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A need to improve the assessment of environmental hazards for falls on stairs and in bathrooms: results of a scoping review

Blanchet R, Edwards N.

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Affiliation: School of Nursing, University of Ottawa, 1 Stewart Street, Room 205, Ottawa, ON, K1H 8M5, Canada.

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Abstract

BACKGROUND: Falls occurring on stairs or in bathrooms are associated with a high risk of injuries among older adults. Home environmental assessments are frequently used to guide fall-prevention interventions. The aims of this review were to describe how, where, by whom, and for whom environmental hazard checklists are used, and to examine the characteristics of environmental hazard assessment checklists with specific attention to features of bathrooms and stairs/steps assessed in them.

METHODS: Studies published before January 5, 2018, were identified using several databases. Publications reporting the use and/or evaluation of environmental hazard checklists were eligible if they assessed bathrooms or stairs/steps in homes of older adults (≥ 65 years). Content analysis was conducted on publications that provided a complete list of specific environmental hazards assessed. Checklist items related to bathrooms and stairs/steps were extracted and categorized as structural or non-structural and as objective or subjective.

RESULTS: 1119 studies were appraised. A pool of 136 published articles and 4 checklists from the grey literature were included in this scoping review. Content analysis was conducted on 42 unique checklists. There was no widely used checklist and no obvious consensus definition of either environmental hazards overall or of single hazards listed in checklists. Checklists varied greatly with respect to what rooms were assessed, whether or not outdoor stair/steps hazards were assessed, and how responses were coded. Few checklists examined person-environment fit. The majority of checklists were not oriented towards structural hazards in bathrooms. Although the majority of checklists assessing stair/steps hazards evaluated structural hazards, most features assessed were not related to the construction geometry of stairs/steps.

OBJECTIVE features of bathrooms and stairs/steps that would deem them safe were rarely specified. Rather, adequacy of their characteristics was mostly subjectively determined by the evaluator with little or no guidance or training.

CONCLUSION: The lack of standard definitions and objective criteria for assessing environmental hazards for falls is limiting meaningful cross-study comparisons and slowing advances in this field. To inform population health interventions aimed at preventing falls, such as building code regulations or municipal housing by-laws, it is essential to include objectively-assessed structural hazards in environmental checklists.

PDF Y Endnote Y

Association between the discrepancy in self-reported and performance-based physical functioning levels and risk of future falls among community-dwelling older adults: the Locomotive Syndrome and Health Outcomes in Aizu Cohort Study (LOHAS)

Kamitani T, Yamamoto Y, Fukuma S, Ikenoe T, Kimachi M, Shimizu S, Yamamoto S, Otani K, Sekiguchi M, Onishi Y, Takegami M, Ono R, Yamazaki S, Konno S, Kikuchi S, Fukuhara S.

J. Am. Med. Dir. Assoc. 2018; ePub(ePub): ePub.

Affiliation: Department of Healthcare Epidemiology, School of Public Health in the Graduate School of Medicine, Kyoto University, Kyoto, Japan; Center for Innovative Research for Communities and Clinical Excellence (CIRC(2)LE), Fukushima Medical University, Fukushima, Japan.

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Abstract

OBJECTIVES: A discrepancy in self-reported and performance-based physical functioning levels is often observed among older adults. We investigated the association of discrepancy in self-reported and performance-based physical functioning levels with risk of future falls among community-dwelling older adults.

DESIGN: Prospective cohort study.

SETTING: Two communities in Fukushima Prefecture, Japan.

PARTICIPANTS: 1379 older adults who took part in the yearly health checkup in both 2009 and 2010.

MEASURES: The performance-based and self-reported physical functioning levels were evaluated by the Timed Up and Go test and the Short-Form 12 Health Survey (Japanese version) physical functioning subscale, respectively. We divided the participants into 4 groups based on the combinations of low or high performance-based and self-reported physical functioning groups, which were classified by age- and sex-specific reference values. The main outcome was the occurrence of any falls within the 1-year follow-up period, assessed using a self-reported questionnaire.

RESULTS: A total of 22% of the participants reported the occurrence of a fall during the follow-up period. In multivariable logistic regression analysis, the adjusted odds ratios of the high self-reported and low performance-based, low self-reported and high performance-based, and low self-reported and low performance-based physical functioning groups were 1.10 (95% confidence interval [CI], 0.67-1.82), 1.76 (95% CI, 1.17-2.66), and 1.80 (95% CI, 1.11-2.90), respectively, compared with the high self-reported and high performance-based physical functioning group.

CONCLUSIONS: Our findings suggest that the discrepancy as high performance-based but low self-reported physical functioning level is associated with an increased risk of future falls in older adults aged 65-89 years. Clinicians should carefully assess older adults whose subjective perception of their physical functioning capacity is lower than those in similar age and sex groups, even if their actual physical functioning appears to be objectively high.

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Equipping staff with the skills to maximise recovery of people with dementia after an injurious fall

Bamford C, Wheatley A, Shaw C, Allan LM.

