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Age-dependent physiological changes, medicines and sex-influenced types of falls

Kusljic S, Perera S, Manias E.

Exp. Aging Res. 2018; ePub(ePub): ePub.

Affiliation: School of Nursing and Midwifery , Deakin University , Melbourne , Australia.

DOI 10.1080/0361073X.2018.1449588 **PMID** 29589804

Abstract

BACKGROUND/STUDY CONTEXT: We investigated various parameters related to falls including age-dependent physiological changes, regular medicine use and different types of falls experienced. There is a lack of research investigating the impact of health status, sex, polypharmacy and ageing on different types of falls such as unspecified fall on the same level, mechanical fall on the same level relating to slipping, tripping or loosing balance, fall from a chair, vehicle and fall as a result of syncope, fall from steps or stairs and fall from the height.

METHODS: The study included a random sample of 250 older patients, which comprised 10% of the total number of patients (n = 2,492), admitted to a large-scale academic hospital following a fall. Patients' medicine and illness history, types of falls, liver, renal and sensory function were collected. Univariate analysis was used to examine associations between the type of fall and explanatory variables, followed by multinominal logistic regression analysis.

RESULTS: There was a significant association between the type of fall and sex, $p = 0.01$, and between the type of fall and regular medicine use, $p = 0.002$. The multinominal logistic regression analysis revealed that the full model, which considered all explanatory variables together, was statistically significant, $p < 0.001$. The strongest predictor of all types of falls except 'fall from the height' was female sex followed by the regular medicine use.

CONCLUSION: This study identified predictors for various types of falls in older people; the strongest predictor being a female sex followed by regular medicine use. Based on these findings, the medicine prescribing practice in this older population must be carefully reviewed.

PDF Y Endnote Y

Association rules method and big data: evaluating frequent medication combinations associated with fractures in older adults

Nishtala PS, Chyou TY, Held F, Le Couteur DG, Gnjidic D.

Pharmacoepidemiol. Drug Saf. 2018; ePub(ePub): ePub.

Affiliation: Faculty of Pharmacy, The University of Sydney, Sydney, NSW, Australia.

DOI 10.1002/pds.4432 **PMID** 29611249

Abstract

BACKGROUND: The association rules method is a novel methodology to ascertain patterns of medication use and combinations associated with adverse drug events.

OBJECTIVES: The aim of this case-crossover study was to apply the association rules method to ascertain medication combinations contributing to the risk of fractures in older adults.

METHODS: A nationwide representative sample of New Zealanders aged ≥65 years was sourced

from the pharmaceutical collection. The first-time coded diagnosis of fracture was extracted from the National Minimum Dataset. Association rule method is a data mining technique that can be used to quickly traverse big datasets to identify a combination of items that co-occur. The association rules method were applied to identify frequent 11 medication combinations in the case and the control periods (1-14 days as hazard period, with 35-day washout period), and the association of fractures with each frequent medication combination were tested by computing a matched odd ratio (OR) and its 95% CI.
RESULTS: We identified a total of 72 184 individuals (mean age 81.5 years) from 2005 to 2014 with incident fracture and exposed to at least 1 medication of interest. The association rules method revealed codeine phosphate (aOR = 11.50, 95% CI, 7.09-15.20, concomitantly with ibuprofen), zopiclone (aOR = 2.34, 95% CI, 1.49-3.67, concomitantly with morphine) and quetiapine (OR = 1.95, 95% CI, 1.28-2.98, concomitantly with zopiclone) were associated with fractures.
CONCLUSION: The association rules method identified medication exposure combinations containing psychotropic medications and codeine are frequently associated with fractures. This novel methodology applied to big data can be an important tool to ascertain medication combinations associated with adverse drug events.

PDF Y Endnote Y

Dynamic balance control during stair negotiation for older adults and people with Parkinson disease

Conway ZJ, Blackmore T, Silburn PA, Cole MH.

Hum. Mov. Sci. 2018; 59: 30-36.

Affiliation: Australian Catholic University, School of Exercise Science, Brisbane, Queensland, Australia. Electronic address: michael.cole@acu.edu.au.

DOI 10.1016/j.humov.2018.03.012 **PMID** 29602049

Abstract

It is well understood that stability during ambulation is reliant upon appropriate control of the trunk segment, but research shows that the rhythmicity of this segment is significantly reduced for people with Parkinson's disease (PD). Given the increased risk associated with stair ambulation, this study investigated whether people with PD demonstrate poorer trunk control during stair ambulation compared with age-matched controls. Trunk accelerations were recorded for twelve PD patients and age-matched controls during stair ascent and descent. Accelerations were used to derive measures of harmonic ratios and root mean square (RMS) acceleration to provide insight into the rhythmicity and amplitude of segmental motion. Compared with what is typically seen during level-ground walking, gait rhythmicity during stair negotiation was markedly reduced for older adults and people with PD. Furthermore, both groups exhibited significantly poorer trunk movements during stair descent compared to stair ascent, suggesting that both populations may face a greater risk of falling during this task. As stair negotiation is a common activity of daily life, the increased risk associated with this task should be considered when working with populations that have an increased risk of falling.

PDF Y Endnote Y

Epidemiology of hip fracture in nursing home residents with multiple sclerosis

Zhang T, Zullo AR, Shireman TI, Lee Y, Mor V, Liu Q, McConeghy KW, Daiello L, Kiel DP, Berry SD.
Disabil. Health J. 2018; ePub(ePub): ePub.
Affiliation: Department of Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts, United States; Hebrew SeniorLife, Institute for Aging Research, Boston, Massachusetts, United States. Electronic address: sarahberry@hsl.harvard.edu.

DOI 10.1016/j.dhjo.2018.03.002 **PMID** 29598927
Abstract

BACKGROUND: Hip fracture risk is high in young people with multiple sclerosis (MS), but has not been examined in an institutionalized aging population with MS.

OBJECTIVE: We aimed to compare the hip fracture risk in nursing home (NH) residents with and without MS; and (2) examine risk factors for hip fracture in those with MS.

METHODS: We conducted a retrospective cohort study using national NH clinical assessment and Medicare claims data. Participants included age-, sex- and race-matched NH residents with/without MS (2007-2008). Multivariable competing risk regression was used to compare 2-year hip fracture risk, and to examine risk factors.

