine whether the intervention was effective for reducing falls in LTC residents with mild-moderate cognitive impairment/dementia. Secondary objectives were to determine intervention effects on cognitive and physical function.

DESIGN: Subgroup analysis of a cluster randomized controlled trial (RCT). **SETTING AND PARTICIPANTS:** Permanent residents of LTC in Australia who participated in the Sunbeam trial with Addenbrooke's Cognitive Examination-Revised (ACE-R) scores <83 (Mini-Mental State Examination >14 = main trial inclusion criteria).

METHODS: Of 221 participants, 148 had an ACE-R <83 and were included in this study. Sixteen LTC residences (clusters) were randomized to receive either the Sunbeam program or usual care. The Sunbeam program involved two 1-hour sessions/week of tailored and progressive resistance and balance training for 25 weeks followed by a maintenance program (two 30-min sessions/week of nonprogressive exercise for 6 months). Assessments were conducted at baseline, 6 months, and 12 months. Falls were recorded using routinely collected data from the LTC incident management systems.

RESULTS: Rate of falls (50%) and risk of falls (31%), multiple falls (40%), and injurious falls (44%) were reduced in the intervention group. The intervention group had significantly better balance (static and dynamic) and sit-to-stand ability when compared with the control group at 6 months and significantly better dynamic balance at 12 months. There were no serious adverse events.

CONCLUSIONS AND IMPLICATIONS: The Sunbeam Program significantly reduced falls and improved physical performance in cognitively impaired LTC residents. This is a novel and important finding, as many previous studies have excluded people with cognitive impairment/dementia and inconsistent findings have been reported when this population has been studied. Our findings suggest that progressive resistance and balance exercise is a safe and effective fall prevention intervention in LTC residents with mild-moderate cognitive impairment/dementia.

Language: en

Keywords

aged; exercise; Dementia; postural balance; Alzheimer disease; cognitive dysfunction

Truly unexplained falls after evaluation for syncope: a new diagnostic entity with severe prognosis

Ungar A, Ceccofiglio A, Mussi C, Bo M, Rivasi G, Rafanelli M, Martone AM, Bellelli G, Nicosia F, Riccio D, Boccardi V, Tonon E, Curcio F, Landi F, Abete P, Mossello E. Eur. J. Intern. Med. 2022; ePub(ePub): ePub.

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DOI 10.1016/j.ejim.2022.02.007 PMID 35172944

Abstract

OBJECTIVE: To compare one-year mortality risk associated with syncope and unexplained fall in older adults with dementia.

METHODS: 522 patients (aged >65 years) with dementia and history of transient loss of consciousness and/or unexplained falls were evaluated. The diagnosis of syncope was based on European Society of Cardiology guidelines. A "Syncopal Fall" was defined in patients with an initial clinical presentation of unexplained fall, but a final diagnosis of syncope after complete assessment. A "Truly Unexplained Fall" was defined in patients with an initial clinical presentation of unexplained fall, in whom a diagnosis of syncope had been excluded after the diagnostic work-up. One-year follow-up was assessed by phone interview.

RESULTS: Follow-up data were available for 501 participants (mean age 83 ± 6 years, 65% female). After a mean follow-up of 324 ± 93 days, death from any cause was reported in 188 participants (24%). Advanced age, male sex, cognitive and functional impairment were associated with a higher mortality rate. Patients with "Truly Unexplained Falls" had a higher mortality risk compared with syncope and "Syncopal Fall". A diagnosis of "Truly Unexplained Falls" remained an independent predictor of one-year all-cause mortality in multivariate model.

CONCLUSIONS: We propose the novel diagnostic category of "Truly Unexplained Fall", resulting from the application of syncope guidelines to subjects with unexplained falls. This condition in older adults with dementia is a predictor of one-year all-cause mortality. For this new high risk profile, we advice a comprehensive geriatric assessment focused on risk factors for fall, aimed at a possible improvement of prognosis.

Language: en

Keywords

Mortality; Syncope; Dementia; Prognosis; Syncopal fall; Unexplained fall

Vestibular function predicts balance and fall risk in patients with Alzheimer's disease

Biju K, Oh E, Rosenberg P, Xue QL, Dash P, Burhanullah MH, Agrawal Y. J. Alzheimers Dis. 2022; ePub(ePub): ePub.