Aging Ment. Health 2018; ePub(ePub): ePub.

Affiliation: Institute of Health Research, University of Exeter, UK.



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Abstract

OBJECTIVES: People with dementia are more likely to fall and less likely to recover well after a fall than cognitively intact older people. Little is known about how best to deliver services to this patient group. This paper explores the importance of compensating for cognitive impairment when working with people with dementia.

METHODS: Qualitative methods - interviews, focus groups and observation - were used to explore the views and experiences of people with dementia, family carers and professionals providing services to people with dementia following an injurious fall. A thematic, iterative analysis was undertaken in which emerging themes were identified from each individual dataset, prior to an integrative analysis.

RESULTS: A key theme across all datasets was the need to deliver services in ways that compensate for cognitive impairment, such as negotiating meaningful activities that can be embedded into the routines of people with dementia. Professionals varied in their ability to adapt their practice to meet the needs of people with dementia. Negative attitudes towards dementia, a lack of knowledge and understanding of dementia limited the ability of some professionals to work in person-centred ways.

CONCLUSION: Improving outcomes for people with dementia following a fall requires the principles of person-centred care to be enacted by professionals with a generic role, as well as specialist staff. This requires additional training and support by specialist staff to address the wide variability in current practice.

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Evaluating falls prevention strategies in community settings: marginal reduction on rate of falls with individual risk-based multifactorial interventions compared to 'usual care'

Lee A, Hayter M.

Evid. Based Nurs. 2018; ePub(ePub): ePub.

Affiliation: Faculty of Health Sciences, University of Hull, Hull, UK.

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Abstract [Abstract unavailable]

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Falls in the elderly: assessment of prevalence and risk factors

Sharif SI, Al-Harbi AB, Al-Shihabi AM, Al-Daour DS, Sharif RS.

Pharm. Pract. (Granada) 2018; 16(3): e1206.

Affiliation: Department of Pharmacy Practice & Pharmacotherapeutics. College of Pharmacy, University of Sharjah. Sharjah (United Arab Emirates). Rubian.sharif@gmail.com.

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Abstract

BACKGROUND: Falls in elderly people can lead to serious health problems. There is limited knowledge about the prevalence of falls, risk factors and causes of falls in the United Arab Emirates.

OBJECTIVE: To assess the prevalence of falls among older adults aged 60 years and above and to determine the risk factors associated with falls.

METHODS: This cross-sectional study was conducted using an anonymous, 20-item questionnaire which was developed in English and Arabic to be delivered as a semi-structured interview. The pre-piloted questionnaire was distributed to 510 families with at least one elderly person. The study was conducted in Sharjah and Dubai, United Arab Emirates, from September to November 2017.

RESULTS: Participants were Arabs (368; 99.5%), living with family (339; 91.6%), females (256; 69.2%), married (240; 64.9%), holders of a university Bachelor's degree (110; 29.7%), and unemployed (154; 41.6%). Almost half of the participants (188; 50.8%) had a fall in the past two years, and three quarters (141; 75%) of those claimed that their illness was the reason for their fall. The results indicate that female and 70 years and above old participants are more likely to experience falls than males and younger counterparts respectively. A larger proportion of elderly participants not taking medications did not experience falls, while those on 1-4 medications fallers were less than non-fallers. However as the number of medications increased to 5-8 and more than 8 the number of those experiencing falls was significantly higher than non-fallers.

CONCLUSIONS: Falls are prevalent among the elderly population studied and efforts should be made to decrease the incidence of falls, identify those at risk and increase awareness about falls and their health consequences among the elderly and the general public.

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Fear of falling and emotional regulation in older adults

Scarlett L, Baikie E, Chan SWY.

Ageing Ment. Health 2018; ePub(ePub): ePub.

Affiliation: Section of Clinical Psychology, School of Health in Social Science , University of Edinburgh , Edinburgh , UK.

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Abstract

OBJECTIVES: Fear of falling is common amongst older adults with and without a prior experience of falling. It is related to decreased quality of life, isolation, and institutionalisation. It also poses a risk for future falls when activity is avoided because of fear of falling and muscle deconditioning occurs. Relatively little is known about the psychological factors underpinning fear of falling. This study explored the relationship between emotion regulation and fear of falling in community dwelling older adults.

METHOD: A sample of 117 older adults (>65 years) were recruited from community based exercise classes, falls reduction classes, NHS and charity organisations. Self-reported measures included the Falls Efficacy Scale-International (FES-I), the Fear of Falling Behaviour Questionnaire (FFABQ), the Difficulties in Emotion Regulation Scale (DERS) and the Hospital and Anxiety Depression Scale (HADS).

RESULTS: A significant positive correlation was found between emotion regulation and fear of falling, as well as between emotional regulation and fear-related avoidance behaviour. A regression model found that after controlling for depression and age, emotion regulation was no longer significantly related to fear of falling.

CONCLUSIONS: Fear of falling is associated with emotion regulation difficulties in community dwelling older adults. However, this link no longer exists once depression is controlled for. The key clinical implication is the importance of the assessment of depression in older adults with a fear of

falling. Future research should use a longitudinal design to further unpick the causal relationships between these variables.