RESULTS: A total of 5692 NH residents with MS were matched to 28,460 without MS. Approximately 80% of residents with MS vs. 50% of those without MS required extensive assistance in walking at NH admission. The adjusted incidence rate of hip fracture was 7.1 and 18.6 per 1000 person-years in those with or without MS, respectively. Wandering and anxiolytic exposure were the main hip fracture risk factors in transfer independent residents with MS; while pneumonia and antidepressant use were the main factors in dependent residents with MS.

CONCLUSIONS: In contrast to prior comparisons from non-NH populations, the incidence of hip fracture was lower in NH residents with MS as compared with matched controls. Residents with MS were much more functionally dependent, which likely explains these findings. Fracture prevention strategies should focus on fall prevention in independent residents; and possibly improvement of health status and facility quality of care in dependent residents.

PDF Y Endnote Y

Gait in mild Alzheimer's disease: feasibility of multi-center measurement in the clinic and home with body-worn sensors: a pilot study

Mc Ardle R, Morris R, Hickey A, Del Din S, Koychev I, Gunn RN, Lawson J, Zamboni G, Ridha B, Sahakian BJ, Rowe JB, Thomas A, Zetterberg H, Mackay C, Lovestone S, Rochesteron L.
J. Alzheimers Dis. 2018; ePub(ePub): ePub.
Affiliation: Institute of Neuroscience, Newcastle University, Newcastle, UK.

DOI 10.3233/JAD-171116 **PMID**29614664
Abstract

Gait is emerging as a potential diagnostic tool for cognitive decline. The 'Deep and Frequent Phenotyping for Experimental Medicine in Dementia Study' (D&FP) is a multicenter feasibility study embedded in the United Kingdom Dementia Platform designed to determine participant acceptability and feasibility of extensive and repeated phenotyping to determine the optimal combination of biomarkers to detect disease progression and identify early risk of Alzheimer's disease (AD). Gait is included as a clinical biomarker. The tools to quantify gait in the clinic and home, and suitability for multi-center application have not been examined. Six centers from the National Institute for Health Research Translational Research Collaboration in Dementia initiative recruited 20 individuals with early onset AD. Participants wore a single wearable (tri-axial accelerometer) and completed both clinic-based and free-living gait assessment. A series of macro (behavioral) and micro (spatiotemporal) characteristics were derived from the resultant data using previously validated algorithms.
RESULTS indicate good participant acceptability, and potential for use of body-worn sensors in both the clinic and the home. Recommendations for future studies have been provided. Gait has been demonstrated to be a feasible and suitable measure, and future research should examine its suitability as a biomarker in AD.
PDF Y Endnote Y

In-hospital mortality following traumatic brain injury among older medicare beneficiaries, comparing statin users with nonusers
Khokhar B, Simoni-Wastila L, Slejko JF, Perfetto E, Zhan M, Smith GS.
J. Pharm. Technol. 2017; 33(6): 225-236.
Affiliation: West Virginia University, Morgantown, WV, USA.

DOI 10.1177/8755122517735656 **PMID**29607441 **PMCID** PMC5877468
Abstract
BACKGROUND: Traumatic brain injury (TBI) is a significant public health concern for older adults. Small-scale human studies have suggested pre-TBI statin use is associated with decreased in-hospital mortality following TBI, highlighting the need for large-scale translational research.
OBJECTIVE: To investigate the relationship between pre-TBI statin use and in-hospital mortality following TBI.
METHODS: A retrospective study of Medicare beneficiaries 65 and older hospitalized with a TBI during 2006 to 2010 was conducted to assess the impact of pre-TBI statin use on in-hospital mortality following TBI. Exposure of interest included atorvastatin, fluvastatin, lovastatin, pravastatin, rosuvastatin, and simvastatin. Beneficiaries were classified as current, recent, past, and nonusers of statins prior to TBI. The outcome of interest was in-hospital mortality. Logistic regression was used to obtain odds ratios (ORs) and 95% confidence intervals (CIs) comparing current, recent, and prior statin use to nonuse.
RESULTS: Most statin users were classified as current users (90%). Current atorvastatin (OR = 0.88; 95% = CI 0.82, 0.96), simvastatin (OR = 0.84; 95% CI = 0.79, 0.91), and rosuvastatin (OR = 0.79; 95% CI = 0.67, 0.94) use were associated with a significant decrease in the risk of in-hospital mortality following TBI.

CONCLUSIONS: In addition to being the most used statins, current use of atorvastatin, rosuvastatin, and simvastatin was associated with a significant decrease in in-hospital mortality following TBI among older adults. Future research must include clinical trials to help exclude the possibility of a healthy user effect in order to better understand the impact of statin use on in-hospital mortality following TBI.

PDF Endnote

Interdisciplinary collaboration in medication-related falls prevention in older adults

Huang L, Turner J, Brandt NJ.

J. Gerontol. Nurs. 2018; 44(4): 11-15.

DOI 10.3928/00989134-20180313-04 **PMID** 29617034

Abstract

The older adult population continues to steadily increase. Largely attributed to longer life spans and aging of the Baby Boomer generation, continued growth of this population is expected to affect a multitude of challenging public health concerns. Specifically, falls in older adults are prevalent but overlooked concerns. Health care providers are well-positioned to provide valuable interventions in this aspect. An interdisciplinary, team-based approach of health care providers is required to maximize falls prevention through patient-centered and collaborative care. The current article highlights the implications of inappropriate medication use and the need to improve care coordination to tackle this public health issue affecting older adults.

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Mortality from falls in Dutch adults 80 years and older, 2000-2016

Hartholt KA, Van Beeck EF, van der Cammen TJM.

J. Am. Med. Assoc. JAMA 2018; 319(13): 1380-1382.

Affiliation: Faculty of Industrial Design Engineering, Delft University of Technology, Delft, the Netherlands.

DOI 10.1001/jama.2018.1444 **PMID** 29614170

Abstract

Falls are a leading cause of health care consumption, morbidity, and mortality among older adults.1,2 Falls mortality in persons 80 years and older in the Netherlands decreased from 1969 through 1999, and then slightly increased from 2000 through 2008.3 We assessed trends in falls mortality in persons 80 years and older from 2000 through 2016.

