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Associations between alcohol use, polypharmacy and falls in older adults

Wong H, Heuberger R, Logomarsino J, Hewlings S.

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Affiliation: Central Michigan University, Mount Pleasant, Michigan, United States.

(Copyright © 2016, RCN Publishing)

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Abstract

AIMS: To describe the prevalence of alcohol intake, medication use and falls, evaluate the association between alcohol intake and medication use, and assess the effects of use of alcohol, medication and/or both on the occurrence of falls.

METHOD: Trained interviewers collected information on self-reported frequency of alcohol consumption, medication use and falls in a cross-sectional sample of 2,444 community-dwelling older adults in rural US. Polypharmacy was defined as taking five or more medications.

RESULTS: Of the sample, 38% consumed alcohol, 83% used medication and 19% had fallen. The ingestion of alcohol was inversely associated with the likelihood of taking medication, but had no statistically significant association with incidence of falls. Analyses with logistic regression indicated that alcohol intake was not a significant predictor of falls. Medication was positively related to, and a significant predictor of, falls.

CONCLUSIO: Nurses working with older people should be aware of medications that increase the risk of falls. Potentially deleterious falls may be prevented through ongoing risk-benefit assessment of prescribed medicines and, when feasible, use of non-pharmacological interventions.

PDF Endnote

Deprescribing in frail older people: a randomised controlled trial

Potter K, Flicker L, Page A, Etherton-Beer C.

PLoS One 2016; 11(3): e0149984.

Affiliation: Western Australian Centre for Health and Ageing, University of Western Australia, Perth, Western Australia, Australia.

(Copyright © 2016, Public Library of Science)

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Abstract

OBJECTIVES: Deprescribing has been proposed as a way to reduce polypharmacy in frail older people. We aimed to reduce the number of medicines consumed by people living in residential aged care facilities (RACF). Secondary objectives were to explore the effect of deprescribing on survival, falls, fractures, hospital admissions, cognitive, physical, and bowel function, quality of life, and sleep.

METHODS: Ninety-five people aged over 65 years living in four RACF in rural mid-west Western Australia were randomised in an open study. The intervention group (n = 47) received a deprescribing intervention, the planned cessation of non-beneficial medicines. The control group (n = 48) received usual care. Participants were monitored for twelve months from randomisation. Primary outcome was change in the mean number of unique regular medicines. All outcomes were assessed at baseline, six, and twelve months.

RESULTS: Study participants had a mean age of 84.3±6.9 years and 52% were female. Intervention group participants consumed 9.6±5.0 and control group participants consumed 9.5±3.6 unique regular medicines at baseline. Of the 348 medicines targeted for deprescribing (7.4±3.8 per person,

78% of regular medicines), 207 medicines (4.4±3.4 per person, 59% of targeted medicines) were successfully discontinued. The mean change in number of regular medicines at 12 months was -1.9±4.1 in intervention group participants and +0.1±3.5 in control group participants (estimated difference 2.0±0.9, 95%CI 0.08, 3.8, p = 0.04). Twelve intervention participants and 19 control participants died within 12 months of randomisation (26% versus 40% mortality, p = 0.16, HR 0.60, 95%CI 0.30 to 1.22) There were no significant differences between groups in other secondary outcomes. The main limitations of this study were the open design and small participant numbers. CONCLUSIONS: Deprescribing reduced the number of regular medicines consumed by frail older people living in residential care with no significant adverse effects on survival or other clinical outcomes. TRIAL REGISTRATION: Australian New Zealand Clinical Trials Registry ACTRN12611000370909.

PDF Endnote

ECG changes of cardiac origin in elderly patients with traumatic brain injury

Hashemian AM, Ahmadi K, Taherinia A, Sharifi MD, Ramezani J, Jazayeri SB, Saadat S, Rahimi-Movaghar V.

Med. J. Islam. Repub. Iran 2015; 29: 306.

Affiliation: MD, Professor of Neurosurgery, Sina Trauma and Surgery Research Center, Tehran University of Medical Sciences, Tehran, Iran. v_rahimi@sina.tums.ac.ir.

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Abstract

BACKGROUND: Simultaneous electrocardiographic (ECG) changes are seen in hemorrhagic brain events even in the absence of associated myocardial infarction (MI). This study was designed to assess the role of ECG changes to predict true MI in patients with hemorrhagic brain trauma.

METHODS: Data of 153 patients with traumatic brain injury and concomitant ECG changes were recorded. Enzyme study was performed for the patients, and a cardiologist confirmed the diagnosis of MI.

RESULTS: Overall, 83 females and 70 males older than 50 years of age were enrolled in the study. The most common type of hemorrhagic brain event was subarachnoid hemorrhage, and the most common ECG change was an inverted T wave. MI was confirmed in 15 (9.8%) patients. Patients with intracranial hemorrhage had significantly (p= 0.023) higher rates of associated MI than other types of brain hemorrhages. ST segment elevation was found to have a positive predictive value of 71.4% in males and 25% in females in terms of diagnosing a true MI associated with hemorrhagic brain events.

CONCLUSION: Although simultaneous cardiac changes are seen after sympathetic over- activity in brain hemorrhages, regular ECG screening of elder patients with traumatic brain injury is suggested, particularly in patients with intracranial hemorrhages.

PDF Endnote

Effect of gaze position and blur on stepping accuracy in older adults

Black AA, Drager D, Parker L, Richardson M, Urquhart T, Wood JM.

Optom. Vis. Sci. 2016; ePub(ePub): ePub.

Affiliation: *BAppSc(Optom), MPH, PhD †BVisSc, MOptom ‡PhD, FAAO School of Optometry and Vision Science and Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Queensland, Australia (all authors).

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Abstract

PURPOSE: To examine the effects of gaze position and optical blur, similar to that used in multifocal corrections, on stepping accuracy for a precision stepping task among older adults.

METHODS: Nineteen healthy older adults (mean age, 71.6 ± 8.8 years) with normal vision performed a series of precision stepping tasks onto a fixed target. The stepping tasks were performed using a repeated-measures design for three gaze positions (fixating on the stepping target as well as 30 and 60 cm farther forward of the stepping target) and two visual conditions (best-corrected vision and with +2.50DS blur). Participants' gaze position was tracked using a head-mounted eye tracker. Absolute, anteroposterior, and mediolateral foot placement errors and within-subject foot placement variability were calculated from the locations of foot and floor-mounted retroreflective markers captured by flash photography of the final foot position.

RESULTS: Participants made significantly larger absolute and anteroposterior foot placement errors and exhibited greater foot placement variability when their gaze was directed farther forward of the stepping target. Blur led to significantly increased absolute and anteroposterior foot placement errors and increased foot placement variability. Furthermore, blur differentially increased the absolute and anteroposterior foot placement errors and variability when gaze was directed 60 cm farther forward of the stepping target.

CONCLUSIONS: Increasing gaze position farther ahead from stepping locations and the presence of blur negatively impact the stepping accuracy of older adults. These findings indicate that blur, similar to that used in multifocal corrections, has the potential to increase the risk of trips and falls among older populations when negotiating challenging environments where precision stepping is required, particularly as gaze is directed farther ahead from stepping locations when walking.

PDF Endnote

Effects of interventions on trajectories of health-related quality of life among older patients with hip fracture: a prospective randomized controlled trial

Tseng MY, Liang J, Shyu YI, Wu CC, Cheng HS, Chen CY, Yang SF.

BMC Musculoskelet. Disord. 2016; 17(1): e114.

Affiliation: School of Nursing, College of Medicine, Chang Gung University, 259 Wenhua 1st Road, Guishan District, Taoyuan, 33302, Taiwan. angel62@mail.cgu.edu.tw.