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Foot problems as a risk factor for falls in community-dwelling older people: a systematic review and meta-analysis

Menz HB, Auhl M, Spink MJ.

Maturitas 2018; 118: 7-14.

Affiliation: School of Health Sciences, Faculty of Health, University of Newcastle, Ourimbah, New South Wales, 2258, Australia.

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Abstract

BACKGROUND: Foot problems are common in older people. The objective of this systematic review was to determine whether foot problems increase the risk of falling in community-dwelling older people.

METHODS: Electronic databases were searched from inception to May 2018. To be eligible for inclusion, papers needed to (i) include community-dwelling older participants, (ii) document falls either retrospectively or prospectively, and (iii) document or assess the presence of foot problems. Screening and data extraction were performed by two independent assessors, with disagreements resolved by consensus.

RESULTS: A total of 146 papers were screened by title and abstract, and nine met the inclusion criteria. An additional six eligible papers were identified by searching the reference lists of included papers, resulting in a total of 15 papers. Quantitative synthesis indicated that older people who fell were more likely to have foot pain, hallux valgus, lesser toe deformity, plantar fasciitis, reduced ankle dorsiflexion range of motion, reduced toe plantarflexion strength, impaired tactile sensitivity and increased plantar pressures when walking. Meta-analysis indicated that fallers were more likely to have foot pain (pooled odds ratio [OR] 1.95, 95% CI 1.38-2.76, $p < 0.001$), hallux valgus (pooled OR 1.89, 95% CI 1.19-3.00, $p = 0.007$) and lesser toe deformity (pooled OR 1.67, 95% CI 1.07-2.59, $p = 0.020$).

CONCLUSION: Foot problems, particularly foot pain, hallux valgus and lesser toe deformity, are associated with falls in older people. Documentation of foot problems and referral to foot care specialists should therefore be a routine component of falls risk assessment and prevention.

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History and physical exam predictors of intracranial injury in the elderly fall patient: a prospective multicenter study

Jeanmonod R, Asher S, Roper J, Vera L, Winters J, Shah N, Reiter M, Bruno E, Jeanmonod D.

Am. J. Emerg. Med. 2018; ePub(ePub): ePub.

Affiliation: St. Luke's University Health Network, Department of Emergency Medicine, Bethlehem, PA, United States of America.

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Abstract

OBJECTIVES: A prior single-center study demonstrated historical and exam features predicting intracranial injury (ICI) in geriatric patients with low-risk falls. We sought to prospectively validate these findings in a multicenter population.

METHODS: This is a prospective observational study of patients ≥ 65 years presenting after a fall to three EDs. Patients were eligible if they were at baseline mental status and were not triaged to the trauma bay. Fall mechanism, head strike history, headache, loss of consciousness (LOC), anticoagulants/antiplatelet use, dementia, and signs of head trauma were recorded. Radiographic imaging was obtained at the discretion of treating physicians. Patients were called at 30 days to determine outcome in non-imaged patients.

RESULTS: 723 patients (median age 83, interquartile range 74-88) were enrolled. Although all patients were at baseline mental status, 76 had GCS < 15 , and 154 had dementia. 406 patients were on anticoagulation/antiplatelet agents. Fifty-two (7.31%) patients had traumatic ICI. Two study variables were helpful in predicting ICI: LOC (odds ratio (OR) 2.02) and signs of head trauma (OR 2.6). The sensitivity of these items was 86.5% (CI 73.6-94) with a specificity of 38.8% (CI 35.1-42.7). The positive predictive value in this population was 10% (CI 7.5-13.3) with a negative predictive value of 97.3% (CI 94.4-98.8). Had these items been applied as a decision rule, 273 patients would not have undergone CT scanning, but 7 injuries would have been missed.

CONCLUSION: In low-risk geriatric fall patients, the best predictors of ICI were physical findings of head trauma and history of LOC.

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Prevalence of falls and fall-related outcomes in older adults with self-reported vision impairment

Ehrlich JR, Hassan SE, Stagg BC.

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Affiliation: National Clinician Scholars Program, University of Michigan Institute for Healthcare Policy and Innovation, Ann Arbor, Michigan.

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Abstract

OBJECTIVES: To determine the prevalence of falls, fear of falling (FoF), and activity limitation due to FoF in a nationally representative study of older adults with self-reported vision impairment (VI).

DESIGN: Cross-sectional analysis of panel survey data.

SETTING: National Health and Aging Trends Study, a nationally representative survey administered annually from 2011 to 2016 to U.S. Medicare beneficiaries aged 65 and older.

PARTICIPANTS: Respondents (N=11,558) who contributed 36,229 participant observations.

MEASUREMENTS: We performed logistic regression to calculate the unadjusted and adjusted prevalence of self-reported history of more than 1 fall in the past year, any fall in the past month, FoF, and activity limitation due to FoF in participants with and without self-reported VI.