PDF Y Endnote Y

Physical frailty and mortality risk in Japanese older adults

Yuki A, Otsuka R, Tange C, Nishita Y, Tomida M, Ando F, Shimokata H.

Geriatr. Gerontol. Int. 2018; ePub(ePub): ePub.

Affiliation: Graduate School of Nutritional Sciences, Nagoya University of Arts and Sciences, Nisshin, Japan.

DOI 10.1111/ggi.13316 **PMID** 29608043
Abstract
AIM: The association between frailty and increased mortality risk is unknown. The present study assessed the longitudinal relationship between frailty and mortality risk in Japanese community-dwelling older adults.
METHODS: Participants included 841 randomly chosen community-dwelling Japanese individuals, including 175 older adults aged 65-88 years with incomplete data at the baseline examination (July 2006-July 2008). Participants were followed from baseline to 31 December 2015 (mean 7.9 years). Frailty was diagnosed according to frailty criteria, including unintentional weight loss (shrinking), exhaustion, low activity, low grip strength and low gait speed. Information on deaths was obtained from a population dynamics survey. The relationship between frailty and mortality was assessed using Kaplan-Meier survival curves and Cox proportional hazards regression. The Cox proportional hazards model was used to control for potential confounders, including age at baseline, body fat, education, the Mini-Mental State Examination score, the Center for Epidemiologic Studies Depression Scale score, total physical activity, total caloric intake, alcohol intake, current smoking, household income and the number of current diseases.
RESULTS: The fully adjusted hazard ratio for all-cause mortality in the frailty group was 2.63 (95% confidence interval, 1.28-5.39; P for trend <0.01). The age- and sex-adjusted hazard ratio for mortality of cancer in the frailty group was 3.33 (95% confidence interval, 1.15-9.62; P for trend <0.05).
CONCLUSION: Complications of frailty, which include shrinking, exhaustion, low activity, weakness, and slowness, appear to be significant risks for mortality in Japanese older adults

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Potentially inappropriate medications with polypharmacy increase the risk of falls in older Japanese patients: 1-year prospective cohort study
Masumoto S, Sato M, Maeno T, Ichinohe Y, Maeno T.
Geriatr. Gerontol. Int. 2018; ePub(ePub): ePub.
Affiliation: Department of Primary Care and Medical Education, Graduate School of Comprehensive Human Sciences, University of Tsukuba, Ibaraki, Japan.

DOI 10.1111/ggi.13307 **PMID** 29582533
Abstract
AIM: We aimed to evaluate whether potentially inappropriate medications (PIMs) increase the risk for adverse clinical outcomes including falls, emergency department (ED) visits and unplanned hospitalizations in older Japanese patients with chronic diseases, comparing the difference between patients with and without polypharmacy.
METHODS: A prospective observational cohort study was carried out in a Japanese outpatient

primary care clinic. Baseline data was collected from January to March 2016. A total of 740 patients aged ≥65 years with chronic diseases were enrolled and were followed up at 1 year; falls, ED visits and unplanned hospitalizations were recorded. A questionnaire and review of the patients' medical records were used to collect information regarding sociodemographic status, comorbidities and medication prescriptions. PIMs were defined using the Screening Tool of Older Person's Prescriptions criteria version 2. Using logistic regression analysis, the incidence of falls, and ED visits and hospitalizations were compared between patients with and without PIMs, stratifying by number of prescriptions: those with five or more prescriptions and those with fewer than five prescriptions. RESULTS: PIMs were identified in 32.3% of enrolled patients. After stratification by number of prescriptions, PIMs were significantly associated with falls in the group with polypharmacy (OR 2.03, 95% CI 1.11-3.69). This association was not seen in the group without polypharmacy. PIMs were not associated with ED visits or hospitalizations at the 1-year follow up upon multivariate analysis. CONCLUSIONS: The combination of PIMs and polypharmacy might increase the risk of falls, therefore clinicians need to pay attention to both PIMs and polypharmacy. © 2018 Japan Geriatrics Society.

PDF Y Endnote Y

Reliability and validity of the Short Falls Efficacy Scale-International for Japanese older people

Kamide N, Shiba Y, Sakamoto M, Sato H.

Aging Clin. Exp. Res. 2018; ePub(ePub): ePub.

Affiliation: Graduate School of Medical Sciences, Kitasato University, Sagamihara, Japan.

DOI 10.1007/s40520-018-0940-y **PMID** 29594873

Abstract

BACKGROUND: The Short Falls Efficacy Scale-International (Short FES-I) has been confirmed to be a good measure with reliability and validity in a UK sample; however, the reliability and validity of the Short FES-I for Japanese older people have not yet been established.
AIM: The aim of this study was to determine the reliability and validity of the Short FES-I for Japanese older people.
METHODS: The study participants were 519 older people aged 65 years and over who were living independently in their community. The Short FES-I is composed of seven items rated on a four-point Likert scale. Lower scores indicate better fall-related efficacy. To investigate the validity of the Short FES-I, previous falls, physical function such as grip strength and scores on the Timed Up and Go (TUG) test, psychological factors such as self-rated health (SRH), cognitive function, and other confounding factors were collected. The association between the previous falls and the Short FES-I was analyzed using logistic regression analysis. Furthermore, factors related to the Short FES-I were investigated using multiple regression analysis.
RESULTS: Cronbach's alpha for the Short FES-I was 0.87. Short FES-I scores were significantly higher in participants with a history of falls than in those without. In addition, Short FES-I scores were significantly and independently associated with falls in logistic regression analysis, and significantly associated with grip strength, TUG time, and SRH in multiple regression analysis.

CONCLUSIONS AND DISCUSSION: These results suggest that the Short FES-I is a reliable and valid fall-related measurement scale for Japanese older people.
PDF Y Endnote Y

Satisfying product features of a fall prevention smartphone app and potential users' willingness to pay: web-based survey among older adults
Rasche P, Mertens A, Brandl C, Liu S, Buecking B, Bliemel C, Horst K, Weber CD, Lichte P, Knobe M.
JMIR Mhealth Uhealth 2018; 6(3): e75.
Affiliation: Department of Orthopaedic Trauma, University of Aachen Medical Center, RWTH Aachen University, Aachen, Germany.