(Copyright © 2022, IOS Press)

DOI 10.3233/JAD-215366 PMID 35180117

Abstract

BACKGROUND: Patients with Alzheimer's disease (AD) are at high risk for falls. Vestibular dysfunction predicts balance impairment in healthy adults; however, its contribution to falls in patients with AD is not well known.

OBJECTIVE: The objective of this study was to assess whether vestibular function contributes to balance and fall risk in patients with AD.

METHODS: In this prospective observational study, we assessed vestibular function using measures of semicircular canal (vestibulo-ocular reflex (VOR) gain) and saccular function (cervical vestibular-evoked myogenic (cVEMP) response), and we assessed balance function using the Berg Balance Scale and quantitative posturography. We evaluated falls incidence for a mean 1-year follow-up period (range 3-21 months) in 48 patients with mild-moderate AD.

RESULTS: Relative to matched controls, AD patients exhibited increased medio-lateral (ML) sway in eyes-open (0.89 cm versus 0.69 cm; $p=0.033$) and eyes-closed (0.86 cm versus 0.65 cm; $p=0.042$) conditions. Among AD patients, better semicircular canal function was associated with lower ML sway and antero-posterior (AP) sway in the eyes-closed condition ($\beta=-2.42$, 95% CI (-3.89, -0.95), $p=0.002$; $\beta=-2.38$, 95% CI (-4.43, -0.32), $p=0.025$, respectively). Additionally, better saccular function was associated with lower sway velocity ($\beta=-0.18$, 95% CI (-0.28, -0.08); $p=0.001$). Finally, we observed that better semicircular canal function was significantly associated with lower likelihood of falls when adjusted for age, sex, and MMSE score (HR=0.65; $p=0.009$).

CONCLUSION: These results support the vestibular system as an important contributor to balance and fall risk in AD patients and suggest a role for vestibular therapy.

Language: en

Keywords

falls; cognitive aging; Alzheimer's disease; postural balance; vestibular function tests

Visual risk factors for falls in older adults: a case-control study

Mehta J, Czanner G, Harding S, Newsham D, Robinson J. *BMC Geriatr.* 2022; 22(1): e134.

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DOI 10.1186/s12877-022-02784-3 PMID 35177024

Abstract

BACKGROUND: Falls are the second leading cause of accidental deaths worldwide mainly in older people. Older people have poor vision and published evidence suggests that it is a risk factor for falls. Less than half of falls clinics assess vision as part of the multi-factorial assessment of older adults at risk of falls despite vision being an essential input for postural stability. The aim of our study was to investigate the relationship between all clinically assessed visual functions and falls amongst older adults in a prospective observational individually age-matched case control study.

METHODS: Visual acuity (VA), contrast sensitivity (CS), depth perception, binocular vision and binocular visual field were measured using routinely used clinical methods in falls participants (N = 83) and non-falls participants (N = 83). Data were also collected on socio-demographic factors, general health, number of medications, health quality, fear of falling and physical activity. Logistic regression analysis was carried out to determine key visual and non-visual risk factors for falls whilst adjusting for confounding covariates.

RESULTS: Older adults have an increased risk of experiencing a fall if they have reduced visual function (odds ratio (OR): 3.49, 1.64-7.45, $p = 0.001$), specifically impaired stereoacuity worse than 85" of arc (OR: 3.4, 1.20-9.69, $p = 0.02$) and reduced (by 0.15 log unit) high spatial frequency CS (18 cpd) (OR: 1.40, 1.12-1.80, $p = 0.003$). Older adults with a hearing impairment are also at higher risk of falls (OR: 3.18, 95% CI: 1.36-7.40, $p = 0.007$). The risk decreases with living in a less deprived area (OR: 0.74, 0.64-0.86, <0.001), or socialising more out of the home (OR: 0.75, 0.60-0.93, $p = 0.01$).

CONCLUSIONS: The combination of social, behavioural and biological determinants are significant predictors of a fall. The non-visual risk factors include older adults, living in deprived neighbourhoods, socialising less outside of the home and those who have a hearing impairment. Impaired functional visual measures; depth perception and contrast are significant visual risk factors for falls above visual acuity.