(Copyright © 2016, BioMed Central)

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Abstract

BACKGROUND: Health-related quality of life (HRQoL) has been used to assess subjects' prognosis and recovery following hip fracture. However, evidence is mixed regarding the effectiveness of interventions to improve HRQoL of elders with hip fracture. The purposes of this study were to identify distinct HRQoL trajectories and to evaluate the effects of two care models on these trajectories over 12 months following hip-fracture surgery.

METHODS: For this secondary analysis, data came from a randomized controlled trial of subjects with hip fracture receiving three treatment care models: interdisciplinary care ($n = 97$),

comprehensive care (n = 91), and usual care (n = 93). Interdisciplinary care consisted of geriatric consultation, discharge planning, and 4 months of in-home rehabilitation. Comprehensive care consisted of interdisciplinary care plus management of malnutrition and depressive symptoms, fall prevention, and 12 months of in-home rehabilitation. Usual care included only in-hospital rehabilitation and occasional discharge planning, without geriatric consultation and in-home rehabilitation. Mental and physical HRQoL were measured at 1, 3, 6, and 12 months after discharge by the physical component summary scale (PCS) and mental component summary scale (MCS), respectively, of the Medical Outcomes Study Short Form 36, Taiwan version. Latent class growth modeling was used to identify PCS and MCS trajectories and to evaluate how they were affected by the interdisciplinary and comprehensive care models.

RESULTS: We identified three quadratic PCS trajectories: poor PCS (n = 103, 36.6 %), moderate PCS (n = 96, 34.2 %), and good PCS (n = 82, 29.2 %). In contrast, we found three linear MCS trajectories: poor MCS (n = 39, 13.9 %), moderate MCS (n = 84, 29.9 %), and good MCS (n = 158, 56.2 %). Subjects in the comprehensive care and interdisciplinary care groups were more likely to experience a good PCS trajectory (b = 0.99, odds ratio [OR] = 2.69, confidence interval [CI] = 7.24-1.00, p = 0.049, and b = 1.32, OR = 3.75, CI = 10.53-1.33, p = 0.012, respectively) than those who received usual care. However, neither care model improved MCS.

CONCLUSIONS: The interdisciplinary and comprehensive care models improved recovery from hip fracture by increasing subjects' odds for following a trajectory of good physical functioning after hospitalization. **TRIAL REGISTRATION:** ClinicalTrials.gov (NCT01350557).

PDF Endnote

Exploring relationships between physiological and psychological condition of seniors and their mobility and social activity

Chen WH, Lin WI, Chang SH, Mak LC.

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Abstract

Taiwan will become a super-aged society by 2025, and promoting active and healthy aging for seniors is desired. This study investigated the relationship between the physiological and psychological condition of seniors and their transportation mobility in relation to their social activities. Mobility was measured by trip frequency and classified into three types: outdoor exercise, chatting with neighbors, and longer-distance activities. The analysis results showed that of the 1,223 subjects, 274 (22.4%) had depressive symptoms, and 252 (20.6%) had poor leg mobility. Analysis results of negative binomial models showed that seniors with depression, leg mobility problems, or both had a lower frequency of the three types of social activity trips. Other factors affecting frequency of social activity by seniors included eye problems, age, education level, motorcycle availability, and types of areas where subjects lived. With consideration of trip patterns for seniors with depression and leg mobility problems, this study offers certain improvement strategies. For example, because seniors prefer active transportation modes, promoting an innovative three-wheeled electric auxiliary bicycle is suggested. Seniors who rode motorcycles and lived in suburban or rural areas had higher frequencies of trips for longer-distance activities. Motorcycles can help seniors maintain their mobility; however, motorcycles are a high-risk mode of travel, especially for

seniors. Motorcycle safety for seniors is an issue in Taiwan. In addition, there was an obvious preference by depressed elderly people for religious activities. Religious venues are good places to attract seniors for social activities and to communicate the benefits of an active lifestyle.

PDF Endnote

Factors associated with fear of falling among community-dwelling older adults in the Shih-Pai Study in Taiwan

Chang HT, Chen HC, Chou P. PLoS One 2016; 11(3): e0150612.

Affiliation: Institute of Public Health and Community Medicine Research Center, National Yang-Ming University, Taipei, Taiwan.

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Abstract

BACKGROUND: Fear of falling is an important risk indicator for adverse health related outcomes in older adults. However, factors associated with fear of falling among community-dwelling older adults are not well-explored.

OBJECTIVES: To explore the quality of life and associated factors in fear of falling among older people in the Shih-Pai area in Taiwan.

METHODS: This community-based survey recruited three thousand eight hundred and twenty-four older adults aged ≥ 65 years. The measurements included a structured questionnaire, including quality of life by using Short-Form 36, and information of fear of falling, fall history, demographics, medical conditions, insomnia, sleep quality, depression and subjective health through face-to-face interviews.

RESULTS: A total of 53.4% of participants reported a fear of falling. The rate of fear of falling was higher in female subjects. Subjects with fear of falling had lower Short Form-36 scores both for men and women. Falls in the previous year, older age, insomnia, depression and worse subjective health were correlates of fear of falling for both sexes. Male-specific associations with fear of falling were the accessibility of medical help in an emergency, diabetes mellitus and stroke. In parallel, cardiovascular diseases were a female-specific correlate for fear of falling.

CONCLUSIONS: Fear of falling is prevalent among community-dwelling older adults. It seems that there are gender differences in fear of falling with respect to the prevalence and associated factors in older adults. Gender differences should be considered when planning prevention and intervention strategies for fear of falling among older people.

PDF Endnote

Interventions to prevent or reduce the level of frailty in community-dwelling older adults: a protocol for a scoping review of the literature and international policies

Puts MT, Toubasi S, Atkinson E, Ayala AP, Andrew M, Ashe MC, Bergman H, Ploeg J, McGilton KS. *BMJ Open* 2016; 6(3): e010959.

Affiliation: Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, Toronto, Ontario, Canada Toronto Rehabilitation Institute, University Health Network, Toronto, Ontario, Canada.

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DOI 10.1136/bmjopen-2015-010959 **PMID** 26936911

Abstract

INTRODUCTION: With ageing comes increased vulnerability such that older adults' ability to recover from acute illnesses, fall-related injuries and other stresses related to the physical ageing processes declines. This increased vulnerability, also known as frailty, is common in older adults and associated with increased healthcare service use and adverse health outcomes. Currently, there is no overview of available interventions to prevent or reduce the level of frailty (as defined by study's authors) which will help healthcare providers in community settings caring for older adults. We will address this gap by reviewing interventions and international policies that are designed to prevent or reduce the level of frailty in community-dwelling older adults.

METHODS AND ANALYSIS: We will conduct a scoping review using the updated guidelines of Arksey and O'Malley to systematically search the peer-reviewed journal articles to identify interventions that aimed to prevent or reduce the level of frailty. We will search grey literature for international policies. The 6-stage scoping review model involves: (1) identifying the research question; (2) identifying relevant studies; (3) selecting studies; (4) charting the data; (5) collating, summarising and reporting the results and (6) consulting with key stakeholders. **ETHICS AND DISSEMINATION:** Our scoping review will use robust methodology to search for available interventions focused on preventing or reducing the level of frailty in community-dwelling older adults. We will consult with stakeholders to find out whether they find the frailty interventions/policies useful and to identify the barriers and facilitators to their implementation in Canada. We will disseminate our findings to relevant stakeholders at local, national and international levels by presenting at relevant meetings and publishing the findings. Our review will identify gaps in research and provide healthcare providers and policymakers with an overview of interventions that can be implemented to prevent or postpone frailty.