DOI 10.2196/mhealth.9467 **PMID** 29588268
Abstract
BACKGROUND: Prohibiting falls and fall-related injuries is a major challenge for health care systems worldwide, as a substantial proportion of falls occur in older adults who are previously known to be either frail or at high risk for falls. Hence, preventive measures are needed to educate and minimize the risk for falls rather than just minimize older adults' fall risk. Health apps have the potential to address this problem, as they enable users to self-assess their individual fall risk.
OBJECTIVE: The objective of this study was to identify product features of a fall prevention smartphone app, which increase or decrease users' satisfaction. In addition, willingness to pay (WTP) was assessed to explore how much revenue such an app could generate.
METHODS: A total of 96 participants completed an open self-selected Web-based survey. Participants answered various questions regarding health status, subjective and objective fall risk, and technical readiness. Seventeen predefined product features of a fall prevention smartphone app were evaluated twice: first, according to a functional (product feature is implemented in the app), and subsequently by a dysfunctional (product feature is not implemented in the app) question. On the basis of the combination of answers from these 2 questions, the product feature was assigned to a certain category (must-be, attractive, one-dimensional, indifferent, or questionable product feature). This method is widely used in user-oriented product development and captures users' expectations of a product and how their satisfaction is influenced by the availability of individual product features.
RESULTS: Five product features were identified to increase users' acceptance, including (1) a checklist of typical tripping hazards, (2) an emergency guideline in case of a fall, (3) description of exercises and integrated workout plans that decrease the risk of falling, (4) inclusion of a continuous workout program, and (5) cost coverage by health insurer. Participants' WTP was assessed after all 17 product features were rated and revealed a median monthly payment WTP rate of €5.00 (interquartile range 10.00).
CONCLUSIONS: The results show various motivating product features that should be incorporated into a fall prevention smartphone app.
RESULTS reveal aspects that fall prevention and intervention designers should keep in mind to encourage individuals to start joining their program and facilitate long-term user engagement,

resulting in a greater interest in fall risk prevention.
PDF Y Endnote Y

Scoring the home falls and accidents screening tool for health professionals (HOME FAST-HP): Evidence from one epidemiological study
Mackenzie L, Byles J.
Aust. Occup. Ther. J. 2018; ePub(ePub): ePub.
Affiliation: Faculty of Health and Medicine, School of Medicine and Public Health, Research Centre for Generational, Health and Ageing, University of Newcastle, Callaghan, NSW, Australia.

DOI 10.1111/1440-1630.12467 **PMID** 29603253
Abstract
BACKGROUND: Falls in older people are a major public health concern. To target falls prevention interventions, screening tools need to be able to identify older people at greater risk of falling. This study aimed to investigate the screening capacity of the Home Falls and Accidents Screening Tool for health professionals (HOME FAST-HP), and to identify the best cut-off score to identify older people at higher risk of falls using the HOME FAST-HP.
METHODS: The study used cross-sectional data from a random sample of 650 women from the 1921 to 1926 cohort of the Australian Longitudinal Study of Women's Health (ALSWH). Selected women were sent a postal survey including the HOME FAST-HP, falls history, and other health factors. Scores on the home fast were calculated and the cut-point for optimal sensitivity and specificity of the HOME FAST-HP in relation to falls was assessed using a Receiver Operating Characteristic curve.
RESULTS: A total of 567 older women participated (response rate 87%). The mean age of participants was 77.5 yrs (95% CI 77.31-77.70). A total of 153 participants (27%) reported a fall in the previous six months. The mean number of hazards using the HOME FAST-HP was 9.74 (95% CI 9.48-10.01), range 2-22. Non-fallers had a mean of 9.6 hazards (95% CI 9.32-9.91) and fallers had a mean of 10.63 hazards (95% CI 10.08-11.19) which was a significant difference (t = 3.41, P = 0.001). The area under the receiver operator curve (AUC) was 0.58 (95% CI 0.53-0.64). A HOME FAST-HP cut-off score of 9 was associated with the optimal sensitivity for falls (73.9%), with specificity (37.9%), and positive predictive value was 30.6% and negative predictive value was 79.7%.
CONCLUSION: The HOME FAST-HP can be used as a screening tool to identify fallers with a cut-off score of nine indicating a higher risk of falling.

PDF Y Endnote Y

Syncope, hypotension, and falls in the treatment of hypertension: results from the randomized clinical systolic blood pressure intervention trial
Sink KM, Evans GW, Shorr RI, Bates JT, Berlowitz D, Conroy MB, Felton DM, Gure T, Johnson KC, Kitzman D, Lyles MF, Servilla K, Supiano MA, Whittle J, Wiggers A, Fine LJ.
J. Am. Geriatr. Soc. 2018; ePub(ePub): ePub.
Affiliation: National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland.

DOI 10.1111/jgs.15236 **PMID** 29601076

Abstract

OBJECTIVE: To determine predictors of serious adverse events (SAEs) involving syncope, hypotension, and falls, with particular attention to age, in the Systolic Blood Pressure Intervention Trial.

DESIGN: Randomized clinical trial.

SETTING: Academic and private practices across the United States (N = 102).

PARTICIPANTS: Adults aged 50 and older with a systolic blood pressure (SBP) of 130 to 180 mmHg at high risk of cardiovascular disease events, but without diabetes, history of stroke, symptomatic heart failure or ejection fraction less than 35%, dementia, or standing SBP less than 110 mmHg (N = 9,361).

INTERVENTION: Treatment of SBP to a goal of less than 120 mmHg or 140 mmHg. MEASUREMENTS: Outcomes were SAEs involving syncope, hypotension, and falls. Predictors were treatment assignment, demographic characteristics, comorbidities, baseline measurements, and baseline use of cardiovascular medications.