Language: en

Keywords

Falls; Vision; Contrast sensitivity; Depth perception; Social determinants

Fall risk assessment using wearable sensors: a narrative review

Ferreira RN, Ribeiro NF, Santos CP. *Sensors (Basel)* 2022; 22(3): e984.

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DOI 10.3390/s22030984 **PMID** 35161731

Abstract

Recently, fall risk assessment has been a main focus in fall-related research. Wearable sensors have been used to increase the objectivity of this assessment, building on the traditional use of oversimplified questionnaires. However, it is necessary to define standard procedures that will us enable to acknowledge the multifactorial causes behind fall events while tackling the heterogeneity of the currently developed systems. Thus, it is necessary to identify the different specifications and demands of each fall risk assessment method. Hence, this manuscript provides a narrative review on the fall risk assessment methods performed in the scientific literature using wearable sensors. For each identified method, a comprehensive analysis has been carried out in order to find trends regarding the most used sensors and its characteristics, activities performed in the experimental protocol, and algorithms used to classify the fall risk. We also verified how studies performed the validation process of the developed fall risk assessment systems. The identification of trends for each fall risk assessment method would help researchers in the design of standard innovative solutions and enhance the reliability of this assessment towards a homogeneous benchmark solution.

Language: en

Keywords

Algorithms; Risk Assessment; *Wearable Electronic Devices; Accidental Falls/prevention & control; fall prediction; fall risk assessment; Reproducibility of Results; wearable sensors

Step length and fall risk in adults with chronic kidney disease: a pilot study

Kimura A, Paredes W, Pai R, Farooq H, Buttar RS, Custodio M, Munugoti S, Kotwani S, Randhawa LS, Dalezman S, Elters AC, Nam K, Ibarra JS, Venkataraman S, Abramowitz MK. BMC Nephrol. 2022; 23(1): 74.

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DOI 10.1186/s12882-022-02706-w PMID 35193493

Abstract

BACKGROUND: Patients with chronic kidney disease commonly experience gait abnormalities, which predispose to falls and fall-related injuries. An unmet need is the development of improved methods for detecting patients at high risk of these complications, using tools that are feasible to implement in nephrology practice. Our prior work suggested step length could be such a marker. Here we explored the use of step length as a marker of gait impairment and fall risk in adults with chronic kidney disease.

METHODS: We performed gait assessments in 2 prospective studies of 82 patients with stage 4 and 5 chronic kidney disease (n = 33) or end-stage renal disease (ESRD) (n = 49). Gait speed and step length were evaluated during the 4-m walk component of the Short Physical Performance Battery (SPPB). Falls within 6 months prior to or following enrollment were identified by questionnaire. Associations of low step length (≤ 47.2 cm) and slow gait speed (≤ 0.8 m/s) with falls were examined using logistic regression models adjusted for demographics and diabetes and peripheral vascular disease status.

RESULTS: Assessments of step length were highly reproducible ($r = 0.88$, $p < 0.001$ for duplicate measurements at the same visit; $r = 0.78$, $p < 0.001$ between baseline and 3-month evaluations). Patients with low step length had poorer physical function, including lower SPPB scores, slower gait speed, and lower handgrip strength. Although step length and gait speed were highly correlated ($r = 0.73$, $p < 0.001$), one-third (n = 14/43) of patients with low step length did not have slow gait speed. Low step length and slow gait speed were each independently associated with the likelihood of falls (odds ratio (OR) 3.90 (95% confidence interval (CI) 1.05-14.60) and OR 4.25 (95% CI 1.24-14.58), respectively). Compared with patients who exhibited neither deficit, those with both had a 6.55 (95% CI 1.40-30.71) times higher likelihood of falls, and the number of deficits was associated with a graded association with falls (p trend = 0.02). Effect estimates were similar after further adjustment for ESRD status.

CONCLUSIONS: Step length and gait speed may contribute additively to the assessment of fall risk in a general adult nephrology population.

Language: en

Keywords

Gait; Fall; Fall risk; Chronic kidney disease; Dialysis; Gait speed; Step length