PDF Endnote

Mental health disorders in elderly people receiving home care: prevalence and correlates in the national U.S. population

Wang J, Kearney JA, Jia H, Shang J.

Nurs. Res. 2016; 65(2): 107-116.

Affiliation: Jinjiao Wang, PhD, RN, is Postdoctoral Research Fellow, School of Nursing, Vanderbilt University, Nashville, Tennessee. Joan A. Kearney, PhD, APRN, is Assistant Professor, School of Nursing, Yale University, New Haven, Connecticut. Haomiao Jia, PhD, is Associate Professor; and Jingjing Shang, PhD, RN, is Assistant Professor, School of Nursing, Columbia University, New York. (Copyright © 2016, Lippincott Williams and Wilkins)

DOI 10.1097/NNR.000000000000147 **PMID** 26938359

Abstract

BACKGROUND: Current evidence on mental health disorders (MHDs) in the U.S. elderly home care population is highly varied and limited to the local level.

AIM: The objective of this study was to examine the prevalence and characteristics of U.S. elders with MHDs on the national level.

METHODS: This is a primary analysis of secondary use data from a 5% random sample of the 2010 National Outcome and Assessment Information Set (OASIS) data spanning a 60-day home care session. MHDs included depression, anxiety, substance abuse, psychotic disorders, aggression, and socially inappropriate behaviors and were identified by diagnosis, symptoms, or mental health service order in the plan of care. Logistic regression was used to identify correlates of MHD.

RESULTS: The final analysis was conducted on records from 28,475 elderly patients with an average age of 79 (range 65-110). Patients were primarily female, White, Medicare beneficiaries, referred from short-stay acute hospitals, and living with others at home. Prevalence of MHDs was approximately 40%; depression (28.0%) and anxiety (18.9%) were common. Factors associated with MHDs were younger age, female, smokers, frail, living alone, referred from psychiatric hospitals, cognitively or sensory impaired, poorer health status, recent history of falls or multiple hospitalizations, and insufficient social support. Only about one third of patients identified with MHD received mental health services during the 60-day home care episode, including psychiatric nursing services and depression interventions.

DISCUSSION: MHDs are a national health concern in the older U.S. home care population and are common but largely undermanaged. Future research in the home care sector should be aimed at developing targeted MHD screening and interventional protocols and training the current workforce, as well as expanding the future workforce to improve psychiatric care for the homebound elderly.

PDF Endnote

Modifiable risk factors for new-onset slow gait in older adults

Verghese J, Wang C, Allali G, Holtzer R, Ayers E.

J. Am. Med. Dir. Assoc. 2016; ePub(ePub): ePub.

Affiliation: Department of Neurology, Albert Einstein College of Medicine, Bronx, NY.

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DOI 10.1016/j.jamda.2016.01.017 **PMID** 26923472

Abstract

OBJECTIVE: Despite the growing importance of slow gait as a universal screen of health, systematic investigation of risk factors for incident slow gait is lacking. Our objective was to identify potentially modifiable risk factors for incident slow gait.

DESIGN: Prospective cohort study.

SETTING: The Health and Retirement Study, a nationally representative US sample.

PARTICIPANTS: A total of 2306 individuals age 65 and older (56.5% women) from the 2008 wave with timed walks at baseline and 4 years later.

MEASUREMENTS: Incident slow gait (walking speed 1 SD below age and sex means) was the outcome. Fifteen potentially modifiable medical and lifestyle risk factors were examined as predictors.

RESULTS: Incident slow gait developed in 243 participants (11%) at 4 years. Physical inactivity (adjusted relative risk [aRR] 1.94), cognitive impairment (aRR 1.77), muscle weakness (aRR 1.48), pain (aRR 1.45), obesity (aRR 1.35), vision (aRR 1.36), and falls (aRR 1.32) predicted increased risk of developing incident slow gait. Together, these risk factors accounted for 77% (95% confidence interval 14-95) of the Population Attributable Risk for incident slow gait.

CONCLUSION: A limited set of potentially modifiable risk factors is associated with new-onset slow gait in older adults. These findings provide a foundation for developing clinical guidelines and preventive interventions for slow gait.

PDF Endnote

Nonbenzodiazepine sedative hypnotics and risk of fall-related injury

Tom SE, Wickwire EM, Park Y, Albrecht JS.

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Abstract

STUDY OBJECTIVES: The objective of this study was to test the hypothesis that use of zolpidem, eszopiclone, and zaleplon would be associated with increased risk of traumatic brain injury (TBI) and hip fracture.

METHODS: We conducted a case-crossover study on a 5% random sample of Medicare beneficiaries age 65 y or older hospitalized with either TBI (n = 15,031) or hip fracture (n = 37,833) during 2007-2009. Use of zolpidem, eszopiclone, or zaleplon during the 30-day period prior to injury hospitalization was compared to use during four control periods at 3, 6, 9, and 12 mo prior to injury. The primary outcome was hospitalization for TBI or hip fracture.

RESULTS: Zolpidem use during the month prior to injury was associated with increased risk of TBI (odds ratio [OR] 1.87; 95% confidence interval [CI] 1.56, 2.25); however, eszopiclone use during the same period was not associated with increased risk (OR 0.67; 95% CI 0.40, 1.13). Zolpidem use during the month prior to injury was associated with increased risk of hip fracture (OR 1.59; 95% CI 1.41, 1.79); however, eszopiclone use during the same period was not associated with increased risk (OR 1.12; 95% CI 0.83, 1.50). Analysis of zaleplon use in the month prior to injury was limited by low drug utilization but was not associated with increased risk of TBI (OR 0.85; 95% CI 0.21, 3.34) or hip fracture (OR 0.92; 95% CI 0.40, 2.13) in this study.

CONCLUSIONS: For the treatment of insomnia in older adults, eszopiclone may present a safer alternative to zolpidem, in terms of fall-related injuries.

PDF Endnote

Physical activity in older age: perspectives for healthy ageing and frailty

McPhee JS, French DP, Jackson D, Nazroo J, Pendleton N, Degens H.

Biogerontology 2016; ePub(ePub): ePub.

Affiliation: Lithuanian Sports University, Kaunas, Lithuania.

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DOI 10.1007/s10522-016-9641-0 **PMID** 26936444

Abstract

Regular physical activity helps to improve physical and mental functions as well as reverse some effects of chronic disease to keep older people mobile and independent. Despite the highly publicised benefits of physical activity, the overwhelming majority of older people in the United Kingdom do not meet the minimum physical activity levels needed to maintain health. The sedentary lifestyles that predominate in older age results in premature onset of ill health, disease and frailty. Local authorities have a responsibility to promote physical activity amongst older people, but knowing how to stimulate regular activity at the population-level is challenging. The physiological rationale for physical activity, risks of adverse events, societal and psychological factors are discussed with a view to inform public health initiatives for the relatively healthy older person as well as those with physical frailty. The evidence shows that regular physical activity is safe for healthy and for frail older people and the risks of developing major cardiovascular and metabolic

diseases, obesity, falls, cognitive impairments, osteoporosis and muscular weakness are decreased by regularly completing activities ranging from low intensity walking through to more vigorous sports and resistance exercises. Yet, participation in physical activities remains low amongst older adults, particularly those living in less affluent areas. Older people may be encouraged to increase their activities if influenced by clinicians, family or friends, keeping costs low and enjoyment high, facilitating group-based activities and raising self-efficacy for exercise.

PDF Endnote

Prospective study of trajectories of physical performance and mortality among community-dwelling older Japanese

Taniguchi Y, Fujiwara Y, Murayama H, Yokota I, Matsuo E, Seino S, Nofuji Y, Nishi M, Matsuyama Y, Shinkai S.