RESULTS: The weighted proportion of participants reporting VI was 8.6% (95% confidence interval (CI)=8.0-9.2%). The unadjusted prevalence of more than 1 fall in the past year was 27.6% (95% CI=25.5-29.7%) in participants with self-reported VI and 13.2% (95% CI=12.7-13.7%) in those without self-reported VI. In respondents with self-reported VI, the prevalence of FoF was 48.3% (95%

CI=46.1-50.6%) and of FoF limiting activity was 50.8% (95%CI 47.3-54.2%), and in those without self-reported VI, the prevalence of FoF was 26.7% (95% CI=25.9-27.5%) and of FoF limiting activity was 33.9% (95% CI=32.4-35.4%). The prevalence of all fall and fall-related outcomes remained significantly higher among those with self-reported VI after adjusting for sociodemographics and potential confounders.

CONCLUSION: The prevalence of falls, FoF, and activity limitation due to FoF is high in older adults with self-reported VI. This is the first study to provide nationally representative data on the prevalence of fall-related outcomes in older Americans with self-reported VI. These findings demonstrate the need to treat avoidable VI and to develop interventions to prevent falls and fall-related outcomes in this population.

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Quality of Life for 19,114 participants in the ASPREE (ASpirin in Reducing Events in the Elderly) study and their association with sociodemographic and modifiable lifestyle risk factors

Stocks NP, González-Chica DA, Woods RL, Lockery JE, Wolfe RSJ, Murray AM, Kirpach B, Shah RC, Nelson MR, Reid CM, Ernst ME, McNeil JJ.

Qual. Life Res. 2018; ePub(ePub): ePub.

Affiliation: Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, VIC, Australia.

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Abstract

PURPOSE: To explore the relationship between sociodemographic and lifestyle variables with health-related quality of life (HRQoL) of a large cohort of 'healthy' older individuals.

METHODS: The sample included individuals aged 65+ years from Australia (N = 16,703) and the USA (N = 2411) enrolled in the ASPIrin in Reducing Events in the Elderly (ASPREE) multicentre placebo-controlled trial study and free of cardiovascular disease, dementia, serious physical disabilities or 'fatal' illnesses. The associations with the physical (PCS) and mental component scores (MCS) of HRQoL (SF-12 questionnaire) were explored using multiple linear regression models from data collected at baseline (2010-2014).

RESULTS: The adjusted PCS mean was slightly higher in the USA (49.5 ± 9.1) than Australia (48.2 ± 11.6 ; $p < 0.001$), but MCS was similar in both samples (55.7 ± 7.5 and 55.7 ± 9.6 , respectively; $p = 0.603$). Males, younger participants, better educated, more active individuals, or those currently drinking 1-2 alcoholic drinks/day showed a better HRQoL (results more evident for PCS than MCS), while current heavy smokers had the lowest physical HRQoL in both countries. Neither age, walking time, nor alcohol intake was associated with MCS in either cohort.

CONCLUSIONS: Baseline HRQoL of ASPREE participants was higher than that reported in population-based studies of older individuals, but the associations between sociodemographic and lifestyle variables were consistent with the published literature. As the cohort ages and develops chronic diseases, ASPREE will be able to document HRQoL changes.

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Reliability, validity and minimal detectable change of 2-minute walk test, 6-minute walk test and 10-meter walk test in frail older adults with dementia

Chan WLS, Pin TW.

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Affiliation: Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hung Hom, Hong Kong. Electronic address: tamis.pin@polyu.edu.hk.

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Abstract

BACKGROUND: Walk tests are commonly used to evaluate walking ability in frail older adults with dementia but their psychometric evidence in this population is lacking.

OBJECTIVES: 1) To examine test-retest and inter-rater reliability, construct and known-group validity, and minimal detectable change at 95% level of confidence (MDC_{95}) of walk tests in frail older adults with dementia, and 2) to examine the feasibility and consistency of a cueing system in facilitating participants in completing walk tests.

DESIGN: Psychometric study with repeated measures.

SETTING: Day care and residential care facilities.

PARTICIPANTS: Thirty-nine frail older adults with a mean age 87.1 and a diagnosis of dementia or Alzheimer's disease who were able to walk independently for at least 15 m.

METHODS: The participants underwent a 2-minute walk test (2MWT), 6-minute walk test (6MWT) and 10-meter walk test (10MeWT) on 3 separate occasions under 2 independent assessors using a cueing system. Functional status was measured using the Elderly Mobility Scale (EMS), Berg Balance Scale (BBS) and Modified Barthel Index (MBI).

RESULTS: Excellent test-retest ($ICC = 0.91-0.98$) and inter-rater reliability ($ICC = 0.86-0.96$) were shown in the 2MWT, 6MWT and 10MeWT. The walk tests were strongly correlated with each other ($\rho = 0.85-0.94$). The correlations between the walk tests and the functional measures were moderate in general ($\rho = 0.34-0.55$). All the walk tests were able to distinguish between those who could walk outdoor and indoor only ($p \leq .036$). The MDC_{95} were 9.1 m in the 2MWT, 28.1 m in the 6MWT, and .16 m/s in the 10MeWT. The cues provided by the assessors in the walk tests were generally consistent ($ICC = 0.62-0.89$).