RESULTS: One hundred seventy-two (1.8%) participants had SAEs involving syncope, 155 (1.6%) hypotension, and 203 (2.2%) falls. Randomization to intensive SBP control was associated with greater risk of an SAE involving hypotension (hazard ratio (HR) = 1.67, 95% confidence interval (CI) = 1.21-2.32, P = .002), and possibly syncope (HR = 1.32, 95% CI = 0.98-1.79, P = .07), but not falls (HR = 0.98, 95% CI = 0.75-1.29, P = .90). Risk of all three outcomes was higher for participants with chronic kidney disease or frailty. Older age was also associated with greater risk of syncope, hypotension, and falls, but there was no age-by-treatment interaction for any of the SAE outcomes.

CONCLUSIONS: Participants randomized to intensive SBP control had greater risk of hypotension and possibly syncope, but not falls. The greater risk of developing these events associated with intensive treatment did not vary according to age.

PDF Y Endnote Y

The effects of combinations of cognitive impairment and pre-frailty on adverse outcomes from a prospective community-based cohort study of older Chinese people

Yu R, Morley JE, Kwok T, Leung J, Cheung O, Woo J.

Front. Med. (Lausanne) 2018; 5: e50.

Affiliation: The Chinese University of Hong Kong Jockey Club Institute of Ageing, Shatin, Hong Kong.

DOI 10.3389/fmed.2018.00050 **PMID** 29600247 **PMCID** PMC5863513

Abstract

OBJECTIVES: To examine how various combinations of cognitive impairment (overall performance and specific domains) and pre-frailty predict risks of adverse outcomes; and to determine whether cognitive frailty may be defined as the combination of cognitive impairment and the presence of pre-frailty.

DESIGN: Community-based cohort study.

PARTICIPANTS: Chinese men and women (*n* = 3,491) aged 65+ without dementia, Parkinson's disease and/or frailty at baseline.
MEASUREMENTS: Frailty was characterized using the Cardiovascular Health Study criteria. Overall cognitive impairment was defined by a Cantonese Mini-Mental Status Examination (CMMSE) total score (<21/24/27, depending on participants' educational levels); delayed recall impairment by a CMMSE delayed recall score (<3); and language and praxis impairment by a CMMSE language and praxis score (<9). Adverse outcomes included poor quality of life, physical limitation, increased cumulative hospital stay, and mortality.
RESULTS: Compared to those who were robust and cognitively intact at baseline, those who were robust but cognitively impaired were more likely to develop pre-frailty/frailty after 4 years ($P < 0.01$). Compared to participants who were robust and cognitively intact at baseline, those who were pre-frail and with overall cognitive impairment had lower grip strength ($P < 0.05$), lower gait speed ($P < 0.01$), poorer lower limb strength ($P < 0.01$), and poorer delayed recall at year 4 [OR, 1.6; 95% confidence interval (CI), 1.2-2.3]. They were also associated with increased risks of poor quality of life (OR, 1.5; 95% CI, 1.1-2.2) and incident physical limitation at year 4 (OR, 1.8; 95% CI, 1.3-2.5), increased cumulative hospital stay at year 7 (OR, 1.5; 95% CI, 1.1-2.1), and mortality over an average of 12 years (OR, 1.5; 95% CI, 1.0-2.1) after adjustment for covariates. There was no significant difference in risks of adverse outcomes between participants who were pre-frail, with/without cognitive impairment at baseline. Similar results were obtained with delayed recall and language and praxis impairments.
CONCLUSION: Robust and cognitively impaired participants had higher risks of becoming pre-frail/frail over 4 years compared with those with normal cognition. Cognitive impairment characterized by the CMMSE overall score or its individual domain score improved the predictive power of pre-frailty for poor quality of life, incident physical limitation, increased cumulative hospital stay, and mortality. Our findings support to the concept that cognitive frailty may be defined as the occurrence of both cognitive impairment and pre-frailty, not necessarily progressing to dementia.
PDF Endnote

The impact of direct oral anticoagulants in traumatic brain injury patients greater than 60-years-old

Prexl O, Bruckbauer M, Voelckel W, Grottke O, Ponschab M, Maegele M, Schöchl H.
Scand. J. Trauma Resusc. Emerg. Med. 2018; 26(1): e20.
Affiliatio: Ludwig Boltzmann Institute for Experimental and Clinical Traumatology, AUVA Trauma Research Centre, Vienna, Austria. herbert.schoechl@auva.at.

DOI 10.1186/s13049-018-0487-0 **PMID** 29580268
Abstract
BACKGROUND: Traumatic brain injury (TBI) is the leading cause of death among trauma patients. Patients under antithrombotic therapy (ATT) carry an increased risk for intracranial haematoma (ICH) formation. There is a paucity of data about the role of direct oral anticoagulants (DOACs)

among TBI patients.
METHODS: In this retrospective study, we investigated all TBI patients ≥60-years-old who were admitted to the intensive care unit (ICU) from January 2014 until May 2017. Patients were grouped into those receiving vitamin K antagonists (VKA), platelet inhibitors (PI), DOACs and no antithrombotic therapy (no-ATT).
RESULTS: One-hundred-eighty-six, predominantly male (52.7%) TBI patients with a median age of 79 years (range: 70-85 years) were enrolled in the study. Glasgow Coma Scale and S-100β were not different among the groups. Patients on VKA and DOACs had a higher Charlson Comorbidity Index compared to the PI group and no-ATT group ($p = 0.0021$). The VKA group received reversal agents significantly more often than the other groups ($p < 0.0001$). Haematoma progression in the follow-up cranial computed tomography (CCT) was lowest in the DOAC group. The number of CCT and surgical interventions were low with no differences between the groups. No relevant differences in ICU and hospital length of stay were observed. Mortality in the VKA group was significantly higher compared to DOAC, PI and no-ATT group ($p = 0.047$).
DISCUSSION: Data from huge registry studies displayed higher efficacy and lower fatal bleeding rates for DOACs compared to VKAs. The current study revealed comparable results. Despite the fact that TBI patients on VKAs received reversal agents more often than patients on DOACs (84.4% vs. 24.2%, $p < 0.001$), mortality rate was significantly higher in the VKA group ($p = 0.047$).
CONCLUSION: In patients ≥60 years suffering from TBI, anticoagulation with DOACs appears to be safer than with VKA. Anti-thrombotic therapy with VKA resulted in a worse outcome compared to DOACs and PI. Further studies are warranted to confirm this finding.
PDF Endnote

The impact of Nordic walking training on the gait of the elderly
Ben Mansour K, Gorce P, Rezzoug N.
J. Sports Sci. 2018; ePub(ePub): ePub.
Affiliation: HandiBio Laboratory, University of Toulon , Toulon Cedex 9 , France.