J. Gerontol. A Biol. Sci. Med. Sci. 2016; ePub(ePub): ePub.

Affiliation: Research Team for Social Participation and Community Health, Tokyo Metropolitan Institute of Gerontology, Japan.

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DOI 10.1093/gerona/glw029 **PMID** 26933162

Abstract

OBJECTIVE: Physical performance measures (PPMs) are good predictors of adverse health outcomes in later life. This prospective study used repeated measures analysis to examine sex-specific age trends in PPMs, identify potential PPM trajectory patterns, and determine whether PPM trajectory patterns were associated with all-cause mortality among older Japanese.

METHODS: Among 1,524 adults aged 65 years or older who participated in a baseline survey, 1,048 adults (mean [SD] age, 71.6 [5.4] years; women, 57.0%) were followed up at least once. The total number of observations was 4,747, and the average number of follow-up assessments was 4.5 during the period from 2002 through 2011. The PPMs studied were handgrip strength, usual gait speed, and one-leg standing time. We checked local registries to identify deaths from any cause; 89 (8.5%) participants died during follow-up.

RESULTS: All PPMs significantly decreased with advancing age, and handgrip strength and usual gait speed showed sex-specific age trends. We identified three distinct trajectory patterns (high, middle, and low trajectory groups) for each PPM in adults aged 65-90 years, and the trajectories for handgrip strength and usual gait speed showed parallel declines in men and women, respectively. After adjusting for important confounders, the trajectory groups for handgrip strength and one-leg standing time were independent predictors of all-cause mortality.

CONCLUSIONS: Regardless of baseline level, the PPMs tended to show similar age-related changes in later life. However, individuals in low PPM trajectory groups had a higher mortality risk, which highlights the importance of interventions that maintain or improve physical performance, even among older adults with low physical performance.

PDF Endnote

Psychotropic medications in older adults: a review

Curković M, Dodig-Curković K, Erić AP, Kralik K, Pivac N.

Psychiatr. Danub. 2016; 28(1): 13-24.

Affiliation: Department of Family Medicine, Josip Juraj Strossmayer University of Osijek, Medical School Osijek, Osijek, Croatia, mcurkov@yahoo.com.

(Copyright © 2016, Facultas Universitatis Studiorum Zagradiensis - Danube Symposium of Psychiatry)

DOI unavailable PMID 26938816

Abstract

BACKGROUND: Prevalence of prescribing psychotropic medications, particularly inappropriate prescription, is widespread in older adults, both in nursing home residents as well as community-dwelling older adults. This review describes prevalence and prevention of inappropriate prescribing and risk factors associated with psychotropic medications.

METHODS: MEDLINE and GOOGLE SCHOLAR data base were searched for the key words "older adults", "psychotropic drugs", "inappropriate prescribing", "nursing home residents", "community-dwelling older adults". The study was limited to the articles published in English in the period from 2007 to 2014. The list of references includes additional articles that were searched manually.

RESULTS: The utilization of different psychotropic medications is prevalent among older adults worldwide, regardless of whether they live in nursing homes or in the community. Among older adults, nursing home residents are the most vulnerable individuals for potentially inappropriate drug prescription. The most common potentially inappropriate prescribed medications in the elderly are benzodiazepines, particularly long-acting, antipsychotics and antidepressants, particularly SSRIs. All classes of listed medications have been associated with different adverse events, particularly falls and falls-related fractures and increased risk for mortality. Many different pharmacological and non-pharmacological interventions, such as monitoring polypharmacy, reviewing medications, spending more time in the institution by a physician, reducing the number of prescribers in the institution as well as greater involvement of geriatricians, general practitioners and pharmacists should be implemented to reduce this health issue.

CONCLUSION: The prevalence of prescribing psychotropic medications to older adults is high. Inappropriate prescribing of psychotropic drugs and polypharmacy are present in institutionalized and non-institutionalized older adults and can cause adverse health events, and can significantly reduce the quality of life of these vulnerable groups. Multidisciplinary approach is needed in addressing widespread problem of prevalence of psychotropic medications in older adults.

PDF Endnote

Relevance of nerve conduction velocity in the assessment of balance performance in older adults with diabetes mellitus

Wang TY, Chen SC, Peng CW, Kang CW, Chen YL, Chen CL, Chou YL, Lai CH.

Disabil. Rehabil. 2016; ePub(ePub): ePub.

Affiliation: Department of Physical Medicine and Rehabilitation, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan;

(Copyright © 2016, Informa - Taylor and Francis Group)

DOI 10.3109/09638288.2016.1146352 PMID 26937553

Abstract

PURPOSE: This study investigated the relationship between peripheral nerve conduction velocity (NCV) and balance performance in older adults with diabetes.

METHODS: Twenty older adults with diabetes were recruited to evaluate the NCV of their lower limbs and balance performance. The balance assessments comprised the timed up and go (TUG) test, Berg balance scale (BBS), unipedal stance test (UST), multidirectional reach test (MDRT), maximum step length (MSL) test and quiet standing with eyes open and closed. The relationship between NCV and balance performance was evaluated by Pearson's correlation coefficients, and the

balance performances of the diabetic patients with and without peripheral neuropathy were compared by using Mann-Whitney U tests.

RESULTS: The NCV in the lower limbs exhibited a moderate to strong correlation with most of the balance tests including the TUG ($r = -0.435$ to -0.520 , $p < 0.05$), BBS ($r = 0.406$ - 0.554 , $p < 0.05$), UST ($r = 0.409$ - 0.647 , $p < 0.05$) and MSL ($r = 0.399$ - 0.585 , $P < 0.05$). In addition, patients with diabetic peripheral neuropathy had a poorer TUG ($p < 0.05$), BBS ($p < 0.01$), UST ($p < 0.05$) and MSL performance ($p < 0.05$) compared with those without peripheral neuropathy ($p < 0.05$).

CONCLUSION: Our findings revealed that a decline in peripheral nerve conduction in the lower limb is not only an indication of nerve dysfunction, but may also be related to the impairment of balance performance in patients with diabetes. Implications for Rehabilitation Nerve conduction velocity in the lower limbs of diabetic older adults showed moderate to strong correlations with most of the results of balance tests, which are commonly used in clinics. Decline in nerve conduction velocity of the lower limbs may be related to the impairment of balance control in patients with diabetes. Diabetic older adults with peripheral neuropathy exhibited greater postural instability than those without peripheral neuropathy.

PDF Endnote

Risk factors for falls in older adults in a South African Urban Community

Kalula SZ, Ferreira M, Swingler GH, Badri M.

BMC Geriatr. 2016; 16(1): e51.

Affiliation: King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia.

motasimb@hotmail.com.

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Abstract

BACKGROUND: Studies on falls in older adults have mainly been conducted in high income countries. Scant, if any, information exists on risk factors for falls in the older population of sub-Saharan African countries.

METHODS: A cross-sectional survey and a 12-month follow-up study were conducted to determine risk factors for falls in a representative multi-ethnic sample of 837 randomly selected ambulant community-dwelling subjects aged ≥ 65 years in three suburbs of Cape Town, South Africa. Logistic regression models were fitted to determine the association between (1) falls and (2) recurrent falls occurring during follow-up and their potential socio-demographic, self-reported medical conditions and physical assessment predictors.

RESULTS: Prevalence rates of 26.4 % for falls and 11 % for recurrent falls at baseline and 21.9 % for falls and 6.3 % for recurrent falls during follow-up. In both prospective analyses of falls and recurrent falls, history of previous falls, dizziness/vertigo, ethnicity (white or mixed ancestry vs black African) were significant predictors. However, poor cognitive score was a significant predictor in the falls analysis, and marital status (unmarried vs married) and increased time to perform the timed Up and Go test in the recurrent fall analysis but not in both. Other than the timed Up and Go test in recurrent falls analysis, physical assessment test outcomes were not significant predictors of falls.