CONCLUSIONS: The 2MWT, 6MWT and 10MeWT are reliable and valid measures in evaluating walking ability in frail older adults with dementia. The MDC_{95} of the walk tests has been established. The cueing system is feasible and reliable to facilitate the administration of the walk tests in this population group.

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PDF Y Endnote Y

Risk assessment during preventive home visits among older people

Fjell A, Cronfalk BS, Carstens N, Rongve A, Kvinge LMR, Seiger Å, Skaug K, Boström AM.

J. Multidiscip. Healthc. 2018; 11: 609-620.

Affiliation: Theme Aging, Karolinska University Hospital, Huddinge, Sweden.

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Abstract



BACKGROUND: Preventive home visits (PHV) may contribute to identify risks and needs in older people, and thereby delay the onset of functional decline and illness, otherwise often followed by home care or admission to hospital or nursing homes. There is a need to increase knowledge about which factors are associated with different risk areas among older people, so that the PHV questionnaire focuses on relevant tests and questions to make the PHV more specific and have a clear focus and purpose.

OBJECTIVE: The objective of this study was to examine associations between five kinds of risks: risk of falls, malnutrition, polypharmacy, cognitive impairment, and risk of developing illness and factors related to lifestyle, health, and medical diagnoses among older people living at home.

METHODS: A cross-sectional study design was applied. PHV were conducted by nurses among 77-year-old people in an urban municipality and among ≥ 75 -year-old people in a rural municipality. A questionnaire including tests and a risk assessment score for developing illness was used. Descriptive and inferential statistics including regression models were analyzed.

RESULTS: The total sample included 166 persons. Poor perceived health was associated with increased risk of developing illness and risk of fall, malnutrition, and polypharmacy. Lifestyle and health factors such as lack of social support, sleep problems, and feeling depressed were associated with risk of developing illness. Risk of falls, malnutrition, polypharmacy, and cognitive impairment were also associated with increased risk of developing illness. None of the independent factors related to lifestyle, health, or medical diagnosis were associated with risk of cognitive impairment.

CONCLUSION: Poor perceived health was associated with health-related risks in older persons living at home. Preventive health programs need to focus on social and lifestyle factors and self-reported health assessment to identify older people at risk of developing illnesses.

PDF Y Endnote Y

Social disconnection among older adults receiving care in the emergency department

Kandasamy D, Platts-Mills TF, Shah MN, Van Orden KA, Betz ME.

West. J. Emerg. Med. 2018; 19(6): 919-925.

Affiliation: University of Colorado School of Medicine, Department of Emergency Medicine, Aurora, Colorado.

(Copyright © 2018, California Chapter of the American Academy of Emergency Medicine)

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Abstract

INTRODUCTION: Social disconnection is a public health problem in older adults, as it can lead to decreased quality of life for this population. This study describes the prevalence of social disconnection and patient interest in social resources to address social disconnection among older adults receiving emergency department (ED) care.

METHODS: We conducted a cross-sectional survey of community-dwelling older adults (≥ 65 years) receiving care at two U.S. EDs. We described participant characteristics (demographic, social, and health variables), social disconnection prevalence, and desire for social resources using percentages and 95% confidence intervals. Then, we performed Chi Square tests and logistic regression to determine factors associated with positive screens for social disconnection.

RESULTS: Of 289 participants, 51% were female and the median age was 72 (interquartile range: 69-78). Most (76%) engaged with the community regularly, and 68% reported driving. Regarding social disconnection, a substantial minority of participants reported feeling as if they were burdensome to

others (37%); as if they didn't belong (27%); or that people would be better off if they were gone (15%); 52% reported at least one of these. In separate regression analyses, the perceptions of being a burden or better off if gone were each significantly associated with needing help with routine tasks (odds ratio [OR] [5.87, 5.90]); perceived burden was associated with hospitalization in the prior month (OR [2.09]); and low belonging was associated with not engaging in the community regularly (OR [2.50]), not seeing family regularly (OR [3.82]), and difficulty affording food (OR [2.50]). Regarding potential ED referrals, most participants were interested in transportation options (68%), food assistance (58%), and mental health resources (55%). Participants experiencing difficulties affording food were interested in food and housing assistance ($p=.03$; $p=.01$).

CONCLUSION: Over half of this sample of older ED patients reported feeling socially disconnected. Social and functional health problems are often related and both must be addressed to optimize older ED patient quality of life. Future research should consider the impact of social disconnection on older adults discharged from the ED and work to develop ED services that could refer this population to programs that may decrease social disconnection.

PDF Y Endnote Y

The association between unexplained falls and cardiac arrhythmias: a scoping literature review

Wiseman T, Betihavas V.

Aust. Crit. Care 2018; ePub(ePub): ePub.

Affiliation: Sydney Nursing School, University of Sydney, NSW, Australia. Electronic address: Vasiliki.betihavas@sydney.edu.au.