DOI 10.1080/02640414.2018.1458396 **PMID** 29582714
Abstract
The purpose of the current study was to define the impact of regular practice of Nordic walking on the gait of the elderly. Thereby, we aimed to determine whether the gait characteristics of active elderly persons practicing Nordic walking are more similar to healthy adults than that of the sedentary elderly. Comparison was made based on parameters computed from three inertial sensors during walking at a freely chosen velocity.
RESULTS showed differences in gait pattern in terms of the amplitude computed from acceleration and angular velocity at the lumbar region (root mean square), the distribution (Skewness) quantified from the vertical and Euclidean norm of the lumbar acceleration, the complexity (Sample Entropy) of the mediolateral component of lumbar angular velocity and the Euclidean norm of the shank acceleration and angular velocity, the regularity of the lower limbs, the spatiotemporal parameters and the variability (standard deviation) of stance and stride durations. These findings reveal that the pattern of active elderly differs significantly from sedentary elderly of the same age while similarity

was observed between the active elderly and healthy adults. These results advance that regular physical activity such as Nordic walking may counteract the deterioration of gait quality that occurs with aging.
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Trial Protocol: Home-based exercise programs to prevent falls and upper limb dysfunction among community-dwelling older people: study protocol for the BEST (Balance Exercise Strength Training) at Home randomised, controlled trial
Bates A, Furber S, Tiedemann A, Ginn K, van den Dolder P, Howard K, Bauman A, Chittenden C, Franco L, Kershaw M, Sherrington C.
J. Physiother. 2018; ePub(ePub): ePub.
Affiliation: School of Public Health, The University of Sydney.

DOI 10.1016/j.jphys.2017.10.001 **PMID** 29605522
Abstract
INTRODUCTION: Falling when older is a major public health issue. There is compelling evidence to show that specific exercise programs can reduce the risk and rate of falls in community-dwelling older people. Another major health issue for older people living in the community is upper limb dysfunction, including shoulder pain. Home-based exercise programs appeal to some older people, due to their convenience.
RESEARCH QUESTIONS: This trial aims to determine the effectiveness and cost-effectiveness of a home-based lower limb exercise program compared with a home-based upper limb exercise program to prevent falls and upper limb dysfunction among community-dwelling people aged 65+ years.
DESIGN: Randomised, controlled trial.
PARTICIPANTS AND SETTING: A total of 576 community-dwelling people will be recruited from the Illawarra and Shoalhaven regions of New South Wales, Australia.
INTERVENTION: Participants will be randomised to either a home-based lower limb exercise intervention or a home-based upper limb exercise intervention. The lower limb program is designed to improve balance and strength in the lower limbs. The upper limb program is designed to improve upper limb strength and mobility. Participants will attend three group-based instruction sessions to learn and progress the exercises, and will be instructed to perform the exercises three times per week at home for 12 months.
OUTCOME MEASURES: The two primary outcomes will be fall rates, recorded with monthly calendars for a 12-month period, and upper limb dysfunction, measured with the Disability of the Arm, Shoulder and Hand questionnaire. Secondary outcomes will include: lower limb strength and balance; shoulder strength and mobility; physical activity; quality of life; attitudes to exercise; proportion of fallers; fear of falling; and health and community service use. The cost-effectiveness of both exercise programs from a health and community service provider perspective will be evaluated.
ANALYSIS: Negative binomial regression models will be used to estimate the between-group difference in fall rates. Modified Poisson regression models will be used to compare groups on

dichotomous outcome measures. Linear regression models will be used to assess the effect of group allocation on the continuously scored measures, after adjusting for baseline scores. Two economic evaluations will be conducted: the first will assess cost-effectiveness of the lower limb program compared with the upper limb program; and the second will assess cost-effectiveness of the upper limb program compared with the lower limb program.
DISCUSSION: If effective, the trial will provide a model for both upper limb and lower limb exercise programs that can be performed at home and implemented at scale to community-dwelling older adults.

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Trunk motion visual feedback during walking improves dynamic balance in older adults: assessor blinded randomized controlled trial
Anson E, Ma L, Meetam T, Thompson E, Rathore R, Dean V, Jeka J.
Gait Posture 2018; 62: 342-348.
Affiliation: Department of Kinesiology, Temple University, Philadelphia, PA, United States.

DOI 10.1016/j.gaitpost.2018.03.044 **PMID** 29614467
Abstract
BACKGROUND: Virtual reality and augmented feedback have become more prevalent as training methods to improve balance. Few reports exist on the benefits of providing trunk motion visual feedback (VFB) during treadmill walking, and most of those reports only describe within session changes.
RESEARCH QUESTION: To determine whether trunk motion VFB treadmill walking would improve over-ground balance for older adults with self-reported balance problems.
METHODS: 40 adults (75.8 years (SD 6.5)) with self-reported balance difficulties or a history of falling were randomized to a control or experimental group. Everyone walked on a treadmill at a comfortable speed 3×/week for 4 weeks in 2 min bouts separated by a seated rest. The control group was instructed to look at a stationary bulls-eye target while the experimental group also saw a moving cursor superimposed on the stationary bulls-eye that represented VFB of their walking trunk motion. The experimental group was instructed to keep the cursor in the center of the bulls-eye. Somatosensory (monofilaments and joint position testing) and vestibular function (canal specific clinical head impulses) was evaluated prior to intervention. Balance and mobility were tested before and after the intervention using Berg Balance Test, BESTest, mini-BESTest, and Six Minute Walk.
RESULTS: There were no significant differences between groups before the intervention. The experimental group significantly improved on the BESTest ($p = 0.031$) and the mini-BEST ($p = 0.019$). The control group did not improve significantly on any measure. Individuals with more profound sensory impairments had a larger improvement on dynamic balance subtests of the BESTest.
SIGNIFICANCE: Older adults with self-reported balance problems improve their dynamic balance after training using trunk motion VFB treadmill walking. Individuals with worse sensory function may benefit more from trunk motion VFB during walking than individuals with intact sensory function.