CONCLUSION: Our study provides simple criteria based on demographic characteristics, medical and physical assessments to identify older persons at increased risk of falls. History taking remains an important part of medical practice in the determination of a risk of falls in older patients. Physical

assessment using tools validated in developed country populations may not produce results needed to predict a risk of falls in a different setting.

PDF Endnote

Sarcopenia as a public health problem

Bruyère O, Beaudart C, Locquet M, Buckinx F, Petermans J, Reginster JY.

Eur. Geriatr. Med. 2016; ePub(ePub): ePub.

(Copyright © 2016, Elsevier Publishers)

DOI 10.1016/j.eurger.2015.12.002 **PMID** unavailable

Abstract

The importance of a health problem is based on its current and expected prevalence, its clinical and economic consequences, the social status of people affected by the problem and the availability of an effective treatment. In this paper, we review the main current literature on sarcopenia in order to assess whether this geriatric syndrome could be considered as a major public health problem. Our review highlights that based on its prevalence, its clinical consequences, the limitations of the current available treatments as well as on the fact that many frail patients are affected by this geriatric syndrome, sarcopenia should be considered as a health priority by all interested parties in order to reduce its burden.

PDF Endnote

Social support and older adult falls

Durbin L, Kharrazi RJ, Graber R, Mielenz TJ.

Inj. Epidemiol. 2016; 3: 4.

Affiliation: Department of Epidemiology, Columbia University Mailman School of Public Health, 722 West 168th St., Room 516, New York, NY 10032 USA.

(Copyright © 2016, The author(s), Publisher Springer Science+Business Media)

DOI 10.1186/s40621-016-0070-y **PMID** 26900545 **PMCID** PMC4744831

Abstract

BACKGROUND: Social support has been shown to be associated with various positive health outcomes among older adults but has not been previously examined in relation to falls, which are a serious health concern among older adults.

FINDINGS: This study (n = 1000) uses multivariable logistic regression to evaluate the relationship between social contact and perceived availability of social support and falls among older adults.

When adjusting for demographic and other covariates neither relationship was significant.

CONCLUSIONS: This study does not find evidence to suggest that social support could be a prevention measure for falls. Future research on this topic should focus on careful definition and precise measurement of the social support construct.

PDF Endnote

The geriatric depression scale and the timed up and go test predict fear of falling in community-dwelling elderly women with type 2 diabetes mellitus: a cross-sectional study

Moreira Bde S, Dos Anjos DM, Pereira DS, Sampaio RF, Pereira LS, Dias RC, Kirkwood RN.

BMC Geriatr. 2016; 16(1): e56.

Affiliation: Graduate Program in Rehabilitation Science, Universidade Federal de Minas Gerais, Minas Gerais, Belo Horizonte, Brazil. renata.kirkwood@gmail.com.

(Copyright © 2016, BioMed Central)

DOI 10.1186/s12877-016-0234-1 PMID 26940811

Abstract

BACKGROUND: Fear of falling is a common and potentially disabling problem among older adults. However, little is known about this condition in older adults with diabetes mellitus. The aims of this study were to investigate the impact of the fear of falling on clinical, functional and gait variables in older women with type 2 diabetes and to identify which variables could predict the fear of falling in this population.

METHODS: Ninety-nine community-dwelling older women with type 2 diabetes (aged 65 to 89 years) were stratified in two groups based on their Falls Efficacy Scale-International score. Participants with a score < 23 were assigned to the group without the fear of falling (n = 50) and those with a score ≥ 23 were assigned to the group with the fear of falling (n = 49). Clinical data included demographics, anthropometrics, number of diseases and medications, physical activity level, fall history, frailty level, cognition, depressive symptoms, fasting glucose level and disease duration. Functional measures included the Timed Up and Go test (TUG), the five times sit-to-stand test (5-STS) and handgrip strength. Gait parameters were obtained using the GAITRite® system.

RESULTS: Participants with a fear of falling were frailer and presented more depressive symptoms and worse performance on the TUG and 5-STS tests compared with those without a fear of falling. The group with the fear of falling also walked with a lower velocity, cadence and step length and increased step time and swing time variability. The multivariate regression analysis showed that the likelihood of having a fear of falling increased 1.34 times (OR 1.34, 95 % CI 1.11-1.61) for a one-point increase in the Geriatric Depression Scale (GDS-15) score and 1.36 times (OR 1.36, 95 % CI 1.07-1.73) for each second of increase in the TUG performance.

CONCLUSIONS: The fear of falling in community-dwelling older women with type 2 diabetes mellitus is associated with frailty, depressive symptoms and dynamic balance, functional mobility and gait deficits. Furthermore, both the GDS-15 and the TUG test predict a fear of falling in this population. Therefore, these instruments should be considered during the assessment of diabetic older women with fear of falling.

PDF Endnote

The neurocognitive basis for impaired dual-task performance in senior fallers

Nagamatsu LS, Hsu CL, Voss MW, Chan A, Bolandzadeh N, Handy TC, Graf P, Beattie BL, Liu-Ambrose T.

Front. Aging Neurosci. 2016; 8: 20.

Affiliation: Department of Physical Therapy, University of British Columbia Vancouver, BC, Canada; Djavad Mowafaghian Centre for Brain Health, University of British Columbia Vancouver, BC, Canada.

(Copyright © 2016, Frontiers Research Foundation)

DOI 10.3389/fnagi.2016.00020 PMID 26903862 PMCID PMC4746244

Abstract

Falls are a major health-care concern, and while dual-task performance is widely recognized as being impaired in those at-risk for falls, the underlying neurocognitive mechanisms remain unknown. A better understanding of the underlying mechanisms could lead to the refinement and development of behavioral, cognitive, or neuropharmacological interventions for falls prevention. Therefore, we conducted a cross-sectional study with community-dwelling older adults aged 70-80 years with a history of falls (i.e., two or more falls in the past 12 months) or no history of falls (i.e., zero falls in

the past 12 months); n = 28 per group. We compared functional activation during cognitive-based dual-task performance between fallers and non-fallers using functional magnetic resonance imaging (fMRI). Executive cognitive functioning was assessed via Stroop, Trail Making, and Digit Span. Mobility was assessed via the Timed Up and Go test (TUG). We found that non-fallers exhibited significantly greater functional activation compared with fallers during dual-task performance in key regions responsible for resolving dual-task interference, including precentral, postcentral, and lingual gyri. Further, we report slower reaction times during dual-task performance in fallers and significant correlations between level of functional activation and independent measures of executive cognitive functioning and mobility. Our study is the first neuroimaging study to examine dual-task performance in fallers, and supports the notion that fallers have reduced functional brain activation compared with non-fallers. Given that dual-task performance-and the underlying neural concomitants-appears to be malleable with relevant training, our study serves as a launching point for promising strategies to reduce falls in the future.

PDF Endnote

Therapy: New findings on vitamin D3 supplementation and falls - when more is perhaps not better

Sanders KM, Seibel MJ.

Nat. Rev. Endocrinol. 2016; ePub(ePub): ePub.

Affiliation: ANZAC Research Institute, The University of Sydney at Concord Campus, Hospital Road, Concord, NSW 2139, Australia.

(Copyright © 2016, Nature Publishing Group)

DOI 10.1038/nrendo.2016.29 **PMID** 26915528

Abstract [Abstract unavailable]

PDF Endnote

Timing paradox of stepping and falls in ageing: not so quick and quick(er) on the trigger

Rogers MW, Mille ML.