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Abstract

BACKGROUND: Falls in older adults are common. Age is a risk factor for falls and with an ageing population, presentation to the emergency department (ED) resulting from falls is rising. Reasons for falls in older adults are numerous and include cardiac arrhythmias. However, older patients who present with falls do not appear to be routinely screened for cardiac arrhythmias.

OBJECTIVES: To determine the association between cardiac arrhythmias and unexplained falls in older adults presenting to the ED and to identify the processes for cardiac screening in patients presenting to the ED after an unexplained fall.

METHODS: A scoping literature review was conducted because of the scarce number of primary research articles using an investigational design to undertake a detailed systematic review. Several databases were searched using the search terms: emergency department; trauma centers; arrhythmias cardiac; fall; and accidental fall. **DATA SOURCES:** A structured and systematic search using MEDLINE, Embase, and PubMed was conducted from 2002 to December 2017.

RESULTS: Five quantitative studies were included in this review that reported on adults who presented to the ED after an unexplained fall. Several factors associated with falls and cardiac arrhythmias were extracted from the data. These included age, past history of falls, current medications, comorbidities, electrocardiography, and other cardiac findings.

CONCLUSION: Falls in the elderly population account for a significant number of presentations to the ED. A number of known factors are associated with falls in elderly patients, including cardiovascular causes, yet specific individualised factors are largely unknown. There is no routine screening process for the identification of cardiovascular risk factors in those who present to the ED

with an unexplained fall. Further research is needed to identify specific cardiac factors associated with the risk of unexplained falls in this patient cohort and to transfer these findings into a routine screening process.

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PDF Y Endnote Y

The pace and prognosis of peripheral sensory loss in advanced age: association with gait speed and falls

Lipsitz LA, Manor B, Habtemariam D, Iloputaife I, Zhou J, Trivison TG.

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Affiliation: Harvard Medical School, Boston, MA, USA.

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Abstract

BACKGROUND: Peripheral sensory loss is considered one of many risk factors for gait impairments and falls in older adults, yet no prospective studies have examined changes in touch sensation in the foot over time and their relationship to mobility and falls. Therefore, we aimed to determine the prevalence and progression of peripheral sensory deficits in the feet of older adults, and whether sensory changes are associated with the slowing of gait and development of falls over 5 years.

METHODS: Using baseline, and 18 and 60 month followup data from the Maintenance Of Balance, Independent Living, Intellect, and Zest in the Elderly (MOBILIZE) Study in Boston, MA, we determined changes in the ability to detect stimulation of the great toe with Semmes Weinstein monofilaments in 351 older adults. We used covariate-adjusted repeated measures analysis of variance to determine relationships between sensory changes and gait speed or fall rates.

RESULTS: Subjects whose sensory function was consistently impaired over 5 years had a significantly steeper decline in gait speed (- 0.23 m/s; 95% CI: -0.28 to - 0.18) compared to those with consistently intact sensory function (- 0.12 m/s; 95% CI: -0.15 to - 0.08) and those progressing from intact to impaired sensory function (- 0.13 m/s; - 0.16 to - 0.10). Compared to subjects with consistently intact sensation, those whose sensory function progressed to impairment during followup had the greatest risk of falls (adjusted risk ratio = 1.57 (95% confidence interval = 1.12 to 2.22).

CONCLUSIONS: Our longitudinal results indicate that a progressive decline in peripheral touch sensation is a risk factor for mobility impairment and falls in older adults.

PDF Y Endnote Y

Thinking on your feet: An analysis of movement and cognition in a sit to stand task

Gibbons CT, Amazeen PG, Jondac JJ.

Acta Psychol. 2018; 192: 52-58.

Affiliation: Arizona State University, Department of Psychology, 950 S. McAllister Ave, Tempe, AZ 85287, USA. Electronic address: jjjohn27@asu.edu.

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DOI 10.1016/j.actpsy.2018.10.014 **PMID**30412840

Abstract



The maintenance of upright posture involves constant adjustment to external and internal perturbations. This balancing act is often assumed to be an automatic process, but studies suggest that cognitive processes, particularly attention, are necessary for the control of posture. The current study examines the role of attention in balance using a dual-task paradigm. Twenty-four healthy young adults performed a sit-to-stand (STS) task on either a stable or unstable platform while performing a secondary cognitive task of counting backwards aloud. Movement of the upper and lower body was analyzed using the largest Lyapunov exponent (λ_1) and standard deviation (SD). RESULTS replicated earlier findings (Gibbons, Amazeen, & Likens, 2018) that the transition from sit to stand was marked by increased variability and a temporary destabilization of postural control. Participants exhibited greater movement variability overall on the unstable platform (large SD), but small λ_1 indicated that movement was controlled. During second task performance, SD increased for the upper body only. Further research is necessary to understand the interaction between attention and balance in young adults.

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Training on Biodex balance system improves balance and mobility in the elderly

Siddiqi FA, Masood T.