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Alterations in white matter network topology contribute to freezing of gait in Parkinson's disease
Hall JM, Shine JM, Ehgoetz Martens KA, Gilat M, Broadhouse KM, Szeto JYY, Walton CC, Moustafa AA, Lewis SJG.
J. Neurol. 2018; ePub(ePub): ePub.
Affiliation: Brain and Mind Centre, University of Sydney, 100 Mallett Street, Camperdown, NSW, 2050, Australia. profsimonlewis@gmail.com.

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Abstract
Freezing of gait (FOG) is a common symptom in advanced Parkinson's disease (PD). Despite current advances, the neural mechanisms underpinning this disturbance remain poorly understood. To this end, we investigated the structural organisation of the white matter connectome in PD freezers and PD non-freezers. We hypothesized that freezers would show an altered network architecture, which could hinder the effective information processing that characterizes the disorder. Twenty-six freezers and twenty-four well-matched non-freezers were included in this study. Using diffusion tensor imaging, we investigated the modularity and integration of the regional connectome by calculating the module degree z score and the participation coefficient, respectively. Compared to non-freezers, freezers demonstrated lower participation coefficients in the right caudate, thalamus, and hippocampus, as well as within superior frontal and parietal cortical regions. Importantly, several of these nodes were found within the brain's 'rich club'. Furthermore, group differences in module degree z scores within cortical frontal and sensory processing areas were found. Together, our results suggest that changes in the structural network topology contribute to the manifestation of FOG in PD, specifically due to a lack of structural integration between key information processing hubs of the brain.
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Associations between patient symptoms and falls in an acute care hospital:A cross-sectional study
Lerdal A, Sigurdsen LW, Hammerstad H, Granheim TI, Risk Study Research Group, Gay CL.
J. Clin. Nurs. 2018; ePub(ePub): ePub.
Affiliation: University of California, Family and Health Care NursingSan Francisco, Department of, San Francisco, USA.

DOI 10.1111/jocn.14364 **PMID** 29603810
Abstract
AIM AND OBJECTIVES: To describe associations between patient fall risk and common symptoms among hospitalized inpatients.
BACKGROUND: Predictors of falls have been identified in a variety of populations and settings, but the role of inpatients' symptom experience has not been adequately evaluated.
DESIGN: Cross-sectional.
METHODS: Participants included 614 medical and elective surgical patients in an acute hospital in

Norway. Patient falls during hospitalization were assessed by self-report and incident reports. Pain intensity and the occurrence and distress of 15 other symptoms were assessed by self-report.
RESULTS: Patient falls were associated with male sex and having more comorbidities. Medical patients were more likely to fall than elective surgical patients. In logistic regression analyses, higher symptom counts were associated with increased risk of fall, with each additional symptom conferring a 15% increase in fall risk. Symptom distress related to concentration difficulties, lack of energy, sleep problems, nausea, vomiting, and diarrhea was associated with increased risk of fall, even after adjusting for the influence of age, sex, and comorbidities (odds ratios ranged 2.3-4.8). Severe pain, as well as symptom distress related to drowsiness, itching, dizziness, or swelling of arms/legs, were also associated with patient falls, although these associations were attenuated after accounting for age, sex, and comorbidities. Overall, symptom distress was more strongly associated with fall risk than symptom occurrence.
CONCLUSIONS: Symptom burden and distress may help identify hospital patients at risk for fall. Additional research is needed to determine whether symptoms are useful for assessing fall risk among hospital patients and other high-risk populations. If symptoms are useful indicators of fall risk, they should be considered for inclusion in standardized risk assessments. This article is protected by copyright. All rights reserved.

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Development and testing of surveillance case definitions and reporting frameworks to standardise the use of ICD-10-CM coded data for injury surveillance, epidemiology and research (Abstract 27)
Hedegaard H, Johnson R.
Inj. Prev. 2017; 23(Suppl. 1): A10-A11.

DOI 10.1136/injuryprev-2017-042560.27 **PMID** unavailable
Abstract
PURPOSE The National Centre for Health Statistics and the National Centre for Injury Prevention and Control have proposed surveillance case definitions and reporting frameworks for analysis of injury data coded using the International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM). This presentation describes recent collaborative efforts to test the proposed definitions and the framework for reporting external cause (injury mechanism by intent).
Methods 1) Analysis of administrative data coded in ICD-10-CM, with comparison to historic results from data coded in ICD-9-CM, and 2) analysis of dual coded data (i.e., same medical record coded in both ICD-9-CM and ICD-10-CM).
RESULTS: Using dual-coded data, the proposed ICD-10-CM definition identified more injury hospitalizations than the ICD-9-CM definition. 95% of the hospitalizations identified using the ICD-10-CM definition but not the ICD-9-CM definition were 'subsequent' encounters. Comparison of results from the proposed ICD-10-CM external cause matrix to historic results using the ICD-9-CM matrix showed a decrease in the number of cases assigned to Unintentional Fall, Motor Vehicle Traffic (MVT)- Pedestrian, Other Pedalcyclist, Other Transportation, Overexertion and Undetermined Intent, while increases were seen in the number of cases assigned to Unintentional MVT-

Pedalcyclist, Other Pedestrian and Unspecified Mechanism.
CONCLUSIONS: Analysis results will be used to finalise the ICD-10-CM surveillance case definitions and the external cause matrix by deciding whether to: 1) include subsequent encounters, 2) limit case inclusion to a principal diagnosis of injury only or to include records with mentions of injury in other diagnosis fields, 3) include records based on presence of an external cause code even if the principal diagnosis is not an injury, and 4) whether re-assignment of codes to specific cells of the external cause matrix is needed.
Significance Use of finalised ICD-10-CM injury surveillance case definitions and reporting frameworks will help standardise the comparison of results across jurisdictions and time.
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Prefrontal over-activation during walking in people with mobility deficits: interpretation and functional implications

Hawkins KA, Fox EJ, Daly JJ, Rose DK, Christou EA, McGuirk TE, Otzel DM, Butera KA, Chatterjee SA, Clark DJ.