J. Physiol. 2016; ePub(ePub): ePub.

Affiliation: Department of Physical Therapy and Human Movement Sciences, Northwestern University Medical School, Chicago, IL, 60611, United States.

(Copyright © 2016, The Physiological Society, Publisher John Wiley and Sons)

DOI 10.1113/JP271167 **PMID** 26915664

Abstract

Physiological and degenerative changes affecting human standing balance are major contributors to falls with ageing. During imbalance, stepping is a powerful protective action for preserving balance that may be voluntarily initiated in recognition of a balance threat, or be induced by an externally imposed mechanical or sensory perturbation. Paradoxically, with ageing and falls, initiation slowing of voluntary stepping is observed together with perturbation-induced steps that are triggered as fast as or faster than for younger adults. While age-associated changes in sensorimotor conduction, central neuronal processing and cognitive functions are linked to delayed voluntary stepping, alterations in the coupling of posture and locomotion may also prolong step triggering. It is less clear, however, how these factors may explain the accelerated triggering of induced stepping. We present a conceptual model that addresses this issue. For voluntary stepping, a disruption in the normal coupling between posture and locomotion may underlie step-triggering delays through suppression of the locomotion network based on an estimation of the evolving mechanical state

conditions for stability. During induced stepping, accelerated step initiation may represent an event-triggering process whereby stepping is released according to the occurrence of a perturbation rather than to the specific sensorimotor information reflecting the evolving instability. In this case, errors in the parametric control of induced stepping and its effectiveness in stabilizing balance would likely occur. We further suggest that there is a residual adaptive capacity with ageing that could be exploited to improve paradoxical triggering and other changes in protective stepping to impact fall risk. This article is protected by copyright. All rights reserved.

PDF Endnote

Unexpected perturbations training improves balance control and voluntary stepping times in older adults - a double blind randomized control trial

Kurz I, Gimmon Y, Shapiro A, Debi R, Snir Y, Melzer I.

BMC Geriatr. 2016; 16(1): e58.

Affiliation: Schwartz Movement Analysis & Rehabilitation Laboratory, Department of Physical Therapy, Recanati School for Community Health Professions, Faculty of Health Sciences, Ben-Gurion University of the Negev, P.O.B. 653, Beer-Sheva, 84105, Israel. itzikm@bgu.ac.il.

(Copyright © 2016, BioMed Central)

DOI 10.1186/s12877-016-0223-4 **PMID** 26944706

Abstract

BACKGROUND: Falls are common among elderly, most of them occur while slipping or tripping during walking. We aimed to explore whether a training program that incorporates unexpected loss of balance during walking able to improve risk factors for falls.

METHODS: In a double-blind randomized controlled trial 53 community dwelling older adults (age 80.1 ± 5.6 years), were recruited and randomly allocated to an intervention group ($n = 27$) or a control group ($n = 26$). The intervention group received 24 training sessions over 3 months that included unexpected perturbation of balance exercises during treadmill walking. The control group performed treadmill walking with no perturbations. The primary outcome measures were the voluntary step execution times, traditional postural sway parameters and Stabilogram-Diffusion Analysis. The secondary outcome measures were the fall efficacy Scale (FES), self-reported late life function (LLFDI), and Performance-Oriented Mobility Assessment (POMA).

RESULTS: Compared to control, participation in intervention program that includes unexpected loss of balance during walking led to faster Voluntary Step Execution Times under single ($p = 0.002$; effect size [ES] = 0.75) and dual task ($p = 0.003$; [ES] = 0.89) conditions; intervention group subjects showed improvement in Short-term Effective diffusion coefficients in the mediolateral direction of the Stabilogram-Diffusion Analysis under eyes closed conditions ($p = 0.012$, [ES] = 0.92). Compared to control there were no significant changes in FES, LLFDI, and POMA.

CONCLUSIONS: An intervention program that includes unexpected loss of balance during walking can improve voluntary stepping times and balance control, both previously reported as risk factors for falls. This however, did not transferred to a change self-reported function and FES. TRIAL

REGISTRATION: ClinicalTrials.gov Registration number: NCT01439451.

PDF Endnote

Development of an implementation plan for the 6-PACK falls prevention programme as part of a randomised controlled trial: protocol for a series of preimplementation studies

Barker AL, Morello RT, Ayton DR, Hill KD, Landgren FS, Brand CA.

Inj. Prev. 2016; ePub(ePub): ePub.

Affiliation: Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University, Melbourne, Australia.

(Copyright © 2016, BMJ Publishing Group)

DOI 10.1136/injuryprev-2015-041915 **PMID** 26932835

Abstract

BACKGROUND: Inhospital falls cause morbidity, staff burden and increased healthcare costs. It is unclear if the persistent problem of inhospital falls is due to the use of ineffective interventions or their suboptimal implementation. The 6-PACK programme appears to reduce fall injuries and a randomised controlled trial (RCT) was undertaken to confirm effects. This paper describes the protocol for the preimplementation studies that aimed to identify moderators of the effective use of the 6-PACK programme to inform the development of an implementation plan to be applied in the RCT.

METHODS: The 6-PACK project included five preimplementation studies: (1) a profile of safety climate; (2) review of current falls prevention practice; (3) epidemiology of inhospital falls; (4) acceptability of the 6-PACK programme; and (5) barriers and enablers to implementation of the 6-PACK programme. The Theoretical Domain Framework that includes 12 behaviour change domains informed the design of these studies that involved 540 staff and 8877 patients from 24 wards from six Australian hospitals. Qualitative and quantitative methods were applied with data collected via: structured bedside observation; daily nurse unit manager verbal report of falls; audit of medical records, incident reporting and hospital administrative data; surveys of ward nurses; focus groups with ward nurses; and key informant interviews with senior staff.

DISCUSSION: Information on contextual, system, intervention, patient and provider level factors is critical to the development of an implementation plan. Information gained from these studies was used to develop a plan applied in the RCT that addressed the barriers and harnessed enablers. **TRIAL REGISTRATION NUMBER:** The RCT is registered with the Australian New Zealand Clinical Trials Registry, number ACTRN12611000332921.

PDF Endnote

PDF Endnote

First fall-related injuries requiring hospitalization increase the risk of recurrent injurious falls: a nationwide cohort study in Taiwan

Lam C, Kang JH, Lin HY, Huang HC, Wu CC, Chen PL.

PLoS One 2016; 11(2): e0149887.

Affiliation: Graduate Institute of Injury Prevention and Control, College of Public Health and Nutrition, Taipei Medical University, Taipei, Taiwan.

(Copyright © 2016, Public Library of Science)

DOI 10.1371/journal.pone.0149887 **PMID** 26900917

Abstract

OBJECTIVES: Recurrent falls not only have risk factors different from those of single falls but also have less favorable outcomes. The aim of our study was to determine the association between the injury characteristics of a first fall and the likelihood of recurrent injurious falls in a cohort of hospitalized patients.

METHODS: We designed a nationwide retrospective cohort study and selected hospitalized patients who had injurious falls between 2001 and 2010. Cox proportional hazards models were used to estimate the hazard ratios (HRs) of recurrent injurious falls requiring hospitalization in the following year on the basis of the patients' demographic characteristics, comorbidities, and the characteristics of injuries from the first injurious fall requiring hospitalization.