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Affiliation: Riphah College of Rehabilitation Sciences, Riphah International University, Islamabad.
(Copyright © 2018, Pakistan Medical Association)

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Abstract

OBJECTIVE: To determine the effects of balance training with visual feedback using static and dynamic Biodex balance system for fall risk and mobility..

METHODS: The two-arm pilot randomised controlled trial was conducted from July to October 2016 at Fauji Foundation Hospital Rawalpindi and comprised community-dwelling elderly individuals. Subjects having no major co-morbid conditions were recruited via non-probability purposive sampling. Subjects were randomly divided in two equal groups. The intervention group received 8-week training on Biodex balance system and the control group received no intervention. Data was collected using Biodex fall risk score, Berg balance scale and Timed Up and Go Test before and after the treatment. Data was analysed using SPSS 20.

RESULTS: There were 18 subjects in two groups of 9(50%) each. Analysis within the groups showed significant improvement in the intervention group ($p < 0.001$) while no significant improvement ($p > 0.05$) was observed in the control group. Post-intervention the result remained unchanged while comparing the two groups ($p < 0.05$).

CONCLUSIONS: Dynamic postural training using static and dynamic Biodex balance system had a positive effect on mobility and balance in the elderly.

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Cost-effectiveness of a home safety intervention to prevent falls in impaired elderly people living in the community

Kunigkeit C, Stock S, Müller D.

Arch. Osteoporos. 2018; 13(1): e122.

Affiliation: Institute for Health Economics and Clinical Epidemiology, The University Hospital of Cologne (AöR), Gleueler Strasse 176 - 178 / II, D -, 50935, Cologne, Germany. Dirk.Mueller@uk-koeln.de.

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Abstract

PURPOSE: Among others, the German National Prevention Conference recently recommended the provision of preventive options for elderly to maintain their independent living. Because a home safety assessment and modification program (HSM) has shown to be effective in avoiding falls and risk of falling in elderly, the aim of this analysis was to evaluate the cost-effectiveness of HSM in patients aged ≥ 80 years who receive non-institutionalized long-term care.

METHODS: In order to reflect quality-adjusted life years (QALYs) and costs resulting from HSM, a Markov-model with a time horizon of 20 years was performed from the perspective of the German statutory health insurance (SHI) and statutory long-term care insurance (LCI). The model assumed that HSM reduces fall-related hip fractures in accordance with the reduction of the rate of falls. Data was obtained from public databases and from various literature searches. The robustness of the results was assessed in deterministic and probabilistic sensitivity analyses.

RESULTS: In women, the incremental cost-effectiveness ratio of HSM compared to no prevention was €9580 per QALY, while in men, it was €57,589. For the German SHI/LCI, in total, the provision of HSM to patients ≥ 80 years who receive non-institutionalized long-term care would result in annual costs of €7.7 million. The results were robust in several sensitivity analyses.

CONCLUSIONS: Provided that the rate of falls is a valid surrogate endpoint for the rate of fall-related hip fractures, HSM could be a promising approach for investments in preventive options targeting the reduction of fall-related fractures in elderly women.

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Effects of upper body strength, hand placement and foot placement on ladder fall severity

Pliner EM, Jin Seo N, Ramakrishnan V, Beschorn KE.

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Affiliation: Department of Industrial Engineering, University of Wisconsin-Milwaukee, Milwaukee, WI 53212, USA. Electronic address: beschorn@pitt.edu.

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Abstract

BACKGROUND: A plurality of fatal falls to lower levels involve ladders. After a slip/misstep on a ladder, climbers use their upper and lower limbs to reestablish contact with the ladder.

RESEARCH QUESTION: This study investigates the impact of upper body strength, hand placement and foot placement on fall severity after a ladder climbing perturbation.

METHODS: Participants performed upper body strength tests (breakaway and grip strength) and climbed a vertical, fixed ladder while a misstep perturbation was applied under the foot. After the perturbation, three hand placement and two foot placement responses were generally observed. Common hand placement responses included the hand moving two rungs, one rung, or did not move to a different rung. Foot placement responses included at least one foot or no feet reestablished contact with the ladder rung(s). Fall severity was quantified by the peak harness force

observed after the perturbation.

RESULTS: Increased strength, reestablishing at least one foot on the ladder, and ascending (compared with descending) the ladder was associated with a reduction in fall severity. An interaction effect indicated that the impact of hand placement was altered by climbing direction. Moving the hand one rung during ascent and moving the hand two rungs during descent was associated with an increased fall severity. Cases where the hand decoupled from the ladder was associated with higher fall severity. Upper body strength assessed using a portable grip dynamometer was sufficient to predict fall severity.

DISCUSSION: This study confirms the multifactor role of upper body strength, hand placement and foot placement in preventing falls from ladders. Furthermore, a portable dynamometer shows potential to screen for high-risk individuals.

RESULTS of this investigation may guide targeted interventions to prevent falls from ladders.

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Forecast or fall: prediction's importance to postural control

Dakin CJ, Bolton DAE.

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Affiliation: Department of Kinesiology and Health Science, Utah State University, Logan, UT, United States.