Hum. Mov. Sci. 2018; 59: 46-55.

Affiliation: Brain Rehabilitation Research Center, North Florida/South Georgia Veterans Health System, 1601 SW Archer Rd, Gainesville, FL 32608, USA; Department of Aging and Geriatric Research, University of Florida, 2004 Mowry Rd, Gainesville, FL 32603, USA. Electronic address: davidclark@ufl.edu.

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Abstract
BACKGROUND: Control of walking by the central nervous system includes contributions from executive control mechanisms, such as attention and motor planning resources. Executive control of walking can be estimated objectively by recording prefrontal cortical activity using functional near infrared spectroscopy (fNIRS).
OBJECTIVE: The primary objective of this study was to investigate group differences in prefrontal/executive control of walking among young adults, older adults, and adults post-stroke. Also assessed was the extent to which walking-related prefrontal activity fits existing cognitive frameworks of prefrontal over-activation.
METHODS: Participants included 24 adults post-stroke with moderate to severe walking deficits, 15 older adults with mild gait deficits, and 9 young healthy adults. Executive control of walking was quantified as oxygenated hemoglobin concentration in the prefrontal cortex measured by fNIRS. Three walking tasks were assessed: typical walking, walking over obstacles, and walking while performing a verbal fluency task. Walking performance was assessed by walking speed.
RESULTS: There was a significant effect of group for prefrontal activity ($p < 0.001$) during typical and obstacles walking tasks, with young adults exhibiting the lowest level of prefrontal activity, followed by older adults, and then adults post-stroke. In young adults the prefrontal activity during typical walking was much lower than for the verbal fluency dual-task, suggesting substantial remaining prefrontal resources during typical walking. However, in older and post-stroke adults these remaining resources were significantly less ($p < 0.01$). Cumulatively, these results are consistent

with prefrontal over-activation in the older and stroke groups, which was accompanied by a steeper drop in walking speed as task complexity increased to include obstacles ($p < 0.05$).

CONCLUSIONS: There is a heightened use of prefrontal/executive control resources in older adults and post-stroke adults during walking. The level of prefrontal resource utilization, particularly during complex walking tasks like obstacle crossing, may approach the ceiling of available resources for people who have walking deficits. Prior cognitive research has revealed that prefrontal over-activation combined with limited prefrontal resources can lead to poor cognitive performance. The present study suggests a similar situation influences walking performance. Future research should further investigate the extent to which prefrontal over-activation during walking is linked to adverse mobility outcomes.
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Top five physical design factors contributing to fall initiation
Pati D, Lee J, Mihandoust S, Kazem-Zadeh M, Oh Y.
HERD 2018; ePub(ePub): ePub.
Affiliation: The Institute for Measurement, Methodology, Analysis and Policy, Texas Tech University, Lubbock, TX, USA.

DOI 10.1177/1937586718763798 **PMID**29592771
Abstract
PURPOSE: To develop a prioritized list of physical design questions/interventions to reduce patient falls by conducting expanded analysis (Phase II) of data generated from a completed study phase.
BACKGROUND: Patient falls continue to be a critical concern for healthcare providers, patients, and families. While substantial literature exist on intrinsic factors, scientific evidence on the role of the physical environment is scarce.
METHOD: Expanded analysis of data from 180 videos of trials conducted in a physical mock-up of a medical-surgical inpatient room in a previously completed study phase. The odds of subject's exhibited postures (predictors) on fall initiation (outcome) were examined in a series of generalized linear mixed effects models. Physical design elements and attributes associated with postures exhibiting statistical significance were examined.
RESULTS: Turning, pulling, pushing, and bending forward exhibited the highest odds of contributing to fall initiation in the bathroom. Grabbing, pushing, and sitting exhibited the highest odds of contributing to fall initiation around the patient bed. Physical design elements/attributes associated with the above postures are the (1) bathroom door; (2) bathroom spatial configuration-relative locations of door, toilet bowl, and the sink; (3) door, toilet, and sink hardware; (4) space availability/tightness inside the clinician zone; and (5) spatial configuration around patient bed-relative locations of bed, patient chair, and overbed table, in relation to bathroom door, and resulting obstructions originating from the configuration.
CONCLUSIONS: Patient falls during unassisted ambulation may be reduced through appropriate examination of these five physical elements/attributes.

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Visual perceptual deficits and their contribution to walking dysfunction in individuals with post-stroke visual neglect

Ogourtsova T, Archambault PS, Lamontagne A.

Neuropsychol. Rehabil. 2018; ePub(ePub): ePub.

Affiliation: Feil-Oberfeld Research Centre , Jewish Rehabilitation Hospital, Site of Centre for Interdisciplinary Research in Rehabilitation of Greater Montreal , Laval , Quebec , Canada.

DOI 10.1080/09602011.2018.1454328 **PMID** 29614914

Abstract

BACKGROUND: Unilateral spatial neglect (USN), a highly prevalent and disabling post-stroke deficit, severely affects functional mobility. Visual perceptual abilities (VPAs) are essential in activities involving mobility. However, whether and to what extent post-stroke USN affects VPAs and how they contribute to mobility impairments remains unclear.

OBJECTIVES: To estimate the extent to which VPAs in left and right visual hemispaces are (1) affected in post-stroke USN; and (2) contribute to goal-directed locomotion.

METHODS: Individuals with (USN+, n = 15) and without (USN-, n = 15) post-stroke USN and healthy controls (HC, n = 15) completed (1) psychophysical evaluation of contrast sensitivity, optic flow direction and coherence, and shape discrimination; and (2) goal-directed locomotion tasks.

RESULTS: Higher discrimination thresholds were found for all VPAs in the USN+ group compared to USN- and HC groups ($p < 0.05$). Psychophysical tests showed high sensitivity in detecting deficits in individuals with a history of USN or with no USN on traditional assessments, and were found to be significantly correlated with goal-directed locomotor impairments.

CONCLUSION: Deficits in VPAs may account for the functional difficulties experienced by individuals with post-stroke USN. Psychophysical tests used in the present study offer important advantages and can be implemented to enhance USN diagnostics and rehabilitation.

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