RESULTS: Among the 504 512 patients hospitalized for injurious falls, 19 442 experienced recurrent injurious falls requiring hospitalization. The 1-year incidence of recurrent injurious falls requiring hospitalization was 3.85%. The incidence density was the highest within the 3-month period after the first injurious fall. The risk of recurrent injurious falls among patients aged 40 to 64, 65 to 74, and ≥ 75 years increased progressively (HR: 2.11, 95% confidence interval [CI]: 1.90-2.34; HR: 2.80, 95% CI: 2.51-3.11; and HR: 3.80, 95% CI: 3.42-4.23, respectively). The length of hospitalization (LOH) ≥ 15 or ≥ 31 days (HR: 1.39, 95% CI: 1.30-1.48; and HR: 1.59, 95% CI: 1.43-1.77, respectively) and injury to the head (HR: 1.59, 95% CI: 1.53-1.65) or spine (HR: 1.66, 95% CI: 1.59-1.74) were also found to be major risk factors.

CONCLUSIONS: Our findings show that the LOH and head and spine injuries are associated with an increased risk of recurrent injurious falls leading to hospitalization. The risk of recurrent injurious falls requiring hospitalization increased significantly among adults older than 40 years. We suggest further research on the effects of injury characteristics associated with the first injurious fall requiring hospitalization and resultant anatomical damages on the risk of recurrent injurious falls requiring hospitalization. High-risk patients should receive tailored rehabilitation addressing their respective injuries within 3 months after hospital discharge.

PDF Endnote

Fractal fluctuations in human walking: comparison between auditory and visually guided stepping Terrier P.

Ann. Biomed. Eng. 2016; ePub(ePub): ePub.

Affiliation: Clinique romande de réadaptation SUVAcare, Av. Gd-Champsec 90, 1951, Sion, Switzerland. Philippe.Terrier@crr-suva.ch.

(Copyright © 2016, Springer Science+Business Media)

DOI 10.1007/s10439-016-1573-y **PMID** 26903091

Abstract

In human locomotion, sensorimotor synchronization of gait consists of the coordination of stepping with rhythmic auditory cues (auditory cueing, AC). AC changes the long-range correlations among consecutive strides (fractal dynamics) into anti-correlations. Visual cueing (VC) is the alignment of step lengths with marks on the floor. The effects of VC on the fluctuation structure of walking have not been investigated. Therefore, the objective was to compare the effects of AC and VC on the fluctuation pattern of basic spatiotemporal gait parameters. Thirty-six healthy individuals walked 3×500 strides on an instrumented treadmill with augmented reality capabilities. The conditions were no cueing (NC), AC, and VC. AC included an isochronous metronome. For VC, projected stepping stones were synchronized with the treadmill speed. Detrended fluctuation analysis assessed the correlation structure. The coefficient of variation (CV) was also assessed. The results showed that AC and VC similarly induced a strong anti-correlated pattern in the gait parameters. The CVs were similar between the NC and AC conditions but substantially higher in the VC condition. AC

and VC probably mobilize similar motor control pathways and can be used alternatively in gait rehabilitation. However, the increased gait variability induced by VC should be considered.

PDF Endnote

Gait parameter control timing with dynamic manual contact or visual cues

Rabin E, Shi P, Werner WG.

J. Neurophysiol. 2016; ePub(ePub): jn.00670.2015.

Affiliation: New York Institute of Technology.

(Copyright © 2016, American Physiological Society)

DOI 10.1152/jn.00670.2015 **PMID** 26936979

Abstract

We investigated the timing of gait parameter changes (stride length, peak toe velocity, and double-, single-support and complete step duration) to control gait speed. Eleven healthy participants adjusted their gait speed on a treadmill to maintain a constant distance between them and a fore-aft oscillating cue (a place on a conveyor belt surface). The experimental design balanced conditions of: cue modality (vision: eyes-open, manual contact: eyes-closed while touching the cue); treadmill speed (0.2, 0.4, 0.85, 1.3m/s); and cue motion (none, ± 10 cm at 0.09Hz, 0.11Hz and 0.18 Hz). Correlation analyses revealed different gait parameters were controlled with various temporal relationships to the cue speed: step length anticipated its most-correlated cue velocity during the subsequent double-support; peak toe velocity nearly coincided with its most-correlated cue velocity during single-support; and the toe-off concluding step- and double-support durations followed cue velocity. Cue-tracking accuracy and cue velocity correlations with timing parameters were higher with the manual contact cue than visual cue. The cue/ gait timing relationships generalized across cue modalities, albeit with greater delays of step-cycle events relative to manual contact cue velocity. We conclude: Individual kinematic parameters of gait are controlled to achieve a desired velocity at different specific times during the gait cycle. The overall timing pattern of instantaneous cue velocities associated with different gait parameters is conserved across cues. This timing pattern may be temporally shifted to optimize control. Different cue/ gait parameter latencies in our non-adaptation paradigm provides general-case evidence of the independent control of gait parameters previously demonstrated in gait adaptation paradigms.

PDF Endnote

Influence of visual feedback on dynamic balance control in chronic stroke survivors

Walker ER, Hynstrom AS, Schmit BD.

J. Biomech. 2016; ePub(ePub): ePub.

Affiliation: Department of Biomedical Engineering, Marquette University, PO Box 1881, Milwaukee, WI 53201-1881, USA. Electronic address: brian.schmit@marquette.edu.

(Copyright © 2016, Elsevier Publishing)

DOI 10.1016/j.jbiomech.2016.01.028 **PMID** 26916509

Abstract

Chronic stroke survivors have an increased incidence of falls during walking, suggesting changes in dynamic balance control post-stroke. Despite this increased incidence of falls during walking, balance control is often studied only in standing. The purpose of this study was to quantify deficits in dynamic balance control during walking, and to evaluate the influence of visual feedback on this control in stroke survivors. Ten individuals with chronic stroke, and ten neurologically intact

individuals participated in this study. Walking performance was assessed while participants walked on an instrumented split-belt treadmill with different types of visual feedback. Dynamic balance control was quantified using both the extent of center of mass (COM) movement in the frontal plane over a gait cycle (COM sway), and base of support (step width). Stroke survivors walked with larger COM sway and wider step widths compared to controls. Despite these baseline differences, both groups walked with a similar ratio of step width to COM sway (SW/COM). Providing a stationary target with a laser reference of body movement reduced COM sway only in the stroke group, indicating that visual feedback of sway alters dynamic balance control post-stroke. These results demonstrate that stroke survivors attempt to maintain a similar ratio of step width to COM movement, and visual cues can be used to help control COM movement during walking post-stroke.

PDF Endnote

Recurrent falls in Parkinson's disease after one year of follow-up: a nested case-control study

Gazibara T, Tepavcevic DK, Svetel M, Tomić A, Stankovic I, Kostić VS, Pekmezović T.

Arch. Gerontol. Geriatr. 2016; 65: 17-24.

Affiliation: Institute of Epidemiology, Faculty of Medicine, University of Belgrade, Serbia. Electronic address: pekmezovic@sezampro.rs.

(Copyright © 2016, Elsevier Publishing)

DOI 10.1016/j.archger.2016.02.006 **PMID** 26921677

Abstract

The aims of this study were to compare clinical and fall characteristics of single and recurrent falls among persons with PD and to evaluate factors associated with recurrent falls. A total of 120 consecutive persons with PD, who denied having fallen in the past 6 months, were recruited. Occurrence of falling was registered during one year. Each person was given a "fall diary" with the aim at writing characteristics of the fall and contacted by telephone each month. Over one year of follow-up 42 persons with PD (35.0%) reported falling. Of 42 persons, 19 (45.2%) went on to become single and 23 (54.8%) went on to become recurrent fallers. Indoor falls were more common among single fallers, whilst outdoor falls were more common among recurrent fallers ($p=0.017$). Slipping and freezing of gait was more common among single fallers ($p=0.035$ and $p=0.024$, respectively). Lower extremity weakness was more frequent among recurrent fallers ($p=0.023$). The most common injury both among single and recurrent fallers was the soft-tissue contusion. The only factor associated with recurrent falling among persons with PD, who did not fall in past 6 months before the start of follow-up, was worse motor performance as measured by the UPDRS III score (odds ratio [OR]=1.06, 95% confidence interval [CI] 1.01-1.11, $p=0.022$). These results could be used in selection of persons with PD to enroll in fall prevention programs.