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Abstract

To interact successfully with an uncertain environment, organisms must be able to respond to both unanticipated and anticipated events. For unanticipated events, organisms have evolved stereotyped motor behaviors mapped to the statistical regularities of the environment, which can be triggered by specific sensory stimuli. These "reflexive" responses are more or less hardwired to prevent falls and represent, maybe, the best available solution to maintaining posture given limited available time and information. With the gift of foresight, however, motor behaviors can be tuned or prepared in advance, improving the ability of the organism to compensate for, and interact with, the changing environment. Indeed, foresight's improvement of our interactive capacity occurs through several means, such as better action selection, processing, and conduction delay compensation and by providing a prediction with which to compare our actual behaviors to, thereby facilitating error identification and learning. Here we review the various roles foresight (prediction) plays in maintaining our postural equilibrium. We start by describing some of the more recent findings related to the prediction of instability. Specifically, we cover recent advancements in the understanding of anticipatory postural behaviors that are used broadly to stabilize volitional movement and compensate for impending postural disturbances. We also describe anticipatory changes in the state, or set, of the nervous system that may facilitate anticipatory behaviors. From changes in central set, we briefly discuss prediction of postural instability online before moving into a discussion of how predictive mechanisms, such as internal models, permit us to tune, perhaps our highest level predictive behaviors, namely the priming associated with motor affordances. Lastly, we explore methods best suited to expose the contribution of prediction to postural equilibrium control across a variety of contexts.

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The contribution of the instrumented Timed-Up-and-Go test to detect falls and fear of falling in people with multiple sclerosis

Hershkovitz L, Malcay O, Grinberg Y, Berkowitz S, Kalron A.

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Affiliation: Multiple Sclerosis Center, Sheba Medical Center, Tel-Hashomer, Israel; Department of Physical Therapy, School of Health Professions, Sackler Faculty of Medicine, Tel-Aviv University, Tel-Aviv, Israel; Sagol School of Neuroscience, Tel-Aviv University, Tel-Aviv, Israel. Electronic address: alonkalr@post.tau.ac.il.

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Abstract

Fear of falling (FoF) and actual falling typifies two common complaints in people with MS (PwMS). The objective of our study was to examine the Instrumented Timed-Up-and-Go test (ITUG) in relation to falls and FoF in PwMS. This case-control study comprised 75 participants; 50 PwMS (33 women), aged 44.2 (S.D = 7.2) and 25 healthy subjects (18 women) aged 44.4 (S.D = 8.6). The ITUG test was evaluated by the APDM Mobility lab (Portland, OR, USA) and was completed under two task conditions, normal and while performing a cognitive test (ITUG-cog). FoF was evaluated by the FES-I questionnaire. PwMS were divided into subgroups of fallers and non-fallers based on their fall history. Total duration to complete the ITUG and ITUG-cog was higher in the PwMS group compared to the healthy controls. Total duration to complete the ITUG-cog was higher compared to the normal ITUG in both groups. However, non-significant differences were found for the condition x group factor. The total duration to complete the ITUG was increased in the MS fallers compared to the non-fallers. No other differences in ITUG measures were found between MS subgroups. According to the regression analysis, the sit-to-stand phase explained 22.7% of the variance relating to FoF in PwMS ($R^2 = 0.227$). The study provides new insights into the TUG test in PwMS. The sit-to-stand transition appears to be a major component associated with FoF. Furthermore, the cognitive-motor interference in conjunction with the ITUG is probably not unique in PwMS.

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The effects of fall history on kinematic synergy during walking

Yamagata M, Tateuchi H, Shimizu I, Ichihashi N.

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Affiliation: Human Health Science, Graduate School of Medicine, Kyoto University, 53 Kawaharacho, Shogoin, Sakyo, Kyoto 606-8507, Japan.

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Abstract

To prevent falls, control of the swing foot during walking is crucial. Recently, some studies demonstrated that the coordinated movement of lower limbs by kinematic synergy is important for stable walking. However, no study has been carried out to reveal the relation between falls and kinematic synergy, and it is unclear whether fall history alters the kinematic synergy. Thus, the purpose of this study was to test the effects of fall history on kinematic synergy using uncontrolled

manifold (UCM) analysis. Older adults were divided into two groups: older adults without fall history (non-fallers, n = 14) and older adults with fall history of at least one fall in the 12 months prior to the measurements (fallers, n = 10). Subjects walked at their own comfortable speed on a pathway and kinematic data were collected. UCM analysis was performed to assess how variability of segmental configurations in the frontal plane, the mediolateral and vertical directions, affects the frontal trajectory of the swing foot. Fallers had a greater variability of segmental configurations than non-fallers in all phases. In the mediolateral direction, the kinematic synergy in fallers was significantly greater than that in non-fallers during the early and late swing phases. On the other hands, fallers continuously had greater kinematic synergy compared to non-fallers in the vertical direction. The results revealed that fall history increased the kinematic synergy, although fallers needed a greater variability of segmental configurations as a compensatory strategy to ensure kinematic synergy.

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