PDF Endnote

Risk of falling for people with venous leg ulcers: a literature review

Humphreys C, Moffatt C, Hood V.

Br. J. Community Nurs. 2016; 21(Suppl 3): S34-S38.

Affiliation: Lecturer, Faculty of Medicine and Health Sciences, University of Nottingham, England.

(Copyright © 2016, Mark Allen Publishing)

DOI 10.12968/bjcn.2016.21.Sup3.S34 **PMID** 26940732

Abstract

INTRODUCTION: Little is known about the risk of falling for people with venous leg ulcers (VLUs), and this subject has not been considered in UK populations. Many problems associated with living with VLUs are also known risk factors for sustaining a fall. This literature review considered the question: 'Do community-dwelling older adults with VLUs have different outcomes in physical function measures used to assess the risk of falling compared with those without VLUs?' **METHOD:** A review of quantitative literature relating to measures of physical function in people with and without VLUs was undertaken, the development of which was guided by the PRISMA guidelines. **FINDINGS:** People with VLUs have poorer scores in measures of physical function than in people without. Reliability of studies included in the review was hampered by small sample sizes and threats to internal validity and generalisability. **CONCLUSIONS:** People with VLUs may be at a greater risk of falling owing to limitations in balance and mobility. Improving physical function may result in ulcer healing and better quality of life. Reducing falls risk may also lead to improved patient safety and enhanced care outcomes. Further research is needed to better understand the problem.

Suitability of smartphone inertial sensors for real-time biofeedback applications

Kos A, Tomažič S, Umek A.

Sensors (Basel) 2016; 16(3): e16030301.

Affiliation: Faculty of Electrical Engineering, University of Ljubljana, Ljubljana 1000, Slovenia.

anton.umek@fe.uni-lj.si.

(Copyright © 2016, Multidisciplinary Digital Publishing Institute)

DOI 10.3390/s16030301 **PMID** 26927125

Abstract

This article studies the suitability of smartphones with built-in inertial sensors for biofeedback applications. Biofeedback systems use various sensors to measure body functions and parameters. These sensor data are analyzed, and the results are communicated back to the user, who then tries to act on the feedback signals. Smartphone inertial sensors can be used to capture body movements in biomechanical biofeedback systems. These sensors exhibit various inaccuracies that induce significant angular and positional errors. We studied deterministic and random errors of smartphone accelerometers and gyroscopes, primarily focusing on their biases. Based on extensive measurements, we determined accelerometer and gyroscope noise models and bias variation ranges. Then, we compiled a table of predicted positional and angular errors under various biofeedback system operation conditions. We suggest several bias compensation options that are suitable for various examples of use in real-time biofeedback applications. Measurements within the developed experimental biofeedback application show that under certain conditions, even uncompensated sensors can be used for real-time biofeedback. For general use, especially for more demanding biofeedback applications, sensor biases should be compensated. We are convinced that real-time biofeedback systems based on smartphone inertial sensors are applicable to many similar examples in sports, healthcare, and other areas.

PDF Endnote

Timing paradox of stepping and falls in ageing: not so quick and quick(er) on the trigger

Rogers MW, Mille ML.

J. Physiol. 2016; ePub(ePub): ePub.

Affiliation: Department of Physical Therapy and Human Movement Sciences, Northwestern University Medical School, Chicago, IL, 60611, United States.

(Copyright © 2016, The Physiological Society, Publisher John Wiley and Sons)

DOI 10.1113/JP271167 **PMID** 26915664

Abstract

Physiological and degenerative changes affecting human standing balance are major contributors to falls with ageing. During imbalance, stepping is a powerful protective action for preserving balance that may be voluntarily initiated in recognition of a balance threat, or be induced by an externally imposed mechanical or sensory perturbation. Paradoxically, with ageing and falls, initiation slowing of voluntary stepping is observed together with perturbation-induced steps that are triggered as fast as or faster than for younger adults. While age-associated changes in sensorimotor conduction, central neuronal processing and cognitive functions are linked to delayed voluntary stepping, alterations in the coupling of posture and locomotion may also prolong step triggering. It is less clear, however, how these factors may explain the accelerated triggering of induced stepping. We present a conceptual model that addresses this issue. For voluntary stepping, a disruption in the normal coupling between posture and locomotion may underlie step-triggering delays through suppression of the locomotion network based on an estimation of the evolving mechanical state conditions for stability. During induced stepping, accelerated step initiation may represent an event-triggering process whereby stepping is released according to the occurrence of a perturbation rather than to the specific sensorimotor information reflecting the evolving instability. In this case, errors in the parametric control of induced stepping and its effectiveness in stabilizing balance would likely occur. We further suggest that there is a residual adaptive capacity with ageing that could be exploited to improve paradoxical triggering and other changes in protective stepping to impact fall risk. This article is protected by copyright. All rights reserved.

PDF Endnote

Torque and muscle activation impairment along with insulin resistance are associated with falls in women with fibromyalgia

GÓes SM, Stefanello JM, Homann D, Lodovico A, Hublely-Kozey CL, Rodacki AL.

J. Strength Cond. Res. 2016; ePub(ePub): ePub.

Affiliation: Dalhousie University, Halifax, Nova Scotia, Canada. Faculty of Health Professions / Dynamics of Human Motion Laboratory. E-mail: su.goes@gmail.com **Copyright** (Copyright © 2016, National Strength and Conditioning Association)

DOI 10.1519/JSC.0000000000001395 **PMID** 26937773

Abstract

Fibromyalgia is a chronic pain condition associated with reduced muscle strength, which can lead to functional incapacity and higher risk of falls.

PURPOSE: The study purpose was to compare maximal ankle joint torque, muscle activation and metabolic changes between women with and without fibromyalgia. Additionally, the relationship between those aspects and retrospectively reported falls in women with fibromyalgia were determined.

METHODS: Twenty-nine middle-aged women with fibromyalgia and 30 controls were recruited. Fall history, pain intensity and threshold were assessed. Plasma glucose levels and insulin resistance were determined. Peak torque and rate of torque development were calculated and muscle activation was assessed from maximum isometric voluntary ankle dorsiflexion and plantar flexion contractions. In addition, voluntary muscle activation failure of the anterior tibialis muscle during maximal dorsiflexion was calculated.

RESULTS: When compared to controls, women with fibromyalgia reported higher number of retrospectively reported falls, exhibited higher insulin resistance, showed reduced plantar flexion and dorsiflexion rate of torque development, had lower plantar flexion peak torque, and demonstrate more antagonist co-activation and higher muscle activation failure ($p < 0.05$). Higher muscle activation failure was explained by glucose level and pain intensity ($R_{adj} = 0.28$; $p < 0.05$). Reduced plantar flexion and dorsiflexion peak torque explained 80% of retrospectively reported falls variance; also, high antagonist co-activation ($OR = 1.6$; $p < 0.05$) and high insulin resistance ($OR = 1.8$; $p < 0.05$) increased the chance of falls in the fibromyalgia group.

CONCLUSION: A combination of metabolic factors and muscle function increased the odds of retrospectively reporting a fall in fibromyalgia. Both aspects may be considered in interventions designed for reducing falls in this population.

PDF Endnote